

Fidelity to AUDACITY
Evolution of the NASA/JPL
Open Source Mars Rover
James H Phelan
USAi Labs
2019.10.19 - ?

See initial PowerPoint presentation: [Fidelity to Audacity.pptx](#)

See Roberto's suggestions for improvement: [Roberto improved JPL Mars Rover.docx](#)

See original [Mars Rover Experience.wpd](#)



www.pololu.com

Motors

current motors: <https://www.pololu.com/product/4888>

Price	\$34.95
voltage	12 V brushed DC LOW POWER
no-load performance	31 rpm, 100 mA
stall torque	1.27 N·m 13 kg·cm 180 oz·in
stall current	1.1 A
Gear ratio	172:1
Size:	25D x 68L mm1
Weight:	107 g 3.8 oz
Shaft diameter:	4 mm

Problems:

lack power

couplings slip

wheels supported on drive shaft - poor design

Given 6" wheels (below) 180 oz-in / 3" = 60 oz of force

6"dia x pi (3.14) = 18.85" circ x 31 rpm = 584"/min / 12"/ft = 48.7 ft/min / 60 sec/min = 0.81 ft/sec = 0.55 mph

NASA/JPL OSR Corner Motor upgrade:

Project Ref Code Quantity to Buy	Model/Config Price Each	Site Price Total	Link	Sold in Packs of	Total Used
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Gear Motor (Corner Motor) E46 45 rpm HD Premium Planetary Gear Motor,
NO relative encoder ServoCity
<https://www.servocity.com/45-rpm-hd-premium-planetary-gear-motor> 1 4
 4 \$39.99 \$159.96

Motor Mount S9 ServoCity
<https://www.servocity.com/hd-premium-planetary-motor-mount-face-tapped> 1
 4 4 \$4.99 \$19.96

Stainless Steel D-Shaft S15 634070 ServoCity
<https://www.servocity.com/0-250-1-4-stainless-steel-d-shafting#371=276> 1 4
 4 \$1.79 \$7.16

0.25" to 6mm Clamping Shaft Coupler S38 625100 ServoCity
<https://www.servocity.com/heavy-duty-clamping-shaft-couplers> 1 4 4
 \$7.99 \$31.96

\$219.04

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\AUDACITY Corner Upgrade.pdf

ORDERED 2019.12.19 (4)

ARRIVED 2019.12.21





FTC Legal



FTC Legal

REV Core Hex motor: <http://www.revrobotics.com/rev-41-1300/>

The Core Hex Motor is a FTC legal motor that features a 90 degree orientation and a female output shaft for maximum flexibility and ease of use. Insert any of the REV standard 5mm hex shafts into or through the Core Hex motor to create custom length motor output shafts. The Core Hex motor has a built in magnetic quadrature encoder which is compatible with 5V or 3.3V logic level devices including the Expansion Hub.

SPECIFICATIONS

Brushed DC motor

Price	\$21
Voltage	12V
Output Shaft:	5mm Female Hex
Weight: 7 oz	198.4 gms
Free Speed:	125 rpm
Stall Torque:	3.2 N-m 32.6 kg-cm 453.16 oz-in
Stall Current:	4.4 A
Gear Ratio:	72:1

Encoder Counts per Revolution

At the motor - 4 counts/revolution

At the output - 288 counts/revolution

$$6" \times \pi (3.14) = 18.85" \text{circ} \times 125 \text{ rpm} = 2357 \text{ "/min} / 12"/\text{ft} = 196.3 \text{ ft/min} / 60 \text{ sec/min} = 3.27 \text{ ft/sec} = 2.23 \text{ mph}$$

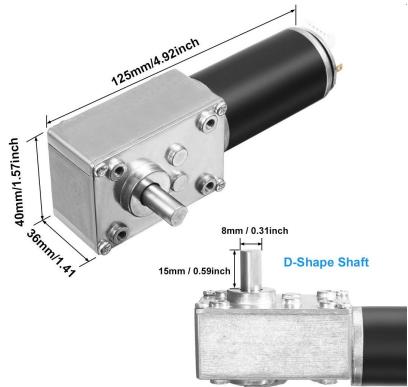
See the OSR TapaTalk about these motors:

https://www.tapatalk.com/groups/jpl_opensource_rover/motor-troubles-t127-s30.html

See BoM:

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\AUDACITY Drive Train.pdf

EVENTUALLY ABANDONED THESE MOTORS IN FAVOR OF UPGRADED OSR MOTORS AND THE FACT THAT THESE ARE NOISY!



uxcell DC 12V 74rpm 6.4Kg.cm Self-Locking Worm Gear Motor with Encoder and Cable, High Torque Speed Reduction Motor
https://www.amazon.com/dp/B0787YFW4H/?coliid=I132IME6SW38TK&colid=1SOOJFFS1N8UC&psc=1&ref_=lv_ov_lig_dp_it

Specification:

Voltage: DC 12V

No-Load Speed: 74rpm

Reduction Ratio: 1:54

Torque: 6.4Kg.cm

Error: ±10%

Wire Length: 20cm / 7.87inch

Output Shaft Diameter: 8mm / 0.31inch D-type

Output Shaft Length: 15mm / 0.59inch

Total Size(not include shaft):40*36*125mm / 1.57*1.41*4.92inch



Hub Motors

https://www.google.com/search?q=hub+motor&safe=off&sxsrf=ACYBGNSWeN65TI0S2XboXVSCtVXr8kQq5Q:1574044852080&source=lnms&tbs=shop&sa=X&ved=0ahUKEwit-JKC3vLIAhUSSa0KHRk0AEUQ_AUIEigB&biw=1600&bih=757

\$50-200

48V (Most. Some 36V)

High torque esp at low speed

High efficiency



Wheels

current wheels:

<https://www.dollarhobbyz.com/collections/all/products/traxxas-2-talon-tires-gemini-black-chrome-wheels-5374x>

Product Description

These are Talon Tires mounted on Gemini Black Chrome Wheels.
Use with 17mm Splined Wheel Hubs and Nuts, TRAC6333.

Features:

Rubber construction

Talon tread

Black chrome nylon wheels

5-spoke design

Includes:

Two Talon Tires premounted on Gemini Black Chrome Wheels

Requires:

Installation on the vehicle

Specs:

Outer Diameter: 152mm (6")

Width: 85.75mm (3.4")

Hex: 17mm Splined

A semi-useful link about casters:

<https://www.douglasequipment.com/casters-1/how-wheel-size-affects-a-casters-performance-on-different-surfaces/>

This hex wheel adapter (or something like it) may be handy (shown above):

<https://www.amazon.com/Traxxas-5353R-Red-Anodized-Aluminum-Splined/dp/B0090THS7K/?tag=tapatalk02-20>

Torque

A useful link re the necessary torque of an engine is:

https://www.researchgate.net/post/How_can_we_calculate_the_required_torque_to_move_a_massive_object_by_means_of_gear_assembly2

LIGHTING

Head lights all 12V:

https://www.amazon.com/dp/B00SOK4702/?coliid=I7JV4DSXGMCV1&colid=264HS86TQASNY&ref_=lv_ov_lig_dp_it&th=1

HOTSYSTEM Eagle Eye \$14.99/12=\$1.25 ea 120-240 lm 12mm 9W/3W??

https://www.amazon.com/dp/B071RFYB3D/?coliid=I3FOWHXVT6MCQU&colid=264HS86TQASNY&ref_=lv_ov_lig_dp_it&th=1

AUTOMONARCH Eagle Eye DRL Strip \$12.99/10 = 1.30 ea ? lm "bright!" M10

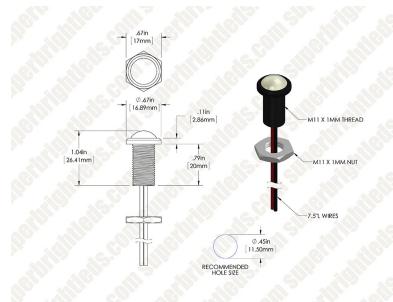
<https://www.superbrightleds.com/moreinfo/led-accent-lighting/bolt-beam-12mm-led-light/1494/> \$2.95 ea 85 lm 12mm 2x cost, ½ brightness

Tail lights:

See above but select different color

Turn signals:

See above but select different color



MEASURE



HOTSYSTEM



Projector Lens Wide Angle

Aluminum frame

1. For DC 12 Volts
2. Package Content: 10 PCS
3. Color Temperature: 6000K White
4. Luminance: 110-120LM
5. LED Size: 23mm(0.9")x24mm(0.94")
6. LED Type: High Power SMD LED Chips
7. Luminous flux: about 120-240 lm
8. Polarity: Polarity Free Design



DISPLAY

There's the official Raspberry Pi display:

<https://www.raspberrypi.org/blog/the-eagerly-awaited-raspberry-pi-display/>

available through CanaKit **\$74.95**: (supposedly MicroCenter too, but link broken)

<https://www.canakit.com/raspberry-pi-lcd-display-touchscreen.html?cid=usd&src=raspberrypi>



Then there's --

Adafruit 7" HDMI Touch Screen **\$89.95**:

<https://www.adafruit.com/product/2407>

Configure for Raspberry Pi here:

<https://learn.adafruit.com/adafruit-5-800x480-tft-hdmi-monitor-touchscreen-backpack/raspberry-pi-config>

Only shows part of the screen w/ no scroll bars.

Solution: Right click screen / Desktop Preferences / Defaults tab / **For small screens**:

Set Defaults / OK. You will need to reset Desktop / Picture / Downloads / Round Robotics Open Source Rover WHITE.png (assuming prev installed). Layout / Fit image onto screen.

Touch off target.

Solution: Download AR1100 Calibration software from Adafruit mirror site.

See left panel / Downloads, Software / click on "If Microchip doesn't have the download configuration software available for some reason, we have a mirror here"

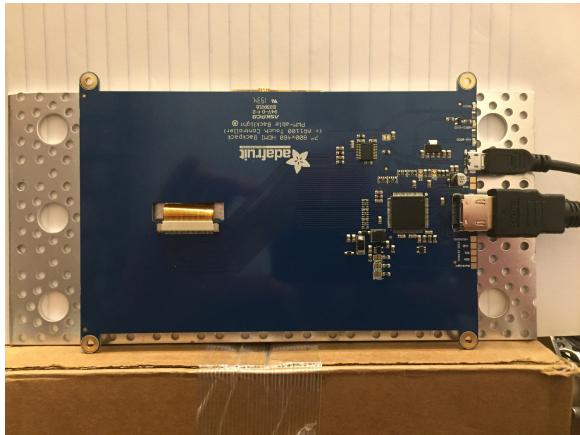
Also see left panel / HELP! link if you loose the touch mouse.

3D printed case for 7" HDMI display:
<https://www.thingiverse.com/thing:1882176>



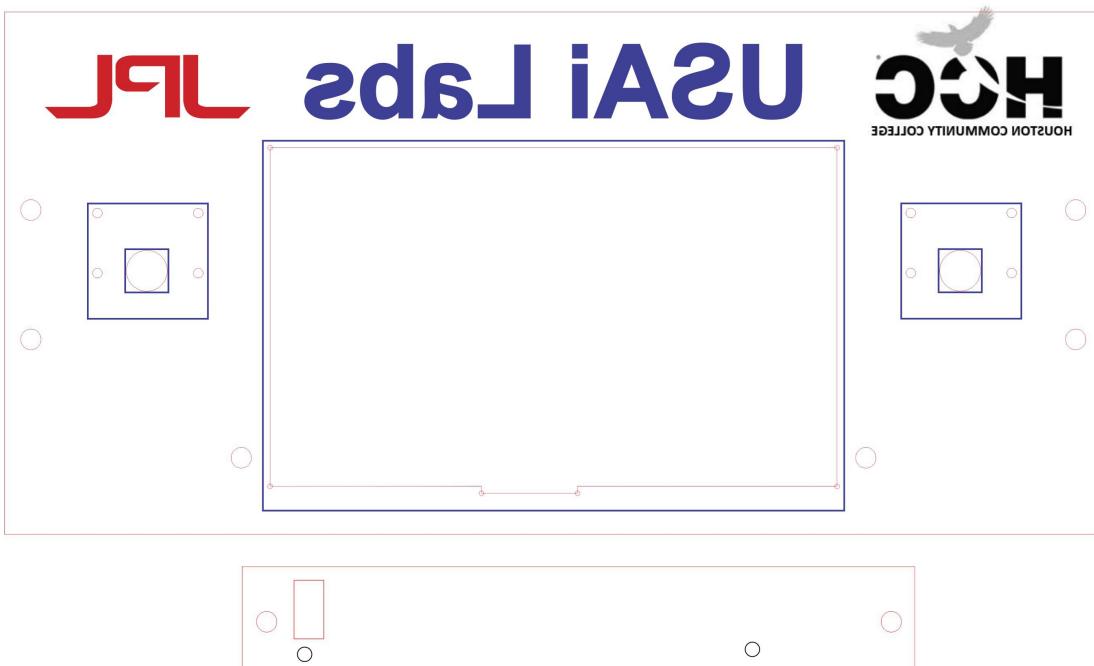
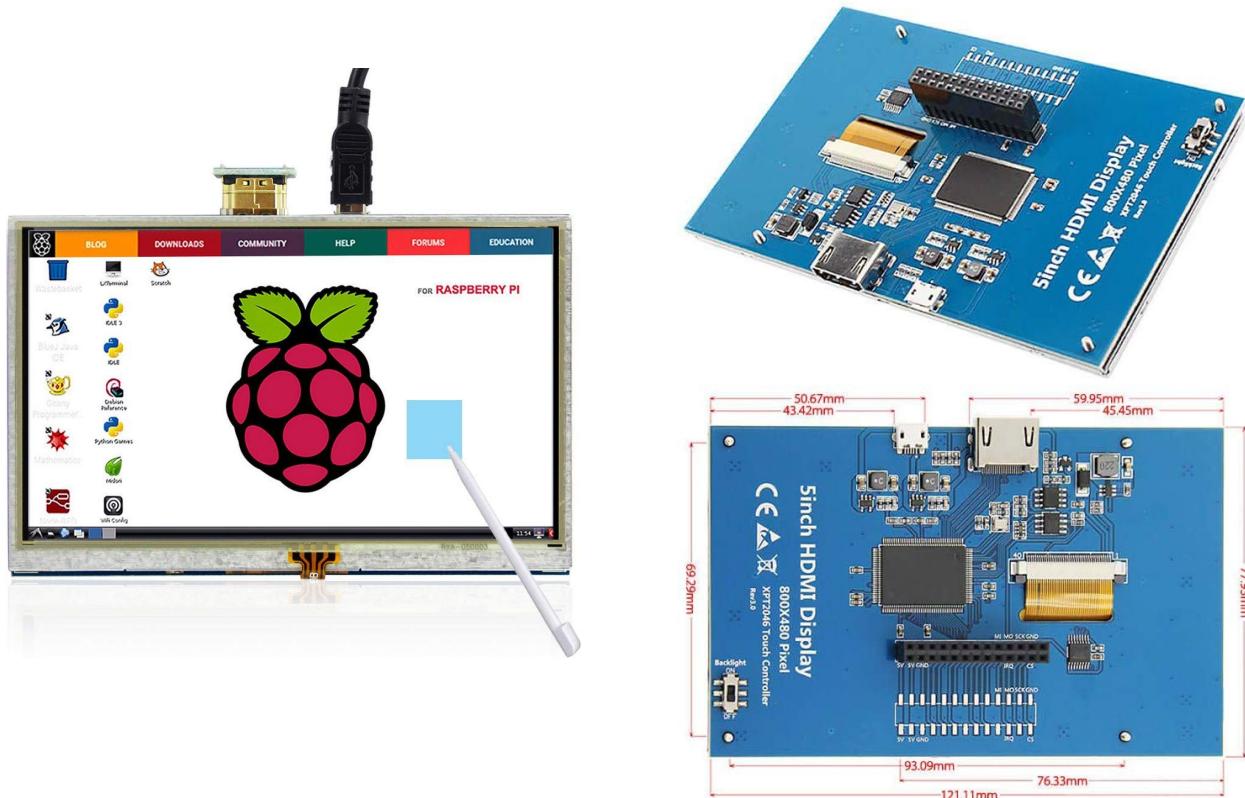
The holes for the cable heads are too small.
The stubs for the screw mounts are too small.
Need to enlarge hole for 4-40 heat-set insert [5/32"]
and enlarge stub to be stronger for the inserts.
Consider reinforced back holes for 6-32 heat-set mounts
[13/64" (5.16mm) starting hole]

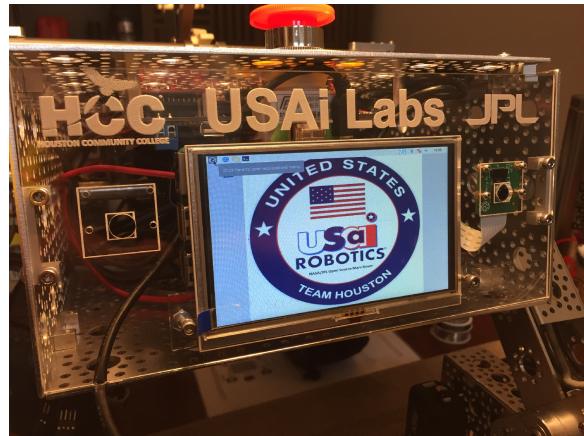
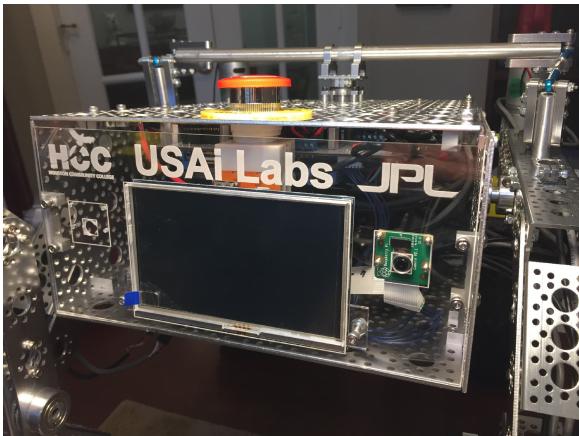
The 7" display is really TOO BIG for the rover. The vertical mounting hole distances are greater than the height of the 9" front / rear panels. The HDMI and USB cables stick out too much on the side. The 5" is probably better....



5" HDMI Touch Screen Display

https://www.amazon.com/gp/product/B013JECYF2/ref=ppx_yo_dt_b_asin_title_o04_s00?ie=UTF8&psc=1





PROBLEM: The Emergency Stop button on top gets in the way of either –

- a) The piggy-backed separate Raspberry Pi or
- b) The HDMI & USB plugs, even if using a right angle adapter. A low-profile plug is needed.

Fidelity to AUDACITY Upgrade Experience

2019.11.13

Created TapaTalk USAi Project Forum: <https://www.tapatalk.com/groups/usailabs/> and specifically the Drive Train upgrade:
<https://www.tapatalk.com/groups/usailabs/fidelity-to-audacity-osr-upgrade-drive-train-t3.html>

2019.12.18

Based on discussion and presentations by

the OSR Github community

the OSR TapaTalk community

Roberto Pensotti <rpenotti@gmail.com> @rpenotti

Chuck Rosser <ROBODILLO@protonmail.com>

Will Dauchy <will.dauchy@gmail.com>

Charles de Montaigu <c.demontaigu@centiasoftware.com> @EuroCarlito

and others at the USAi Meetups this was posted on TapaTalk:

Reviewing the TT OSR discussion on Motor Troubles:

https://www.tapatalk.com/groups/jpl_opensource_rover/motor-troubles-t127-s40.html

and the revised / updated NASA/JPL OSR Github:

<https://github.com/nasa-jpl/open-source-rover>

I see the corner steering motors have been replaced with stronger motors with a 6mm instead of a 4mm shaft for improved coupling as slippage is a chronic issue.

While we should continue to consider other alternatives, I believe making this change would be the most efficient first step in upgrading Fidelity to AUDACITY as steering is the current major handicap and this change would require the fewest collateral changes. If y'all agree, I'll buy 4 motors and accessories later this week.

2019.12.19

Ordered the parts from Servocity

<C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\AUDACITY Corner Steering Upgrade.pdf>

2019.12.21

Received parts from Servocity:



2019.12.22

Ordered parts for 2 drive motor assemblies from REV Robotics & Servocity:

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars

Rover\AUDACITY\AUDACITY Drive Train Upgrade.pdf

(Won't be shipped til /p 1/1/20)

Tested the 4 steering motors & all moved ok to forward & reverse 12V.

Noted the 1/4" drive shaft & 6mm-1/4" coupler are longer than in Fidelity.

Reviewed updated OSR Corner Steering Build and see the old 0.75" threaded stand-offs are replaced w/ 1.25" threaded stand-offs. The screws remain 6-32 3/4" button head (I have cap head which are ok & many ways preferable). Ordered the new standoffs from Servocity. Sent email to request combining orders to save shipping. We'll see if that works....

2019.12.30 Home

REV Robotics shipment arrived:

2 HEX Core Motors
4 Hex drive shafts 5mm x 135mm
10 Shaft collars
20 Round bearing inserts 5mm hex - 8mm

2020.01.19 Home

This last week

installed all 4 revised OSR corner steering motors.

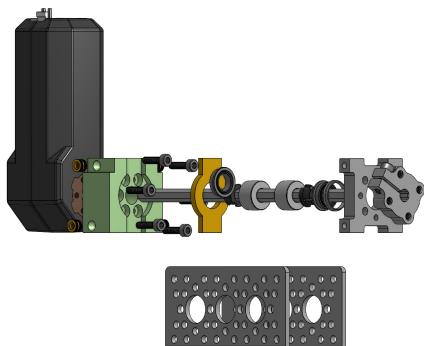
Installed 1 pair (right & left front) REV Robotics Hex motors

According to Option 7 from:

https://www.tapatalk.com/groups/jpl_opensource_rover/motor-troubles-t127-s40.html
post #45

Which points to this OnShape page (requires proper browser setup to allow graphic acceleration, see their help page) Sign up and log into:

<https://cad.onshape.com/documents/3b5249dd0690232c8aaa41af/w/8061a78a58d9cbf842df9d4c/e/a47df3d30f54d14397ff292d>



The 6 M3 holes are too small and could be counter-sunk some more.

The 3 holes for the heat-set inserts are too small and too shallow.

Beware of units when downloading to 3D print.
It should be about an inch cube, not microscopic.
I think it needs to be in inches, not mm.

Posted to TapaTalk:

#65

@jtoebes @jheinske

REV hex motor and Roboclaw: I got one pair (right and left front) of REV hex drive motors installed Option 7. The second time the heat-set inserts gave me more trouble. At first the 3D printer slicer showed the motor mount and bearing holders as microscopic. I think I downloaded them as mm but they're in inches or something like that.

Once I got the units straight they did OK except for the hole sizes mentioned above. But when I tried to calibrate the motors with Motion Studio I ran into problems.

First I had to update the firmware to 4.1.34 and the Motion Studio interface is a little different.

The encoders are directly wired to the Roboclaws without any intervening boards.

RED = +5V, BLACK = GND, BLUE = ENCA, WHITE = ENCB.

When I move the PWM slider positive, the wheel moves forward. Both the motor speed reading and encoder reading increase.

BUT when I move the slider negative, the wheel moves backward, but the speed and encoder readings are still positive/increasing.

When I go to Velocity settings and Autotune M2 (the old standard motor R middle wheel) it does fine.

When I try to Autotune M1 (the REV hex right front motor) the wheel jiggles as expected, then starts running backwards and won't stop.

Motion Studio is frozen. I have to CTL-ALT-DEL to Task Manager, stop Motion Studio, exit Task Manager, re-open Motion Studio, connect to the Roboclaw then click STOP ALL for the motor to quit. I had this problem initially with the original motors when the Amps limit was set to 5A. The Motion Studio tech support guy told me that the sudden changes in direction sometimes pulled extra power and a too low Max Amps setting would trigger a halt and lock the program. But back then I would see a red flag pop up in Motion Studio. I'm not seeing that now and have max amps set to 15A to prevent that problem. Clicking the Invert box on Encoder 1 Mode didn't help. The numbers just changed to negative in both directions.

Anybody have any ideas?

Jim Phelan

USAi Labs

Decided to turn off launch on bootup until the calibration was done so the motors wouldn't go crazy and try to kill me:

Disable service (doesn't run on boot of RPi):

sudo systemctl disable osr_startup.service

eMail to Nathan Scherdin, tech support for the RoboClaw motor controllers:
On Sun, Jan 26, 2020 at 5:34 PM James H Phelan <jhphelan@hal-pc.org> wrote:

Nathan,

Much appreciate the help you've given in the past to Houston Robotics, now USAi Labs! Previously I had a problem of Motion Studio crashing leaving the motor under test in a run-away condition with a Pololu 172:1 Metal Gearmotor 25Dx68L mm LP 12V with 48 CPR Encoder (No End Cap)L

<https://www.pololu.com/product/3268>

I had to end task of Motion Studio, bring it back up, re-connect, then Stop All to stop the motor. You determined that the Max Amps setting was too low during Auto Tune causing an over-current condition with subsequent crash.

This time I'm testing a pair of REV Robotics CORE HEX MOTOR REV-41-1300 motors:

<http://www.revrobotics.com/rev-41-1300/>

I've upgraded the RoboClaw to the latest firmware (4.1.34) with Motion Studio (1.0.0.64). I increased the Max Amps to 15 to avoid the prior problem. I get no red flags during the procedure. One of the motors LEFT FRONT on RC3M2 Auto Tunes ok. The other one RIGHT FRONT on RC1M1 acts as the old motors did - jiggle, crash M.S. and keep running in reverse until stopped as above. Swapping the power and encoder wires between the RIGHT and LEFT motors (and reversing the motor and encoder polarities) causes the problem to switch to the other motor.

This suggests it's something about RC1M1 that's amiss. Another peculiar finding is that under PWM Settings the speed shows a POSITIVE number regardless of whether the motor is running forward or reverse. Also, the Encoder value continues to INCREASE regardless of whether the motor is running forward or reverse. Under the Velocity Settings when M1 is run in reverse, it runs rough but consistently backwards. But when it's run forward, it stutters and reverses erratically.

Thinking it may be corrupt firmware, I re-updated the firmware. No change. This suggests that this particular RC is having a problem with the encoder data. I don't have a spare RoboClaw handy and connecting it to yet another RC is a less trivial task.

I'll start troubleshooting the connections.

Meanwhile, what do you think?

Jim Phelan
USAi Labs

Nathan replied:

On 1/27/2020 1:05 PM, Nathan Scherdin wrote:

With recent firmwares you can set a serial timeout in General settings. If communications fails (like if Motion Studio crashes) the motors will automatically stop after that timeout period.

It sounds like there may be something wrong with the Enc1 channel. If the speed doesn't change direction when the motor changes direction this would also cause the autotuner to crash. It sounds like this is a hardware problem with that Roboclaw (because it works fine with both motors on channel 2 but doesn't work with either motor on channel 1 if I understood what you said above).

There is a potential cause of this kind of error that you can correct. We have found these motors with hall effect encoders built in have a design flaw. They include a motor snubber cap on the encoder logic board. This allows large amounts of noise to get coupled on to the logic circuit. The fix for this problem is to add .01uf caps from each signal line to ground AND from the 5v line powering the encoders to ground. I recommend trying this before we move to swapping out the controller.

If this fixes it you will know because the encoder count will go up and down appropriately when the motor moves forward and backwards.

Nathan Scherdin
Basicmicro

I applied the 0.01uF caps to the encoder wires & POS power to NEG. Was able to tune the motors ok.

On Thu, Jan 30, 2020 at 2:40 PM James H Phelan <jhphelan@hal-pc.org> wrote:

Nathan,

Adding the 0.01uF caps seem to have done the trick.

Only added to the problem motor, but will add to the other for safety. (any symmetry!)

Jim

USAi Labs

2020.02.01 Stafford

After tuning the drive motors turned to the corner motors. I tripped the set screw on one of the pinion gears but bought more at Ace Hardware. Hope it works.

Note that in the document Electrical Assembly, in section 3 Connecting Motors/Encoders, Figure 24: RoboClaw - Motor Assignments, the Front and Back are reversed and the corner motors are reversed right/left.

Yesterday at home I got the first pair of corner motors #1 and #2 on R.C. 4/131 calibrated ok. When trying to calibrate #3 and #4, #3 tuned ok, but in auto tuning #4, Motion Studio froze up and I was unable to have Motion Studio recognize that R.C. again.

Today at Stafford had a similar problem. It would take several reboots of the Rpi and the laptop for it to reconnect. Some of the problem in rebooting the Pi seems to be in reading the SD card. It may need to be rewritten.

Once I got it back to running, I finally realized why #4 wouldn't auto tune - the pinon gear wasn't yet installed so the RC had no feed back from the encoder!! Problem was that the set screw had stripped. Replaced it with 10/32 set screw as per the gear's documentation but seems the hole is stripped also. On Roberto's suggestion, we just used Super Glue to keep the gear in place. Bingo!

However, despite tuning by the RC, the 2 new REV motors run 2-3x faster than the old motors. I *thought* that the "intelligent" RCs were supposed to match the power to the desired rpms. Apparently not. Will have to present the problem to the OSR Forum on Tapatalk.

Post to TapaTalk 2020.02.01:

@jtoebes @ejunkins @Mik @rpensotti

I emailed Nathan Scherdin the very helpful tech support guy at Basic Motion. His suggestion was that the snub cap in the motor allows noise to the encoders. He suggested putting 0.01uF caps between the two encoder wires plus the power line and GND. This solved the problem and I was able to tune ok.

I had a problem tuning my last corner motor when I forgot to install the pinion gear! Without that, the RoboClaw had no feedback so crashed Motion Studio. Took a lot of rebooting of everything to get it to recognize that RC again.

Note that in the document Electrical Assembly, in section 3 Connecting Motors/Encoders, Figure 24: RoboClaw - Motor Assignments, the Front and Back are reversed and the corner motors are reversed right/left. This has been mentioned before, but is still incorrect as of the last documentation from Dec '2018.

MY PROBLEM is that in replacing the two front motors with the REV robotics HEX motors, that the two new motors run faster than the standard motors causing them to slip as the old motors hold them back. **I thought that the “intelligent” RCs were supposed to match the power to the desired rpms so all the motors would work the same. Apparently not.** What's up with that? How might I fix this? The brute force hardware solution is, of course, to replace the other 4 motors with the REV motors. But I'm looking to understand what's going on here.

<http://www.revrobotics.com/rev-41-1300/>

I upgraded the corner steering motors to the latest upgrade per JPL. I tuned the motors. However the steering is not right. The left rear motor doesn't want to steer correctly.

Jim Phelan
USAi Labs
Houston, TX

response from ejunkins:

More debug information is necessary here.

What do you mean they run faster? Are they a different gear box? The roboclaws are given a command of how much to spin each motor, but if they are different gearboxes, or different encoder counts per turn it will not equate to the same output revolution of the wheel

What do you mean it doesn't want to steer correctly? Any debug information is necessary to try and assist with this. One single one not working is not systematic.

2020.02.05 post to TapaTalk OSR forum:

@ejunkins @jtoebes

Oh, snap! The encoders are reading the *motor* shaft rotations not the *output* shaft rotations (embarrassed emoji)

The original Pololu motors:

Pololu Drive Motor.jpg (59.25KiB)

<https://www.pololu.com/product/4888>

172:1 with 48 CPR (motor) encoders

The replacement REV Robotics motors:

REV Robotics Core_Hex_Motor_Four_96616.1502722968.png (1.01MiB)

<http://www.revrobotics.com/rev-41-1300/>

72:1 with Encoder Counts per Revolution

At the motor - 4 counts/revolution

At the output - 288 counts/revolution

I've gone ahead and ordered parts for the remaining 4 drive motors so they'll all match anyway,

but -- are there software parameters that account for the gear ratio & CPR such that different motors can be synchronized?

(Don't fret the steering issue. It's not well defined yet.)

Jim
USAi Labs
Houston, TX

Separate TapaTalk post:

@Mik Has anybody (besides @huseyindenizkivrak) tried using servos in place of the steering motors / absolute encoders?

If so, how did you do it to avoid the problems mentioned above and how did you change the rover code?

Everybody who sees the rover asks why it's designed the way it is instead of a servo (or stepper motor or worm gear motor)
and I have no real good explanation.

Jim
@rpensotti @EuroCarlito @8MegaByte

Reply from Ejunkins:

I wouldn't recommend using a stepper motor for this, Stepper motors are generally for high precision, not high torque application, a servo is fine if it is appropriately rated yes. The reasoning of why we went the the dc motors was simply because we had a solution already working with parts we also already had from the drive system, so it was only duplicating that and adding one encoder, as opposed to adding servos and also dealing with controlling them. I'm not saying it is not a potential good solution, just one we didn't pursue at the time.

2020.02.05 Home

Ordered remaining parts for full Drive Train upgrade:

Model/Config	Site	Link	Sold in Packs of	Price Each	HAVE	NEED
CORE HEX MOTOR REV-41-1300REV	Robotics	http://www.revrobotics.com/rev-41-1300/	1	\$21.00	2	4
5MM X 135MM HEX SHAFT REV-41-1349	REV Robotics	http://www.revrobotics.com/rev-41-1349/	4	\$10.00	1	1
5MM HEX TO 8MM ROUND BEARING INSERT REV-41-1528	REV Robotics	http://www.revrobotics.com/rev-41-1528/	20	\$8.00	1	0
SHAFT COLLAR REV-41-1327	REV Robotics	http://www.revrobotics.com/rev-41-1327/	10	\$7.00	1	1
Side Tapped Pattern Mount D 545324	ServoCity	https://www.servocity.com/90-quad-hub- mount-d	1	\$5.99	4	2
5mm Hex Clamping Hub 545690	ServoCity	https://www.servocity.com/5mm-hex- clamping-hub	1	\$7.99	2	4
1/2" - 12mm Hole Reducer 633142	ServoCity	https://www.servocity.com/12mm-center- hole-adaptors	4	\$2.49	1	1
8mm ID x 12mm OD Flanged Ball Bearing 535222	ServoCity	https://www.servocity.com/8mm-id-x- 12mm-od-flanged-ball-bearing	2	\$3.49	2	4

2020.02.08 Stafford

prior email to Kywan [annotated]:

motor mount for the Mars rover drive train, Option 7 exploded, from:

<https://cad.onshape.com/documents/3b5249dd0690232c8aaa41af/w/8061a78a58d9cbf842df9d4c/e/a47df3d30f54d14397ff292d>

I believe the default download units are centimeters [milimeters]. It should be on the order of a one inch cube. If it's microscopic, you may have to re-export it from the OnShape source.

The 6 holes are for M3 screws and are too small. I had to drill them out [to 1/8" 3.25mm]. They also should be counter-sunk to half the depth with large enough diameter (1/4" 4.0mm) for the screw head.

The 4 side holes are for 6-32 tapered heat-set inserts. I had to drill them out, too. [to 13/64" 5.16mm starting hole, 1/4-3/8" 9.0 mm deep]
It's associated bearing carrier is OK as is.

My sample was printed at Stafford in ABS and otherwise fits fine. I haven't torture tested it yet.

3D printed case for 7" HDMI display:

<https://www.thingiverse.com/thing:1882176>



The holes for the cable heads are too small.
The stubs for the screw mounts are too small.
Need to enlarge hole for 4-40 heat-set insert [5/32"]
and enlarge stub to be stronger for the inserts.
Consider reinforced back holes for 6-32 heat-set mounts
[13/64" starting hole]

2020.02.09 Home

To: Kywan Kerawalla <kerawalla.k@gmail.com>

K

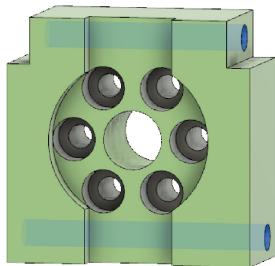
Based on difficulties reported by the OSR build group that created this block, plus breaking a screw trying to extract it from this block, I've changed the heat-set inserts to 6-32" 1 3/4" through and through screws.

By your saving it as a .f3d file I was easily able to make the changes! I will share the result with the original group & credit you!

Thanks!!

J

[This in addition to increasing the 6 holes to 3.25mm and deepen the countersink to 4mm to more easily accommodate the M3 screws.]



2020.02.09 Home, continued

Rewiring rover to allow top to be hinged at the front instead of the left side to allow better access to put 0.01uF caps between encoder lines & GND. This DIDN'T work as the hinges throw off the hole spacing so the locking screws don't match up. Eliminated hinges altogether in place of Dual Side Mount A's and 4 cap head screws to hold lid on.

Need connectors for motor wiring to allow dis-assembly. May go w/ Molex 6-conductor.

Hub clamps on differential arm have come loose from U-channels as 1/4" screws have fallen out from below. Changed to 1/4" cap head + LockTite in 2 holes opposite the clamping screw.

Looking to replace 2 shielded cables 2-conductor + 4-conductor with one colored CAT-5+ cable in red/white/blue/(blk/grn) to match USAi Labs color scheme replacing RJ45 connectors with Molex mini-fit 6-pin connectors. [* NO. CAT cables can't carry enough current. 1A max at 12V.]

<https://www.digikey.com/products/en?keywords=WM24062-ND>

Control Board:

Want to update the Control Board to:

instead of to each other...

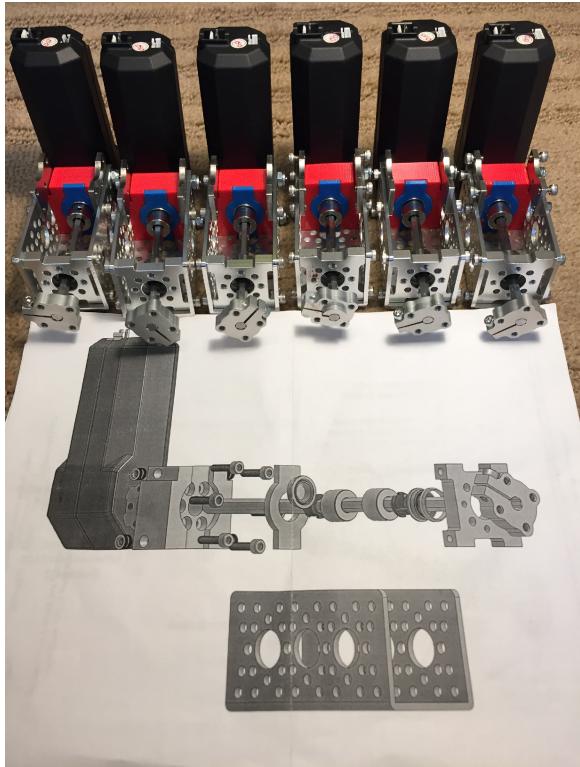
1. Wire Battery connector directly to board
2. Wire Voltmeter directly to board
3. Wire Master Switch directly to board
 - a. use Emergency Stop Switch as Master Switch to kill *all* power to rover
4. insert break in Motor Controller 12V power circuit for Remote Kill Switch to kill power to the motors, actuators.
5. insert 12V output after Remote Kill Switch for Robot Safety Module (lights & beeper)
6. insert 0.01uF caps between all encoder lines and GND
7. *flip* the board right/left so that it is mounted in the bottom of the rover & not suspended from the top
8. rearrange 5 RoboClaws:
 - a. 1 in the middle for the middle 2 drive motors
 - b. 1 on each corner for the drive & steering motor for that corner
 - i. this avoids excess strain for paired, especially the lead two, drive motors running from the same RoboClaw
 - ii. requires *reprogramming* the ROS code accordingly
9. OR 3 RoboClaws (not symmetrically paired drive motors) + a 4x servo control board/hat if steering motors replaced by servos (preferable)

UNTIL THEN:

2020.03.06 Stafford

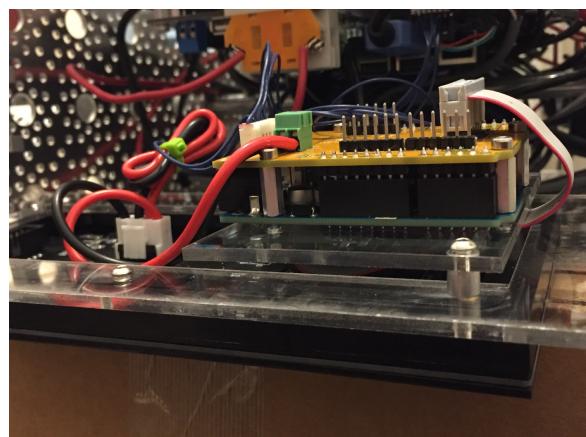
Catching up:

Finished installing all 6 REV Robotics HEX core motors.

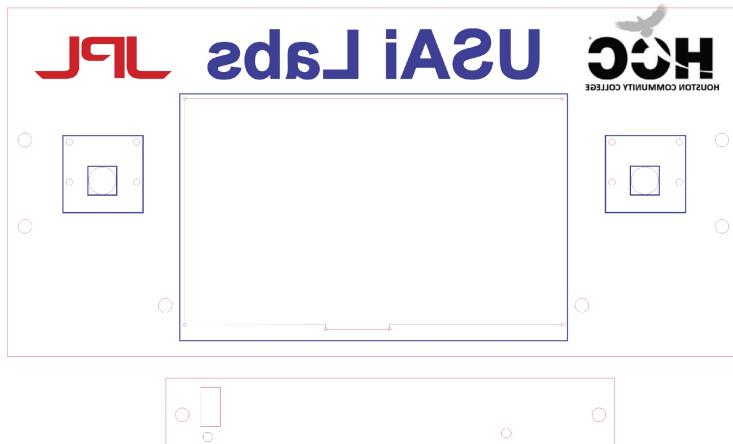


In the process of changing DuPont connectors which don't lock to Molex Mini-Fit Jr. 6 conductor (2x3) which do and can carry more current. Would like to find a locking 6-conductor connector that would fit through the $\frac{1}{2}$ " holes in the pattern plate and channels.

Created an acrylic front plate for the rover to carry the LED display and the Arduino carrier plate:



Next created an acrylic front plate for a 5" HDMI touch screen display + room for 2 Pi Cameras with a cross-bar to hold it in place to the front plate:



Next to configure the 5" display & Raspberry Pi pair to act as a web cam for telepresence.

Download latest Raspbian Buster: <https://www.raspberrypi.org/downloads/>
Raspberry Pi Imager for Windows
run downloaded Imager
Raspbian / select SD card to write

Move card to Raspberry Pi & launch
Configure Raspbian Buster per local preferences

Google: "configure raspberry pi picamera as web camera"

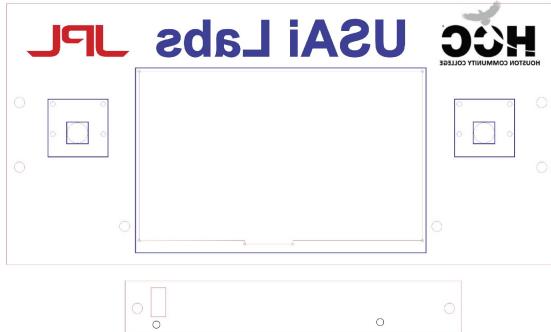
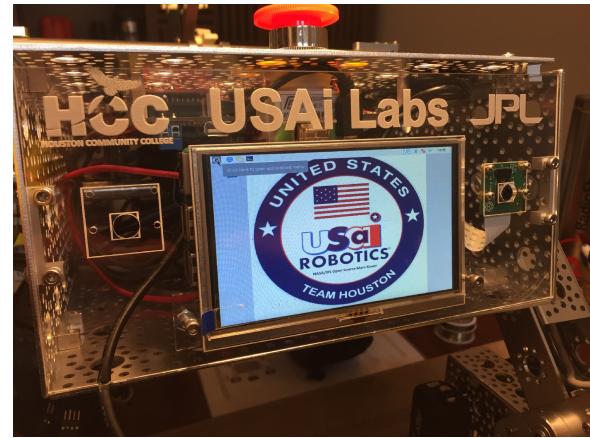
<https://www.meccanismocomplesso.org/en/picamera-python-programming-a-webcam-on-raspberry-pi/>

... a start but inadequate directions for streaming web cam.

Configured the 5" display according to the enclosed directions changing the config.txt and downloading from github. Works like a charm! Can use the enclosed stylus to work the desktop. Just can't type.

Tilted the PiCamera (on the rover's left side) toward the camera a little by loosening the medial screws and tightening the lateral screws so the camera is looking a little more toward center. Would have to be adjusted back if wanted stereo vision.

Took a picture of the rover taking a picture of me:



Sent e-mail to USAI Labs mail list requesting help w/ streaming from Rpi:

On Sun, Mar 8, 2020, 3:18 PM James H Phelan <jhphelan@hal-pc.org> wrote:

Team,

I want to make AUDACITY rover a telepresence robot.

Sometime in the past someone (Diane?) told me how to stream with a PiCamera (from a GoPiGo ?) to a laptop browser.

I've forgotten how and can't find any notes on the subject. I've Googled and YouTubed but the results have not been satisfactory.

Diane often mentions "Cheeze" and something else. I think I used the something else and I don't think it was OpenCV although that would be ok.

Can't y'all point me in the right direction?

My PiCamera is installed and I can do raspistill and raspiivid ok so that much works. I can VPN and SSH into the Pi ok.

I realize a PiCamera is not the best for telepresence as there is no sound. I need to use a USB camera/microphone eventually, and the rover will need speakers, but it's what I have and a start....

Jim

From Roberto Pensotti <rpensootti@gmail.com>:

Jim, I'm probably not the best person to give you a solution.

I would buy a simple USB microphone to add sound and SSH the Pi's desktop instead of only the terminal.

That way if you open a raspiivid command you should see on your remote laptop the image captured by the Picam.

For the sound, I believe is a question of selecting the right sound source in the Pi configuration option.

Pls let me know if I'm just totally wrong.

From Harsh Bhasin <robogeekster@gmail.com>:

Jim,

I am assuming you don't want to do any processing on the video but rather continuously steam what the camera is looking at. If that is the case, I have done that in the past using numpy, and continuously mapping the image on the image window.

In fact there is a neat video streaming library provided by Flask. I am sure if you google 'Flask Video streaming' , you will find something on it.

Hope that helps!

From Heather Kaiser-Hahn <babyhclimber@yahoo.com>:

Jim, this is what Alex wanted you to know:

Cheese software only works with a USB webcam and not the raspberry pi camera model. Diane and I were playing with cheese with her webcam on my raspberry pi.

OpenCV does work with a raspberry pi camera, but it was complicated. It took the combination of Charles trick and my dad getting it to work on the Jetson Nano. We never got it to work very well on the Raspberry Pi. I remembered it taking hours to install though...

I don't know how to stream with pi camera.

Heather writing what Alex is saying to me...

From Charles de Montaigu <c.demontaigu@centiasoftware.com>:

ROS has a teleops feature otherwise look @ ffmpeg base solution

C

From Avishek Roy Chowdhury <avishek.rc1@gmail.com>:

Jim a few things to consider for Pi video streaming on a mobility based device.

- Priority of the video task: is it a dedicated pi for video? If it's supposed to do real time robotics stuff in parallel, then video would be jittery.
- Network Accessibility: if Audacity and the viewing device would be in same network, then Please refer to MJPG web browser based streaming. It's simple and low latency. Downside, Audio/Video is dependent on the camera and not from USB, hence pi cam might not suit long term goal.
- Network Accessibility (part 2): if the rover and viewing device might have different network access, then IFTTT webhooks driven approach is easy to implement.

These above are all when you do not have a dedicate pi. If you do, then there are various prepackaged SD card images to perform telepresence and remote security with 2 way conversation.

Will show u examples of each

Regards,

Avi

and later:

Jim, a few of the options you can look for, based on my implementation with Azrael Project. (later Roberto took it over and fired me from that.. Grrrr).

- For Audacity, maybe you would just need an "upgraded" Pi (4GB) or a (Nvidia Xavier, upper ver of Nano). Reason? For Pi, you would need an additional Edge processor (Coral, say) which would compensate the fall off from Motion and Automation computing degradation. On the plus side, you can integrate Face Recognition and Motion tracking (fed to your same autonomous engine/Program running in parallel within the same Pi)
- If you are using a Nano/Xavier, all you would need is to align the stack to Nvidia Deepstream SDK (words.. cuz am exploring Nvidia now) and to me its pretty straight forward. This SDK to "some extent" takes care of Nav, Recog and all fun words.
- Now the Camera - I saw the \$25 Wyze Pan cam that has the Pan/Tilt, Auto focus, 2 Way audio and (cheery on top) IFTTT capability, that is - Alexa/Google or just vanilla integration.

My Python snip has the feature to integrate the xBox One controller (all keys) to make it

(and rover motion) to work like charm. Next Week - bring champagne (parking lot?) and we will have fun.

Regards,
Avi

On Mon, Mar 9, 2020 at 6:30 AM James H Phelan <jhphelan@hal-pc.org> wrote:

Team,

Thanks for everybody's prompt help! I LOVE you guys!

The 5" HDMI touch screen I'm using is designed for a piggy-back RPi so I'm using that for testing thinking at some point to just use the main Pi as remote control is not all that demanding.

https://www.amazon.com/gp/product/B013JECYF2/ref=ppx_yo_dt_b_asin_title_o04_s00?ie=UTF8&psc=1

But, given what y'all say, I'll probably stick with the dedicated RPi as later the main Pi (eventually Nano) will have more work with autonomous driving.

I'd be very interested in the "prepackaged SD card images to perform telepresence and remote security with 2 way conversation" but would want to understand the guts of it, too.

Need to find a USB webcam that is small enough to mount nicely in place of the PiCamera.

It's SO nice with the laser cutter that we can zap out a new front panel in just a few minutes to fit new specifications!

Although, on further thought, it should probably be on a pan-tilt servo which adds some complexity to the telepresence setup.

Should be easy enough to add servo commands to the main Pi from the Xbox controller as there are unused joypads.

Jim

In researching the above, the following look promising:

<https://www.linux-project.org/rpi-videoconference-demo-os/>

<http://www.linux-project.org/uv4l/>

<https://www.raspberrypi.org/forums/viewtopic.php?p=1580751>

which led me to:

<http://blog.cudmore.io/post/2019/12/14/Installing-uv4l-on-raspbian-buster/>

So followed their directions....

The “VIDEO” Raspberry Pi 3b from the Pi stack I had been using refused to boot even after reflashing the bootloader according to raspberrypi.org instructions.

Replaced it with the “SENSOR” Pi3b, the latest Raspbian Buster using the Raspberry Pi Imager. Reconfigured to local settings preferences interfaces and desktop.

After this install, run uv4l as follows:

```
uv4l --driver raspicam --auto-video_nr --encoding h264 --enable-server on
```

And then view the stream in a browser with (**please note your IP address might be different**)

<http://192.168.1.23:8080/stream>

Somehow while trying to align the PiCam in the rover, the image froze and I could not get the camera to work again. Did I short it out?? I was using steel screws & nuts. Best use nylon next time and no metal tools!

Trying to use USB webcam as alternative & ultimate replacement to the PiCam as it has a microphone. The recommended “Logitech HD Webcam C525, Portable HD 720p Video Calling with Autofocus” is on indefinite backorder:

<https://www.amazon.com/Logitech-Webcam-Portable-Calling-Autofocus/dp/B004WO8HQ4/?tag=androidcentralb-20&ascsubtag=UUacUdUnU80123YYwYg>

So I'm using my obsolete VGA Creative Live! Webcam:



Now to try uv4l with a USB webcam.

Start from scratch from here:

<http://www.linux-projects.org/uv4l/installation/>

Instructions only go up to Raspbian Strech, not Buster, so I'll substitute Buster:

```
curl http://www.linux-projects.org/listing/uv4l_repo/lpkey.asc | sudo apt-key add -
```

and add the following line to the file /etc/apt/sources.list:

```
#deb http://www.linux-projects.org/listing/uv4l_repo/raspbian/stretch stretch main  
I commented it out (#) to try the buster variation first.
```

I also added:

```
deb http://www.linux-projects.org/listing/uv4l_repo/raspbian/buster buster main
```

```
pi@televideo:~ $ sudo apt-get install uv4l uv4l-raspicam
```

Reading package lists... Done

Building dependency tree

Reading state information... Done

uv4l is already the newest version (1.9.17).

uv4l-raspicam is already the newest version (1.9.63).

0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.

So far, so good.

If you want the driver to be loaded at boot, also install this optional package:

```
pi@televideo:~ $ sudo apt-get install uv4l-raspicam-extras
```

Reading package lists... Done

Building dependency tree

Reading state information... Done

E: Unable to locate package uv4l-raspicam-extras

It may have to look in Stretch.

Un-# the stretch version in /etc/apt/sources.list and try again.

Success.

As a convenience, the above package will install a service script for starting, stopping or restarting the driver at any time, for example:

```
$ sudo service uv4l_raspicam restart
```

In my case, it's not -raspicam I want but a USB camera. There may be another script?

Borrowed from GoPiGo Experience.wpd:

uv4l

This is a streaming video package you'll want on the GoPiGo to get telepresence.

Watch this guy's videos of how to install the PiCamera & install & configure uv4l:

https://www.youtube.com/watch?v=GzTbm7yo4I4&index=3&list=PLWJfbQMqNj4mloVbI_G8SVgCdbKZQ92ZiQ

But things have changed since this video....

Google: "uv4l usb webcam raspberry pi"

<https://www.raspberrypi.org/forums/viewtopic.php?t=246214>

which led to :

<https://raspberrypi.stackexchange.com/questions/39690/configuring-uv4l-for-web-rtc-using-usb-camera-on-rpi2-raspbian>

http://wiki.bitplan.com/index.php/Raspberry_Pi_WebCam

2020.04.08 Home

Replacement Raspberry Pi Camera V2 and Raspberry Pi NOIR V2 arrived.

Basic commands:

raspistill -o Desktop/image.jpg

raspistill -o Desktop/image-small.jpg -w 640 -h 480

raspivid -o Desktop/video.h264

In order to play the video file, double-click the video.h264 file icon on the Desktop to open it in VLC Media Player. *This doesn't work! Have to convert file to mp3, etc. first using VLC. Which doesn't work either!!*

<http://192.168.1.105:8080/stream/webrtc> from laptop works

when RPi is set to:

VLC

Media

Open Capture Device

Capture mode: Video Camera

Video device name: /dev/video0

Play

Now for the PiCam NOIR

2020.04.14

Reached out to R&D for ev4l help
R&D,

D - A few years back in the early days at HCC you introduced me to uv4l to get my GoPiGo to stream back video to my laptop. It worked great.

Now I want SECURE https 2-way telepresence between the rover and my laptop because Chrome requires https to connect from the laptop side.

Attached is my uv4l-raspicam.conf file in the INSECURE configuration which works.

I have selfsign.key and selfsign.crt in my /home/pi directory but the secure settings have failed so far.

Any guidance??

J

and got back following:

Hi Jim:

On subject of UV4L - the purpose matters (streaming server, control of GPIO over the internet, screen sharing or video games.

That being said, the following issues will figure into the process, using Flask, Version of Ubuntu, Jessie (no longer handled), what model of the pi you are using, etc. Please see attached.

All the best, take good care. Let me know if you need anything.

R&D

attached: [Python WebServer With Flask and Raspberry Pi.docx](#)

which is partly blurred out but which can be found here:

<https://towardsdatascience.com/python-webserver-with-flask-and-raspberry-pi-398423cc6f5d>

There are several obvious errors in the transcript such as:

The best when you start a new project is to create a folder where to have your files organized. For example:

mkdir rpiWebServer

The above command will create a folder named “Server”. There we will save our python files (application):

/home/pi/Documents/Server****

<https://www.hackster.io/mjrobot/iot-raspberry-pi-robot-with-video-streamer-and-pan-tilt-f50e53>

which points to:

<https://miguelmota.com/blog/raspberry-pi-camera-board-video-streaming/>

(scan down to the 19 Jan 2014 update)

2020.04.20 Home

STARTING OVER ON TELECONFERENCE

Google: teleconference between 2 raspberry pi

1) <https://www.raspberrypi.org/forums/viewtopic.php?t=246214>

skip down to: Re: Videocalls/conferencing with the Pi3B+? Sun Jul 21, 2019 4:09 am

2) <https://www.raspberrypi.org/blog/working-from-home-with-your-raspberry-pi/>

skip down to: Skype

Then there's the primary source:

<http://www.linux-projects.org/uv4l/installation/>

2020.04.27 Home

Endless frustration w/ teleconferencing w/ Rpi and uv4l/webrtc.

Achille just started working for a company that uses it extensively. Asked for help.

After multiple dead-ends to downloads that don't exist, multiple ways of installing secure signatures that don't work, and refusals to connect I decided it's time to start over from a fresh Rpi image then send Achille a Private Message detailing my goals and failures:

Open Source Mars Rover telepresence project:

To equip the Open Source Rover with a camera, microphone, speakers, video display and telecommunication software such that it will be able to host a two-way audio/video conversation between its controller at a remote computer and a person it encounters on its journey, presumably over , although cellular could be an option.

Equipment:

Separate Raspberry Pi 3B at first to avoid confusion with or overload of the main processor. Later may be integrated if the burden is not excessive. With remote control the navigation overhead is minimal. With AI autonomous navigation it is much more demanding. To be a true telepresence robot, the remote control should shift from the Xbox controller / receiver to the WiFi link.

USB camera with microphone or Picamera plus a USB microphone. There is some criticism of the USB cameras as having too much latency. There seems to be only one inexpensive Chinese USB microphone of questionable quality. Adafruit sells a version that, hopefully, has been quality controlled?

Speakers amplified and powered from the battery and plugged into the audio out of the Pi. \$ sudo raspi-config / advanced / audio / force to output jack may need to be configured.

HDMI video display powered from the Raspberry Pi GPIO pins or separate USB connector. Draws a significant current. Be sure is adequately powered. Larger system

battery or separate televideo system battery.

Software:

uv4l / webrtc seem to be the go-to software for simple web based telecommunication on the Raspberry Pi. One-way display of the Picamera to the remote computer is easy. Modern browsers (in my case Chrome) seem to insist on secure https or they will refuse to webrtc to an unsecure web site. Configuring uv4l / webrtc for https has been frustratingly unsuccessful. Numerous sites give instruction for http then suggest the same settings will work for https. They are wrong. Several sites give instructions for installing a self-signed or external agent provided key and certificate. They are very different in their approaches and all have failed to allow connection.

I suspect that multiple attempts have installed overlapping and conflicting software and configurations. I am starting over with a fresh install of the latest Raspbian Buster image. Direction to a proven secure uv4l/webrtc installation path and copies of the working .conf files would be MOST welcome!

2020.05.03 reply from Achille:

Hi Jim,

It's odd to me that you're using the Mars Rover as a telepresence robot. The Mars Rover is designed to go outside, to explore. With ten motors, it sucks a lot of energy which does not make sense for an indoor telepresence robot.

Although it's admirable, I would personally advise against trying to set up webRTC or any advanced software yourself and instead go with an out of the box solution. These things take entire software teams to set up properly as there are many small nuances. webRTC for example won't do much if you're running on cellular and you definitely can't rely on wifi outside.

Consider starting with something like putting an Android tablet on the Rover that runs Google Meet or Hangouts and then work your way up. I've done that before and it works just fine for most purposes. They also solve the prioritization of video vs audio which is nontrivial.

For full disclosure: I work at Freedom Robotics, which solves this exact problem of remote operation. I mention to prove that I know what I'm talking about.

Some other answers to your questions:

* The latency of a USB camera is determined by the latency in the bus, which is set as 16ms or something like that. You could drop it to be lower, but it's also affected by other usb devices. This latency is minimal compared to the time taken to serialize, transmit, deserialize, visualize. However if you want, you could pick an industrial camera that comes with Ethernet or similar high speed connection.

* I would use Ubuntu on a raspberry pi 4 and stay away from raspbian. Alternatively throw in a mini PC like a NUC to do the heavy lifting. ROS supports multiple machines quite nicely. Always start with too much compute, and then optimize once you have things working.

* some of the Logitech cameras come with microphones which work quite well. However I would get something like a Jabra. You will want to know if you want a directional microphone/speaker vs an omnidirectional one (which tend to be better but draw more power and are more expensive)

* Power any screen larger than a phone off an external power source. Otherwise, if you don't already burn out your RPi, you will reduce the power that makes it to the CPU and the thing will lose half of its compute.

Best of luck,
Achille

2020.05.04 my response:

"It's odd to me that you're using the Mars Rover as a telepresence robot. The Mars Rover is designed to go outside, to explore. With ten motors, it sucks a lot of energy which does not make sense for an indoor telepresence robot."

True if telepresence were the goal. But, we've got the rover, so why not make it communicate?

"I would personally advise against trying to set up webRTC or any advanced software yourself and instead go with an out of the box solution. These things take entire software teams to set up properly as there are many small nuances."

Not what I wanted to hear but it figures. Everything about Linux is fraught with nuances and poor direction. I thought uv4l was supposed to be the easy solution!

"Consider starting with something like putting an Android tablet on the Rover that runs Google Meet or Hangouts and then work your way up. I've done that before and it works just fine for most purposes. They also solve the prioritization of video vs audio which is nontrivial."

The notion of putting a cheap cell phone at the front of the rover makes a lot of sense. In addition, the OSR has an Android bluetooth app that can be used for the remote control instead of the Xbox. I've not used it as I have an iPhone. I wonder if an android phone could be connected to the rover (via USB or Bluetooth) to receive steering instructions from a remote Android phone perhaps just by tapping on the remote screen the direction you want the rover to go or object you want it to follow? Cellular communication would free the rover from the indoor limits of WiFi! Do you have any occupational insight that would be useful here? I think 4G would be cheaper and adequate for the job for now?

Other questions:

USB camera latency no longer a concern given above.

Why Ubuntu over Raspbian in your experience?

Our next steps will be Pi3b/Raspbian >> Pi4/Ubuntu >> Jetson Nano / Ubuntu toward implementing autonomous driving using Intel RealSense & LIDAR.

What kind of Jabra? There are many. Probably no longer an issue, but curious.

Agree with hefty battery power!

Thanks!!

Jim

NEED TO SPLIT “DISPLAY” INTO 2 TRACKS:

1) DISPLAY of the Processor activity

Improve the LED display to be more intuitive in the original plan

Replace the LED display with a touch screen HDMI display

2) TELECOMMUNICATION

iPhone FaceTime with the rover

uv4l/webrtc seem unworkable

Re: Steering:

On Mon, Mar 16, 2020 at 8:54 PM James H Phelan <jhphelan@hal-pc.org> wrote:

R(oberto Pensotti),

You wanted to help with AUDACITY.

All 6 drive motors are installed and wired. See pix. I just need to tune the RoboClaws for straight-line mobility.

I need your help designing the proper support and servos for AUDACITY's 4 corner steering motors.

Let's use ServoCity / Actobotics standard parts where possible to be compatible with the rest of the builders for bearing blocks, etc.

Then we need to figure out how to control the servos and how to adapt ROS accordingly to follow the Xbox commands.

J

On 3/16/2020 9:24 PM, Roberto Pensotti wrote:

- > Hello Jim,
- > I understand you would like me to 3D print four adapters for standard servos from Servo City to replace the steering motors.
- > These adapters should be compatible with the Actobotics form factor and use their hub shaft, hub horns and bearings wherever possible.
- > I'm ready to design and print a prototype as soon as you send me more design restrictions and specifications.
- > I will naturally submit it to your prior approval
- > I have a two 6" pieces of perforated aluminum channels which can help me in the process.
- > Please, show me the type of servers you intend to use and how they are going to be connected to their respective controllers.
- > It would also help if you send me a few pictures of the current arrangement with and without the steering motors on board.
- > Also, I'm taking seriously the COVID-19 situation and my wife and I are in a voluntary isolation, so this whole project can be resolved online.
- > Regards
- > Roberto

On 3/17/20 06:30 Jim Phelan wrote:

R,

Not exactly....

I'm not looking to 3D print anything unless necessary.

I look to you to select 4 steering servos that --

are reasonably priced for others to follow our lead but don't sacrifice quality

are strong enough to turn the wheels either directly or via gearing

turn at least 45o in either direction, preferably 90o like the Harvester

have proper engineering support - you mentioned "thrust bearings" so the weight of the rover is not on the motor shaft like it is now

fit in the existing Actobotics U-channels if possible using Actobotics parts

have a servo controller compatible with the Raspberry Pi 3 and future Pi 4 and Nano that will fit in the rover.

Then we'll have to modify the rover software.

Later we'll want to completely redesign the PCB to accommodate this and other changes.

There are lots of images and specifications of the current setup in the OSR github:

<https://github.com/nasa-jpl/open-source-rover>

and the OSR TapaTalk Forum:

https://www.tapatalk.com/groups/jpl_opensource_rover/index.php

There you'll find at least 1 other group that used servos

I agree with your "social distancing". We can Skype to converse more easily.

Jim

Steering motor twitch issue:

2020.03.17 TapaTalk post from AchilleO:

Unread post 11:57 AM - Today#38

@ireasor I think I've figured out the twitching issue on the corner wheels you've seen. I got it as well, didn't see your post and decided to investigate thinking it was unique to my setup. Took me more than two days to figure it out, hah!

I'm going to email the roboclaw folks to get to the bottom of this (I think it's an issue on board of the roboclaws) but I'll open up a PR with a fix on GitHub. If you're still working on the rover, would love to hear if that fixed it for you as well.

=====

2020.03.17 20:15 posted to TapaTalk:

@achille0

@ireasor

I set up my ROS launch to display the command stream from the Raspberry Pi via this OSR_launch line in:

/home/pi/osr_ws/src/osr Bringup/launch/osr.launch

```
<node name="motor_controller" pkg="osr" type="motor_controller.py"  
respawn="true" output="screen" />
```

I was able by ^S to stop the screen output and observe the following:

Left rear twitch:

Checking status

```
[INFO] [1566525894.911626]: drive_motor: [0, 0, 0, 0, 0, 0]
```

```
corner_motor: [-1, -1, -1, -1]
```

```
[INFO] [1566525895.913318]: drive_motor: [0, 0, 0, 0, 0, 0]
```

```
corner_motor: [-1, 912, -1, -1]
```

Checking status

```
[INFO] [1566525896.914060]: drive_motor: [0, 0, 0, 0, 0, 0]
```

```
corner_motor: [-1, 912, -1, -1]
```

```
[INFO] [1566525897.915275]: drive_motor: [0, 0, 0, 0, 0, 0]
```

```
corner_motor: [-1, -1, -1, -1]
```

Right front twitch:

Checking status

```
[INFO] [1566526206.289876]: drive_motor: [0, 0, 0, 0, 0, 0]
```

```
corner_motor: [-1, -1, -1, -1]
```

[INFO] [1566526207.290639]: drive_motor: [0, 0, 0, 0, 0, 0]
corner_motor: [-1, -1, -1, -1]

Checking status

[INFO] [1566526208.291623]: drive_motor: [0, 0, 0, 0, 0, 0]
corner_motor: [845, -1, -1, -1]

[INFO] [1566526209.292121]: drive_motor: [0, 0, 0, 0, 0, 0]
corner_motor: [845, -1, -1, -1]

Checking status

[INFO] [1566526210.292934]: drive_motor: [0, 0, 0, 0, 0, 0]
corner_motor: [-1, -1, -1, -1]

[INFO] [1566526211.293920]: drive_motor: [0, 0, 0, 0, 0, 0]
corner_motor: [-1, -1, -1, -1]

Left rear (didn't catch beginning as got stuck & manually freed)

Checking status

[INFO] [1566527167.408573]: drive_motor: [0, 0, 0, 0, 0, 0]
corner_motor: [-1, -1, 637, -1]

[INFO] [1566527168.409527]: drive_motor: [0, 0, 0, 0, 0, 0]
corner_motor: [-1, -1, 637, -1]

Checking status

[INFO] [1566527169.410247]: drive_motor: [0, 0, 0, 0, 0, 0]
corner_motor: [-1, -1, -1, -1]

[INFO] [1566527170.4 637 10990]: drive_motor: [0, 0, 0, 0, 0, 0]
corner_motor: [-1, -1, 637, -1]

It seems like some cycling software process is sending bogus steering commands to the motor controllers.

I haven't had the patience nor software knowledge to tease out what's going on. Maybe someone else can....

Jim Phelan
USAi Labs
Houston, Tx

From Achille0:

Hey Jim, not sure if you saw my post above. I essentially went through the whole thing myself and figured it out. I cheated and used some fancy tools for analyzing what was going on though :) Here's a before and after the fix. You're seeing an increase in these jerks because I increased the loop rate from 5Hz to 250Hz. I'll be able to explain the exact details of this when I get a reply from the roboclaw folks.



For now, the fix is to replace the `rc.ForwardMX(addr, 0)` command used to send zero velocity to the motors when no command comes in with a another command that essentially does the same thing, such as `rc.SpeedDistanceMX()`. See this commit on my fork. Since it seems like you're learning about git, feel free to ask me how to do this easily!

I suspect the reason why we can't use `rc.ForwardMX()` is that we're interfering with the internal PID loop running on the roboclaws which is what's causing random commands to get sent to the motors (and not the encoders reporting stray values!)

From ejunkins:

@jhphelan Are the bolded commands what you are thinking are bogus commands? Those are actual commands that more-or-less make sense. The way the software is right now is that array sends projected tick values to track for the corner motors. Those values should be between [0,2000] as a hard requirement, but will depend on your individual calibration of the corner system. The values seen here all make sense to me. A value if -1 signifies that the corner motor is within a certain deadband tolerance of where it is projected to go, and thus is not commanded to do anything.

@achille0 has proposed quite a few software upgrades to expose these as more intuitive, as well as more in-line with standard ROS convention that I believe as a community of builders we should work on chipping away at to help with issues such as this.

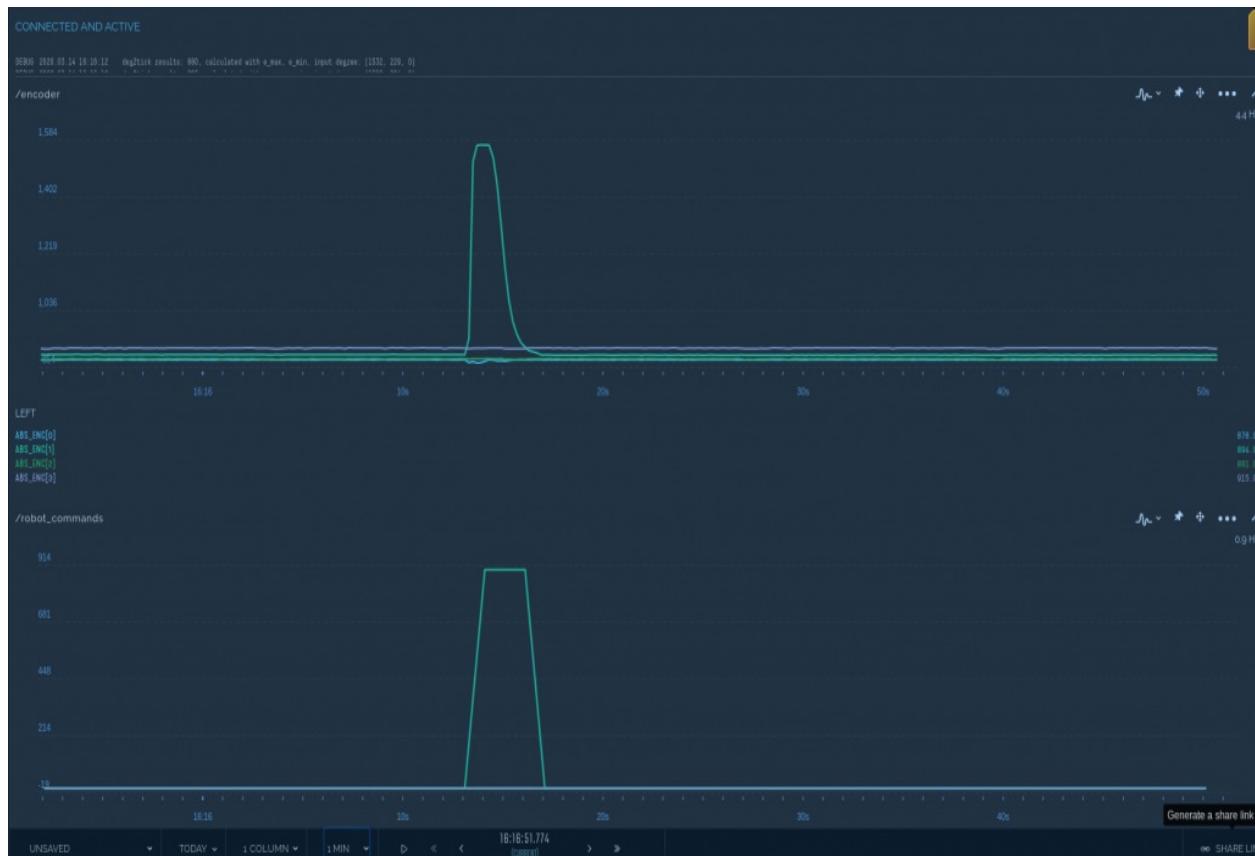
My response:

@ejunkins Yes. The display shows -1 for all array values when the rover is centered and at rest except when these unusual values pop up out of nowhere and the motor twitches. Are these values telling the motor to move or are they a response saying that the motor has moved?

@Mik @ireasor @achille0
JHP

From Achille0:

These values are somewhat irrelevant actually. They are the response from the higher level code to the twitches originally caused by the roboclaw. They send the motor back to where it was. The twitches happen regardless of whether you send it back or not. In the attached picture, you can (barely) see that the encoder hike precedes the robot commands, and if you look very closely, you can also see that the encoder hike follows a smooth trajectory as opposed to a stepwise function, proving that the encoder hike is actually a result of a command, not the cause.



My response:

@achille0 @ejunkins

Thanks for clarifying that my odd values are the RESULT of the problem, not the CAUSE.

So, can I just edit the roboclaw_wraper.py with the 7 additions & 6 deletions you show and be good? Or is there more to it than that?

I see some mention of merging some of the python scripts. Should I just wait until all the code is ironed out and just let it twitch in the meantime?

JHP

2020.03.24

Email to REVRobotics.com:

Dear REV Robotics,

I am the project lead at USAI Labs robotics group on the NASA/JPL Open Source Rover project:

<https://opensourcerover.jpl.nasa.gov/>

<https://github.com/nasa-jpl/open-source-rover>

<https://www.youtube.com/watch?v=2Wdgss0q63s> (video by Houston Community College about USAI Labs)

Recently we decided to improve from the standard motors to the REV HEX motors:

<https://www.tapatalk.com/groups/usailabs/fidelity-to-audacity-osr-upgrade-drive-train-t3-s10.html>

We bought a pair earlier to test the concept, then the remaining 4 last month. The motor side of all 6 tested ok.

We were not able to test the encoder side until all 6 were finally installed and began tuning using Basic Micro's Motion Studio in the past week.

4 of the 6 motors tuned just fine. Two of them failed to register a speed or encoder reading.

Swapping motor controllers confirmed that it was the motor, not the motor controller as the source of error.

Meticulous continuity checking and wire swapping demonstrated that it was the motors, not the wiring as the source of the problem.

Placing 0.01uF caps from the encoder lines to GND as suggested by Basic Micro to limit noise failed to solve the problem.

We would like to return the two failed motors in exchange for 2 others. The invoices containing the order details are attached.

We would also be most interested in any autopsy findings on the failed motors!

We are quite happy with the motors otherwise, particularly the non-slip hex shaft, except --

1) they are quite noisy compared to the Pololu motors
<https://www.pololu.com/product/4888>

2) they are just a little too large to fit inside the ServoCity U-channel.
<https://www.servocity.com/3-0-channel>

If you come up with a similarly powerful but smaller and quieter motor, let us know and we will pass it on to the greater OSR build community!

Yours truly

James Phelan

USAi Labs

Houston, TX

--

James H Phelan
"Nihil est sine ratione cur potius sit quam non sit"
Liebniz

incl: 2 invoices & pix of REV HEX motors installation

2020.04.16

The replacement motors arrived at no cost from REV Robotics without any explanation of the prior failures. Re-mounted them on the rover today and reinstated the pivot at the middle wheel which I'd removed and made rigid when there were no middle wheels. Now I am about to tune them with Basicmicro's Motion Studio.

Strange...

1) osr_startup.service is ON THIS IS THE PROBLEM. Turn it OFF:

\$ sudo systemctl stop osr_startup.service

2) Basicmicro Motion Studio

each RoboClaw is added to the powered USB hub

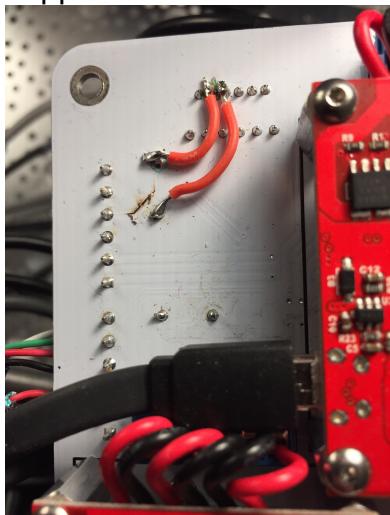
3) When each drive wheel slider was advanced, the motor would run the appropriate direction and speed for about a second and stop. If advanced more, it would run faster, then stop. If slid back, it would run slower then stop. Negative direction the same.

This problem disappeared when osr_startup.service was stopped.

It had been enabled to start on bootup, unlike during previous motor tuning.

2020.04.18 Home in “lockdown” due to COVID-19. Had USAI Lab Robotics Meetup via Cisco WebEx this time instead of Skype, thanks to Diane.

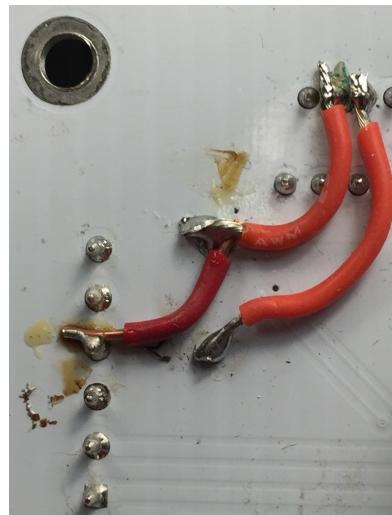
Today discovered Right Front wheel wouldn't read encoder. Also Left Front wheel. Via substitution determined it was the Right Front MOTOR but the RoboClaw for the Left Front and Middle motors, motor #2. Made sure the osr_startup.service was OFF and the Right Front motor worked OK again. Continuity check of the wiring from the Left Front motor to the PCB was intact. Examination of the RoboClaw side of the PCB showed a blown trace leading to the encoder circuit of the offending RoboClaw. This happened after an Over Current warning during tuning.



See offending trace near previous repairs in same area on the left.

See patch on the right prior to cleaning the flux spots.

Post-repair motor tuning successful all around.



HOWEVER... When Motion Studio is closed and the powered USB hub removed. The drive motors respond very quickly to forward and reverse commands. But, the right side steering motors on start of osr_startup.service turn to the right (clockwise from

above) about 30° and resist being re-centered. There's no provision in Motion Studio to set the center point of the steering motors. Perhaps it assumes (unwisely?) that center is $\frac{1}{2}$ way between Min and Max. May need to recalibrate those. Particularly as RC #5 that controls the left steering motors was giving a Position Error flag when Motion Studio was first started, but vanished after reloading the settings. On command to turn right, the right front motor turns right and the right rear motor turns left as expected. BUT the left side front and rear steering motors DO NOT RESPOND AT ALL even though they responded via Motion Studio. PERHAPS SOME OTHER TRACE BETWEEN THE PI AND THE ROBOCLAW BLEW? I'm beginning to think the PCB is under-engineered and/or poorly manufactured as I've had at least 2 traces blow on me.

See thread in TapaTalk – the blown trace was to J22 +5V which powers the Left Front steering encoder so it wouldn't register w/ the RoboClaw.

2020.04.19 Home

Raspberry Pi commands to the RoboClaws come through serial commands from pins TXD (GPIO14, pin 8) and RXD (GPIO15, pin 10) to RoboClaw #5 (and others) S1 and S2. I traced the entire paths and they are **intact!**? (With the help of transparency printouts of the front and back Cu layers [C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\open-source-rover-electronics-pcb-rework\Electrical\PCB\Control Board\Monolithic Board.kicad_pcb] along with the [general schematic.](#))

Now to rest them again. Maybe just messing around fixed something....

Attach powered USB w/ RC5, HDMI, keyboard, mouse.

Power up

\$ sudo systemctl stop osr_startup.service

Bring up Basicmicro Motion Studio

Connect to RC5/132

Slider on M1 working max 1354, min 163, center = 758.5 ~right

Slider on M2 working max 1472, min 275, center = 873 ~right

Now to try live....

Disconnect RC5/132 from Motion Studio & close MS

Disconnect RC5 from USB hub

Bring back up osr_startup. STILL no response from L side steering motors.

R side steering motors still turn out. [need to retune]

Bring up Basicmicro Motion Studio

Connect to RC4/131

Slider on M1 working max 1308, min 123, center = 715.5 ~right

Slider on M2 working max 1261, min 100, center = 680.5 (~650 looks right)

Wonder what Error Limit for Velocity and Position mean?

Nothing in the Help file on Motion Studio

Google found this: <https://resources.basicmicro.com/velocity-and-position-error-limit/>
...so keeping them both at 0 to disable.

Discovered what Position Settings Control lever was for – CENTERING!! When I first tried it, both sliders were at the bottom, which I thought was weird since they should be in the center. When I tried to nudge the slider on M1 up, the motor slammed into the negative position. Only after tuning for Velocity and Position did I try again to find that if I moved it up toward the center, the motor would wiggle about each position until I reached the center. I fiddled with the slider until the wheel was centered and the “position” reading approximated the center point I calculated and the wheel looked straight. The oscillations dampend around that point. Then STOP ALL. Let’s see how this affects the rovers live performance!

To recap:

RC4/131

Slider on M1 working max 1308, min 123, center = 715.5 ~right

Slider on M2 working max 1261, min 100, center = 680.5 (~650 looks right)

RC5/132

Slider on M1 working max 1354, min 163, center = 758.5 ~right

Slider on M2 working max 1472, min 275, center = 873 ~right

Now BOTH sides are steering, almost appropriately! But, the Right side still toes out on startup. Need to re-tune position for right side.

Retuned R side steering motors to toe IN to over-compensate for the toe-out error.

Rebooted and NOW it decides to behave!! But only at rest. Upon startup, the wheels toe in again on the right and wobble with driving. Perhaps will be fixed with the software upgrade.

2020.04.25 Home during USAi Labs virtual meeting

Sent PM on TapaTalk OSR Forum to Achille0:

Achille,

REALLY appreciate your taking the lead to clean up the documentation and ROS code for the OSR! Having been in on the project from its release I see it has suffered from beneficial mid-course corrections into the master control board and subsequent revisions and ROS. There have been work-arounds for the wonky steering but I don't see that it has been cleaned up back to a from-scratch install. I'm wondering if the install instructions are ready for a clean re-install or if I should wait?

If I should wait, what is the clean short-term fix for the wonky steering? My field is medicine, not robotics so I need a lot of hand-holding and am afraid of accidentally hopelessly mis-configuring the system.

Currently I have a system with the upgraded stronger steering motors. But when I start

the ROS system, the right front & rear wheels turn out about 15o in front and 30o in back despite having centered them with Motion Studio during tuning.

Don't know if PCB design is your interest, but I have had two PCB traces blow out on me requiring me to jump the broken connections. This affected RC5 running the left steering motors. Discovered this when the motors tuned fine on Motion Studio but were paralysed when using the Xbox. Had to be a problem between the Pi and the RCs. I feel the PCB is under-designed with traces that are too narrow to handle the current. I'll be posting my experience to the forums.

It's also designed to hang from the roof of the rover which makes it very awkward to service as the rover really isn't designed to lay on its back. Would like to see it completely re-designed and mounted to be accessed from the top. Would also like to see a break in the RoboClaw power traces with terminals to insert an optional remote kill switch that would affect the motor system but leave the RPi running to avoid unplanned shutdown.

Again, appreciate your leadership in this!

Jim Phelan
USAi Labs, Houston, TX

2020.04.26 Home

Google Hangout with Achille

Don't install ROS from source

were unable to re-install ROS as "source not found" despite changing the source list.

May have to rebuild according to the latest manual

Plan to re-configure for the Pi4 / Ubuntu later.

Was able to backup old ROS code then git clone into the osr_ws/src directory.

All the steering wheels shimmied but that's supposedly normal given the backlash of the steering motors vs the encoders. Can be corrected by changing the D(I think?) of the PID.

The steering motors are now straight except the right front is toeing in (instead of out) perhaps a result of overcompensating the center position.

Also getting loss of encoder signal errors.

Got "no LED display" warning (not plugged in).

Long lag between Xbox controller and wheel response prob due to high VNC overhead w/ the laptop.

Tried uv4l / webrtc install AGAIN! FAIL, AGAIN!

PROCESSOR UPGRADE -

Raspberry Pi 3B+ / Raspbian Buster

>> Raspberry Pi4 / Ubuntu v?

With the help of Achille Verheye, TapaTalk OSR forum.

2020.05.05 Home

Achille,

I'm ready to start with upgrading the OSR to the Pi4. I'm sure I can't handle trying to do it all in one session! Let's do baby steps. If you know of a reliable guide to installing the appropriate version of Ubuntu on the Pi4 I can start it myself. If all goes well, we can then configure Ubuntu to my local environment. Then set up Git to load the appropriate ROS code. Then swap the new Pi4 in place of the old Pi3B+. Then re-tune the motors.

Let's start with which version of Ubuntu do I want? Is there a reliable guide for Pi4 install?

I will be in San Antonio again this weekend but maybe I can accomplish a lot in the evenings.

Jim

BTW I found an old iPhone 4. I'll see if I can set up a line for it and use it to FaceTime with the rover.

2020.05.06 Achille's reply:

Hi Jim,

Sounds good.

You want Ubuntu 18: <https://ubuntu.com/download/raspberry-pi> it is now officially supported so should be straightforward.

I would recommend brushing up on git if you have some spare time. It really is a powerful tool which will help you a lot while developing.

I would not use iPhone as it would be impossible to interface with the thing from the Pi. Better to get some kind of cheap Android tablet. Will save you a lot of hassle setting it up and coding on it.

Cheers
Achille

my reply:

Achille,

Thanks!

I'll get started on Ubuntu 18 & document my progress.

I'll look into Android tablets. The ones I've seen so far are too large and don't have cell capability (like my wife's Kindle Fire). I'll check w/ my local ATT store and online for maybe a used pair. I assume I want "unlocked."

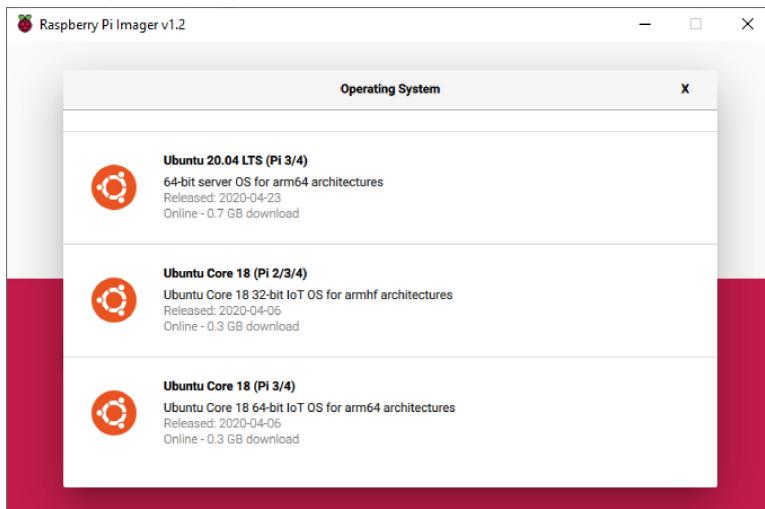
Jim

another:

Achille,

Already running into questions. Do I want 32 or 64?

Jim



2020.05.06 TapaTalk

Jim,

It would probably be faster for you to google these kinds of questions than to ask me. One is Ubuntu 20 which you don't want. The difference between the other two is that one is based on 64 bit and the other on 32 bit length instructions. Modern software typically is 64 bit so I would go with that one.

Achille

2020.05.06 TapaTalk

Achille,

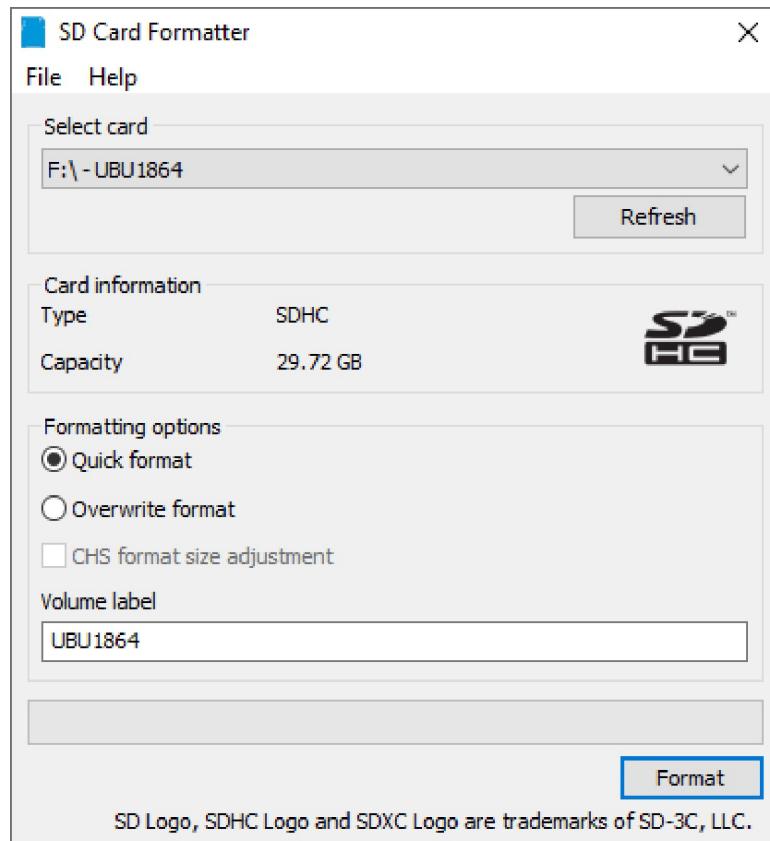
More important is which version did YOU use? My system needs to be EXACTLY the same as yours. Any install is difficult enough without starting off with different OS and finding some incompatibility with the hardware, ROS or the Python or C rover code down the road. I trust your expert opinion having already done this successfully much more than my uninformed pinballing through random Google hits that are only tangential to the question at hand.

So, assuming you also installed Ubuntu 18 - 64 bit on your Pi4, I will begin the same. I'm sure there will be many more "silly" questions to come!

My goal is, with your help, to parlay my ignorance into a roadmap for others as naive as myself to follow. Too often expert instructors have forgotten what the noobie doesn't know that they take for granted and leave out explanations for key decisions points (like 32 vs 64 bit). Without your guidance I would assume the "recommended" Ubuntu 20 not knowing perhaps that ROS isn't compatible.

Thanks for your indulgence of my ignorant questions!

Jim





Ubuntu 18 64 bit

Moved SD card to Pi4 equipped with:
HDMI cable & adapter
USB power supply
USB keyboard
USB mouse
Ethernet cable connected to router
WiFi available

"If you are using an HDMI screen and a USB keyboard, ensure they are plugged in before powering the Pi. You will be able to see the boot process on screen and log in using "ubuntu" as both the password and login ID."

The boot process stalls at creating an account.

No login ID nor password is requested:

Boot up

Profile setup:

Ethernet IPv4

WiFi

email address

Enter an email address from your account in the store.

If you do not have an account, visit <https://login.ubuntu.com> to create one

On the laptop <https://login.ubuntu.com> :

full name James H Phelan

user name jhphelan

email jhphelan@hal-pc.org

password: *****

Applications

none

SSH Keys

Import new SSH key

Insert the contents of your public key (usually `~/.ssh/id_dsa.pub` or `~/.ssh/id_rsa.pub`).

Note: Only SSH v2 keys are supported.

Public SSH Key:[]

??????

At the Pi:

entered email address

Creating user failed:

error: while creating user: cannot create user for “jhphelan@hal-pc.org”: no ssh keys found.

?????

Let's reflash the SD card and start over –

“Getting setup with Wi-Fi

With the SD card still inserted in your laptop, open a file manager and locate the “system-boot” partition on the card. It contains initial configuration files that will be loaded during the first boot.

Edit the network-config file to add your Wi-Fi credentials. An example is already included in the file, you can simply adapt it.”

There is NO such network-config file in the boot partition of the SD card as viewed in Windows.

Since WiFi setup worked on initial boot on the Pi, go that route.

press *ENTER* to *configure* [ENTER]

Ubuntu Core

Configure the network and setup an administrator account on this all-snap Ubuntu Core system. [OK]

(spontaneous reboot?!)

(Back to Ubuntu Core)

Network connections:

eth0 > Will use DHCP for IPv4, currently has address: 192.168.1.15
has no IPv6....
wlan0

(spontaneous reboot?!)
(Back to Ubuntu Core)

Clearly the Superpbag 2A powered USB hub is inadequate for the job.
Need a more powerful USB supply. Ordered CanaKit 3.5A.
Power OFF.

2020.05.08 San Antonio

consider using USB power from wall-powered OSR Control Board pending arrival of
CanaKit power supply.

TapaTalk to Achille:

Achille,

"You want Ubuntu 18: <https://ubuntu.com/download/raspberry-pi> it is now officially supported to should be straightforward."

Unfortunately, it's anything but "straightforward".

The Raspberry Pi Imager works fine to dowload the Ubuntu 18/64.

Then it says to edit the network-config file to allow WiFi on bootup. There is NO such file on the boot image. In the past it's always been possible to configure WiFi after boot-up, so skip to boot-up. You want Ubuntu 18:

<https://ubuntu.com/download/raspberry-pi> it is now officially supported to should be straightforward.

Instead of booting up to requesting username and password, it boots up to WiFi config (fine) then wants my email for some kind off account in the store. Followed the link to the store and created an account, but then it wants a public SSH key. ?? Can not get past this point.

Currently helping my daughter move to San Antonio, TX so won't get to try again til Monday.

Jim

2020.05.13 Home

Reeling from Achille0's "help" of "Google it and figure it out for yourself" I decided to try afresh and do just that. Carlito mentioned someone in the Sunday group is looking forward to the next release of ROS 2 on 6/5/20 on Ubuntu 20 on Raspberry Pi 4.

Meanwhile went to YouTube and searched:

"ubuntu core 18 raspberry pi 4" (didn't intend include "core" but it offered)
and came up with:

<https://www.youtube.com/watch?v=fZbJle2oj8k>

dated 2020.03.17

Too late, tired to try today.

2020.05.14 Home

Going to try above install.

SD card 32GB

SD Card Formatter; reformat "UBU1864"

<https://ubuntu.com/download/raspberry-pi>

Only offers Ubuntu 20.

Try link: "First time installing Ubuntu on Raspberry Pi? Follow our tutorial >"

next

takes you to Raspberry Pi Imager (which I already have)

Choose OS / Ubuntu / Ubuntu Core 18 64 bit

Choose SD Card / F: [doesn't give option to download to PC]

write

Youtube suggests Etcher to write to SD card

[It's already written by Raspberry Pi Imager]

I have used Win32 Disk Imager in past as works both ways but not needed here

Open Notepad++ & Update to v7.8.6 **[NOT NECESSARY if not overclocking]**

DON'T USE plain Notepad as may corrupt configuration

Youtube recommends OVERCLOCKING Pi4, I won't be doing this at this time.

Unplug / replug SD card to edit it. **[NOT NECESSARY if not overclocking]**

Look for system-boot partition [doesn't exist in this image!]

Find "config" file [or "config.txt" if extensions are visible]

RIGHT CLICK and edit w/ Notepad ++

to overclock, add to bottom of file: I won't be doing this at this time

over_voltage=6

arm_freq=2000

save & close

Move to RPi4 & boot up

While waiting for RPi4 power supply to be delivered tomorrow, because of brown-outs & spont. reboots from powered USB hub, made a switched USB plug with PowerPole input end to use w/ 5V output of old desktop power supply. Confirmed 5V to the cable (had to push connectors in better). Confirmed RPi4 powered up when switched on. (No SD card at first).

Power-on RPi4

Boots up to Ubuntu Core logo, long delay blank screen

Press enter to configure. [ENTER]

Does NOT boot up like YouTube video.

Does NOT ask for username / password

spontaneously reboots, still!!

Ubuntu Core

Configure the network and setup an administrator account on this all-snap Ubuntu Core system. [OK]

Still wants to do the stupid store account.

Googled this: “ubuntu 18 for raspberry pi 4 not all-snap” and stumbled to this:

<https://ubuntu-mate.org/ports/raspberry-pi/>

chose “Downloads” from top bar and got this:

<https://ubuntu-mate.org/download/>

from where I chose this:

Raspberry Pi (experimental)

64-bit. Compatible with models: B3 and B3+

which took me here:

<https://ubuntu-mate.org/download/arm64/bionic/thanks/>

which downloaded this:

ubuntu-mate-18.04.2-beta1-desktop-arm64+raspi3-ext4.img.xz

Which I extracted using 7-Zip to:

ubuntu-mate-18.04.2-beta1-desktop-arm64+raspi3-ext4.img

Using SD Card Formatter *overwrite* formatted the 32GB SD card to be super-clean

Using Win32 Disk Imager flashed .img to SD card

Eject & move SD card to RPi4

FAILS TO BOOT

replace in PC, files are there and editable by Notepad++

config.txt looks different than YouTube

FAILS TO BOOT

starts to boot w/ green (SD card reader) light on for a second, then off.

Swapped prev SD card (Buster?). Again FAILS TO BOOT

Power issue?

Change back to powered USB hub....

Try writing Raspbian to SD card & rebooting...
This boots successfully!

Try writing Ubuntu 20.04 64 to SD card & rebooting...
This boots successfully!

Ubuntu login: [49.821785 undervoltage detected]
ci-info: no authorized SSH keys fingerprints found for user ubuntu
###

BEGIN SSH HOST KEY FINGERPRINTS

...

###

BEGIN SSH HOST KEYS

...

END OF SSH HOST KEYS

...

[166.751436] under-voltage detected! ...

FREEZES HERE

^C

^D

Ubuntu 20.04 LTS ubuntu tty

ubuntu login: [ubuntu]

Password: [ubuntu]

change password...

[C-]

...

ubuntu\$ubuntu:~\$ **sudo shutdown -h now**

Try writing Ubuntu 18 Core 32 bit...

Press enter to configure [ENTER]

Ubuntu Core

Configure the network and setup an administrator account on this all-snap Ubuntu Core system. [OK]

down-arrow to wlan0 [ENTER]

Configure WIFI settings [ENTER]

...done

[keep getting spont reboots w/ low voltage signals.

UNPLUG fan to reduce load]

persistent FAIL

2020.05.14 Home try fresh /p dinner

Google: "ubuntu 18.04 raspberry pi 4"

scroll down to:

Ubuntu 18.04 and Raspberry Pi 4 support - Raspberry Pi ...www.raspberrypi.org › forums › viewtopic Feb 17, 2020

<https://www.raspberrypi.org/forums/viewtopic.php?t=265415>

scroll down to:

Tue Mar 24, 2020 3:11 pm

The official Ubuntu image is labelled raspi3, but there is raspi4 image here which works fine on 4B:

<https://jamesachambers.com/raspberry-pi ... nofficial/>

which takes you to:

<https://jamesachambers.com/raspberry-pi-4-ubuntu-server-desktop-18-04-3-image-unofficial/>

which take you to:

<https://github.com/TheRemote/Ubuntu-Server-raspi4-unofficial/releases>

from which I chose Desktop instead of Server:

<ubuntu-18.04.4-preinstalled-desktop-arm64+raspi4.img.xz>

NOW, let's see if we can extract and boot this *&^%\$!

Flashed to the SD card

Move to RPi4

seeming normal boot-up scrolling commands

long blank screen

displays logon:

Ubuntu

[it's asking for login = "ubuntu"]

then asks for password "ubuntu"

then asks for NEW password "password"

then retype new password "password"

opens to Mate (?) desktop

WiFi configured

Ethernet stumbling to configure eth0 "DISABLED"

Internet search: not helpful

\$ sudo apt-get update

\$ sudo apt-get upgrade Y

MAJOR upgrade!

Fixed eth0 problem!

GIT TUTORIAL

On Achille's recommendation am digging deeper into Git & Github
Starting w/ Youtube Tutorials:

Learn Git in 15 Minutes

<https://www.youtube.com/watch?v=USjZcfj8yxE>

With associated notes "Introduction to Git":

<https://www.notion.so/Introduction-to-Git-ac396a0697704709a12b6a0e545db04>

9

Learn Github in 20 Minutes

<https://www.youtube.com/watch?v=nhNq2klvi9s>

With associated notes "Introduction to GitHub":

<https://www.youtube.com/watch?v=nhNq2klvi9s>

2020.05.21 PM on TapaTalk:

Achille,

I was finally able to get Ubuntu 18.04 running on the RPi4. Recently Ubuntu stopped offering the choice of Ubuntu version - 18, 19, or 20 and started offering ONLY 20.04. Trying to find a back way to 18.04 I ran into the Catch 22 install of having to have an Ubuntu One account. It shouldn't have existed, but it did. I finally found an "unofficial" ubuntu image for 18.04, flashed it, booted and update/upgraded it to where it seems to be working. Am able to PuTTY, VNC and FileZilla into to Pi.

I've done a few YouTube tutorials on Git/Github and am fairly familiar with it and, as is usual, examples don't always match up with reality, but I was able to work around the problems.

The OSR code is not a place I want to stumble around and muddy things up. Are you willing to assist me in properly getting the ROS code loaded? Our working through it together and solving problems as they surely pop up will teach me, in a real application, way more than all the theory and YouTube videos I could watch.

I have Thursday afternoon off tomorrow. My daughter is home from grad school this holiday weekend but I could set aside an hour or two.

Thanks!!

Jim Phelan

you can email direct: jphelan@hal-pc.org
or text to 281-460-6923

2020.05.28 Home

Response from Achille0:

Hi Jim,

You can still download Ubuntu 18.04 officially from the website:

<https://ubuntu.com/download/raspberry-pi>

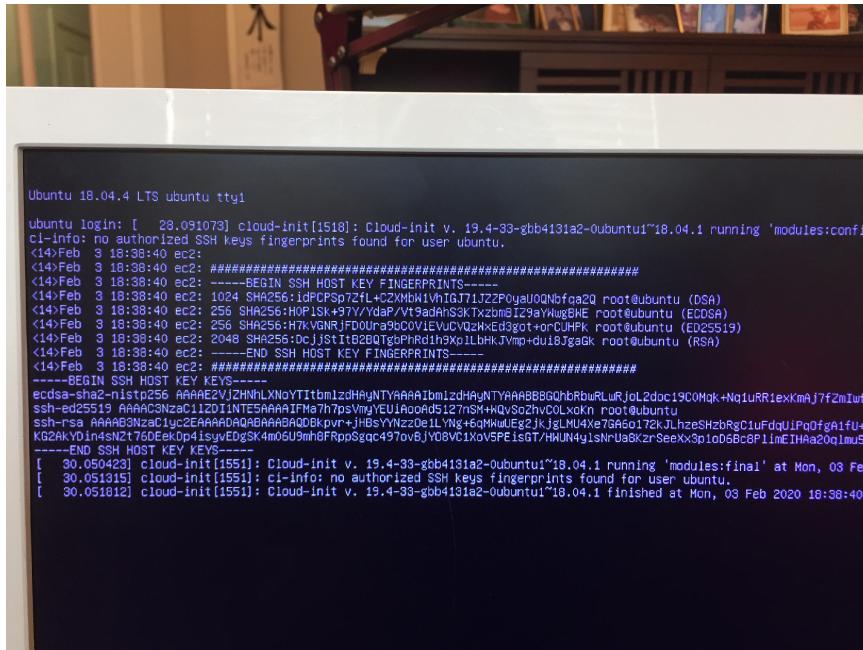
You shouldn't have to create an account. Once ubuntu server is installed you can decide to install a desktop (but you don't have to) so you can plug in an HDMI and see a desktop.

My contribution to OSR is voluntary and on my free time of which I don't have much so unfortunately I can't sit through hours of helping you. I can however help you with questions. And that's what the forums are for, so that others can pitch in and learn as well. So happy to answer any specific questions, but the purpose of this project is to learn and understand, and sometimes that involves staring at Youtube videos for half a day. That's how I learned myself.

Best,
Achille

Went to above link. Downloaded 18.04-64 bit.
Extracted using 7-Zip to .img
SD Card Formatter; Win32 Disk Imager to 16GB SD card.

Booted in RPi4
came up and got stuck here:



I recalled seeing “hit any key to halt auto-boot” or something like that.
Rebooted and hit SPACE.
Opened to Login: [ubuntu] Password: [ubuntu]
instructed to change password
Re-enter password [ubuntu]
Enter & confirm new password [secret] [secret]

Install Desktop of my choice:
Google: “best ubuntu desktop for ubuntu 18.04”
Gnome failed
KDE failed

Got this error trying to install. Solved using Method 2.

<https://itsfoss.com/could-not-get-lock-error/>

Method 1: sudo killall apt apt-get
apt: no processes found
apt-get: no processes found

Method 2:
Able to finally install but has no apps, not even Terminal. How to delete? (Start over?)

Let's try Mate desktop...
\$ sudo apt install tasksel
\$ sudo apt update
\$ sudo tasksel install ubuntu-mate-desktop
long... install

failed at first,
had to follow Method(s) above
reinstalled tasksel
reinstalled Mate
success! Booted to Mate desktop

2020.05.30 Home

The custom installed Mate desktop needs a lot of configuring.
I like the preinstalled Ubuntu 18 + Mate better.

Response from Achille:

Jim,

1 - git does not come with ubuntu. You'll need to `sudo apt update && sudo apt upgrade`
&& sudo apt install git'
2 - you should install ROS (Melodic) yourself as before.
<http://wiki.ros.org/melodic/Installation/Ubuntu>
3 - download the code from the main repo. All my changes have been merged in there.

I don't have a display actually, I put a bunch of sensors instead that are power hungry enough as is :)

Looking forward to seeing your contributions!

Achille

Followed his instructions & got git installed ok.
Now working to install ROS:
<http://wiki.ros.org/melodic/Installation/Ubuntu>
NOTE case counts in the url.
If you enter lower case installation or ubuntu you get to a dead page!

Following directions get error:
E: Unable to locate package ros-melodic-desktop-full

Googling error not helpful.
Downloaded "Software Steps.pdf" from OSR Github but it won't open.
Tried to VNC to desktop, got error
Download "Software Steps.pdf" to laptop
can't open there, apparently corrupted
Viewing "Software Steps.pdf" online the links for installing don't function

Entered manually link for gpg key issue. Downloaded key appears to be the correct one C1CF...
Didn't see any error with the "sources.list" either.
Googled error message within last year and followed 'answers.ros.org' link
re-added source
re-ran 'sudo apt update' & got 8 options
re-ran 'sudo apt upgrade'
re-ran 'sudo apt install ros-melodic-desktop-full'
success, at least a bunch of stuff is downloading...!
finished w/o errors.

*SHUT-DOWN and install using the other card....
Server card + self-installed Mate doesn't have a lot of apps & is confusing.
Go BACK to 18.04 Desktop which is more pre-configured.*

Having trouble running VNC

Don't know why as it worked before, I think on this same setup.

Am able to PuTTY into Ubuntu

Am able to FileZilla into Ubuntu

Remote Desktop fails (not installed on Pi?)

x11vnc pre-installed on Desktop

2020.06.04 Home

VNC install

Several searcher for "how to install VNC on Ubuntu 18.04?"

Led to several complicated installation and configuration scenarios.

I recall just trying

\$ sudo raspi-config

even when in Ubuntu and having it work

I was able to configure for VNC and seemed to get a step further logging if but authentication still failed. It always directs me to the VNC server log, but no indication where that is.

\$ sudo find / -name *.log

(or vnc*)

not helpful.

May just try rdesktop

\$ sudo apt install xrdp

Gets connection problem regardless of protocol selected

2020.06.04 Home

Keep getting this error:

E: Unable to acquire the dpkg frontend lock (/var/lib/dpkg/lock-frontend), is another process using it?

Google the error w/o the E: or it will look for your E: drive.

Try this permanent solution to stop auto-updates:

<https://linuxconfig.org/could-not-get-lock-var-lib-dpkg-lock-ubuntu-debian>

Having the Ubuntu system trigger background update and preventing the user from using the apt or dpkg command can be very frustrating situation.

The solution is to stop automatic background system package list updates and run updates manually. To turn off automatic updates edit /etc/apt/apt.conf.d/20auto-upgrades using your favorite text editor:

```
$ sudo nano /etc/apt/apt.conf.d/20auto-upgrades
```

Once you have the file opened, switch off the Update-Package-Lists directive from 1 to 0 as shown below on Line 1:

```
APT::Periodic::Update-Package-Lists "0";  
APT::Periodic::Unattended-Upgrade "1";
```

re-entered

\$ sudo apt upgrade
and it progressed normally.

Possibly it just had time to finish & unlock. Hopefully it won't do that any more.

2020.06.05-06 Home
Processor upgrade

<http://wiki.ros.org/melodic/Installation>

Select Your Platform: *Ubuntu*

<http://wiki.ros.org/melodic/Installation/Ubuntu>

1.1 Configure your Ubuntu repositories

Configure your Ubuntu repositories to allow "restricted," "universe," and "multiverse."

You can follow the Ubuntu guide for instructions on doing this.

<https://help.ubuntu.com/community.Repositories/Ubuntu>

The operations described on this page modify the software repositories configuration file /etc/apt/sources.list. If you wish to, you can modify this file directly. For further details please see Managing Repositories from the Command Line.

<https://help.ubuntu.com/community.Repositories/CommandLine>

1.3 Set up your keys

...unchanged (confirms I did this already)

1.4 Installation

sudo apt update

sudo apt upgrade (0 upgraded0

Desktop-Full Install: (Recommended) : ROS, rqt, rviz, robot-generic libraries, 2D/3D simulators and 2D/3D perception

sudo apt install ros-melodic-desktop-full

(already installed)

1.5 Environment setup

echo "source /opt/ros/melodic/setup.bash" >> ~/.bashrc

source ~/.bashrc

1.6 Dependencies for building packages

sudo apt install python-rosdep python-rosinstall python-rosinstall-generator

python-wstool build-essential

1.6.1 Initialize rosdep

sudo apt install python-rosdep

already newest version

...use sudo apt autoremove to remove them

sudo apt autoremove

sudo rosdep init

rosdep update

DONE

2020.06.06 Home
Processor upgrade

Back to “Software Steps”:

Was able to download uncorrupted “Software Steps” from Achille’s OSR Github.
FileZilla’d it to Desktop of Pi4. Click to open successful!

2.3 Setting up serial communication

Run the following commands on the Pi to setup/enable the serial communication for the RoboClaws:

sudo raspi-config

[I’m not running Raspbian, but rather Ubuntu 18.04.
But, I know I can run raspi-config, as above. So...do it.
(I think I already did previously.)

Didn’t tell me to reboot so suggests was already done.]

Once the Pi reboots, open up a terminal again and look at the serial devices:

ls -l /dev/serial*

no such file or directory

Maybe I do need to reboot....

Oops, skipped a step in raspi-config. Retry & reboot.

no such file or directory

Sent PM to Achille0 on TapaTalk for suggestions.

Tried

sudo nano /boot/cmdline.txt

but get blank file

Googled:

configuring gpio serial port ubuntu "18.04" raspberry pi 4

which led to:

<https://askubuntu.com/questions/1215848/how-to-disable-ttyama0-console-on-boot-raspberry-pi>

and tried

I had this issue resolved for 18.04 by bypassing grub completely by adding these lines to the [ALL] section of /boot/firmware/config.txt:

kernel=vmlinuz
initramfs initrd.img followkernel

I also had device tree commented out in the same file as well but not sure if it was necessary.

REBOOT
but...

ls -l /dev/serial*
no such file or directory

Presented problem to USAI Labs virtual meeting this am.
Avi indicated he knew command line solution.
Emailed Avi w/ above lack of progress notes.

Posted to USAI Labs TapaTalk forum.

Meanwhile, will work on LED display. See next page.

2020.06.15
Processor upgrade

Posted to OSR TapaTalk forum:
serial port problems with Ubuntu 18.04

With the help of @Achille0 I was able to install Ubuntu 18.04 on the RPi4.
But when I get to the place in "Software Steps" to find the serial devices using "ls -l /dev/serial**" I get "no such file or directory".
I've seen this before when I unsuccessfully tried Ubuntu on the RPi3 in the beginning.
I vaguely recall some work around either with Ubuntu or in the OSR code to fix this.
Anybody know the fix?
Jim Phelan
Also, I can PuTTy ok into the RPi4, but have run into nothing but roadblocks trying to VNC into it.
"sudo raspi-config" appears to work, even tho it's Ubuntu and not Raspbian, but it has no effect.

2020.06.06 Home
LED display
“Software Steps.pdf”:
1 Flashing the Arduino Code

Arduino IDE is already installed.
Update done

OsrScreen.ino

```
#include <RGBmatrixPanel.h>
#include <OsrScreen.h>
Screen screen(1)

OsrScreen.h
#include "../RGB_matrix_Panel/RGBmatrixPanel.h"
#define BIT_MAX          15
#define RED              BIT_MAX,0,0
#define GREEN             0,BIT_MAX,0
#define BLUE              0,0,BIT_MAX
#define BLACK             0,0,0
#define WHITE             BIT_MAX,BIT_MAX,BIT_MAX

#define YELLOW_GREEN      7,BIT_MAX,0
#define YELLOW             BIT_MAX,BIT_MAX,0
#define YELLOW_RED         BIT_MAX,7,0

#define PREAMBLE_HIGH     0xAB
#define PREAMBLE_LOW       0xCD

#define CONNECTED_POS      2
#define BATTERY_POS        3
#define STATUS_POS         4
#define TEMP_POS           5
#define DRIVE_POS          8
#define STEER_POS          11
#define FACE_POS           13
#define CHKSUM_POS         14
#define MAX_MILLIS_TO_WAIT 10000
#define RUNNING            0x00
#define IDLE               0x01

class Screen: public RGBmatrixPanel
```

OsrScreen.cpp

```
#include "OsrScreen.h"
#include "Arduino.h"
#include "../RGB_matrix_Panel/RGBmatrixPanel.h"
Screen::Screen(int t) : RGBmatrixPanel(14,15,16,8,10,9,false)
void Screen::init_display()
```

RGBmatrixPanel.h

```
#include "Arduino.h"
#include "Adafruit_GFX.h"
```

RGBmatrixPanel.cpp

```
#include "RGBmatrixPanel.h"
#include "gamma.h"
```

2020.06.11 Home
LED Display

Focus on Arduino code.
Re-downloaded “Software Steps.pdf”.

2. *Download the Arduino code:*
(a) *Navigate to <https://github.com/nasa-jpl/osr-rover-code> and click the green 'Clone or download' button. Choose 'Download ZIP'.*

Unzipped in OSR2020.06.11 folder
Deleted .zip file

- (b) *Unzip/extract and open the downloaded zip file. Then, select the Arduino folder and create a new zip file of just that Arduino folder. Name it OsrScreen.zip*

There is no Arduino folder!
Go back to OSR Github / Software
you have to open the “rover-code @ 9197f3a...” folder
Download that, unzip & discard .zip file.

*Then, select the Arduino folder and create a new zip file of just that Arduino folder.
Name it OsrScreen.zip*

Can't just R-click it. Call up 7-Zip.
Navigate to OSR2020,06,11 / osr-rover-code-919...
R-click Arduino folder, Add to Archive, Archive format = zip
“Osrscreen.zip”
OK
DRAG the Osrscreen.zip file out of 7-Zip to the osr-rover-code folder. [strange but ok]

I have the LED display out of the rover.
The LED power jack is powered by an external 5v supply not connected to the Arduino
nor its daughterboard.
The Arduino is plugged into the laptop via USB cable.

3. *Load the sketch onto the Arduino*
(a) *Unplug the Arduino shield JST cable so the Arduino isn't powered by the control board*
(b) *Connect the Arduino to your development machine with USB cable*
(c) *Open Arduino IDE*
(d) *Select Sketch - Include Library - Add .Zip Library*
(e) *Select the OsrScreen.zip folder created previously*
Arduino: 1.8.12 (Windows Store 1.8.33.0) (Windows 10), Board: "Arduino Uno"
“A library named Arduino already exists”

Go to C:\Users\Me\Documents\Arduino\libraries and
DELETE Arduino folder (contains OSR code)

Go back to 3 above & repeat.

"Library added to your libraries. Check 'include library' menu"

(f) Click the Upload button in the Sketch Window

BLANK SCREEN on LED display

Only sketch_jun11a shows on Arduino IDE, not rover code.

Something is missing! I think 4 should come before the upload above.

4. To load the example in the Arduino IDE:

(a) File - Examples - OsrScreen - OsrScreen

(f) Click the Upload button in the Sketch Window

SUCCESS!

Original "Happy Face" has returned to the LED display (as opposed to modified face Jessica, a visitor to USAi Labs, created to explore the display.)

Found scroll display file here:

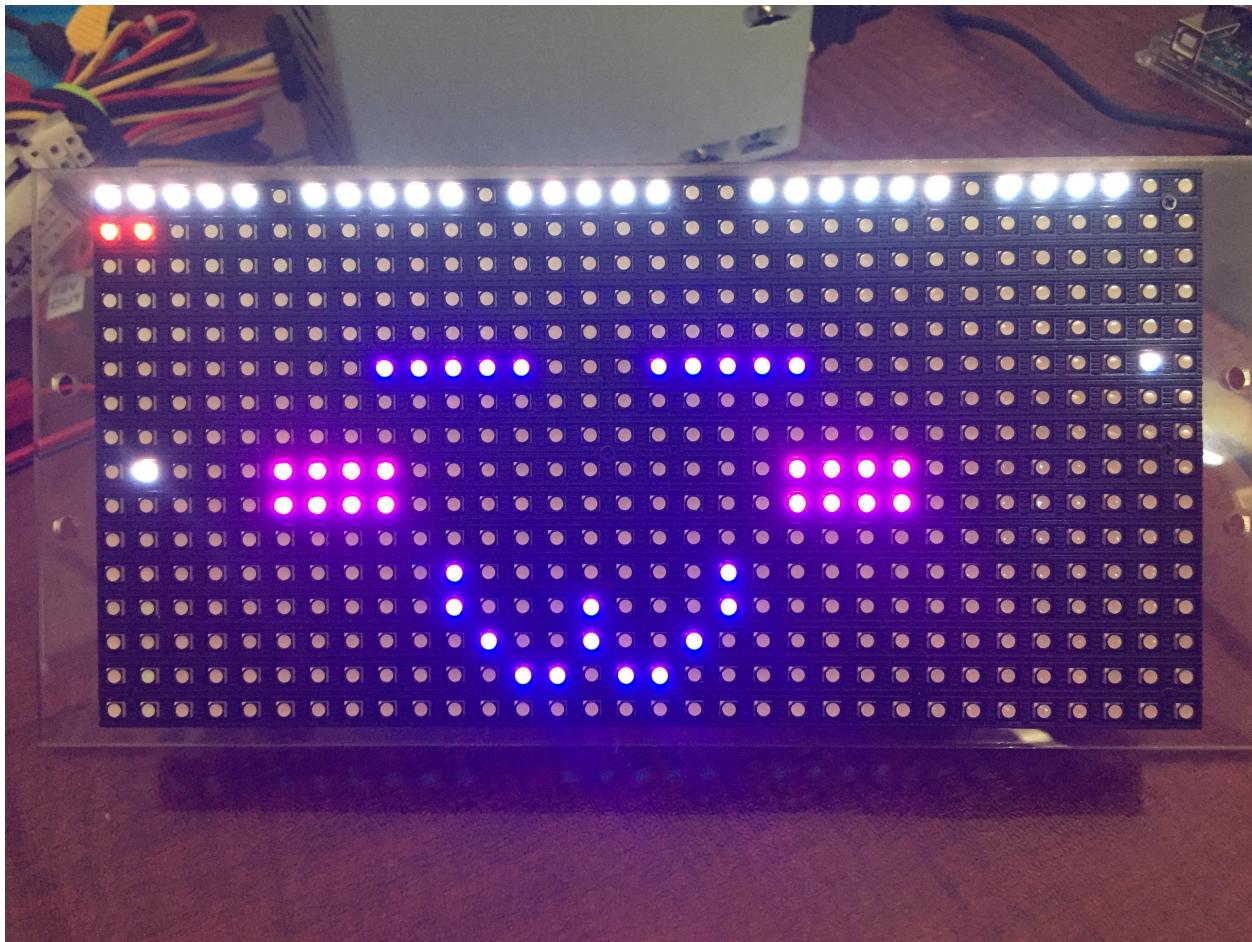
C:\Users\Me\Documents\Arduino\UASi_Labs_NASA_JPL_Open_Source_Rover_scroll
h@rd0nna8

2020.06.13 Home LED Display

Looking through the Arduino code this week and playing with 32x16 rectangle of graph paper I found the map of the the origins of the OSR status lights in:
OsrScreen.h

```
int TEST_MODE          = 0;
int state              = IDLE;
int BATTERY[2]         = {0,0};
int CONNECT[2]         = {0,1};
int STATUS[2]          = {6,0};
int TEMP[2]            = {12,0};
int DRIVE_CURRENT[2]   = {19,0};
int STEER_CURRENT[2]   = {26,0};
int DEBUG[2]           = {0,8};
int STATE[2]           = {1,1};
```

the {column, row} of the LED panel with {0,0} as the upper left origin of the {0-31, 0-15} screen.



Next is to get rid of the silly smiley / sleepy face and replace it with a stick figure of the rover with clear locations for the drive and steering wheel current indicators and the others. Currently the drive motor and steering motor indicators are in row clusters together. In the new scheme they'll have to be separate individual locations on the image of the rover.

2020.06.20 Home
Processor Upgrade
email to USAi Labs core team:

Team,

The Mars rover is designed to run ROS under Raspbian on the RPi3.
This configuration is becoming obsolete and inadequate for upgrading to AI applications.
Ultimately we need ROS2 on Ubuntu 20 on the RPi4 and ultimately the Jetson NANO or better.

The intermediate step is to run it still in ROS(1) but on Ubuntu 18 on the RPi4.
In converting from Raspbian to Ubuntu I'm running into problems --
In the "Software Steps.pdf" from the NASA/JPL Open Source Mars Rover Github:
<https://github.com/nasa-jpl/open-source-rover/blob/master/Software/Software%20Steps.pdf>

After installing Raspbian and ROS, in section 2.3 Setting up Serial Communication it says:

2.3 Setting up serial communication

In this project we will be using serial communication to talk to the motor controllers.
Serial communication is a communication protocol that describes how bits of information are transferred between one device and another. You can find more information on serial communication at:

<https://learn.sparkfun.com/tutorials/serial-communication>

Run the following commands on the Pi to setup/enable the serial communication for the RoboClaws:

sudo raspi-config

In the raspi-config menu, set the following options:

- Interface Options > Serial
- Would you like a login shell to be accessible over serial? > No
- Would you like the serial port hardware to be enabled? > Yes
- Would you like to reboot now? > Yes

Once the Pi reboots, open up a terminal again and look at the serial devices:

ls -l /dev/serial*

Make sure that this shows serial0 -> ttyS0 . If it does not, ensure that you have followed every step in this tutorial in order. Next, edit the /boot/cmdline.txt

sudo nano /boot/cmdline.txt

Change ONLY the part with "console =" to read "console=tty1" and remove any other instance where it references console. The first bit of that line should look similar to the Figure 1: 1

BUT when I do the

ls -l /dev/serial*

in Ubuntu, I get "no such file or directory".

So, how to I implement the same function in Ubuntu 18.04?

Jim

2020.06.22 Home
Processor upgrade

Google: “**configure serial port in Ubuntu 18.04**”

<http://manpages.ubuntu.com/manpages/bionic/man8/setserial.8.html>

suggests **setserial** command referencing one of the ports in /dev
ubuntu@ubuntu:~\$ **setserial /dev/ttys0**

Command 'setserial' not found, but can be installed with:

sudo apt install setserial

so...

\$ sudo apt install setserial

success

ubuntu@ubuntu:~\$ **setserial /dev/ttys0**
/dev/ttys0, UART: 16550, Port: 0x0000, IRQ: 21

Something is niggling me in the back of my brain that the secret is to not worry about serial0 -> tty0 and just leave that part in the /boot/cmdline.txt to change console to tty1 and we'll have it. Maybe?

2020.06.25 Home
Processor upgrade

On 2020.06.23 Timsent posted:

I'm guessing I can use "/dev/ttys0" or "/dev/ttyAMA0" directly versus "/dev/serial0" in Ubuntu by changing line 105 in roboclaw_wrapper.py. Going to give that a try and see what I get.

On 2020.06.24 Achille0 posted:

@timsent I don't recommend that. You're likely facing a different problem if you're not seeing /dev/serial0. `/dev/ttyAMA0` is not the right device to talk to. If you do want to try it, rather than modifying the code, simply modify the yaml file:

<https://github.com/nasa-jpl/osr-rover-c ... arams.yaml>

```
motor_controller:  
  baud: 115200  
  device: "/dev/serial0"  
  addresses: "128,129,130,131,132"
```

Change to “/dev/ttys0” ??

What about /boot/cmdline.txt? Does it remain “console=tty1”?

2020.06.27 Home Processor Upgrade

Post to TapaTalk:

@achille0 @leosent @timsent

In Ubuntu 18.04, \$ ls -l /dev/serial* does not return serial0->ttyS0.

\$ ls -l /dev returns (among others) tty, tty0-tty63, ttyAMA0, ttyS0

*"if you're not seeing /dev/serial0. `/dev/ttyAMA0` is not the right device to talk to. If you do want to try it, rather than modifying the code, simply modify the yaml file:
https://github.com/nasa-jpl/osr-rover-c ... osr_params.yaml"*

osr_params.yaml includes the line:

 device: "/dev/serial0"

if

 \$ ls -l /dev/serial*

is supposed to return

 serial0 -> ttyS0

then in osr_params.yaml should it read

 device: "/dev/ttyS0"

?

Also --

In /boot/cmdline.txt should console=tty1 as before?

JHP

2020.06.27 Home USAi Labs virtual meetup

Update from

Karl on LoRaWAN

Kevin on General AI, links to GAI curricula

Roberto on the Jetson NANO YouTube videos to install & configure NANO
me on OSR serial port issue

2020.06.27 Home Steering Upgrade

Post to TapaTalk forum:

Switching from motors to servos for steering

https://www.tapatalk.com/groups/jpl_opensource_rover/switching-from-motors-to-servos-for-steering-t200.html#p1478

@dcschooley @gfosmire @achille0

We were pondering the same issue. I'd like to see the cost and specs on the proposed servos. My sense was that the more powerful servos that we thought would work were expensive and more concerned about speed and precision whereas the rover steering can be relatively slow and doesn't have to be terribly precise. I was thinking that a small motor with a rotary encoder and a worm gear could drive the steering cog on a shaft that would be properly supported by the frame rather than the steering motor. A simple low-cost geared potentiometer could give the zero position to a reasonable degree of accuracy on startup. Otherwise, so many motor turns equals so many degrees of steering. Thoughts of those way more qualified than me?

JHP
USAi Labs
Houston

ejunkins reply:

@jhphelan The reason servos were proposed is because it has a few benefits:

Remove 2 roboclaws (-\$150)

Reduce Wiring complexity by having less total wires

Increase Precision on corner system

What you described is a common way of doing absolute positioning. You use something with a known absolute scale that gives you your initial position, and then you use a quadrature encoder that is mounted with the actuator itself for all control algorithms. However I am not sure if that helps us solve any of the complexity or cost that we were looking to try and make improvements on. You'd still need a motor controller, and now you also need something to read both a quadrature encoder and some absolute measurement as well.

my reply:

@ejunkins @gfosmire @dcschooley

Which servos would be specified? I hear Dynamixel recommended often.

"*after doing some testing we decided a servo with 2 N*m of torque should be sufficient*" if 1.8N*m is sufficiently close to 2N*m (the next size up is much more expensive)--

The Dynamixel AX-18A delivers 1.8 N*m at \$95 x 4 = \$380

<https://www.trossenrobotics.com/dynamixel-ax-18a-robot-actuator.aspx>

vs

(2 RoboClaw x \$75 = \$150) + (4 steering motors x \$40 = \$160) + (4 absolute encoders x \$55.50 = 222.00) = \$532

\$152 savings w/ servos

JHP

[I'm thinking some extra hardware needed to mount the servos, but eliminate the 3D printed encoder mounts and some motor mounting hardware]

2020.06.28 Home
Processor Upgrade

On 6/27/2020 10:21 PM, Antonio Hernandez wrote:

>
> Jim,
>
> In Debian based distribution such as Ubuntu you can add extra software from
something called PPA or Personal Package Archives.
>
> <https://launchpad.net/~ubuntu-pi-flavour-makers/+archive/ubuntu/ppa>
>
> This one seems to contain the raspi-config file for Bionic (18.04)
>
> The following command should get you going with raspi-config on bionic.
>
> sudo add-apt-repository ppa:ubuntu-pi-flavour-makers/ppa
> sudo apt-get update
> sudo apt-get install raspi-config -y
>
> This PPA should make it easier to install software that is by default included in
Raspbian but seems to be absent from Ubuntu 18.04 (at least I think so, I could be
wrong).
>
> I hope this helps.
>
> Antonio.
>

my reply:

Antonio,
raspi-config exists in Ubuntu 18.04 in that I can
 \$ sudo raspi-config
and it will pop up and I can make all the changes, but the changes don't seem to stick.
At least
 \$ ls -l /dev/serial*
comes up with nothing.
Also setting VNC fails to allow me to VNC in from outside.
I haven't tried the camera.
Perhaps updating it as you suggest will restore the function.
I'll give it a try.
Thanks!

reply from Antonio:

Jim,

I can jump on a zoom call to help you. I would like to know if you are able to ssh into the RPi4

Let me know.

Antonio

832-401-3264

my reply to Antonio:

Antonio,

I tried the raspi-config reinstall as listed.

When I select the interface option for serial, it asks about I2C instead. (In addition to the I2C option above it).

It doesn't ask for the two step serial config that it should.

Once done \$ ls -l /dev/serial* still shows nothing.

VNC isn't even a choice.

I believe the answer, according to the OSR forum for the rover at least, lies in the osr_params.yaml file.

I'd still like to be able to VNC into the RPi.

It seems to be connecting, and asks for the Ubuntu password, but then I get "An authentication error occurred. See the VNC Server error log for details.

No hint as to where the VNC Server error log is & searches for it have failed. Googling the error message has been no help.

Jim

Drive Motor Upgrade:

Roberto, et al. (anyone looking at wheeled robot drive motors)

In the OSR forum the experts are considering this motor as an upgrade to the currently specified drive motors:

<https://www.gobilda.com/5202-series-yellow-jacket-planetary-gear-motor-26-9-1-ratio-223-rpm-3-3-5v-encoder/>

It has built-in dual ball bearing shaft support.

Twice the torque and speed of the previous.

See post #78:

https://www.tapatalk.com/groups/jpl_opensource_rover/motor-troubles-t127-s70.html

Jim

2020.07.03-5 Home

Processor upgrade. Raspbian / Ubuntu differences

Next, edit the /boot/cmdline.txt file:

sudo nano /boot/cmdline.txt

But it is not in /boot...

ubuntu@ubuntu:/boot\$ **ls cmdline.txt**

ls: cannot access 'cmdline.txt': No such file or directory

So Google: “ubuntu equivalent of raspbian cmdline.txt” and found:

<https://www.raspberrypi.org/forums/viewtopic.php?t=235451>

It's in /boot/firmware --

ubuntu@ubuntu:/boot/firmware\$ **ls cmdline.txt**
cmdline.txt

Change ONLY the part with "console =" to read "console=tty1" and remove any other instance where it references console.

```
ubuntu@ubuntu:/boot/firmware$ cat cmdline.txt
snd_bcm2835.enable_headphones=1 snd_bcm2835.enable_hdmi=1
snd_bcm2835.enable_compat_alsa=0 dwc_otg.lpm_enable=0 console=tty1
fsck.repair=yes fsck.mode=auto root=/dev/mmcblk0p2 rootfstype=ext4
elevator=deadline rootwait
```

OK.

2.4 Building the Rover Code to work with your ROS installation

IGNORE THIS AS ROS MELODIC IS ALREADY INSTALLED

...update your GPG keys.

Done

Create a catkin workspace directory, and move into it:

```
$ mkdir -p ~/osr_ws/src && cd ~/osr_ws
```

Source your newly created ROS environment:

Use nano (or your editor of choice) to add the above two 'source' commands to the end of your `/.bashrc` file, each on its own line:

```
source /opt/ros/kinetic/setup.bash  
source ~/osr_ws/devel/setup.bash
```

But, in editing it, I see it's already set up for melodic installed earlier.

```
source /opt/ros/melodic/setup.bash
```

```
ubuntu@ubuntu:~$ roscore
```

... logging to

```
/home/ubuntu/.ros/log/fd535ed2-bf1d-11ea-adf7-dca632160e50/roslaunch-ubuntu-7546.log
```

Checking log directory for disk usage. This may take a while.

Press Ctrl-C to interrupt

Done checking log file disk usage. Usage is <1GB.

```
started roslaunch server http://ubuntu:40055/
```

```
ros_comm version 1.14.6
```

SUMMARY

=====

PARAMETERS

```
* /rosdistro: melodic
```

```
* /rosversion: 1.14.6
```

NODES

auto-starting new master

```
process[master]: started with pid [7559]
```

```
ROS_MASTER_URI=http://ubuntu:11311/
```

```
setting /run_id to fd535ed2-bf1d-11ea-adf7-dca632160e50
```

```
process[rosout-1]: started with pid [7570]
```

```
started core service [/rosout]
```

2020.07.11 Home
to continue to load the OSR code...

2.4 Building the Rover Code to work with your ROS installation
Create a catkin workspace directory, which will contain all ROS compilation and source code files, and move into it:

```
mkdir -p ~/osr_ws/src && cd ~/osr_ws  
[already done]
```

Build a basic, empty catkin project:

catkin_make

If this doesn't report any errors, check if there are two new directories:

ls ~/osr_ws/build

and

ls ~/osr_ws/devel

should not report 'No such file or directory'

```
ubuntu@ubuntu:~/osr_ws$ ls  
build devel src
```

Source your newly created ROS environment:

source /opt/ros/kinetic/setup.bash

...but our version is **melodic**, so...

source /opt/ros/melodic/setup.bash

and

source ~/osr_ws/devel/setup.bash

Use nano (or your editor of choice) to add the above two 'source' commands to the end of your `~/.bashrc` file, each on its own line. This will run those lines for you every time you open a new terminal window so you don't have to manually run those each time.

sudo nano ~/.bashrc

Now continue the installation steps at <https://github.com/nasa-jpl/osr-rover-code>:

Follow the instructions to set up your Raspberry Pi and install ROS in Software Steps
In the newly created catkin workspace you just made, clone this repo:

```
cd ~/osr_ws/src
git clone https://github.com/nasa-jpl/osr-rover-code.git
cd ~/osr_ws/src
git clone https://github.com/nasa-jpl/osr-rover-code.git
Cloning into 'osr-rover-code'...
remote: Enumerating objects: 221, done.
remote: Counting objects: 100% (221/221), done.
remote: Compressing objects: 100% (121/121), done.
remote: Total 913 (delta 133), reused 157 (delta 95), pack-reused 692
Receiving objects: 100% (913/913), 433.07 KiB | 3.52 MiB/s, done.
Resolving deltas: 100% (471/471), done.

# install the dependencies
~/osr_ws/src$ cd ..          BACK UP one dir to get to ~/osr_ws dir to do rosdep
~/osr_ws$ rosdep install --from-paths src --ignore-src
~/osr_ws$ catkin_make

# add the generated files to the path so ROS can find them
~/osr_ws$ source devel/setup.bash
```

The rover has some customizable settings that will overwrite the default values.
Whether you have any changes compared to the defaults or not, you have to manually create these files:

```
cd ~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config
touch physical_properties_mod.yaml roboclaw_params_mod.yaml

cd ~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config
touch physical_properties_mod.yaml roboclaw_params_mod.yaml
```

To change any values from the default, modify these files instead so they don't get tracked by git. The files follow the same structure as the default.

2.5 Init Script

Starting scripts on boot using ROS can be a little more difficult than starting scripts on boot normally from the Raspberry Pi because of the default permission settings on the RPi and the fact that ROS cannot be ran as the root user. The way that we will starting our rover code automatically on boot is to create a service that starts our roslaunch script, and then automatically run that service on boot of the robot. Further information on system service scripts running at boot can be found at:

<https://www.linode.com/doccs/quick-answers/linux/start-service-at-boot/>

There are two scripts in the "Software/Init Scripts" folder. The first is the bash file that runs the roslaunch file, and the other creates a system service to start that bash script. Open up a terminal on the raspberry Pi and execute the following commands:

```
cd /home/pi/osr/Init\ Scripts  
sudo cp LaunchOSR.sh /usr/bin/LaunchOSR.sh  
sudo chmod +x /usr/bin/LaunchOSR.sh  
sudo cp osr_startup.service /etc/systemd/system/osr_osrstartup.service  
sudo chmod 644 /etc/systemd/system/osr_startup.service
```

cd /home/pi/osr/Init\ Scripts There is no such directory
It's actually at (note the '\') the \ means the space between Init & Scripts in Init Scripts
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/'Init Scripts' \$ ls
CATKIN_IGNORE LaunchOSR.sh osr_startup.service

```
sudo cp LaunchOSR.sh /usr/bin/LaunchOSR.sh  
sudo chmod +x /usr/bin/LaunchOSR.sh  
sudo cp osr_startup.service /etc/systemd/system/osr_startup.service  
sudo chmod 644 /etc/systemd/system/osr_startup.service
```

Your osr_startup service is now installed on the Pi and ready to be used. The following are some commands related to managing this service which you might find useful:

Description	Command
Start service	sudo systemctl start osr_startup.service
Stop service	sudo systemctl stop osr_startup.service
Enable service (runs on bootup)	sudo systemctl enable osr_startup.service
Disable service (doesn't run on bootup)	sudo systemctl disable osr_startup.service
Check status of service	sudo systemctl status osr_startup.service
View live service list	sudo journalctl -f

Raspberry Pi3b >> 4B

USB Micro B > USB Micro C power adapter from PCB > RPi.

LED display re-installed w/ USB>tty, JST & power connectors.

Power-up as below:

```
ubuntu@ubuntu:~$ source ~/osr_ws/devel/setup.bash
ubuntu@ubuntu:~$ roslaunch osr Bringup osr.launch
... logging to
/home/ubuntu/.ros/log/eb3b075a-c453-11ea-9c98-dca632160e51/roslaunch-ubuntu-33
12.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
```

started roslaunch server http://ubuntu:40233/

SUMMARY

=====

PARAMETERS

- * /corner_acceleration_factor: 0.8
- * /drive_acceleration_factor: 0.5
- * /drive_no_load_rpm: 31
- * /joy2twist/axis_angular: 3
- * /joy2twist/axis_linear: 1
- * /joy2twist/enable_button: 4
- * /joy2twist/enable_turbo_button: 5
- * /joy2twist/scale_angular: 0.53
- * /joy2twist/scale_linear: 0.24
- * /joy2twist/scale_linear_turbo: 0.5
- * /joy_node/autorepeat_rate: 1.0
- * /joy_node/coalesce_interval: 0.05
- * /motor_controller/addresses: 128,129,130,131,132
- * /motor_controller/baud: 115200
- * /motor_controller/device: /dev/tty0
- * /roboclaw_wrapper/roboclaw_mapping/corner_left_back/address: 132
- * /roboclaw_wrapper/roboclaw_mapping/corner_left_back/channel: M1
- * /roboclaw_wrapper/roboclaw_mapping/corner_left_back/gear_ratio: 0.3333
- * /roboclaw_wrapper/roboclaw_mapping/corner_left_back/ticks_per_rev: 2000
- * /roboclaw_wrapper/roboclaw_mapping/corner_left_front/address: 132
- * /roboclaw_wrapper/roboclaw_mapping/corner_left_front/channel: M2
- * /roboclaw_wrapper/roboclaw_mapping/corner_left_front/gear_ratio: 0.3333
- * /roboclaw_wrapper/roboclaw_mapping/corner_left_front/ticks_per_rev: 2000
- * /roboclaw_wrapper/roboclaw_mapping/corner_right_back/address: 131
- * /roboclaw_wrapper/roboclaw_mapping/corner_right_back/channel: M2
- * /roboclaw_wrapper/roboclaw_mapping/corner_right_back/gear_ratio: 0.3333
- * /roboclaw_wrapper/roboclaw_mapping/corner_right_back/ticks_per_rev: 2000
- * /roboclaw_wrapper/roboclaw_mapping/corner_right_front/address: 131
- * /roboclaw_wrapper/roboclaw_mapping/corner_right_front/channel: M1
- * /roboclaw_wrapper/roboclaw_mapping/corner_right_front/gear_ratio: 0.3333
- * /roboclaw_wrapper/roboclaw_mapping/corner_right_front/ticks_per_rev: 2000
- * /roboclaw_wrapper/roboclaw_mapping/drive_left_back/address: 129

```
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/address: 130
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/address: 130
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/address: 129
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/address: 128
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/address: 128
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/ticks_per_rev: 48
* /rosdistro: melodic
* /rosversion: 1.14.6
* /rover_dimensions/d1: 0.184
* /rover_dimensions/d2: 0.267
* /rover_dimensions/d3: 0.267
* /rover_dimensions/d4: 0.2556
* /rover_dimensions/wheel_radius: 0.075
```

NODES

```
/  
joy2twist (teleop_twist_joy/teleop_node)  
joy_node (joy/joy_node)  
led_screen (led_screen/arduino_comm.py)  
roboclaw_wrapper (osr/roboclaw_wrapper.py)  
rover (osr/rover.py)
```

auto-starting new master

process[master]: started with pid [3322]

ROS_MASTER_URI=http://localhost:11311

setting /run_id to eb3b075a-c453-11ea-9c98-dca632160e51

process[rosout-1]: started with pid [3333]

started core service [/rosout]

process[roboclaw_wrapper-2]: started with pid [3340]

```
ERROR: cannot launch node of type [teleop_twist_joy/teleop_node]:  
teleop_twist_joy  
ROS path [0]=/opt/ros/melodic/share/ros  
ROS path [1]=/home/ubuntu/osr_ws/src  
ROS path [2]=/opt/ros/melodic/share  
process[rover-4]: started with pid [3341]  
process[led_screen-5]: started with pid [3342]  
ERROR: cannot launch node of type [joy/joy_node]: joy  
ROS path [0]=/opt/ros/melodic/share/ros  
ROS path [1]=/home/ubuntu/osr_ws/src  
ROS path [2]=/opt/ros/melodic/share  
Traceback (most recent call last):  
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py",  
line 4, in <module>  
    from osr_msgs.msg import Status  
ImportError: No module named osr_msgs.msg  
[led_screen-5] process has died [pid 3342, exit code 1, cmd  
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py  
__name__:=led_screen  
__log:=/home/ubuntu/.ros/log/eb3b075a-c453-11ea-9c98-dca632160e51/led_screen-5.log].  
log file:  
/home/ubuntu/.ros/log/eb3b075a-c453-11ea-9c98-dca632160e51/led_screen-5*.log  
Traceback (most recent call last):  
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/rover.py", line 8, in  
<module>  
    from osr_msgs.msg import CommandDrive, CommandCorner  
ImportError: No module named osr_msgs.msg  
Traceback (most recent call last):  
  File  
"/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py",  
line 9, in <module>  
    from osr_msgs.msg import CommandDrive, CommandCorner, Status  
ImportError: No module named osr_msgs.msg  
[roboclaw_wrapper-2] process has died [pid 3340, exit code 1, cmd  
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py  
__name__:=roboclaw_wrapper  
__log:=/home/ubuntu/.ros/log/eb3b075a-c453-11ea-9c98-dca632160e51/roboclaw_wrapper-2.log].  
log file:  
/home/ubuntu/.ros/log/eb3b075a-c453-11ea-9c98-dca632160e51/roboclaw_wrapper-2*.log  
[rover-4] process has died [pid 3341, exit code 1, cmd  
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/rover.py __name__:=rover  
__log:=/home/ubuntu/.ros/log/eb3b075a-c453-11ea-9c98-dca632160e51/rover-4.log].
```

log file:

/home/ubuntu/.ros/log/eb3b075a-c453-11ea-9c98-dca632160e51/rover-4*.log

Output stops here. ^C to quit.

The joy node error is expected as the Playstation doesn't have certain features.

The LED-screen error suggests some Arduino code is missing.

Not sure about the RoboClaw wrapper message.

Error messages are the same whether device: "/dev/**serial0**" or device: "/dev/**tty0**"

2020.07.18 Home

Processor upgrade

Created "Raspberry Pi 2 to 4 Upgrade" to upload to the TapaTalk forum

While there discovered this thread re RPi4 & Ubuntu & serial0 issue:

https://www.tapatalk.com/groups/jpl_opensource_rover/serial-port-issues-on-ubuntu-t205.html#p1528

The solution to the serial0 problem is (from Achille0):

I thought I lost it but I actually saved the history of all the commands I executed when setting up my RPi4. One thing I didn't mention above is that I created a udev rule (sudo touch /etc/udev/rules.d/99-com.rules) and populated it (sudo nano) with the following:

```
SUBSYSTEM=="input", GROUP="input", MODE="0660"
SUBSYSTEM=="i2c-dev", GROUP="i2c", MODE="0660"
SUBSYSTEM=="spidev", GROUP="spi", MODE="0660"
SUBSYSTEM=="bcm2835-gpiomem", GROUP="gpio", MODE="0660"

SUBSYSTEM=="gpio*", PROGRAM="/bin/sh -c \
    chown -R root:gpio /sys/class/gpio && chmod -R 770 /sys/class/gpio;\
    chown -R root:gpio /sys/devices/virtual/gpio && chmod -R 770 /sys/devices/virtual/gpio;\
    chown -R root:gpio /sys$devpath && chmod -R 770 /sys$devpath\
"""

KERNEL=="ttyAMA[01]", PROGRAM="/bin/sh -c \
    ALIASES=/proc/device-tree/aliases; \
    if cmp -s $ALIASES/uart0 $ALIASES/serial0; then \
        echo 0;\
    elif cmp -s $ALIASES/uart0 $ALIASES/serial1; then \
        echo 1; \
    else \
        exit 1; \
    fi\
", SYMLINK+="serial%c"

KERNEL=="ttyS0", PROGRAM="/bin/sh -c \
    ALIASES=/proc/device-tree/aliases; \
    if cmp -s $ALIASES/uart1 $ALIASES/serial0; then \
        echo 0; \
    elif cmp -s $ALIASES/uart1 $ALIASES/serial1; then \
        echo 1; \
    else \
        exit 1; \
    fi\
", SYMLINK+="serial%c"
```

I did the above &

```
ubuntu@ubuntu:~$ ls -l /dev/serial*
lrwxrwxrwx 1 root root 5 Jan 28 2018 /dev/serial0 -> ttyS0
lrwxrwxrwx 1 root root 7 Jan 28 2018 /dev/serial1 -> ttyAMA0
```

```
/dev/serial:
total 0
drwxr-xr-x 2 root root 60 Jan 28 2018 by-id
drwxr-xr-x 2 root root 60 Jan 28 2018 by-path
```

Since raspi-config didn't work, tried downloading raspi-config from "unofficial" 18.04 site. Cc raw and pasted to .txt. Filezilla'd to Downloads.

```
In /usr/bin
    sudo mv /usr/bin/raspi-config /usr/bin/raspi-config.old
    sudo mv raspi-config.txt /usr/bin/raspi-config
    sudo chmod 777 /usr/bin/raspi-config
    sudo chown root /usr/bin/raspi-config
sudo raspi-config
    no such file
copied everything back
sudo raspi-config
    old one worked, still badly.
    Got error & it froze
    rebooted & PuTTY connection refused
power-cycled
rebooted ok Phew!!
```

Now when I –

```
ubuntu@ubuntu:~$ rosrun osr Bringup osr.launch
```

I get the usual boot-up until --

```
started core service [/rosout]
process[roboclaw_wrapper-2]: started with pid [2426]
ERROR: cannot launch node of type [teleop_twist_joy/teleop_node]: teleop_twist_joy
ROS path [0]=/opt/ros/melodic/share/ros
ROS path [1]=/home/ubuntu/osr_ws/src
ROS path [2]=/opt/ros/melodic/share
process[rover-4]: started with pid [2427]
process[led_screen-5]: started with pid [2428]
ERROR: cannot launch node of type [joy/joy_node]: joy
ROS path [0]=/opt/ros/melodic/share/ros
ROS path [1]=/home/ubuntu/osr_ws/src
ROS path [2]=/opt/ros/melodic/share
Traceback (most recent call last):
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py", line 4, in
<module>
    from osr_msgs.msg import Status
ImportError: No module named osr_msgs.msg
[led_screen-5] process has died [pid 2428, exit code 1, cmd
  /home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py
    __name:=led_screen __log:=
  /home/ubuntu/.ros/log/2d462ac8-c961-11ea-9892-dca632160e50/led_screen-5.log].
log file: /home/ubuntu/.ros/log/2d462ac8-c961-11ea-9892-dca632160e50/led_screen-5*.log
Traceback (most recent call last):
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/rover.py", line 8, in
    <module>
Traceback (most recent call last):
  from osr_msgs.msg import CommandDrive, CommandCorner
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py",
    line 9, in <module>
ImportError:  No module named osr_msgs.msgfrom osr_msgs.msg import CommandDrive,
  CommandCorner, Status

ImportError: No module named osr_msgs.msg
[roboclaw_wrapper-2] process has died [pid 2426, exit code 1, cmd
  /home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py
    __name:=roboclaw_wrapper
    __log:=/home/ubuntu/.ros/log/2d462ac8-c961-11ea-9892-dca632160e50/roboclaw_wrapper-
  2.log].
log file: /home/ubuntu/.ros/log/2d462ac8-c961-11ea-9892-dca632160e50/roboclaw_wrapper-2*.log
[rover-4] process has died [pid 2427, exit code 1, cmd
  /home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/rover.py __name:=rover
    __log:=/home/ubuntu/.ros/log/2d
  462ac8-c961-11ea-9892-dca632160e50/rover-4.log].
log file: /home/ubuntu/.ros/log/2d462ac8-c961-11ea-9892-dca632160e50/rover-4*.log
```

2020.07.21 Home
Processor upgrade

Ubuntu installation

Went here to get Ubuntu 18.04 with pre-installed Desktop instead of the Ubuntu web site which only offers U-20 with Desktop:

<https://github.com/TheRemote/Ubuntu-Server-raspi4-unofficial/releases/tag/v28>

Installing VNC on RPi4 / Ubuntu 18.04

Having been highly frustrated doing this before, I tried again.

Went to Ubuntu Desktop, selected 3x3 dots “Show Applications”

Search “VNC”. Select “X11VNCServer”.

Default to port 5900. Check “Accept Connections”. Optional password. OK.

Go to external computer, launch VNC app,

enter IP address of Rpi (\$ ifconfig on pi if you don’t know).

Enter password if chosen & save if desired.

Connect.

Side documentation "Upgrade Raspberry Pi3 to 4.wpd" inserted here:

NASA/JPL Open Source Rover

Raspberry Pi 3 to 4 Upgrade

James H Phelan

USAi Labs, Houston, TX

2020.07+

Based on "**Fidelity to AUDACITY**, Evolution of the NASA/JPL Open Source Mars Rover, James H Phelan, USAi Labs, 2019.10.19 - ?

<C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY>

With help from TapaTalk OSR forum:

https://www.tapatalk.com/groups/jpl_opensource_rover/index.php

And the original NASA/JPL OSR Github:

<https://github.com/nasa-jpl/open-source-rover>

The goal is to upgrade the rover from:

Fidelity: Raspberry Pi 3B / Raspbian Stretch / ROS Kinetic / OSR code
to

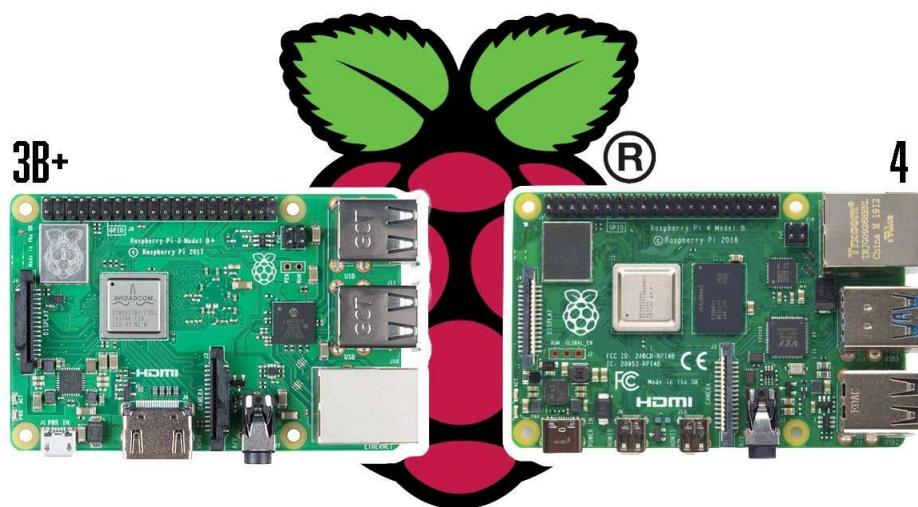
Audacity: Raspberry Pi 4B / Ubuntu 18.04 / ROS Melodic / OSR code revised
ultimately to

Name?: Jetson NANO / Ubuntu 20.04 / ROS 2 / OSR code yet to be envisioned

Raspberry Pi 3B vs 4

The MagPi - Raspberry Pi 4 vs Raspberry Pi 3B+:

<https://magpi.raspberrypi.org/articles/raspberry-pi-4-vs-raspberry-pi-3b-plus>



Test	RPi 3B+	RPi 4B	Change
Boot Time	39.9	41.7	-4.5%
Idle Power (Amps)	0.505	0.684	-35.4%
Peak Power (Amps)	1.14	1.12	1.8%
CPU - sysbench primes - 1 thread	317.7	250.4	21.2%
CPU - sysbench primes - 4 threads	86.2	62.8	27.1%
RAM Bandwidth - mbw	1420	2983	110.1%
OpenGL - videog32	30.9	35.8	15.9%
Ethernet - iperf3 (Mbps)	332	933	181.0%
WiFi 2.4Ghz - iperf3 (Mbps)	38.6	39.6	2.6%
WiFi 5Ghz (ac) - iperf3 (Mbps)	98.6	107	8.5%
External USB Drive Write - dd	35	155	342.9%
External USB Drive Read - dd	32	233	628.1%

Raspbian Stretch vs Ubuntu 18.04

<https://www.ubuntupit.com/debian-vs-ubuntu-top-15-things-to-know-before-choosing-the-best-one/>

<https://linuxconfig.org/debian-vs-ubuntu>

<https://stackshare.io/stackups/raspbian-vs-ubuntu>

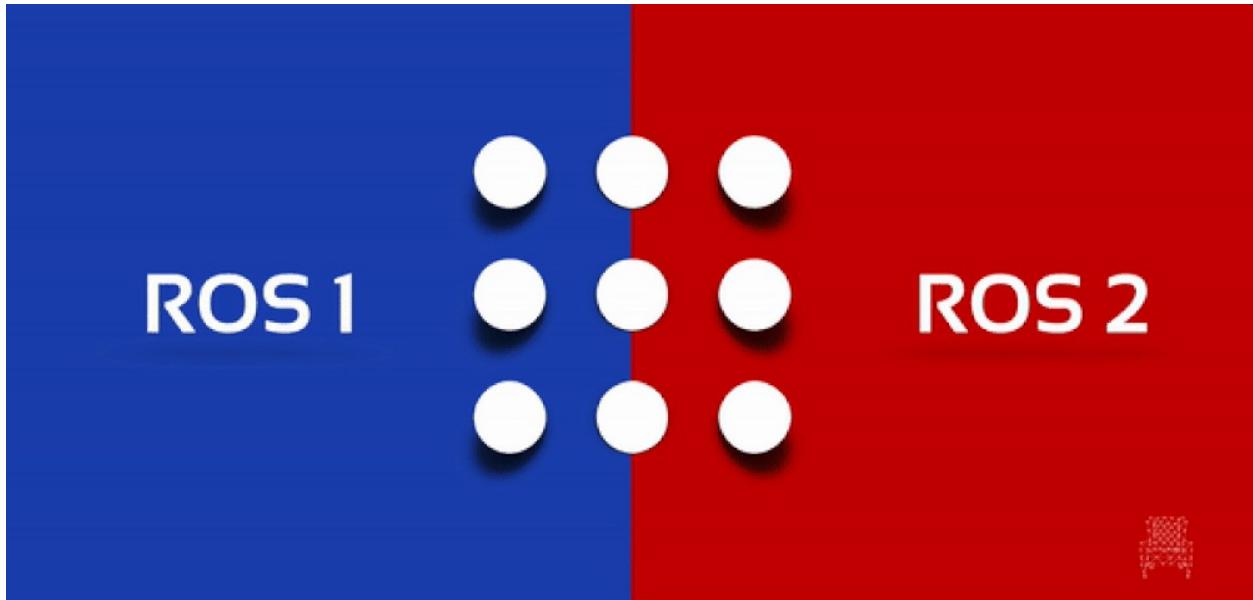


ROS 1 vs ROS 2

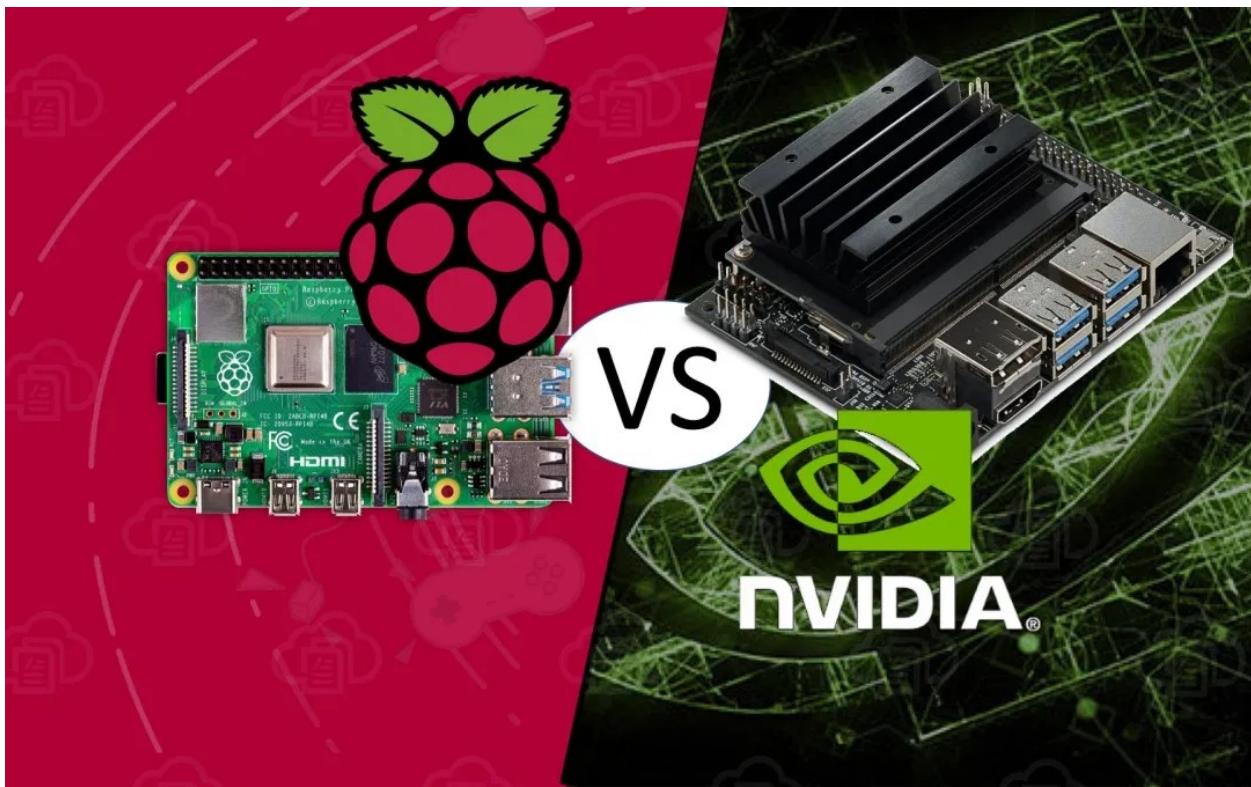
<http://design.ros2.org/articles/changes.html>

<https://blog.generationrobots.com/en/ros-vs-ros2/#:~:text=In%20ROS%20it%20is%20not,multiple%20nodes%20in%20a%20process.&text=In%20ROS%20roslaunch%20files%20are,complex%20logic%20like%20conditionals%20etc.>

<https://www.theconstructsim.com/infographic-ros-1-vs-ros-2-one-better-2/>



Raspberry Pi 4 vs Jetson NANO



Raspberry Pi 4 vs NVIDIA Jetson Nano Developer Kit (Build5Nines):

<https://build5nines.com/raspberry-pi-4-vs-nvidia-jetson-nano-developer-kit/#:~:text=The%20biggest%20difference%20in%20compute,low%20power%20integrated%20multimedia%20GPU.>

Battle of the Boards: Jetson Nano vs Raspberry Pi 4 (Adafruit):

https://blog.adafruit.com/2019/12/16/battle-of-the-boards-jetson-nano-vs-raspberry-pi-4-raspberry_pi-nvidiaembedded-syonykblog/

Raspberry Pi 3B vs 4

Footprint: The Pi4 is hole-for-hole compatible with the P13. It mounts on the revised PCB just like the Pi3.

Power: The Pi4 takes more power $0.5 > 0.7\text{A}$

& requires a USB Micro B > USB Micro C power adapter \$5.99 Amazon

https://www.amazon.com/CableCreation-Compatible-MacBook-12-inches-OnePlus/dp/B012V56D2A/ref=sr_1_1?crid=1XSQ2J5OAIT40&dchild=1&keywords=usb+type-c+to+usb-a+2.0+male+charger+cable+1ft&qid=1595106773&s=electronics&sprefix=USB+Type-C+to+USB-A+2.0+Male+Charger%2Celectronics%2C198&sr=1-1



HDMI jack is micro HDMI requiring new cable or adapter:



Installation of Ubuntu 18.04

you can go here:

<https://ubuntu.com/download/raspberry-pi>

There was a period where it refused to offer 18.04 and only offered 20.04.

This was fixed but only with Server, not Desktop

YOU HAVE TO INSTALL YOUR OWN DESKTOP - A PAIN

Or (this is where I went when the above didn't work):

<https://github.com/TheRemote/Ubuntu-Server-raspi4-unofficial/releases>

then chose Desktop instead of Server:

[ubuntu-18.04.4-preinstalled-desktop-arm64+raspi4.img.xz](https://github.com/TheRemote/Ubuntu-Server-raspi4-unofficial/releases)

THIS HAS PREINSTALLED DESKTOP - MUCH EASIER

Extract and flash it to a 32GB or greater SD card.

I format with SD Card Formatter, not Windows.

I used Win32 Disk Imager as it will also read an SD card to an image for backup.

Many others use Etcher.

Move SD card to the RPi & boot up.

displays logon (if not you may have to hit SPACE bar):

Ubuntu

[it's asking for login = "ubuntu"]

then asks to change password "ubuntu" again

then asks for NEW password "password" of your choosing

then retype new password "password"

opens to Mate (?) desktop

Configure WiFi so you can update. Ethernet didn't work until after the update.

Open a terminal window.

\$ sudo apt-get update

\$ sudo apt-get upgrade Y

MAJOR upgrade!

Plug in your ethernet cable and configure eth0 for faster speed

and to work headlessly from your other computer.

It helps to download "Software Steps.pdf" directly into the RPi4 so you can follow links & cut & paste from there. BEWARE: underscores "_" don't copy well. You may have to correct or hand enter. Sometimes spaces between words in multi-word directories or files get translated as "\ " so "my directory" becomes "my\ directory". Sometimes odd characters won't copy. In my case "fi" as in "file" doesn't copy so becomes " le".

Commands are CaSe SeNsiTive!

Lock error:

Sometimes doing an install you get a “could-not-get-lock” error. If so, try this, Method 2:
<https://itsfoss.com/could-not-get-lock-error/>

Sometimes you get this error:

E: Unable to acquire the dpkg frontend lock (/var/lib/dpkg/lock-frontend), is another process using it?

Try this permanent solution to stop auto-updates that are hogging the locks:

<https://linuxconfig.org/could-not-get-lock-var-lib-dpkg-lock-ubuntu-debian>

Having the Ubuntu system trigger background update and preventing the user from using the apt or dpkg command can be very frustrating situation.

The solution is to stop automatic background system package list updates and run updates manually. To turn off automatic updates edit /etc/apt/apt.conf.d/20auto-upgrades using your favorite text editor:

```
$ sudo nano /etc/apt/apt.conf.d/20auto-upgrades
```

Once you have the file opened, switch off the Update-Package-Lists directive from 1 to 0 as shown below on Line 1:

```
APT::Periodic::Update-Package-Lists "0";  
APT::Periodic::Unattended-Upgrade "1";
```

re-entered

```
$ sudo apt upgrade
```

and it progressed normally.

Possibly it just had time to finish & unlock. Hopefully it won't do that any more.

Install git:

git does not come with ubuntu. You'll need to

```
$ sudo apt update && sudo apt upgrade && sudo apt install git
```

2.3 Setting up serial communication

Doesn't work like the Raspbian!

```
$ sudo raspi-config
```

appears to work allowing to configure serial ports (no to part 1, yes to part 2) but

```
$ ls -l /dev/serial*
```

no such file or directory

discovered this thread re RPi4 & Ubuntu & serial0 issue:

https://www.tapatalk.com/groups/jpl_opensource_rover/serial-port-issues-on-ubuntu-t205.html#p1528

The solution to the serial0 problem is (from Achille0):

I thought I lost it but I actually saved the history of all the commands I executed when setting up my RPi4. One thing I didn't mention above is that I created a udev rule (sudo touch /etc/udev/rules.d/99-com.rules) and populated it (sudo nano) with the following:

```
SUBSYSTEM=="input", GROUP="input", MODE="0660"
SUBSYSTEM=="i2c-dev", GROUP="i2c", MODE="0660"
SUBSYSTEM=="spidev", GROUP="spi", MODE="0660"
SUBSYSTEM=="bcm2835-gpiomem", GROUP="gpio", MODE="0660"

SUBSYSTEM=="gpio*", PROGRAM="/bin/sh -c \
    chown -R root:gpio /sys/class/gpio && chmod -R 770 /sys/class/gpio; \
    chown -R root:gpio /sys/devices/virtual/gpio && chmod -R 770 /sys/devices/virtual/gpio; \
    chown -R root:gpio /sys$devpath && chmod -R 770 /sys$devpath
"""

KERNEL=="ttyAMA[01]", PROGRAM="/bin/sh -c \
    ALIASES=/proc/device-tree/aliases; \
    if cmp -s $ALIASES/uart0 $ALIASES/serial0; then \
        echo 0; \
    elif cmp -s $ALIASES/uart0 $ALIASES/serial1; then \
        echo 1; \
    else \
        exit 1; \
    fi \
", SYMLINK+="serial%c"

KERNEL=="ttyS0", PROGRAM="/bin/sh -c \
    ALIASES=/proc/device-tree/aliases; \
    if cmp -s $ALIASES/uart1 $ALIASES/serial0; then \
        echo 0; \
    elif cmp -s $ALIASES/uart1 $ALIASES/serial1; then \
        echo 1; \
    else \
        exit 1; \
    fi \
", SYMLINK+="serial%c"
```

I did the above &

```
ubuntu@ubuntu:~$ ls -l /dev/serial*
lrwxrwxrwx 1 root root 5 Jan 28 2018 /dev/serial0 -> ttyS0
lrwxrwxrwx 1 root root 7 Jan 28 2018 /dev/serial1 -> ttyAMA0
```

```
/dev/serial:
total 0
drwxr-xr-x 2 root root 60 Jan 28 2018 by-id
drwxr-xr-x 2 root root 60 Jan 28 2018 by-path
```

Install ROS Melodic:

<http://wiki.ros.org/melodic/Installation/Ubuntu> NOTE caps important in URL

Install OSR code as per “Software Steps” in the NASA/JPL OSR Github.

Be sure to download the most recent edition.

The gpg key issue does not seem to be a problem, but you may need to do the fix if you get an error.

Check your Pi4 IP address to SSH in with:

\$ ifconfig

PuTTY should work ok

FileZilla should work ok

I was later able to get VNC to work - see below.

cmdline.txt

The directions say

Next, edit the /boot/cmdline.txt file:

sudo nano /boot/cmdline.txt

but it's not there.

It's in /boot/firmware --

ubuntu@ubuntu:/boot/firmware\$ ls cmdline.txt

cmdline.txt

There is only 1 reference to console: console=tty1 so no change is needed.

Source your newly created ROS environment:

source /opt/ros/kinetic/setup.bash

...but our version is **melodic**, so...

sudo nano ~/.bashrc

and add at the bottom

source /opt/ros/melodic/setup.bash

and

source ~/osr_ws/devel/setup.bash

2.5 Init Script

Directions say to

cd /home/pi/osr/Init Scripts (=cd /home/pi/osr/Init Scripts)

but there's no such directory.

It's actually here:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/'Init Scripts' $ ls  
CATKIN_IGNORE LaunchOSR.sh osr_startup.service
```

You can follow the directions from there.

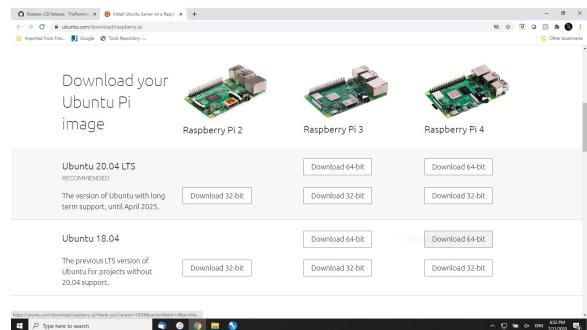
Even with all the above “fixes” I get error messages on boot-up and it doesn't respond to the Playstation controller. But it's a start!

**2020.07.21 Home
Processor Upgrade
Ubuntu 18.04 Desktop install**

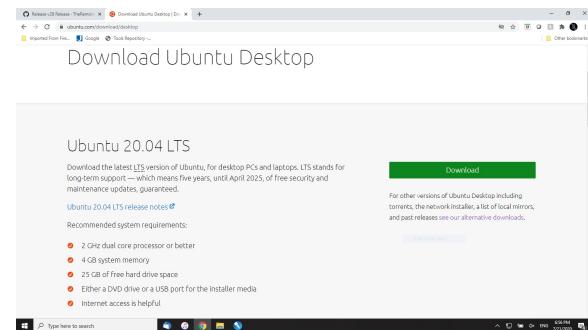
Went [here](#) to get Ubuntu 18.04 Desktop:
<https://github.com/TheRemote/Ubuntu-Server-raspbpi4-unofficial/releases/tag/v28>
Desktop has raspi-config which will be needed later.

...since the regular Ubuntu website:
<https://ubuntu.com/download/raspberry-pi>
doesn't offer Desktop with 18.04, only with 20.04

***Install Ubuntu Server
on a Raspberry Pi 2, 3 or 4***



Download Ubuntu Desktop
<https://ubuntu.com/download/desktop>



2020.07.23 Home

Prev installed 18.04 Desktop as listed above
confirm installation package:

```
ubuntu@ubuntu:~$ cat /etc/os-release
NAME="Ubuntu"
VERSION="18.04.4 LTS (Bionic Beaver)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 18.04.4 LTS"
VERSION_ID="18.04"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-policy"
VERSION_CODENAME=bionic
UBUNTU_CODENAME=bionic
```

```
ubuntu@ubuntu:~$ hostnamectl
Static hostname: ubuntu
Icon name: computer
Machine ID: a7a42b5b3378838c73bffcd65e54a4ac
Boot ID: 452f9c360cd74476aaee8ea5959d5fab
Operating System: Ubuntu 18.04.4 LTS
Kernel: Linux 4.19.105-v8-28
Architecture: arm64
ubuntu@ubuntu:~$ uname -srn
Linux 4.19.105-v8-28 aarch64
```

```
$ script 2020.07.23Install
$ sudo apt update
$ sudo apt upgrade
Y
...
$ sudo raspi-config
    configure locale, serial port, camera, SSH, VNC
reboot      (lost script as failed to exit prior to reboot!)
Ifconfig now shows ethh0 in addition to wlan0
close PuTTY & change from wlan0 to eth0 connection
```

Fix serial port problem (see entry above)

```
$ ls /dev/serial*
blank
```

```
$ sudo touch /etc/udev/rules.d/99-com.rules
```

```
$ sudo nano /etc/udev/rules.d/99-com.rules
```

with the following (see entry above)

```
$ exit
```

```
$ sudo reboot
```

```
ubuntu@ubuntu:~$ ls -l /dev/serial*
```

```
lrwxrwxrwx 1 root root 5 Jan 28 2018 /dev/serial0 -> ttyS0
lrwxrwxrwx 1 root root 7 Jan 28 2018 /dev/serial1 -> ttyAMA0
```

Next, edit the /boot/cmdline.txt file:

```
sudo nano /boot/cmdline.txt
```

Change ONLY the part with "console =" to read "console=tty1" and remove any other instance where it references console. The first bit of that line should look similar to: dwc_otg.lpm_enable=0 console=tty1 root=/dev/mmcblk0p7

[it's not there. It's here under firmware -]

```
ubuntu@ubuntu:~$ cat /boot/firmware/cmdline.txt
snd_bcm2835.enable_headphones=1 snd_bcm2835.enable_hdmi=1
snd_bcm2835.enable_compat_alsa=0 dwc_otg.lpm_enable=0 console=tty1
fsck.repair=yes fsck.mode=auto root=/dev/mmcblk0p2 rootfstype=ext4
elevator=deadline rootwait
```

Software Steps 2.2 Installing ROS

Since this is not Raspberry Pi3 / Rasbpian Stretch
but rather Raspberry Pi 4 / Ubuntu 18.04,
we need *ROS Melodic*, not Kinetic.
skip GPG keys, current installed

Go here instead of the link in *Software Steps*:

Ubuntu install of ROS Melodic

<http://wiki.ros.org/melodic/Installation/Ubuntu>

1.1 Configure your Ubuntu repositories [OK AS DEFAULTED]

Configure your Ubuntu repositories to allow "restricted," "universe," and "multiverse."

You can follow the Ubuntu guide for instructions on doing this:

<https://help.ubuntu.com/community.Repositories/Ubuntu>

Using Desktop, select 3x3 dots / Software & Updates (box+globe) / Ubuntu Software / all but Source Code should be checked.

Download from: Main server (not uk mirror as in directions as we're in USA)

1.2 Setup your sources.list

Setup your computer to accept software from packages.ros.org.

```
$ sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main" > /etc/apt/sources.list.d/ros-latest.list'
```

1.3 Set up your keys

```
$ sudo apt-key adv --keyserver 'hkp://keyserver.ubuntu.com:80' --recv-key C1CF6E31E6BADE8868B172B4F42ED6FBAB17C654
```

1.4 Installation

First, make sure your Debian package index is up-to-date: [in our case Ubuntu]

```
$ sudo apt update  
$ sudo apt upgrade
```

Desktop-Full Install: (Recommended) : ROS, rqt, rviz, robot-generic libraries, 2D/3D simulators and 2D/3D perception

```
$ sudo apt install ros-melodic-desktop-full  
Y
```

1.5 Environment setup

It's convenient if the ROS environment variables are automatically added to your bash session every time a new shell is launched:

```
$ echo "source /opt/ros/melodic/setup.bash" >> ~/.bashrc  
source ~/.bashrc
```

1.6 Dependencies for building packages

Up to now you have installed what you need to run the core ROS packages. To create and manage your own ROS workspaces, there are various tools and requirements that are distributed separately. For example, rosinstall is a frequently used command-line tool that enables you to easily download many source trees for ROS packages with one command.

To install this tool and other dependencies for building ROS packages, run:

```
$ sudo apt install python-rosdep python-rosinstall  
python-rosinstall-generator python-wstool build-essential
```

1.6.1 Initialize rosdep

Before you can use many ROS tools, you will need to initialize rosdep. rosdep enables you to easily install system dependencies for source you want to compile and is required to run some core components in ROS. If you have not yet installed rosdep, do so as follows.

```
$ sudo apt install python-rosdep  
$ sudo rosdep init  
$ rosdep update
```

Software Steps 2.4

Building the Rover Code to work with your ROS installation

Create a catkin workspace directory, and move into it:

```
$ mkdir -p ~/osr_ws/src && cd ~/osr_ws
```

Build a basic, empty catkin project:

```
ubuntu@ubuntu:~/osr_ws$ catkin_make
```

make sure it worked --

```
ubuntu@ubuntu:~/osr_ws$ ls  
build  devel  src
```

Source your newly created ROS environment:

Use nano (or your editor of choice) to add the above two 'source' commands to the end of your `~/.bashrc` file, each on its own line. This will run those lines for you every time you open a new terminal window so you don't have to manually run those each time.

```
$ sudo nano ~/.bashrc
```

add

```
source /opt/ros/melodic/setup.bash [already there from prev]
```

and

```
source ~/osr_ws/devel/setup.bash
```

Now continue the installation steps at <https://github.com/nasa-jpl/osr-rover-code>:

Follow the instructions to set up your Raspberry Pi and install ROS in Software Steps In the newly created catkin workspace you just made, clone this repo:

```
cd ~/osr_ws/src  
git clone https://github.com/nasa-jpl/osr-rover-code.git  
# install the dependencies  
[NEED TO DO $ cd .. here to go up one level or it won't find src as you're in it]  
rosdep install --from-paths src --ignore-src  
catkin_make  
# add the generated files to the path so ROS can find them  
source devel/setup.bash  
  
$ cd ~/osr_ws/src  
~/osr_ws/src $ git clone https://github.com/nasa-jpl/osr-rover-code.git  
install the dependencies  
~/osr_ws/src$ cd .. BACK UP one dir to get to ~/osr_ws dir to do rosdep  
~/osr_ws$ rosdep install --from-paths src --ignore-src  
~/osr_ws$ catkin_make  
# add the generated files to the path so ROS can find them  
~/osr_ws$ source devel/setup.bash
```

The rover has some customizable settings that will overwrite the default values. Whether you have any changes compared to the defaults or not, you have to manually create these files:

```
cd ~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config  
touch physical_properties_mod.yaml roboclaw_params_mod.yaml  
  
~/osr_ws$ cd ~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config  
~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config$  
touch physical_properties_mod.yaml roboclaw_params_mod.yaml
```

To change any values from the default, modify these files instead so they don't get tracked by git. The files follow the same structure as the default.

2.5 Init Script

Starting scripts on boot using ROS can be a little more difficult than starting scripts on boot normally from the Raspberry Pi because of the default permission settings on the RPi and the fact that ROS cannot be ran as the root user. The way that we will starting our rover code automatically on boot is to create a service that starts our roslaunch script, and then automatically run that service on boot of the robot. Further information on system service scripts running at boot can be found at:

<https://www.linode.com/doccs/quick-answers/linux/start-service-at-boot/>

There are two scripts in the "Software/Init Scripts" folder. The first is the bash file that runs the roslaunch file, and the other creates a system service to start that bash script. Open up a terminal on the raspberry Pi and execute the following commands:

```
$ cd [go home from wherever you are]  
$ cd ~/osr_ws/src/osr-rover-code/Init Scripts  
~/osr_ws/src/osr-rover-code/Init Scripts$ ls  
CATKIN_IGNORE LaunchOSR.sh osr_startup.service  
  
~/osr_ws/src/osr-rover-code/Init Scripts$  
    sudo cp LaunchOSR.sh /usr/bin/LaunchOSR.sh  
    $ sudo chmod +x /usr/bin/LaunchOSR.sh  
    $ sudo cp osr_startup.service  
        /etc/systemd/system/osr_startup.service  
    $ sudo chmod 644 /etc/systemd/system/osr_startup.service
```

Your osr_startup service is now installed on the Pi and ready to be used. The following are some commands related to managing this service which you might find useful:

Description	Command
Start service	<code>sudo systemctl start osr_startup.service</code>
Stop service	<code>sudo systemctl stop osr_startup.service</code>
Enable service (runs on bootup)	<code>sudo systemctl enable osr_startup.service</code>
Disable service (doesn't run on bootup)	<code>sudo systemctl disable osr_startup.service</code>
Check status of service	<code>sudo systemctl status osr_startup.service</code>
View live service list	<code>sudo journalctl -f</code>

Installing VNC on RPi4 / Ubuntu 18.04

Having been highly frustrated doing this before, I tried again.

Went to Ubuntu Desktop, selected 3x3 dots “Show Applications”

Search “VNC”. Select “X11VNCServer”.

Default to port 5900. Check “Accept Connections”. Optional password. OK.

Go to external computer, launch VNC app,

enter IP address of RPi (\$ ifconfig in pi terminal if you don’t know).

Enter password if chosen & save if desired.

Connect.

STARTING THE ROVER

```
ubuntu@ubuntu:~$ source ~/osr_ws/devel/setup.bash  
ubuntu@ubuntu:~$ rosrun osr_bringup osr.launch
```

First unable to connect to roboclaws.

Works better when the ribbon cable is plugged into the Rpi!

Try again...

```
Normal boot-up until --  
process[joy_node-6]: started with pid [24590]  
[ERROR] [1595547276.791905115]: Couldn't open joystick force feedback!  
...then...  
IndexError: string index out of range  
[led_screen-5] process has died [pid 24585, exit code 1, cmd  
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py  
__name__:=led_screen  
__log:=/home/ubuntu/.ros/log/104ae97e-cd3d-11ea-8c5f-dca632160e50/led_screen-5.log].  
log file: /home/ubuntu/.ros/log/104ae97e-cd3d-11ea-8c5f-dca632160e50/led_screen-5*.log  
^C[joy_node-6] killing on exit
```

"IndexError: string index out of range" seems familiar from initial rover launch errors....

Back to the regular documentation stream....

2020.08.03 Home

Processor Upgrade

Upon advice of TapaTalk forum:

Swapped a wired game controller for the wireless that seems underpowered and does not want to pair.

Tested RoboClaws w/ MotionStudio and, once got plugged into right laptop USB port, tested ok.

LED display is unplugged to avoid power drain. Need to comment out its launch as that may be the hangup.

Wonder if it's still not the serial0 issue?

```
ubuntu@ubuntu:~$ roslaunch osr_bringup osr.launch
... logging to
/home/ubuntu/.ros/log/579bddfc-d5de-11ea-a215-dca632160e50/roslaunch-ubuntu-150
2.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
```

started roslaunch server http://ubuntu:35239/

SUMMARY

=====

PARAMETERS

```
* /corner_acceleration_factor: 0.8
* /drive_acceleration_factor: 0.5
* /drive_no_load_rpm: 31
* /joy2twist/axis_angular: 3
* /joy2twist/axis_linear: 1
* /joy2twist/enable_button: 4
* /joy2twist/enable_turbo_button: 5
* /joy2twist/scale_angular: 0.53
* /joy2twist/scale_linear: 0.24
* /joy2twist/scale_linear_turbo: 0.5
* /joy_node/autorepeat_rate: 1.0
* /joy_node/coalesce_interval: 0.05
* /motor_controller/addresses: 128,129,130,131,132
* /motor_controller/baud: 115200
* /motor_controller/device: /dev/serial0
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/address: 132
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/address: 132
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/address: 131
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/address: 131
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/address: 129
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/channel: M2
```

```
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/address: 130
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/address: 130
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/address: 129
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/address: 128
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/address: 128
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/ticks_per_rev: 48
* /rosdistro: melodic
* /rosversion: 1.14.6
* /rover_dimensions/d1: 0.184
* /rover_dimensions/d2: 0.267
* /rover_dimensions/d3: 0.267
* /rover_dimensions/d4: 0.2556
* /rover_dimensions/wheel_radius: 0.075
```

NODES

```
/  
joy2twist (teleop_twist_joy/teleop_node)  
joy_node (joy/joy_node)  
led_screen (led_screen/arduino_comm.py)  
roboclaw_wrapper (osr/roboclaw_wrapper.py)  
rover (osr/rover.py)
```

auto-starting new master

process[master]: started with pid [1513]

ROS_MASTER_URI=http://localhost:11311

setting /run_id to 579bddfc-d5de-11ea-a215-dca632160e50

process[rosout-1]: started with pid [1524]

started core service [/rosout]

process[roboclaw_wrapper-2]: started with pid [1527]

process[joy2twist-3]: started with pid [1528]

```
process[rover-4]: started with pid [1529]
process[led_screen-5]: started with pid [1530]
process[joy_node-6]: started with pid [1531]
[ INFO] [1596496155.571410566]: Teleop enable button 4.
[ INFO] [1596496155.594622798]: Turbo on button 5.
[ INFO] [1596496155.594987849]: Linear axis x on 1 at scale 0.240000.
[ INFO] [1596496155.595130569]: Turbo for linear axis x is scale 0.500000.
[ INFO] [1596496155.595188495]: Angular axis yaw on 3 at scale 0.530000.
[ INFO] [1596496155.595241753]: Turbo for angular axis yaw is scale 0.530000.
[ERROR] [1596496155.614055743]: Couldn't open joy stick /dev/input/js0. Will retry
every second.
[INFO] [1596496156.768165]: Starting the rover node
[INFO] [1596496156.768823]: Starting the roboclaw wrapper node
[INFO] [1596496156.773544]: Initializing motor controllers
[INFO] [1596496156.819890]: Sucessfully connected to RoboClaw motor controllers
```

Traceback (most recent call last):

```
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py",
", line 7, in <module>
    screen = LedScreen()
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/screen.py",
line 49, in __init__
    self.send_init()
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/screen.py",
line 206, in send_init
    if (ord(response[0]) == 67 and ord(response[1]) == 68):
IndexError: string index out of range
[led_screen-5] process has died [pid 1530, exit code 1, cmd
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py
__name__:=led_screen
__log__:=/home/ubuntu/.ros/log/579bddfc-d5de-11ea-a215-dca632160e50/led_screen-5.log].
log file:
/home/ubuntu/.ros/log/579bddfc-d5de-11ea-a215-dca632160e50/led_screen-5*.log
no response to game controller.
```

After <!-- commenting out --> the LED display I get this:

```
...
process[joy_node-5]: started with pid [1829]
[ INFO] [1596496842.876824027]: Teleop enable button 4.
[ INFO] [1596496842.883691514]: Turbo on button 5.
[ INFO] [1596496842.884230414]: Linear axis x on 1 at scale 0.240000.
[ INFO] [1596496842.884635835]: Turbo for linear axis x is scale 0.500000.
[ INFO] [1596496842.884996645]: Angular axis yaw on 3 at scale 0.530000.
[ INFO] [1596496842.885312215]: Turbo for angular axis yaw is scale 0.530000.
[ERROR] [1596496842.938005710]: Couldn't open joystick /dev/input/js0. Will retry every second.
[INFO] [1596496843.986702]: Starting the roboclaw wrapper node
[INFO] [1596496843.990506]: Initializing motor controllers
[INFO] [1596496843.997918]: Starting the rover node
[INFO] [1596496844.024834]: Sucessfully connected to RoboClaw motor controllers
```

no response to game controller.

osr.launch:

```
<launch>
  <rosparam file="$(find osr_bringup)/config/osr_params.yaml" />

  <!-- Nodes to run the Open Source Rover -->
  <node name="roboclaw_wrapper" pkg="osr" type="roboclaw_wrapper.py"
output="screen">
    <rosparam command="load" file="$(find
osr_bringup)/config/roboclaw_params.yaml"/>
    <rosparam command="load" file="$(find
osr_bringup)/config/roboclaw_params_mod.yaml"/>
  </node>
  <node name="joy2twist" pkg="teleop_twist_joy" type="teleop_node"
output="screen">
    <param name="enable_button" value="4"/> <!-- which button to press to enable
movement-->
    <param name="enable_turbo_button" value="5"/> <!-- -1: disable turbo -->
    <param name="axis_linear" value="1"/> <!-- which joystick axis to use for
driving -->
    <param name="axis_angular" value="3"/> <!-- which joystick axis to use for
turning -->
    <param name="scale_linear" value="0.24"/> <!-- scale to apply to drive speed,
in m/s: drive_motor_rpm * 2pi / 60 * wheel radius -$>
    <param name="scale_angular" value="0.53"/> <!-- scale to apply to angular
speed, in rad/s: scale_linear / min_radius -->
    <param name="scale_linear_turbo" value="0.5"/> <!-- scale to apply to linear
speed, in m/s -->
  </node>
  <rosparam command="load" file="$(find
osr_bringup)/config/physical_properties.yaml"/>
  <rosparam command="load" file="$(find
osr_bringup)/config/physical_properties_mod.yaml"/>
  <node name="rover" pkg="osr" type="rover.py" output="screen"/>
  <!-- COMMENT OUT LED_SCREEN as not installed -->
  <!-- node name="led_screen" pkg="led_screen" type="arduino_comm.py"-->
  <node pkg="joy"
        type="joy_node" name="joy_node" output="screen">
    <param name="autorepeat_rate"  value="1.0"/>
    <param name="coalesce_interval" value="0.05"/>
  </node>
</launch>
```

```
ubuntu@ubuntu:~$ ls -l /dev/ser*
lrwxrwxrwx 1 root root 5 Jan 28 2018 /dev/serial0 -> ttyS0
lrwxrwxrwx 1 root root 7 Jan 28 2018 /dev/serial1 -> ttyAMA0
```

```
/dev/serial:
total 0
drwxr-xr-x 2 root root 60 Jan 28 2018 by-id
drwxr-xr-x 2 root root 60 Jan 28 2018 by-path
```

2020.08.05 Home Processor Upgrade

From TapaTalk forum @thellertik:

@jhphelan I think you ought to test something simpler here. You can isolate serial issues by using the roboclawtest.py script in my overhaul_readme branch. There are usage instructions for the script here.

If that script isn't talking to your motor controllers, then you won't be able to with ROS.

I think your problem is that both your /dev/serial devices are group root. You should change the group for those device files to tty, and make sure your user is in the tty group. There are currently instructions for doing that here. The instructions may move around, so repeating them:*

```
# symlink the dev files
sudo ln -s /dev/ttyS0 /dev/serial0
sudo ln -s /dev/ttyAMA0 /dev/serial1

# change the group of the new serial devices
sudo chgrp -h tty /dev/serial0
sudo chgrp -h tty /dev/serial1

# The devices are now under the tty group. Need to add the ubuntu user to the tty
group:
sudo adduser ubuntu tty
# also need dialout for ttyS0 and ttyAMA0
sudo adduser ubuntu dialout

# update the permissions for group read on the devices
sudo chmod g+r /dev/ttyS0
sudo chmod g+r /dev/ttyAMA0
```

System responses:

```
ubuntu@ubuntu:~$ sudo ln -s /dev/ttyS0 /dev/serial0
ln: failed to create symbolic link '/dev/serial0': File exists
ubuntu@ubuntu:~$ sudo ln -s /dev/ttyAMA0 /dev/serial1
ln: failed to create symbolic link '/dev/serial1': File exists
ubuntu@ubuntu:~$ sudo chgrp -h tty /dev/serial0
ubuntu@ubuntu:~$ sudo chgrp -h tty /dev/serial1
ubuntu@ubuntu:~$ sudo adduser ubuntu tty
Adding user `ubuntu' to group `tty' ...
Adding user ubuntu to group tty
Done.
ubuntu@ubuntu:~$ sudo adduser ubuntu dialout
The user `ubuntu' is already a member of `dialout'.
ubuntu@ubuntu:~$ sudo chmod g+r /dev/ttyS0
ubuntu@ubuntu:~$ sudo chmod g+r /dev/ttyAMA0
ubuntu@ubuntu:~$
```

reboot just to be sure....

```
ubuntu@ubuntu:~$ roslaunch osr Bringup osr.launch
```

...
[ERROR] [1596672060.194527875]: Couldn't open joystick /dev/input/js0.
Will retry every second.

```
[INFO] [1596672061.121985]: Starting the rover node
[INFO] [1596672061.125922]: Starting the roboclaw wrapper node
[INFO] [1596672061.129983]: Initializing motor controllers
[INFO] [1596672061.166404]: Sucessfully connected to RoboClaw motor controllers
```

...

but no response from the game controller.

@dcschooley

"I don't think you have disabled the serial console correctly if /dev/ttyS0 and /dev/ttyAMA0 have group tty or root. Fixing that is different with ubuntu than with Raspian. Those devices have group dialout in my setup. The group changed when I finally managed to get the console disabled."

These commands provoke no errors, but don't change the group from root to tty either:
(Oh, wait! There's now tty after root!)

```
ubuntu@ubuntu:~$ sudo chgrp -h tty /dev/serial0
ubuntu@ubuntu:~$ sudo chgrp -h tty /dev/serial1
ubuntu@ubuntu:~$ ls -l /dev/ser*
lrwxrwxrwx 1 root tty 5 Jan 28 2018 /dev/serial0 -> ttyS0
lrwxrwxrwx 1 root tty 7 Jan 28 2018 /dev/serial1 -> ttyAMA0
```

How do I "correctly disable the serial console?"

OK, tried this...

```
ubuntu@ubuntu:~$ sudo nano roboclawtest.py    (entered python script)
ubuntu@ubuntu:~$ python roboclawtest.py 128
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@ubuntu:~$
```

So, NOW where am I??

Jim

2020.08.10 Home Processor Upgrade

from TapaTalk @thellertik yesterday:

Oh, turns out there was one step I forgot. I updated the directions in <https://github.com/apollokit/osr-rover-... buntu-1804>.

The key there is you need to disable the serial-getty@ttyS0.service service. It interferes with the /dev/ttyS0 device, at least from my experience today:

2.4.1 Ubuntu 18.04

Because we are using the serial port for communicating with the roboclaw motor controllers, we have to disable the serial-getty@ttyS0.service service. This service has some level of control over serial devices that we use, so if we leave it on it we'll get weird errors (source).

Note that this may stop us from being able to communicate with the RPi over serial. Todo: confirm this and discuss workarounds (e.g. only use ssh)

```
sudo systemctl stop serial-getty@ttyS0.service
sudo systemctl disable serial-getty@ttyS0.service
```

Now we'll need to copy over a udev rules file, which is used to configure needed device files in /dev; namely, ttyS0 and ttyAMA0. Here's a good primer on udev.

```
# copy udev file from the repo to your system
$ cd ~/osr_ws/src/osr-rover-code/config
No such file or directory
```

```
sudo cp serial_udev_ubuntu1804.rules /etc/udev/rules.d/10-local.rules
```

```
# reload the udev rules so that the devices files are set up correctly.
sudo udevadm control --reload-rules && sudo udevadm trigger
This configuration should persist across RPi reboots.
```

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code/config  
-bash: cd: /home/ubuntu/osr_ws/src/osr-rover-code/config: No such file or directory
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ ls  
Arduino 'Init Scripts' LICENSE.txt README.md ROS
```

```
ubuntu@ubuntu:~$ sudo find / -name serial_udev_ubuntu*  
find: '/run/user/116/gvfs': Permission denied  
ubuntu@ubuntu:~$
```

2020.08.12 from @thellertik / TapaTalk #22:

The file exists: see

https://github.com/apollokit/osr-rover-code/tree/overhaul_readme/config

So, to clarify, for your situation you might have to offroad a bit from the exact instructions in the readme.

Per the instructions, you'll have done:

`cd ~/osr_ws/src`

`git clone https://github.com/nasa-jpl/osr-rover-code.git`

But that's the base nasa-jpl repo. You need my fork for this. One approach would be to add another remote repo reference, to mine.

`cd ~/osr_ws/src/osr-rover-code`

`git remote add apollokit git@github.com:apollokit/osr-rover-code.git`

git remote -v # display all your remote repos. Doesn't change anything.

`git checkout apollokit/overhaul_readme`

Then you should have the config directory.

You can switch back to nasa-jpl with:

`git checkout master`

My reply:

So...

`ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code`

`ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git remote add apollokit`

`git@github.com:apollokit/osr-rover-code.git`

`ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git remote -v`

display all your remote repos. Doesn't change anything.

`apollokit git@github.com:apollokit/osr-rover-code.git (fetch)`

`apollokit git@github.com:apollokit/osr-rover-code.git (push)`

`origin https://github.com/nasa-jpl/osr-rover-code.git (fetch)`

`origin https://github.com/nasa-jpl/osr-rover-code.git (push)`

`ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$`

`git checkout apollokit/overhaul_readme`

error: pathspec 'apollokit/overhaul_readme' did not match any file(s) known to git.

`ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ ls`

`Arduino 'Init Scripts' LICENSE.txt README.md ROS`

...didn't work to provide the missing config directory

are we missing a step?

2020.08.15 Home
Processor Upgrade

TapaTalk @thellertik:
Oh, sorry, add a "git fetch apollokit" before the checkout

So that would make it...

```
cd ~/osr_ws/src/osr-rover-code
git remote add apollokit git@github.com:apollokit/osr-rover-code.git
git remote -v  # display all your remote repos. Doesn't change anything.
git fetch apollokit
git checkout apollokit/overhaul_readme
```

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git remote add apollokit
git@github.com:apollokit/osr-rover-code.git
fatal: remote apollokit already exists.
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git remote -v
apollokit    git@github.com:apollokit/osr-rover-code.git (fetch)
apollokit    git@github.com:apollokit/osr-rover-code.git (push)
origin  https://github.com/nasa-jpl/osr-rover-code.git (fetch)
origin  https://github.com/nasa-jpl/osr-rover-code.git (push)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git fetch apollokit
The authenticity of host 'github.com (140.82.114.4)' can't be established.
RSA key fingerprint is
SHA256:nThbg6kXUpJWGI7E1IGOCspRomTxdCARLviKw6E5SY8.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'github.com,140.82.114.4' (RSA) to the list of known
hosts.
git@github.com: Permission denied (publickey).
fatal: Could not read from remote repository.
```

Please make sure you have the correct access rights
and the repository exists.

TapaTalk @thellertik:
*"That command is not going to work if you haven't added your ssh key to github.
You could try https instead:"*

"git remote add apollokit https https://github.com/apollokit/osr-rover-code.git"

So that would make it...

```
cd ~/osr_ws/src/osr-rover-code
git remote add apollokit git@github.com:apollokit/osr-rover-code.git
git remote add apollokit https://github.com/apollokit/osr-rover-code.git
git remote -v # display all your remote repos. Doesn't change anything.
git fetch apollokit
git checkout apollokit/overhaul_readme
```

```
ubuntu@ubuntu:~$ cd osr_ws/src/osr-rover-code
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git remote add apollokit https://github.com/apollokit/osr-rover-code.git
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git remote -v
apollokit    git@github.com:apollokit/osr-rover-code.git (fetch)
apollokit    git@github.com:apollokit/osr-rover-code.git (push)
apollokithttps https://github.com/apollokit/osr-rover-code.git (fetch)
apollokithttps https://github.com/apollokit/osr-rover-code.git (push)
origin      https://github.com/nasa-jpl/osr-rover-code.git (fetch)
origin      https://github.com/nasa-jpl/osr-rover-code.git (push)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git fetch apollokit
Warning: Permanently added the RSA host key for IP address '140.82.112.3' to the list
of known hosts.
git@github.com: Permission denied (publickey).
fatal: Could not read from remote repository.
```

Please make sure you have the correct access rights
and the repository exists.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git checkout
    apollokit/overhaul_readme
error: pathspec 'apollokit/overhaul_readme' did not match any file(s) known to git.
```

My reply:

Clearly there's an incantation or spell missing here. What is it?

"That command is not going to work if you haven't added your ssh key to github."
How do I do that? My understanding is that SSH keys are for my own account, not
accessing someone else's?

JHP

2020.09.04 Home

TapaTalk / Achille0 yesterday:

"Hi Jim, that sounds like serial still isn't working for you. Did you try @thellertik 's updated instructions? @ejenkins went through them and verified that they work. I'll try going through those instructions as well soon."

So try here again:

https://github.com/apollokit/osr-rover-code/tree/overhaul_readme

and choose this: Raspberry Pi setup with Ubuntu 18.04

Which takes you here:

https://github.com/apollokit/osr-rover-code/blob/overhaul_readme/setup/rpi.md

Setting up the Raspberry Pi (RPi)

assume already done

These instructions should work for both the RPi 3 and 4.

[we shall see...]

1 Installing Ubuntu

assume already done

2 Installing ROS

check current distro:

```
ubuntu@ubuntu:~$ roscore
```

...

PARAMETERS

* /rosdistro: **melodic**

* /rosversion: 1.14.6

Ok, got that done

3 Setting up ROS environment and building the rover code

3.1 Setup ROS build environment

already done

3.2 Clone and build the rover code

already done

4 Setting up serial communication on the RPi0

[Here's where I failed previously. Let's see if these directions fly....]

The RPi will talk to the motor controllers over serial.

Because we are using the serial port for communicating with the roboclaw motor controllers, we have to disable the serial-getty@ttyS0.service service. This service has some level of control over serial devices that we use, so if we leave it on it we'll get weird errors ([source](#)).

Note that this may stop us from being able to communicate with the RPi over serial.

Todo: confirm this and discuss workarounds (e.g. only use ssh)

```
ubuntu@ubuntu:~$ sudo systemctl stop serial-getty@ttyS0.service
```

```
ubuntu@ubuntu:~$ sudo systemctl disable serial-getty@ttyS0.service
```

Now we'll need to copy over a udev rules file, which is used to configure needed device files in /dev; namely, `ttyS0` and `ttyAMA0`. Here's a [good primer](#) on udev.

```
# copy udev file from the repo to your system  
cd ~/osr_ws/src/osr-rover-code/config  
[The correct config directory is:  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config$ ]
```

```
sudo cp serial_udev_ubuntu1804.rules /etc/udev/rules.d/10-local.rules
```

[There is no `serial_udev_ubuntu1804.rules` file here]
[In `/etc/udev/rules.d/` there is instead a `10-local-rpi.rules`]

```
# reload the udev rules so that the devices files are set up correctly.  
sudo udevadm control --reload-rules && sudo udevadm trigger  
[given the above disparities, didn't even try this. No telling what it would do out of place]
```

Posted problem to TapaTalk.

@achille0

I'm not sure where you see that the last code change was 5 months ago. The page shows that the last change was a month ago.

From the nasa-jpl/osr git

I still recommend you read up on git. It will benefit you in the long term. You are not supposed to 're-clone', rather you are supposed to 'git checkout'...

Recall our PMs. I have many strengths but git isn't one of them. A couple successful tutorials with straightforward examples does not a git expert make when it comes to real world situations that don't seem to be working as expected, let alone "offroading". Followed by months of disuse and I'm back to Park Bench. OSR is designed to be community outreach. Many of the builders will have little expertise or even seen a command line prompt. As a Family Physician I appreciate how challenging it is for an expert to explain complicated concepts to individuals with a broad range of understanding. I can't just say "Here's your test report. Google is your friend."

You are looking at the wrong config directory. The bringup config directory has nothing to do with this. See image

Found the image but have no idea what to do next. Do I create a new config directory? There are no directions to do so in the readme. I'm at a roadblock with no detour arrows and no GPS. I'm using a Pi4 with Ubuntu 18.04 and ROS Melodic. I'm going to stumble around. See travelogue to follow...

Jim Phelan

```
ubuntu@ubuntu:~$ find ~ -name config  
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr Bringup/config  
/home/ubuntu/osr_ws/src/osr-rover-code/.git/config
```

[Ok so there's a hidden .git directory with a config file]

directions say:

```
cd ~/osr_ws/src/osr-rover-code/config  
sudo cp serial_udev_ubuntu1804.rules /etc/udev/rules.d/10-local.rules
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ ls -a  
. .git Arduino LICENSE.txt ROS  
.. .gitignore 'Init Scripts' README.md
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/.git$ ls -a  
. FETCH_HEAD branches description index logs packed-refs  
.. HEAD config hooks info objects refs
```

there's no config directory here

there is a hidden .git directory and a config file, but not a config directory.

there is no serial_udev_ubuntu1804.rules file

??

JHP

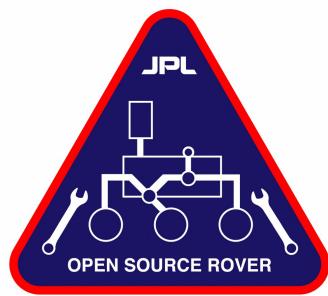
2020.09.08 lschooley @ TapaTalk

3:14 PM - Today#23

Took a bit longer than planned, but here are a few rough patch designs. I have used the few required elements (stick figure rover, text) mentioned earlier in this thread along with some of the optional ones (tools, "education" icons, etc). I've varied the complexity of the designs, with "02" being the most complex (and most difficult to carry over between materials) and "01" being the simplest. All of the designs are currently in multiple colors, but all of them except "02" and "06" should be at least loosely translatable to two-color versions with some further editing of color sections which currently overlap. The color schemes are very experimental right now. Some use the main colors of the OSR website which, as far as I can tell from recent NASA design guidelines, are the standard NASA colors and are not required as part of mission patches. Other patches use colors that had a fair amount of contrast together and, depending on how people feel about them, can be shifted, kept or moved across designs.

The text is currently in Helvetica, as that is a standard NASA typeface. However, I want to do a little more work on finding various other fonts as Helvetica doesn't really grab one's attention on a patch.

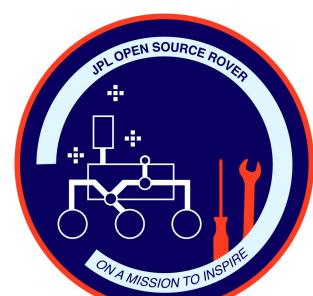
Let me know what you think of these and I can modify and change the existing designs and/or create some new ones based on the elements of certain patches here that people do like. The ones here, being very rough, will get more polished with more edits beyond this point.



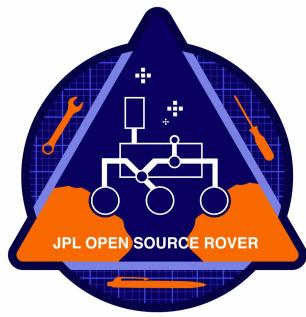
01



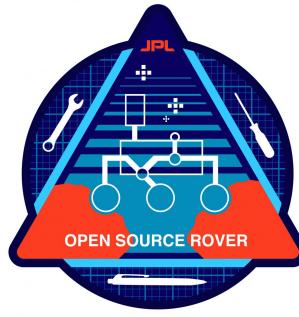
02



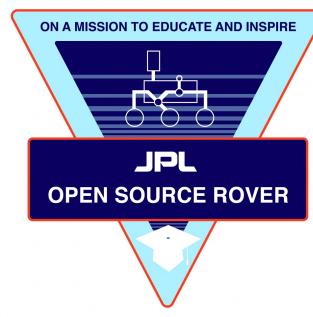
03



04



05



06

@lschooley
Nice work Lauren!

I want a full color embroidered patch for a shirt and to give out to members of our build team!

But mostly thinking how it would look etched onto acrylic.

Would like to see black/white and white/black or white/gray to get a feel for it.

No to the horizontal lines in perspective. Too busy.
I like 6, 4, & 3 in that order.

Just JPL, no NASA?

I like the wrench / screwdriver / pen idea -- design & build.

Maybe #6 could have pen & screwdriver instead of two wrenches?

How to express programming? Perhaps 00100110 (ASCII for "&" ampersand) = AND
("bitwise and" in Python, "address of" in C++)

to suggest connection, inclusion, community, partnership, synergy...

Maybe #3 with the pen replacing the wrench and 00100110 replacing the pen: design / build / program.

I like the graph paper motif.

@ejunkins @Mik

BTW Happy Anniversary y'all! I was TWO YEARS AGO end of August the OSR was released!!

Jim Phelan

2020.09.08 Home
email to wife, daughter, USAi Labs mailing list:

My Fair Ladies and the USAi Labs Team:

Lauren Schooley just posted in the NASA/JPL Open Source Rover TapaTalk forum her first drafts of mission patches for the OSR. See attached.

Definitely want the final design on a shirt and to give out to people who helped build the rover!

Would appreciate your artistic feedback to pass back to Lauren and the OSR build community.

Consider how it would look monochrome and laser etched on acrylic.

Each image has a number for clarity.

[They were in reverse order on the TapaTalk forum!]

BTW Happy Anniversary! The OSR was released the end of August TWO YEARS AGO!!

Jim

Reply from Roberto:

Hello Jim,

Frankly I'm not impressed,

The skeleton depiction of the rover itself is not very flattering.

Paradoxically, the N2 is the only one that looks like a patch, but I'm not sure it will look good in monochrome or etched in acrylic.

The wrench and screwdriver are terribly low tech symbols for such a complex model.

Is there any hope for Version 2.0?

Roberto

Reply from Heather, Todd, Alex:

#3 and #4 doesn't have the JPL Logo---we think it needs the JPL logo

#1 is the easiest/simplest to be a patch and then also in other uses.

Our family likes 1 & 5 and we'd love to buy a patch!

from Kevin Kin:

I like the yellow rocks in 02 as well as the aqua color scheme in 05.

from Charles:

I would go N3 with jpl logo of n1 inside circle @ top. Not a fan of orange color maybe use light blue ... Need pie or arduino symbol to imply software/hardware project

2020.09.10

dcschooley @ TapaTalk:

@jhphelan - do you have a source to have patches made? I will want to buy at least two.

My reply:

No, I was just going to look locally as I want our USAI Labs logo made into one too. BUT - I recall in an article I read about NASA mission patches (that I think I posted somewhere along this thread) that there's a place in FL that's done all the NASA mission patches so far. Would try them first to keep in tradition! I'll see if I can track that down. Could be a fundraiser for our build groups...? Maybe get it included in the NASA store?? NASA may want a say, but the first job of the astronauts was to design their own mission patch.

JHP

@dcschooley @ejunkins @lschooley et al.:

Ok, here's the original post:

<viewtopic.php?p=762#p762>

Here's the article:

<https://www.asildastore.com/blogs/news/...sa-patches>

Here's the company (in NC, not FL) (I'll make some inquiries):

<https://www.abemblem.com/>

JHP

2020.09.10

Email to abemblem.com:

Dear A.B. Emblem:

I understand y'all have done the NASA Mission Patches from the beginning.

Two things:

- 1) A patch for our Robotics / AI group "USAi Labs".
- 2) A "Mission Patch" for the NASA/JPL Open Source Rover project.

1) USAi Labs

I'm president of USAi Labs in Houston, TX. We're a nonprofit organization that grew out of two Meetup groups - "Houston Robotics" and "AI and ML for Robotics and IoT." We have an affiliation with Houston Community College who did a report on us here:
<https://www.youtube.com/watch?v=2Wdgss0q63s>

One of our logos is attached. "Round Robotics WHITE.bmp". We have other similar logos for different divisions, but I'd start here.

I'd be looking for a 4" round iron-on embroidered patch as the NASA patches seem to be 4".

What is your minimum order size and price and breakdown for larger orders?

Is there a preferred image format? Are there other decision factors we need to consider?

I expect we'll need your expertise to convert from image to embroidery. (Having done some of that for my wife in the past, I know that's the hard part!)

2) NASA/JPL Open Source Rover

The project home:

<https://opensourcerover.jpl.nasa.gov/#!/home>

The OSR TapaTalk forum where we discuss the mission patch (free membership required):

https://www.tapatalk.com/groups/jplOpensource_rover/mission-logo-for-the-open-source-rover-t104.html

I'm the USAi Lab's Project Lead for the OSR and an active member of the OSR builder group's forum above.

We're in the beginning stage of design, but when we get a final design, we'd like to consider y'all for production in true NASA tradition with the same questions above.

Sincerely,
Jim Phelan

2020.09.17 Home

Try again to upgrade the RPi4/Ubuntu 18.04/ROS/osr-code:
following from here:

https://www.tapatalk.com/groups/jpl_opensource_rover/raspberry-pi-3-to-4-upgrade-t208-s10.html

which points here:

https://github.com/apollokit/osr-rover-code/blob/overhaul_readme/setup/rpi.md

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git remote add apollokithttps  
https://github.com/apollokit/osr-rover-code.git
```

fatal: remote apollokithttps already exists.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git remote -v  
apollokit      git@github.com:apollokit/osr-rover-code.git (fetch)  
apollokit      git@github.com:apollokit/osr-rover-code.git (push)  
apollokithttps  https://github.com/apollokit/osr-rover-code.git (fetch)  
apollokithttps  https://github.com/apollokit/osr-rover-code.git (push)  
origin         https://github.com/nasa-jpl/osr-rover-code.git (fetch)  
origin         https://github.com/nasa-jpl/osr-rover-code.git (push)
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git fetch apollokithttps
```

remote: Enumerating objects: 147, done.

remote: Counting objects: 100% (147/147), done.

remote: Compressing objects: 100% (96/96), done.

remote: Total 156 (delta 87), reused 108 (delta 48), pack-reused 9

Receiving objects: 100% (156/156), 139.73 KiB | 1.86 MiB/s, done.

Resolving deltas: 100% (88/88), completed with 7 local objects.

From <https://github.com/apollokit/osr-rover-code>

```
* [new branch]  gobilda_2motors    -> apollokithttps/gobilda_2motors  
* [new branch]  iss74            -> apollokithttps/iss74  
* [new branch]  iss87            -> apollokithttps/iss87  
* [new branch]  issue-33        -> apollokithttps/issue-33  
* [new branch]  issue73          -> apollokithttps/issue73  
* [new branch]  markdown_test   -> apollokithttps/markdown_test  
* [new branch]  master           -> apollokithttps/master  
* [new branch]  overhaul_readme -> apollokithttps/overhaul_readme  
* [new branch]  overhaul_readme_temp -> apollokithttps/overhaul_readme_temp
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git fetch apollokithttps
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git checkout
```

apollokit/overhaul_readme

error: pathspec 'apollokit/overhaul_readme' did not match any file(s) known to git.

2020.09.18 New Raspberry Pi 4 Installation Ubuntu 18.04

Tried making a video install tutorial using:
Sparkocam - terrible sound and desktop quality!
PowerPoint insert desktop recording - too confusing without more practice
Fall back to my standard text journal:

From thellertik@TapaTalk OSR Forum:

https://www.tapatalk.com/groups/jpl_opensource_rover/raspberry-pi-3-to-4-upgrade-t208-s40.html

12:27 AM - Today#43

@jhphelan , the new instructions have been merged into master!

*Follow the instructions at the bottom here: <https://github.com/nasa-jpl/osr-rover-code>
(honestly, I'd recommend you start from scratch, with a new image on an SD card)*

Sorry that was a bit longer than two weeks.

thellertik

The github link takes you to:
JPL Open Source Rover Code

...

Setup

The setup directory contains tutorial files for getting everything setup and configured for running the rover code. You should proceed through them in the following order:

[Arduino setup](#)

[Raspberry Pi setup with Ubuntu 18.04](#)

If you want to use Raspian, there are instructions [here](#), though they're not maintained.

[Rover code bringup](#)

I am not a fan of the LED display on the head of the rover. I don't think it's very intuitive and could use some improvement. My lack of skill in C impedes this but I'll give it a try later. Meanwhile, I'll do it their way so as not to miss anything and for demo purposes.

Flashing the Arduino code

follow the link here:

<https://github.com/nasa-jpl/osr-rover-code/blob/master/setup/arduino.md>

In this section we will be flashing the code that runs on the arduino to control the LED matrix in the head. The following steps should be performed on your laptop or development machine (not the raspberry pi)

1. Install the [Arduino IDE](#) used for loading code onto the arduino
2. Download the Arduino code:
 - i Navigate to [the repo](#) and click the green "Clone or download" button.
Choose "Download ZIP".
 - ii Unzip/extract and open the downloaded zip file.
Then, select the Arduino folder and create a new zip file of just that Arduino folder. Name it OsrScreen.zip
3. Load the sketch onto the Arduino
 - i Unplug the Arduino shield JST cable
so the Arduino isn't powered by the control board
 - ii Connect the Arduino to your development machine with USB cable
 - iii Open Arduino IDE
 - iv Select Sketch -> Include Library -> Add .Zip Library
 - v Select the OsrScreen.zip folder created previously
 - vi Click the Upload button in the Sketch Window
4. To load the example in the Arduino IDE: File -> Examples -> OsrScreen -> OsrScreen
 1. I already have the Arduino IDE 1.8.13 installed
 2. Done. R-click, Using 7-zip, add to "Arduino.zip"
 3. i Also unplug from the LED screen itself
and the ribbon cable from the OSR custom Arduino shield
✓
 - ii ✓
 - iii ✓
 - iv **error: A library named Arduino already exists**
This is because I've already done this before.
Look here:
C:\Users\Me\Documents\Arduino\libraries
where I see the Arduino folder. Delete. ✓
 - iv **avrdude: ser_open(): can't open device "\\.\COM17": The system cannot find the file specified.**
Check Tools / Port to be sure on right port. Correct to COM10.
- 4 **File -> Examples -> OsrScreen -> OsrScreen**
should be:
File -> Examples -> (scroll to bottom) -> Arduino -> OsrScreen. Upload.
An error occurred while uploading the sketch

Tools / Get Board Info: BN: Arduino Uno. OK.

Tools / Board: set to Arduino Uno. (Prev set to another board).

Upload (successful.)

SUGGESTED INSTRUCTIONS

1. Install Arduino IDE
 - a. If you're new to Arduino, just follow along. If you've used Arduino before it doesn't hurt to update. Your version number may appear current but, upon opening, offer to update. There may be an older version lurking. Accept the update. It will take you to the Arduino site.
 - b. Go to the [Arduino download site](#).
 - i. Choose your OS e.g. "Windows Installer, for Windows 7 and up."
 - ii. "Just Download" or "Contribute and Download" (nice to do)
 - iii. Click the downloaded arduino-1.8.13-windows.exe (or whichever version) to install.
 - iv. Microsoft Store may offer to get the app there for safety.
"Continue installing from outside the Store" is OK, but either way....
 - v. If it finds an older version it may ask to uninstall first.
Accept then try again.
2. Download the Arduino code
 - a. Navigate to [the repo](#) and click the green "Clone or download" button. Choose "Download ZIP".
 - b. Move downloaded file to your OSR project folder or create one.
 - c. Unzip/extract and open the downloaded zip file: Right-click, select zip tool of choice (eg 7-zip. May need to install one). Extract here.
 - d. Select the Arduino folder and rename it to OsrScreen.
 - e. Create a new zip file of just that folder
 - i. Right-click, using 7-zip, add to "OsrScreen.zip".

[If you zip the file first, then rename it, the Arduino IDE still sees the library folder as "Arduino". There tend to be lots of "Arduino-" folders in C:\Users\Me\Documents\Arduino\libraries. Perhaps better to name it OsrScreen first, then zip, so the library folder says "OsrScreen". Maybe name it OsrScreen in the repo to start with? Changing the folder name doesn't seem to impair the sketch function.]

3. Load the sketch onto the Arduino
 - a. Unplug the Arduino shield JST cable so the Arduino isn't powered by the control board
 - b. Connect the Arduino to your development machine with USB cable
 - c. Open the Arduino IDE. If you've used Arduino before, the IDE may be expecting a different board or COM port.
 - i. Tools / Get Board Info. It should say "BN: Arduino Uno". OK.
 - ii. Tools / Board. It should say "Arduino Uno". If not, slide over and select Arduino Uno.
 - iii. Tools / Port. It should say "Port: COMxx(Arduino Uno)". If not, slide over and select appropriate COM port.
 - d. Select Sketch -> Include Library -> Add .Zip Library
 - e. Navigate to your OSR project folder and select the OsrScreen.zip folder created previously. If you've done this before and are reinstalling the Arduino code you may get the error: **A library named OsrScreen (or Arduino) already exists.**

Go to C:\Users\Me\Documents\Arduino\libraries

Find the OsrScreen (or Arduino) folder and delete it. Then try again.

[Instructions say upload here, but shouldn't 4 come first?]

4. To load the example in the Arduino IDE: File -> Examples (scroll way down to Examples from Custom Libraries) -> OsrScreen -> OsrScreen
5. Click the Upload button in the Sketch Window. If you get an upload error, recheck 3 above.

Sent above as PM to thellertik@TapaTalk OSR forum

Now for the more challenging parts - installing Ubuntu 18.04, then ROS and the OSR code.

2020.09.19 Installing Ubuntu

The next step is [Raspberry Pi setup with Ubuntu 18.04](#)

1 Installing Ubuntu

The first step is to install the Ubuntu Operating System on your Raspberry Pi.

Download Ubuntu 18.04 from [here](#) for your RPi version. For an RPi3 the best default is 32-bit, but if you're on an Rpi4 then you can go for 64-bit.

Download your Ubuntu Pi image



Raspberry Pi 2 Raspberry Pi 3 Raspberry Pi 4

Ubuntu 20.04.1 LTS RECOMMENDED <small>The version of Ubuntu with long term support, until April 2025.</small>	Download 64-bit	Download 64-bit
	Download 32-bit	Download 32-bit
Ubuntu 18.04.5 <small>The previous LTS version of Ubuntu for projects without 20.04 support.</small>	Download 64-bit	Download 64-bit
	Download 32-bit	Download 32-bit

It will download as:

ubuntu-18.04.5-preinstalled-server-arm64+raspi4.img.xz

which needs to be unzipped to:

ubuntu-18.04.5-preinstalled-server-arm64+raspi4.img

Right-click, use unzipping tool of choice, “extract here”

Move .img to your OSR project folder.

Note this is the SERVER version. Desktop will have to be installed separately.

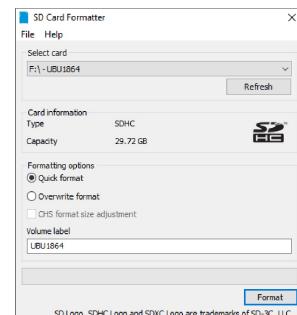
Preparing the image for the RPi and boot it up:

Format a good quality (Sandisk etc) 32GB or larger micro SD card using [SD Card Formatter](#)

Check File Explorer for the drive number of your SD card.

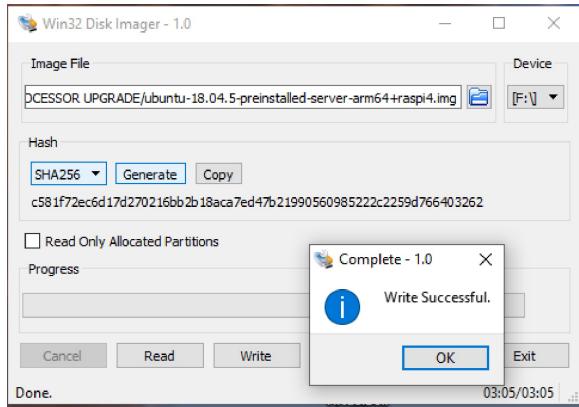
Choose a Volume label for your card e.g. UBU1864 for Ubuntu v18.04 64 bit.

Format (Quick format is ok)



Flash Ubuntu onto your microSD card.

*There are instructions for doing this on [Ubuntu](#), [Windows](#), and [Mac](#)
Using [Win32DiskImager](#)*



Select your SD card drive in Device.

Find the Image (.img) file in the OSR project folder.

Write. OK. Exit.

When finished eject the card: File explorer - select SD card, Right-click, Eject.

Have a monitor, keyboard and mouse attached to the Raspberry Pi.

If you don't have those, there are ways to control a Raspberry Pi "headlessly" but that's a story for another day....

Insert the flashed SD card in the RPi

Power it on

There will be a long list of bootup commands, then it will stop.

You will probably have to hit **ENTER** on the keyboard before it will prompt for the login and password:

Ubuntu login: **ubuntu**

Password: **ubuntu** it won't display

You are required to change your password immediately (root enforced)

Changing the password for ubuntu.

(current) UNIX password: **ubuntu** it won't display

Enter new UNIX password: **MyP@55w0rd** it won't display. Choose your own

Retype new UNIX password: **MyP@55w0rd** it won't display. Same as above

ubuntu@ubuntu:~\$ _

You're in!

1 *Installing Ubuntu (done above). From here I'm using PuTTY to remote in to my Raspberry Pi 4 for ease of copy/paste into this journal. While still connected to the Pi, I did \$ ifconfig to find out the IP address of ETH0 = 192.168.1.16. I then directed PuTTY to*

2 **Further setup: wifi, desktop GUI (optional), ssh**

2.1 *Connect to wifi from the command line. Get your new device on the internet.*

Instructions [here](#). [These instructions are for Ubuntu 20.04 but will hopefully apply. [This one](#) deals specifically with Ubuntu 18.04 but they seem similar.]

2.1.1 *Basically, you need to edit the /etc/netplan/50-cloud-init.yaml file and add your wifi network)*

2.1.1.1 *First step is to identify the name of your wireless network interface. To do so execute:*

```
ubuntu@ubuntu:~$ ls /sys/class/net
eth0 lo wlan0
```

2.1.1.2 *Next, navigate to the /etc/netplan directory and locate the appropriate Netplan configuration files. Should end in .yaml.*

```
ubuntu@ubuntu:~$ ls /etc/netplan
50-cloud-init.yaml
```

2.1.1.3 *Edit the Netplan configuration file:*

```
ubuntu@ubuntu:~$ sudoedit /etc/netplan/50-cloud-init.yaml
```

and insert the following configuration stanza while replacing the SSID-NAME-HERE and PASSWORD-HERE with your SSID network name and password:

wifis:

```
wlan0:
  optional: true
  access-points:
    "SSID-NAME-HERE":
      password: "PASSWORD-HERE"
  dhcp4: true
```

Make sure that the wifis block is aligned with the above ethernets or version block if present. The entire configuration file may look similar to the one below:

Change:

```
# This file is generated from information provided by the datasource. Changes
# to it will not persist across an instance reboot. To disable cloud-init's
# network configuration capabilities, write a file
#/etc/cloud/cloud.cfg.d/99-disable-network-config.cfg with the following:
# network: {config: disabled}
network:
  ethernets:
    eth0:
      dhcp4: true
      optional: true
  version: 2
```

To:

```
# This file is generated from information provided by the datasource. Changes
# to it will not persist across an instance reboot. To disable cloud-init's
# network configuration capabilities, write a file
# /etc/cloud/cloud.cfg.d/99-disable-network-config.cfg with the following:
# network: {config: disabled}
network:
  ethernets:
    eth0:
      dhcp4: true
      optional: true
  version: 2
  wifis:
    wlan0:
      optional: true
      access-points:
        "SSID-NAME-HERE":
          password: "PASSWORD-HERE"
      dhcp4: true
```

- 2.1.1.4 *Once ready, apply the changes and connect to your wireless interface by executing the bellow command:*

```
ubuntu@ubuntu:~$ sudo netplan apply
```

- 2.1.1.5 *After following these steps, you should see an ip address assigned in the output of ip a. It will be an inet value like 192.168.1.18, underneath an interface entry like wlan0*

```
ubuntu@ubuntu:~$ ip a
```

```
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN
group default qlen 1000
```

```
  link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
```

```
  inet 127.0.0.1/8 scope host lo
```

```
    valid_lft forever preferred_lft forever
```

```
  inet6 ::1/128 scope host
```

```
    valid_lft forever preferred_lft forever
```

```
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP
group default qlen 1000
```

```
  link/ether dc:a6:32:16:0e:50 brd ff:ff:ff:ff:ff:ff
```

```
  inet 192.168.1.16/24 brd 192.168.1.255 scope global dynamic eth0
```

```
    valid_lft 86211sec preferred_lft 86211sec
```

```
    inet6 fe80::dea6:32ff:fe16:e50/64 scope link
```

```
      valid_lft forever preferred_lft forever
```

```
3: wlan0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel
state UP group default qlen 1000
```

```
  link/ether dc:a6:32:16:0e:51 brd ff:ff:ff:ff:ff:ff
```

```
  inet 192.168.1.17/24 brd 192.168.1.255 scope global dynamic wlan0 ...
```

Or, to look at it another way:

```
ubuntu@ubuntu:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
  inet 192.168.1.16 netmask 255.255.255.0 broadcast 192.168.1.255
    inet6 fe80::dea6:32ff:fe16:e50 prefixlen 64 scopeid 0x20<link>
      ether dc:a6:32:16:0e:50 txqueuelen 1000 (Ethernet)
        RX packets 1622 bytes 423817 (423.8 KB)
        RX errors 0 dropped 13 overruns 0 frame 0
        TX packets 1210 bytes 146862 (146.8 KB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
  inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
      loop txqueuelen 1000 (Local Loopback)
        RX packets 122 bytes 9380 (9.3 KB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 122 bytes 9380 (9.3 KB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
  inet 192.168.1.17 netmask 255.255.255.0 broadcast 192.168.1.255
    inet6 fe80::dea6:32ff:fe16:e51 prefixlen 64 scopeid 0x20<link>
      ether dc:a6:32:16:0e:51 txqueuelen 1000 (Ethernet)
        RX packets 21 bytes 3616 (3.6 KB)
        RX errors 0 dropped 1 overruns 0 frame 0
        TX packets 16 bytes 2240 (2.2 KB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

2.2 Install a desktop GUI environment (optional)

This is a good option for newbies to the linux world. It's pretty easy to do, though it'll take a while (maybe an hour).

Follow the instructions [here](#).

- 1 *We recommend using SLiM as the Display Manager, it seems lighter weight than the other options*
- 2 *We also recommend using GNOME for the GUI*
- 3 *Note that you'll probably need to sudo tasksel (instead of without sudo, per the instructions), otherwise you'll get a permissions error.*

As usual, start with a fresh update. Probably should have done this at the very beginning? This ensures you are working with the most recent software updates.

```
ubuntu@ubuntu:~$ sudo apt-get update && sudo apt-get upgrade  
[Y]  
Loooong download, successful w/o errors.
```

Next, install the tasksel manager utility:

```
ubuntu@ubuntu:~$ sudo apt-get install tasksel  
Y
```

Now it is time to install a desktop environment.

Select a Display Manager

A display manager is an application that starts the display server, launches the desktop, and manages user authentication. The default GDM3 (used with KDE-Plasma) is a resource-intensive display manager. If you need to conserve system resources, consider a lighter display manager, like SDDM, SLiM, or LightDM.

By default, only one display manager can manage a server. They can run simultaneously only if configured to manage different servers. This article assumes that you will be using a single default display manager.

To install a specific display manager, use the apt-get package manager:

To install SLiM:

```
ubuntu@ubuntu:~$ sudo apt-get install slim  
Y
```

Choose a GUI for Your Server

GNOME is the default GUI for most Ubuntu installations and is (loosely) based on the Apple ecosystem.

KDE is another popular GUI, (loosely) based on the Microsoft ecosystem. If you want to have the look and feel of a regular Ubuntu system, choose one of these desktop environments.

GNOME

To install GNOME, start by launching tasksel (**remembering the sudo caution above**):
ubuntu@ubuntu:~\$ **sudo tasksel**

*A colorful interface will launch. Use the arrow key to scroll down the list and find **Ubuntu desktop**. [SPACE] to select. [TAB] to get to <OK>. [ENTER]. Installs.*

The system will install the software and reboot, giving you a graphical login screen generated by your default display manager. In our case, it's Slim.

s

The system did NOT reboot itself.

I think the first time I did sudo tasksel I selected “Ubuntu GNOME live CD” when I should have scrolled farther down to “Ubuntu desktop”.

This time it did a serious install!

Switch the HDMI cable back to the Rpi & observe the reboot. It comes up to a desktop, but now WiFi has been lost. Won't let me set up from the GUI.

Ran sudo tasksel again to look at the options expecting to be able to ^C out of it, but NO. So I deselected everything & said OK expecting it would have nothing to do. But NO. It started uninstalling everything I unselected!

Reran sudo tasksel selecting only “Ubuntu desktop” as I wasn’t sure what all I had unchecked. Let’s see what kind of mess I’ve made! Rebooted to an unresponsive blank rainbow desktop! OK! Start over from flashing the SD card!

Got through installing GNOME Desktop. Sudo shutdown -h now seems to take a long time. Rebooted but nothing comes up on the monitor during boot even tho PuTTY comes up & logs in fine. Shut-down & reboot again. This time came up OK but the screen resolution was less. Error: “Xsession: unsupported number of arguments (4); falling back t”. Came up to “Welcome!” screen. Made selections. Error: “System program problem detected. Do you want to report the problem now? [Cancel]. Software updater [close]. Restart.

Desktop denies WiFi. ifconfig requiring sudo! Shows wlan0 ok. Clock on desktop shows 5 hours ahead! Went to setup & put auto time zone (not London!). Added network printer. Shutdown for the night!

2020.09.20

Since the desktop GUI is optional, perhaps I shouldn't worry about it, but I want it to work.

Cold reboot. Login. Thinks it's still in London.

Reported a system problem, doesn't say what. Cancel.

Manual time zone - was finally able to click Chicago instead of Mexico, Canada or Indiana. Could have just searched, but.... Back to auto time zone.

Install Terminator.

Let's see if I can Remote Desktop in? No.

How about VNC? No.

Attach 7" HDMI to OSR.

Reboot to activate little screen.

Odd - the right 1/5 of the 7" screen is blank.

Right-click desktop, display settings - window way larger than desktop.

Drag left to see "unknown display", resolution - blank, no drop-down. Cold reboot.

"System program problem detected" again. Report.

Switch back to normal monitor. Restart. Display is normal.

7" display connected to laptop is normal. (?!)

Back to install....

2.3 Enable SSH

Since PuTTY works, isn't SSH already installed?

You probably will also want to connect to your newly configured RPi remotely over ssh, rather than having to use a separate monitor every time. Instructions [here](#).

- 1 Basically, run `sudo systemctl enable ssh.socket` from the command line
- 2 Now you should be able to login from your dev machine. `ssh ubuntu@192.168.1.18`, using the ip address for your RPi that you found above.
- 3 It should prompt you for a password. Once you enter it successfully, you'll be logged on! The enable step above should configure the ssh server to automatically come up on reboot, so you can just login to the RPi remotely from now on.

```
ubuntu@ubuntu:~$ sudo systemctl enable ssh.socket
```

(This works from Command Prompt box on laptop, not from browser.)

**Would really like to have Remote Desktop or VNC to work remotely.
This works great with Raspbian. Never got it to work with Ubuntu before. Let's try....**

Install xrdp from [here](#):

```
ubuntu@ubuntu:~$ sudo apt-get install xrdp
```

```
Y
```

Remote Desktop connects, logs in, then immediately disconnects. !?

```
ubuntu@ubuntu:~$ sudo systemctl enable xrdp
```

```
ubuntu@ubuntu:~$ sudo apt-get install xfce4 xfce4-terminal
```

```
looong install
```

```
ubuntu@ubuntu:~$ sudo sed -i.bak '/fi/a #xrdp multiple users configuration  
n xfce-session n' /etc/xrdp/startwm.sh
```

```
ubuntu@ubuntu:~$ sudo ufw allow 3389/tcp
```

```
ubuntu@ubuntu:~$ sudo /etc/init.d/xrdp restart
```

Remote Desktop connects, logs in, then immediately disconnects. Still. !?

Install VNC from [here](#):

```
ubuntu@ubuntu:~$ sudo apt install xfce4 xfce4-goodies xorg dbus-x11  
x11-xserver-utils Y
```

```
ubuntu@ubuntu:~$ sudo apt install tigervnc-standalone-server  
tigervnc-common
```

```
ubuntu@ubuntu:~$ vncserver
```

You will require a password to access your desktops.

Password: ****

Verify: ****

Would you like to enter a view-only password (y/n)? n

New 'ubuntu:1 (ubuntu)' desktop at :1 on machine ubuntu

Starting applications specified in /etc/X11/Xvnc-session
Log file is /home/ubuntu/.vnc/ubuntu:1.log

Use xtigervncviewer -SecurityTypes VncAuth -passwd /home/ubuntu/.vnc/passwd :1 to connect to the VNC server.

vncserver: Failed command '/etc/X11/Xvnc-session': 256!

```
===== tail -15 /home/ubuntu/.vnc/ubuntu:1.log
=====
```

Xvnc TigerVNC 1.7.0 - built Dec 5 2017 09:25:01

Copyright (C) 1999-2016 TigerVNC Team and many others (see README.txt)

See <http://www.tigervnc.org> for information on TigerVNC.

Underlying X server release 11905000, The X.Org Foundation

Sun Sep 20 08:35:43 2020

vncext: VNC extension running!

vncext: Listening for VNC connections on local interface(s), port 5901

vncext: created VNC server for screen 0

XIO: fatal IO error 11 (Resource temporarily unavailable) on X server ":1"

 after 175 requests (175 known processed) with 0 events remaining.

Killing Xtigervnc process ID 16447... which seems to be deadlocked. Using SIGKILL!

```
=====
=====
```

Starting applications specified in /etc/X11/Xvnc-session has failed.

Maybe try something simple first, e.g.,

 tigervncserver -xstartup /usr/bin/xterm

ubuntu@ubuntu:~\$ **tigervncserver -xstartup /usr/bin/xterm**

New 'ubuntu:1 (ubuntu)' desktop at :1 on machine ubuntu

Starting applications specified in /usr/bin/xterm

Log file is /home/ubuntu/.vnc/ubuntu:1.log

Use xtigervncviewer -SecurityTypes VncAuth -passwd /home/ubuntu/.vnc/passwd :1 to connect to the VNC server.

"The connection was refused by the computer"

I give up on Remote Desktop or VNC.

3 Installing ROS

We'll install ROS (Robot Operating System) Melodic on the RPi.

You'll need to be logged in to the RPi via ssh, or open a terminal in the desktop GUI if you installed it above.

The below steps are based off of [these instructions](#). Consult them for more details.

Setup

```
# Setup your computer to accept software from packages.ros.org
```

```
ubuntu@ubuntu:~$ sudo sh -c 'echo "deb  
http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main" >  
/etc/apt/sources.list.d/ros-latest.list'
```

set up keys

```
ubuntu@ubuntu:~$ sudo apt-key adv --keyserver  
'hkp://keyserver.ubuntu.com:80' --recv-key  
C1CF6E31E6BADE8868B172B4F42ED6FBAB17C654
```

Installation

```
# make sure your Debian package index is up-to-date
```

```
ubuntu@ubuntu:~$ sudo apt update
```

...

2 packages can be upgraded. Run 'apt list --upgradable' to see them.

```
ubuntu@ubuntu:~$ sudo apt upgrade Y
```

```
# desktop-Full Install: (Recommended) : ROS, rqt, rviz, robot-generic libraries, 2D/3D  
simulators and 2D/3D perception
```

```
ubuntu@ubuntu:~$ sudo apt install ros-melodic-desktop-full Y
```

Loooong install

Dependencies for building packages

```
# install 'em
```

```
ubuntu@ubuntu:~$ sudo apt install python-rosdep python-rosinstall  
python-rosinstall-generator python-wstool build-essential Y
```

```
# initialize rosdep
```

```
ubuntu@ubuntu:~$ sudo rosdep init
```

```
ubuntu@ubuntu:~$ rosdep update
```

4 Setting up ROS environment and building the rover code

4.1 Setup ROS build environment

First we'll create a workspace for the rover code.

```
# Create a catkin workspace directory, which will contain all ROS compilation and  
# source code files, and move into it  
ubuntu@ubuntu:~$ mkdir -p ~/osr_ws/src && cd ~/osr_ws  
# Source your newly created ROS environment  
ubuntu@ubuntu:~/osr_ws$ source /opt/ros/$ROS_DISTRO/setup.bash  
-bash: /opt/ros//setup.bash: No such file or directory  
apparently $ROS_DISTRO needs to be replace by "melodic"?  
ubuntu@ubuntu:~/osr_ws$ source /opt/ros/melodic/setup.bash  
[no error this time]
```

4.2 Clone and build the rover code

For this section, you'll be working with the version control software git. Now's a good time to [read up](#) on how that works if you're new to it and make a GitHub account! In the newly created catkin workspace you just made, clone this repo:

```
ubuntu@ubuntu:~/osr_ws$ sudo apt-get install git  
ubuntu@ubuntu:~/osr_ws$ cd ~/osr_ws/src  
ubuntu@ubuntu:~/osr_ws/src$ git clone  
https://github.com/nasa-jpl/osr-rover-code.git  
# install the dependencies  
ubuntu@ubuntu:~/osr_ws/src$ rosdep install --from-paths src --ignore-src  
given path 'src' does not exist
```

Previously cd .. came first, then rosdep. Let's try that:

```
# install the dependencies  
~/osr_ws/src$ cd ..          BACK UP one dir to get to ~/osr_ws dir to do rosdep  
~/osr_ws$ rosdep install --from-paths src --ignore-src  
~/osr_ws$ catkin_make  
ubuntu@ubuntu:~/osr_ws/src$ cd ..  
ubuntu@ubuntu:~/osr_ws$ rosdep install --from-paths src --ignore-src  
#All required rosdeps installed successfully  
ubuntu@ubuntu:~/osr_ws$ catkin_make  
...  
[100%] Built target osr_msgs_generate_messages
```

add the generated files to the path so ROS can find them

```
ubuntu@ubuntu:~/osr_ws$ source devel/setup.bash
```

The rover has some customizable settings that will overwrite the default values.

Whether you have any changes compared to the defaults or not, you have to manually create these files:

```
ubuntu@ubuntu:~/osr_ws$ cd  
~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config$ touch  
physical_properties_mod.yaml roboclaw_params_mod.yaml
```

To change any values from the default, modify these files instead so they don't get tracked by git. The files follow the same structure as the default.

4.3 Add ROS config scripts to `.bashrc`

The source...`foo.bash` lines above are used to manually configure your ROS environment. We can do this automatically in the future by doing:

```
echo "source /opt/ros/$ROS_DISTRO/setup.bash" >> ~/.bashrc
```

change this to:

```
echo "source /opt/ros/melodic/setup.bash" >> ~/.bashrc
```

[I don't think the following needs to be done from this deep directory, but no directions to change to home directory and it shouldn't matter to these commands...]

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config$ echo  
"source /opt/ros/melodic/setup.bash" >> ~/.bashrc
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config$ echo  
"source ~/osr_ws/devel/setup.bash" >> ~/.bashrc
```

This adds the source lines to `~/.bashrc`, which runs whenever a new shell is opened on the RPi - by logging in via ssh, for example. So, from now on, when you log into the RPi your new command line environment will have the appropriate configuration for ROS and the rover code.

5 Setting up serial communication on the RPi

The RPi will talk to the motor controllers over serial.

Because we are using the serial port for communicating with the roboclaw motor controllers, we have to disable the serial-getty@ttyS0.service service. This service has some level of control over serial devices that we use, so if we leave it on it we'll get weird errors ([source](#)).

*Note that the following **may step may stop** you from being able to communicate with the RPi over serial.*

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config$ sudo  
systemctl stop serial-getty@ttyS0.service  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config$ sudo  
systemctl disable serial-getty@ttyS0.service
```

Now we'll need to copy over a udev rules file, which is used to configure needed device files in /dev; namely, ttyS0 and ttyAMA0. Here's a [good primer](#) on udev.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config$ cd  
~/osr_ws/src/osr-rover-code/config  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo cp  
serial_udev_ubuntu1804.rules /etc/udev/rules.d/10-local.rules  
# reload the udev rules so that the devices files are set up correctly.  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo udevadm control  
--reload-rules && sudo udevadm trigger
```

This configuration should persist across RPi reboots.

Finally, add the user to the tty group:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo adduser ubuntu tty
```

You'll need to log out of your ssh session and log back in for this to take effect. Or you can restart Ubuntu.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo shutdown -h now
```

Take a break....

6 Testing serial comm with the Roboclaw motors controllers

Run the roboclawtest.py script with all of the motor addresses:

```
cd ~/osr_ws/src/osr-rover-code/scripts
```

```
python roboclawtest.py 128
```

```
python roboclawtest.py 129
```

```
python roboclawtest.py 130
```

```
python roboclawtest.py 131
```

```
python roboclawtest.py 132
```

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code/scripts
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 128
```

Traceback (most recent call last):

```
  File "roboclawtest.py", line 18, in <module>
```

```
    print roboclaw.ReadVersion(address)
```

```
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw.py", line 708, in
ReadVersion
```

```
    self._port.flushInput()
```

```
AttributeError: Roboclaw instance has no attribute '_port'
```

[python3 doesn't work either]

Xbox controller: No response to direct-wired controller

BasicMicro Motion Studio to recheck Roboclaws:

All 5 Roboclaws, all 10 motors respond appropriately.

roboclawtest.py:

```
# A short and sweet script to test communication with a single roboclaw motor
controller.
```

```
# usage
```

```
# $ python roboclawtest.py 128
```

```
from time import sleep
import sys
from os import path
# need to add the roboclaw.py file in the path
sys.path.append(path.join(path.expanduser('~'),
'osr_ws/src/osr-rover-code/ROS/osr/src'))
from roboclaw import Roboclaw
```

```
if __name__ == "__main__":
```

```
    address = int(sys.argv[1])
```

```
    roboclaw = Roboclaw("/dev/serial0", 115200)
```

```
    roboclaw.Open()
```

```
    print roboclaw.ReadVersion(address)
```

```
    print roboclaw.ReadEncM1(address)
```

2020.09.27

TapaTalk OSR Forum @Robocarp having same problems. Shared by install experience .pdf's.

FINAL STEP:

Rover code bringup

<https://github.com/nasa-jpl/osr-rover-code/blob/master/setup/rover Bringup.md>

1 Manual rover bringup

In a sourced terminal

```
source /opt/ros/$ROS_DISTRO/setup.bash && source ~/osr_ws/devel/setup.bash  
which translates for ROS melodic to --  
source /opt/ros/melodic/setup.bash && source ~/osr_ws/devel/setup.bash  
run  
roslaunch osr Bringup osr.launch
```

```
ubuntu@ubuntu:~$ rosrun osr Bringup osr.launch  
... logging to  
/home/ubuntu/.ros/log/5b4269dc-00f7-11eb-b67e-dca632160e50/roslaunch-ubuntu-562  
3.log  
Checking log directory for disk usage. This may take a while.  
Press Ctrl-C to interrupt  
Done checking log file disk usage. Usage is <1GB.
```

started roslaunch server http://ubuntu:33749/

SUMMARY

=====

PARAMETERS

```
* /corner_acceleration_factor: 0.8  
* /drive_acceleration_factor: 0.5  
* /drive_no_load_rpm: 31  
* /joy2twist/axis_angular: 3  
* /joy2twist/axis_linear: 1  
* /joy2twist/enable_button: 4  
* /joy2twist/enable_turbo_button: 5  
* /joy2twist/scale_angular: 0.53  
* /joy2twist/scale_linear: 0.24  
* /joy2twist/scale_linear_turbo: 0.5  
* /joy_node/autorepeat_rate: 1.0  
* /joy_node/coalesce_interval: 0.05  
* /motor_controller/addresses: 128,129,130,131,132  
* /motor_controller/baud: 115200  
* /motor_controller/device: /dev/serial0
```

```
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/address: 132
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/address: 132
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/address: 131
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/address: 131
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/address: 129
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/address: 130
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/address: 130
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/address: 129
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/address: 128
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/address: 128
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/ticks_per_rev: 48
* /rosdistro: melodic
* /rosversion: 1.14.9
* /rover_dimensions/d1: 0.184
* /rover_dimensions/d2: 0.267
* /rover_dimensions/d3: 0.267
* /rover_dimensions/d4: 0.2556
* /rover_dimensions/wheel_radius: 0.075
```

```
* /velocity_timeout: 2.0
```

```
NODES
```

```
/  
joy2twist (teleop_twist_joy/teleop_node)  
joy_node (joy/joy_node)  
led_screen (led_screen/arduino_comm.py)  
roboclaw_wrapper (osr/roboclaw_wrapper.py)  
rover (osr/rover.py)
```

```
auto-starting new master
```

```
process[master]: started with pid [5633]  
ROS_MASTER_URI=http://localhost:11311
```

```
setting /run_id to 5b4269dc-00f7-11eb-b67e-dca632160e50
```

```
process[rosout-1]: started with pid [5644]
```

```
started core service [/rosout]
```

```
process[roboclaw_wrapper-2]: started with pid [5651]
```

```
process[joy2twist-3]: started with pid [5652]
```

```
process[rover-4]: started with pid [5653]
```

```
process[led_screen-5]: started with pid [5655]
```

```
process[joy_node-6]: started with pid [5660]
```

```
[ WARN] [1601234798.730907445]: Couldn't set gain on joystick force feedback: Bad  
file descriptor
```

```
Traceback (most recent call last):
```

```
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py",  
line 7, in <module>
```

```
    screen = LedScreen()
```

```
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/screen.py", line 26,  
in __init__
```

```
    self.ser = serial.Serial(dev,baud,timeout=1.0)
```

```
  File "/usr/lib/python2.7/dist-packages/serial/serialutil.py", line 240, in __init__  
    self.open()
```

```
  File "/usr/lib/python2.7/dist-packages/serial/serialposix.py", line 268, in open  
    raise SerialException(msg(errno, "could not open port {}: {}".format(self._port, msg)))  
serial.serialutil.SerialException: [Errno 2] could not open port /dev/ttyUSB0: [Errno 2] No  
such file or directory: '/dev/ttyUSB0'
```

```
[led_screen-5] process has died [pid 5655, exit code 1, cmd
```

```
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py
```

```
__name__:=led_screen
```

```
__log__:=/home/ubuntu/.ros/log/5b4269dc-00f7-11eb-b67e-dca632160e50/led_screen-5.l  
og].
```

```
log file:
```

```
/home/ubuntu/.ros/log/5b4269dc-00f7-11eb-b67e-dca632160e50/led_screen-5*.log
```

```
[INFO] [1601234800.676632]: Starting the roboclaw wrapper node
```

```
[INFO] [1601234800.682419]: Initializing motor controllers
```

```
Traceback (most recent call last):
```

```
File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py", line
444, in <module>
    wrapper = RoboclawWrapper()
File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py", line
28, in __init__
    self.establish_roboclaw_connections()
File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py", line
128, in establish_roboclaw_connections
    version_response = self.rc.ReadVersion(address)
File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw.py", line 708, in
ReadVersion
    self._port.flushInput()
AttributeError: Roboclaw instance has no attribute '_port'
[INFO] [1601234800.780007]: Starting the rover node
[roboclaw_wrapper-2] process has died [pid 5651, exit code 1, cmd
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py
__name:=roboclaw_wrapper
__log:=/home/ubuntu/.ros/log/5b4269dc-00f7-11eb-b67e-dca632160e50/roboclaw_wra
pper-2.log].
log file:
/home/ubuntu/.ros/log/5b4269dc-00f7-11eb-b67e-dca632160e50/roboclaw_wrapper-2*.log
```

^C

```
^C[joy_node-6] killing on exit
[rover-4] killing on exit
[joy2twist-3] killing on exit
[rosout-1] killing on exit
[master] killing on exit
shutting down processing monitor...
... shutting down processing monitor complete
done
```

Rover is UNRESPONSIVE to direct-connect USB Xbox controller.

```
ubuntu@ubuntu:~$ roscore
... logging to
/home/ubuntu/.ros/log/ad02ce50-00f8-11eb-b67e-dca632160e50/roslaunch-ubuntu-570
5.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
```

```
started roslaunch server http://ubuntu:44387/
ros_comm version 1.14.9
```

SUMMARY

```
=====
```

PARAMETERS

- * /rostdistro: melodic
- * /rosversion: 1.14.9

NODES

```
auto-starting new master
process[master]: started with pid [5715]
ROS_MASTER_URI=http://ubuntu:11311/
```

```
setting /run_id to ad02ce50-00f8-11eb-b67e-dca632160e50
process[rosout-1]: started with pid [5726]
started core service [/rosout]
```

2 Automatic bringup with init script

<https://github.com/nasa-jpl/osr-rover-code/blob/master/setup/rover Bringup.md>

Starting scripts on boot using ROS can be a little more difficult than starting scripts on boot normally from the Raspberry Pi because of the default permission settings on the RPi and the fact that that ROS cannot be ran as the root user. The way that we will starting our rover code automatically on boot is to create a service that starts our roslaunch script, and then automatically run that service on boot of the robot. Further information on system service scripts running at boot.

There are two scripts in the "Software/Init Scripts" folder. The first is the bash file that runs the roslaunch file, and the other creates a system service to start that bash script. Open up a terminal on the raspberry Pi and execute the following commands.

```
cd /home/pi/osr/Init Scripts      This directory does not exist in Ubuntu setup  
sudo cp LaunchOSR.sh /usr/bin/LaunchOSR.sh  
sudo chmod +x /usr/bin/LaunchOSR.sh  
sudo cp osr_startup.service /etc/systemd/system/osr_startup.service  
sudo chmod 644 /etc/systemd/system/osr_startup.service
```

Your osr startup service is now installed on the Pi and ready to be used. The following are some commands related to managing this service which you might find useful:

Description	Command
Start service	sudo systemctl start osr_startup.service
Stop service	sudo systemctl stop osr_startup.service
Enable service (runs on boot of RPi)	sudo systemctl enable osr_startup.service
Disable service (doesn't run on boot)	sudo systemctl disable osr_startup.service
Check status of service	sudo systemctl status osr_startup.service
View live service list	sudo journalctl -f

Note: We do not recommend enabling the service until you have verified that everything on your robot runs successfully manually. Once you enable the service, as soon as you power on the RPi it will try and run everything. This could cause issues if everything has not yet been fully tested and verified. Additionally, if you are doing development of your own software for the robot we suggest disabling the service and doing manual launch of the scripts during testing phases. This will help you more easily debug any issues with your code.

Once you have fully tested the robot and made sure that everything is running correctly by starting the rover code manually via roslaunch osr Bringup osr.launch, enable the startup service on the robot with the command below:

```
sudo systemctl enable osr_startup.service
```

At this point, your rover should be fully functional and automatically run whenever you boot it up! Congratulations and happy roving!!

2020.10.08 Home

Attempting to get the software final step to get the motors running.

Reviewing Tapatalk & Github again:

https://www.tapatalk.com/groups/jpl_opensource_rover/software-problem-getting-motors-to-run-t220.html

<https://github.com/nasa-jpl/osr-rover-code>

Baseline system config:

ubuntu@ubuntu:~\$ **roscore**

... logging to

/home/ubuntu/.ros/log/0b5d8818-09c4-11eb-a367-dca632160e50/roslaunch-ubuntu-4050.log

Checking log directory for disk usage. This may take a while.

Press Ctrl-C to interrupt

Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://ubuntu:38027/

ros_comm version 1.14.9

SUMMARY

=====

PARAMETERS

* /rosdistro: melodic

* /rosversion: 1.14.9

NODES

auto-starting new master

process[master]: started with pid [4062]

ROS_MASTER_URI=http://ubuntu:11311/

setting /run_id to 0b5d8818-09c4-11eb-a367-dca632160e50

process[rosout-1]: started with pid [4075]

started core service [/rosout]

ubuntu@ubuntu:~\$ **ls -l /dev/serial0**

lrwxrwxrwx 1 root root 5 Aug 6 18:06 /dev/serial0 -> ttyS0

```
ubuntu@ubuntu:~$ roslaunch osr Bringup osr.launch
... logging to
/home/ubuntu/.ros/log/c59aa2fe-09c6-11eb-a367-dca632160e50/roslaunch-ubuntu-411
1.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
```

started roslaunch server http://ubuntu:42165/

SUMMARY

=====

PARAMETERS

```
* /corner_acceleration_factor: 0.8
* /drive_acceleration_factor: 0.5
* /drive_no_load_rpm: 31
* /joy2twist/axis_angular: 3
* /joy2twist/axis_linear: 1
* /joy2twist/enable_button: 4
* /joy2twist/enable_turbo_button: 5
* /joy2twist/scale_angular: 0.53
* /joy2twist/scale_linear: 0.24
* /joy2twist/scale_linear_turbo: 0.5
* /joy_node/autorepeat_rate: 1.0
* /joy_node/coalesce_interval: 0.05
* /motor_controller/addresses: 128,129,130,131,132
* /motor_controller/baud: 115200
* /motor_controller/device: /dev/serial0
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/address: 132
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/address: 132
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/address: 131
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/address: 131
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/address: 129
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/channel: M2
```

```
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/address: 130
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/address: 130
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/address: 129
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/address: 128
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/address: 128
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/ticks_per_rev: 48
* /rosdistro: melodic
* /rosversion: 1.14.9
* /rover_dimensions/d1: 0.184
* /rover_dimensions/d2: 0.267
* /rover_dimensions/d3: 0.267
* /rover_dimensions/d4: 0.2556
* /rover_dimensions/wheel_radius: 0.075
* /velocity_timeout: 2.0
```

NODES

```
/  
joy2twist (teleop_twist_joy/teleop_node)  
joy_node (joy/joy_node)  
led_screen (led_screen/arduino_comm.py)  
roboclaw_wrapper (osr/roboclaw_wrapper.py)  
rover (osr/rover.py)
```

auto-starting new master

process[master]: started with pid [4121]

ROS_MASTER_URI=http://localhost:11311

setting /run_id to c59aa2fe-09c6-11eb-a367-dca632160e50

process[rosout-1]: started with pid [4132]

started core service [/rosout]

process[roboclaw_wrapper-2]: started with pid [4139]

```
process[joy2twist-3]: started with pid [4140]
process[rover-4]: started with pid [4141]
process[led_screen-5]: started with pid [4143]
process[joy_node-6]: started with pid [4149]
[ERROR] [1602203492.460784284]: Couldn't open joystick /dev/input/js0. Will retry
every second.
Traceback (most recent call last):
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py",
line 7, in <module>
    screen = LedScreen()
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/screen.py", line 26,
in __init__
    self.ser = serial.Serial(dev,baud,timeout=1.0)
  File "/usr/lib/python2.7/dist-packages/serial/serialutil.py", line 240, in __init__
    self.open()
  File "/usr/lib/python2.7/dist-packages/serial/serialposix.py", line 268, in open
    raise SerialException(msg(errno, "could not open port {}: {}".format(self._port, msg)))
serial.serialutil.SerialException: [Errno 2] could not open port /dev/ttyUSB0: [Errno 2] No
such file or directory: '/dev/ttyUSB0'
[led_screen-5] process has died [pid 4143, exit code 1, cmd
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py
__name__:=led_screen
__log__:=/home/ubuntu/.ros/log/c59aa2fe-09c6-11eb-a367-dca632160e50/led_screen-5.l
og].
log file:
/home/ubuntu/.ros/log/c59aa2fe-09c6-11eb-a367-dca632160e50/led_screen-5*.log
[INFO] [1602203494.495262]: Starting the rover node
[INFO] [1602203494.496143]: Starting the roboclaw wrapper node
[INFO] [1602203494.500637]: Initializing motor controllers
Traceback (most recent call last):
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py", line
444, in <module>
    wrapper = RoboclawWrapper()
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py", line
28, in __init__
    self.establish_roboclaw_connections()
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py", line
128, in establish_roboclaw_connections
    version_response = self.rc.ReadVersion(address)
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw.py", line 708, in
ReadVersion
    self._port.flushInput()
AttributeError: Roboclaw instance has no attribute '_port'
[roboclaw_wrapper-2] process has died [pid 4139, exit code 1, cmd
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py
__name__:=roboclaw_wrapper
__log__:=/home/ubuntu/.ros/log/c59aa2fe-09c6-11eb-a367-dca632160e50/roboclaw_wra
```

pper-2.log].

log file:

/home/ubuntu/.ros/log/c59aa2fe-09c6-11eb-a367-dca632160e50/roboclaw_wrapper-2*.log

[WARN] [1602203513.523648852]: Couldn't set gain on joystick force feedback: Bad file descriptor

^C[joy_node-6] killing on exit

[rover-4] killing on exit

[joy2twist-3] killing on exit

[rosout-1] killing on exit

[master] killing on exit

shutting down processing monitor...

... shutting down processing monitor complete

done

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr/src\$ cat roboclaw.py | grep

"_port"

```
self._port.write(chr(address))
```

```
    self._port.write(chr(command))
```

```
    data = self._port.read(2)
```

```
    data = self._port.read(1)
```

```
    self._port.write(chr(val&0xFF))
```

```
        self._port.flushInput()
```

```
        self._port.write(chr(byte))
```

```
        self._port.flushInput()
```

```
            data = self._port.read(1)
```

```
        self._port.flushInput()
```

```
        self._port.write(chr(ee_address))
```

```
        self._port.flushInput()
```

```
        self._port = serial.Serial(port=self.comport, baudrate=self.rate,
```

```
timeout=1, interCharTimeout=self.timeout)
```

2020.10.10

Reviewing from p162 here, 5 Setting up serial communication on the Rpi:

...we have to disable the serial-getty@ttyS0.service service...

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config$ sudo systemctl  
stop serial-getty@ttyS0.service
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config$ sudo systemctl  
disable serial-getty@ttyS0.service
```

Not sure why/if following needs to be done from this directory, but....

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code/ROS/osrBringup/config/
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config$ ls
```

```
osr_params.yaml  
physical_properties.yaml  
physical_properties_mod.yaml  
roboclaw_params.yaml  
roboclaw_params_mod.yaml
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config$ sudo systemctl
```

stop serial-getty@ttyS0.service

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config$ sudo systemctl  
disable serial-getty@ttyS0.service
```

Now we'll need to copy over a udev rules file, which is used to configure needed device files in /dev; namely, ttyS0 and ttyAMA0.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config$ cd  
~/osr_ws/src/osr-rover-code/config
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo cp  
serial_udev_ubuntu1804.rules /etc/udev/rules.d/10-local.rules
```

reload the udev rules so that the devices files are set up correctly.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo udevadm control  
--reload-rules && sudo udevadm trigger
```

This configuration should persist across RPi reboots.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config$
```

cd ~/osr_ws/src/osr-rover-code/config

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ ls
```

serial_udev_ubuntu1804.rules

[so the source file is there]

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ cd /etc/udev/rules.d
```

```
ubuntu@ubuntu:/etc/udev/rules.d$ ls
```

10-local.rules

[so the destination file is there]

[show contents of .rules]

```
ubuntu@ubuntu:/etc/udev/rules.d$ cat 10-local.rules
# make symlinks serial0 and serial1, pointing to the default device names. Grant
read/write permissions for the devices
# note: not sure if these actually ought to be tty, but this works.
KERNEL=="ttyS0", SYMLINK+="serial0" GROUP="tty" MODE="0660"
KERNEL=="ttyAMA0", SYMLINK+="serial1" GROUP="tty" MODE="0660"

# reload the udev rules so that the devices files are set up correctly.
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo udevadm control
--reload-rules && sudo udevadm trigger
[go back to prev config directory]
ubuntu@ubuntu:/etc/udev/rules.d$ cd ~/osr_ws/src/osr-rover-code/config
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo udevadm control
--reload-rules && sudo udevadm trigger
This configuration should persist across RPi reboots.
```

Finally, add the user to the tty group:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo adduser ubuntu tty
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo adduser ubuntu tty
The user `ubuntu' is already a member of `tty'
[so that's accomplished]
```

Now to p. 163 **6 Testing serial comm with the Roboclaw motors controllers**

Run the roboclawtest.py script with all of the motor addresses:

```
cd ~/osr_ws/src/osr-rover-code/scripts
python roboclawtest.py 128
python roboclawtest.py 129
python roboclawtest.py 130
python roboclawtest.py 131
python roboclawtest.py 132
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$
cd ~/osr_ws/src/osr-rover-code/scripts
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ ls
make_readme_pdf.sh roboclawtest.py
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 128
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, -1, 130)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 129
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 130
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 131
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 740, 128)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 132
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 781, 130)
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ cat roboclawtest.py
# A short and sweet script to test communication with a single roboclaw motor
controller.
# usage
# $ python roboclawtest.py 128
```

```
from time import sleep
import sys
from os import path
# need to add the roboclaw.py file in the path
sys.path.append(path.join(path.expanduser('~'),
'osr_ws/src/osr-rover-code/ROS/osr/src'))
from roboclaw import Roboclaw

if __name__ == "__main__":
    address = int(sys.argv[1])
    roboclaw = Roboclaw("/dev/serial0", 115200)
    roboclaw.Open()

    print roboclaw.ReadVersion(address)
    print roboclaw.ReadEncM1(address)
```

Xbox controller isn't responsive, but I haven't run roslaunch yet....

```
ubuntu@ubuntu:~$ roscore
[yes, it's running]^C
```

```
ubuntu@ubuntu:~$ roslaunch osr_bringup osr.launch
... logging to
/home/ubuntu/.ros/log/77f3874a-0b66-11eb-a1fe-dca632160e50/roslaunch-ubuntu-665
2.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
```

started roslaunch server http://ubuntu:41577/

SUMMARY

=====

PARAMETERS

```
* /corner_acceleration_factor: 0.8
* /drive_acceleration_factor: 0.5
* /drive_no_load_rpm: 31
* /joy2twist/axis_angular: 3
* /joy2twist/axis_linear: 1
* /joy2twist/enable_button: 4
* /joy2twist/enable_turbo_button: 5
* /joy2twist/scale_angular: 0.53
* /joy2twist/scale_linear: 0.24
* /joy2twist/scale_linear_turbo: 0.5
* /joy_node/autorepeat_rate: 1.0
* /joy_node/coalesce_interval: 0.05
* /motor_controller/addresses: 128,129,130,131,132
* /motor_controller/baud: 115200
* /motor_controller/device: /dev/serial0
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/address: 132
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_left_back/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/address: 132
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_left_front/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/address: 131
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_right_back/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/address: 131
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/gear_ratio: 0.3333
* /roboclaw_wrapper/roboclaw_mapping/corner_right_front/ticks_per_rev: 2000
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/address: 129
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/channel: M2
```

```
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_back/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/address: 130
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_front/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/address: 130
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_left_middle/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/address: 129
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_back/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/address: 128
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/channel: M1
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_front/ticks_per_rev: 48
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/address: 128
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/channel: M2
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/gear_ratio: 171.79
* /roboclaw_wrapper/roboclaw_mapping/drive_right_middle/ticks_per_rev: 48
* /rosdistro: melodic
* /rosversion: 1.14.9
* /rover_dimensions/d1: 0.184
* /rover_dimensions/d2: 0.267
* /rover_dimensions/d3: 0.267
* /rover_dimensions/d4: 0.2556
* /rover_dimensions/wheel_radius: 0.075
* /velocity_timeout: 2.0
```

NODES

```
/  
joy2twist (teleop_twist_joy/teleop_node)  
joy_node (joy/joy_node)  
led_screen (led_screen/arduino_comm.py)  
roboclaw_wrapper (osr/roboclaw_wrapper.py)  
rover (osr/rover.py)
```

auto-starting new master

process[master]: started with pid [6662]

ROS_MASTER_URI=http://localhost:11311

setting /run_id to 77f3874a-0b66-11eb-a1fe-dca632160e50

process[rosout-1]: started with pid [6673]

started core service [/rosout]

process[roboclaw_wrapper-2]: started with pid [6680]

```
process[joy2twist-3]: started with pid [6681]
process[rover-4]: started with pid [6682]
process[led_screen-5]: started with pid [6685]
process[joy_node-6]: started with pid [6690]
[ WARN] [1602382032.859220396]: Couldn't set gain on joystick force feedback: Bad
file descriptor
Traceback (most recent call last):
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py",
line 7, in <module>
    screen = LedScreen()
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/screen.py", line 26,
in __init__
    self.ser = serial.Serial(dev,baud,timeout=1.0)
  File "/usr/lib/python2.7/dist-packages/serial/serialutil.py", line 240, in __init__
    self.open()
  File "/usr/lib/python2.7/dist-packages/serial/serialposix.py", line 268, in open
    raise SerialException(msg.errno, "could not open port {}: {}".format(self._port, msg))
serial.serialutil.SerialException: [Errno 2] could not open port /dev/ttyUSB0: [Errno 2] No
such file or directory: '/dev/ttyUSB0'
[led_screen-5] process has died [pid 6685, exit code 1, cmd
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py
__name__:=led_screen
__log__:=/home/ubuntu/.ros/log/77f3874a-0b66-11eb-a1fe-dca632160e50/led_screen-5.l
og].
log file:
/home/ubuntu/.ros/log/77f3874a-0b66-11eb-a1fe-dca632160e50/led_screen-5*.log
[INFO] [1602382035.033131]: Starting the rover node
[INFO] [1602382035.036618]: Starting the roboclaw wrapper node
[INFO] [1602382035.040004]: Initializing motor controllers
[INFO] [1602382035.076350]: Sucessfully connected to RoboClaw motor controllers
[ERROR] [1602382090.842359371]: Connection to joy stick device lost unexpectedly.
Will reopen.
[ERROR] [1602382090.842758082]: Couldn't open joy stick /dev/input/js0. Will retry
every second.
```

Posted these results to the TapaTalk forum.

2020.10.14 OSR Builder Teleconference
breakout: auto-launch on boot-up.
Correct directory is:
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts\$

2020.10.15 Home

Try on my own to configure launch on boot.

The original directions:

```
cd /home/pi/osr/Init\ Scripts  
sudo cp LaunchOSR.sh /usr/bin/LaunchOSR.sh  
sudo chmod +x /usr/bin/LaunchOSR.sh  
sudo cp osr_startup.service /etc/systemd/system/osr_startup.service  
sudo chmod 644 /etc/systemd/system/osr_startup.service
```

The correct directory is:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts$
```

To get there:

```
ubuntu@ubuntu:~$ ls  
Desktop Documents Downloads LaunchOSR.sh  
Music Pictures Public Templates  
Videos osr_ws thinclient_drives  
ubuntu@ubuntu:~$ cd osr_ws/  
ubuntu@ubuntu:~/osr_ws$ ls  
build devel src  
ubuntu@ubuntu:~/osr_ws$ cd src  
ubuntu@ubuntu:~/osr_ws/src$ ls  
CmakeLists.txt osr-rover-code  
ubuntu@ubuntu:~/osr_ws/src$ cd osr-rover-code/  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ ls  
Arduino 'Init Scripts' LICENSE.txt README.md  
ROS config scripts setup  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ cd Init Scripts/  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts$ ls  
CATKIN_IGNORE LaunchOSR.sh osr_startup.service  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts$ cat LaunchOSR.sh  
#!/bin/bash  
bash -c ". /home/$USER/osr_ws/devel/setup.sh"  
bash -c ". /home/$USER/osr_ws/devel/setup.bash"  
bash -c ". /opt/ros/kinetic/setup.sh"  
bash -c ". /opt/ros/kinetic/setup.bash"  
bash -i -c "roslaunch osr Bringup osr.launch"
```

The next direction is

```
sudo cp LaunchOSR.sh /usr/bin/LaunchOSR.sh
```

First, let's see if it's already there:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts$ ls -l /usr/bin/Lau*  
-rwxr-xr-x 1 root root 230 Oct 14 20:36 /usr/bin/LaunchOSR.sh
```

Yes, it is. Let's see what's in it...

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts$ cat /usr/bin/LaunchOSR.sh
#!/bin/bash
bash -c ". /home/$USER/osr_ws/devel/setup.sh"
bash -c ". /home/$USER/osr_ws/devel/setup.bash"
bash -c ". /opt/ros/kinetic/setup.sh"
bash -c ". /opt/ros/kinetic/setup.bash"
bash -i -c "roslaunch osr Bringup osr.launch"
```

OK, they're the same. Accomplished!

Next, make it executable:

```
sudo chmod +x /usr/bin/LaunchOSR.sh
```

The -rwxr-xr-x above shows it already is.

Next is copy over the osr_startup.service:

```
sudo cp osr_startup.service /etc/systemd/system/osr_startup.service
```

Is it there to cc?:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts$ ls
CATKIN_IGNORE LaunchOSR.sh osr_startup.service
```

Yes, it is. Contents?

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts$ cat osr_startup.service
```

```
[Unit]
```

```
Description=OSR service
```

```
After=network.target
```

```
[Service]
```

```
User=ubuntu
```

```
Group=ubuntu
```

```
WorkingDirectory=/home/ubuntu/
```

```
ExecStart=/home/ubuntu/LaunchOSR.sh
```

```
ExecReload=/bin/kill -HUP $MAINPID
```

```
Restart=always
```

```
RestartSec=3
```

```
[Install]
```

```
WantedBy=multi-user.target
```

Has it already been cc to its target dir?:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts$ ls /etc/systemd/system/
... osr_startup.service ...
```

Yes, it is. Contents?:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts$ cat  
/etc/systemd/system/osr_startup.service  
[Unit]  
Description=OSR service  
After=network.target
```

```
[Service]  
User=ubuntu  
Group=ubuntu  
WorkingDirectory=/home/ubuntu/  
ExecStart=/home/ubuntu/LaunchOSR.sh  
ExecReload=/bin/kill -HUP $MAINPID  
Restart=always
```

RestartSec=3

```
[Install]  
WantedBy=multi-user.target
```

What's in the "WorkingDirectory"?:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/Init Scripts$ cd  
ubuntu@ubuntu:~$ ls  
Desktop Documents Downloads LaunchOSR.sh Music Pictures Public Templates  
Videos osr_ws thinclient_drives
```

Contents?:

```
ubuntu@ubuntu:~$ cat LaunchOSR.sh  
#!/bin/bash  
bash -c ". /home/$USER/osr_ws/devel/setup.sh"  
bash -c ". /home/$USER/osr_ws/devel/setup.bash"  
bash -c ". /opt/ros/kinetic/setup.sh"  
bash -c ". /opt/ros/kinetic/setup.bash"  
bash -i -c "roslaunch osr Bringup osr.launch"
```

```
ubuntu@ubuntu:~$ roslaunch osr_bringup osr.launch
```

Get same error:

```
...
AttributeError: Roboclaw instance has no attribute '_port'
```

...

Seems like this got fixed when I re-ran the Serial Setup directions.

Suspect it's the last direction to reload the udevadm control....

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$
```

```
    sudo udevadm control --reload-rules && sudo udevadm trigger
```

```
ubuntu@ubuntu:~$ cd osr_ws/src/osr-rover-code/config/
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ ls
```

```
serial_udev_ubuntu1804.rules
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo udevadm control
--reload-rules && sudo udevadm trigger
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ cd
```

```
ubuntu@ubuntu:~$ roslaunch osr_bringup osr.launch
```

...

Exception: Unable to establish connection to one or more of the Roboclaw motor controllers

...

```
ubuntu@ubuntu:~$ sudo find ~/ -name roboclawtest.py
```

```
/home/ubuntu/osr_ws/src/osr-rover-code/scripts/roboclawtest.py
```

```
ubuntu@ubuntu:~$ cd /home/ubuntu/osr_ws/src/osr-rover-code/scripts/
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ ls
```

```
make_readme_pdf.sh roboclawtest.py
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 128
```

Traceback (most recent call last):

```
  File "roboclawtest.py", line 18, in <module>
```

```
    print roboclaw.ReadVersion(address)
```

```
  File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw.py", line 708, in
ReadVersion
```

```
    self._port.flushInput()
```

```
AttributeError: Roboclaw instance has no attribute '_port'
```

Posted to new opensourcerover.slack.com chat group #troubleshooting.

2020.10.16 Home

Reviewing Slack discussion since it's inception after the Builders Meet:
<https://app.slack.com/client/T01CMHZLGPL/C01D07KNKJM>

It seems the critical steps are:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config$ sudo systemctl  
stop serial-getty@ttyS0.service
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config$ sudo systemctl  
disable serial-getty@ttyS0.service
```

but they don't stick after reboot despite the "disable".

There's some theory that another USB device like the USB-tty device may be at issue causing serial-getty to persist.

They added a "mask" command to make it STFU permanently [their works ;-)]

Will give it a try –

```
sudo systemctl stop serial-getty@ttyS0.service  
sudo systemctl disable serial-getty@ttyS0.service  
sudo systemctl mask serial-getty@ttyS0.service  
sudo systemctl status serial-getty@ttyS0.service
```

```
ubuntu@ubuntu:~$ sudo systemctl stop serial-getty@ttyS0.service  
ubuntu@ubuntu:~$ sudo systemctl disable serial-getty@ttyS0.service  
ubuntu@ubuntu:~$ sudo systemctl mask serial-getty@ttyS0.service  
Created symlink /etc/systemd/system/serial-getty@ttyS0.service → /dev/null.  
ubuntu@ubuntu:~$ sudo systemctl status serial-getty@ttyS0.service
```

● serial-getty@ttyS0.service

 Loaded: masked (/dev/null; bad)

 Active: inactive (dead) since Fri 2020-10-16 20:35:43 CDT; 2min 10s ago

 Main PID: 2062 (code=killed, signal=TERM)

Oct 16 19:32:37 ubuntu systemd[1]: Started Serial Getty on ttyS0.

Oct 16 20:35:43 ubuntu systemd[1]: Stopping Serial Getty on ttyS0...

Oct 16 20:35:43 ubuntu systemd[1]: Stopped Serial Getty on ttyS0.

Now test the RoboClaws:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 128
```

...

AttributeError: Roboclaw instance has no attribute '_port'

Oh, wait! Need to REBOOT!

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ sudo reboot now
```

```
ubuntu@ubuntu:~$ cd osr_ws/src/osr-rover-code/scripts/
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ ls
make_readme_pdf.sh roboclawtest.py
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 128
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 129
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 130
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 131
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 747, 130)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python roboclawtest.py 132
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 726, 128)
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$  
    roslaunch osr_bringup osr.launch
```

...

Just get joystick force feedback& string index out of range errors (@LED).
No _port attribute error!

Posted success to Slack [2020.10.16]:

James Phelan 9:19 PM

SUCCESS!!

From my earlier failure of - -reload-rules alone and @Robert Carpenter experiments above it was clear that the serial-getty steps were critical to bringing the system back in line.

I re-did as y'all advised above including the "mask" command. Rebooted.

The roboclawtest.py tests all ran fine.

roslaunch osr_bringup osr.launch came up without the _port attribute error, just the usual force feedback and index out of range errors.

Paired the Xbox controller & pushed the LB. Parkinsonian tremors of the steering motors and wild runaway of some of the drive motors!

Good thing it's intentionally "high centered" on a box! Otherwise right now the rover would be careening across the room!

Recall I have the REV HEX drive motors and standard upgraded steering motors.

Will need some Basicmicro Motion Studio tuning to stop the oscillation in the steering motors.

Will likely need some guidance reigning in the drive motors!

I do have the USB-tty Raspberry Pi > Arduino serial dongle attached as well as keyboard and mouse. Plus the Xbox receiver dongle.

I installed the GNOME GUI desktop but don't like it. It gives be an error on bootup, On opening a terminal it requires "sudo" before "ifconfig" whereas if I do it from PuTTY it doesn't.

It won't let me open the file cabinet. Clearly a permissions issue I don't know how to solve. Very awkward to set locale configuration. Assumed I was in London.

Had better GUI experience previously installing the Ubuntu Desktop instead of Ubuntu Server but don't want to stray (too far) from the official OSR path!

I would like to get rid of it and just have it come up to command line. Better would be a decent GUI desktop I could access via Remote Desktop or VNC but have had no success installing either previously. Didn't try this time to avoid contaminating the system.

Very successful first Slack #troubleshooting conversation! (edited)

2020.10.17 Home

With the OSR serial-getty issue resolved, and the rover shaking & running off, it was noticed that:

- 1) The corner motors oscillated excessively
- 2) The left front drive motor would run forward fast. Making a RIGHT turn would settle it down to just a slow run.
- 3) The left middle drive motor would also sometimes run forward or backward according to the joystick, but wouldn't stop at joystick neutral.

Running Basicmicro Motion Studio to calibrate the motors all went well except for RC#3 (130). When plugged in, Windows would say it's not functioning properly even though Motion Studio would recognize and attach it. But, when running Autotune, most often the Left Front motor would continue to run making the RoboClaw time out and the Motion Studio to stop responding. Sometime it was the Left Middle drive motor.

RoboClaw #3 was replaced by a spare. Firmware updated to 4.1.34.

Address set to 130. Max Current ok at 15.0.

Reverse M1 relative direction.

Reverse M2 relative direction.

Encoder 1 quadrature

Encoder 2 quadrature **NOT RESPONDING**

Failure of E2: RoboClaw? Rev Hex motor encoder? Wiring between?

2020.10.18 Home

Hypothesis 1: Failure of E2 on RoboClaw:

The fact that the PC didn't recognize the original RoboClaw makes me think it's that RoboClaw.

The fact that the replacement RoboClaw is recognized, but doesn't record E2 and the runaway behavior of RC3's wheels makes me suspect the wiring or encoders. How likely are both encoders flaky?

The easiest test is to check the wiring from the Left Front REV HEX motor to the RoboClaw: INTACT

Left Middle REV HEX motor to the RoboClaw:

Don't recall the encoder reading of the original RoboClaw under the PWM Settings.

Revert back to original RoboClaw to test. ☺

This time PC didn't reject it. Maybe retightening the wiring helped?

PWM Settings E1 & E2 responded appropriately.

Velocity Settings Autotune M1: SUCCESS. Autotune M2: SUCCESS

2020.10.18 Home, cont'd

Retry roslaunch – SUCCESS. But steering motors still oscillate & drive motors want to run backwards. Running the drive motors forward & backward a couple cycles makes the drive motors stay still but turning the steering motors does not settle the steering motor tremor. Releasing Left Button quiets everything but the Left Front steering motor that still giggles.

Prev tuned steering motors with PID. Basicmicro suggested trying just PD to avoid oscillation. Will give that a try. SUCCESS. Tuning w/ PD removed the oscillations of the steering motors. The drive motors still want to run backwards on bootup but settle with a few forward & backward movements of the rover. Still get

[ERROR] [1603063975.736860]: Motor controller '128' reported error code 16384

with all 5 RoboClaws as the motors run. I can't figure out what error cod 16384 is from examining the roboclaw.py or roboclaw_wrapper.py. Seems something integral to a RoboClaw utility that is deeper in the system. From the LED display it's probably an overcurrent warning as the motors go from zero to 60 in no time. Curious that 131, 132 show errors but no LED display on turning either direction to limits.

Since I can't at present WiFi into the rover, I'll have to set it up to auto-launch on boot-up before it can run on the ground. osr_startup.service has already been installed.

Description	Command
Start service	sudo systemctl start osr_startup.service
Stop service	sudo systemctl stop osr_startup.service
Enable service (runs on boot of RPi)	sudo systemctl enable osr_startup.service
Disable service (doesn't run on boot)	sudo systemctl disable osr_startup.service
Check status of service	sudo systemctl status osr_startup.service
View live service list	sudo journalctl -f

Enabled service. Worked on reboot. Now to try on the floor. SUCCESS.

The steering motors didn't twitch. The drive motors want to run backwards but settle with a few farward & backward commands. The drive motors run WAY too fast! I have to drive in short bursts then correct steering. The Right foreleg wants to twist inward.

2020.10.30 Home

Don't like GNOME desktop. Gives me program system error on every bootup.
Google: **ubuntu 18.04 remove GNOME**

<https://askubuntu.com/questions/1233025/how-to-remove-gnome-shell-from-ubuntu-20-04-lts-to-install-other-desktop-environ>

Recommended not trying to remove GNOME as may break system if not done perfectly. Suggested install desktop of choice, reboot, then log into that one.

Then one can install any desktop environment of interest with commands like:

*Cinnamon - sudo apt install cinnamon-desktop-environment
KDE as in Kubuntu - sudo apt install kubuntu-desktop^
MATE as in Ubuntu MATE - sudo apt install ubuntu-mate-desktop^
Unity - sudo apt install ubuntu-unity-desktop
Xfce as in Xubuntu - sudo apt install xubuntu-desktop^*

then reboot, select newly installed desktop session and login to it.

I tried \$ **sudo apt install ubuntu-mate-desktop** without the '^'
But got a bunch of "unable to get..." errors.

Tried \$ **sudo apt install ubuntu-mate-desktop^** with the '^'
Had better luck but still "unable to get..." errors.
Having Internet stability problems. Rechecked & re-ran with better results.
Got window asking me to choose gdm3, lightDM or slim.
Chose lightDM and install progressed. Success.

Install Chromium: \$ **sudo apt install chromium-browser**

Manually tune drive motors:

The new standard Gobilda drive motors for OSR differ a lot in the encoder specs vs the REV HEX motor encoders:

Manufacturer	Gobilda	REV Robotics
Model	5202 223 rpm	REV HEX
Price	\$39.99	\$21.00
rpm	233	125
No load current	250mA	?
Stall current	9.2A	4.4A

Stall torque kg-cm/oz-in	38 / 530	32.6 / 453
Gear ratio	26.9:1	72:1
Shaft size mm	6	5
Shaft type	D	hex
Encoder @ motor	28	4
Encoder @ output	753.2	288
URL	https://www.gobilda.com/5202-series-yellow-jacket-planetary-gear-motor-26-9-1-ratio-223-rpm-3-3-5v-encoder/	http://www.revrobotics.com/rev-41-1300/

2020.10.31 Home

Set up to manually calibrate RoboClaws 1,2,3. Find R front not running. Manipulating connections gets it running. Slider upward and it runs forward then back. Definitely need to work on connections. R front wheel assembly loose, screws missing (had been found on the floor earlier, unknown where from. Now I know.... Shut down til mechanical & electrical issues resolved.

Right Front Drive Motor (only) power & encoder wiring resoldered directly without the Molex connectors to minimize one possible point of failure.

2020.11.02 Home

Read the two reference in the Calibration OSR documentation. One is too elementary and silly. The other seems like a bad translation. Surely JPL can find a better reference!

Recalibrated all 10 motors. Unable to manually determine QPPS as the motors would only run for about 1 second then stop w/ each incremental increase in the PWM slider. Estimated 800s for QPPS and one auto-tune session settled at 937. Tried entering 1000 as the baseline QPPS then auto-tune would recalculate to 937. Replaced that as the QPPS. Sometimes it would auto-calculate to 300s which was clearly wrong. So entered 937.

Now when I engage the Left Button, all 6 drive motors run backwards at a moderate pace but somewhat jerky. Flicking the throttle forward and back responds appropriately but doesn't correct the baseline backwards idle.

Tried blanking the QPPS & re-tuning. Still starts off in reverse but stops after a few throttle reverses.

2020.11.03 Home

Don't know how to solve the REV HEX motor problem. Think the best and fastest fix is to go w/ the standard Gobilda motors and see if I can return the REV HEX motors.

First, figure out BOM for the Gobilda motors:

Download <https://github.com/nasa-jpl/open-source-rover> as a zip file.

New folder OSR 2020.11.03, unzip here.

Import master_parts_list_raw.csv into Xcel.

The relevant upgrade parts are lines 138-144:

YellowJacket 223 rpm drive motor	E46	6	\$39.99	\$239.94
M4 x 0.7mm 6mm screws	B15	2	\$1.79	\$3.58
GoBilda 2 hole U-Channel	S45	6	\$2.79	\$33.48
GoBilda 23mm threaded plate	S46	12	\$2.49	\$29.88
2-post 43-32mm drive motor clamping mount	S47	6	\$5.99	\$35.94
GoBilda Pattern Adaptor	S48	12	\$4.99	\$59.88
6mm Bore Clamping D-Hub 0.770in	S49	6	\$7.99	\$47.94
				\$450.64

Placed orders.

2020.11.06

GoBilda Yellow Jacket 223 rpm motors & hardware arrived. Over next couple days replace all 6 REV HEX drive motors with new GoBilda motors per the JPL specs. The JST connectors for the motors are not included so had to order them. Also ordered a PowerPole to motor power bullet connector.

2020.11.17

The ordered cables were supposedly delivered last week but didn't show. Filed a missing package claim w/ the USPS. Today the missing package showed up on the doorstep, not in the mailbox, so was probably dropped off by a neighbor who got it by mistake?

All 6 motors run when 16V power applied via the PowerPole to bullet connectors.

Wired up the right front motor & applied the BasicMicro Motion Studio most recent update to RoboClaw 128 via a powered USB hub to calibrate it. Don't know why, but Logic Battery Min always reverts back to 5.5V even tho I keep resetting it to 4.5V & writing to device.

All appears ok except when I go to PWM and run the slider up. The motor only runs for about a second or two then stops. If I move it up more, it runs faster for another second and stops. All the way to max throttle. Same in reverse. Timeout is set to 5.0 sec. Symptoms persisted when deactivated by setting to 0.0. The system acted the same with the REV HEX motors but not previously. If I Auto Tune the motor Motion

Studio crashes at the end of the tune and leaves the motor running. Have to Task Manager to kill Motion Studio and shutdown to stop the motor. Never saw any overcurrent warnings. The wheels weren't attached so little strain on the motors except for the D shaft hub clamp.

2020.11.21

Decided that the problem w/ Motion Studio is that ROS is auto booting at startup and sending conflicting commands to the RoboClaw.

Initially I tried

```
ubuntu@ubuntu:~$ sudo systemctl status osr startup.service
```

Unit osr.service could not be found.

Unit bringup.service could not be found.

Then I realized that cc from .pdf to WordPerfect loses the “_” character! So then –

```
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
```

● osr_startup.service - OSR service

 Loaded: loaded (/etc/systemd/system/osr_startup.service; **enabled**; vendor pres

 Active: **active** (running) since Sat 2020-11-21 14:08:30 CST; 2s ago

 Main PID: 3356 (LaunchOSR.sh)

 Tasks: 2 (limit: 4439)

 CGroup: /system.slice/osr_startup.service

 └─3356 /bin/bash /home/ubuntu/LaunchOSR.sh

 └─3404 /usr/bin/python /opt/ros/melodic/bin/roslaunch osr Bringup osr

Nov 21 14:08:30 ubuntu systemd[1]: Started OSR service.

Nov 21 14:08:31 ubuntu LaunchOSR.sh[3356]: bash: /opt/ros/kinetic/setup.sh: No s

Nov 21 14:08:31 ubuntu LaunchOSR.sh[3356]: bash: /opt/ros/kinetic/setup.bash: No

Nov 21 14:08:31 ubuntu LaunchOSR.sh[3356]: bash: cannot set terminal process gro

Nov 21 14:08:31 ubuntu LaunchOSR.sh[3356]: bash: no job control in this shell

lines 1-14/14 (END)

So then I just need to–

```
ubuntu@ubuntu:~$ sudo systemctl stop osr_startup.service
```

```
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
```

● osr_startup.service - OSR service

 Loaded: loaded (/etc/systemd/system/osr_startup.service; **enabled**; vendor pres

 Active: **inactive** (dead) since Sat 2020-11-21 14:09:46 CST; 3s ago

 Process: 3356 ExecStart=/home/ubuntu/LaunchOSR.sh (code=killed, signal=TERM)

 Main PID: 3356 (code=killed, signal=TERM)...

```
ubuntu@ubuntu:~$ sudo systemctl disable osr_startup.service
```

Removed /etc/systemd/system/multi-user.target.wants/osr_startup.service.

```
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
```

● osr_startup.service - OSR service

 Loaded: loaded (/etc/systemd/system/osr_startup.service; **disabled**; vendor pre

 Active: **inactive** (dead)

So now I should be able to run Motion Studio without interference from ROS.

OSR now does not respond to the Xbox controller. The steering motors are not twitching. The only wired right front drive motor is quiet.

Bring up Motion Studio. Connect Roboclaw 128.

Device / Read settings. Min Logic Battery remains 5.5 instead of 4.5 that I'd set it, still!

File / Load settings. Min Logic Battery now 4.5. But it won't stick.

PWM Settings: Motor1 slide up/down - motor ramps up/down normally!

Velocity Settings: Autotune Tune M1, OK.

Encoder direction is reversed relative to motor direction. OK

General Settings:

Uncheck Invert Encoder 1 Mode

Velocity Settings: Autotune Tune M1, OK. Success

Now to re-wire the new motors. Since the prev motors were wired with Molex mini-fit connectors, I guess I'll do the same even though I have some concern re the security of the connections. I really don't want to hardwire everything from scratch.

2020.11.29 Home

Finished rewiring the GoBilda drive motors with Molex connectors. Connected to Motion Studio. Found the endoders or RR & LR RoboClaw 129 had faulty encoders. Checked continuity on connectors and replaced a couple. Was able to auto-tune all 6 drive motors. Put the wheels on and roslaunched the code.

Both rear wheels want to run off in reverse on their own. All other systems seem ok. Shutting down. Reapplied Motion Studio and both rear encoders failing again. Rechecked continuity between motor encoder plug and the Molex plug ok on both motors. Autotune on LR M2 failed & crashed MS. Relaunching got USB errors.

Rebooted OSR and was able to recognize RC129 for rear motors and the encoder error persists. Will have to check continuity from motor all the way to the PCB. If that's ok, will have to check the RC itself.

2020.11.30 Home

Seem to have fixed the errant encoder Molex connections. Perhaps just some wiggling and rubbing? No fixed failure noted. Roslaunched OSR and motors came up with a uniform slow backward roll (high-centered on box for testing). Flicking Xbox control to reverse snapped it out of it. Seems to go quite fast! Turns well w/o Parkinsonian tremor of steering!

Now to configure for auto-launch and run on the ground. Can't PuTTY in on WiFi even tho I can browse out from the rover using WiFi or ethernet even tho it worked earlier! May just need a reboot but the rover desktop is functional w/ attached HDMI, keyboard, and mouse.

```
ubuntu@ubuntu:~$ sudo systemctl enable osr_startup.service  
ubuntu@ubuntu:~$ sudo systemctl start osr_startup.service
```

shutdown
power off
switch to battery
power on
pair Xbox controller
test Xbox controller success!
disconnect peripherals
setup on floor
test Xbox:

very jackrabbit movements! Seems to have only stop and zoom! Joystick doesn't seem to have any ability to limit speed but it does proportional steering. Rocker-bogie tended to jackknife and leave either the mid or front wheel off the ground. The right middle wheel tended to keep going in forward or reverse but didn't want to stop. Had to use emergency "bop-to-stop" button to power off. (The remote kill switch was out of reach!). Have to find a way to slow it down!

Email from Roberto:

Hello Jim,
It's my fault, but I cannot find the Python code that takes care of the Ackerman steering
of the four peripheral wheels.
Can you please help me to find it in GitHub, or wherever it's found?
Thanks
Roberto

Reply:

<https://github.com/nasa-jpl/osr-rover-code/tree/master/ROS/osr/src>
the osr-rover-code is separate from the open-source-rover mechanical repository
Jim

2020.12.03

Posting to Slack:

<https://opensourcerover.slack.com/archives/C01D07KNKJM/p1607049021025600>

Jackrabbit Rover!

Team, I successfully replaced all the REV HEX drive motors with the V2 GoBilda drive
motors!

I learned the hard way that I needed to be sure to run (if previously enabled):

ubuntu@ubuntu:~\$ sudo systemctl disable osr_startup.service

or the rover code would interfere with the Motion Studio commands and crazy behavior
would result.

A loose encoder connector would cause the motors to keep going even when the Xbox
controller was in the stop position.

Once corrected the motors tuned just fine.

HOWEVER -- the rover acts like a jackrabbit! Any more than just the slightest touch on
the Xbox controller and the rover goes from zero to Zoom!

Release the throttle and it screeches to a halt. I would like for it to be less aggressive
and more gentle.

See following video. You have to download for it to play right.

Jim (edited)

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars
Rover\AUDACITY\IMAGES\IMG_6069_HEVC.MOV

2020.12.04

Achille 8:49 AM

Awesome, @James Phelan! Really glad it finally all came together! Some comments: you disabled the startup service. You can also temporarily stop it by using sudo service osr stop . When you want to turn it back on, use sudo service osr enable.

Use your configuration files to adjust acceleration and speed of the rover. The readme has instructions on how to use those files. [This](#) is probably the value you want to set to a lower value.

Corner motors look really smooth, mine still jitter a bit. Did you solve that through PID tuning?

Your right middle wheel seems to wobble a tiny amount. Make sure everything is tight and aligned

Looking forward to a video where you speed it around!

rover_dimensions:

```
d1: 0.184 # [m, ~7.254in]  
d2: 0.267 # [m, ~10.5in]  
d3: 0.267 # [m, ~10.5in]  
d4: 0.2556 # [m, ~10.073in]
```

wheel_radius: 0.075 # [m]

drive_no_load_rpm: 223 # no load speed for the drive motors

drive_acceleration_factor: 0.5 # fraction used to scale the drive motor acceleration (0, 1]

corner_acceleration_factor: 0.8 # fraction used to scale the corner motor acceleration (0, 1])

velocity_timeout: 2.0 # maximum time [s] a particular velocity command will stay active without a new command before stopping

My file:

rover_dimensions:

```
d1: 0.184 # [m, ~7.254in]  
d2: 0.267 # [m, ~10.5in]  
d3: 0.267 # [m, ~10.5in]  
d4: 0.2556 # [m, ~10.073in]
```

wheel_radius: 0.075 # [m]

drive_no_load_rpm: 31 # no load speed for the drive motors

drive_acceleration_factor: 0.5 # fraction used to scale the drive motor acceleration (0, 1]

corner_acceleration_factor: 0.8 # fraction used to scale the corner motor acceleration (0, 1])

velocity_timeout: 2.0 # maximum time [s] a particular velocity command will stay active without a new command before stopping

I changed drive_no_load_rpm from 31 to 223 as per Github repo even tho that seemed counter-intuitive to INCREASE a value when you wanted it to SLOW. It didn't make any difference that I could see. Will change it back.

The rover has some customizable settings that will overwrite the default values. Whether you have any changes compared to the defaults or not, you have to manually create these files:

```
cd ~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config  
touch physical_properties_mod.yaml roboclaw_params_mod.yaml
```

To change any values from the default, modify these files (the _mod.yaml ones) instead so your changes don't get committed to git. The files follow the same structure as the default. Just include the values that you need to change as the default values for other parameters may change over time.

You might also want to modify the file osr-rover-code/ROS/osr Bringup/launch/osr.launch to change the velocities the gamepad controller will send to the rover. These values in the node joy2twist are of interest:S

*The maximum speed your rover can go is determined by the no-load speed of your drive motors. The default no-load speed is located in the file physical_properties.yaml as drive_no_load_rpm, unless you modified it in the corresponding _mod.yaml file. This maximum speed corresponds to scale_linear_turbo and can be calculated as drive_no_load_rpm * 2pi / 60 * wheel radius (=0.075m). Based on this upper limit, let's set our regular moving speed to a sensible fraction of that which you can configure to your liking. Start with e.g. 0.75 * scale_linear_turbo. If you think it's too slow or too fast, simply scale it up or down.*

The turning speed of the rover, just like a regular car, depends on how fast it's going. As a result, scale_angular should be set to scale_linear / min_radius. For the default configuration, the min_radius equals 0.45m.

Post to Slack:

<https://opensourcerover.slack.com/archives/C01D07KNKJM/p1607214935043000>

James Phelan 6:35 PM

@Achille as I recall I solved the corner jiggle by tuning w/ PD instead of PID as per RoboClaw tech support recommendation. But I'd have to double-check.

I checked the R mid wheel and it's tight.

I checked the configuration files per your link --

My drive_no_load_rpm: 31 as opposed to your link's default of 233 (the rpm of the GoBilda motors). It didn't seem logical that a lower number would be faster, but I changed it to 223 with no apparent effect. Changed back.

Also checked the osr.launch parameters as per readme.md. Mine were different as noted below. Changing the values didn't seem to make a difference:

<param name="scale_linear" value="0.18"/>	mine = 0.24
<param name="scale_angular" value="0.4"/>	mine = 0.53
<param name="scale_linear_turbo" value="0.24"/>	mine = 0.5

I suspect that with all the updates and cleanup in the code, that mine may be behind the times.

While I managed to load the initial code ok, I'm still not at all confident that I can update it without totally trashing my system! :confused:

(Yeah, I know....!! My mind learns best by practice with real-world examples, not so much from over-simplified tutorials.)

So, after I make a backup image of my current system, I could use some hand-holding while I try to update. Volunteers?

My left rear wheel wants to continue on its own after releasing the throttle. Stops when I wiggle the connector. Got to be one of the encoder connections.

Unfortunately, I ran out of Molex pins with the conversion. Order due next week so I can fit it.

Thanks! Jim

2021.01.14 20:00 Home

Slack / WebEx meeting w/ Kit Kennedy NASA/JPL OSR community
Needed to update OSR-code from Github since the code update,
but I'm not at all secure w/ Github.

ubuntu@ubuntu:~\$ cd ~/osr_ws/src/osr-rover-code/ROS

git log

q or z to exit

git status

git diff

git stash

git config --global user.email "your@email"

git config --global user.name "Your Name"

git stash

git pull This is the MAIN command

git log

sudo systemctl restart osr_startup.service

nano physical_properties_mod.yaml

delete prev change as base speed of motors is now 233 instead of 32

sudo systemctl restart osr_startup.service

At initial restart, with Left Button (deadman) press -

steering motors went to hard right turn

With Forward / Reverse joystick

steering motor went straight & drive motors ran forward / reverse

With Right / Left joystick

steering motors turned appropriately and settled down to going straight

Turbo button now functions normally

This may be due to some ROS functions not loading quickly.

Now, with OSR built (x- head) and running to NASA/JPL specifications,
it's time to take the next step toward autonomy.

- 1) Sign up for free Freedom Robotics app, download & install
- 2) Order Intel RealSense D455 stereo/IR/IMU camera & download SDK

2021.01.15

Read image of current OSR SD card for backup prior to installing Freedom Robotics app
C:/Users/Me/Documents/My Downloads/Robotics/USAi Labs/Mars
Rover/AUDACITY/PROCESSOR UPGRADE/2021.01.15 OSR latest update pre
FreedomRobotics

<https://app.freedomrobotics.ai/#/devices/DAB47FEEB3B5AD0E167AE825173/setup?=&customSetup=false>

The command below installs the Freedom Agent on your device, to connect it to our platform.

Please paste it into a terminal window, and give it a few minutes to complete.

```
curl -sSf
"https://api.freedomrobotics.ai/accounts/A6124B5AB85968B6435933C21/devices/DAB4
7FEEB3B5AD0E167AE825173/installscript?mc_token=T20BFF8BDE15D1146297359B
F&mc_secret=Sfcc681baaaafb15a4edbffffdf&install_elements=webrtc&auto_install_deps
=true&ppa_is_allowed=true" | python
```

Please enter the sudo password to enable install to set up the Freedom SYSTEM SERVICE, Remote SSH, etc... for the Freedom Agent.
(This will time out after 60 seconds and continue without installing the services.)

[sudo] password for ubuntu: *****

Step 1/7: VERIFYING PREREQUISITES

Installing pip for python2: /usr/bin/python. Please stand by.

INSTALL DID NOT COMPLETE SUCCESSFULLY

Dependency python `pip`, is not installed. Please run `sudo apt-get update && sudo apt-get install -y python-pip` or `curl https://bootstrap.pypa.io/get-pip.py | python` and then rerun this script.

ubuntu@ubuntu:~\$ sudo apt-get update && sudo apt-get install -y python-pip

...

```
curl -sSf
"https://api.freedomrobotics.ai/accounts/A6124B5AB85968B6435933C21/devices/DAB4
7FEEB3B5AD0E167AE825173/installscript?mc_token=T20BFF8BDE15D1146297359B
F&mc_secret=Sfcc681baaaafb15a4edbffffdf&install_elements=webrtc&auto_install_deps
=true&ppa_is_allowed=true" | python
```


#####

Installing FREEDOM ROBOTICS Micro Service

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#####

Step 1/7: VERIFYING PREREQUISITES

Installing pip for python3: /usr/bin/python3. Please stand by.

COMPLETE

Step 2/7: INSTALLING CREDENTIALS

COMPLETE

Step 3/7: REMOTE CONNECTION

COMPLETE

Step 4/7: INSTALLING PACKAGE (python2.7)

Installing freedomrobotics agent and its direct dependencies for python 2.7. This might take a few minutes.

COMPLETE

Step 5/7: INSTALLING PACKAGE (python3.6)

Installing freedomrobotics agent and its direct dependencies for python 3.6. This might take a few minutes.

COMPLETE

Step 6/7: RTC DEPENDENCIES

Installing webrtc dependencies. First installation might take a few minutes.

COMPLETE

Step 7/7: INSTALLING MICRO SERVICE

COMPLETE

```
#####
#####
```

INSTALL COMPLETE WITH 1 WARNING

MICRO AGENT : INSTALLED AND ACTIVE
ROS SHADOW : INSTALLED
REMOTE SSH : INSTALLED
PYTHON2.7 PACKAGE : INSTALLED
PYTHON3.6 PACKAGE : INSTALLED
RTC DEPENDENCIES : INSTALLED

ACCOUNT : A6124B5AB85968B6435933C21
DEVICE : DAB47FEEB3B5AD0E167AE825173

```
#####
#####
```

WARNING: We found library libavdevice installed at version 57.10.100.
While this should still work, we recommend upgrading to version 58+, for a
better WebRTC performance and experience overall.

SOLUTIONS:

1. Install ffmpeg4.2 from our PPA which contains updated libraries:
<https://launchpad.net/~freedomrobotics/+archive/ubuntu/ppa>
2. Try installing ffmpeg 4.2+ from source code by following steps on this page:
<https://docs.freedomrobotics.ai/docs/legacy-ubuntu#section-a-name-ubuntu-16-x-86-ffmpeg-source-from-sources-a>

```
#####
#####
```

Adding this PPA to your system

You can update your system with unsupported packages from this untrusted PPA by
adding ppa:freedomrobotics/ppa to your system's Software Sources. (Read about
installing)

```
sudo add-apt-repository ppa:freedomrobotics/ppa
sudo apt-get update
```

```
ubuntu@ubuntu:~$ sudo add-apt-repository ppa:freedomrobotics/ppa
```

More info: <https://launchpad.net/~freedomrobotics/+archive/ubuntu/ppa>
Press [ENTER] to continue or Ctrl-c to cancel adding it.

```
Hit:1 http://ports.ubuntu.com/ubuntu-ports bionic InRelease  
Get:2 http://ppa.launchpad.net/freedomrobotics/ppa/ubuntu bionic InRelease [15.9 kB]  
Hit:3 http://packages.ros.org/ros/ubuntu bionic InRelease  
Hit:4 http://ports.ubuntu.com/ubuntu-ports bionic-updates InRelease  
Hit:5 http://ports.ubuntu.com/ubuntu-ports bionic-backports InRelease  
Hit:6 http://ports.ubuntu.com/ubuntu-ports bionic-security InRelease  
Get:7 http://ppa.launchpad.net/freedomrobotics/ppa/ubuntu bionic/main arm64  
  Packages [524 B]  
Get:8 http://ppa.launchpad.net/freedomrobotics/ppa/ubuntu bionic/main Translation-en  
  [520 B]  
Fetched 16.9 kB in 3s (5935 B/s)  
Reading package lists... Done
```

```
ubuntu@ubuntu:~$ sudo apt-get update
```

```
Hit:1 http://packages.ros.org/ros/ubuntu bionic InRelease  
Hit:2 http://ports.ubuntu.com/ubuntu-ports bionic InRelease  
Hit:3 http://ppa.launchpad.net/freedomrobotics/ppa/ubuntu bionic InRelease  
Hit:4 http://ports.ubuntu.com/ubuntu-ports bionic-updates InRelease  
Hit:5 http://ports.ubuntu.com/ubuntu-ports bionic-backports InRelease  
Hit:6 http://ports.ubuntu.com/ubuntu-ports bionic-security InRelease  
Reading package lists... Done
```

Freedom Robotics web page:

PROCEED

WHAT'S YOUR ROBOT'S NAME?

Audacity

PROCEED

WHAT TYPE OF ROBOT IS AUDACITY?

This helps manage robots by type.

For example, a model number, or a version number.

New Type

NASA/JPL Open Source Rover

Congratulations! You've just added your device!

Freedom provides API's and scripts for monitoring, alerting and control.
Get started with our extensive documentation.

[Get Started](#)

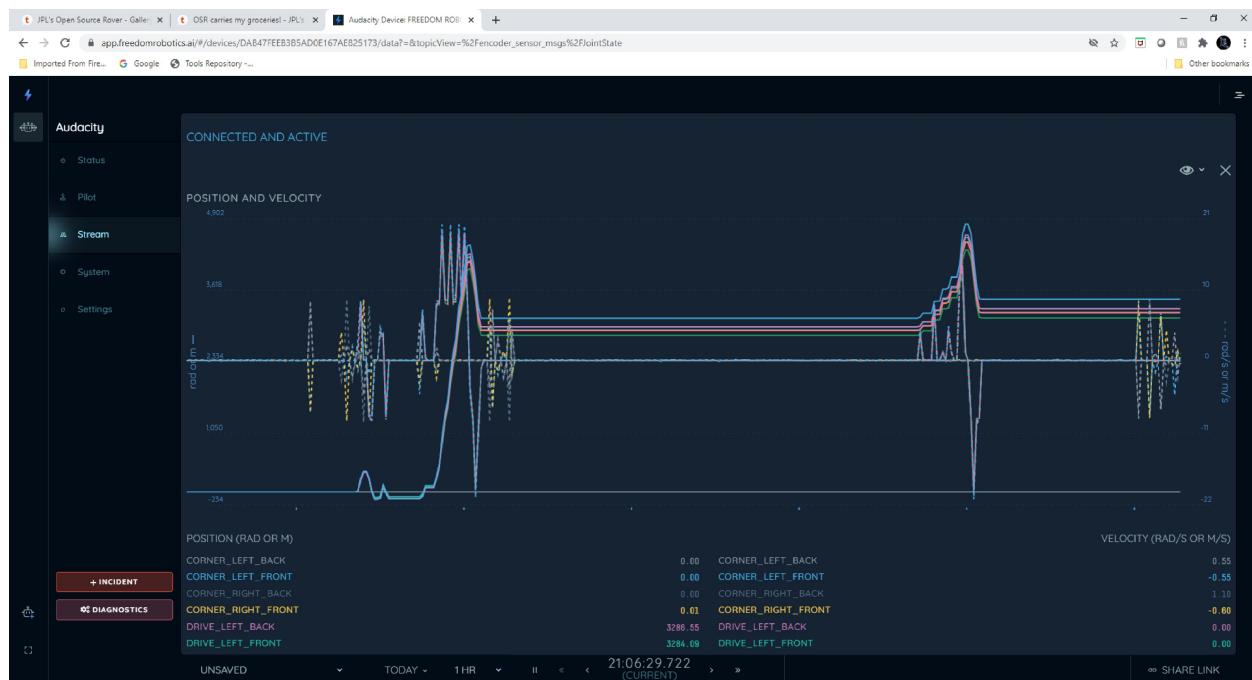
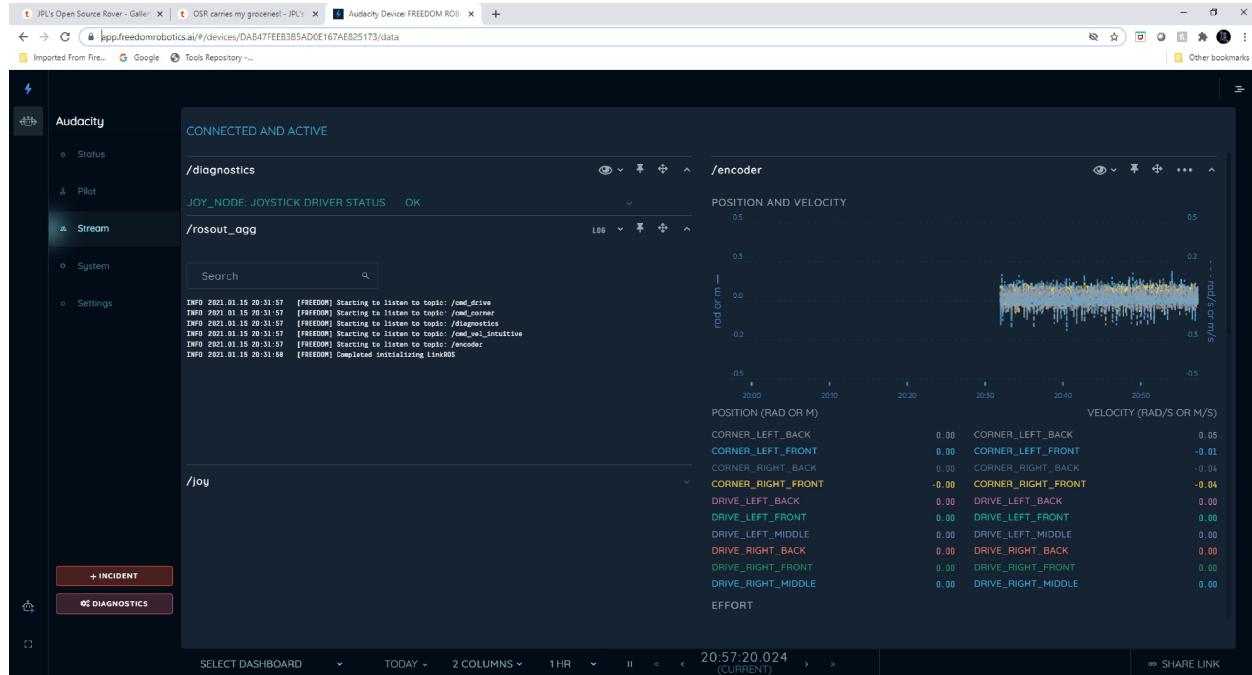
[API Docs](#)

[Go to Device](#)

<https://docs.freedomrobotics.ai/docs/install>

Looks like we're already installed & time to Go to Device

<https://app.freedomrobotics.ai/#/devices/DAB47FEEB3B5AD0E167AE825173/data>



Expanded view of upper right window

Paste this command into any terminal to start an SSH session with your device:
ubuntu@ubuntu:~\$ ssh ubuntu@0.tunnel.freedomrobotics.ai -p 19309

The authenticity of host '[0.tunnel.freedomrobotics.ai]:19309 ([3.22.30.40]:19309)' can't be established.

ECDSA key fingerprint is

SHA256:0pX5+VMzHNmQs6uH7ABEa+ewb3QO/MFTrLkfqpDgEvU.

Are you sure you want to continue connecting (yes/no)? y

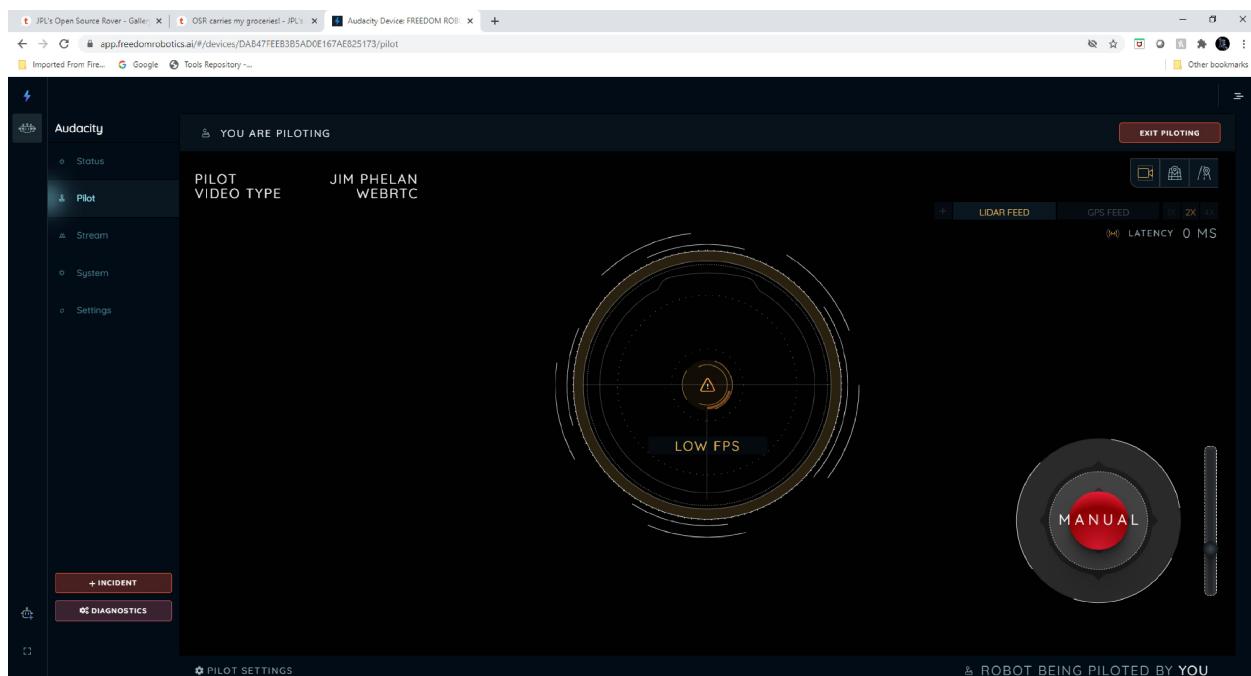
Please type 'yes' or 'no': yes

Warning: Permanently added '[0.tunnel.freedomrobotics.ai]:19309,[3.22.30.40]:19309' (ECDSA) to the list of known hosts.

ubuntu@0.tunnel.freedomrobotics.ai's password:

Welcome to Ubuntu 18.04.5 LTS (GNU/Linux 5.4.0-1026-raspi aarch64)

SSH to rover "Coming Soon"



Freedom Robotics Pilot view no video

USAi Labs virtual meetup:

Roberto suggested a pan-tilt servo for the piloting camera to take info from the IMU to create a SteadiCam for the rover.

2021.01.16 Home

SSH error enabling SSH on FR Dashboard:

```
ubuntu@ubuntu:~$ ssh ubuntu@[0.tunnel.freedomrobotics.ai]:19309
@@@@@@@WARNING: POSSIBLE DNS SPOOFING DETECTED! @
@@@@@@@The ECDSA host key for [0.tunnel.freedomrobotics.ai]:19309 has changed,
and the key for the corresponding IP address [3.14.182.203]:19309
is unknown. This could either mean that
DNS SPOOFING is happening or the IP address for the host
and its host key have changed at the same time.
@@@@@@@WARNING: REMOTE HOST IDENTIFICATION HAS CHANGED! @
@@@@@@@IT IS POSSIBLE THAT SOMEONE IS DOING SOMETHING NASTY!
Someone could be eavesdropping on you right now (man-in-the-middle attack)!

It is also possible that a host key has just been changed.
The fingerprint for the ECDSA key sent by the remote host is
SHA256:R+os8QGyjV63ljefrk+xANtjaPHi8VdSqrSxA7uqms.
Please contact your system administrator.
Add correct host key in /home/ubuntu/.ssh/known_hosts to get rid of this message
```

Offending ECDSA key in /home/ubuntu/.ssh/known_hosts:1

remove with:

```
ssh-keygen -f "/home/ubuntu/.ssh/known_hosts" -R "[0.tunnel.freedomrobotics.ai]
]:19309"
```

ECDSA host key for [0.tunnel.freedomrobotics.ai]:19309 has changed and you have
requested strict checking.

Host key verification failed.

```
ubuntu@ubuntu:~$ ssh-keygen -f "/home/ubuntu/.ssh/known_hosts" -R
"[0.tunnel.freedomrobotics.ai]:19309"
# Host [0.tunnel.freedomrobotics.ai]:19309 found: line 1
/home/ubuntu/.ssh/known_hosts updated.
Original contents retained as /home/ubuntu/.ssh/known_hosts.old
```

```
ubuntu@ubuntu:~$ ssh ubuntu@0.tunnel.freedomrobotics.ai -p 19309
Warning: the ECDSA host key for '[0.tunnel.freedomrobotics.ai]:19309' differs from the
key for the IP address '[3.22.30.40]:19309'
Offending key for IP in /home/ubuntu/.ssh/known_hosts:1
Matching host key in /home/ubuntu/.ssh/known_hosts:2
Are you sure you want to continue connecting (yes/no)? yes
ubuntu@0.tunnel.freedomrobotics.ai's password:
Permission denied, please try again.
ubuntu@0.tunnel.freedomrobotics.ai's password:
Permission denied, please try again.
ubuntu@0.tunnel.freedomrobotics.ai's password:
```

Doesn't seem to like my password(s)!!?

Let's try to re-install/update: REINSTALL from installation window
Device already at latest version.

2021.01.18

With the upgrades in drive motors and new osr-code,
the original Fidelity is now Fidelity 2.0 and not yet Audacity.
Except for the addition of a “bop to stop” emergency stop switch, the remote kill fob and
moving the Arduino display to the front panel, our rover is to NASA/JPL standard.

Now, to advance to the Audacity plan!

Rolled the OS back to pre-Freedom Robotics to re-try the install to get past the
password issue.

Re-installed Freedom Robotics Mission Control.

Next to install simple camera for Pilot video camera feed to Mission Control.

2021.01.19 Slack

James Phelan 7:45 PM

@Kit Kennedy @Achille

I consider the original plans for the Open Source Rover V1.0.

The upgraded motors and code is V2.0.

At USAI Labs we called our original rover "Fidelity"

being (reasonably) true to the NASA/JPL specifications.

Our intent was to build toward a remotely driven and ultimately autonomous rover we called "Audacity".

Now that we are firmly in step with Fidelity 2.0, it's time to work toward "Audacity."

Toward that direction I have successfully installed the Freedom Robotics

"Mission Control" app. in the rover.

Now to install a camera to allow remote piloting of the rover via the FR MC dashboard.

How to proceed?

I have 2 Picameras - regular and NOIR.

I have a cheap USB camera I use as a webcam.

I have an iPhone with an app that allows it to be a USB camera.

Yesterday my Intel RealSense D455 depth camera arrived.

I'd like to start simple, ie with the Picamera but am not sure how to integrate it with ROS and the Freedom Robotics Mission Control app. particularly in an Ubuntu environment as opposed to Raspbian.

Suggestions?

Jim (edited)

Installing picamera:

<https://ubuntu.com/blog/how-to-stream-video-with-raspberry-pi-hq-camera-on-ubuntu-core>

Enable the camera to work with Ubuntu Core

Access the uboot config file with this command:

sudo vi /boot/uboot/config.txt

Next scroll to the bottom of the file and type:

start_x=1

This is the line that enables the camera. That's it.

Now to save and exit the file

ubuntu@ubuntu:/boot/firmware\$ **lsb_release -a**

No LSB modules are available.

Distributor ID: Ubuntu

Description: Ubuntu 18.04.5 LTS

Release: 18.04

Codename: bionic

The directory /boot/u-boot/ doesn't exist in Ubuntu 18.04

But /boot/firmware does:

```
ubuntu@ubuntu:~$ cd /boot
ubuntu@ubuntu:/boot$ ls
System.map-5.4.0-1023-raspi    grub
System.map-5.4.0-1026-raspi    initrd.img
config-5.4.0-1023-raspi       initrd.img-5.4.0-1023-raspi
config-5.4.0-1026-raspi       initrd.img-5.4.0-1026-raspi
dtb                           initrd.img.old
dtb-5.4.0-1023-raspi         vmlinuz
dtb-5.4.0-1026-raspi         vmlinuz-5.4.0-1023-raspi
dtbs                          vmlinuz-5.4.0-1026-raspi
firmware                      vmlinuz.old
```

```
ubuntu@ubuntu:/boot/firmware$ ls
```

```
...
config.txt
...
```

```
ubuntu@ubuntu:/boot/firmware$ cat config.txt
```

```
# Please DO NOT modify this file; if you need to modify the boot config, the
# "usercfg.txt" file is the place to include user changes. Please refer to
# the README file for a description of the various configuration files on
# the boot partition.
```

```
...
```

```
ubuntu@ubuntu:/boot/firmware$ cat usercfg.txt
```

```
# Place "config.txt" changes (dtparam, dtoverlay, disable_overscan, etc.) in
# this file. Please refer to the README file for a description of the various
# configuration files on the boot partition.
```

I prefer nano as my text editor

```
ubuntu@ubuntu:/boot/firmware$ sudo nano usercfg.txt
```

```
# Place "config.txt" changes (dtparam, dtoverlay, disable_overscan, etc.) in
# this file. Please refer to the README file for a description of the various
# configuration files on the boot partition.
```

```
start_x=1
```

Next, we need to install `picamera-demo-application`. This is a snap in the snap store developed and maintained by Ogra, a Canonical engineer. To do this use the following command:

```
snap install picamera-streaming-demo
```

```
ubuntu@ubuntu:~$ snap install picamera-streaming-demo
error: access denied (try with sudo)
ubuntu@ubuntu:~$ sudo snap install picamera-streaming-demo
error: snap "picamera-streaming-demo" is not available on stable for this
architecture (arm64) but exists on other architectures (armhf).
```

```
ubuntu@ubuntu:~$ sudo reboot
ubuntu@ubuntu:~$ sudo apt update
ubuntu@ubuntu:~$ sudo apt upgrade
ubuntu@ubuntu:~$ sudo apt autoremove
```

Perhaps these directions will fare better
from Google: “install picamera ubuntu 18.04”
<https://mfurkannargul.medium.com/install-ubuntu-18-04-77a003f392f7>

Install Ubuntu 18.04 Server on
Raspberry Pi 4, Setup VNC &
SSH, and Publish Image Stream
from Camera Module in ROS

Firstly, let me tell you what purpose I have for this tutorial. The reason why I’m writing this tutorial is is that I’m currently working on a “Drone Localization Project” as a capstone project at my university. In the project, the drone is supposed to fly autonomously and localize itself by using computer vision algorithms and UWB sensors so Raspberry Pi is the most commonly used small single-board computer for this purpose. That’s why I had to make it prepared for this use. Additionally, it took too much time for me to complete installations and setups. Hence, I hope this tutorial will be utilized by those who work on this.

...
Install Raspi-Config. This a necessary step to provide the functionality for making configuration changes. Here you can enable some options such as SSH, VNC, and camera module which are a must for our purpose.

```
cd /etc/apt
sudo nano sources.list
```

Add “deb <http://archive.raspberrypi.org/debian/> jessie main” to the end of the lines.
deb http://archive.raspberrypi.org/debian/jessie main [this is wrong, see below]

```
ubuntu@ubuntu:/etc/apt$ sudo apt-key adv --keyserver
hkp://keyserver.ubuntu.com:80 --recv-keys 7FA3303E
```

```
gpg: WARNING: no command supplied. Trying to guess what you mean ...
usage: gpg [options] [filename]
```

```
ubuntu@ubuntu:/etc/apt$ sudo apt-key adv --keyserver
hkp://keyserver.ubuntu.com:80 --recv-keys 7FA3303E
Executing: /tmp/apt-key-gpghome.SqU32A1z3O/gpg.1.sh --keyserver
hkp://keyserver.ubuntu.com:80 --recv-keys 7FA3303E
gpg: key 82B129927FA3303E: 1 signature not checked due to a missing key
gpg: key 82B129927FA3303E: public key "Raspberry Pi Archive Signing Key" imported
gpg: Total number processed: 1
gpg:           imported: 1
```

Then; arrange the keyserver, make the update and install it with the following commands.

```
sudo apt-key adv - -keyserver hkp://keyserver.ubuntu.com:80 - -recv-keys 7FA3303E
ubuntu@ubuntu:/etc/apt$ sudo apt-key adv--keyserver
hkp://keyserver.ubuntu.com:80--recv-keys 7FA3303E
Executing: /tmp/apt-key-gpghome.ED49m1tblz/gpg.1.sh
hkp://keyserver.ubuntu.com:80--recv-keys 7FA3303E
gpg: WARNING: no command supplied. Trying to guess what you mean ...
usage: gpg [options] [filename]
ubuntu@ubuntu:/etc/apt$ sudo apt-key adv --keyserver
hkp://keyserver.ubuntu.com:80 --recv-keys 7FA3303E
Executing: /tmp/apt-key-gpghome.SqU32A1z3O/gpg.1.sh --keyserver
hkp://keyserver.ubuntu.com:80 --recv-keys 7FA3303E
gpg: key 82B129927FA3303E: 1 signature not checked due to a missing key
gpg: key 82B129927FA3303E: public key "Raspberry Pi Archive Signing Key" imported
gpg: Total number processed: 1
gpg:           imported: 1
```

```
ubuntu@ubuntu:~$ sudo apt update
E: Malformed entry 58 in list file /etc/apt/sources.list (Component)
E: The list of sources could not be read.
```

```
sudo nano sources.list
deb http://archive.raspberrypi.org/debian/[SPACE] jessie main
```

```
ubuntu@ubuntu:~$ sudo apt update
...
N: Skipping acquire of configured file 'main/binary-arm64/Packages' as repository
'http://archive.raspberrypi.org/debian jessie InRelease' doesn't support architecture
'arm64'
...
```

Since I'm on a Pi4, try jessie > buster

```
sudo nano etc/apt/sources.list  
deb http://archive.raspberrypi.org/debian/[SPACE] buster main
```

```
ubuntu@ubuntu:~$ sudo apt update  
ubuntu@ubuntu:~$ sudo apt upgrade
```

Some packages could not be installed. This may mean that you have requested an impossible situation or if you are using the unstable distribution that some required packages have not yet been created or been moved out of Incoming.

The following information may help to resolve the situation:

The following packages have unmet dependencies:

```
libgl1-mesa-dev : Conflicts: libgl-dev  
E: Broken packages
```

```
ubuntu@ubuntu:~$ sudo apt-get install raspi-config  
done
```

```
sudo mount /dev/mmcblk0p1 /boot  
ubuntu@ubuntu:~$ sudo mount /dev/mmcblk0p1 /boot
```

```
ubuntu@ubuntu:~$ sudo raspi-config
```

enabled

Pi Camera,
SSH since this already functioned best no to disable?
VNC Very long install.....
There was an error running option P3 VNC

reboot

The HDMI-microHDMI adapter plug fell apart causing a crash of the Raspberry Pi 4.
Ordered a pair to arrive day after tomorrow.

2021.01.20

Disconnected the R Pi from the rover PCB & power to permit diagnosis.

The OSR voltmeter illuminates when powered.

The fuse on the PCB conducts.

The isolated Pi LEDs illuminated when powered but w/o monitor can't tell much.

2021.01.21

HDMI-microHDMI connectors arrived.

Pi only boots to rainbow square w/o any scrolling text w/ current SD card.

Replacing w/ Pre-Freedom Robotics SD card boots fully.

Therefore current FR SD card got corrupted in the crash.

Rebuilding from PreFR .img file.

This will give me opportunity to install the picamera *before* re-installing FR Mission Control dashboard.

I don't think the raspi-config install is necessary.

The SSH isn't necessary as it already works.

VNC failed (as always prev) and isn't needed.

Google: "install picamera ubuntu 18

<https://askubuntu.com/questions/1211805/raspberry-picamera-on-ubuntu-not-found>

...suggests that the config.txt addition of

start_x=1

...is sufficient.

<https://ubuntu.com/blog/how-to-stream-video-with-raspberry-pi-hq-camera-on-ubuntu-core>

...just refers to Ubuntu Core which is quite different from 18.04 but also indicates that the above config.txt mod is the trick.

<https://gist.github.com/xxl007/5db5a3625f3a5914541c84c37b380bfa>

...seems the most straightforward.

<https://raspberrypi.stackexchange.com/questions/111852/ubuntu-19-10-enabling-and-using-raspberry-pi-camera-module-v2-1>

...suggests that the different CPU of the Pi4 may not work with the config.txt change.

...or maybe it was just 19.04 that didn't work?

This one refers to Pi3, not Pi4:

<https://gist.github.com/xxl007/5db5a3625f3a5914541c84c37b380bfa>

This one is the one tried above before the crash.

<https://mfurkannargul.medium.com/install-ubuntu-18-04-77a003f392f7>

He does have instructions for VNC install:

sudo apt update

sudo apt install tightvncserver

tightvncserver -geometry 1280x720

Open VNC Viewer, type "name of your Raspberry Pi".local:1 and connect it. Example: ubuntu.local:1. Now, you can remotely control Raspberry Pi. Don't forget to always type tightvncserver -geometry 1280x720 on terminal before opening VNC Viewer. Now, you should have accessed the desktop of Raspberry Pi.

*Install ROS Melodic and make sure that ROS is working by typing **roscore** on terminal.*

Setup Raspberry Pi Camera. Make sure that the camera module is properly connected to Raspberry Pi.

Install camera libraries and reboot.

```
sudo apt-get install libraspberrypi-dev  
sudo apt update  
sudo apt install python-pip  
sudo pip install picamera  
sudo reboot
```

should be python3-pip

This specifically addresses the ROS raspicam node:

[https://answers.ros.org/question/356280/raspberry-pi-cam-node-for-melodic-ubuntu-1804-server/_](https://answers.ros.org/question/356280/raspberry-pi-cam-node-for-melodic-ubuntu-1804-server/)

2021.01.23

```
added to /boot/firmware/usercfg.txt      (instead of config.txt tho this may not work)  
start_1=1  
gpu_mem=128
```

ubuntu@ubuntu:~\$ **sudo apt-get install libraspberrypi-dev**

...
E: Unable to locate package libraspberrypi-dev

ubuntu@ubuntu:~\$ **sudo pip install picamera**
sudo: pip: command not found

ubuntu@ubuntu:~\$ **sudo apt install python-pip**
ubuntu@ubuntu:~\$ **sudo pip install picamera**

The directory '/home/ubuntu/.cache/pip/http' or its parent directory is not owned by the current user and the cache has been disabled. Please check the permissions and owner of that directory. If executing pip with sudo, you may want sudo's -H flag.

The directory '/home/ubuntu/.cache/pip' or its parent directory is not owned by the current user and caching wheels has been disabled. check the permissions and owner of that directory. If executing pip with sudo, you may want sudo's -H flag.

Collecting picamera

 Downloading

<https://files.pythonhosted.org/packages/79/c4/80afe871d82ab1d5c9d8f0c0258228a8a0ed96db07a78ef17e7fba12fda8/picamera-1.13.tar.gz> (143kB)

 100% |██████████| 153kB 2.0MB/s

Installing collected packages: picamera

 Running setup.py install for picamera ... done

Successfully installed picamera-1.13

```
ubuntu@ubuntu:~$ sudo -H pip install picamera
Requirement already satisfied: picamera in /usr/local/lib/python2.7/dist-packages
```

```
ubuntu@ubuntu:~$ sudo apt-get install libraspberrypi-dev
E: Unable to locate package libraspberrypi-dev
```

I'm going to try the approach of

<https://mfurkannargul.medium.com/install-ubuntu-18-04-77a003f392f7>

and install raspi-config by adding this source:

Since I'm on a Pi4, try jessie > buster

sudo nano etc/apt/sources.list

```
deb http://archive.raspberrypi.org/debian/[SPACE] buster main
deb http://archive.raspberrypi.org/debian/ buster main
```

```
ubuntu@ubuntu:/etc/apt$ sudo apt-key adv --keyserver
hkp://keyserver.ubuntu.com:80 --recv-keys 7FA3303E
```

```
ubuntu@ubuntu:~$ sudo apt update
```

```
ubuntu@ubuntu:~$ sudo apt upgrade
```

The following packages have unmet dependencies:

libgl1-mesa-dev : Conflicts: libgl-dev

E: Broken packages

Hopefully the broken packages aren't important to raspi-config or picamera

```
ubuntu@ubuntu:~$ sudo apt-get install raspi-config
```

Will use this ONLY for installing picamera and ignore SSH and VNC

...

Use 'sudo apt autoremove' to remove them.

```
ubuntu@ubuntu:~$ sudo apt autoremove
```

```
ubuntu@ubuntu:~$ sudo mount /dev/mmcblk0p1 /boot
```

```
ubuntu@ubuntu:~$ sudo raspi-config
```

Will use this ONLY for installing picamera and ignore SSH and VNC

enable picamera; finish; reboot

Now, let's try this again:

```
ubuntu@ubuntu:~$ sudo apt-get install libraspberrypi-dev
```

...long install...

Errors were encountered while processing:

raspberrypi-kernel

E: Sub-process /usr/bin/dpkg returned an error code (1)

Let's hope again nothing important

```
ubuntu@ubuntu:~$ sudo apt install python-pip          again to be sure  
Errors were encountered while processing:  
raspberrypi-kernel  
E: Sub-process /usr/bin/dpkg returned an error code
```

```
ubuntu@ubuntu:~$ sudo pip install picamera           again to be sure  
Requirement already satisfied: picamera in /usr/local/lib/python2.7/dist-packages (1.13)
```

```
ubuntu@ubuntu:~$ sudo reboot
```

Create a python script named cam.py and copy the code below.
Then, run it by typing python cam.py .

```
import picamera  
camera = picamera.PiCamera()  
camera.capture('mytest_image.jpg')  
camera.close()
```

```
ubuntu@ubuntu:~$ python cam.py  
Traceback (most recent call last):  
  File "cam.py", line 1, in <module>  
    import picamera  
  File "/usr/local/lib/python2.7/dist-packages/picamera/__init__.py", line 72, in <module>  
    from picamera.exc import (  
  File "/usr/local/lib/python2.7/dist-packages/picamera/exc.py", line 41, in <module>  
    import picamera.mmal as mmal  

```

```
ubuntu@ubuntu:~$ raspicam  
raspicam: command not found  
ubuntu@ubuntu:~$ raspivid  
raspivid: command not found
```

```
So let's try this solution from https://rhoeby.com/blog/adding-ros-raspberry-pi-4b-camera/
cd src/      I'll use osr_ws/src
git clone https://github.com/6by9/userland.git
cd userland/
git checkout 64bit_mm
./buildme --aarch64
ls /opt/vc/bin/
```

```
raspivid
/opt/vc/bin/raspivid
find . -name libmmal_core.so
```

```
ubuntu@ubuntu:~/osr_ws/src$ git clone https://github.com/6by9/userland.git
Cloning into 'userland'...
remote: Enumerating objects: 7939, done.
remote: Total 7939 (delta 0), reused 0 (delta 0), pack-reused 7939
Receiving objects: 100% (7939/7939), 40.32 MiB | 10.40 MiB/s, done.
Resolving deltas: 100% (4794/4794), done.
```

```
ubuntu@ubuntu:~/osr_ws/src$ ls
CMakeLists.txt  osr-rover-code  userland
```

```
ubuntu@ubuntu:~/osr_ws/src$ cd userland
ubuntu@ubuntu:~/osr_ws/src/userland$ git checkout 64bit_mm
Branch '64bit_mm' set up to track remote branch '64bit_mm' from 'origin'.
Switched to a new branch '64bit_mm'
ubuntu@ubuntu:~/osr_ws/src/userland$ ./buildme --aarch64
...extensive build...
ubuntu@ubuntu:~/osr_ws/src/userland$ ls /opt/vc/bin
containers_check_frame_int  containers_test    dtoverlay-pre  tvservice
containers_datagram_receiver  containers_test_bits  dtparam      vcgencmd
containers_datagram_sender   containers_test_uri  mmal_vc_diag  vchiq_test
containers_dump_pktfile     containers_uri_pipe  raspistill   vcmailbox
containers_rtp_decoder      dtmerge          raspivid
containers_stream_client    dtoverlay        raspividyuv
containers_stream_server    dtoverlay-post   raspiyuv
```

```
ubuntu@ubuntu:~/osr_ws/src/userland$ find . -name libmmal_core.so
./build/lib/libmmal_core.so
```

```
ubuntu@ubuntu:~/osr_ws/src/userland$ LD_PRELOAD="/opt/vc/lib/libmmal_vc_client.so /opt/vc/lib/libvcsn.so
/opt/vc/lib/libmmal_core.so /opt/vc/lib/libmmal_util.so" /opt/vc/bin/raspistill -o
cam.jpg
-bash: /opt/vc/lib/libvcsn.so: Permission denied
...which is a lot different error than the site got.
```

```
ubuntu@ubuntu:~$ LD_PRELOAD="/opt/vc/lib/libmmal_vc_client.so  
/opt/vc/lib/libmmal_core.so /opt/vc/lib/libmmal_util.so"  
ubuntu@ubuntu:~$ /opt/vc/bin/raspistill -o cam.jpg  
/opt/vc/bin/raspistill: error while loading shared libraries: libmmal_core.so: cannot open  
shared object file: No such file or directory
```

correct raspistil > raspistill & try whole thing again:

```
ubuntu@ubuntu:~$ LD_PRELOAD="/opt/vc/lib/libmmal_vc_client.so  
/opt/vc/lib/libmmal_core.so /opt/vc/lib/libmmal_util.so" /opt/vc/bin/raspistill -o  
cam.jpg  
/opt/vc/bin/raspistill: error while loading shared libraries: libvcsn.so: cannot open shared  
object file: No such file or directory
```

NOTHING WORKS

Try this Google of error message fix:

<https://www.raspberrypi.org/forums/viewtopic.php?t=51925>

Re: libmmal_core.so: cannot open shared object file

Quote

Wed Aug 07, 2013 3:51 am

*Make sure that the /opt/vc/lib is in your library path. On my pi
/etc/ld.so.conf.d/00-vmcs.conf has the /opt/vc/lib path. If you don't have that file and
none of the other files under /etc/ld.so.conf.d/ contain that path create a new file:*

File Name: /etc/ld.so.conf.d/00-vmcs.conf

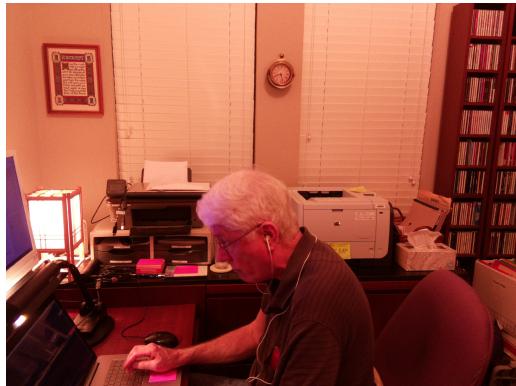
Contents:

/opt/vc/lib

Save the file. Run ldconfig to re-init your library paths and see if that fixes your issues.

Try again:

```
ubuntu@ubuntu:~$ LD_PRELOAD="/opt/vc/lib/libmmal_vc_client.so  
/opt/vc/lib/libmmal_core.so /opt/vc/lib/libmmal_util.so" /opt/vc/bin/raspistill -o  
cam.jpg
```



2021.01.24

continuing...

Publish the image stream in ROS. Clone the raspicam node and compile it. Then, publish Raspberry Pi Camera images into an image rostopic:

```
cd ~/catkin_ws/src           In our case catkin_ws/src = osr_ws/src  
git clone https://github.com/dganbold/raspicam_node.git  
cd ~/catkin_ws/  
catkin_make                  Other sites say catkin_make --pkg raspicam_node
```

```
ubuntu@ubuntu:~$ cd osr_ws/src  
ubuntu@ubuntu:~/osr_ws/src$ ls  
CMakeLists.txt  osr-rover-code  userland  
ubuntu@ubuntu:~/osr_ws/src$ git clone  
https://github.com/dganbold/raspicam\_node.git  
Cloning into 'raspicam_node'...  
remote: Enumerating objects: 120, done.  
remote: Total 120 (delta 0), reused 0 (delta 0), pack-reused 120  
Receiving objects: 100% (120/120), 268.94 KiB | 1.54 MiB/s, done.  
Resolving deltas: 100% (61/61), done.  
ubuntu@ubuntu:~/osr_ws/src$ cd ..  
ubuntu@ubuntu:~/osr_ws$ catkin_make --pkg raspicam_node  
Base path: /home/ubuntu/osr_ws  
Source space: /home/ubuntu/osr_ws/src  
Build space: /home/ubuntu/osr_ws/build  
Devel space: /home/ubuntu/osr_ws/devel  
Install space: /home/ubuntu/osr_ws/install  
####  
#### Running command: "cmake /home/ubuntu/osr_ws/src -DCATKIN_DEVEL_PREFIX=/home/ubuntu/osr_ws/devel  
-DCMAKE_INSTALL_PREFIX=/home/ubuntu/osr_ws/install -G Unix Makefiles" in "/home/ubuntu/osr_ws/build"  
####  
-- Using CATKIN_DEVEL_PREFIX: /home/ubuntu/osr_ws/devel  
-- Using CMAKE_PREFIX_PATH: /home/ubuntu/osr_ws/devel;/opt/ros/melodic  
-- This workspace overlays: /home/ubuntu/osr_ws/devel;/opt/ros/melodic  
-- Found PythonInterp: /usr/bin/python2 (found suitable version "2.7.17", minimum required is "2")  
-- Using PYTHON_EXECUTABLE: /usr/bin/python2  
-- Using Debian Python package layout  
-- Using empy: /usr/bin/empy  
-- Using CATKIN_ENABLE_TESTING: ON  
-- Call enable_testing()  
-- Using CATKIN_TEST_RESULTS_DIR: /home/ubuntu/osr_ws/build/test_results  
-- Found gtest sources under '/usr/src/googletest': gtests will be built  
-- Found gmock sources under '/usr/src/googletest': gmock will be built  
-- Found PythonInterp: /usr/bin/python2 (found version "2.7.17")  
-- Using Python nosetests: /usr/bin/nosetests-2.7  
-- catkin 0.7.28  
-- BUILD_SHARED_LIBS is on  
-- BUILD_SHARED_LIBS is on  
-- ~~~ traversing 5 packages in topological order:  
-- ~~ - osr_bringup  
-- ~~ - led_screen  
-- ~~ - osr_msgs  
-- ~~ - osr  
-- ~~ - raspicam_node  
-- +++ processing catkin package: 'osr_bringup'
```

```

-- ==> add_subdirectory(osr-rover-code/ROS/osrBringup)
-- +++ processing catkin package: 'led_screen'
-- ==> add_subdirectory(osr-rover-code/ROS/led_screen)
-- +++ processing catkin package: 'osr_msgs'
-- ==> add_subdirectory(osr-rover-code/ROS/osr_msgs)
-- Using these message generators: gencpp;geneus;genlisp;gennodejs;genpy
-- osr_msgs: 3 messages, 0 services
-- +++ processing catkin package: 'osr'
-- ==> add_subdirectory(osr-rover-code/ROS/osr)
-- +++ processing catkin package: 'raspicam_node'
-- ==> add_subdirectory(raspicam_node)
-- Configuring done
-- Generating done
-- Build files have been written to: /home/ubuntu/osr_ws/build
#####
##### Running command: "make -j4 -l4" in "/home/ubuntu/osr_ws/build/raspicam_node"
#####
Scanning dependencies of target raspicamcontrol
Scanning dependencies of target raspicam_node_gencfg
Scanning dependencies of target raspicli
[ 14%] Generating dynamic reconfigure files from cfg/Camera.cfg:
/home/ubuntu/osr_ws/devel/include/raspicam_node/	CameraConfig.h
/home/ubuntu/osr_ws/devel/lib/python2.7/dist-packages/raspicam_node/cfg/CameraConfig.py
[ 28%] Building C object raspicam_node/CMakeFiles/raspicli.dir/src/RaspiCLI.c.o
[ 42%] Building C object raspicam_node/CMakeFiles/raspicamcontrol.dir/src/RaspiCamControl.c.o
Generating reconfiguration files for Camera in raspicam_node
Wrote header file in /home/ubuntu/osr_ws/devel/include/raspicam_node/	CameraConfig.h
[ 42%] Built target raspicam_node_gencfg
[ 57%] Linking C static library /home/ubuntu/osr_ws/devel/lib/libraspicli.a
[ 57%] Built target raspicli
[ 71%] Linking C static library /home/ubuntu/osr_ws/devel/lib/libraspicamcontrol.a
[ 71%] Built target raspicamcontrol
Scanning dependencies of target raspicam_node
[ 85%] Building CXX object raspicam_node/CMakeFiles/raspicam_node.dir/src/raspicam_node.cpp.o
[100%] Linking CXX executable /home/ubuntu/osr_ws/devel/lib/raspicam_node/raspicam_node
[100%] Built target raspicam_node

```

Start the node with all services for the camera module and publish images.

cd ~/catkin_ws/ Already there

source devel/setup.bash

roslaunch raspicam_node camera_module_v2_640x480_30fps.launch

It has now been launched. Open another terminal and type:

rosservice call /raspicam_node/start_capture

Now, video capture has been started. Open one another terminal and type.

rosrun image_view image_view image:=/raspicam_node/image_raw

Finally, it shows you the image streaming. You have now accessed to the camera module and been receiving images from it.

ubuntu@ubuntu:~/osr_ws\$ source devel/setup.bash

....

[WARN] [1611522301.675862217]: camera_component not initialized

```
ubuntu@ubuntu:~/osr_ws$ roslaunch raspicam_node  
camera_module_v2_640x480_30fps.launch  
... logging to  
/home/ubuntu/.ros/log/22a02f18-5dec-11eb-afe1-dca632160e50/roslaunch-ubuntu-6106  
.log  
Checking log directory for disk usage. This may take a while.  
Press Ctrl-C to interrupt  
Done checking log file disk usage. Usage is <1GB.
```

started roslaunch server http://ubuntu:34433/

SUMMARY =====

PARAMETERS

```
* /raspicam_node/camera_frame_id: raspicam  
* /raspicam_node/camera_info_url: package://raspica...  
* /raspicam_node/framerate: 30  
* /raspicam_node/height: 480  
* /raspicam_node/width: 640  
* /rosdistro: melodic  
* /rosversion: 1.14.9
```

NODES

```
/  
  raspicam_node (raspicam_node/raspicam_node)
```

ROS_MASTER_URI=http://localhost:11311

```
process[raspicam_node-1]: started with pid [6122]  
[ INFO] [1611522774.638295949]: Loading CameraInfo from  
package://raspicam_node/camera_info/camera_module_v2_640x480.yaml  
[ INFO] [1611522774.647987694]: camera calibration URL:  
package://raspicam_node/camera_info/camera_module_v2_640x480.yaml  
[ INFO] [1611522774.969505079]: Camera successfully calibrated  
[ INFO] [1611522775.005618174]: Reconfigure Request: contrast 0, sharpness 0,  
brightness 50, saturation 0, ISO 400, exposureCompensation 0, videoStabilisation 0,  
vFlip 0, hFlip 0, zoom 1.00, exposure_mode auto, awb_mode auto  
[ WARN] [1611522775.005750209]: camera_component not initialized  
mmal: mmal_component_create_core: could not find component 'vc.ril.camera'  
mmal: Failed to create camera component  
[ INFO] [1611522783.198631752]: init_cam: Failed to create camera component  
[raspicam_node-1] process has died [pid 6122, exit code -11, cmd  
/home/ubuntu/osr_ws/devel/lib/raspicam_node/raspicam_node  
__name:=raspicam_node  
__log:=/home/ubuntu/.ros/log/22a02f18-5dec-11eb-afe1-dca632160e50/raspicam_node-  
1.log].
```

log file:
/home/ubuntu/.ros/log/22a02f18-5dec-11eb-afe1-dca632160e50/raspicam_node-1*.log
all processes on machine have died, roslaunch will exit
shutting down processing monitor...
... shutting down processing monitor complete
done

<https://stackoverflow.com/questions/61527655/running-picamera-on-ubuntu-in-c>
I had this error while compiling a ROS node for the raspicam. I fixed it by adding the following to my CMakeLists.txt:

```
set (CMAKE_SHARED_LINKER_FLAGS "-Wl,--no-as-needed")
```

The issue was that the reference to the library containing the 'vc.ril.camera' was optimized out by the linker and could not be found at run time.

This doesn't help, I'm not compiling a .cpp node.

<https://www.raspberrypi.org/forums/viewtopic.php?t=183038>

```
ubuntu@ubuntu:~$ vcgencmd get_camera
```

```
vcgencmd: command not found
```

```
ubuntu@ubuntu:~$ sudo raspi-gpio get
```

```
sudo: raspi-gpio: command not found
```

The following, of course, also Fail.

[open another PuTTY window]

```
ubuntu@ubuntu:~$ rosservice call /raspicam_node/start_capture
```

ERROR: transport error completing service call: unable to receive data from sender,
check sender's logs for details

[open another PuTTY window]

```
ubuntu@ubuntu:~$ rosrun image_view image_view
```

```
image:=/raspicam_node/image_raw
```

```
[ INFO] [1611522665.515322117]: Initializing nodelet with 4 worker threads.
```

```
[ INFO] [1611522666.728665751]: Using transport "raw"
```

Unable to init server: Could not connect: Connection refused

```
(image_raw:6073): Gtk-WARNING **: 15:11:06.741: cannot open display:
```

Let's try directions from: <https://rhoeby.com/blog/adding-ros-raspberry-pi-4b-camera/>

```
ubuntu@ubuntu:~$ 680 LD_PRELOAD="/opt/vc/lib/libmmal_vc_client.so  
/opt/vc/lib/libvcsn.so /opt/vc/lib/libmmal_core.so /opt/vc/lib/libmmal_util.so"  
/opt/vc/bin/raspivid -o video.h264 -t 10000
```

```
ubuntu@ubuntu:~$: command not found
```

Doesn't recognize 680 as command? Does it belong to raspistill command??

```
ubuntu@ubuntu:~$ LD_PRELOAD="/opt/vc/lib/libmmal_vc_client.so  
/opt/vc/lib/libvcsn.so /opt/vc/lib/libmmal_core.so /opt/vc/lib/libmmal_util.so"
```

```
/opt/vc/bin/raspivid -o video.h264 -t 10000
-bash: ubuntu@ubuntu:~="/opt/vc/lib/libmmal_vc_client.so: No such file or directory
copied too much
```

```
ubuntu@ubuntu:~$ LD_PRELOAD="/opt/vc/lib/libmmal_vc_client.so
/opt/vc/lib/libvcsm.so /opt/vc/lib/libmmal_core.so /opt/vc/lib/libmmal_util.so"
/opt/vc/bin/raspivid -o video.h264 -t 10000
-bash: /opt/vc/lib/libvcsm.so: Permission denied
```

```
ubuntu@ubuntu:~$ sudo LD_PRELOAD="/opt/vc/lib/libmmal_vc_client.so
/opt/vc/lib/libvcsm.so /opt/vc/lib/libmmal_core.so /opt/vc/lib/libmmal_util.so"
/opt/vc/bin/raspivid -o video.h264 -t 10000
sudo: /opt/vc/lib/libvcsm.so: command not found
```

```
ubuntu@ubuntu:~$ LD_PRELOAD="/opt/vc/lib/libmmal_vc_client.so
/opt/vc/lib/libmmal_core.so /opt/vc/lib/libmmal_util.so" /opt/vc/bin/raspistill -o
cam.jpg 680
Invalid command line option (680)
```

So what IS this 680??

```
export LD_LIBRARY_PATH=/opt/vc/lib /opt/vc/bin/raspivid -o video.h264 -t 10000
```

```
ubuntu@ubuntu:~$ export LD_LIBRARY_PATH=/opt/vc/lib /opt/vc/bin/raspivid -o
video.h264 -t 1000
-bash: export: `/opt/vc/bin/raspivid': not a valid identifier
-bash: export: `-o': not a valid identifier
-bash: export: `video.h264': not a valid identifier
-bash: export: `-t': not a valid identifier
-bash: export: `1000': not a valid identifier
```

I think these should be 2 separate commands

```
ubuntu@ubuntu:~$ export LD_LIBRARY_PATH=/opt/vc/lib
ubuntu@ubuntu:~$ /opt/vc/bin/raspivid -o video.h264 -t 10000
```

```
sudo ln -s /opt/vc/bin/raspivid /usr/bin/raspivid
ubuntu@ubuntu:~$ sudo ln -s /opt/vc/bin/raspivid /usr/bin/raspivid
```

```
raspivid -o video.h264 -t 10000
ubuntu@ubuntu:~$ raspivid -o video.h264 -t 10000
```

(added 'export LD_LIBRARY_PATH=\$LD_LIBRARY_PATH:/opt/vc/lib' to .bashrc)

```
ubuntu@ubuntu:~$ sudo apt install ffmpeg
Reading package lists... Done
Building dependency tree
Reading state information... Done
Some packages could not be installed. This may mean that you have
requested an impossible situation or if you are using the unstable
distribution that some required packages have not yet been created
or been moved out of Incoming.
The following information may help to resolve the situation:

The following packages have unmet dependencies:
ffmpeg : Depends: libavcodec58 (= 7:4.1.6-1~deb10u1+rpt1)
          Depends: libavdevice58 (= 7:4.1.6-1~deb10u1+rpt1) but it is not going to be
          installed
          Depends: libavfilter7 (= 7:4.1.6-1~deb10u1+rpt1)
          Depends: libavformat58 (= 7:4.1.6-1~deb10u1+rpt1) but it is not going to be
          installed
          Depends: libavresample4 (= 7:4.1.6-1~deb10u1+rpt1) but it is not going to be
          installed
          Depends: libavutil56 (= 7:4.1.6-1~deb10u1+rpt1) but it is not going to be installed
          Depends: libpostproc55 (= 7:4.1.6-1~deb10u1+rpt1) but it is not going to be
          installed
          Depends: libsdl2-2.0-0 (>= 2.0.9) but 2.0.8+dfsg1-1ubuntu1.18.04.4 is to be
          installed
          Depends: libswresample3 (= 7:4.1.6-1~deb10u1+rpt1) but it is not going to be
          installed
          Depends: libswscale5 (= 7:4.1.6-1~deb10u1+rpt1) but it is not going to be
          installed
E: Unable to correct problems, you have held broken packages.
```

REBOOT

Let's try this again...

```
ubuntu@ubuntu:~$ roslaunch raspicam_node  
camera_module_v2_640x480_30fps.launch  
... logging to  
/home/ubuntu/.ros/log/cc67e486-5e97-11eb-88cf-dca632160e50/roslaunch-ubuntu-3267  
.log  
Checking log directory for disk usage. This may take a while.  
Press Ctrl-C to interrupt  
Done checking log file disk usage. Usage is <1GB.  
started roslaunch server http://ubuntu:36567/
```

SUMMARY

=====

PARAMETERS

```
* /raspicam_node/camera_frame_id: raspicam  
* /raspicam_node/camera_info_url: package://raspica...  
* /raspicam_node/framerate: 30  
* /raspicam_node/height: 480  
* /raspicam_node/width: 640  
* /rosdistro: melodic  
* /rosversion: 1.14.9
```

NODES

```
/  
    raspicam_node (raspicam_node/raspicam_node)  
ROS_MASTER_URI=http://localhost:11311  
process[raspicam_node-1]: started with pid [3282]  
[ INFO] [1611531042.815055715]: Loading CameraInfo from  
package://raspicam_node/camera_info/camera_module_v2_640x480.yaml  
[ INFO] [1611531042.828031669]: camera calibration URL:  
package://raspicam_node/camera_info/camera_module_v2_640x480.yaml  
[ INFO] [1611531043.158756293]: Camera successfully calibrated  
[ INFO] [1611531043.197698136]: Reconfigure Request: contrast 0, sharpness 0,  
brightness 50, saturation 0, ISO 400, exposureCompensation 0, videoStabilisation 0,  
vFlip 0, hFlip 0, zoom 1.00, exposure_mode auto, awb_mode auto  
[ WARN] [1611531043.197802414]: camera_component not initialized
```

https://github.com/dganbold/raspicam_node

And also need to make a rule for /dev/vchiq is accessible to users in video group:

```
echo 'SUBSYSTEM=="vchiq",GROUP="video",MODE="0660"' >  
/etc/udev/rules.d/10-vchiq-permissions.rules  
reboot  
I missed the 2nd '='
```

Didn't fix it!

Let's try installing a different raspicam_node, this time from Ubiquity Robotics:
https://index.ros.org/p/raspicam_node/

add repository (it's for Ubuntu Xenial 16.04, let's hope it ports ok):

<https://packages.ubiquityrobotics.com/>

1) Add the source to your apt lists:

sudo sh -c 'echo "deb https://packages.ubiquityrobotics.com/ubuntu/ubiquity xenial main" > /etc/apt/sources.list.d/ubiquity-latest.list'

```
ubuntu@ubuntu:~$ sudo sh -c 'echo "deb  
https://packages.ubiquityrobotics.com/ubuntu/ubiquity xenial main" >  
/etc/apt/sources.list.d/ubiquity-latest.list'
```

2) Add our signing key to your trusted list:

```
sudo apt-key adv --keyserver hkp://ha.pool.sks-keyservers.net:80 --recv-key C3032ED8  
ubuntu@ubuntu:~$ sudo apt-key adv --keyserver
```

hkp://ha.pool.sks-keyservers.net:80 --recv-key C3032ED8

```
Executing: /tmp/apt-key-gpghome.6LHcwu4t7P/gpg.1.sh --keyserver  
hkp://ha.pool.sks-keyservers.net:80 --recv-key C3032ED8  
gpg: key 4BBE95A1C3032ED8: public key "Ubiquity Robotics  
<packaging@ubiquityrobotics.com>" imported  
gpg: Total number processed: 1  
gpg:           imported: 1
```

3) Finally: sudo apt-get update

```
ubuntu@ubuntu:~$ sudo apt-get update
```

...

Reading package lists... Done

Then run sudo apt install ros-kinetic-raspicam-node

I wonder if I should remove the previous raspicam_node stuff??

```
ubuntu@ubuntu:~$ sudo apt install ros-kinetic-raspicam-node
```

Reading package lists... Done

Building dependency tree

Reading state information... Done

E: Unable to locate package ros-kinetic-raspicam-node

Slack post this evening:

Achille 3:45 PM

That's a lot of text to sift through. There's two main options when it comes to cameras and the Raspberry Pi. One is the 'raspicam' which uses CSI to connect to the RPi, the other is simply using USB.

The second option is much easier. Since RPi runs a full ubuntu stack, you can use any tools that work for full sized computers, like ROS usb_cam. That's what I use. There's just no setup required.

If you have a really good reason to use the raspicam, then that should work too, although it might not be as straightforward.

James Phelan 6:58 PM

raspicam_node isn't working. Regardless of which set of directions, they lead eventually to

```
ubuntu@ubuntu:~$ roslaunch raspicam_node  
camera_module_v2_640x480_30fps.launch
```

which ends with the error --

```
[ WARN] [1611531043.197802414]: camera_component not initialized
```

Following the next step, opening another window and running --

```
ubuntu@ubuntu:~$ rosservice call /raspicam_node/start_capture
```

gives the error --

ERROR: transport error completing service call: unable to receive data from sender,
check sender's logs for details

and causes the raspicam_node to crash and exit.

I know the camera is installed as I have created and been able to display files from raspistill (in prev post) and raspivid.

Googling the error message and following multiple leads has been unproductive.

I think I'll try the USB camera but I'd still like to be able to use the picamera as it's small and there's a fisheye lens available.

If anybody has a clean set of directions for our situation, I'd LOVE it!

Meanwhile, I'll roll back to pre-raspicam_node and try the USB route. Anybody have a clean roadmap there?

One issue is that all 4 USB ports are in use if a keyboard and mouse are connected.

I can free one up by unplugging the head display which isn't that useful anyway.

Jim

2021.01.25

Install USB camera.

Google “install usb camera raspberry pi 4 ubuntu 18.04”

<https://www.raspberrypi.org/documentation/usage/webcams/>

This site does specify OS so assuming Raspbian. Will it work for Ubuntu?

First, install the fswebcam package:

ubuntu@ubuntu:~\$ sudo apt install fswebcam

done

Should probably update/upgrade as I've rolled back to pre Freedom Robotics image...

ubuntu@ubuntu:~\$ sudo apt-get update

ubuntu@ubuntu:~\$ sudo apt-get upgrade

SSH connection crashed mid upgrade

direct upgrade “locked by another process”

REBOOT

ubuntu@ubuntu:~\$ sudo apt-get update

E: dpkg was interrupted, you must manually run ‘sudo dpkg --configure -a’ to correct the problem.

ubuntu@ubuntu:~\$ sudo dpkg --configure -a

.....

ubuntu@ubuntu:~\$ sudo apt autoremove Y

...

Add your user to video group

sudo usermod -a -G video <username>

ubuntu@ubuntu:~\$ sudo usermod -a -G video ubuntu

Basic usage

Enter the command fswebcam followed by a filename and a picture will be taken using the webcam, and saved to the filename specified:

fswebcam image.jpg

ubuntu@ubuntu:~\$ fswebcam image.jpg



```
ubuntu@ubuntu:~$ fswebcam -r 1280x720 image2.jpg
```



Install Freedom Robotics Mission Control Dashboard:

<https://app.freedomrobotics.ai/#/devices/DAB47FEEB3B5AD0E167AE825173/settings/installation>

```
curl -sSf  
"https://api.freedomrobotics.ai/accounts/A6124B5AB85968B6435933C21/devices/DAB4  
7FEEB3B5AD0E167AE825173/installscript?mc_token=T20BFF8BDE15D1146297359B  
F&mc_secret=Sfcc681baaaafb15a4edbffffdf&install_elements=webrtc&auto_install_deps  
=true&ppa_is_allowed=true" | python  
...1-7/7 steps
```

WARNING: We found library libavdevice installed at version 57.10.100.
While this should still work, we recommend upgrading to version 58+, for a
better WebRTC performance and experience overall.

SOLUTIONS:

1. Install ffmpeg4.2 from our PPA which contains updated libraries:
<https://launchpad.net/~freedomrobotics/+archive/ubuntu/ppa>
2. Try installing ffmpeg 4.2+ from source code by following steps on this page:
<https://docs.freedomrobotics.ai/docs/legacy-ubuntu#section-a-name-ubuntu-16-x-86-ffmpeg-source-from-sources-a>

```
sudo add-apt-repository ppa:freedomrobotics/ppa  
sudo apt-get update
```

```
ubuntu@ubuntu:~$ sudo add-apt-repository ppa:freedomrobotics/ppa  
More info: https://launchpad.net/~freedomrobotics/+archive/ubuntu/ppa  
Press [ENTER] to continue or Ctrl-c to cancel adding it.      ENTER  
... done
```

```
ubuntu@ubuntu:~$ sudo apt-get update
```

Video doesn't show on FR MC dashboard

ubuntu@ubuntu:~\$ **ffmpeg**

Command 'ffmpeg' not found, but can be installed with:

sudo apt install ffmpeg

...apparently didn't install from FR repo

ubuntu@ubuntu:~\$ **sudo apt install ffmpeg**

...done

ubuntu@ubuntu:~\$ **ffmpeg -version**

```
ffmpeg version 3.4.8-0ubuntu0.2 Copyright (c) 2000-2020 the FFmpeg developers
built with gcc 7 (Ubuntu/Linaro 7.5.0-3ubuntu1~18.04)
configuration: --prefix=/usr --extra-version=0ubuntu0.2 --toolchain=hardened --l
ibdir=/usr/lib/aarch64-linux-gnu
--incdir=/usr/include/aarch64-linux-gnu --enable
e-gpl --disable-stripping --enable-avresample --enable-avisynth --enable-gnutls
--enable-ladspa --enable-libass --enable-libbluray
--enable-libbs2b --enable-lib                         caca --enable-libcdio
--enable-libflite --enable-libfontconfig --enable-libfreet
ype --enable-libfribidi --enable-libgme --enable-libgsm --enable-libmp3lame --en
able-libmysofa --enable-libopenjpeg
--enable-libopenmpt --enable-libopus --enabl
e-libpulse --enable-librubberband --enable-librsvg --enable-libshine --enable-li
bsnappy --enable-libsoxr --enable-libspeex --enable-libssh
--enable-libtheora --                                enable-libtwolame
--enable-libvorbis --enable-libvpx --enable-libwavpack --enabl
e-libwebp --enable-libx265 --enable-libxml2 --enable-libxvid --enable-libzmq
--enable-opengl --enable-sdl2 --enabl
e-libdc1394 --enable-libdrm --enable-libiec61883 --enable-chromaprint --enable-f
rei0r --enable-libopencv --enable-libx264 --enable-shared
libavutil      55. 78.100 / 55. 78.100
libavcodec     57.107.100 / 57.107.100
libavformat    57. 83.100 / 57. 83.100
libavdevice   57. 10.100 / 57. 10.100
libavfilter     6.107.100 / 6.107.100
libavresample   3. 7. 0 / 3. 7. 0
libswscale      4. 8.100 / 4. 8.100
libswresample   2. 9.100 / 2. 9.100
libpostproc     54. 7.100 / 54. 7.100
```

REBOOT

no change

2021.01.26

Freedom Robotics install tells me my ffmpeg v57 is out of date:

*WARNING: We found library libavdevice installed at version 57.10.100.
While this should still work, we recommend upgrading to version 58+, for a
better WebRTC performance and experience overall.*

SOLUTIONS:

1. Install ffmpeg4.2 from our PPA which contains updated libraries:
<https://launchpad.net/~freedomrobotics/+archive/ubuntu/ppa>
2. Try installing ffmpeg 4.2+ from source code by following steps on this page:
<https://docs.freedomrobotics.ai/docs/legacy-ubuntu#section-a-name-ubuntu-16-x-86-ffmpeg-source-from-sources-a>

```
sudo add-apt-repository ppa:freedomrobotics/ppa
sudo apt-get update
```

I tried #1 but

```
ubuntu@ubuntu:~$ ffmpeg -version
```

says it's still v57:

```
libavdevice 57. 10.100 / 57. 10.100
```

Let's try #2...

But, at the top of the link it says:

"If you are running Ubuntu 18.04 and ROS Melodic, you'll find it comes with all dependencies available preinstalled." [which I am, but apparently they aren't?]
And I've updated at least twice.

Ah, #2 adds the following that #1 did not:

```
apt-get install -y ffmpeg4.2
```

```
ubuntu@ubuntu:~$ apt-get install -y ffmpeg4.2
```

```
E: Could not open lock file /var/lib/dpkg/lock-frontend - open (13: Permission denied)
E: Unable to acquire the dpkg frontend lock (/var/lib/dpkg/lock-frontend), are you root?
```

Try again with sudo...

```
ubuntu@ubuntu:~$ sudo apt-get install -y ffmpeg4.2
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
 libass-dev libfribidi-dev libmp3lame-dev libvorbis-dev libx264-dev
 libx265-dev
Suggested packages:
 libx265-doc
The following NEW packages will be installed:
 ffmpeg4.2 libass-dev libfribidi-dev libmp3lame-dev libvorbis-dev libx264-dev
 libx265-dev
0 upgraded, 7 newly installed, 0 to remove and 127 not upgraded.
Need to get 7790 kB of archives.
After this operation, 24.0 MB of additional disk space will be used.
Get:1 http://ports.ubuntu.com/ubuntu-ports bionic/main arm64 libfribidi-dev arm64
0.19.7-2 [42.5 kB]
Get:2 http://ppa.launchpad.net/freedomrobotics/ppa/ubuntu bionic/main arm64
ffmpeg4.2 arm64 4.2.2-1ubuntu18.04 [6466 kB]
Get:3 http://ports.ubuntu.com/ubuntu-ports bionic/universe arm64 libass-dev arm64
1:0.14.0-1 [86.5 kB]
Get:4 http://ports.ubuntu.com/ubuntu-ports bionic/main arm64 libvorbis-dev arm64
1.3.5-4.2 [307 kB]
Get:5 http://ports.ubuntu.com/ubuntu-ports bionic/universe arm64 libx264-dev arm64
2:0.152.2854+git9a5903-2 [383 kB]
Get:6 http://ports.ubuntu.com/ubuntu-ports bionic/universe arm64 libx265-dev arm64
2.6-3 [365 kB]
Get:7 http://ports.ubuntu.com/ubuntu-ports bionic/main arm64 libmp3lame-dev arm64
3.100-2 [139 kB]
Fetched 7790 kB in 2s (4700 kB/s)
Selecting previously unselected package libfribidi-dev.
(Reading database ... 327169 files and directories currently installed.)
Preparing to unpack .../0-libfribidi-dev_0.19.7-2_arm64.deb ...
Unpacking libfribidi-dev (0.19.7-2) ...
Selecting previously unselected package libass-dev:arm64.
Preparing to unpack .../1-libass-dev_1%3a0.14.0-1_arm64.deb ...
Unpacking libass-dev:arm64 (1:0.14.0-1) ...
Selecting previously unselected package libvorbis-dev:arm64.
Preparing to unpack .../2-libvorbis-dev_1.3.5-4.2_arm64.deb ...
Unpacking libvorbis-dev:arm64 (1.3.5-4.2) ...
Selecting previously unselected package libx264-dev:arm64.
Preparing to unpack .../3-libx264-dev_2%3a0.152.2854+git9a5903-2_arm64.deb ...
Unpacking libx264-dev:arm64 (2:0.152.2854+git9a5903-2) ...
Selecting previously unselected package libx265-dev:arm64.
Preparing to unpack .../4-libx265-dev_2.6-3_arm64.deb ...
Unpacking libx265-dev:arm64 (2.6-3) ...
Selecting previously unselected package libmp3lame-dev:arm64.
```

```
Preparing to unpack .../5-libmp3lame-dev_3.100-2_arm64.deb ...
Unpacking libmp3lame-dev:arm64 (3.100-2) ...
Selecting previously unselected package ffmpeg4.2.
Preparing to unpack .../6-ffmpeg4.2_4.2.2-1ubuntu18.04_arm64.deb ...
Unpacking ffmpeg4.2 (4.2.2-1ubuntu18.04) ...
dpkg: error processing archive
/tmp/apt-dpkg-install-ILsWFb/6-ffmpeg4.2_4.2.2-1ubuntu18.04_arm64.deb (--unpack):
 trying to overwrite '/usr/share/ffmpeg/libvpx-1080p.ffpreset', which is also in package
ffmpeg 7:3.4.8-0ubuntu0.2
Errors were encountered while processing:
/tmp/apt-dpkg-install-ILsWFb/6-ffmpeg4.2_4.2.2-1ubuntu18.04_arm64.deb
E: Sub-process /usr/bin/dpkg returned an error code (1)
```

Sent email to Achille

Google “install usb_cam ros melodic”:

https://www.reddit.com/r/ROS/comments/gvv986/how_do_i_install_the_usb_cam_package_on_a/
said “I tried doing it first using sudo apt install ros-melodic-usb-cam but this doesn’t work on the Raspberry Pi...”

But I thought I’d try anyway as it looked straightforward --

```
ubuntu@ubuntu:~/osr_ws/src$ sudo apt install ros-melodic-usb-cam
installed, no errors
ubuntu@ubuntu:~/osr_ws/src$ ffmpeg -version
still 57.
ubuntu@ubuntu:~$ sudo reboot
Refreshed FR MC app and went to Pilot
Video type: WebRTC, Low FPS.
```

Let’s see if there’s a usb_cam node running
(apparently not. Need to launch it):

```
ubuntu@ubuntu:~$ rostopic list
/cmd_corner
/cmd_drive
/cmd_vel
/cmd_vel_intuitive
/diagnostics
/encoder
/joy
/joy/set_feedback
/move_base/cancel
/rosout
/rosout_agg
/status
/tf
/tf_static
```

Does one exist? Yes:

```
ubuntu@ubuntu:~/osr_ws$ sudo find / -name usb_cam
/opt/ros/melodic/lib/usb_cam
/opt/ros/melodic/share/usb_cam
/opt/ros/melodic/include/usb_cam
```

Email from Achille:

Hi Jim,

Cc'ing our support team on this to help.

I installed it twice (last time 20 minutes ago coincidentally) and it worked fine from the first try so I'm not sure what happened with your setup.

Ffmpeg is different from ffmpeg4.2. The packages are colliding. Try:

""

```
sudo apt-get remove ffmpeg
sudo apt-get install ffmpeg4.2
""
```

And re-run the installer.

Best,
Achille

I did this, confirmed ffmpeg gone and ffmpeg4.2 v58 but FR still gives same error.
Emailed back to Achille.

This site looks promising:

<https://www.programmersought.com/article/2507246579/>

This blog post has encountered a problem and is running separately

rosrun usb_cam usb_cam_node

[ERROR] [1538658769.608520191]: Webcam: expected picture but didn't get it...

```
ubuntu@ubuntu:~$ rosrun usb_cam usb_cam_node
[ INFO] [1611793520.356406295]: using default calibration URL
[ INFO] [1611793520.359880535]: camera calibration URL:
file:///home/ubuntu/.ros/camera_info/head_camera.yaml
[ INFO] [1611793520.360212461]: Unable to open camera calibration file
[/home/ubuntu/.ros/camera_info/head_camera.yaml]
[ WARN] [1611793520.360329480]: Camera calibration file
/home/ubuntu/.ros/camera_info/head_camera.yaml not found.
[ INFO] [1611793520.360561628]: Starting 'head_camera' (/dev/video0) at 640x480 via
mmap (mpeg) at 30 FPS
[ WARN] [1611793520.469909313]: unknown control 'white_balance_temperature_auto'
[ WARN] [1611793520.489486850]: unknown control 'focus_auto'

[mjpeg @ 0xaaab24cd1610] No JPEG data found in image
[ERROR] [1611793521.360970371]: Error while decoding frame.
```

...
^C

[NOTE: following MUST be run from desktop as opens a display window.

Will not work from SSH]

The following is the solution process.

There is a test file `usb_cam-test.launch` in the `usb_cam` package, which runs directly

roslaunch usb_cam usb_cam-test.launch

There is no problem at all. If you open this file, you can create two types of nodes: /usb_cam/usb_cam_node and /image_view/image_view, named usb_cam and image_view. The former is used to "access" the image of the camera, and publish In the /usb_cam/image_raw topic, the latter subscribes to this topic and outputs the image to the screen.

This runs successfully from desktop and displays the webcam!

Running FR w/ `usb_cam` running as above displays camera view & enables pilot!!

Now to do it with OSR running...!

```

ubuntu@ubuntu:~$ sudo find / -name usb_cam-test.launch
/opt/ros/melodic/share/usb_cam/launch/usb_cam-test.launch
ubuntu@ubuntu:~$ cat
/opt/ros/melodic/share/usb_cam/launch/usb_cam-test.launch
<launch>
  <node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >
    <param name="video_device" value="/dev/video0" />
    <param name="image_width" value="640" />
    <param name="image_height" value="480" />
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="usb_cam" />
    <param name="io_method" value="mmap"/>
  </node>
  <node name="image_view" pkg="image_view" type="image_view" respawn="false" output="screen">
    <remap from="image" to="/usb_cam/image_raw"/>
    <param name="autosize" value="true" />
  </node>
</launch>

ubuntu@ubuntu:~$ sudo find / -name osr.launch
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osrBringup/launch/osr.launch
ubuntu@ubuntu:~$ cat
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osrBringup/launch/osr.launch
<launch>
  <rosparam file="$(find osrBringup)/config/osr_params.yaml" />

  <!-- Nodes to run the Open Source Rover -->
  <node name="roboclaw_wrapper" pkg="osr" type="roboclaw_wrapper.py" output="screen">
    <rosparam command="load" file="$(find osrBringup)/config/roboclaw_params.yaml"/>
    <rosparam command="load" file="$(find osrBringup)/config/roboclaw_params_mod.yaml"/>
  </node>
  <node name="joy2twist" pkg="teleop_twist_joy" type="teleop_node">
    <param name="enable_button" value="4"/> <!-- which button to press to enable movement-->
    <param name="enable_turbo_button" value="5"/> <!-- -1: disable turbo -->
    <param name="axis_linear" value="1"/> <!-- which joystick axis to use for driving -->
    <param name="axis_angular" value="3"/> <!-- which joystick axis to use for turning -->
    <param name="scale_linear" value="0.8"/> <!-- scale to apply to drive speed, in m/s:
drive_motor_rpm * 2pi / 60 * wheel radius -->
    <param name="scale_angular" value="1.75"/> <!-- scale to apply to angular speed, in rad/s:
scale_linear / min_radius -->
    <param name="scale_linear_turbo" value="1.78"/> <!-- scale to apply to linear speed, in m/s -->
    <remap from="/cmd_vel" to="/cmd_vel_intuitive"/>
  </node>
  <rosparam command="load" file="$(find osrBringup)/config/physical_properties.yaml"/>
  <rosparam command="load" file="$(find osrBringup)/config/physical_properties_mod.yaml"/>
  <node name="rover" pkg="osr" type="rover.py" output="screen"/>
  <node name="led_screen" pkg="led_screen" type="arduino_comm.py"/>
  <node pkg="joy">
    <type>joy_node</type>
    <name>joy_node</name>
    <param name="autorepeat_rate" value="1.0"/>
    <param name="coalesce_interval" value="0.05"/>
  </node>
</launch>

```

So, I believe I can add the usb_cam launch commands into the osr.launch file?

Turn off auto-launch at bootup:

```
ubuntu@ubuntu:~$ sudo systemctl disable osr_startup.service
```

```
Removed /etc/systemd/system/multi-user.target.wants/osr_startup.service.
```

2021.01.28

[SKIP this paragraph. Picamera fails]

Try for picamera again as I'd like to get the fisheye lens and it's small and easy to mount
Following

<https://raspberrypi.stackexchange.com/questions/111852/ubuntu-19-10-enabling-and-using-raspberry-pi-camera-module-v2-1>

and

<https://mfurkannargul.medium.com/install-ubuntu-18-04-77a003f392f7>

Ubuntu Core is *not* the same as Server

I don't think raspi-config is needed, in fact raspi-config is dropped for Pi4 to be replaced by "something in the works". I'm guessing individual configuration settings until they do. just the start_x=1 and gpu_mem=128 in the config file.

And apparently *not* in the usercfg.txt file. We'll see...

let's try --

```
ubuntu@ubuntu:~$ sudo nano /boot/firmware/config.txt & add --
```

```
start_x=1
```

```
gpu_mem=128
```

Searching the web, I FAIL to find a picamera install for the Pi4 in Ubuntu.

Will stick with the USB camera, but need to find a fisheye.

You can test the webcam from a browser on the Pi at --

<https://webcamtests.com/>

Allow access to webcam, choose the camera if more than one, click test and see the stream. Works.

Let's try modifying the osr.launch file

[Term 1]

```
ubuntu@ubuntu:~$ cd
```

```
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osrBringup/launch/
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ ls
```

```
osr.launch
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ cp osr.launch
```

```
osr.launch-ORIGINAL
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ ls
```

```
osr.launch osr.launch-ORIGINAL
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ nano
```

```
osr.launch
```

[Term 2]

```
ubuntu@ubuntu:~$ cd /opt/ros/melodic/share/usb_cam/launch/
```

```
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ ls
```

```
usb_cam-test.launch
```

```
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ nano usb_cam-test.launch
```

```

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ cat osr.launch
<launch>
  <rosparam file="$(find osr Bringup)/config/osr_params.yaml" />

  <!-- Nodes to run the Open Source Rover -->
  <node name="roboclaw_wrapper" pkg="osr" type="roboclaw_wrapper.py" output="screen">
    <rosparam command="load" file="$(find osr Bringup)/config/roboclaw_params.yaml"/>
    <rosparam command="load" file="$(find osr Bringup)/config/roboclaw_params_mod.yaml"/>
  </node>
  <node name="joy2twist" pkg="teleop_twist_joy" type="teleop_node">
    <param name="enable_button" value="4"/> <!-- which button to press to enable movement-->
    <param name="enable_turbo_button" value="5"/> <!-- -1: disable turbo -->
    <param name="axis_linear" value="1"/> <!-- which joystick axis to use for driving -->
    <param name="axis_angular" value="3"/> <!-- which joystick axis to use for turning -->
    <param name="scale_linear" value="0.8"/> <!-- scale to apply to drive speed, in m/s:
drive_motor_rpm * 2pi / 60 * wheel radius -->
    <param name="scale_angular" value="1.75"/> <!-- scale to apply to angular speed, in rad/s:
scale_linear / min_radius -->
    <param name="scale_linear_turbo" value="1.78"/> <!-- scale to apply to linear speed, in m/s -->
    <remap from="/cmd_vel" to="/cmd_vel_intuitive"/>
  </node>
  <rosparam command="load" file="$(find osr Bringup)/config/physical_properties.yaml"/>
  <rosparam command="load" file="$(find osr Bringup)/config/physical_properties_mod.yaml"/>
  <node name="rover" pkg="osr" type="rover.py" output="screen"/>
  <node name="led_screen" pkg="led_screen" type="arduino_comm.py"/>
  <node pkg="joy"
        type="joy_node" name="joy_node">
    <param name="autorepeat_rate" value="1.0"/>
    <param name="coalesce_interval" value="0.05"/>
  </node>
  <node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >
    <param name="video_device" value="/dev/video0"/>
    <param name="image_width" value="640" />
    <param name="image_height" value="480" />
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="usb_cam" />
    <param name="io_method" value="mmap"/>
  </node>
  <node name="image_view" pkg="image_view" type="image_view" respawn="false" output=$
    <remap from="image" to="/usb_cam/image_raw"/>
    <param name="autosize" value="true" />
  </node>
</launch>
```

```

ubuntu@ubuntu:~$ sudo systemctl stop osr_startup.service
ubuntu@ubuntu:~$ sudo systemctl start osr_startup.service

```

REBOOT

```

ubuntu@ubuntu:~$ rosnode list

```

ERROR: Unable to communicate with master!

STOP, DISABLE osr_startup.service

REBOOT

```

ubuntu@ubuntu:~$ rosrun osr Bringup osr.launch
... logging to
/home/ubuntu/.ros/log/14b5b87e-61d3-11eb-970b-dca632160e50/roslaunch-ubuntu-386
7.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

```

RLEException: Invalid roslaunch XML syntax: not well-formed (invalid token): line 38, column 90

The traceback for the exception was written to the log file

See \$ above. Line got truncated & replaced with '\$'
should finish with output="screen">

Corrected.

[NOTE: the head display is disconnected & removed. Thus the warnings below
Need to comment out that node]

```

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ rosrun
osr Bringup osr.launch
...
```

```

NODES
/
image_view (image_view/image_view)
joy2twist (teleop_twist_joy/teleop_node)
joy_node (joy/joy_node)
led_screen (led_screen/arduino_comm.py)
roboclaw_wrapper (osr/roboclaw_wrapper.py)
rover (osr/rover.py)
usb_cam (usb_cam/usb_cam_node)
```

```

auto-starting new master
process[master]: started with pid [8366]
ROS_MASTER_URI=http://localhost:11311
```

```

setting /run_id to 7058c404-61d4-11eb-970b-dca632160e50
process[rosout-1]: started with pid [8381]
started core service [/rosout]
process[roboclaw_wrapper-2]: started with pid [8385]
process[joy2twist-3]: started with pid [8386]
process[rover-4]: started with pid [8387]
process[led_screen-5]: started with pid [8393]
process[joy_node-6]: started with pid [8398]
process[usb_cam-7]: started with pid [8401]
process[image_view-8]: started with pid [8408]
[ WARN] [1611885065.147959227]: Couldn't set gain on joystick force feedback: Bad file descriptor
[ INFO] [1611885065.817311905]: Initializing nodelet with 4 worker threads.
```

Traceback (most recent call last):

```

File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py", line 7, in <module>
    screen = LedScreen()
File "/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/screen.py", line 26, in __init__
    self.ser = serial.Serial(dev,baud,timeout=1.0)
File "/usr/lib/python2.7/dist-packages/serial/serialutil.py", line 240, in __init__
    self.open()
File "/usr/lib/python2.7/dist-packages/serial/serialposix.py", line 268, in open
    raise SerialException(msg.errno, "could not open port {}: {}".format(self._port, msg))
serial.serialutil.SerialException: [Errno 2] could not open port /dev/ttyUSB0: [Errno 2] No such file or directory: '/dev/ttyUSB0'
[led_screen-5] process has died [pid 8393, exit code 1, cmd
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py __name__:=led_screen
__log:=/home/ubuntu/.ros/log/7058c404-61d4-11eb-970b-dca632160e50/led_screen-5.log].
log file: /home/ubuntu/.ros/log/7058c404-61d4-11eb-970b-dca632160e50/led_screen-5*.log
[ INFO] [1611885067.751985170]: Using transport "raw"
Unable to init server: Could not connect: Connection refused
```

```
(image_raw:8408): Gtk-WARNING **: 19:51:07.843: cannot open display:  
[ INFO] [1611885068.215053175]: using default calibration URL  
[ INFO] [1611885068.239382698]: camera calibration URL: file:///home/ubuntu/.ros/camera_info/head_camera.yaml  
[ INFO] [1611885068.242721622]: Unable to open camera calibration file [/home/ubuntu/.ros/camera_info/head_camera.yaml]  
[ WARN] [1611885068.244169306]: Camera calibration file /home/ubuntu/.ros/camera_info/head_camera.yaml not found.  
[ INFO] [1611885068.245526046]: Starting 'head_camera' (/dev/video0) at 640x480 via mmap (yuyv) at 30 FPS  
[INFO] [1611885068.464533]: Starting the roboclaw wrapper node  
[INFO] [1611885068.473118]: Initializing motor controllers  
[INFO] [1611885068.573555]: Starting the rover node  
[ WARN] [1611885068.577157184]: unknown control 'white_balance_temperature_auto'
```

```
[INFO] [1611885068.600536]: Sucessfully connected to RoboClaw motor controllers  
[ WARN] [1611885068.656632415]: unknown control 'focus_auto'
```

```
[image_view-8] process has died [pid 8408, exit code -11, cmd /opt/ros/melodic/lib/image_view/image_view  
image:=/usb_cam/image_raw __name:=image_view  
__log:=/home/ubuntu/.ros/log/7058c404-61d4-11eb-970b-dca632160e50/image_view-8.log].  
log file: /home/ubuntu/.ros/log/7058c404-61d4-11eb-970b-dca632160e50/image_view-8*.log
```

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup\$ rosrun osr osr.launch

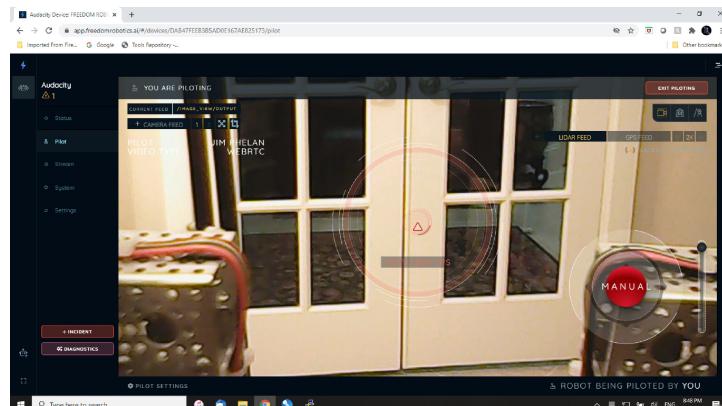
```
...  
[image_view-7] process has died [pid 13744, exit code -7, cmd /opt/ros/melodic/lib/image_view/image_view  
image:=/usb_cam/image_raw __name:=image_view  
__log:=/home/ubuntu/.ros/log/9efd5314-61d5-11eb-970b-dca632160e50/image_view-7.log].  
log file: /home/ubuntu/.ros/log/9efd5314-61d5-11eb-970b-dca632160e50/image_view-7*.log
```

[I think image_view can't be launched in SSH terminal as it can't launch another window]
[Try commenting out image_view]

```
[ERROR] [1611886006.856039544]: Cannot open '/dev/video0': 16, Device or resource busy  
[usb_cam-6] process has died [pid 17826, exit code 1, cmd /opt/ros/melodic/lib/usb_cam/usb_cam_node  
__name:=usb_cam  
__log:=/home/ubuntu/.ros/log/a0b319fe-61d6-11eb-970b-dca632160e50/usb_cam-6.log].  
log file: /home/ubuntu/.ros/log/a0b319fe-61d6-11eb-970b-dca632160e50/usb_cam-6*.log
```

```
[image_view-7] process has died [pid 20247, exit code -11, cmd  
/opt/ros/melodic/lib/image_view/image_view image:=/usb_cam/image_raw __name:=image_view  
__log:=/home/ubuntu/.ros/log/36c98536-61d7-11eb-970b-dca632160e50/image_view-7.log].  
log file: /home/ubuntu/.ros/log/36c98536-61d7-11eb-970b-dca632160e50/image_view-7*.log
```

Try running from Pi desktop instead of SSH:
Yes, that works bringing up a camera display window.
Now try the FR MC dashboard...



Yes! The FPS is low & intermittent. Latency is like to the moon and back. But it works!
Will prob need to decrease the resolution for better throughput.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ cat osr.launch
<launch>
  <rosparam file="$(find osrBringup)/config/osr_params.yaml" />

  <!-- Nodes to run the Open Source Rover -->
  <node name="roboclaw_wrapper" pkg="osr" type="roboclaw_wrapper.py" output="screen">
    <rosparam command="load" file="$(find osrBringup)/config/roboclaw_params.yaml"/>
    <rosparam command="load" file="$(find osrBringup)/config/roboclaw_params_mod.yaml"/>
  </node>
  <node name="joy2twist" pkg="teleop_twist_joy" type="teleop_node">
    <param name="enable_button" value="4"/> <!-- which button to press to enable movement-->
    <param name="enable_turbo_button" value="5"/> <!-- -1: disable turbo -->
    <param name="axis_linear" value="1"/> <!-- which joystick axis to use for driving -->
    <param name="axis_angular" value="3"/> <!-- which joystick axis to use for turning -->
    <param name="scale_linear" value="0.8"/> <!-- scale to apply to drive speed, in m/s:
drive_motor_rpm * 2pi / 60 * wheel radius -->
    <param name="scale_angular" value="1.75"/> <!-- scale to apply to angular speed, in rad/s:
scale_linear / min_radius -->
    <param name="scale_linear_turbo" value="1.78"/> <!-- scale to apply to linear speed, in m/s -->
    <remap from="/cmd_vel" to="/cmd_vel_intuitive"/>
  </node>
  <rosparam command="load" file="$(find osrBringup)/config/physical_properties.yaml"/>
  <rosparam command="load" file="$(find osrBringup)/config/physical_properties_mod.yaml"/>
  <node name="rover" pkg="osr" type="rover.py" output="screen"/>
  <!--node name="led_screen" pkg="led_screen" type="arduino_comm.py"-->
  <node pkg="joy"
    type="joy_node" name="joy_node">
    <param name="autorepeat_rate" value="1.0"/>
    <param name="coalesce_interval" value="0.05"/>
  </node>
  <node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >
    <param name="video_device" value="/dev/video0" />
    <param name="image_width" value="640" />
    <param name="image_height" value="480" />
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="usb_cam" />
    <param name="io_method" value="mmap"/>
  </node>
  <node name="image_view" pkg="image_view" type="image_view" respawn="false" output="screen">
    <remap from="image" to="/usb_cam/image_raw"/>
    <param name="autosize" value="true" />
  </node>
</launch>
```

2021.01.29

Updated the USAI Labs TapaTalk forums to reflect much of current progress.
Still need to detail the installation of the USB camera.

2021.01.30

That's done here:

<https://www.tapatalk.com/groups/usailabs/viewtopic.php?p=137#p137>

[SKIP DOWN TO 2021.01.31 as this was a waste of time]

Try installing VNC onto rover again.

From –

<https://mfurkannargul.medium.com/install-ubuntu-18-04-77a003f392f7>

Install tightvncserver and start it at 720p to initialize the environment for VNC. It'll ask you to create a password to use the VNC session. Set it to be the same as your Raspberry Pi password.

sudo apt update

sudo apt install tightvncserver

tightvncserver -geometry 1280x720

ubuntu@ubuntu:~\$ sudo apt update

128 packages can be upgraded. Run 'apt list --upgradable' to see them.

ubuntu@ubuntu:~\$ sudo apt upgrade Y

ubuntu@ubuntu:~\$ sudo apt autoremove Y

ubuntu@ubuntu:~\$ sudo apt install tightvncserver

installed no issue

ubuntu@ubuntu:~\$ tightvncserver -geometry 1280x720

New 'X' desktop is ubuntu:1

Starting applications specified in /etc/X11/Xvnc-session

Log file is /home/ubuntu/.vnc/ubuntu:1.log

DOES NOT WORK get either “no such host is known” or “connection refused by server”

ubuntu@ubuntu:~\$ sudo apt remove tightvncserver

<https://devanswers.co/install-vnc-ubuntu-18-04-windows-mac-linux/>

sudo apt install xfce4 xfce4-goodies tightvncserver

ubuntu@ubuntu:~\$ sudo apt install xfce4 xfce4-goodies tightvncserver

Reading package lists... Done

Building dependency tree

Reading state information... Done

tightvncserver is already the newest version (1.3.10-0ubuntu4).

xfce4 is already the newest version (4.12.4).

xfce4-goodies is already the newest version (4.12.4).

0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.

```
$ vncserver
```

You will be asked to enter a password. Generate a password 8 chars long, any longer and it will be truncated.

You will also be asked if you want a view-only password where the user can only view and not control the remote server. You can skip this if you don't require it.

```
ubuntu@ubuntu:~$ vncserver
```

New 'ubuntu:2 (ubuntu)' desktop at :2 on machine ubuntu

Starting applications specified in /etc/X11/Xvnc-session

Log file is /home/ubuntu/.vnc/ubuntu:2.log

Use xtigervncviewer -SecurityTypes VncAuth -passwd /home/ubuntu/.vnc/passwd :2 to connect to the VNC server.

```
vncserver: Failed command '/etc/X11/Xvnc-session': 256!
```

```
===== tail -15 /home/ubuntu/.vnc/ubuntu:2.log
```

```
=====
```

```
Killing Xtigervnc process ID 25501... success!
```

```
Xvnc TigerVNC 1.7.0 - built Dec 5 2017 09:25:01
```

```
Copyright (C) 1999-2016 TigerVNC Team and many others (see README.txt)
```

```
See http://www.tigervnc.org for information on TigerVNC.
```

```
Underlying X server release 11905000, The X.Org Foundation
```

```
Sat Jan 30 20:12:33 2021
```

```
vncext: VNC extension running!
```

```
vncext: Listening for VNC connections on local interface(s), port 5902
```

```
vncext: created VNC server for screen 0
```

```
XIO: fatal IO error 11 (Resource temporarily unavailable) on X server ":2"
```

```
    after 175 requests (175 known processed) with 0 events remaining.
```

```
Killing Xtigervnc process ID 1552... which seems to be deadlocked. Using SIGKILL!
```

```
=====
```

```
=====
```

Starting applications specified in /etc/X11/Xvnc-session has failed.

Maybe try something simple first, e.g.,

```
tigervncserver -xstartup /usr/bin/xterm
```

```
ubuntu@ubuntu:~$ tigervncserver -xstartup /usr/bin/xterm
New 'ubuntu:2 (ubuntu)' desktop at :2 on machine ubuntu
Starting applications specified in /usr/bin/xterm
Log file is /home/ubuntu/.vnc/ubuntu:2.log
Use xtigervncviewer -SecurityTypes VncAuth -passwd /home/ubuntu/.vnc/passwd :2 to
connect to the VNC server.
```

Never did it ask me for a password. Since it's now saying ubuntu:2, I think there's already ubuntu:1 running which also doesn't work. Need to kill them all.

```
ubuntu@ubuntu:~$ sudo apt remove xfce4 xfce4-goodies tightvncserver
Now it says ubuntu:3. Removing clearly doesn't work! Reboot to clear its mind.
Turned OFF firewall. Didn't help.
"Connect refused by computer."
```

2021.01.31

Achille's response to my TapaTalk post: [NOTE: look in his melodic-delev branch!] You can always look how I did things. Here's for example my [sensors.launch file](#) <https://www.github.com/Achille/osr-rove ... ors.launch>

It has both the usb and the raspicam but again best to start with the USB if you're newer to this. I created a udev rule that recognizes the camera when it gets plugged in and gives it a static name because /dev/ttUSB0 might be USB1 or other if you have other stuff plugged in. Only do this when you get the camera working properly.

Camera is working properly if there are no errors/warnings and you see that the camera is publishing at a decent frequency (5Hz or more)

His launch sensor.launch codes on next page...

I'm wondering if adding start_x=1 to the config.txt file is opening up the raspicam and slowing down the USB feed? Let's try removing that first & compare.

```
ubuntu@ubuntu:~$ sudo nano /boot/firmware/config.txt          "& # out"
#start_x=1
#gpu_mem=128
ubuntu@ubuntu:~$ sudo reboot
```

Achille's **sensor.launch**

```
<launch>
  <!-- launch the RealSense T265 tracking camera -->
  <!--<include file="$(find realsense2_camera)/launch/rs_t265.launch">
  </include>-->
  <!-- launch the monocular camera -->
  <node name="front_webcam" pkg="usb_cam" type="usb_cam_node" output="screen">
    <param name="video_device" value="/dev/front_webcam" />
    <param name="image_width" value="1280" />
    <param name="image_height" value="720" />
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="front_webcam" />
    <param name="io_method" value="mmap"/>
    <param name="framerate" value="5"/>
    <param name="camera_info_url" value="package://osrBringup/config/front_webcam_1280x720.yaml"/>
    <param name="camera_name" value="front_webcam"/>
  </node>
  <!-- <node name="raspicam" pkg="usb_cam" type="usb_cam_node" output="screen" >
    <param name="video_device" value="/dev/video2" />
    <param name="image_width" value="640" />
    <param name="image_height" value="480" />
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="raspicam" />
    <param name="io_method" value="mmap"/>
    <param name="framerate" value="10"/>
    <param name="camera_info_url" value="package://osrBringup/config/raspicam.yaml"/>
    <param name="camera_name" value="raspicam"/>
  </node> -->
  <!-- tf for head cam -->
  <!-- <node name="tf2_static_pub_base_link_to_raspicam"
    pkg="tf2_ros"
    type="static_transform_publisher"
    args="0.08 0 0.1 0 0 0 1 base_link raspicam">
  </node> -->
  <!-- tf for head cam -->
  <node name="tf2_static_pub_base_link_to_frontwebcam"
    pkg="tf2_ros"
    type="static_transform_publisher"
    args="0.08 0 0.1 0 0 0 1 base_link front_webcam">
  </node>
  <!-- launch the MPU9255 IMU -->
  <include file="$(find MPU9255)/launch/imu.launch">
  </include>
  <!-- launch the SICK TIM561 lidar -->
  <include file="$(find sick_scan)/launch/sick_lms_5xx.launch" ns="lidar">
    <arg name="hostname" value="192.168.4.5"/>
  </include>
  <!-- tf for lidar -->
  <node name="tf2_static_pub_base_link_to_lidar"
    pkg="tf2_ros"
    type="static_transform_publisher"
    args="-0.01 0.01 -0.25 0 0 0 1 base_link cloud">
  </node>
</launch>
```

```
ubuntu@ubuntu:~$ sudo systemctl start osr_startup.service
ubuntu@ubuntu:~$ rostopic list
/cmd_corner
/cmd_drive
/cmd_vel
/cmd_vel_intuitive
/diagnostics
/encoder
/image_view/output
/image_view/parameter_descriptions
/image_view/parameter_updates
/joy
/joy/set_feedback
/rosout
/rosout_agg
/status
/tf
/tf_static
/usb_cam/camera_info
/usb_cam/image_raw
/usb_cam/image_raw/compressed
/usb_cam/image_raw/compressed/parameter_descriptions
/usb_cam/image_raw/compressed/parameter_updates
/usb_cam/image_raw/compressedDepth
/usb_cam/image_raw/compressedDepth/parameter_descriptions
/usb_cam/image_raw/compressedDepth/parameter_updates
/usb_cam/image_raw/theora
/usb_cam/image_raw/theora/parameter_descriptions
/usb_cam/image_raw/theora/parameter_updates
```

```
ubuntu@ubuntu:~$ rostopic hz /usb_cam/image_raw
average rate: 14.348
    min: 0.066s max: 0.075s std dev: 0.00241s window: 14
```

INTERESTING...

I “commented out” the image_view node and now...

```
ubuntu@ubuntu:~$ rostopic list
/cmd_vel_intuitive
/diagnostics
/joy
/joy/set_feedback
/rosout
/rosout_agg
/usb_cam/image_raw/compressedDepth
```

This is FALSE. A repeat rostopic list lists all the rest of the /usb_cam/... topics

ubuntu@ubuntu:~\$ sudo systemctl enable osr_startup.servicerestored image_view node

removed framerate = 5 parameter

REBOOT

USB camera feed to FR dashboard restored.

restored framerate = 5 parameter. Made no difference.

Try changing reso fro 640x480 > 1280x720 [not sure what the res of this camera is!]

Killed the camera view. Guessing webcam is just 640x480.

restored resolution to 640x480. View restored.

According to <https://webcamtests.com/>

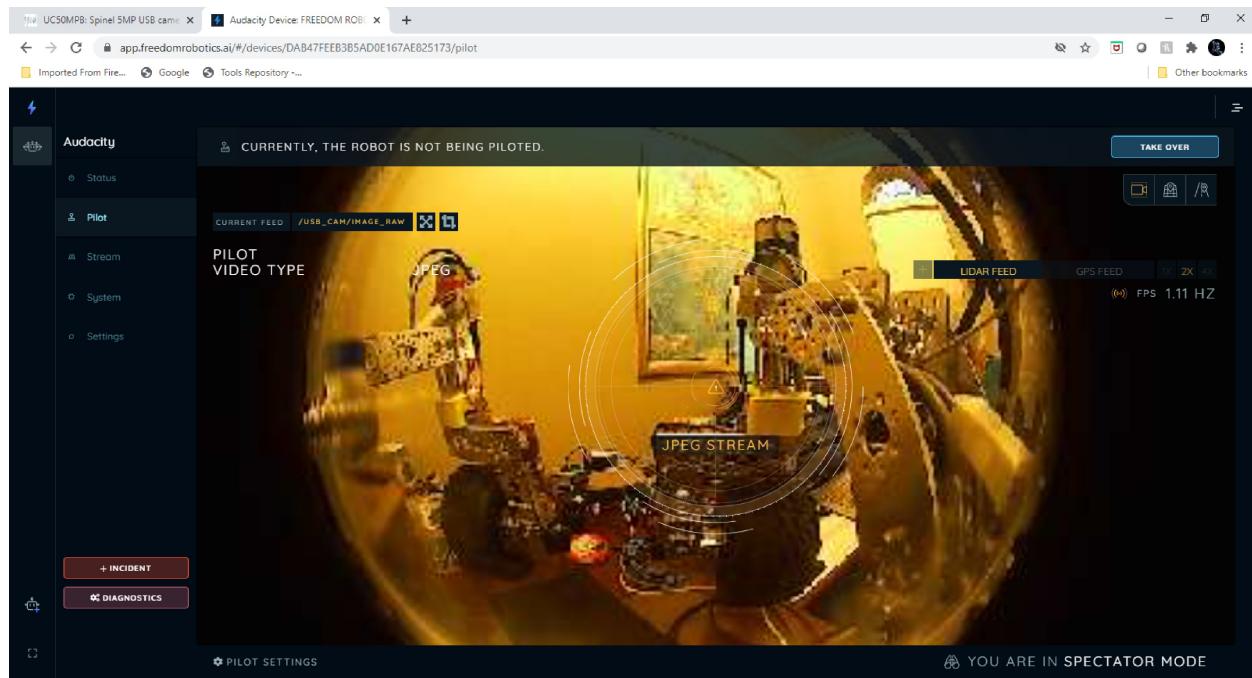
my USB cam res is 640x480.

2021.02.02

https://www.spinelectronics.com/5mp_usb_cameras/UC50MPB

arrived today and works on laptop and rover as is. Tweaking may be indicated.

M2 screws 28mm centers squared. Needs acrylic front panel mount.



2021.02.03

Looked over the rest of Achille's melodic-devel code surrounding the sensor.launch:
<https://github.com/Achille/osr-rover-code/blob/melodic-devel/ROS/osr Bringup/launch/sensors.launch>

I don't see in any of this how multiple .launch files get launched. sensor.launch is not part of osr.launch. Neither is it referenced in the osr.startup files. In the config files the front_webcam_640x480.yaml is mostly camera calibration parameters which I don't have. I did see a camera calibration site somewhere...?

2021.02.05

Try picamera again.

Google "camera_component not initialized
mmal: mmal_component_create_core: could not find component 'vc.ril.camera'
mmal: Failed to create camera component":

<https://raspberrypi.stackexchange.com/questions/83630/failed-to-create-mmal-component-bvc-ril-camera-out-of-memory>

```
ubuntu@ubuntu:~$ vcgencmd get_camera
vcgencmd: command not found
ubuntu@ubuntu:~$ raspistill -o 2021.02.05.jpg
raspistill: command not found
```

Ok, so I must have deleted the raspicam stuff.

ubuntu@ubuntu:~\$ **sudo pip install picamera** The directory '/home/ubuntu/.cache/pip/http' or its parent directory is not owned by the current user and the cache has been disabled. Please check the permissions and owner of that directory. If executing pip with sudo, you may want sudo's -H flag.

The directory '/home/ubuntu/.cache/pip' or its parent directory is not owned by the current user and caching wheels has been disabled. check the permissions and owner of that directory. If executing pip with sudo, you may want sudo's -H flag.

Collecting picamera

 Downloading

<https://files.pythonhosted.org/packages/79/c4/80afe871d82ab1d5c9d8f0c0258228a8a0ed96db07a78ef17e7fba12fda8/picamera-1.13.tar.gz> (143kB)

 100% 153kB 946kB/s

Installing collected packages: picamera

 Running setup.py install for picamera ... done

Successfully installed picamera-1.13

```
ubuntu@ubuntu:~$ sudo pip install -H picamera
```

no such option: -H

```
ubuntu@ubuntu:~$ sudo -H pip install picamera
```

...

Requirement already satisfied: picamera in /usr/local/lib/python2.7/dist-packages

```
ubuntu@ubuntu:~$ raspistill -o 2021.02.05.jpg
```

raspistill: command not found

??

2021.02.11

Need to add these valuable sites to this narrative:

4 good common-sense blogs from an experienced robotics engineer involved in the Open Source Rover project:

<https://www.freedomrobotics.ai/blog/building-the-nasa-jpl-open-source-rover>

<https://www.freedomrobotics.ai/blog/how-to-pick-navigation-sensors-for-autonomous-mobile-robot>

<https://www.freedomrobotics.ai/blog/tuning-odometry-for-wheeled-robots>

<https://www.freedomrobotics.ai/blog/deploying-on-mars-mapping-localization>

Let's try calibrating the odometry from #3 above.

Using the Stream tab in Freedom Robotics' web app, I copied the last drive command I sent to the wheels

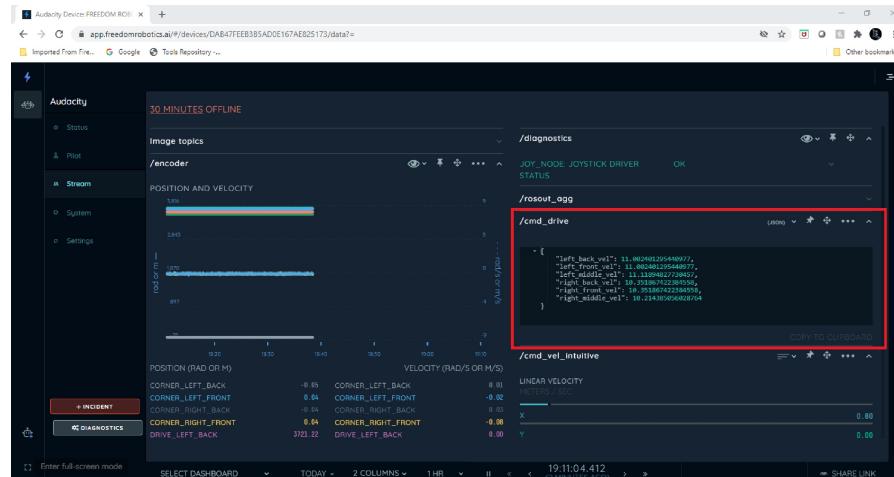
{

```
"left_back_vel": 11.002401295440977,  
"left_front_vel": 11.002401295440977,  
"left_middle_vel": 11.11894827730457,  
"right_back_vel": 10.351867422384558,  
"right_front_vel": 10.351867422384558,  
"right_middle_vel": 10.214385056028764
```

}

Go to Pilot tab / Take Over / Take Over. Using onscreen joystick pilot the rover to max forward speed.

In tab Stream /cmd_drive find & cc to clipboard.



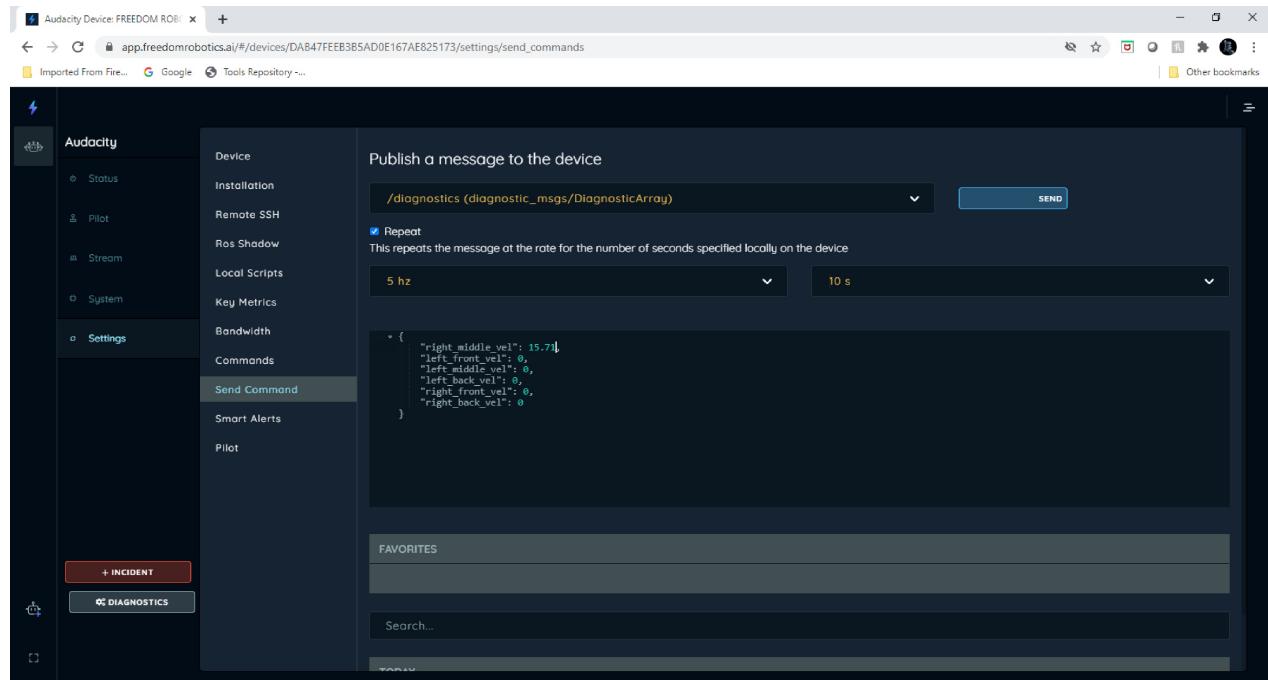
2021.02.12

I then pasted the command and modified it to set one wheel to be spinning at 15.71 rad/s, or 150rpm

This is in the Settings / Send Command tab of the Freedom Robotics Mission Control app. For some strange reason, when it pastes the command, the right_middle_vel moves up to the top!?!? I'll leave it as the right middle is the wheel I have my reflective sticker(s) on.

```
{  
    "right_middle_vel": 15.71,  
    "left_front_vel": 0,  
    "left_middle_vel": 0,  
    "left_back_vel": 0,  
    "right_front_vel": 0,  
    "right_back_vel": 0  
}
```

Check ✓ Repeat and enter 5 hz for 10 s.



Using the Neiko tachometer:

https://www.amazon.com/gp/product/B000I5LDVC/ref=ppx_yo_dt_b_asin_title_o00_s00?ie=UTF8&psc=1

1 reflector	2 reflectors
138.1	277.8
138.3	277.1
138.5	277.7
139.2	277.7
139.3	277.9
138.68 rpm	138.82 rpm

Right Middle: avg = 138.75 rpm

Right Front, 2 reflectors, no friction: 125.65.

With friction: 111.75 rpm

Right Rear, 2 reflectors, no friction: 127.95.

With light friction: 123.45, mod friction: 118.25, firm friction: 112.95

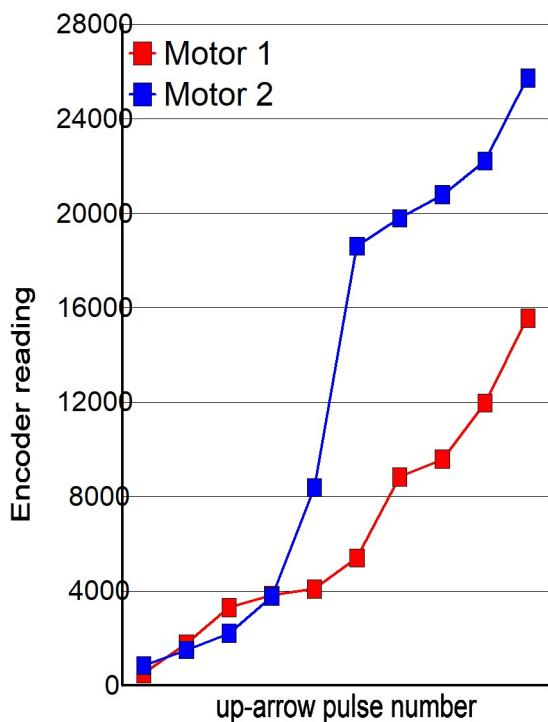
2021.02.13

Pursuing calibration of motors per Achille's blog.

Plugged RoboClaws into Motion Studio.

#128 seems to have forgotten its settings as when I "read settings" nothing appears.

Inching the drive slider up with the up-arrow key only runs the motor for about 1 ½ seconds, then stops in uneven fashion. It shouldn't stop at all but continue at that speed:



So re-Auto-tuned the motors on RC128.

Ah, I seem to recall this bizarre behavior before! It happens when I have the ROS running with the OSR bringup. The ROS commands interfere with the MotionStudio commands. I'll have to stop the OSR with

```
ubuntu@ubuntu:~$ sudo systemctl stop osr_startup.service
```

```
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
```

● osr_startup.service - OSR service

 Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor pres

 Active: inactive (dead) since Sat 2021-02-13 14:35:13 CST; 34s ago

 Process: 1951 ExecStart=/home/ubuntu/LaunchOSR.sh (code=killed, signal=TERM)

 Main PID: 1951 (code=killed, signal=TERM)

Feb 13 14:35:13 ubuntu LaunchOSR.sh[1951]: [joy_node-5] killing on exit

Feb 13 14:35:13 ubuntu LaunchOSR.sh[1951]: [joy2twist-3] killing on exit

Feb 13 14:35:13 ubuntu LaunchOSR.sh[1951]: [rover-4] killing on exit

Feb 13 14:35:13 ubuntu LaunchOSR.sh[1951]: [roboclaw_wrapper-2] killing on exit

Feb 13 14:35:13 ubuntu LaunchOSR.sh[1951]: [rosout-1] killing on exit

Feb 13 14:35:13 ubuntu LaunchOSR.sh[1951]: [master] killing on exit

Feb 13 14:35:13 ubuntu LaunchOSR.sh[1951]: shutting down processing monitor...

Feb 13 14:35:13 ubuntu LaunchOSR.sh[1951]: ... shutting down processing monitor

Feb 13 14:35:13 ubuntu LaunchOSR.sh[1951]: done

Feb 13 14:35:13 ubuntu systemd[1]: Stopped OSR service.

Now, let's try again. Yes, that works!

Autotune all RC/motors to PID settings. Write settings to device. Save settings to files.

(Prev just used PD to avoid steering motor jitter. Will try agin with PID)

Done. Disconnect Rcs.

```
ubuntu@ubuntu:~$ sudo systemctl start osr_startup.service
```

Now the steering motors have Parkinson's tremor that I noticed before when I tuned as PID. Need to go back and tune as PD only. ☺

ReAutotuned all motors as PD. On restarting the rover went into Parkinsonian tremor again as soon as the Xbox controller was activated and the left rear wheel ran amok.

Disconnected the powered USB hub from the laptop and the RC from the hub.

REBOOT

Did NOT fix the problem. ☺

Recalibrate following the OSR documents in case they've changed:

<https://github.com/nasa-jpl/open-source-rover/blob/master/electrical/Calibration.pdf>

It was hard to find during the documentation cleanup going on now.

Prev I'd deferred entering the QPPS manually as Motion Studio does this automatically during autotune. But I'm going to follow the directions. I suspect I'll have to manually tune them given the current problems.

On Xbox enable (Left Button) the left rear motor wants to run in reverse. The corner motors want to turn right. The corner motors straighten out after a few right/left commands but the left rear motor continues to run & the left rear steering motor wants to oscillate. After fiddling with the Molex connector, the misbehavior resolved. Suspect it's a sensor wire that's flaky. Seems like it's the green wire on the motor side of the LR drive motor.

2021.02.14

Having re-calibrated all the motors, I tried the odometry exercise above again.

This time with the /cmd_drive (osr_msg/CommandDrive) command

```
{  
    "left_back_vel": 0,  
    "left_front_vel": 0,  
    "left_middle_vel": 0,  
    "right_back_vel": 0,  
    "right_front_vel": 0,  
    "right_middle_vel": 15.71  
}
```

The tachometer with 2 reflectors on the RM motor read as 308 meaning 154 rpm which is quite close to the 150 rpm expected. With friction it still read 309>154.5 rpm.

LF	153.5	RF	154
LM	154	RM	154
LR	154.3	RR	154

I tried fixing the bits of reflective tape to the tires with a pinch of poster putty, but the putty wanted to leave a residue on the tire. Goo Gone is contraindicated on rubber. So went with a tiny piece of double stick cellophane tape. I increased the duration of the command to 15s to give me time to get around the desk to the back side wheels.

Trying to Pilot with the FR MC dashboard, the latency is horrific! Will give it a try on the ground. Will be interesting to see if WiFi works opposed to Eth0.

2021.02.16

No progress yesterday due to 32hr power outage from near-record arctic cold blast to low teens! On initial boot-up of both laptop & rover I couldn't SSH into either eth0 or wlan0. FR MC dashboard Pilot dropped immediately from 10 FPS to 1 fps w/ latency of 90ms.

Rebooted both. This time both eth0 and wlan0 PuTTYd ok.

Theorized that the unused picamera was putting a burden on the system, I checked /boot/firmware/config.txt and start_x=1 was commented out so that wasn't the reason.

FR MC dash FPS no better but latency down to 10ms.

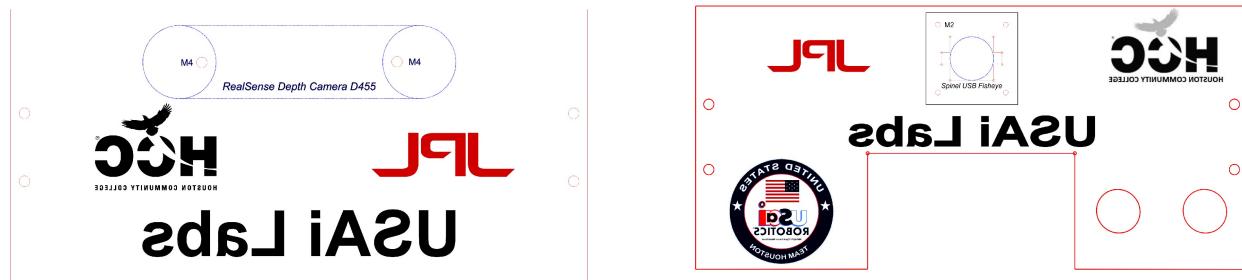
Let's try on the ground battery powered....

Was able to successfully drive from study to living room using FR MC Pilot dashboard and fisheye front camera only!! Seems to loose communication at the end so was Xbox controlled back home.

Spent rest of evening redesigning front and back plates of rover to accommodate front fisheye drive camera plus future Intel RealSense D455 Depth Camera and future rear picamera backup camera.

2021.02.18

Further investigation into the picamera on a raspberry pi 4 using 64 bit Ubuntu 18.04 suggests that it just doesn't work until involved libraries are upgraded. So, the new idea is to drive using just the RealSense camera and use the fisheye USB camera for backup:



Goals:

- 1) get the Spinel USB fisheye camera to work as the drive camera with better fps perhaps by a properly configured .yaml file.
- 2) get the RealSense D455 Depth Camera to work as the drive camera. Then ultimately as a navigation camera.

1) USB camera .yaml config:

https://github.com/Achille/osl-rover-code/blob/melodic-devel/ROS/osl_bringup/launch/serialsors.launch

osr_launch(partial):

```
<!-- launch the monocular camera -->
<node name="front_webcam" pkg="usb_cam" type="usb_cam_node" output="screen">
  <param name="video_device" value="/dev/front_webcam" />
  <param name="image_width" value="1280" />
  <param name="image_height" value="720" />
  <param name="pixel_format" value="yuyv" />
  <param name="camera_frame_id" value="front_webcam" />
  <param name="io_method" value="mmap"/>
  <param name="framerate" value="5"/>
  <param name="camera_info_url"
value="package://osl_bringup/config/front_webcam_1280x720.yaml"/>
  <param name="camera_name" value="front_webcam"/>
</node>
```

front_webcam_1280x720.yaml

```
image_width: 1280
image_height: 720
camera_name: front_webcam
camera_matrix:
  rows: 3
  cols: 3
  data: [928.10624, 0., 632.02395,
         0., 925.59529, 346.96347,
         0., 0., 1.]
camera_model: plumb_bob
distortion_coefficients:
  rows: 1
  cols: 5
  data: [0.095396, -0.148677, -0.003254, -0.001661, 0.000000]
rectification_matrix:
  rows: 3
  cols: 3
  data: [1., 0., 0.,
         0., 1., 0.,
         0., 0., 1.]
projection_matrix:
  rows: 3
  cols: 4
  data: [939.55127, 0., 629.43709, 0.,
         0., 940.83197, 345.02643, 0.,
         0., 0., 1., 0.]
```

While powered down, removed the picamera as unlikely to be useable in the near future. Removed “bop to stop” panic button as the remote fob is more useful and the button would be hard to use in an emergency. Replaced with a large jumper wire on the master PCP. May use the freed up space for a robot arm or LIDAR.

Booted up and all 6 drive motors ran forward w/o any Xbox commands. Pairing the Xbox showed system unresponsive.

```
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
```

all nominal x- at the end:

```
Feb 18 20:20:48 ubuntu LaunchOSR.sh[6370]: * /usb_cam/image_Unable to init server:  
Could not connect: Connection refused  
Feb 18 20:20:48 ubuntu image_view[6835]: cannot open display:  
Feb 18 20:20:50 ubuntu LaunchOSR.sh[6370]: [image_view-7] process has died [pid  
6835, exit code -11, cmd /opt/ros/melodic/lib/image_view/image_  
Feb 18 20:20:50 ubuntu LaunchOSR.sh[6370]: log file:  
/home/ubuntu/.ros/log/0c36acc6-7259-11eb-bff3-dca632160e51/image_view-7*.log  
Feb 18 20:20:50 ubuntu LaunchOSR.sh[6370]: [ WARN] [1613701250.312049892]:  
Camera calibration file /home/ubuntu/.ros/camera_info/head_camera.ya  
Feb 18 20:20:50 ubuntu LaunchOSR.sh[6370]: [ WARN] [1613701250.952712469]:  
unknown control 'focus_auto'
```

```
ubuntu@ubuntu:~$ sudo systemctl stop osr_startup.service
```

```
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
```

confirms dead system

```
ubuntu@ubuntu:~$ sudo systemctl start osr_startup.service
```

```
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
```

all nominal.

Doesn't respond to Xbox. ?!

REBOOT

Usual odd behaviour on enabling the Xbox. Rel by jiggle of LR cable & cycling Xbox controls.

osr-rover-code/init_scripts/LaunchOSR.sh:

```
#!/bin/bash  
bash -c ". /home/$USER/osr_ws/devel/setup.sh"  
bash -c ". /home/$USER/osr_ws/devel/setup.bash"  
bash -c ". /opt/ros/kinetic/setup.sh"           should be melodic??  
bash -c ". /opt/ros/kinetic/setup.bash"  
bash -i -c "roslaunch osr_bringup osr.launch"
```

Added *front_webcam_1280x720.yaml* to system

on FR MC Stream dashboard, changed Image Topics upper right from 4s to 4hz.
Seemed to increase fps but in Pilot mode still ~1fps with latency up to 640ms.

More work to do.

2021.02.20

Checked the continuity of the LR drive motor Molex green wire and found it flaky.
Soldered it with improvement, but see below.

Confused as to why my system is so much slower than Achille's similar system I'm going to his first principles:

<https://github.com/Achille/osl-rover-code/tree/melodic-devel>
ubuntu@ubuntu:~\$ cd ~/osl_ws/src/osl-rover-code/ROS/osl Bringup/config/
ubuntu@ubuntu:~/osl_ws/src/osl-rover-code/ROS/osl Bringup/config\$
rm front_webcam_1280x720.yaml

to get rid of unnecessary .yaml as I want to decr resolution to improve fps.

*You might also want to modify the file
osr-rover-code/ROS/osl Bringup/launch/osr.launch to change the velocities the
gamepad controller will send to the rover. These values in the node joy2twist are of
interest:*

```
<param name="scale_linear" value="0.18"/>  
<param name="scale_angular" value="0.4"/>  
<param name="scale_linear_turbo" value="0.24"/>
```

Changed these parameters back to default as prev I had increased them greatly as the motors were very slow. Discovered this improved with the revised rover code. They became too fast and difficult to drive. Let's see how these settings perform now.

Shutdown.

Ok, much slower. Too slow. Will want to up these params a bit.

Will try

```
"scale_linear" value= 0.18 > 0.24  
"scale_linear_turbo" value= 0.24 > 0.36
```

Will leave

```
"scale_angular" value="0.4"
```

REBOOT

Was faster, but not that much.

```
"scale_linear" value= 0.18 > 0.24 > 0.50  
"scale_linear_turbo" value= 0.24 > 0.36 > 0.75
```

This was a little too fast & corner steering too little.

```
"scale_linear" value= 0.18 > 0.24 > 0.50 > 0.40  
"scale_linear_turbo" value= 0.24 > 0.36 > 0.50  
"scale_angular" value="0.4" > 0.6
```

Basic speed ok, but turbo speed not enough. Corner steering speed ok.

```
"scale_linear" value= 0.18 > 0.24 > 0.50 > 0.40 = 0.40  
"scale_linear_turbo" value= 0.24 > 0.36 > 0.50 > 0.60  
"scale_angular" value="0.4" > 0.6 = 0.60
```

Would like the linear speed and turbo just a little faster. Steering ok.

```
"scale_linear" value= 0.18 > 0.24 > 0.50 > 0.40 = 0.40 > 0.45
"scale_linear_turbo" value= 0.24 > 0.36 > 0.50 > 0.60 > 0.65
"scale_angular" value="0.4" > 0.6 = 0.60
```

```
ubuntu@ubuntu:~$ sudo systemctl stop osr_startup.service
```

```
ubuntu@ubuntu:~$ sudo systemctl start osr_startup.service
```

```
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
```

Now fails to respond to Xbox. REBOOT.

ALSO noted the the LR steering motor is slipping, more in one direction than another. ALSO the LR drive motor wants to run away in reverse, but not forward!?! Could be another sensor wire, but why not both directions? Will check continuity of the yellow wire and the mechanical connections.

2021.02.21

The Molex pins on LR drive motor are flaky. Since I haven't seen any real need to be able to disconnect the motors, I'm just going to solder the connections any time I find a flaky one starting here.

Soldering done. Boot-up. LR drive motor running amok in reverse. Unresponsive to Xbox, unlike others. FR MC dash shows commands to all drive motors 0, but LR drive motor running rapidly. [At least shows usefulness of the FR app.] Behavior started prior to soldering so doubt cause, but lack of response is worse. Need to check this out.

2021.02.22

Removed and disassembled the LR wheel assembly freeing the drive and steering motors from the rover and each other for better access.

2021.02.23

```
ubuntu@ubuntu:~$ sudo systemctl stop osr_startup.service
```

this stopped responsiveness to the Xbox controller and the abnormal LR drive and steering motor behavior. Therefore it's a software issue, possibly in the RoboClaw tuning.

```
ubuntu@ubuntu:~$ sudo systemctl disable osr_startup.service
```

Prevents restarting on reboot.

Next step – examine the RoboClaw configurations on 129 LR drive and 132 LR steering. The LR steering encoder is weird. Should read 0-1400. Can only get it to read 0-900 when spinning free of gear. PWM calibrates min-max 40-400 but then at max the encoder reading starts drifting down w/o it moving!?!? If I invert the encoder in MotionStudio, the range 1790-1990 and drifts downward. I think I've got the encoder cross wired during resolder? Will have to trace from the encoder plug to the RC next session.

2021.02.27

The LR corner steering absolute encoder is defective. Don't know what happened to it but it won't calibrate in MotionStudio. The max value is much lower than the normal (about half and drifts downward as measured suggesting a slow leak of the analog voltage. When tested in situ, the analog out fails to change as the shaft is rotated but tends to drift from input voltage toward zero. It needs to be replaced. ☹ US Digital isn't open on Saturday. Will also need SuperGlue dissolver to get the pinion gear off.

2021.02.28

Pending replacement of the encoded, going to focus on the camera setup going to Achille's setup: <https://github.com/Achille/osr-rover-code/tree/melodic-devel>

Added:

osr-rover-code/ROS/osr Bringup/config/**front_webcam_640x480.yaml**

osr-rover-code/ROS/osr Bringup/config/**front_webcam_1280x720.yaml**

osr-rover-code/ROS/osr Bringup/config/**raspicam.yaml**

osr-rover-code/ROS/osr Bringup/launch/**osr.launch**

Mine:

...

```
<param name="scale_linear" value="0.45"/> <!-- scale to apply to drive speed, in m/s:  
drive_motor_rpm * 2pi / 60 * wheel radius -->
```

```
<param name="scale_angular" value="0.60"/> <!-- scale to apply to angular speed, in  
rad/s: scale_linear / min_radius -->
```

```
<param name="scale_linear_turbo" value="0.65"/> <!-- scale to apply to linear speed, in  
m/s -->
```

Achille:

...

```
<param name="scale_linear" value="0.8"/> <!-- scale to apply to drive speed, in m/s:  
drive_motor_rpm * 2pi / 60 * wheel radius -->
```

```
<param name="scale_angular" value="1.75"/> <!-- scale to apply to angular speed, in  
rad/s: scale_linear / min_radius -->
```

```
<param name="scale_linear_turbo" value="1.78"/> <!-- scale to apply to linear speed, in  
m/s -->
```

```

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ cat osr.launch
<launch>
  <rosparam file="$(find osr Bringup)/config/osr_params.yaml" />

  <!-- Nodes to run the Open Source Rover -->
  <node name="roboclaw_wrapper" pkg="osr" type="roboclaw_wrapper.py" output="screen">
    <rosparam command="load" file="$(find osr Bringup)/config/roboclaw_params.yaml"/>
    <rosparam command="load" file="$(find osr Bringup)/config/roboclaw_params_mod.yaml"/>
  </node>
  <node name="joy2twist" pkg="teleop_twist_joy" type="teleop_node">
    <param name="enable_button" value="4"/> <!-- which button to press to enable movement-->
    <param name="enable_turbo_button" value="5"/> <!-- -1: disable turbo -->
    <param name="axis_linear" value="1"/> <!-- which joystick axis to use for driving -->
    <param name="axis_angular" value="3"/> <!-- which joystick axis to use for turning -->
    <param name="scale_linear" value="0.45"/> <!-- scale to apply to drive speed, in m/s: drive_motor_rpm * 2pi / 60 * wheel
radius -->
    <param name="scale_angular" value="0.60"/> <!-- scale to apply to angular speed, in rad/s: scale_linear / min_radius -->
    <param name="scale_linear_turbo" value="0.65"/> <!-- scale to apply to linear speed, in m/s -->
    <remap from="/cmd_vel" to="/cmd_vel_intuitive"/>
  </node>
  <rosparam command="load" file="$(find osr Bringup)/config/physical_properties.yaml"/>
  <rosparam command="load" file="$(find osr Bringup)/config/physical_properties_mod.yaml"/>
  <node name="rover" pkg="osr" type="rover.py" output="screen"/>
  <!--node name="led_screen" pkg="led_screen" type="arduino_comm.py"-->
  <node pkg="joy"
    type="joy_node" name="joy_node">
    <param name="autorepeat_rate" value="1.0"/>
    <param name="coalesce_interval" value="0.05"/>
  </node>
  <node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >
    <param name="video_device" value="/dev/video0" />
    <param name="image_width" value="640" /> <!--orig = 640-->
    <param name="image_height" value="480" /> <!--orig = 480-->
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="usb_cam" />
    <param name="io_method" value="mmap" />
    <param name="framerate" value="5"/>
    <param name="camera_info_url" value="package://osr Bringup/config/front_webcam_640x460.yaml" />
    <param name="camera_name" value="Spinel fisheye"/>
  </node>
  <node name="image_view" pkg="image_view" type="image_view" respawn="false" output="screen">
    <remap from="image" to="/usb_cam/image_raw"/>
    <param name="autosize" value="true" />
  </node>
</launch>

```

Slack reply from Achille:

I don't remember how I got it to work. I haven't used it in a while, for some reason it wouldn't play nice with a USB camera and I didn't get around to debugging that. It should work fine with Ubuntu 18.04, where did you read that? The internet is full of people claiming all sorts of false stuff :slightly_smiling_face:

I'm not sure why your FPS is so low. Best to reach out to support@freedomrobotics.ai

I'm consistently getting 15 FPS, on both my raspberry pi's (18.04 and 20.04 / ROS2)

My reply:

@Achille Not sure where I read it. Something about certain libraries not being present for the Pi4. There were some reported work-arounds for 32 bit Ubuntu and that the problem "was being worked on".

This was consistent with my repeated failure to get it to work past a still shot and error messages I got.

I'm guessing the reduced frame rate may be related to:

- a) 1280x720 resolution so will try 640x480.
- b) lack of a camera .yaml so using yours. The config may not perfect but should do for now?
- c) something I've completely missed.

How do you bring up the cameras? I don't see them in your osr.bringup and don't see any reference to sensor.bringup in startup.service or anywhere in your melodic-dev branch.

I just cut the front_webcam section from sensor.bringup and pasted it into osr.bringup with appropriate (I hope!) modifications.

I'm now wondering if that could be interfering with the FR MC camera code? Is the "image_view" node part of FR? Some ideas to chew on.

Mechanically, the rover is "in the shop" as the Left Rear absolute encoder seems to have failed. Replacement pending.

@Achille Now I'm seeing TWO melodic-devel branches! One with 6 and one with 3 folders. ?!

```
#!/bin/bash
bash -c ". /home/$USER/osr_ws/devel/setup.sh"
bash -c ". /home/$USER/osr_ws/devel/setup.bash"
bash -c ". /opt/ros/kinetic/setup.sh"
bash -c ". /opt/ros/kinetic/setup.bash"
bash -i -c "roslaunch osr_bringup osr.launch"
```

>> melodic?

```
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
   Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
   Active: activating (auto-restart) (Result: exit-code) since Sun 2021-02-28 21:16:26
             CST; 410ms ago
     Process: 16237 ExecStart=/home/ubuntu/LaunchOSR.sh (code=exited,
               status=203/EXEC)
    Main PID: 16237 (code=exited, status=203/EXEC)
```

2021.03.01

Absolute encoder MA3-A10-125-D ORDERED

Since launch was corrupted copied original osr.launch.

Brought launched osr.

LR drive motor ran off crazy even w/o the Xbox enable. The other motors responded appropriately x- the LR steering encoder was disconnected @ failed.

Have NO IDEA why the LR drive motor is going crazy!

Pulling encoder plug slows motor but doesn't stop it.

- A) encoder mis-wired?
- B) RoboClaw defective?
- C) Software? If so, where?

```
config  
serial_udev_ubuntu1804.rules  
Achille's:  
config: osr-rover-code/config/serial_udev_ubuntu1804.rules  
# make symlinks serial0 and serial1, pointing to the default device names. Grant  
read/write permissions for the devices  
# note: not sure if these actually ought to be tty, but this works.  
KERNEL=="ttyS0", SYMLINK+="serial0" GROUP="tty" MODE="0660"  
KERNEL=="ttyAMA0", SYMLINK+="serial1" GROUP="tty" MODE="0660"
```

Mine:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$  
  cat serial_udev_ubuntu1804.rules  
# make symlinks serial0 and serial1, pointing to the default device names. Grant  
read/write permissions for the devices  
# note: not sure if these actually ought to be tty, but this works.  
KERNEL=="ttyS0", SYMLINK+="serial0" GROUP="tty" MODE="0660"  
KERNEL=="ttyAMA0", SYMLINK+="serial1" GROUP="tty" MODE="0660"
```

OK, they match.

```
init_scripts/
osr_startup.service
Achille's:
[Unit]
Description=OSR service
After=network.target
[Service]
User=ubuntu
Group=ubuntu
WorkingDirectory=/home/ubuntu/
ExecStart=/home/ubuntu/LaunchOSR.sh
ExecReload=/bin/kill -HUP $MAINPID
Restart=always
RestartSec=3
[Install]
WantedBy=multi-user.target
```

Mine:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ cat osr_startup.service
[Unit]
Description=OSR service
After=network.target
[Service]
User=ubuntu
Group=ubuntu
WorkingDirectory=/home/ubuntu/
ExecStart=/home/ubuntu/LaunchOSR.sh
ExecReload=/bin/kill -HUP $MAINPID
Restart=always
RestartSec=3
[Install]
WantedBy=multi-user.target
```

They match.

Achille:

```
osr-rover-code/init_scripts/LaunchOSR.sh
#!/bin/bash
bash -c ". /home/$USER/osr_ws/devel/setup.sh"
bash -c ". /home/$USER/osr_ws/devel/setup.bash"
bash -c ". /opt/ros/kinetic/setup.sh"
bash -c ". /opt/ros/kinetic/setup.bash"
bash -i -c "roslaunch osr Bringup osr.launch"
```

Mine:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ cat LaunchOSR.sh
#!/bin/bash
bash -c ". /home/$USER/osr_ws/devel/setup.sh"
bash -c ". /home/$USER/osr_ws/devel/setup.bash"
bash -c ". /opt/ros/kinetic/setup.sh"
bash -c ". /opt/ros/kinetic/setup.bash"
bash -i -c "roslaunch osr Bringup osr.launch"
```

They match.

Add ROS config scripts to .bashrc

```
ubuntu@ubuntu:~$ cat ~/.bashrc
```

...

```
source /opt/ros/melodic/setup.bash
source ~/osr_ws/devel/setup.bash
```

osr-rover-code/setup/rpi.md

Confirmed steps

osr-rover-code/setup/rover_bringup.md

Confirmed steps

osr-rover-code/ROS/osr/src/rover.py

Achille's and mine the same

osr-rover-code/ROS/osr/src/roboclaw_wrapper.py

Achille's and mine the same

osr-rover-code/ROS/osr/src/roboclaw.py

Achille's and mine the same

CmakeLists.txt

differ considerably but just seem to be housekeeping details.

osr-rover-code/ROS/osr/package.xml

same

2021.03.16

Replacement absolute encoder for the Left Rear steering motor arrived yesterday & replaced.

Left Rear drive motor tuned.

Left Rear steering motor tuned PD.

Behaved shakey at first. Returned PID. Shaking unchanged. Retuned PD. Shaking resolved.

Behaved ok w/ ubuntu@ubuntu:~\$ **roslaunch osr_bringup osr.launch**

```
ubuntu@ubuntu:~$ sudo systemctl enable osr_startup.service
ubuntu@ubuntu:~$ sudo systemctl start osr_startup.service
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
   Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
     Active: activating (auto-restart) (Result: exit-code) since Tue 2021-03-16 19:53:14
              CDT; 2s ago
       Process: 8429 ExecStart=/home/ubuntu/LaunchOSR.sh (code=exited,
status=203/EXEC)
      Main PID: 8429 (code=exited, status=203/EXEC)
```

Something wrong at: /home/ubuntu/LaunchOSR.sh

```
ubuntu@ubuntu:~$ sudo find / -name LaunchOSR.sh
find: '/run/user/1000/gvfs': Permission denied
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch/LaunchOSR.sh
/home/ubuntu/osr_ws/src/osr-rover-code/init_scripts/LaunchOSR.sh
```

```
ubuntu@ubuntu:~$ cat
osr_ws/src/osr-rover-code/ROS/osr_bringup/launch/LaunchOSR.sh
#!/bin/bash
bash -c ". /home/$USER/osr_ws/devel/setup.sh"
bash -c ". /home/$USER/osr_ws/devel/setup.bash"
bash -c ". /opt/ros/melodic/setup.sh"
bash -c ". /opt/ros/melodic/setup.bash"
bash -i -c "roslaunch osr_bringup osr.launch"
```

```
ubuntu@ubuntu:~$ cat osr_ws/src/osr-rover-code/init_scripts/LaunchOSR.sh
#!/bin/bash
bash -c ". /home/$USER/osr_ws/devel/setup.sh"
bash -c ". /home/$USER/osr_ws/devel/setup.bash"
bash -c ". /opt/ros/melodic/setup.sh"
bash -c ". /opt/ros/melodic/setup.bash"
bash -i -c "roslaunch osr_bringup osr.launch"
```

2021.03.17

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS  
git log  
    q to exit  
git status  
git diff  
git stash  
git config --global user.email "your@email"  
git config --global user.name "Your Name"  
git stash
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS$ git pull  
remote: Enumerating objects: 45, done.  
remote: Counting objects: 100% (45/45), done.  
remote: Compressing objects: 100% (26/26), done.  
remote: Total 45 (delta 22), reused 38 (delta 18), pack-reused 0  
Unpacking objects: 100% (45/45), done.  
From https://github.com/nasa-jpl/osr-rover-code  
  63572d1..e75ec28 master      -> origin/master  
* [new branch]   foxy-devel  -> origin/foxy-devel  
* [new branch]   melodic-devel -> origin/melodic-devel  
Updating 63572d1..e75ec28  
Fast-forward  
.gitignore          | 2 ++  
ROS/osr/src/roboclaw_wrapper.py | 44  
+++++-----  
ROS/osr Bringup/launch/.gitignore | 1 +  
init_scripts/LaunchOSR.sh     | 6 -----  
init_scripts/launch_osr.sh    | 21 ++++++-----  
init_scripts/osr_paths.sh    | 3 +++  
init_scripts/osr_startup.service | 2 +-  
setup/rover_bringup.md       | 15 ++++++-----  
8 files changed, 73 insertions(+), 21 deletions(-)  
create mode 100644 ROS/osr_Bringup/launch/.gitignore  
delete mode 100644 init_scripts/LaunchOSR.sh  
create mode 100755 init_scripts/launch_osr.sh  
create mode 100644 init_scripts/osr_paths.sh
```

```
ubuntu@ubuntu:~/osr_ws/src$ roslaunch osr Bringup osr.launch
launches normally x- for no LED screen (not installed).
Steering motors jiggle until run through few commands of right/left, fwd/rev, then settle.
^C
```

```
ubuntu@ubuntu:~$ sudo find -name LaunchOSR.sh
./osr_ws/src/osr-rover-code/ROS/osr_Bringup/launch/LaunchOSR.sh
```

only 1 location now, not two.

```
ubuntu@ubuntu:~/osr_ws/src$ cat
~/osr_ws/src/osr-rover-code/ROS/osr_Bringup/launch/LaunchOSR.sh
#!/bin/bash
bash -c ". /home/$USER/osr_ws/devel/setup.sh"
bash -c ". /home/$USER/osr_ws/devel/setup.bash"
bash -c ". /opt/ros/melodic/setup.sh"
bash -c ". /opt/ros/melodic/setup.bash"
bash -i -c "roslaunch osr_Bringup osr.launch"

bash -c ". /opt/ros/melodic/setup.bash"
>>
bash -c ". /opt/ros/melodic/setup.bash"
```

```
ubuntu@ubuntu:~/osr_ws/src$ sudo systemctl restart osr_startup.service
```

Didn't fix problem.

2021.03.18

Achille 9:52 PM

Hey Jim. We'll need the actual error to see why the startup service is shutting down. status just shows you the status, not the error. As in the readme, use

journalctl -u osr_startup.service -b -e

Formatting tip: When adding multiple lines of code in Slack or Github, use the triple back tick (``) to make it a bit more readable (like the line above)

```
ubuntu@ubuntu:~$ journalctl -u osr_startup.service -b -e
Mar 18 15:49:39 ubuntu systemd[10310]: osr_startup.service: Failed at step EXEC
spawning /home/ubuntu/LaunchOSR.sh: No such file or directory
Mar 18 15:49:39 ubuntu systemd[1]: osr_startup.service: Main process exited,
code=exited, status=203/EXEC
Mar 18 15:49:39 ubuntu systemd[1]: osr_startup.service: Failed with result 'exit-code'.
Mar 18 15:49:42 ubuntu systemd[1]: osr_startup.service: Service hold-off time over,
scheduling restart.
Mar 18 15:49:42 ubuntu systemd[1]: osr_startup.service: Scheduled restart job, restart
counter is at 21641.
Mar 18 15:49:42 ubuntu systemd[1]: Stopped OSR service.
Mar 18 15:49:42 ubuntu systemd[1]: Started OSR service.
```

```
ubuntu@ubuntu:~$ sudo find / -name osr_startup.service
find: '/proc/14574': No such file or directory
find: '/proc/14576': No such file or directory
find: '/run/user/1000/gvfs': Permission denied
/etc/systemd/osr_startup.service
/etc/systemd/system/osr_startup.service
/etc/systemd/system/multi-user.target.wants/osr_startup.service
/home/ubuntu/osr_ws/src/osr-rover-code/init_scripts/osr_startup.service
```

```
ubuntu@ubuntu:~$ cat
/home/ubuntu/osr_ws/src/osr-rover-code/init_scripts/osr_startup.service
[Unit]
Description=OSR service
After=network.target
[Service]
User=ubuntu
Group=ubuntu
WorkingDirectory=/home/ubuntu/
ExecStart=/home/ubuntu/launch_osr.sh
ExecReload=/bin/kill -HUP $MAINPID
Restart=always
RestartSec=3
[Install]
WantedBy=multi-user.target
```

Digging into the latest instructions:

<https://github.com/nasa-jpl/osr-rover-code/blob/master/setup/rover Bringup.md>

2 Custom osr_mod.launch file

If you want to customize your osr.launch file, make a copy of it in the same directory (osr-rover-code/ROS/osr_bringup/launch/) and name it osr_mod.launch. The OSR launch script will automatically find it.

This is useful, for example, when you don't have the LED screen. In that case you would just remove the <node name="led_screen" pkg="led_screen" type="arduino_comm.py"/> line in osr_mod.launch.

3 Automatic bringup with launch script

Starting scripts on boot using ROS can be a little more difficult than starting scripts on boot normally from the Raspberry Pi because of the default permission settings on the RPi and the fact that that ROS cannot be ran as the root user. The way that we will starting our rover code automatically on boot is to create a service that starts our roslaunch script, and then automatically run that service on boot of the robot. Further information on system service scripts running at boot.

There are two scripts in the "init_scripts" folder. The first is the bash file that runs the roslaunch file, and the other creates a system service to start that bash script. Open up a terminal on the raspberry Pi and execute the following commands.

```
cd ~/osr_ws/src/osr-rover-code/init_scripts
# use symbolic links so we capture updates to these files in the service
ln -s $(pwd)/launch_osr.sh ~/launch_osr.sh
ln -s $(pwd)/osr_paths.sh ~/osr_paths.sh
sudo cp osr_startup.service /etc/systemd/system/osr_startup.service
sudo chmod 644 /etc/systemd/system/osr_startup.service
```

So let's try these direction (seem different than prev):

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code/init_scripts
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s $(pwd)/launch_osr.sh
~/launch_osr.sh
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s $(pwd)/osr_paths.sh
~/osr_paths.sh
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ ls      [just to see...]
CATKIN_IGNORE launch_osr.sh osr_paths.sh osr_startup.service
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ sudo cp osr_startup.service
/etc/systemd/system/osr_startup.service
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ sudo chmod 644
/etc/systemd/system/osr_startup.service
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ sudo systemctl enable  
osr_startup.service
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ sudo systemctl start  
osr_startup.service
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ sudo systemctl status  
osr_startup.service
```

- osr_startup.service - OSR service

```
  Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
```

```
  Active: active (running) since Thu 2021-03-18 16:41:11 CDT; 16s ago
```

```
    Main PID: 1255 (launch_osr.sh)
```

```
      Tasks: 47 (limit: 4438)
```

```
     CGroup: /system.slice/osr_startup.service
```

```
         └─1255 /bin/bash /home/ubuntu/launch_osr.sh
```

```
          ├─1343 /usr/bin/python /opt/ros/melodic/bin/roslaunch osr Bringup osr.launch
```

```
          ├─1427 /usr/bin/python /opt/ros/melodic/bin/rosmaster --core -p 11311 -w 3
```

```
          __log:=/home/ubuntu/.ros/log/a97d6ddc-8832-11eb-9df6-dca6
```

```
          ├─1460 /opt/ros/melodic/lib/roscout/roscout __name:=roscout
```

```
          __log:=/home/ubuntu/.ros/log/a97d6ddc-8832-11eb-9df6-dca632160e50/roscout-1.
```

```
          ├─1471 python /home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py
```

```
          __name:=roboclaw_wrapper __log:=/home/ubuntu/.r
```

```
          ├─1478 /opt/ros/melodic/lib/teleop_twist_joy/teleop_node /cmd_vel:=/cmd_vel_intuitive
```

```
          __name:=joy2twist __log:=/home/ubuntu/.ros/log
```

```
          ├─1479 python /home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/rover.py __name:=rover
```

```
          __log:=/home/ubuntu/.ros/log/a97d6ddc-8832-1
```

```
          └─1486 /opt/ros/melodic/lib/joy/joy_node __name:=joy_node
```

```
          __log:=/home/ubuntu/.ros/log/a97d6ddc-8832-11eb-9df6-dca632160e50/joy_node
```

```
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: screen = LedScreen()
```

```
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: File
```

```
"/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/screen.py", line 26, in __init__
```

```
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: self.ser = serial.Serial(dev,baud,timeout=1.0)
```

```
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: File "/usr/lib/python2.7/dist-packages/serial/serialutil.py",  
line 240, in __init__
```

```
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: self.open()
```

```
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: File "/usr/lib/python2.7/dist-packages/serial/serialposix.py",  
line 268, in open
```

```
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: raise SerialException(msg errno, "could not open port {}:  
{}".format(self._port, msg))
```

```
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: serial.serialutil.SerialException: [Errno 2] could not open port  
/dev/ttyUSB0: [Errno 2] No such file or directory
```

```
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: [led_screen-5] process has died [pid 1485, exit code 1, cmd  
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/screen.py]
```

```
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: log file:
```

```
/home/ubuntu/.ros/log/a97d6ddc-8832-11eb-9df6-dca632160e50/led_screen-5*.log
```

```

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ journalctl -u
osr_startup.service -b -e
... [normal stuff]
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]:   File
"/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/arduino_comm.py", line
7, in <mod>
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]:     screen = LedScreen()
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]:   File
"/home/ubuntu/osr_ws/src/osr-rover-code/ROS/led_screen/src/screen.py", line 26, in
__init__
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]:     self.ser =
serial.Serial(dev,baud,timeout=1.0)
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]:   File
"/usr/lib/python2.7/dist-packages/serial/serialutil.py", line 240, in __init__
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]:     self.open()
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]:   File
"/usr/lib/python2.7/dist-packages/serial/serialposix.py", line 268, in open
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]:     raise SerialException(msg.errno, "could
not open port {}: {}".format(self._port, msg))
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: serial.serialutil.SerialException: [Errno 2]
could not open port /dev/ttyUSB0: [Errno 2] No such file or directory
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: [led_screen-5] process has died [pid
1485, exit code 1, cmd /home/ubuntu/osr_ws/src/osr-rover-code/
Mar 18 16:41:19 ubuntu launch_osr.sh[1255]: log file:
/home/ubuntu/.ros/log/a97d6ddc-8832-11eb-9df6-dca632160e50/led_screen-5*.log
[this is because LED screen is not installed]
```

Battery powered house / yard run – too fast & too dramatic steering. Need to modify the launch files.

```

<param name="scale_linear" value="0.60"/> <!-- scale to apply to drive speed,
in m/s: drive_motor_rpm * 2pi / 60 * wheel radius -$>
    <param name="scale_angular" value="0.75"/> <!-- scale to apply to angular
speed, in rad/s: scale_linear / min_radius -->
        <param name="scale_linear_turbo" value="1.00"/> <!-- scale to apply to linear
speed, in m/s -->
```

The Right Rear steering motor is not responding. Wire jiggling didn't help.

Doesn't respond to MotionStudio.

Shutdown.

Need to check the continuity of the Right Rear Steering cable. Appears OK.

2021.03.19

Cable tested ok. MotionStudio check ok. Bringing up Xbox performs ok /p initialization exercise.

Let's try Freedom Robotics Mission Control dashboard.

"There are no currently uploading video topics, are you sure you want to connect to pilot the device?"

2021.03.20

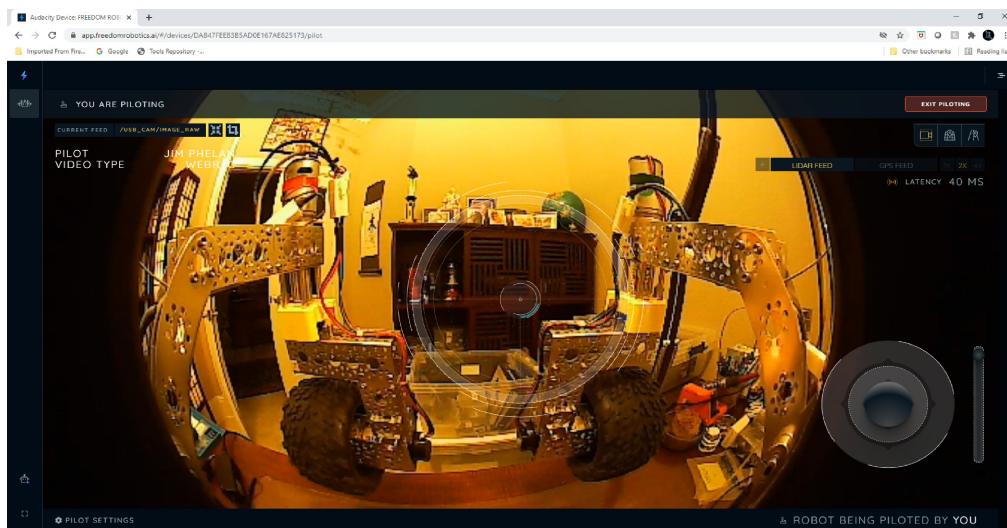
Rewired the red illuminated power button back in as I briefly left the fob in the other room and wanted to be able to power down the rover w/o it.

Added this node:

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ nano  
osr_mod.launch
```

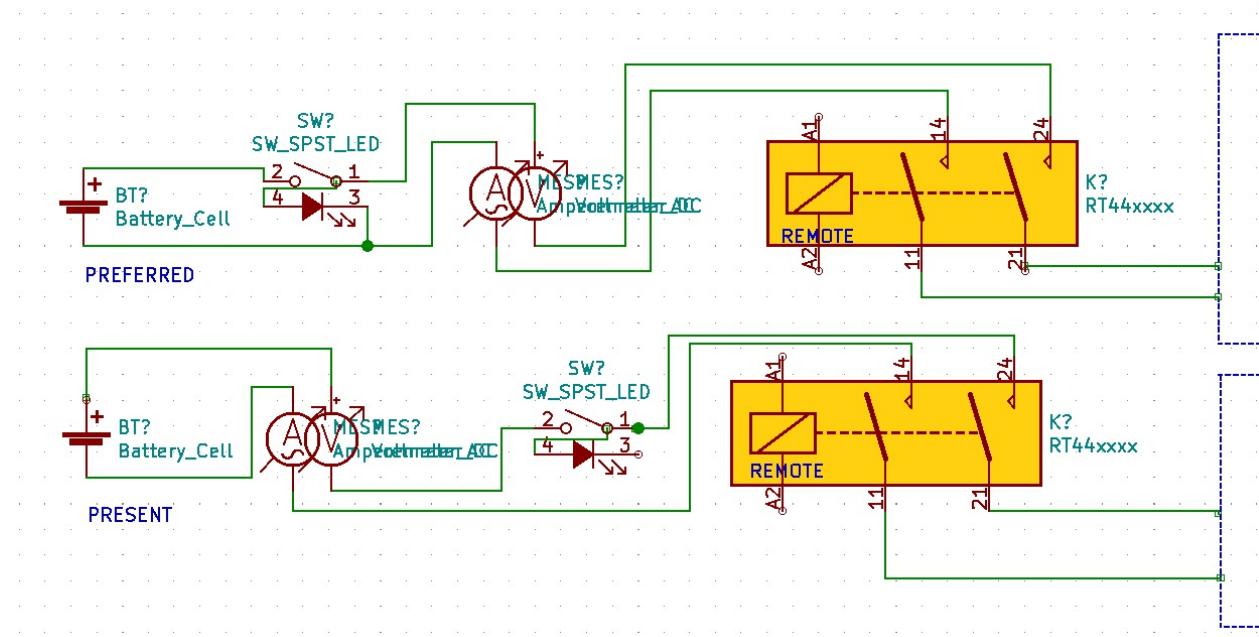
```
</node>  
<node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >  
  <param name="video_device" value="/dev/video0" />  
  <param name="image_width" value="640" />  <!--orig = 640-->  
  <param name="image_height" value="480" />  <!--orig = 480-->  
  <param name="pixel_format" value="yuyv" />  
  <param name="camera_frame_id" value="usb_cam" />  
  <param name="io_method" value="mmap" />  
  <param name="framerate" value="5"/>  
  <param name="camera_info_url"  
value="package://osr Bringup/config/front_webcam_640x460.yaml" />  
  <param name="camera_name" value="Spinel fisheye"/>  
</node>
```

FR MC dash now works but up to 70ms latency.



2021.03.21

Download Fritzing to show power hookup. Useless - no parts for what I need.
Changed to KiCAD. More awkward to use but has the parts.



Rebooted computer as very slow. Improved but FR MC pilot view still long latency up to 780ms.

Left Front drive motor sometimes flaky. Responded to Molex jiggle. May have to direct rewire one day.

Learn more about Freedom Robotics Mission Control app via tutorials:

<https://docs.freedomrobotics.ai/docs/install>

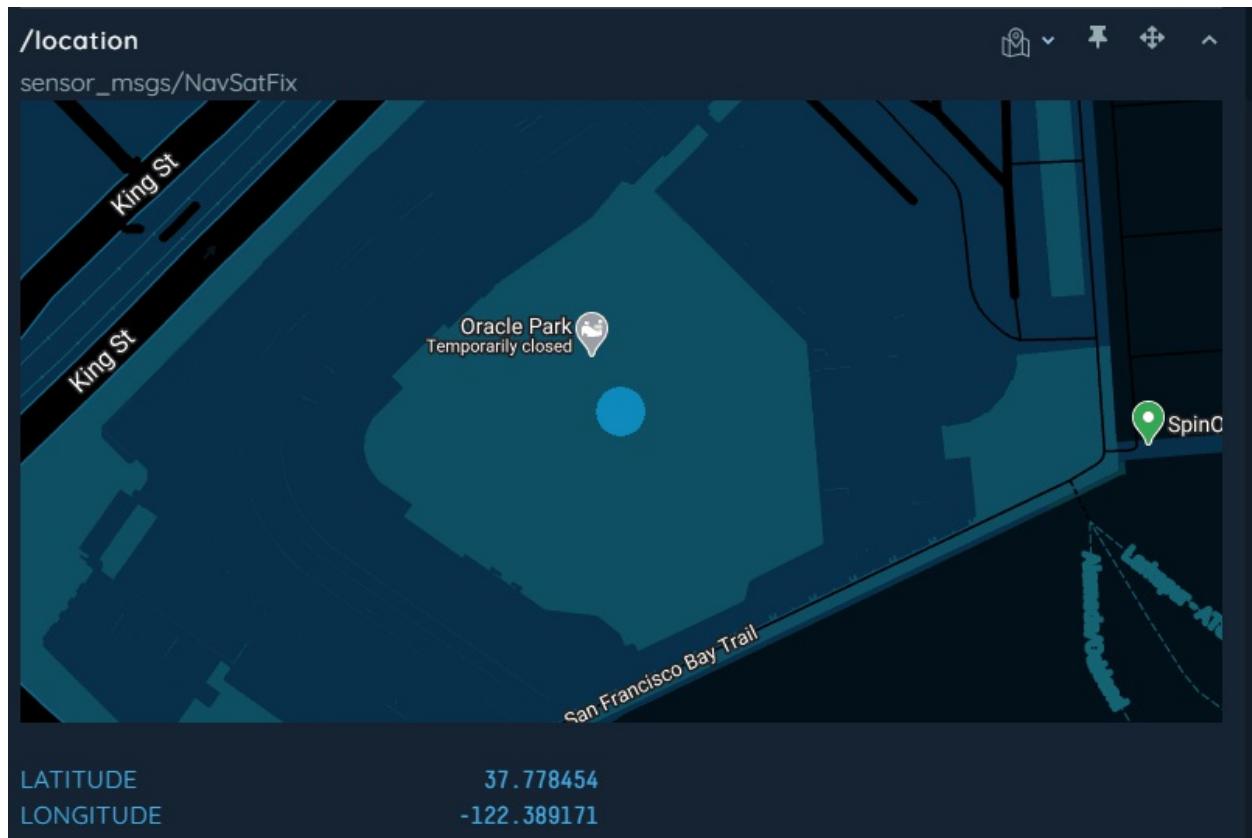
and start with python:

<https://docs.freedomrobotics.ai/docs/connect-with-python>

Send a message

```
ubuntu@ubuntu:~$ mkdir freedom_robots
ubuntu@ubuntu:~$ cd freedom_robots/
ubuntu@ubuntu:~/freedom_robots$ touch robot.py
ubuntu@ubuntu:~/freedom_robots$ nano robot.py
    from freedomrobotics.link import Link
    # Connect to the cloud with Link
    # you can instantiate multiple Link objects by using different names (core,
    my_node1)
    freedom = Link("core")
    # Send your GPS position
    freedom.message("/location", \
        "sensor_msgs/NavSatFix", \
        {"latitude": 37.778454,"longitude": -122.389171})
```

```
ubuntu@ubuntu:~/freedom_robots$ python robot.py
[LINK] [17538] [INFO ]
[LINK] [17538] [INFO ]
#####
[LINK] [17538] [INFO ] Freedom Robotics Device Link Python Package
[LINK] [17538] [INFO ] Copyright Freedom Robotics, Inc (c) 2020 - All Rights Reserved
[LINK] [17538] [INFO ]
#####
[LINK] [17538] [INFO ]
[LINK] [17538] [INFO ]
[LINK] [17538] [INFO ] [FREEDOM] NEW SESSION INITIATED
[LINK] [17538] [INFO ] Increased open file descriptors limit to 100000
[LINK] [17538] [INFO ] [FREEDOM] Link `core` initialization complete.
[LINK] [17538] [INFO ] [FREEDOM] All data synchronized.
```



Sweet!!

Receive a message

```
ubuntu@ubuntu:~/freedom_robots$ touch callback.py  
ubuntu@ubuntu:~/freedom_robots$ nano callback.py
```

```
from time import sleep  
from freedomrobotics.link import Link  
  
keep_alive = True  
  
# Create a callback to handle remote messages  
def callback(msg):  
    global keep_alive  
    freedom.log("info", "I heard " + str(msg) )  
    if msg["topic"] == "/commands":  
        if msg["message"]["data"] == "mission":  
            freedom.log("info", "Running mission...")  
        elif msg["message"]["data"] == "shutdown":  
            freedom.log("info", "Shutting down...")  
            keep_alive = False  
  
# Connect to the cloud with Link  
freedom = Link(name="Core", command_callback=callback)  
  
# Run until told to shut down  
while keep_alive:  
    sleep(1)
```

```
ubuntu@ubuntu:~/freedom_robots$ python callback.py
```

**Directions unclear, doesn't work, no token created.
Unclear what “file” to populate w/ token and secret.**

TOKEN: TE0386C9980D6F91CE552DB57

SECRET: S6156d0fadfaf0e41fb67ce60

URL: <https://api.freedomrobotics.ai>

Here are your token and secret. This is the only time your secret will be available so please record it.

TOKEN: T2F754C935A04EA3B0583E153

SECRET: Sbbd8cc5cb9b964394b4e049b

URL: <https://api.freedomrobotics.ai>

Documentation edit suggestions and chat send. They'll be back tomorrow.

2021.03.23

Freedom Robotics dashboard.

Upper right 3 horiz line menu

Settings

Tokens

Custom

ADD TOKEN

Check all PUT boxes

Check JIM Phelan's account

Check ALL DEVICES SPECIFIED ACCOUNTS

Pulldown DEVICE

DESCRIPTION "callback test"

CREATE

Token was successfully created

Here are your token and secret. This is the only time your secret will be available so please record it.

TOKEN: T816D24A49912172ED6B398A2

SECRET: Sac649be172d91bcc1248681e

URL: <https://api.freedomrobotics.ai>

"Create a file on your machine called test.sh."

Which machine? Robot? Laptop?

ubuntu@ubuntu:~/freedom_robots\$ **touch test.sh**

ubuntu@ubuntu:~/freedom_robots\$ **nano test.sh**

```
TOKEN="MY_TOKEN"
SECRET="MY_SECRET"
ACCOUNT="MY_ACCOUNT"
DEVICE="MY_DEVICE"
HEADERS="-H content-type:application/json -H mc_token:$TOKEN -H
mc_secret:$SECRET"
DATA='[{
    "platform": "custom",
    "utc_time": `date +%s`,
    "topic": "/commands",
    "type": "std_msgs/String",
    "expiration_secs": 60,
    "message": {"data": "mission"}
}]'
```

curl -v \$HEADERS -d "\$DATA" -X PUT

"[https://api.freedomrobotics.ai/accounts/\\$ACCOUNT/devices/\\$DEVICE/commands](https://api.freedomrobotics.ai/accounts/$ACCOUNT/devices/$DEVICE/commands)"

```
ubuntu@ubuntu:~/freedom_robots$ python callback.py
[LINK ] [25749] [INFO ]
[LINK ] [25749] [INFO ]
#####
[LINK ] [25749] [INFO ] Freedom Robotics Device Link Python Package
[LINK ] [25749] [INFO ] Copyright Freedom Robotics, Inc (c) 2020 - All Rights Reserved
[LINK ] [25749] [INFO ]
#####
[LINK ] [25749] [INFO ]
[LINK ] [25749] [INFO ]
[LINK ] [25749] [INFO ] [FREEDOM] NEW SESSION INITIATED
[LINK ] [25749] [INFO ] Increased open file descriptors limit to 100000
[LINK ] [25749] [INFO ] [FREEDOM] Link `Core` initialization complete.
```

ubuntu@ubuntu:~\$ **bash test.sh** (in separate PuTTY window)

```
ubuntu@ubuntu:~/freedom_robots$ bash test.sh
* Trying 13.226.178.48...
* TCP_NODELAY set
* Connected to api.freedomrobotics.ai (13.226.178.48) port 443 (#0)
* ALPN, offering h2
* ALPN, offering http/1.1
* successfully set certificate verify locations:
*   CAfile: /etc/ssl/certs/ca-certificates.crt
  CApth: /etc/ssl/certs
* TLSv1.3 (OUT), TLS handshake, Client hello (1):
* TLSv1.3 (IN), TLS handshake, Server hello (2):
* TLSv1.3 (IN), TLS Unknown, Certificate Status (22):
* TLSv1.3 (IN), TLS handshake, Unknown (8):
* TLSv1.3 (IN), TLS Unknown, Certificate Status (22):
* TLSv1.3 (IN), TLS handshake, Certificate (11):
* TLSv1.3 (IN), TLS Unknown, Certificate Status (22):
* TLSv1.3 (IN), TLS handshake, CERT verify (15):
* TLSv1.3 (IN), TLS Unknown, Certificate Status (22):
* TLSv1.3 (IN), TLS handshake, Finished (20):
* TLSv1.3 (OUT), TLS change cipher, Client hello (1):
* TLSv1.3 (OUT), TLS Unknown, Certificate Status (22):
* TLSv1.3 (OUT), TLS handshake, Finished (20):
* SSL connection using TLSv1.3 / TLS_AES_128_GCM_SHA256
* ALPN, server accepted to use h2
* Server certificate:
*   subject: CN=api.freedomrobotics.ai
*   start date: Mar 6 00:00:00 2021 GMT
*   expire date: Apr 4 23:59:59 2022 GMT
*   subjectAltName: host "api.freedomrobotics.ai" matched cert's "api.freedomrobo
                  tics.ai"
*   issuer: C=US; O=Amazon; OU=Server CA 1B; CN=Amazon
*   SSL certificate verify ok.
* Using HTTP2, server supports multi-use
* Connection state changed (HTTP/2 confirmed)
* Copying HTTP/2 data in stream buffer to connection buffer after upgrade: len=0
* TLSv1.3 (OUT), TLS Unknown, Unknown (23):
* TLSv1.3 (OUT), TLS Unknown, Unknown (23):
```

```

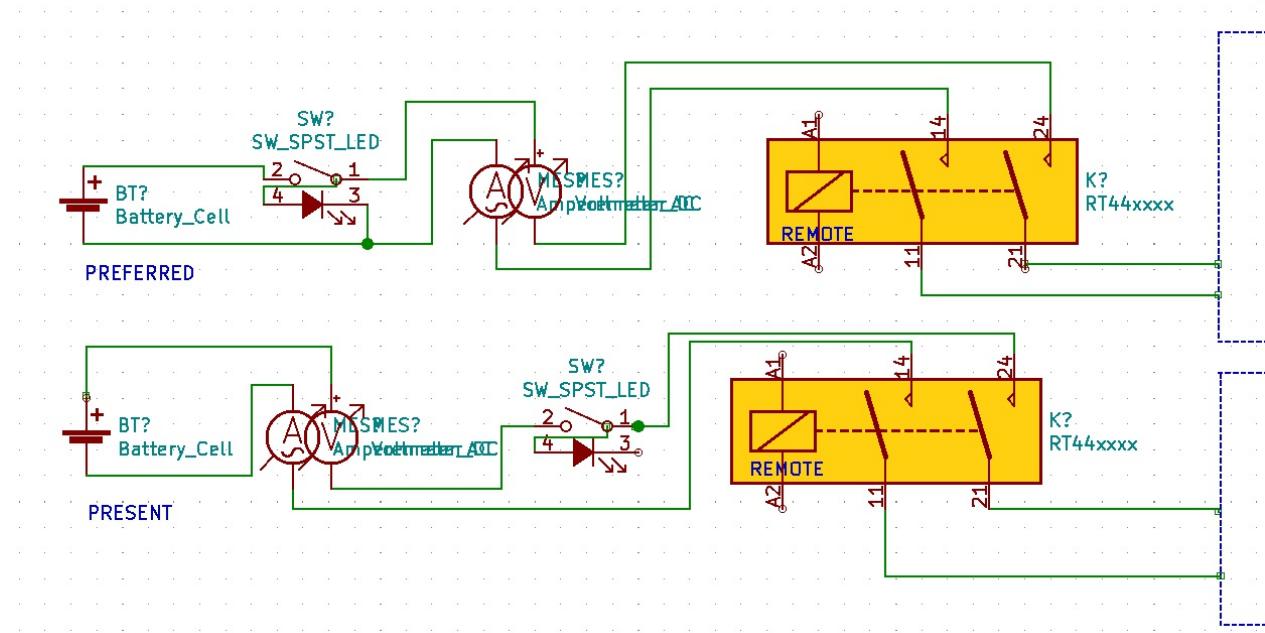
* TLSv1.3 (OUT), TLS Unknown, Unknown (23):
* Using Stream ID: 1 (easy handle 0xaaaaec23c690)
* TLSv1.3 (OUT), TLS Unknown, Unknown (23):
> PUT /accounts/A6124B5AB85968B6435933C21/devices/AUDACITY/commands HTTP/2
> Host: api.freedomrobotics.ai
> User-Agent: curl/7.58.0
> Accept: */
> content-type:application/json
> mc_token:T816D24A49912172ED6B398A2
> mc_secret:Sac649be172d91bcc1248681e
> Content-Length: 177
>
* TLSv1.3 (OUT), TLS Unknown, Unknown (23):
* We are completely uploaded and fine
* TLSv1.3 (IN), TLS Unknown, Unknown (23):
* Connection state changed (MAX_CONCURRENT_STREAMS updated)!
* TLSv1.3 (OUT), TLS Unknown, Unknown (23):
* TLSv1.3 (IN), TLS Unknown, Unknown (23):
< HTTP/2 404
< content-type: application/json
< content-length: 124
< date: Wed, 24 Mar 2021 00:05:58 GMT
< x-amzn-requestid: f5ca0f2c-7336-45ac-a381-e12746906a41
< access-control-allow-origin: *
< access-control-allow-headers: Authorization,Content-Encoding,Content-Type,X-Am
z-Date,X-Amz-Security-Token,X-Api-Key,mc_secret,mc_token
< x-amz-apigw-id: cqIQCGIEiYcFVsg=
< x-amzn-trace-id: Root=1-605a8266-3bd2eea5112af1bd0587785c
< access-control-max-age: 600
< x-cache: Error from cloudfront
< via: 1.1 96be9e5995b5a5e8d1a370ce77f35235.cloudfront.net (CloudFront)
< x-amz-cf-pop: DFW55-C1
< x-amz-cf-id: mz4iyHXDHQ1qBbs0lf1awaGFxJCn_JrHD-CP3mOvSyc1q1xNdDi8lA==
<
* TLSv1.3 (IN), TLS Unknown, Unknown (23):
* Connection #0 to host api.freedomrobotics.ai left intact
{"Message":"[NOT FOUND] A6124B5AB85968B6435933C21/AUDACITY MESSAGE: NotFound: De

```

The callback.py window is doing nothing.

SIDE TRIP TO “Intel RealSense Camera Experience”

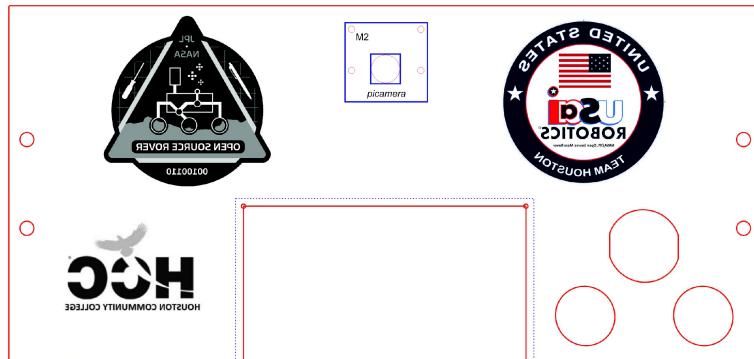
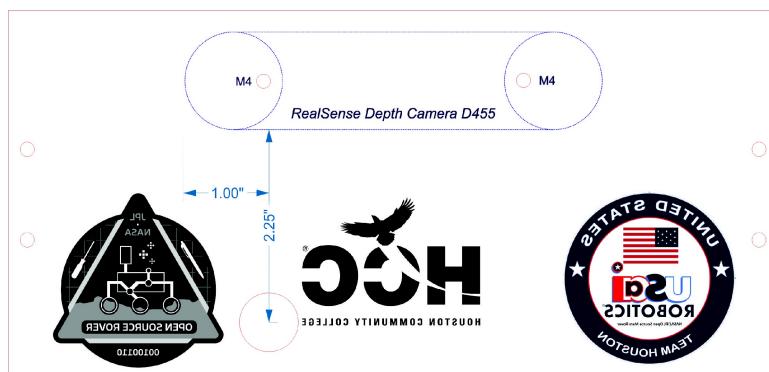
2021.03.28



Rewire of Audacity to preferred configuration.

Modified design of front plate for RealSense camera.

Modified design of back plate for backup camera and reinstalled power switch.



2021.04.01 14:00

Videoconference with Doug Cooper, Freedom Robotics:

doug@freedomrobotics.ai <doug@freedomrobotics.ai>

He's a real young customer service guy without a lot of experience w/ ROS.

He did reveal that the latency is a problem of the FR system.

He didn't know how to implement the RealSense camera with ROS but explaining it to him made me realize how to do it. I needed to --

```
ubuntu@ubuntu:~$ rosrun realsense2_camera rs_camera.launch
```

I need to see if

1) a .launch file can launch another .launch file

2) the osr_startup.service can launch more than one .launch file

3) I can put all the necessary config files in the main osr_mod.launch file

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch$ sudo find /  
-name rs_camera.launch
```

```
/opt/ros/melodic/share/realsense2_camera/launch/rs_camera.launch
```

```
$ cd /opt/ros/melodic/share/realsense2_camera/launch/
```

```
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch$ ls -w 1
```

```
demo_pointcloud.launch
```

```
demo_t265.launch
```

```
includes
```

```
opensource_tracking.launch
```

```
rs_aligned_depth.launch
```

```
rs_camera.launch
```

```
rs_d400_and_t265.launch
```

```
rs_d435_camera_with_model.launch
```

```
rs_from_file.launch
```

```
rs_multiple_devices.launch
```

```
rs_rgbd.launch
```

```
rs_rtabmap.launch
```

```
rs_t265.launch
```

I'm confused as to how the osr_mod.launch file is supposed to work.

I don't see an <include> or other statement in the osr.launch file referring to the osr_mod.launch file.

2021.04.03

Looked at the osr_mod.launch issue but didn't accomplish anything. Posted to Slack:
James Phelan 10:00 PM

How does osr.launch recognize osr_mod.launch? I don't see any reference to it in the osr.launch file or any <include> statements. I'm looking to add nodes for the USB camera(s) either in osr_mod.launch or via <include>.

2021.04.04

Replies from Slack:

Eric Junkins 8 hours ago

You mean the params mod? (link to osr.launch file)

Achille 8 hours ago

`osr_mod.launch` doesn't exist AFAIK

[Well, that's helpful!]

Replied w/ quote and link to "Bringing up the rover code" docs.

Digging deeper into roslaunch:

<https://wiki.ros.org/roslaunch> et seq.

Example

```
<include file="$(find roslaunch)/resources/example-include.launch" />
```

translates to

```
<include file="$(find realsense2_camera)/launch/rs_camera.launch" >
```

added to osr.launch in place of (commented out) and assoc params:

```
<!--node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >
```

```
$ sudo systemctl stop osr_startup.service
```

```
$ sudo systemctl status osr_startup.service
```

```
$ roslaunch osr_bringup osr.launch DOESN'T invoke osr_mod.launch
```

you'd have to do

```
$ roslaunch osr_bringup osr_mod.launch INSTEAD!
```

Rechecked Slack:

Achille 3 hours ago

That's referring to the startup service. [See

here](https://www.github.com/nasa-jpl/osr-rover-code/tree/master/init_scripts%2Flaunch_osr.sh)

`osr.launch` doesn't launch it. If the service sees that such modified file exists, it will launch it instead of `osr.launch`, so you have to copy the file and then edit it.

My response:

@Achille Ah! Got it! So it's not

```
osr.launch > (?)osr_mod.launch
```

but instead

```
osr_startup.service > launch_osr.sh > osr_mod.launch? else osr.launch  
so it only works on boot-up via osr_startup.service unless you manually --
```

```
roslaunch osr_bringup osr_mod.launch
```

Needed to dig deeper into the roots of the tree! Thanks!!

See cascade below:

```
osr_startup.service
[Unit]
Description=OSR service
After=network.target

[Service]
User=ubuntu
Group=ubuntu
WorkingDirectory=/home/ubuntu/
ExecStart=/home/ubuntu/launch_osr.sh
ExecReload=/bin/kill -HUP $MAINPID
Restart=always

RestartSec=3

[Install]
WantedBy=multi-user.target

launch_osr.sh
#!/bin/bash
# exit on error, and output executed commands to stdout
set -ex

source osr_paths.sh
launch_dir=$OSR_CODE_DIR/ROS/osr_bringup/launch

bash -c ". /home/$USER/osr_ws/devel/setup.sh"
bash -c ". /home/$USER/osr_ws/devel/setup.bash"
bash -c ". /opt/ros/melodic/setup.sh"
bash -c ". /opt/ros/melodic/setup.bash"

# execute the custom mod launch file if it's available
if [ -e "$launch_dir/osr_mod.launch" ]; then
    echo "Launching osr_mod.launch"
    bash -i -c "roslaunch osr_bringup osr_mod.launch"
# otherwise go with the default
else
    echo "Launching osr.launch"
    bash -i -c "roslaunch osr_bringup osr.launch"
fi
```

```

osr_mod.launch
<launch>
  <rosparam file="$(find osr_bringup)/config/osr_params.yaml" />

  <!-- Nodes to run the Open Source Rover -->
  <node name="roboclaw_wrapper" pkg="osr" type="roboclaw_wrapper.py" output="screen">
    <rosparam command="load" file="$(find osr_bringup)/config/roboclaw_params.yaml"/>
    <rosparam command="load" file="$(find osr_bringup)/config/roboclaw_params_mod.yaml"/>
  </node>
  <node name="joy2twist" pkg="teleop_twist_joy" type="teleop_node">
    <param name="enable_button" value="4"/> <!-- which button to press to enable movement-->
    <param name="enable_turbo_button" value="5"/> <!-- -1: disable turbo -->
    <param name="axis_linear" value="1"/> <!-- which joystick axis to use for driving -->
    <param name="axis_angular" value="3"/> <!-- which joystick axis to use for turning -->
    <param name="scale_linear" value="0.60"/> <!-- scale to apply to drive speed, in m/s:
drive_motor_rpm * 2pi / 60 * wheel radius -->
    <param name="scale_angular" value="0.75"/> <!-- scale to apply to angular speed, in rad/s:
scale_linear / min_radius -->
    <param name="scale_linear_turbo" value="1.00"/> <!-- scale to apply to linear speed, in m/s -->
    <remap from="/cmd_vel" to="/cmd_vel_intuitive"/>
  </node>
  <rosparam command="load" file="$(find osr_bringup)/config/physical_properties.yaml"/>
  <rosparam command="load" file="$(find osr_bringup)/config/physical_properties_mod.yaml"/>
  <node name="rover" pkg="osr" type="rover.py" output="screen"/>
  <node pkg="joy"
        type="joy_node" name="joy_node">
    <param name="autorepeat_rate"  value="1.0"/>
    <param name="coalesce_interval" value="0.05"/>

  </node>
  <!--node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >
    <param name="video_device" value="/dev/video0" />
    <param name="image_width" value="640" /> <!--orig = 640-->
    <param name="image_height" value="480" /> <!--orig = 480-->
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="usb_cam" />
    <param name="io_method" value="mmap" />
    <param name="framerate" value="5"/>
    <param name="camera_info_url"
value="package://osr_bringup/config/front_webcam_640x460.yaml"/>
    <param name="camera_name" value="Spinel fisheye"/>
  </node-->
  <include file="$(find realsense2_camera)/launch/rs_camera.launch" >
</launch>

```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ rosrun  
osr Bringup osr_mod.launch
```

...

RLEException: Invalid rosrun XML syntax: not well-formed (invalid token): line 31,
column 58

The traceback for the exception was written to the log file

Not real clear which part 31, 58 refers to as there are no line, column numbers.

I don't know if it counts skipped lines (I know believe it does)

I think it means:

```
<param name="image_width" value="640" /> <!--orig = 640-->
```

as it's not expecting another !-- without a --> first??

Let's just delete that whole part....

osr_mod.launch

```
<launch>  
  <rosparam file="$(find osr Bringup)/config/osr_params.yaml" />  
  
  <!-- Nodes to run the Open Source Rover -->  
  <node name="roboclaw_wrapper" pkg="osr" type="roboclaw_wrapper.py" output="screen">  
    <rosparam command="load" file="$(find osr Bringup)/config/roboclaw_params.yaml"/>  
    <rosparam command="load" file="$(find osr Bringup)/config/roboclaw_params_mod.yaml"/>  
  </node>  
  <node name="joy2twist" pkg="teleop_twist_joy" type="teleop_node">  
    <param name="enable_button" value="4"/> <!-- which button to press to enable movement-->  
    <param name="enable_turbo_button" value="5"/> <!-- -1: disable turbo -->  
    <param name="axis_linear" value="1"/> <!-- which joystick axis to use for driving -->  
    <param name="axis_angular" value="3"/> <!-- which joystick axis to use for turning -->  
    <param name="scale_linear" value="0.60"/> <!-- scale to apply to drive speed, in m/s:  
    drive_motor_rpm * 2pi / 60 * wheel radius -->  
    <param name="scale_angular" value="0.75"/> <!-- scale to apply to angular speed, in rad/s:  
    scale_linear / min_radius -->  
    <param name="scale_linear_turbo" value="1.00"/> <!-- scale to apply to linear speed, in m/s -->  
    <remap from="/cmd_vel" to="/cmd_vel_intuitive"/>  
  </node>  
  <rosparam command="load" file="$(find osr Bringup)/config/physical_properties.yaml"/>  
  <rosparam command="load" file="$(find osr Bringup)/config/physical_properties_mod.yaml"/>  
  <node name="rover" pkg="osr" type="rover.py" output="screen"/>  
  <node pkg="joy"  
        type="joy_node" name="joy_node">  
  
    <param name="autorepeat_rate" value="1.0"/>  
    <param name="coalesce_interval" value="0.05"/>  
  </node>
```

```
  <include file="$(find realsense2_camera)/launch/rs_camera.launch">  
</launch>
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ rosrun  
osr Bringup osr_mod.launch
```

RLEException: Invalid rosrun XML syntax: not well-formed (invalid token): line 30,
column 0

The traceback for the exception was written to the log file

I think now it's referring to a missing "/" at the end of the <include> file:

```
<include file="$(find realsense2_camera)/launch/rs_camera.launch >
should be
<include file="$(find realsense2_camera)/launch/rs_camera.launch />
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ rosrun
osr Bringup osr_mod.launch
```

...
RLException: Invalid rosrun XML syntax: not well-formed (invalid token): line 30,
column 0
The traceback for the exception was written to the log file

using the nano commands ^_ (Go to Line) and ^C (Cur Pos) this confirms the error is at:
</launch>

...which makes me think it's the new <include... /> statement above it.
I see the statement only has a beginning " and no end "!!

```
<include file="$(find realsense2_camera)/launch/rs_camera.launch />
should be
<include file="$(find realsense2_camera)/launch/rs_camera.launch" />
```

This time

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ rosrun
osr Bringup osr_mod.launch
```

succeeded without errors (except chronic warning about force feedback).
All the rs_camera parameters seemed to load.

However –

On the Freedom Robotics dashboard it's telling me
"LOW SYSTEM RESOURCES HIGH CPU The system resources are maxed out."
CPU 96%, TEMP: 62o, DISK 36%, MEMORY 33%.
I'm getting both RGB and point cloud images. Wonder if I can eliminate point cloud?

I DECREASED WEBRTC MAX VIDEO RESOLUTION to 320x240 (½ x ½ of prior).

CHANGED

```
<arg name="initial_reset" value="true"/>      [default: value="$(arg initial_reset)"/>]
back to its original default value instead of "true"
```

```
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch$ rosrun
realsense2_camera rs_camera.launch
by itself without the osr Bringup osr.launch.
```

FR MC dashboard System: CPU: 93%, MEMORY: 31%, DISK: 36%, TEMP: 62oC
Not much difference without the osr.launch running.

Try Settings/WEBRTC MAX VIDEO RESOLUTION/ to max of 1280x720
Try Settings/WEBRTC MAX BANDWIDTH from 300 KB/s to max of 1 MB/s
Still low FPS of ~1.11.

Go back to 300 KB/s and 640x480 (camera default 640x280, go to that)
Need to see what default camera settings are.
Maybe can kill point cloud although it seems to default to “false”, clearly it’s not.
There’s an “include” in the rs_camera.launch to nodelet.launch.xml.

Stream / diagnostics / CAMERA/REALSENCE2_CAMERA_MANAGER_COLOR:
FREQUENCY STATUS “Frequency too low”
Actual frequency (Hz) 22.646831 Min. acc. freq. 30.000000

DETOUR TO “RealSense Camera Experience.wpd”

/opt/ros/melodic/share/realsense2_camera/launch/includes/nodelet.launch.xml
Try changing in nodelet.launch.xml
to
 <arg name="enable_depth" default="**true**">
to turn off depth camera feed to FR dashboard

```
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch/includes$ sudo nano nodelet.launch.xml
```

```
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch$ roslaunch realsense2_camera rs_camera.launch
```

That alone didn’t kill the depth camera.

```
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch$ sudo nano rs_camera.launch  
change  
    <arg name="enable_depth"      default="true">  
to  
    <arg name="enable_depth"      default="false">
```

```
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch$ roslaunch realsense2_camera rs_camera.launch
```

This WAS able to eliminate the depth camera display in the FR dashboard.

2021.04.11

Since I was able to disable the depth camera part of the RealSense D455, now maybe I can enable the Spinel fisheye USB camera to eventually become the backup camera.

Will need to

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ nano  
osr_mod.launch
```

but first have to find out what to include.

This looks right:

```
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ cat usb_cam-test.launch  
<launch>  
  <node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >  
    <param name="video_device" value="/dev/video0" />  
    <param name="image_width" value="640" />  
    <param name="image_height" value="480" />  
    <param name="pixel_format" value="yuyv" />  
    <param name="camera_frame_id" value="usb_cam" />  
    <param name="io_method" value="mmap"/>  
  </node>  
  <node name="image_view" pkg="image_view" type="image_view" respawn="false"  
output="screen">  
    <remap from="image" to="/usb_cam/image_raw"/>  
    <param name="autosize" value="true" />  
  </node>  
</launch>
```

So add to osr_mod.launch:

```
  <include file="$(find usb_cam)/launch/usb_cam-test.launch" />
```

```

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch$ sudo systemctl
restart osr_startup.service
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch$ sudo systemctl
status osr_startup.service
osr_startup.service - OSR service
   Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
     Active: active (running) since Sun 2021-04-11 13:02:53 CDT; 47s ago
       Main PID: 22608 (launch_osr.sh)
          Tasks: 113 (limit: 4438)
        CGroup: /system.slice/osr_startup.service
                └─22608 /bin/bash /home/ubuntu/launch_osr.sh
                  ├─22694 /usr/bin/python /opt/ros/melodic/bin/roslaunch osr_bringup osr_mod.launch
                  ├─22821 /usr/bin/python /opt/ros/melodic/bin/rosmaster --core -p 11311 -w 3
                  └─log:=/home/ubuntu/.ros/log/25e5424e-9af0-11eb-8c9c-dca
                    ├─22869 /opt/ros/melodic/lib/roscout/roscout __name:=roscout
                    └─log:=/home/ubuntu/.ros/log/25e5424e-9af0-11eb-8c9c-dca632160e50/roscout-1
                      ├─22894 python /home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/roboclaw_wrapper.py __name:=roboclaw_wrapper
                      └─log:=/home/ubuntu/.
                        ├─22895 /opt/ros/melodic/lib/teleop_twist_joy/teleop_node /cmd_vel:=/cmd_vel_intuitive __name:=joy2twist
                        └─log:=/home/ubuntu/.ros/lo
                          ├─22898 python /home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr/src/rover.py __name:=rover
                          └─log:=/home/ubuntu/.ros/log/25e5424e-9af0-
                            ├─22911 /opt/ros/melodic/lib/joy/joy_node __name:=joy_node
                            └─log:=/home/ubuntu/.ros/log/25e5424e-9af0-11eb-8c9c-dca632160e50/joy_nod
                              ├─22916 /opt/ros/melodic/lib/nodelet/nodelet manager __name:=realsense2_camera_manager
                              └─log:=/home/ubuntu/.ros/log/25e5424e-9af0-11
                                ├─22919 /opt/ros/melodic/lib/nodelet/nodelet load realsense2_camera/RealSenseNodeFactory realsense2_camera_manager
                                └─name:=realsense
                                  ├─22928 /opt/ros/melodic/lib/usb_cam/usb_cam_node __name:=usb_cam
                                  └─log:=/home/ubuntu/.ros/log/25e5424e-9af0-11eb-8c9c-dca632160e50/
                                    └─22933 /opt/ros/melodic/lib/image_view/image_view image:=/usb_cam/image_raw __name:=image_view
                                    └─log:=/home/ubuntu/.ros/log/25e5424

Apr 11 13:03:14 ubuntu launch_osr.sh[22608]: [ INFO] [1618164193.345744955]: color stream is enabled - width: 1280, height: 720,
fps: 30, Forma
Apr 11 13:03:14 ubuntu launch_osr.sh[22608]: [ INFO] [1618164193.345969858]: setupPublishers...
Apr 11 13:03:14 ubuntu launch_osr.sh[22608]: [ INFO] [1618164193.363431085]: Expected frequency for color = 30.00000
Apr 11 13:03:14 ubuntu launch_osr.sh[22608]: [ INFO] [1618164193.603654097]: setupStreams...
Apr 11 13:03:14 ubuntu launch_osr.sh[22608]: [ INFO] [1618164193.617620797]: insert Color to RGB Camera
Apr 11 13:03:14 ubuntu launch_osr.sh[22608]: [ INFO] [1618164193.814070818]: SELECTED BASE:Depth, 0
Apr 11 13:03:14 ubuntu launch_osr.sh[22608]: [ INFO] [1618164193.851131417]: RealSense Node Is Up!
Apr 11 13:03:14 ubuntu launch_osr.sh[22608]: 11/04 13:03:14,466 WARNING [281472351068544] (messenger-libusb.cpp:42)
control_transfer returned
Apr 11 13:03:14 ubuntu launch_osr.sh[22608]: 11/04 13:03:14,519 WARNING [281472351068544] (messenger-libusb.cpp:42)
control_transfer returned
Apr 11 13:03:26 ubuntu launch_osr.sh[22608]: 11/04 13:03:26,788 WARNING [281472351068544] (messenger-libusb.cpp:42)
control_transfer returned

```

Now let's see what the FR MC Pilot dashboard looks like.
YES! Fisheye camera is secondary camera! Can switch between.

Spinel fisheye camera is out of focus. Attempted to focus on checkerboard but resolution too low.

```
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ sudo nano  
usb_cam-test.launch
```

change

```
<param name="image_width" value="640" />  
<param name="image_height" value="480" />  
to  
<param name="image_width" value="1280" />  
<param name="image_height" value="760" />
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ sudo systemctl  
restart osr_startup.service
```

Spinel camera doesn't show up!!

```
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ sudo systemctl status  
osr_startup.service
```

```
...  
Apr 11 13:26:55 ubuntu launch_osr.sh[7853]: [image_view-9] process has died [pid  
8185, exit code -7, cmd /opt/ros/melodic/lib/image_view/image_
```

...

Change back to 640x480

Still doesn't show up!

Try launching separately:

```
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ rosrun usb_cam
usb_cam-test.launch
... logging to /home/ubuntu/.ros/log/7297b082-9af4-11eb-8c9c-dca632160e50/roslaunch-ubuntu-16241.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
```

started roslaunch server http://ubuntu:39077/

SUMMARY

=====

PARAMETERS

```
* /image_view/autosize: True
* /rosdistro: melodic
* /rosversion: 1.14.10
* /usb_cam/camera_frame_id: usb_cam
* /usb_cam/image_height: 480
* /usb_cam/image_width: 640
* /usb_cam/io_method: mmap
* /usb_cam/pixel_format: yuyv
* /usb_cam/video_device: /dev/video0
```

NODES

```
/image_view (image_view/image_view)
usb_cam (usb_cam/usb_cam_node)
```

ROS_MASTER_URI=http://localhost:11311

```
process[usb_cam-1]: started with pid [16404]
process[image_view-2]: started with pid [16406]
[ INFO] [1618166186.476919046]: Initializing nodelet with 4 worker threads.
[ INFO] [1618166187.602021240]: Using transport "raw"
Unable to init server: Could not connect: Connection refused
```

```
(image_raw:16406): Gtk-WARNING **: 13:36:27.662: cannot open display:
[ INFO] [1618166188.343826923]: using default calibration URL
[ INFO] [1618166188.353205088]: camera calibration URL:
file:///home/ubuntu/.ros/camera_info/head_camera.yaml
[ INFO] [1618166188.353707490]: Unable to open camera calibration file
[/home/ubuntu/.ros/camera_info/head_camera.yaml]
[ WARN] [1618166188.353889191]: Camera calibration file
/home/ubuntu/.ros/camera_info/head_camera.yaml not found.
[ INFO] [1618166188.354094022]: Starting 'head_camera' (/dev/video0) at 640x480 via mmap (yuyv) at 30
FPS
[ERROR] [1618166188.354391592]: Cannot identify '/dev/video0': 2, No such file or directory
[usb_cam-1] process has died [pid 16404, exit code 1, cmd /opt/ros/melodic/lib/usb_cam/usb_cam_node
__name:=usb_cam
__log:=/home/ubuntu/.ros/log/7297b082-9af4-11eb-8c9c-dca632160e50/usb_cam-1.log].
log file: /home/ubuntu/.ros/log/7297b082-9af4-11eb-8c9c-dca632160e50/usb_cam-1*.log
[image_view-2] process has died [pid 16406, exit code -7, cmd /opt/ros/melodic/lib/image_view/image_view
image:=/usb_cam/image_raw __name:=image_view
__log:=/home/ubuntu/.ros/log/7297b082-9af4-11eb-8c9c-dca632160e50/image_view-2.log].
log file: /home/ubuntu/.ros/log/7297b082-9af4-11eb-8c9c-dca632160e50/image_view-2*.log
```

WTF?? Reboot.

```
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ ls /dev/video*
/dev/video10 /dev/video11 /dev/video12 /dev/video13 /dev/video14 /dev/video15
/dev/video16 /dev/video6 /dev/video7
```

No video0? Try video10.

```
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ sudo nano
usb_cam-test.launch
change
<param name="video_device" value="/dev/video0" />
to
<param name="video_device" value="/dev/video10" />
```

```
ubuntu@ubuntu:~$ sudo systemctl restart osr_startup.service
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
```

I'm baffled as to why the 2nd camera disappeared! Enough for today.

2021.04.12

Refer back to Achille's sensors.launch file to rebuild .launch files(s):

With osr.launch already running...

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ roslaunch
front_webcam.launch
```

...
[WARN] [1618275120.083062294]: Camera calibration file did not specify distortion model, assuming plumb bob

[INFO] [1618275120.089960553]: Starting 'front_webcam' (/dev/front_webcam) at 1280x720 via mmap (yuyv) at 5 FPS

[ERROR] [1618275120.092226461]: Cannot identify '/dev/front_webcam': 2, No such file or directory

[front_webcam-1] process has died [pid 18386, exit code 1, cmd
/opt/ros/melodic/lib/usb_cam/usb_cam_node __name:=front_webcam
__log:=/home/ubuntu/.ros/log/68da4f68-9bcc-11eb-b7ae-dca632160e50/front_webcam-1.log].

log file:

/home/ubuntu/.ros/log/68da4f68-9bcc-11eb-b7ae-dca632160e50/front_webcam-1*.log

2021.04.13

Response yest from Doug at FR to earlier inquiry:

Hello Jim,

Yes it should install WebRTC if the flag is set to web_RTC in the curl command.

'install_elements=web_RTC'

When the install command is run do you see any warnings or errors after installation?

Usually I see a warning about libadevice for WebRTC install, the way you can resolve that is

sudo apt install libavdevice-dev

This will install the libadevice dependencies for WebRTC and you will have to run the install command again.

Thank you,

Doug

On Sat, Apr 10, 2021 at 5:54 PM James H Phelan <jhphelan@hal-pc.org> wrote:

Doug,

When using Pilot mode, the dashboard struggles with framerate and tries to upgrade to WebRTC. It fails and asks in a pop-up left side box if WebRTC is enabled.

Does the FR app install WebRTC during its install?

When I try --

\$ webrtc -v as a wild guess as to how to see if it's installed, I get "webrtc: command not found"

If I do --

\$ sudo find / -name webrtc

I get no finds.

When I Google "how to install webrtc ubuntu 18.04" I get several hits:

webrtc-streamer, Spreed, and Janus.

Not sure what to do here.

Jim

ubuntu@ubuntu:~\$ **script session2021.04.13.txt**

FR / Settings / Installation / Update

sending update command to device [count-up]

Update dommand complete

Device updated successfully [OK]

[This is not what I intended. I need to see the output of the curl command.

Didn't fix the webrtc error]

2021.04.13

ubuntu@ubuntu:~\$ **script session2021.04.13.txt**

FR / Settings / Installation / COPY TO CLIPBOARD

curl -sSf

```
"https://api.freedomrobotics.ai/accounts/A6124B5AB85968B6435933C21/devices/D  
AB47FEEB3B5AD0E167AE825173/installscript?mc_token=T077BD4F38781080419  
E82EF2&mc_secret=Sac18b8b63a6b09c40a10b493&install_elements=webrtc&aut  
o_install_deps=true&ppa_is_allowed=true" | python
```

paste to RPi command line

Step 1/7: VERIFYING PREREQUISITES

Step 2/7: INSTALLING CREDENTIALS

Step 3/7: REMOTE CONNECTION

Step 4/7: INSTALLING PACKAGE (python2.7)

Installing freedomrobotics agent and its direct dependencies for python 2.7. This might take a few minutes.

Step 5/7: INSTALLING PACKAGE (python3.6)

Step 6/7: RTC DEPENDENCIES

Step 7/7: INSTALLING MICRO SERVICE

INSTALL COMPLETE

MICRO AGENT : INSTALLED AND ACTIVE

ROS SHADOW : INSTALLED

REMOTE SSH : INSTALLED

PYTHON2.7 PACKAGE : INSTALLED

PYTHON3.6 PACKAGE : INSTALLED

RTC DEPENDENCIES : INSTALLED

ACCOUNT : A6124B5AB85968B6435933C21

DEVICE : DAB47FEEB3B5AD0E167AE825173

\$ **exit**

WebRTC indicated to install by **install_elements=webrtc**

Unplugged RealSense camera & commented out <!-- --> the RS camera from osr_mod.launch and un-commenting out the usb camera.

Launching from PuTTY gets image_view error (can't launch image_view in remote window).

Relaunching from R Pi desktop succeeds in showing the fisheye camera.

The fisheye camera appears on the FR dashboard.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ cat
front_webcam.launch
<launch>
  <node name="front_webcam" pkg="usb_cam" type="usb_cam_node"
output="screen">
    <param name="video_device" value="/dev/front_webcam" />
    <param name="image_width" value="1280" />
    <param name="image_height" value="720" />
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="front_webcam" />
    <param name="io_method" value="mmap"/>
    <param name="framerate" value="5"/>
    <param name="camera_info_url"
value="package://osr Bringup/config/front_webcam_1280x720.yaml"/>
      <param name="camera_name" value="front_webcam"/>
  </node>
</launch>
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch$ cat
osr_mod.launch
<launch>
  <rosparam file="$(find osr Bringup)/config/osr_params.yaml" />

  <!-- Nodes to run the Open Source Rover -->
  <node name="roboclaw_wrapper" pkg="osr" type="roboclaw_wrapper.py"
output="screen">
    <rosparam command="load" file="$(find
osr Bringup)/config/roboclaw_params.yaml"/>
    <rosparam command="load" file="$(find
osr Bringup)/config/roboclaw_params_mod.yaml"/>
  </node>
  <node name="joy2twist" pkg="teleop_twist_joy" type="teleop_node">
    <param name="enable_button" value="4"/> <!-- which button to press to enable
movement-->
    <param name="enable_turbo_button" value="5"/> <!-- -1: disable turbo -->
    <param name="axis_linear" value="1"/> <!-- which joystick axis to use for driving
-->
    <param name="axis_angular" value="3"/> <!-- which joystick axis to use for
turning -->
    <param name="scale_linear" value="0.60"/> <!-- scale to apply to drive speed,
in m/s: drive_motor_rpm * 2pi / 60 * wheel radius -->
    <param name="scale_angular" value="0.75"/> <!-- scale to apply to angular
speed, in rad/s: scale_linear / min_radius -->
    <param name="scale_linear_turbo" value="1.00"/> <!-- scale to apply to linear
speed, in m/s -->
    <remap from="/cmd_vel" to="/cmd_vel_intuitive"/>
  </node>
```

```

<rosparam command="load" file="$(find
osr_bringup)/config/physical_properties.yaml"/>
<rosparam command="load" file="$(find
osr_bringup)/config/physical_properties_mod.yaml"/>
<node name="rover" pkg="osr" type="rover.py" output="screen"/>
<node pkg="joy"
      type="joy_node" name="joy_node">

      <param name="autorepeat_rate"  value="1.0"/>
      <param name="coalesce_interval" value="0.05"/>
</node>

<!--include file="$(find realsense2_camera)/launch/rs_camera.launch" /-->
<include file="$(find osr_bringup)/launch/front_webcam.launch" />
</launch>

```

USB camera is now absent from dashboard.

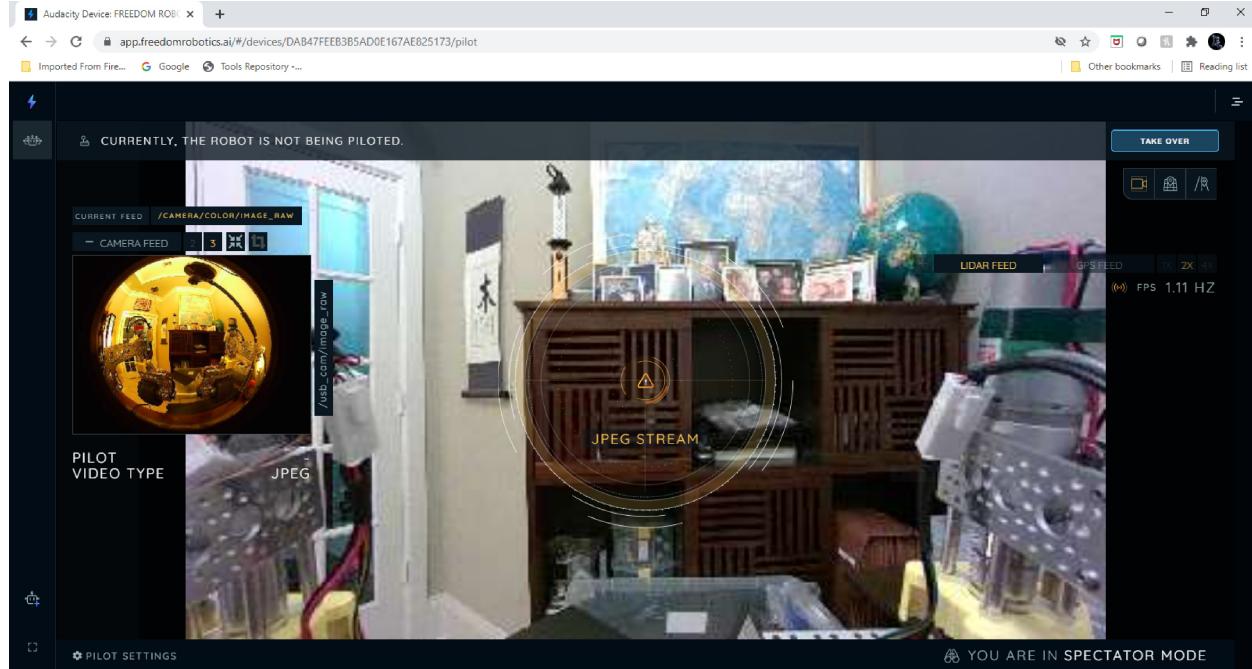
Looking at Spinel USB camera datasheet – should be 1280x960 or x 1024, not 720.
Let's try x960.

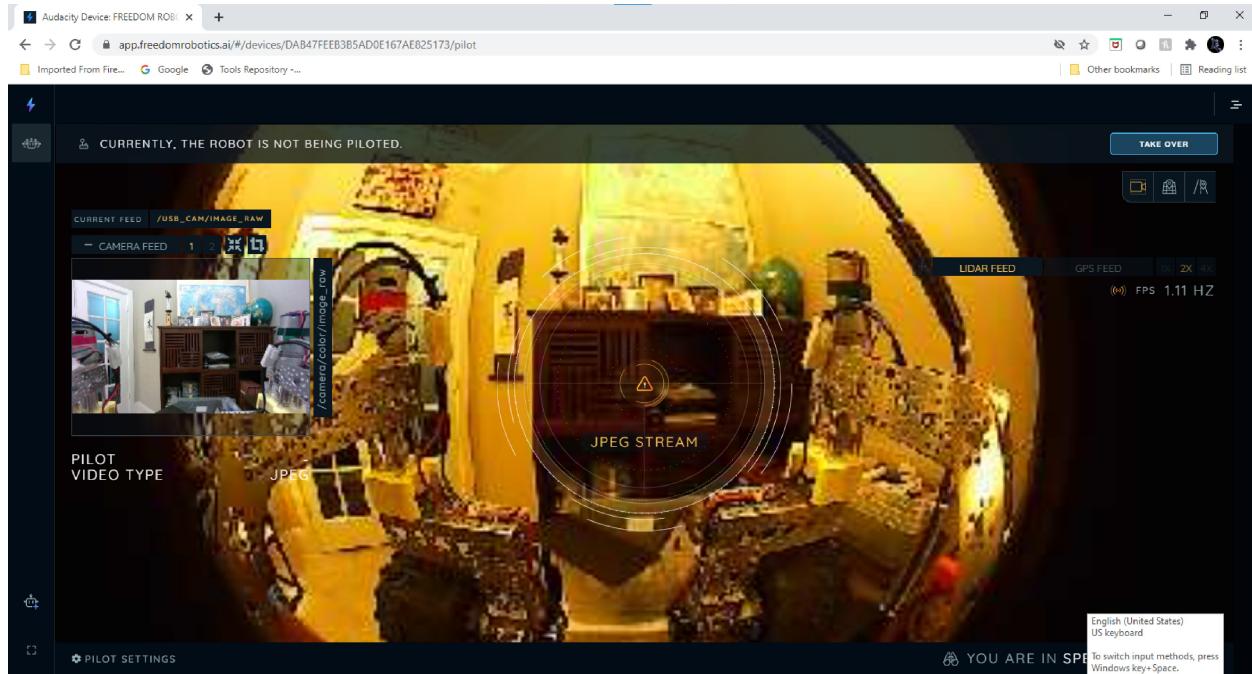
Can't find "front_webcam". Did ok w/ "**usb_cam-test.launch**"

Yes, usb camera returned!

Now let's add back the RS camera.

Yes!! Both cameras are baaaaack!!





2021.04.14

Lost fisheye camera again! /dev/video0 not found.

Tried disabling osr_startup.service

Tried

\$ rosrun usb_cam usb_cam-test launch

instead of showing the USB fisheye camera, it showed the RS Depth camera!

Maybe I need to launch the USB camera first, then the RS camera?

Try swapping the position of the <include> statements in osr_mod.launch.

That didn't seem to work. rosrunning RS camera alone fails w/ rvis & realsense-viewer (as usual).

2021.04.17

Trying to sort out the missing camera problem and the WebRTC failure in the FR dashboard.

Doug,

I reinstalled FR app with no errors.

I confirmed webrtc installed by

```
ubuntu@ubuntu:~$ sudo find / -name webrtc*
find: '/run/user/1000/gvfs': Permission denied
/home/ubuntu/.config/freedomrobotics/logs/webrtc_async.log
/home/ubuntu/.config/freedomrobotics/logs/webrtc_sync.log
/home/ubuntu/.local/lib/python3.6/site-packages/freedomrobotics/linkhelpers/commands/webrtc_teleop
/home/ubuntu/.local/lib/python3.6/site-packages/freedomrobotics/linkhelpers/commands/webrtc_teleop/webrtc_monitoring.cpython-3
6m-aarch64-linux-gnu.so
...
/home/ubuntu/.local/lib/python2.7/site-packages/freedomrobotics/linkhelpers/commands/webrtc_teleop
/home/ubuntu/.local/lib/python2.7/site-packages/freedomrobotics/linkhelpers/commands/webrtc_teleop/webrtc_monitoring.so
...
```

but the FR pilot dashboard after "UPGRADING TO WEBRTC"

A left side popout window says
"launch_webrtc_video command was not handled within 20 seconds, giving up"
then another
"Device did not reply with WebRTC Details. Are you sure webrtc is supported?"

The dashboard displays the RGB camera from the RealSense D455 Depth Camera. It does not consistently also display the Spinel fisheye USB camera (sometimes it does, sometimes it doesn't and I haven't yet figured out why.)

Jim

<https://www.tapatalk.com/groups/usailabs/viewtopic.php?p=137#p137> #19

11 minutes ago#19

@achille0

Above you mention " I created a udev rule that recognizes the camera when it gets plugged in and gives it a static name because /dev/ttyUSB0 might be USB1 or other if you have other stuff plugged in. Only do this when you get the camera working properly." I'm having difficulty having the FR dashboard consistently display both the RealSense D455 RGB camera AND the Spinel fisheye USB camera. I think a udev rule might be in order. What is your udev rule? The one on github is

```
# make symlinks serial0 and serial1, pointing to the default device names. Grant read/write
permissions for the devices
# note: not sure if these actually ought to be tty, but this works.
KERNEL=="ttyS0", SYMLINK+="serial0" GROUP="tty" MODE="0660"
KERNEL=="ttyAMA0", SYMLINK+="serial1" GROUP="tty" MODE="0660"
```

I don't think that's what you mean, is it?

[photo of FR dashboard w/ both cameras showing]

Tried again w/ osr_startup.service disabled.

\$ rosrun usb_cam usb_cam-test.launch

displays the RS depth camera, not the Spinel fisheye camera as "usb_cam/image_raw

ubuntu@ubuntu:~\$ ls /dev/video*

```
/dev/video0  /dev/video11  /dev/video14  /dev/video2  /dev/video5  
/dev/video1  /dev/video12  /dev/video15  /dev/video3  /dev/video6  
/dev/video10 /dev/video13  /dev/video16  /dev/video4  /dev/video7
```

ubuntu@ubuntu:~\$ lsusb

```
Bus 002 Device 002: ID 8086:0b5c Intel Corp.  
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub  
Bus 001 Device 005: ID 413c:2105 Dell Computer Corp. Model L100 Keyboard  
Bus 001 Device 004: ID 413c:3012 Dell Computer Corp. Optical Wheel Mouse  
Bus 001 Device 003: ID 1b17:0522  
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub  
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

\$ rosrun realsense2_camera rs_camera.launch

Add Source / Platform Camera / RGB Camera switch on
! No Frames Received!

Disable auto launch of cameras:

**ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch\$ nano
osr_mod.launch**

```
<!--include file="$(find usb_cam)/launch/usb_cam-test.launch" /-->  
<!--include file="$(find realsense2_camera)/launch/rs_camera.launch" /-->
```

Unplug RealSense D455

\$ rosrun realsense2_camera rs_camera.launch

Cannot identify '/dev/video0' No such file or directory

\$ ls /dev/video*

/dev/video10...6, /video6..7

^C usb_cam-test.launch

\$ ls /dev/video*

/dev/video10...6, /video6..7

^C osr_mod.launch

\$ ls /dev/video*

/dev/video10...6, /video6..7

What happened to video0?

\$ sudo reboot

```
ubuntu@ubuntu:~$ ls /dev/video*
/dev/video0 /dev/video1 /dev/video10 /dev/video11 /dev/video12 /dev/video13
/dev/video14 /dev/video15 /dev/video16
```

It's back!

```
$ rosrun usb_cam usb_cam-test.launch
/usb_cam/image_raw shows fisheye camera!
```

FR dashboard shows 2 cameras both showing fisheye camera:

```
USB_CAM/IMAGE_RAW
IMAGE_VIEW/OUTPUT
```

Let's look at usb_cam-test.launch:

```
ubuntu@ubuntu:~$ roscd usb_cam
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam$ cd launch
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ cat usb_cam-test.launch
<launch>
  <node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >
    <param name="video_device" value="/dev/video0" />
    <param name="image_width" value="640" />
    <param name="image_height" value="480" />
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="usb_cam" />
    <param name="io_method" value="mmap"/>
  </node>
  <node name="image_view" pkg="image_view" type="image_view" respawn="false"
        output="screen">
    <remap from="image" to="/usb_cam/image_raw"/>
    <param name="autosize" value="true" />
  </node>
</launch>
```

So, looks like usb_cam-test.launch commandeers video0 preventing another from using it?

So, now let's look at realsense2_camera rs_camera.launch:

```
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ roscd realsense2_camera
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera$ cd launch
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch$ ls
demo_pointcloud.launch
demo_t265.launch
includes
opensource_tracking.launch
rs_aligned_depth.launch
rs_camera.launch
rs_d400_and_t265.launch
rs_d435_camera_with_model.launch
rs_from_file.launch
rs_multiple_devices.launch
rs_rgbd.launch
rs_rtabmap.launch
rs_t265.launch
```

What's in *includes*?

```
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch$ cd includes/
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch/includes$ ls
nodelet.launch.xml
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch/includes$ cat
nodelet.launch.xml
```

[almost 2 screens of default configs. No assigned video port. Default reso 640x480]

```
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch$ cat
rs_camera.launch
```

[Another long list of defaults deferring to nodelet.launch.xml. Refers to "external manager" "realsense2_camera_manager"]

```
ubuntu@ubuntu:~$ sudo find / -name realsense2_camera_manager
find: '/proc/13653': No such file or directory
find: '/proc/13676': No such file or directory
find: '/proc/13677': No such file or directory
find: '/proc/13680': No such file or directory
find: '/proc/13681': No such file or directory
find: '/proc/13683': No such file or directory
find: '/run/user/1000/gvfs': Permission denied
```

DETOUR explore the FAILED warnings on boot-up.

Had to take a cell-phone pic of boot-up messages as the stream by too fast and I can't remember the long statement:

[14.503135] iscsi: registered trasport (tcp)
[FAILED] Failed to start Load Kernel Modules.

See 'systemctl status systemd-modules-load.service' for details.

```
ubuntu@ubuntu:~$ sudo systemctl status systemd-modules-load.service
```

● systemd-modules-load.service - Load Kernel Modules
 Loaded: loaded (/lib/systemd/system/systemd-modules-load.service; static; vendor preset: enabled)
 Active: failed (Result: exit-code) since Sun 2021-04-18 10:13:39 CDT; 12min ago
 Docs: man:systemd-modules-load.service(8)
 man:modules-load.d(5)
 Process: 1883 ExecStart=/lib/systemd/systemd-modules-load (code=exited,
status=1/FAILURE)
 Main PID: 1883 (code=exited, status=1/FAILURE)

```
Apr 18 10:13:39 ubuntu systemd[1]: Starting Load Kernel Modules...  
Apr 18 10:13:39 ubuntu systemd-modules-load[1883]: Failed to find module 'parport_pc'  
Apr 18 10:13:39 ubuntu systemd-modules-load[1883]: Failed to find module 'ib_iser'  
Apr 18 10:13:39 ubuntu systemd[1]: systemd-modules-load.service: Main process  
exited, code=exited, status=1/FAILURE  
Apr 18 10:13:39 ubuntu systemd[1]: systemd-modules-load.service: Failed with result  
'exit-code'.  
Apr 18 10:13:39 ubuntu systemd[1]: Failed to start Load Kernel Modules.
```

\$ **journalctl**

... MONTHS of boot logs!

```
...  
Apr 17 17:06:46 ubuntu systemd-networkd[1836]: wlan0: Lost carrier  
Apr 17 17:06:46 ubuntu wpa_supplicant[1950]: Failed to initialize control interface  
'/run/wpa_supplicant'. You may have another wpa_supplicant process already running  
or the file was left by an unclean termination of wpa_supplicant in which case you will  
need to manually remove this file before starting wpa_supplicant again.  
Apr 17 17:06:46 ubuntu systemd-networkd[1836]: wlan0: Gained carrier  
Apr 17 17:06:46 ubuntu wpa_supplicant[1950]: nl80211: deinit ifname=wlan0  
disabled_11b_rates=0  
Apr 17 17:06:47 ubuntu NetworkManager[1962]: <error> [1618697207.0263]  
sup-iface[0xaaaaff3eedb0,wlan0]: error adding interface: wpa_supplicant  
Apr 17 17:06:47 ubuntu NetworkManager[1962]: <info> [1618697207.0266] device  
(wlan0): supplicant interface state: starting -> down  
Apr 17 17:06:47 ubuntu NetworkManager[1962]: <info> [1618697207.0268] device  
(wlan0): supplicant interface keeps failing, giving up
```

...
Apr 18 10:09:52 ubuntu NetworkManager[1896]: <warn> [1618758592.6294] error requesting auth for org.**freedesktop**.NetworkManager.wifi.share.open: Authorization check failed: Message recipient disconnected from message bus without replying
Apr 18 10:09:52 ubuntu NetworkManager[1896]: <warn> [1618758592.6312] error requesting auth for org.**freedesktop**.NetworkManager.wifi.share.protected: Authorization check failed: Message recipient disconnected from message bus without replying

[Does this relate to Freedom Robotics dashboard?]

Apr 18 10:13:41 ubuntu cloud-init[1878]: ci-info: | eth0 | False | . | . | dc:a6:32:16:0e:50 |

[Keep getting eth0 not up. But according to ifconfig on Pi it is..?]

Apr 18 10:15:14 ubuntu wpa_supplicant[1963]: Delete '/run/wpa_supplicant/wlan0' manually if it is not used anymore

ubuntu@ubuntu:/run\$ **sudo ls wpa_supplicant/**

p2p-dev-wlan0 wlan0

ubuntu@ubuntu:/run\$ **sudo rm ./wpa_supplicant/wlan0**

ubuntu@ubuntu:~\$ **sudo ls /run/wpa_supplicant/**

p2p-dev-wlan0

[It's gone now. We'll see what happens]

Would like to increase reso to better focus the camera.

According to Intel-RealSense-D400-Series-Datasheet-June-2020.pdf the max RGB resolution is 1280x720.

According to Spinel USB Webcam fisheye UC50MPB Specification.pdf

320X240	MJPEG @30fps YUV2 @ 30fps
640X480	MJPEG @30fps YUV2 @ 30fps
800X600	MJPEG @30fps YUV2 @ 20fps
1024X768	MJPEG @30fps YUV2 @ 10fps
1280X960	MJPEG @15fps YUV2 @ 10fps
1280X1024	MJPEG @10fps YUV2 @ 10fps
1600x1200	MJPEG @15fps YUV2 @ 5fps
2048x1536	MJPEG @15fps YUV2 @ 4fps
2592x1944	MJPEG @15fps YUV2 @ 2fps

Let's swap cameras, reboot & explore the RealSense camera.

\$ **sudo reboot**

ubuntu@ubuntu:~\$ **lsusb**

```
Bus 002 Device 002: ID 8086:0b5c Intel Corp.  
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub  
Bus 001 Device 004: ID 413c:2105 Dell Computer Corp. Model L100 Keyboard  
Bus 001 Device 003: ID 413c:3012 Dell Computer Corp. Optical Wheel Mouse  
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub  
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

ubuntu@ubuntu:~\$ **ls -w 1 /dev/video***

```
/dev/video0  
/dev/video1  
/dev/video10  
/dev/video11  
/dev/video12  
/dev/video13  
/dev/video14  
/dev/video15  
/dev/video16  
/dev/video2  
/dev/video3  
/dev/video4  
/dev/video5
```

From R Pi desktop to allow output to screen..

\$ **roslaunch realsense2_camera rs_camera.launch**

worked fine until –

[WARN] [1618767593.687394967]:

18/04 12:39:53,690 WARNING [281472734970240] (messenger-libusb.cpp:42)
control_transfer returned error, index: 768, error: No data available, number: 61

^C

Then

ubuntu@ubuntu:~\$ **ls -w 1 /dev/video***

```
/dev/video10  
/dev/video11  
/dev/video12  
/dev/video13  
/dev/video14  
/dev/video15  
/dev/video16
```

[somehow video0-5 get lost!]

ubuntu@ubuntu:~\$ **sudo reboot**

```
$ realsense-viewer  
Unable to Add Source
```

```
ubuntu@ubuntu:~$ rostopic list  
/camera/color/camera_info  
/camera/color/image_raw  
/camera/color/image_raw/compressed  
/camera/color/image_raw/compressed/parameter_descriptions  
/camera/color/image_raw/compressed/parameter_updates  
/camera/color/image_raw/compressedDepth  
/camera/color/image_raw/compressedDepth/parameter_descriptions  
/camera/color/image_raw/compressedDepth/parameter_updates  
/camera/color/image_raw/theora  
/camera/color/image_raw/theora/parameter_descriptions  
/camera/color/image_raw/theora/parameter_updates  
/camera/motion_module/parameter_descriptions  
/camera/motion_module/parameter_updates  
/camera/realsense2_camera_manager/bond  
/camera/rgb_camera/auto_exposure_roi/parameter_descriptions  
/camera/rgb_camera/auto_exposure_roi/parameter_updates  
/camera/rgb_camera/parameter_descriptions  
/camera/rgb_camera/parameter_updates  
/camera/stereo_module/parameter_descriptions  
/camera/stereo_module/parameter_updates  
/diagnostics  
/rosout  
/rosout_agg  
/tf  
/tf_static
```

```
[from R Pi desktop:]  
ubuntu@ubuntu:~$ rostopic echo /camera/color/image_raw  
display bunch of numbers, so is publishing  
ubuntu@ubuntu:~$ rosrun rviz rviz  
libEGL warning: DRI2: failed to authenticate  
...rviz version 1.13.16  
compiled against Qt version 5.9.5  
compiled against OGRE version 1.9.0 (Ghadamon)  
Forcing OpenGL version 0.  
Stereo is NOT SUPPORTED  
OpenGL device: llvmpipe (LLVM 10.0.0, 128 bits)  
OpenGL version: 3.1 (GLSL 1.4).
```

Displays interface but no images

Google “WARNING [281472734970240] (messenger-libusb.cpp:42) control_transfer returned error, index: 768, error: No data available, number: 61”

<https://github.com/IntelRealSense/realsense-ros/issues/1510>

after slogging through pages of outputs and miscommunication I get to
12-17-20

“If you view the image on the point cloud tutorial in full size, it shows that you should set Fixed Frame to camera_link instead of the default map.”

I did that and it didn’t help.

“Could you try using the Add button at the bottom of the side panel to add a topic to view please?”

This time

Add /

By Topic /

Camera v /

color v / image_raw /

 Camera raw;

 Image raw

Now Image and Camera appear in left bottom panel. But NOT on main window.

*“Okay, next please try reducing FPS from 30 to 15 with these roslaunch instructions:
depth_fps:=15 color_fps:=15”*

Still get frequent control_transfer warnings, either

“No data available, number: 61”

“Resource temporarily unavailable, number 11”

\$ rqt

Plugins / Visualization / Image View

Shows RGB view from RealSense

libEGL warning: DRI2: failed to authenticate

QEGLPlatformContext: eglGetCurrent failed: 3002

QEGLPlatformContext: eglSwapBuffers failed: 300d

Google “libEGL warning: DRI2: failed to authenticate”:

```
ubuntu@ubuntu:~$ sudo find / -name libEGL*
find: '/proc/4191': No such file or directory
find: '/run/user/1000/gvfs': Permission denied
/usr/lib/aarch64-linux-gnu/libEGL_mesa.so.0
/usr/lib/aarch64-linux-gnu/libEGL.so.1
/usr/lib/aarch64-linux-gnu/libEGL_mesa.so.0.0.0
/usr/lib/aarch64-linux-gnu/libEGL.so.1.0.0
/usr/lib/aarch64-linux-gnu/libEGL.so
/usr/lib/chromium-browser/libEGL.so
/usr/lib/chromium-browser/swiftshader/libEGL.so
```

Several sources suggest

\$ sudo apt-get update

haven't done it in a while so do again.

First ^C rs_camera.

\$ sudo apt-get update

Let's try launching both cameras separately starting w/ usb_cam as rs_cam seems to mess up the /dev/video's.

Plug Spinel fisheye camera back in.

ubuntu@ubuntu:~\$ **sudo reboot**

ubuntu@ubuntu:~\$ **ls /dev/video***

/dev/video0 /dev/video10 /dev/video12 /dev/video14 /dev/video16 /dev/video3

/dev/video5 /dev/video7

/dev/video1 /dev/video11 /dev/video13 /dev/video15 /dev/video2 /dev/video4

/dev/video6

ubuntu@ubuntu:~\$ **roslaunch usb_cam usb_cam-test.launch**

displays Depth Camera view!

ubuntu@ubuntu:~\$ **lsusb**

Bus 002 Device 002: ID 8086:0b5c Intel Corp.

Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub

Bus 001 Device 005: ID 413c:2105 Dell Computer Corp. Model L100 Keyboard

Bus 001 Device 004: ID 413c:3012 Dell Computer Corp. Optical Wheel Mouse

Bus 001 Device 003: ID 1b17:0522

Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub

Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub

[shows new device, the Spinel fisheye USB cam presumably]

\$ rqt

also shows depth camera as /usb_cam/image_raw

Try adding RS cam.

FR dashboard now shows RS RGB camera.

\$ rqt

/camera/color/image_raw

 shows RS RGB camera

/image_view/output

 no image

can't get Spinel USB camera to show.

Try reversing the order of launching cameras. This time RS first, then USB.

ubuntu@ubuntu:~\$ **sudo reboot**

With neither camera launched, no FR dashboard cam.

Try RS first.

```
$ roslaunch realsense2_camera rs_camera.launch
```

FR dashboard shows RS RGB.

```
$ rqt
```

Shows RS RGB camera

```
ubuntu@ubuntu:~$ ls /dev/video*
```

```
/dev/video10 /dev/video11 /dev/video12 /dev/video13 /dev/video14 /dev/video15
```

```
/dev/video16 /dev/video6 /dev/video7
```

```
ubuntu@ubuntu:~$ roslaunch usb_cam usb_cam-test.launch
```

can't find video0 [cause it's not there!]

```
ubuntu@ubuntu:~$ sudo reboot
```

2021.04.19

Enabled “commented out” usb_cam and realsense2_camera in osr_mod.launch.
Reboot.

usb_cam fails while RS cam displays of FR dash.
ls /dev/video* shows missing video0.

Try just the usb_cam alone.

This just displays the Depth Cam from the RS camera, NOT the usb_cam!

2021.04.21

Trial of changing reso of usb_cam in usb_cam-test.launch to 1280x720 fails to display.
Changed back, ok.

2021.04.22

Checked journalctl -b and, although there were a few errors, none seemed relevant to this situation.

Spinel fisheye camera focused using chessboard target and tightened in place.
Look to [Intel RealSense Camera Experience.wpd](#) to seek “secret sauce” to get both cameras to work together. Not seeing any clue.
Commented out both cameras in osr_mod.launch & rebooted. System up but no cameras appear as expected.

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch\$ **roslaunch front_webcam.launch**

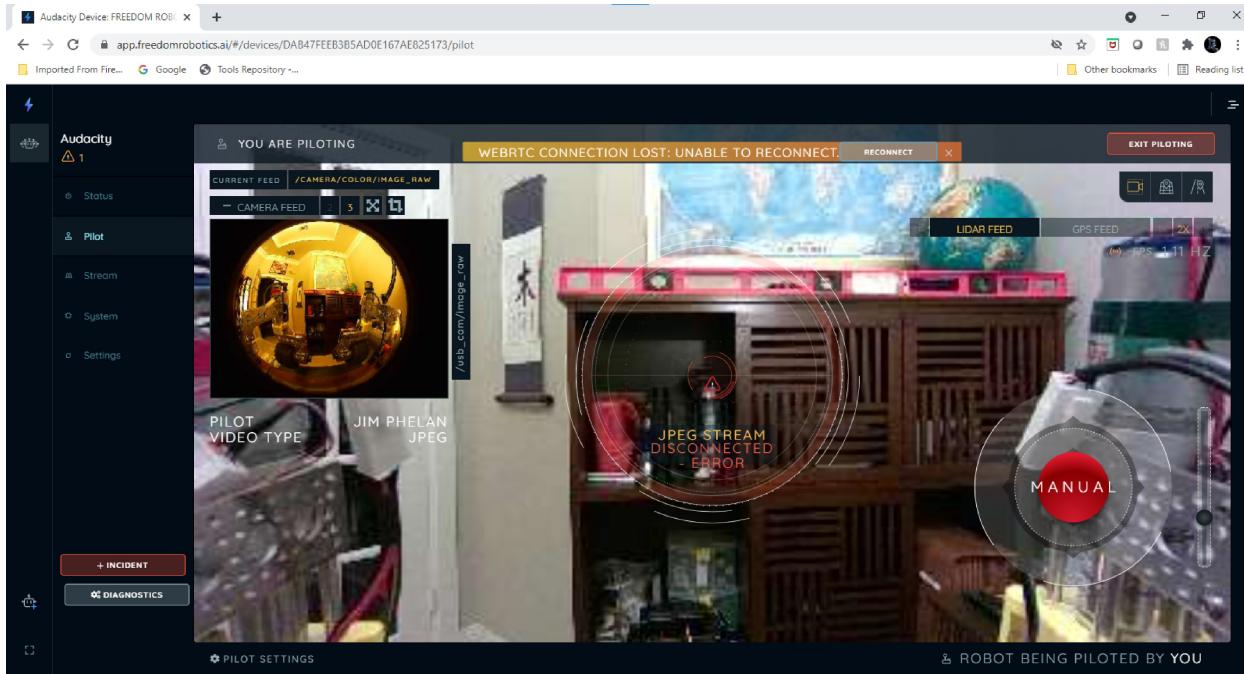
Can't identify front_webcam.

I think

 <param name="video_device" value="/dev/front_webcam" />
should be

 <param name="video_device" value="/dev/video0" />

this seems to work



THIS WORKED:

```
osr_bringup osr_mod.launch:
    comment out rs_camera.launch
    comment out usb_cam-test.launch
$ roslaunch osr_bringup osr_mod.launch
```

Tried changing front_webcam to video0 and 640x480.
Failed. Cannot identify /dev/video0.

Tried going back to usb_cam-test.launch
set to video0 and 640x480
set video_device to /dev/video1
\$ roslaunch usb_cam usb_cam-test.launch
success

```
$ roslaunch realsense2 rs_camera.launch
success
```

It looked like the FR dashboard didn't see the RS cam, BUT –
under Stream there were 3 image topics:

- /camera/color/image_raw from the RS cam
- /usb_cam/image_raw from the Spinel cam
- /image_view/output from the Spinel cam

in the Pilot window there is a "CAMERA FEED" selector over the smaller window
If the fisheye camera is central, the CAMERA FEED switches between Spinel and RS.
If the RS is central, the CAMERA FEED switches between the two usb_cam views.
Now to incorporate the separate .launch's into the osr_mod.launch.
Don't know how to get rid of the dual USB cam feeds, yet.

2021.04.24

Booted w/ osr_mod.launch without launching either camera.

Then...

```
ubuntu@ubuntu:~$ rosrun usb_cam usb_cam-test.launch
```

```
...
[ INFO] [1619292640.510661722]: Starting 'head_camera' (/dev/video1) at 640x480 via mmap (yuyv) at 30
FPS
[ERROR] [1619292640.511338916]: VIDIOC_S_FMT error 22, Invalid argument
[usb_cam-1] process has died [pid 30746, exit code 1, cmd /opt/ros/melodic/lib/usb_cam/usb_cam_node
__name:=usb_cam
__log:=/home/ubuntu/.ros/log/5668f3ce-a49c-11eb-a420-dca632160e50/usb_cam-1.log].
log file: /home/ubuntu/.ros/log/5668f3ce-a49c-11eb-a420-dca632160e50/usb_cam-1*.log
[image_view-2] process has died [pid 30747, exit code -7, cmd /opt/ros/melodic/lib/image_view/image_view
image:=/usb_cam/image_raw __name:=image_view
__log:=/home/ubuntu/.ros/log/5668f3ce-a49c-11eb-a420-dca632160e50/image_view-2.log].
log file: /home/ubuntu/.ros/log/5668f3ce-a49c-11eb-a420-dca632160e50/image_view-2*.log
```

In the directory /home/ubuntu/.ros/log/5668f3ce-a49c-11eb-a420-dca632160e50/

there IS NO image_view*.log:

```
ubuntu@ubuntu:~/ros/log/5668f3ce-a49c-11eb-a420-dca632160e50$ ls -w 1
joy2twist-3-stdout.log
joy_node-5-stdout.log
master.log
roboclaw_wrapper-2.log
roslaunch-ubuntu-17326.log
roslaunch-ubuntu-2325.log
roslaunch-ubuntu-30678.log
rosout-1-stdout.log
rosout.log
rover-4.log
```

```
ubuntu@ubuntu:/opt/ros/melodic/share/usb_cam/launch$ cat usb_cam-test.launch
<launch>
  <node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >
    <param name="video_device" value="/dev/video1" />
    <param name="image_width" value="640" />
    <param name="image_height" value="480" />
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="usb_cam" />
    <param name="io_method" value="mmap"/>
  </node>
  <node name="image_view" pkg="image_view" type="image_view" respawn="false" output="screen">
    <remap from="image" to="/usb_cam/image_raw"/>
    <param name="autosize" value="true" />
  </node>
</launch>
```

There is a `usb_cam_node` but it's binary.

If I make `usb_cam-test.launch /dev/video0`, I get the RS Depth camera.

If I make `usb_cam-test.launch /dev/video1`, I get a launch error to a non-existent .log

If I launch `rs_camera.launch` first, it removes video0 so `usb_cam` can't launch.

WTF!! How did this work before??

2021.05.01

Mentally recovered from the dual camera conflict frustration and ready to try again based on Achille's comments:

Cool! This is a classic case of devices interfering with each other. The realsense is notorious for not playing nice. Also make sure you plug it in to a USB3 port (blue) with the official cable. Many USB cables don't work or only intermittently.

Make sure you follow the RealSense instructions to the letter. If you installed the drivers through apt, it should also install the udev package for it. You can check that those rules exist by looking in the /etc/udev/rules.d folder. One of the rules files should clearly represent a rule for the realsenses. If it's not there, go look through the intel instructions again to download their udev package.

You can try setting up a udev rule for the other camera, but if you have a different model/brand monocular camera/usb webcam lying around, try using that one first. There are many webcams with proprietary formats and poor linux integration that aren't worth messing with for too long. I recommend good ones in my blog on sensor selection.

There are several reasons why webRTC is failing to connect. Typically it's because a dependency isn't installed well or a firewall is blocking ports. Here's our documentation for troubleshooting webRTC issues

- ✓ plug it in to a USB3 port (blue)
- ✓ official cable
- ✓ follow the RealSense instructions to the letter
- ✓ check the /etc/udev/rules.d folder
 - ubuntu@ubuntu:/etc/udev/rules.d\$ ls
10-local.rules 99-realsense-libusb.rules
- ✗ try using a different model/brand monocular camera/usb webcam
didn't make any difference

If lauch rs_camera first, launch usb_cam can't find video0 as video0-5 disappear with rs_camera launch.

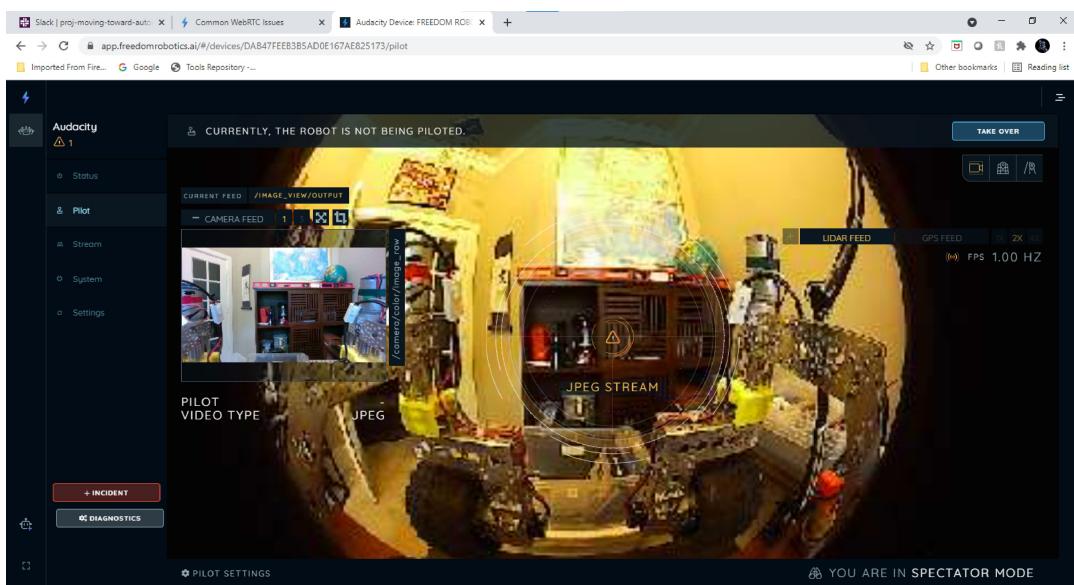
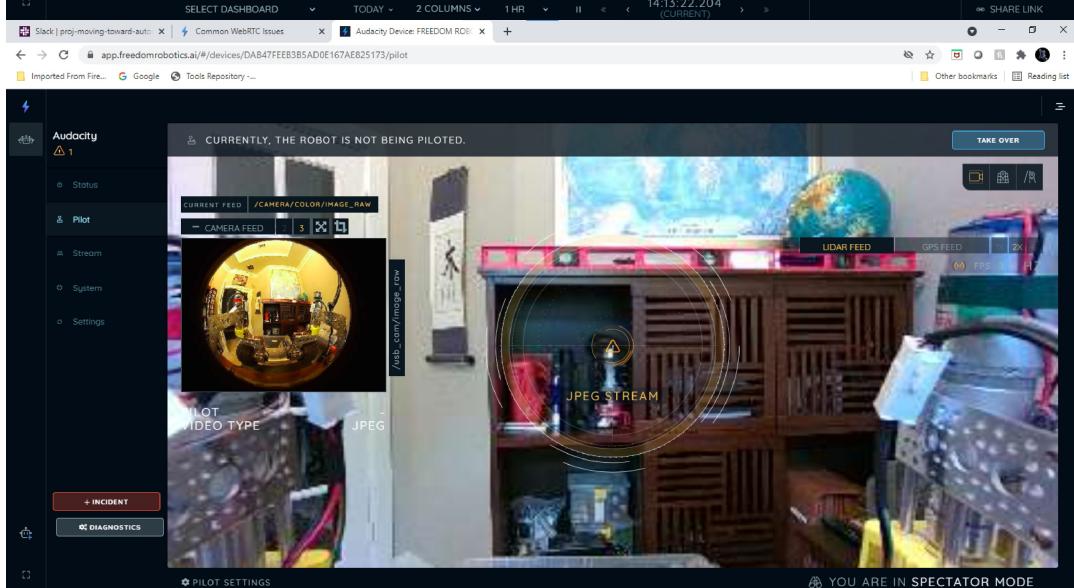
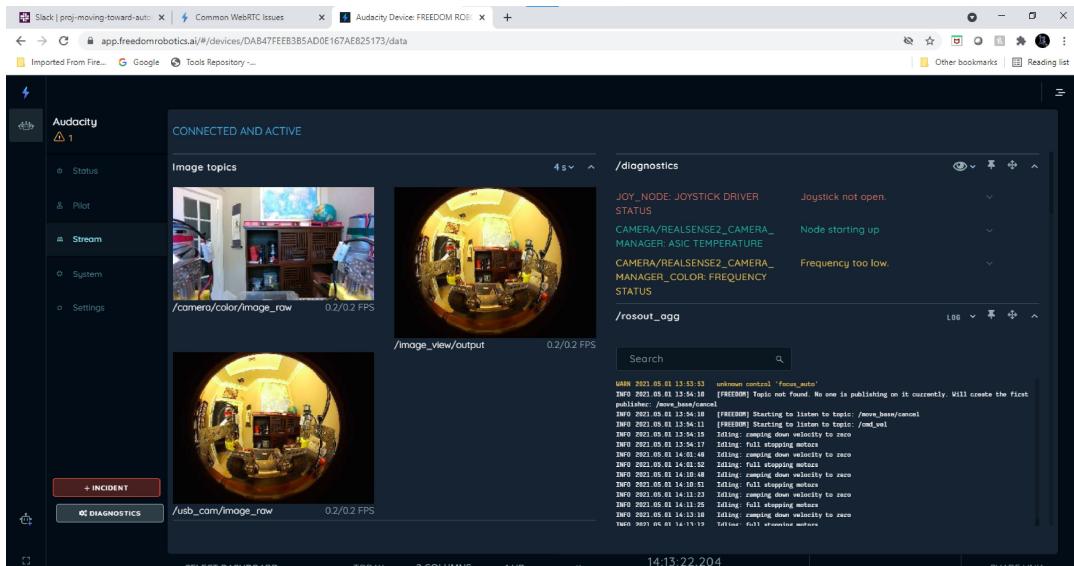
If launch usb_cam first, it displays the depth camera from the RS, not the usb camera.
Then launch rs_camera disables the usb camera.

If change usb_cam-test.launch from video0 to video6 and launch rs_camera first, then usb_cam-test, the USB camera appears as desired. I'd tried video10 before and it didn't like video10.

On the FR dashboard / Stream / Image topics shows:

/camera/color/image_raw for the RS camera
/image_view/output for the USB camera
/usb_com/image_raw for the USB camera

On the FR dashboard / Pilot it shows the RS camera and either USB camera image and can switch among all 3.



Tried enabling the depth camera with:

```
$ rosrun realsense2_camera rs_camera.launch enable_depth:=true
```

displayed a mostly black point cloud. Examined \$ rostopic list and tried \$ rostopic echo with a few but no images appeared.

Now to tackle the WebRTC problem following this link from Achille:

<https://docs.freedomrobotics.ai/docs/common-webrtc-issues>

FR / Settings /

WEBRTC MAX BANDWIDTH

Try 1 MB/s > 500KB/s

WEBRTC MAX FPS

already set to 10FPS

WEBRTC MAX VIDEO RESOLUTION

cameras are set to 640x480

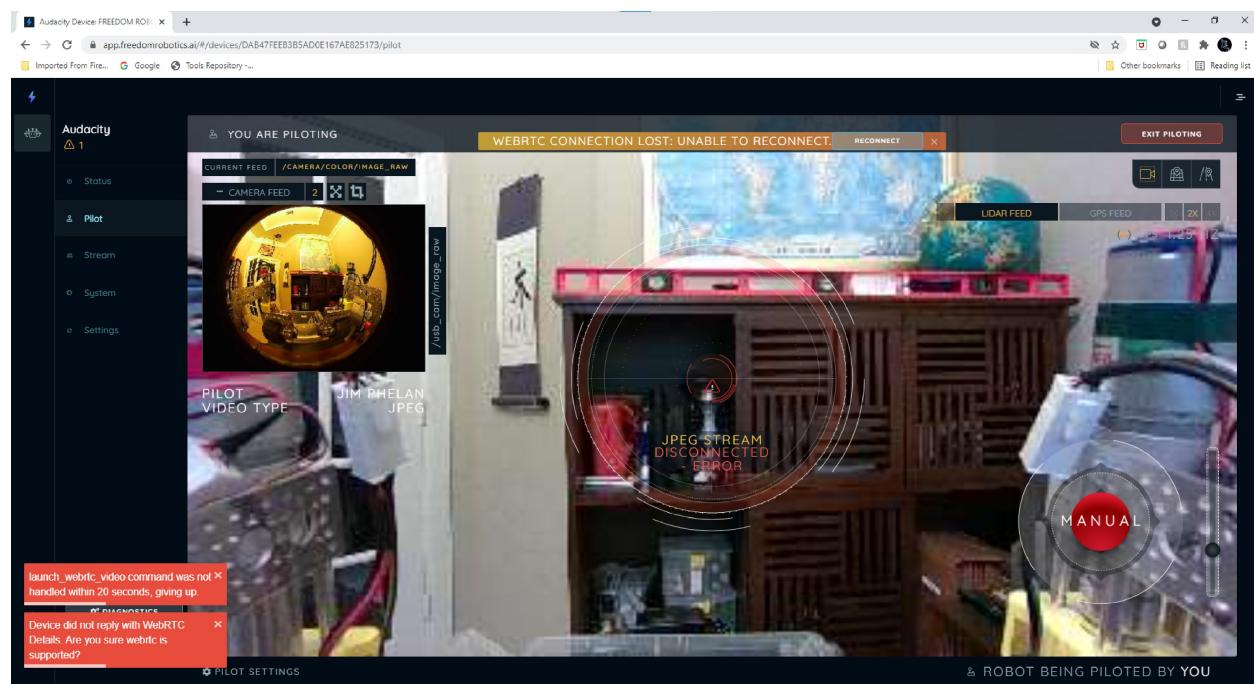
try 1280x720 > 640x480

FR / Pilot / TAKE OVER

JPEG STREAM, UPGRADING TO WEBRTC

"launch_webrtc_video command was not handled within 20 seconds, giving up"

"Device did not reply with WebRTC Details. Are you sure webrtc is supported?"



Validate if it works on a high-bandwidth network

```
ubuntu@ubuntu:~$ sudo apt-get install speedtest-cli && speedtest-cli --bytes  
...ValueError: invalid literal for int() with base 10:
```

```
ubuntu@ubuntu:~$ sudo apt-get install speedtest-cli  
installed ok  
ubuntu@ubuntu:~$ speedtest-cli --bytes  
...ValueError: invalid literal for int() with base 10:
```

Try running Internet Speed Test from RPi desktop browser

Download: 17.4 Mbps

Upload 9.01 Mbps

If it is greater than a few megabytes, then you should be fine.

Check topic bandwidth

Check your device's System Measurement tab and look at your topic bandwidth. If you are seeing a queue of messages to upload which spikes into the hundreds, then the connection is not keeping up

BANDWIDTH: 128KB/s TOPICS: 61 MAX QUEUE: 16 AVG QUEUE: 6

Use Chrome Browser

Already using

Check firewalls - Try running on a different network - some corporate networks limit specific protocol's connectivity, so running on a hotspot or different network with normal connectivity may solve the issue.

Running on a home LAN. How do I check if WebRTC is limited?

Google: "webrtc ports"

<https://tools.ietf.org/id/draft-jennings-behave-rtcweb-firewall-03.html#:~:text=In%20general%20WebRTC%20media%20can,firewall%20is%20one%20of%20these.>

In general WebRTC media can be sent on a wide range of UDP ports but the two ports that are commonly used are the RTP port (5004) and TURN port (3478). Some firewalls MAY choose to only allow flows where the destination port on the outside of the firewall is one of these.

Only 5800 TightVNC is forwarded. No other ports listed.

NEED MORE SPECIFIC ADVICE HERE

If your session disconnects randomly

It doesn't. It either connects or it doesn't

A moving robot

No. Stationary.

IP address changes during a session

No. Stable.

Wifi network is changed during a session

Wifi disconnection

Wifi poor signal

Using eth0

speedtest-cli --bytes fails

ubuntu@ubuntu:~\$ **nmcli dev wifi**

IN-USE SSID MODE CHAN RATE SIGNAL BARS SECURITY

no data...

ubuntu@ubuntu:~\$ **iwconfig**

eth0 no wireless extensions.

wlan0 IEEE 802.11 ESSID:"NUTHOUSE"

Mode:Managed Frequency:2.422 GHz Access Point: 44:94:FC:5D:86:19

Bit Rate=58.5 Mb/s Tx-Power=31 dBm

Retry short limit:7 RTS thr:off Fragment thr:off

Power Management:on

Link Quality=59/70 Signal level=-51 dBm

Rx invalid nwid:0 Rx invalid crypt:0 Rx invalid frag:0

Tx excessive retries:1 Invalid misc:0 Missed beacon:0

lo no wireless extensions.

Extremely high CPU usage

CPU: 93% MEMORY: 37% DISK: 37% TEMP: 64°C

Could be an issue...

If you have high latency or jerky video

On your robot, sometimes there are delays in sending video due to pipeline length for algorithms, delayed messages, etc. Check that you have locally fast video.

How??

webcamtest.com:

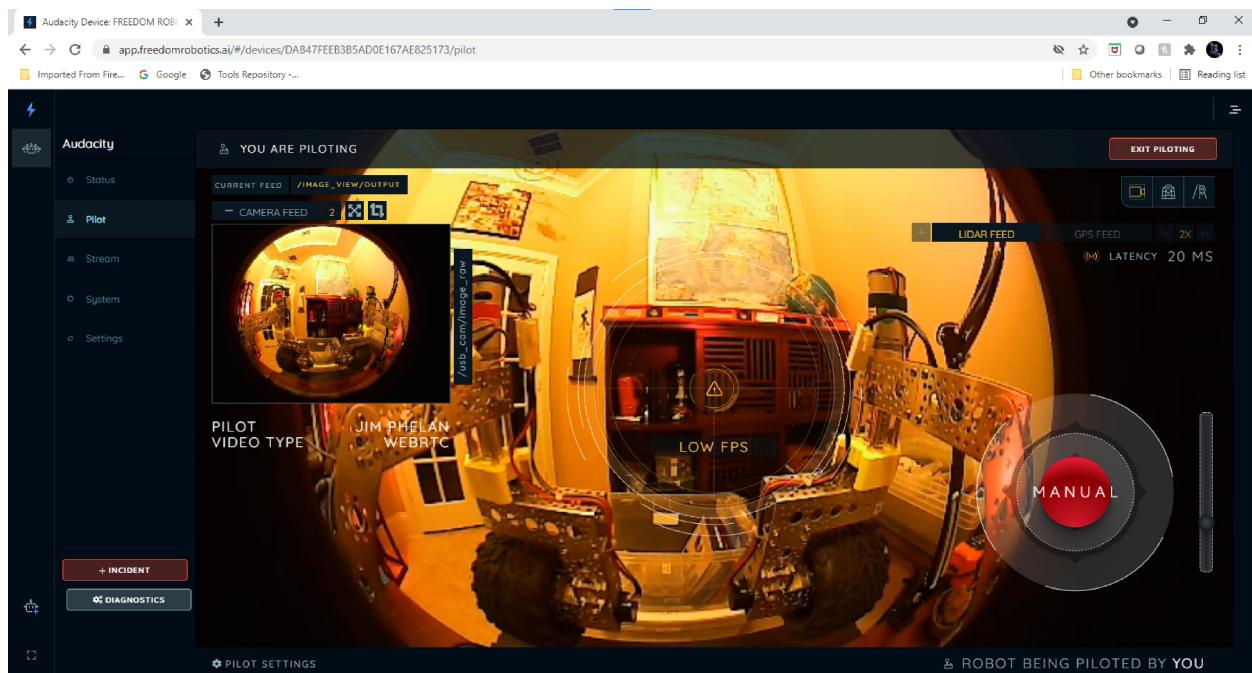
Webcam Name:	P600 (Spinel fisheye USB)
Quality Rating	42047
Built-in Microphone	None
Built-in Speaker	None
Frame rate:	8 FPS
Stream Type:	video
Image Mode:	rgb
Webcam MegaPixels:	5.04 MP
Webcam Resolution:	2592x1944
Video Standard:	???
Aspect Ratio:	1.33
PNG File Size:	4.02 MB
JPEG File Size:	2.42 MB
Bitrate:	19.55 MB/s
Number of Colors:	146001
Average RGB Color:	[dark purple]
Lightness:	21.96%
Luminosity:	24.00%
Brightness:	22.09%
Hue:	31o
Saturation:	57.14%

Fair amount of latency with hand wave before camera.

webcamtest.com didn't recognize RS camera when USB was unplugged.

Let's test latency with just the RS camera. WebRTC failed.

Let's test latency with just the USB camera. WebRTC succeeded w/ low latency & FPS.



Seems RS cam puts more strain on the system, but even just the USB cam is slow.

Try ping google.com to test your connection's overall latency. If it is > 50 msecs, then you should check out why that is happening. If you see it > 250 msecs, then your may have a very unstable WebRTC connection.

```
ubuntu@ubuntu:~$ ping google.com
PING google.com (172.217.14.174) 56(84) bytes of data.
64 bytes from dfw28s22-in-f14.1e100.net (172.217.14.174): icmp_seq=1 ttl=115
time=20.3 ms
64 bytes from dfw28s22-in-f14.1e100.net (172.217.14.174): icmp_seq=2 ttl=115
time=16.5 ms
64 bytes from dfw28s22-in-f14.1e100.net (172.217.14.174): icmp_seq=3 ttl=115
time=18.2 ms
64 bytes from dfw28s22-in-f14.1e100.net (172.217.14.174): icmp_seq=4 ttl=115
time=15.1 ms
64 bytes from dfw28s22-in-f14.1e100.net (172.217.14.174): icmp_seq=5 ttl=115
time=15.0 ms
64 bytes from dfw28s22-in-f14.1e100.net (172.217.14.174): icmp_seq=6 ttl=115
time=14.8 ms
64 bytes from dfw28s22-in-f14.1e100.net (172.217.14.174): icmp_seq=7 ttl=115
time=15.2 ms
64 bytes from dfw28s22-in-f14.1e100.net (172.217.14.174): icmp_seq=8 ttl=115
time=16.4 ms
^C
--- google.com ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7007ms
rtt min/avg/max/mdev = 14.882/16.470/20.352/1.813 ms
```

In the Freedom app, press ~ while connected over WebRTC and you will see a diagnostics screen appear.

Latency avg 25; FPS 4.9

If you can't connect with WebRTC at all

Check that in the advanced install settings for your device, you have selected to enable WebRTC. If it was not enabled, please enable it then re-install and try again.

How? Shouldn't this have been done by the FR install?

WebRTC is there according to \$ find.

It works some of the time so it must be enabled.

2021.05.02

Looking again at boot errors and if they may be affecting performance:

```
ubuntu@ubuntu:~$ sudo systemctl status systemd-modules-load.service
● systemd-modules-load.service - Load Kernel Modules
  Loaded: loaded (/lib/systemd/system/systemd-modules-load.service; static; vendor
  preset: enabled)
    Active: failed (Result: exit-code) since Sat 2021-05-01 20:26:00 CDT; 13h ago
      Docs: man:systemd-modules-load.service(8)
            man:modules-load.d(5)
  Process: 1893 ExecStart=/lib/systemd/systemd-modules-load (code=exited,
  status=1/FAILURE)
 Main PID: 1893 (code=exited, status=1/FAILURE)
```

May 01 20:26:00 ubuntu systemd[1]: Starting Load Kernel Modules...
May 01 20:26:00 ubuntu systemd-modules-load[1893]: Failed to find module 'parport_pc'
May 01 20:26:00 ubuntu systemd-modules-load[1893]: Failed to find module 'ib_iser'
May 01 20:26:00 ubuntu systemd[1]: systemd-modules-load.service: Main process
exited, code=exited, status=1/FAILURE
May 01 20:26:00 ubuntu systemd[1]: systemd-modules-load.service: Failed with result
'exit-code'.
May 01 20:26:00 ubuntu systemd[1]: Failed to start Load Kernel Modules.

Google “**ExecStart=/lib/systemd/systemd-modules-load (code=exited, status=1/FAILURE)**”

<https://unix.stackexchange.com/questions/607435/systemd-modules-load-cannot-find-modules>

“I can run modprobe my-module and the module is discovered and loaded just fine.”

```
ubuntu@ubuntu:~$ modprobe parport_pc
modprobe: FATAL: Module parport_pc not found in directory
/lib/modules/5.4.0-1034-raspi
```

```
ubuntu@ubuntu:~$ modprobe ib_iser
modprobe: FATAL: Module ib_iser not found in directory /lib/modules/5.4.0-1034-raspi
```

So, they're definitely not there. Is that even important?

Google “**Module parport_pc not found in directory /lib/modules/5.4.0-1034-raspi**”
Your search - Module parport_pc not found in directory /lib/modules/5.4.0-1034-raspi - did not match any documents.

Google “**Module parport_pc not found in directory**”
multiple hits

<https://stackoverflow.com/questions/3140478/fatal-module-not-found-error-using-modprobe>

Try insmod instead of modprobe. Modprobe looks in the module directory /lib/modules/uname -r for all the modules and other files

ubuntu@ubuntu:~\$ **insmod parport_pc**

insmod: ERROR: could not load module parport_pc: No such file or directory

ubuntu@ubuntu:~\$ **insmod ib_iser**

insmod: ERROR: could not load module ib_iser: No such file or directory

ubuntu@ubuntu:~\$ **lsmod**

fails to display above modules

Google “**what is parport_pc**”

<https://www.kernel.org/doc/html/latest/admin-guide/parport.html>

The parport code provides parallel-port support under Linux. This includes the ability to share one port between multiple device drivers.

I don't have a parallel port. No problem.

Google “**what is ib_iser**”

<https://raspberrypi.stackexchange.com/questions/112985/failed-to-start-load-kernel-modules-for-installing-ubuntu-18-04-on-raspberry-4>

which led to

<https://ubuntuforums.org/showthread.php?t=2318779&p=13466943#post13466943>

which suggested (as seen previously):

In Recovery Mode the first thing you must do is select Enable networking. That not only enables networking but mounts the file systems in read/write mode which is necessary to do anything. You'll be asked for confirmation so just select yes and then you'll be returned to the menu again so select Drop to root shell. From there you'll need to run some commands to try and recover. It may be necessary to repeat these in no specific order as you proceed (no sudo needed because you are in a root shell):

```
apt-get update  
dpkg --configure -a  
apt-get dist-upgrade  
apt-get -f install
```

However, the first link above warns:

dist-upgrade is the kiss of death on Ubuntu.

It tries to replace the Pi specific boot code and firmware with EFI code.

Seems ib_iser is related to SCSI and not an issue?

```
ubuntu@ubuntu:~$ journalctl -b
Feb 22 ...
May 01 20:26:44 ubuntu systemd[1]: Started ntp-systemd-netif.service.
May 01 20:26:44 ubuntu wpa_supplicant[1931]: ctrl_iface exists and seems to be in use - cannot override it
May 01 20:26:44 ubuntu wpa_supplicant[1931]: Delete '/run/wpa_supplicant/wlan0' manually if it is not used anymore
May 01 20:26:44 ubuntu systemd-networkd[1827]: wlan0: Lost carrier
May 01 20:26:44 ubuntu wpa_supplicant[1931]: Failed to initialize control interface '/run/wpa_supplicant'.
                                                You may have another wpa_supplicant process already running or the file was
                                                left by an unclean termination of wpa_supplicant in which case you will need
                                                to manually remove this file before starting wpa_supplicant again.
May 01 20:26:44 ubuntu systemd-networkd[1827]: wlan0: DHCP lease lost
May 01 20:26:44 ubuntu avahi-daemon[1937]: Withdrawing address record for 192.168.1.13 on wlan0.
May 01 20:26:44 ubuntu systemd-networkd[1827]: wlan0: Gained carrier
May 01 20:26:44 ubuntu avahi-daemon[1937]: Leaving mDNS multicast group on interface wlan0.IPv4 with address 192.168.1.13.
May 01 20:26:44 ubuntu systemd-timesyncd[1741]: Synchronized to time server 91.189.91.157:123
(ntp.ubuntu.com).
May 01 20:26:44 ubuntu avahi-daemon[1937]: Interface wlan0.IPv4 no longer relevant for mDNS.
May 01 20:26:44 ubuntu wpa_supplicant[1931]: nl80211: deinit ifname=wlan0 disabled_11b_rates=0
May 01 20:26:44 ubuntu systemd-networkd[1827]: wlan0: DHCPv4 address 192.168.1.13/24 via 192.168.1.1
May 01 20:26:44 ubuntu avahi-daemon[1937]: Joining mDNS multicast group on interface wlan0.IPv4 with address 192.168.1.13.
May 01 20:26:44 ubuntu avahi-daemon[1937]: New relevant interface wlan0.IPv4 for mDNS.
May 01 20:26:44 ubuntu avahi-daemon[1937]: Registering new address record for 192.168.1.13 on wlan0.IPv4.
May 01 20:26:44 ubuntu systemd-timesyncd[1741]: Network configuration changed, trying to establish connection.
May 01 20:26:44 ubuntu systemd[1]: ntp-systemd-netif.service: Start request repeated too quickly.
May 01 20:26:44 ubuntu systemd[1]: ntp-systemd-netif.service: Failed with result 'start-limit-hit'.
May 01 20:26:44 ubuntu systemd[1]: Failed to start ntp-systemd-netif.service.
May 01 20:26:44 ubuntu NetworkManager[1930]: <error> [1619918804.3714]
sup-iface[0xaaaacdc37a40,wlan0]: error adding interface: wpa_supplicant couldn't grab this interface.
May 01 20:26:44 ubuntu NetworkManager[1930]: <info> [1619918804.3716] device (wlan0): supplicant interface state: starting -> down
May 01 20:26:44 ubuntu NetworkManager[1930]: <info> [1619918804.3722] manager: startup complete
May 01 20:26:44 ubuntu systemd-timesyncd[1741]: Synchronized to time server 91.189.91.157:123
(ntp.ubuntu.com).
```

Seems like there's a little handshake issue with ntp-systemd-netif.service but it establishes ok.

```
May 01 20:26:48 ubuntu lightdm[2332]: PAM unable to dlopen(pam_kwallet.so):
/lib/security/pam_kwallet.so: cannot open shared object file: No such file or directory
May 01 20:26:48 ubuntu lightdm[2332]: PAM adding faulty module: pam_kwallet.so
May 01 20:26:48 ubuntu lightdm[2332]: PAM unable to dlopen(pam_kwallet5.so):
/lib/security/pam_kwallet5.so: cannot open shared object file: No such file or directory
May 01 20:26:48 ubuntu lightdm[2332]: PAM adding faulty module: pam_kwallet5.so
May 01 20:26:48 ubuntu lightdm[2332]: pam_unix(lightdm-greeter:session): session opened for user lightdm by (uid=0)
```

Seems to be self-installing pam_kwallet5.so

```
ubuntu@ubuntu:~$ ls /var/crash/ -atl
total 48
drwxrwsrwt 2 root whoopsie 4096 May 1 18:28 .
-rw-r--r-- 1 ubuntu whoopsie 0 May 1 18:28 _usr_bin_speedtest-cli.1000.upload
-rw-r----- 1 ubuntu whoopsie 38795 May 1 18:28 _usr_bin_speedtest-cli.1000.crash
drwxr-xr-x 14 root root 4096 Sep 19 2020 ..
```

Prev reported speedtest crashes. No other reports.

Following not red flagged but related to OSR:

```
May 01 20:26:47 ubuntu launch_osr.sh[2009]: + '[' -e
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch/osr_mod.launch ']'
May 01 20:26:47 ubuntu launch_osr.sh[2009]: + echo 'Launching osr_mod.launch'
May 01 20:26:47 ubuntu launch_osr.sh[2009]: Launching osr_mod.launch
May 01 20:26:47 ubuntu launch_osr.sh[2009]: + bash -i -c 'roslaunch osr Bringup
osr_mod.launch'
May 01 20:26:47 ubuntu launch_osr.sh[2009]: bash: cannot set terminal process group
(2009): Inappropriate ioctl for device
May 01 20:26:47 ubuntu launch_osr.sh[2009]: bash: no job control in this shell
```

```
ubuntu@ubuntu:~$ cat launch_osr.sh
#!/bin/bash
# exit on error, and output executed commands to stdout
set -ex
source osr_paths.sh
launch_dir=$OSR_CODE_DIR/ROS/osr Bringup/launch
bash -c ". /home/$USER/osr_ws/devel/setup.sh"
bash -c ". /home/$USER/osr_ws/devel/setup.bash"
bash -c ". /opt/ros/melodic/setup.sh"
bash -c ". /opt/ros/melodic/setup.bash"
# execute the custom mod launch file if it's available
if [ -e "$launch_dir/osr_mod.launch" ]; then
    echo "Launching osr_mod.launch"
    bash -i -c "roslaunch osr Bringup osr_mod.launch"
# otherwise go with the default
else
    echo "Launching osr.launch"
    bash -i -c "roslaunch osr Bringup osr.launch"
```

Re: **source osr_paths.sh**

```
fiubuntu@ubuntu:~$ sudo find / -name osr_paths.sh
/home/ubuntu/osr_ws/src/osr-rover-code/init_scripts/osr_paths.sh
/home/ubuntu/osr_paths.sh
```

```
ubuntu@ubuntu:~$ cat /home/ubuntu/osr_paths.sh
## Paths used for OSR code
# make sure to source (`$ source osr_paths.sh`) this script!
export OSR_CODE_DIR=$HOME/osr_ws/src/osr-rover-code
```

```
ubuntu@ubuntu:~$ cat
/home/ubuntu/osr_ws/src/osr-rover-code/init_scripts/osr_paths.sh
## Paths used for OSR code
# make sure to source (`$ source osr_paths.sh`) this script!
export OSR_CODE_DIR=$HOME/osr_ws/src/osr-rover-code
```

Re: **launch_dir=\$OSR_CODE_DIR/ROS/osr_bringup/launch**
directory is correct

Re: **bash -c ". /home/\$USER/osr_ws-devel/setup.sh"**
ubuntu@ubuntu:~/osr_ws/devel\$ cat setup.sh
#!/usr/bin/env sh
generated from catkin/cmake/template/setup.sh.in

Re: **bash -c ". /home/\$USER/osr_ws-devel/setup.bash"**
ubuntu@ubuntu:~/osr_ws/devel\$ cat setup.bash
#!/usr/bin/env bash
generated from catkin/cmake/templates/setup.bash.in
....

Re: **bash -c ". /opt/ros/melodic/setup.sh"**
ubuntu@ubuntu:/opt/ros/melodic\$ cat setup.sh
#!/usr/bin/env sh
generated from catkin/cmake/template/setup.sh.in
....

Re: **bash -c ". /opt/ros/melodic/setup.bash"**
ubuntu@ubuntu:/opt/ros/melodic\$ cat setup.bash
#!/usr/bin/env bash
generated from catkin/cmake/templates/setup.bash.in
...

```
Re: if [ -e "$launch_dir/osr_mod.launch" ]; then
    echo "Launching osr_mod.launch"
    bash -i -c "roslaunch osr Bringup osr_mod.launch"
```

reflects upon: **osr_mod.launch**

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_Bringup/launch$ cat
osr_mod.launch
<launch>
  <rosparam file="$(find osr_Bringup)/config/osr_params.yaml" />
  <!-- Nodes to run the Open Source Rover -->
  <node name="roboclaw_wrapper" pkg="osr" type="roboclaw_wrapper.py" output="screen">
    <rosparam command="load" file="$(find osr_Bringup)/config/roboclaw_params.yaml"/>
    <rosparam command="load" file="$(find osr_Bringup)/config/roboclaw_params_mod.yaml"/>
  </node>
  <node name="joy2twist" pkg="teleop_twist_joy" type="teleop_node">
    <param name="enable_button" value="4"/> <!-- which button to press to enable movement-->
    <param name="enable_turbo_button" value="5"/> <!-- -1: disable turbo -->
    <param name="axis_linear" value="1"/> <!-- which joystick axis to use for driving -->
    <param name="axis_angular" value="3"/> <!-- which joystick axis to use for turning -->
    <param name="scale_linear" value="0.60"/> <!-- scale to apply to drive speed, in m/s:
drive_motor_rpm * 2pi / 60 * wheel radius -->
    <param name="scale_angular" value="0.75"/> <!-- scale to apply to angular speed, in rad/s:
scale_linear / min_radius -->
    <param name="scale_linear_turbo" value="1.00"/> <!-- scale to apply to linear speed, in m/s -->
    <remap from="/cmd_vel" to="/cmd_vel_intuitive"/>
  </node>
  <rosparam command="load" file="$(find osr_Bringup)/config/physical_properties.yaml"/>
  <rosparam command="load" file="$(find osr_Bringup)/config/physical_properties_mod.yaml"/>
  <node name="rover" pkg="osr" type="rover.py" output="screen"/>
  <node pkg="joy"
        type="joy_node" name="joy_node">
    <param name="autorepeat_rate" value="1.0"/>
    <param name="coalesce_interval" value="0.05"/>
  </node>
  <!--include file="$(find usb_cam)/launch/usb_cam-test.launch" /-->
  <!--include file="$(find realsense2_camera)/launch/rs_camera.launch" /-->
</launch>
```

Is it just about?:

```
<node name="roboclaw_wrapper" pkg="osr" type="roboclaw_wrapper.py" output="screen">
```

```
ubuntu@ubuntu:~$ top -u ubuntu
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND	
19409	ubuntu	20	0	57972	52648	6312	R	55.9	1.4	0:01.79	rosnode	
2537	ubuntu	20	0	722656	53536	6392	R	52.4	1.4	404:18.14	python	
2580	ubuntu	20	0	4650172	2.130g	15932	S	34.4	57.5	393:39.43	fr_link_ros	
11806	ubuntu	20	0	891764	87472	14576	R	18.0	2.3	204:50.26	fr_webrtc	
2387	ubuntu	20	0	1216024	113124	15540	S	9.6	2.9	198:14.61	fr_agent	
17351	ubuntu	20	0	221956	27948	19836	S	8.0	0.7	0:17.21	floater	
19341	ubuntu	20	0	9592	3524	2792	R	3.2	0.1	0:00.58	top	
2935	ubuntu	20	0	638264	19024	10340	S	2.9	0.5	3:20.17	marco	
2488	ubuntu	20	0	1353488	57272	6608	S	2.3	1.5	21:17.93	rosmaster	
2542	ubuntu	20	0	868556	52548	6568	S	2.3	1.4	19:35.11	python	
2283	ubuntu	20	0	281888	55304	6836	S	1.0	1.4	6:11.07	roslaunch	
2533	ubuntu	20	0	273348	4352	3080	S	1.0	0.1	5:58.62	rosout	
2996	ubuntu	20	0	446252	15612	8508	R	0.6	0.4	4:37.20	clock-applet	
19459	ubuntu	20	0	1912	468	404	S	0.6	0.0	0:00.02	sh	
19460	ubuntu	20	0	4	4	0	R	0.6	0.0	0:00.02	fr_link_ros	
2541	ubuntu	20	0	338976	4108	3036	S	0.3	0.1	4:38.07	teleop_node	
2553	ubuntu	20	0	338644	4060	3000	S	0.3	0.1	4:34.27	joy_node	
16140	ubuntu	20	0	12428	4404	3388	S	0.3	0.1	0:00.95	sshd	
2009	ubuntu	20	0	6560	2620	2376	S	0.0	0.1	0:00.03	launch osr.sh	

Let's see if osr_startup.service can be reactivated w/ USB & RS cameras:

```
ubuntu@ubuntu:~$ rosrun osr Bringup/launch
```

```
LaunchOSR.sh front_webcam.launch osr.launch osr_mod.launch
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ nano
```

```
osr_mod.launch
```

```
<!--include file="$(find usb_cam)/launch/usb_cam-test.launch" /-->
```

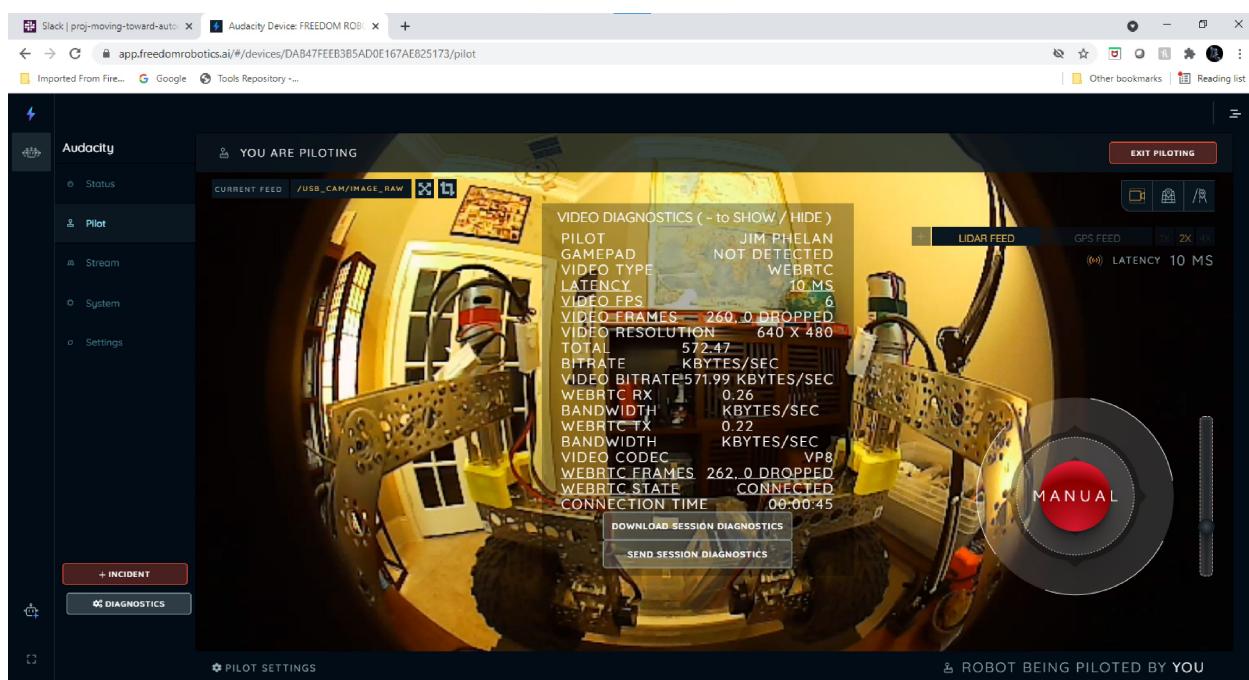
```
<!--include file="$(find realsense2_camera)/launch/rs_camera.launch" /-->
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ sudo reboot
```

```
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
```

```
May 02 16:21:17 ubuntu image_view[2618]: cannot open display:
```

```
probably trying to output image_view to nonexistent screen in batch file.
```



Reasonable latency of 10 MS and 6 FPS. 640x480 reso' looks better than normal pixelated view. Despite latency of "10 MS" the display was about a second behind behind a hand waved before it.

Now add the RS camera.

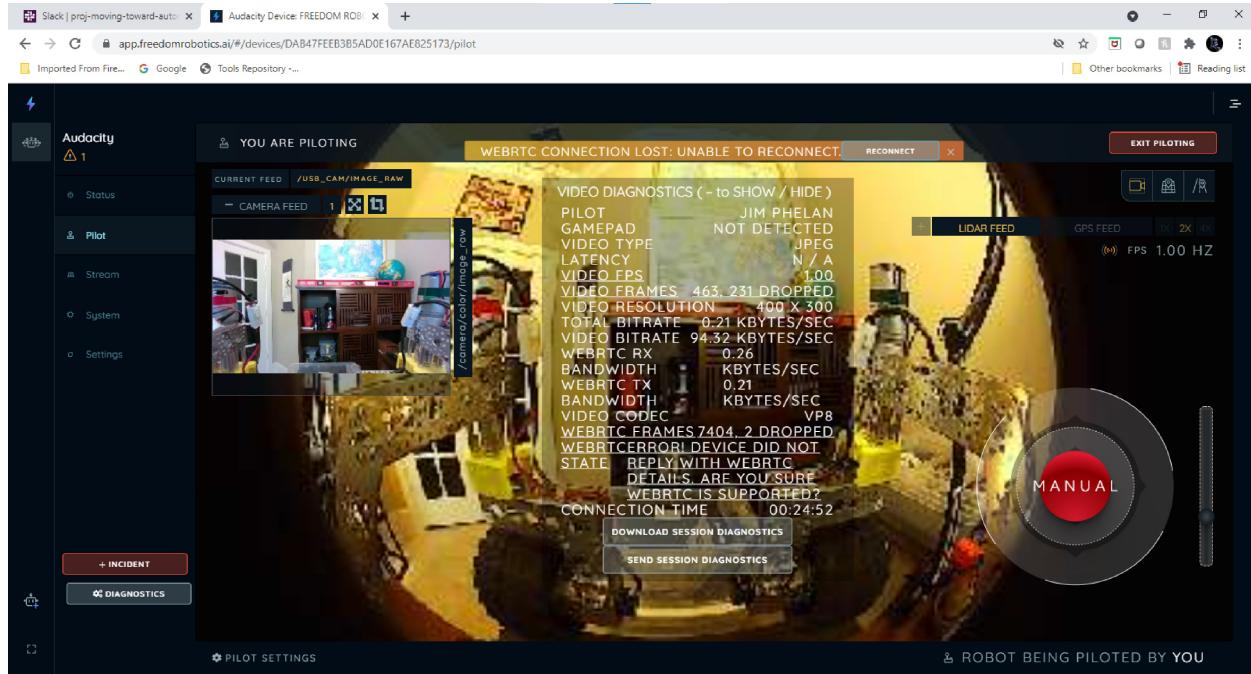
```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ nano
```

```
osr_mod.launch
```

```
<include file="$(find usb_cam)/launch/usb_cam-test.launch" />
```

```
<!--include file="$(find realsense2_camera)/launch/rs_camera.launch" /-->
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch$ sudo reboot
```



Down to 1 FPS, latency N/A (infinite), WebRTC fail. This time only 1 USB camera!

On to more advance features toward autonomy / SLAM.

Intel® RealSense™ and ROS/ROS 2

from RealSense email

https://www.intelrealsense.com/ros/?cid=em&source=elo&campid=egi_WW_egirs_EN_2021_RS_ROS_Blog_C-MKA-23569_T-MKA-24121&content=egi_WW_egirs_EMN_EN_2021_RS_ROS_Blog_B_C-MKA-23569_T-MKA-24121&elq_cid=7228371&em_id=68721&elqrid=4c8d4f501791423588331fb6c27dd27e&elqcampid=43866&erpm_id=10370164

https://dev.intelrealsense.com/docs/ros-wrapper?_ga=2.110390917.1682744136.1619994485-2080439009.1610678933

Launch parameters

ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch\$ **sudo nano**

rs_camera.PHELAN.launch

```
<arg name="serial_no" default="043422250975"/>
<arg name="device_type" default="d455"/>
<arg name="camera" default="RealSense D455"/>
<arg name="enable_infra" default="true"/>
<arg name="enable_color" default="true"/>
<arg name="enable_pointcloud" default="true"/>
```

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch\$ **nano**

osr_mod.launch

```
<!--include file="$(find usb_cam)/launch/usb_cam-test.launch" /-->
<!--include file="$(find realsense2_camera)/launch/rs_camera.PHELAN.launch" /-->
```

To prevent auto camera launch. Then manual RS camera only launch from RPi desktop.
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch\$ **sudo reboot**

ubuntu@ubuntu:~\$ **roscd realsense2_camera/launch**

ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch\$ **roslaunch**

realsense2_camera rs_camera.PHELAN.launch

Namespace [/RealSense D455] is invalid:

```
<arg name="camera" default="RealSense D455"/>
to
<arg name="camera" default="" />
but I think this would have worked
<arg name="camera" default="RealSenseD455"/>
```

rvis showed only RGB

realsense-viewer showed nothing

2021.05.08

Looking into Mission Patch ordering from: <https://www.abemblem.com/>
via ordering portal: <https://custompatches.abemblem.com/get-a-quote/>
image set to width 4" which makes the patch width & height 3 5/8"
image set to 4.4" should come out to 4" patch (4 x 4 / 3.625)

4" is a bit too large for a pocket. 3.5" would be better.
 $3.5 \times 4 / 3.625 = 3.86$ image width

Width: 3.5"
Height: 3.5"
Number of Colors: 5
Background: Non-Fully Embroidered
Border: Merrow
Backing: Iron-On
Quantity: 100
Name Your Patch: Open Source Mars Rover
Price: $\$3.29 \times 100 = \329.00 fully embroidered

Shipping envSelopes: 6"x9" x 100 = $\$17.99 \times 1.0825$ tax = $\$19.48 / 100 = \0.20 each
Postage: \$ 0.55

Patches $\$329.00 - 25\% \text{ discount} = \$254.40 / 100 = \$2.55$ each Fully embroidered
Shipping $\$75.00 + 19.48 = 94.48 / 100 = \0.95 each (\$0.55+0.20 extra oz)
International shipping = \$1.20 can be absorbed.

Space Center Houston Official patches are \$6.99 each
Space Center Houston shipping ~\$10.00+ depending on quantity
Sale price: \$7.00 + \$3.00 sh = \$10.00

TapaTalk post:

Open Source Rover Mission Patches now available!!

Somebody had to take the ball and run, so...

I just ordered 3.5", full color, fully embroidered, iron-on, OSR Mission Patches from the same company the astronauts use!

Space Center Houston sells official mission patches for \$6.99 plus tax and a lot for shipping.

For \$10 each, I will ship our own official Open Source Rover mission patch anywhere in the world (except COVID restricted countries).

Once I've covered expenses, 1/2 the profit will go to Lauren for designing such a fine patch. The other 1/2 will go to USAI Labs, a not-for-profit robotics education organization.

To order patches PayPal \$10 per patch to jphelan@hal-pc.org and include your name and shipping address.

I should be able to send them out before the end of the month.

2021.05.09

Mission Patches

Got 3 orders, 4 patches already this am
\$0.59 PayPal fee on first order.

2021.05.10

Now up to 26 patches from main players with hint of many more to come from Eric.
Heartening response!

2021.05.22

Return from vacation

Slack 2021.05.08 Achille:

*@James Phelan I just tested Freedom's Pilot on ROS2 and it also runs fine. The Raspberry pi is cutting it close in terms of CPU usage, but I was able to run at 8Hz. Make sure you're on the latest version of software (sudo apt-get update && sudo apt-get upgrade) and make sure you have the required packages installed and up-to-date, pip install --upgrade --user opencv-python
sudo apt install ros-\$ROS_DISTRO-cv-bridge*

ubuntu@ubuntu:~\$ **sudo apt-get update**
ubuntu@ubuntu:~\$ **sudo apt-get upgrade**

E: Could not get lock /var/lib/dpkg/lock-frontend - open (11: Resource temporarily unavailable)

E: Unable to acquire the dpkg frontend lock (/var/lib/dpkg/lock-frontend), is another process using it?

ubuntu@ubuntu:~\$ **sudo nano /etc/apt/apt.conf.d/20auto-upgrades**

change line one 1 > 0, save

Retried upgrade. Same error. Reboot.

ubuntu@ubuntu:~\$ **sudo apt-get upgrade**

worked this time part way then PuTTY crashed.

Reboot.

Run from desktop:

ubuntu@ubuntu:~\$ **sudo apt-get upgrade**

E: dpkg was interrupted, you must manually run 'sudo dpkg --configure -a' to correct the problem.

\$ sudo dpkg --configure -a

long update

Setting up ...

Update-initramfs: ...

...

Start over:

```
ubuntu@ubuntu:~$ sudo apt-get update
ubuntu@ubuntu:~$ sudo apt-get upgrade, Y
ubuntu@ubuntu:~$ sudo apt autoremove, Y
ubuntu@ubuntu:~$ pip install --upgrade --user opencv-python
numpy 1.17.5 uninstalled
numpy 1.19.5 installed
WARNING: You are using pip version 21.0.1; however, version 21.1.1 is available.
You should consider upgrading via '/usr/bin/python3 -m pip install --upgrade pip'
ubuntu@ubuntu:~$ /usr/bin/python3 -m pip install --upgrade pip
uninstalled 21.0.1
installed 21.1.1
ubuntu@ubuntu:~$ sudo apt install ros-$ROS_DISTRO-cv-bridge
already newest version
```

FR dashboard blank, no camera but getting data

```
ubuntu@ubuntu:~$ sudo systemctl start osr_startup.service
ubuntu@ubuntu:/opt/ros/melodic/share/realsense2_camera/launch $ rosrun
rs_camera.PHELAN.launch
now RS camera is working.
Still long latency and low FPS
```

2021.05.23

FRESH START

from Achille's Ubuntu 20.04, ROS2 repo:

<https://github.com/Achille/osl-rover-code/blob/foxy/nav2/setup/rpi.md>

128GB SD card

SD Card Formatter, Quick

1 Installing Ubuntu

The Raspberry Pi Imager has CHANGED since Achille's directions.

Had to choose CUSTOM then select the downloaded file and flash to SD card on F:

Try booting with just the Ubuntu Desktop:

Booted fine w/ no flagged errors.

Changed password.

2 Further setup: wifi, desktop GUI (optional), ssh

2.1 Connect to wifi from the command line

\$ ls /sys/class/net

eth0 lo wlan0

\$ ifconfig

Command 'ifconfig' not found, but can be installed with:

sudo apt install net-tools

Basically, you need to edit the /etc/netplan/50-cloud-init.yaml file and add your wifi network)

SSID-NAME-HERE is your network's name, and PASSWORD-HERE is the password for it.

ubuntu@ubuntu:~\$ cd /etc/netplan/

ubuntu@ubuntu:/etc/netplan\$ ls

50-cloud-init.yaml

ubuntu@ubuntu:/etc/netplan\$ sudo nano 50-cloud-init.yaml

network:

 ethernets:

 eth0:

 dhcp4: true

 optional: true

 version: 2

 wifis:

 wlan0:

 optional: true

 access-points:

 “SSID-NAME”:

 password: “PASSWORD”

 dhcp4: true

ubuntu@ubuntu:/etc/netplan\$ sudo netplan apply

...power save enabled...Under-voltage detected!...

```
[ENTER] to progress
ubuntu@ubuntu:/etc/netplan$ ip a
1: lo:...
2: eth0: ...
    192.168.1.22/24
    ...
3: wlan0: ...
    192.168.1.21/24
    ...
```

PuTTY
login to .22 ok

```
ubuntu@ubuntu:~$ hostname
ubuntu
ubuntu@ubuntu:~$ hostnamectl
ubuntu
ubuntu@ubuntu:~$ hostnamectl
  Static hostname: ubuntu
          Icon name: computer
      Machine ID: 3482470194d74305ae488efd95ea9b14
          Boot ID: 3918c816fa41429095e3d7014366554e
Operating System: Ubuntu 20.04.2 LTS
          Kernel: Linux 5.4.0-1028-raspi
        Architecture: arm64
```

```
ubuntu@ubuntu:~$ sudo hostname AUDACITY
ubuntu@ubuntu:~$ hostnamectl
  Static hostname: ubuntu
Transient hostname: AUDACITY
          Icon name: computer
      Machine ID: 3482470194d74305ae488efd95ea9b14
          Boot ID: 3918c816fa41429095e3d7014366554e
Operating System: Ubuntu 20.04.2 LTS
          Kernel: Linux 5.4.0-1028-raspi
        Architecture: arm64
```

```
ubuntu@ubuntu:~$ hostnamectl set-hostname AUDACITY
==== AUTHENTICATING FOR
org.freedesktop.hostname1.set-static-hostname ===
Authentication is required to set the statically configured local
host name, as well as the pretty host name.
Authenticating as: Ubuntu (ubuntu)
Password: Could not set property: Connection timed out
polkit-agent-helper-1: pam_authenticate failed: Authentication
failure
```

```
ubuntu@ubuntu:~$ hostnamectl set-hostname AUDACITY
===== AUTHENTICATING FOR
org.freedesktop.hostname1.set-static-hostname ===
Authentication is required to set the statically configured local
host name, as well as the pretty host name.
Authenticating as: Ubuntu (ubuntu)
Password:<password>
===== AUTHENTICATION COMPLETE ===
ubuntu@ubuntu:~$ hostnamectl      [NOTE hostname not changed]
    Static hostname: AUDACITY
        Icon name: computer
        Machine ID: 3482470194d74305ae488efd95ea9b14
            Boot ID: 3918c816fa41429095e3d7014366554e
Operating System: Ubuntu 20.04.2 LTS
        Kernel: Linux 5.4.0-1028-raspi
    Architecture: arm64
try reboot
ubuntu@ubuntu:~$ sudo reboot

AUDACITY login: ubuntu
Password: <password>
...
ubuntu@AUDACITY:~$ ip a
[same IP addresses]
PuTTY connected ok
```

SKIP THE GUI INSTALL

2.2 Install a desktop GUI environment (optional)
This is a good option for newbies to the linux world. It's pretty easy to do, though it'll take a while (maybe an hour).
Follow the instructions [here](#).

[I thought I downloaded Ubuntu desktop!? Why isn't one showing?]

Update Repositories and Packages
ubuntu@AUDACITY:~\$ sudo apt-get update
...
Fetched 3546 kB in 4s (813 kB/s)
Reading package lists... Done
ubuntu@AUDACITY:~\$ sudo apt-get upgrade, Y
...done

Next, install the tasksel manager utility:
sudo apt-get install tasksel
ubuntu@AUDACITY:~\$ sudo apt-get install tasksel, Y

Select a Display Manager

To install SliM:

```
sudo apt-get install slim
```

```
ubuntu@AUDACITY:~$ sudo apt-get install slim, Y
```

Choose a GUI for Your Server

GNOME is the default GUI for most Ubuntu installations and is (loosely) based on the Apple ecosystem.

To install GNOME, start by launching tasksel:

```
tasksel
```

```
ubuntu@AUDACITY:~$ tasksel
```

A colorful interface will launch. Use the arrow key to scroll down the list and find Ubuntu desktop.

```
debconf: DbDriver "passwords" warning: could not open
/var/cache/debconf/passwords.dat: Permission denied
debconf: DbDriver "config": could not write
/var/cache/debconf/config.dat-new: Permission denied
tasksel: debconf failed to run
```

Note that you'll probably need to sudo tasksel (instead of without sudo, per the instructions), otherwise you'll get a permissions error.

```
ubuntu@AUDACITY:~$ sudo tasksel
```

```
success
```

The system will install the software and reboot, giving you a graphical login screen generated by your default display manager. In our case, it's SliM. [it didn't reboot, so I will?]

```
ubuntu@AUDACITY:~$ sudo reboot
```

[reboot didn't display desktop, just command line login.]

F1 no effect. Let's try reinstall tasksel/desktop]

[ENTER] from command line % low voltage brought up tasksel again.
Chose only Ubuntu Desktop.

tasksel: apt-get failed (100)

[try sudo tasksel again]

```
ubuntu@AUDACITY:~$ sudo tasksel
```

[uncheck cloud image]

uncheck OpenSSH server

uncheck Basic Ubuntu Server

check Ubuntu desktop]

tasksel: apt-get failed (100)

[Maybe I should leave them checked??]

[KEEP GETTING UNDERVOLTAGE WARNINGS, as I did w/ prior setup.
Wonder if powering Pi directly w/ it's own power supply will
eliminate this. Will do next reboot w/ shutdown & restart w/ new
power supply instead of OSR PCB.]

Pi4 power supply lighted red LED but no green flashes nor reboot sequence on monitor. Removed GPIO ribbon cable & got some green flashes but no boot on monitor. OH! I ACCIDENTALLY UNPLUGGED THE MONITOR FROM THE HDMI PORT. Replugged. Repowered & boot successful! Came up to GUI desktop! Small command line window appears black/white. Can't resize. Can't move. Clicking desktop no effect. Same IP addresses. Try sudo tasksel again? This time leave defaults checked.]

ubuntu@AUDACITY:~\$ **sudo tasksel**
[slower install.... Same result. Let's do it all over WITHOUT the desktop/GUI]

\$ **sudo shutdown -h now**
Will leave the dedicate Pi4 power supply for now.

STARTING OVER

Setting up the Raspberry Pi (RPi)

<https://github.com/Achillle/osr-rover-code/blob/foxy/nav2/setup/rpi.md>

1 Installing Ubuntu

The Ubuntu download site doesn't offer 64 bit Desktop 20.04 except as an .iso format which doesn't boot following either Raspberry Pi Imager nor Win32 Disk Imager.

I don't need the GUI and installing is fraught with problems.
Skip it & just use the SERVER 64 bit 20.04 version via Raspberry Pi Imager.

```
Booting successfully!
ubuntu login: ubuntu
Password: ubuntu
change password
Current password: ubuntu
New password: <new password>
Retype new password: <new password>
```

2 Further setup: wifi, desktop GUI (optional), ssh

2.1 Connect to wifi from the command line

Basically, you need to edit the /etc/netplan/50-cloud-init.yaml file and add your wifi network)

SSID-NAME-HERE is your network's name, and PASSWORD-HERE is the password for it.

After following these steps, you should see an ip address assigned in the output of ip a. It will be an inet value like 192.168.1.18, underneath an interface entry like wlan0

```
[same as previously
ubuntu@ubuntu:/etc/netplan$ sudo netplan apply
ubuntu@ubuntu:/etc/netplan$ ip a
[same IP addresses]
[Now PuTTY in]
```

```
ubuntu@ubuntu:~$ hostnamectl set-hostname AUDACITY
```

2.2 Install a desktop GUI environment (optional)

SKIP Needed afterall, see ROS2 install below. :-(

2.3 Enable SSH

You probably will also want to connect to your newly configured RPi remotely over ssh, rather than having to use a separate monitor every time. Instructions here.

Basically, run sudo systemctl enable ssh.socket from the command line

Now you should be able to login from your dev machine. ssh ubuntu@192.168.1.18, using the ip address for your RPi that you found above.

It should prompt you for a password. Once you enter it successfully, you'll be logged on! The enable step above should configure the ssh server to automatically come up on reboot, so you can just login to the RPi remotely from now on.

```
ubuntu@ubuntu:~$ sudo systemctl enable ssh.socket  
from CMD can login as ssh ubuntu@192.168.1.22  
accept security risk, enter login "ubuntu", enter password.  
[PuTTY works better]
```

3 Installing ROS

We'll install ROS2 (Robot Operating System) Foxy on the RPi. If you're new to ROS, we recommend learning it as it is a crucial part in the code base.

You'll need to be logged in to the RPi via ssh, or open a terminal in the desktop GUI if you installed it above.

Follow the instructions for installing ROS2.

You can choose to either install the 'full version' (sudo apt install ros-foxy-desktop) which comes with graphical packages like RViz and QT or install just the barebones version (sudo apt install ros-foxy-ros-base). The latter allows you to install packages in the full version whenever you need them. If you didn't install the GUI on Ubuntu, definitely install the base version as you will have little use for GUI applications in the full version.

[I'll need to install the GUI after all as I'll need Rviz & QT]

```
ubuntu@ubuntu:~$ sudo apt-get update && sudo apt-get upgrade
```

Next, install the tasksel manager utility:

```
sudo apt-get install tasksel
```

```
ubuntu@ubuntu:~$ sudo apt-get install tasksel
```

Now it is time to install a desktop environment.

Select a Display Manager

If you need to conserve system resources, consider a lighter display manager, like SDDM, SLiM, or LightDM

To install SLiM:

```
sudo apt-get install slim
```

```
ubuntu@ubuntu:~$ sudo apt-get install slim
```

Choose a GUI for Your Server

GNOME is the default GUI for most Ubuntu installations and is (loosely) based on the Apple ecosystem.

To install GNOME, start by launching tasksel:

```
ubuntu@ubuntu:~$ tasksel
```

Ubuntu desktop ONLY

```
debconf: DbDriver "passwords" warning: could not open
/var/cache/debconf/passwords.dat: Permission denied
debconf: DbDriver "config": could not write
/var/cache/debconf/config.dat-new: Permission denied
tasksel: debconf failed to run
[forgot to "sudo tasksel"]
```

```
ubuntu@ubuntu:~$ sudo tasksel
```

Extracting templates from packages: 100%

```
tasksel: apt-get failed (100)
```

Google: "tasksel apt-get failed (100)"
<https://superuser.com/questions/1629058/ubuntu-20-04-lts-server-tasksel-apt-get-failed-100-while-installing-ubuntu>

SOLUTION 2: Check that you have tasksel dependencies installed using the commands:

```
ubuntu@ubuntu:~$ sudo apt list --installed debhelper*
Listing... Done
ubuntu@ubuntu:~$ sudo apt list --installed dpkg-dev*
Listing... Done
ubuntu@ubuntu:~$ sudo apt list --installed gettext*
Listing... Done
gettext-base/focal,now 0.19.8.1-10build1 arm64
[installed,automatic]
ubuntu@ubuntu:~$ sudo apt list --installed po-debconf*
Listing... Done
```

```
ubuntu@ubuntu:~$ sudo apt-get debhelper
[long install]
ubuntu@ubuntu:~$ sudo apt-get install dpkg-dev
dpkg-dev is already the newest version (1.19.7ubuntu3).
ubuntu@ubuntu:~$ sudo apt-get install po-debconf
po-debconf is already the newest version (1.0.21).
ubuntu@ubuntu:~$ sudo apt-get install gettext
gettext is already the newest version (0.19.8.1-10build1).
```

[Looks like debhelper was missing link?]

```
ubuntu@ubuntu:~$ sudo tasksel
xserver-xorg           install
tasksel: apt-get failed (100)
ubuntu@ubuntu:~$ sudo apt-get install xserver-xorg
xserver-xorg is already the newest version (1:7.7+19ubuntu14).
```

```
ubuntu@ubuntu:~$ sudo apt-get update && sudo apt-get upgrade
The following packages have been kept back:
  ubuntu Advantage-tools
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
```

```
ubuntu@ubuntu:~$ sudo tasksel
[failed again]
```

Google “xserver-xorg install tasksel: apt-get failed (100)”:

<https://www.youtube.com/watch?v=NlkPm5JCGNc>

suggested:

ubuntu@ubuntu:~\$ **sudo dpkg --configure -a**

[same error]

suggested:

check /etc/resolv.conf for DNS settings [SKIP]

check /etc/apt/sources.list for update servers [SKIP]

run apt-get update && apt-get install vim (or whatever to test) [SKIP]

ubuntu@ubuntu:~\$ sudo apt-get remove tasksel

ubuntu@ubuntu:~\$ sudo apt-get remove slim

SCREW IT! I'LL DO WITHOUT THE GUI DESKTOP

3 Installing ROS

We'll install ROS2 (Robot Operating System) Foxy on the RPi. If you're new to ROS, we recommend learning it as it is a crucial part in the code base.

You'll need to be logged in to the RPi via ssh, or open a terminal in the desktop GUI if you installed it above.

Follow the [instructions](#) for installing ROS2.

Installing ROS 2 on Ubuntu Linux

You can choose to either install the 'full version' (`sudo apt install ros-foxy-desktop`) which comes with graphical packages like RViz and QT or install just the barebones version (`sudo apt install ros-foxy-ros-base`). The latter allows you to install packages in the full version whenever you need them. If you didn't install the GUI on Ubuntu, definitely install the base version as you will have little use for GUI applications in the full version.

We support Ubuntu Linux Focal Fossa (20.04) 64-bit x86 and 64-bit ARM.

Add the ROS 2 apt repository

You will need to add the ROS 2 apt repositories to your system. To do so, first authorize our GPG key with apt like this:

```
sudo apt update && sudo apt install curl gnupg2 lsb-release  
sudo curl -sSL
```

```
https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -o  
/usr/share/keyrings/ros-archive-keyring.gpg
```

```
ubuntu@ubuntu:~$ sudo apt update && sudo apt install curl gnupg2  
lsb-release
```

```
ubuntu@ubuntu:~$ sudo curl -sSL  
https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -o  
/usr/share/keyrings/ros-archive-keyring.gpg
```

And then add the repository to your sources list:

```
echo "deb [arch=$(dpkg --print-architecture)  
signed-by=/usr/share/keyrings/ros-archive-keyring.gpg]  
http://packages.ros.org/ros2/ubuntu $(lsb_release -cs) main" |  
sudo tee /etc/apt/sources.list.d/ros2.list > /dev/null
```

```
ubuntu@ubuntu:~$ echo "deb [arch=$(dpkg --print-architecture)  
signed-by=/usr/share/keyrings/ros-archive-keyring.gpg]  
http://packages.ros.org/ros2/ubuntu $(lsb_release -cs) main" |  
sudo tee /etc/apt/sources.list.d/ros2.list > /dev/null
```

Downloading ROS 2

Go to releases:

<https://github.com/ros2/ros2/releases>

and choose Foxy Fitzroy - Patch Release 4

<https://github.com/ros2/ros2/releases/tag/release-foxy-20201211>

Then choose arm64

Download the latest package for Ubuntu; let's assume that it ends up at

ros2-foxy-20201211-linux-focal-arm64.tar.bz2

[Have to use Filezilla to get it from PC > Pi]

done

Unpack it:

mkdir -p ~/ros2_foxy

cd ~/ros2_foxy

tar xf ~/Downloads/ros2-foxy-20201211-linux-focal-arm64.tar.bz2

```
ubuntu@ubuntu:~$ mkdir -p ~/ros2_foxy
```

```
ubuntu@ubuntu:~$ ls
```

```
Downloads ros2_foxy
```

```
ubuntu@ubuntu:~$ cd ros2_foxy/
```

```
ubuntu@ubuntu:~/ros2_foxy$ tar xf
```

```
~/Downloads/ros2-foxy-20201211-linux-focal-arm64.tar.bz2
```

```
ubuntu@ubuntu:~/ros2_foxy$ ls
```

```
ros2-linux
```

Installing and initializing rosdep

sudo apt update

sudo apt install -y python3-rosdep

sudo rosdep init

rosdep update

```
ubuntu@ubuntu:~/ros2_foxy$ sudo apt update
```

```
ubuntu@ubuntu:~/ros2_foxy$ sudo apt install -y python3-rosdep
```

```
ubuntu@ubuntu:~/ros2_foxy$ sudo rosdep init
```

```
ubuntu@ubuntu:~/ros2_foxy$ rosdep update
```

Installing the python3 libraries

sudo apt install -y libpython3-dev python3-pip

pip3 install -U argcomplete

```
ubuntu@ubuntu:~/ros2_foxy$ sudo apt install -y libpython3-dev
```

```
python3-pip
```

```
ubuntu@ubuntu:~/ros2_foxy$ pip3 install -U argcomplete
```

Set up your environment by sourcing the following file.

```
. ~/ros2_foxy/ros2-linux/setup.bash
```

```
ubuntu@ubuntu:~/ros2_foxy$ source  
~/ros2_foxy/ros2-linux/setup.bash  
[DELETE the '.' in the instructions.  
Or maybe '.' means 'source'?]
```

Try some examples

In one terminal, source the setup file and then run a C++ talker:

```
. ~/ros2_foxy/ros2-linux/setup.bash  
ros2 run demo_nodes_cpp talker
```

In another terminal source the setup file and then run a Python listener:

```
. ~/ros2_foxy/ros2-linux/setup.bash  
ros2 run demo_nodes_py listener
```

You should see the talker saying that it's Publishing messages and the listener saying I heard those messages. This verifies both the C++ and Python APIs are working properly. Hooray!

```
ubuntu@ubuntu:~/ros2_foxy$ . ~/ros2_foxy/ros2-linux/setup.bash  
ubuntu@ubuntu:~/ros2_foxy$ ros2 run demo_nodes_cpp talker  
terminate called after throwing an instance of  
'rclcpp::exceptions::RCL Error'  
what(): failed to initialize rcl init options: failed to load  
shared library of rmw implementation:  
/home/ubuntu/ros2_foxy/ros2-linux/lib/librmw_fastrtps_cpp.so  
Exception: LoadLibrary error: libtinyxml2.so.6: cannot open shared  
object file: No such file or directory, at  
/home/jenkins-agent/workspace/ci_packaging_linux-aarch64/ws/src/ro  
s2/rmw/src/shared_library.c:84, at  
/home/jenkins-agent/workspace/ci_packaging_linux-aarch64/ws/src/ro  
s2/rmw_implementation/rmw_implementation/src/functions.cpp:62, at  
/home/jenkins-agent/workspace/ci_packaging_linux-aarch64/ws/src/ro  
s2/rcl/rcl/src/rcl/init_options.c:61  
  
find: 'demo_nodes': No such file or directory
```

You can choose to either install the 'full version' (`sudo apt install ros-foxy-desktop`) which comes with graphical packages like RViz and QT or install just the barebones version (`sudo apt install ros-foxy-ros-base`). The latter allows you to install packages in the full version whenever you need them. If you didn't install the GUI on Ubuntu, definitely install the base version as you will have little use for GUI applications in the full version.

[The above instruction for install say nothing about
 `sudo apt install ros-foxy-ros-EITHER`
Let's try?]

```
ubuntu@ubuntu:~$ sudo apt install ros-foxy-ros-base  
[long install]
```

Try Examples above again:

Terminal 1:

```
[INFO] [1621818242.282384992] [talker]: Publishing: 'Hello World:  
95'
```

Terminal 2:

```
[INFO] [1621818242.288983877] [listener]: I heard: [Hello World:  
95]
```

4 Setting up ROS environment and building the rover code
[Let's save this for tomorrow?]

AUDACITY2??

2021.05.25

4 Setting up ROS environment and building the rover code

4.1 Setup ROS build environment

First we'll create a ROS workspace for the rover code.

Create a colcon workspace directory, which will contain all ROS compilation and

source code files, and navigate into it

```
mkdir -p ~/osr_ws/src && cd ~/osr_ws
```

Source your newly created ROS environment

```
source /opt/ros/foxy/setup.bash
```

install the build tool colcon

```
sudo apt install python3-colcon-common-extensions
```

```
ubuntu@AUDACITY:~$ mkdir -p ~/osr_ws/src && cd ~/osr_ws
```

```
ubuntu@AUDACITY:~/osr_ws$ source /opt/ros/foxy/setup.bash
```

```
ubuntu@AUDACITY:~/osr_ws$ sudo apt install
```

```
python3-colcon-common-extensions
```

4.2 Clone and build the rover code

For this section, you'll be working with the version control software git. Now's a good time to read up on how that works if you're new to it and make a GitHub account! In the newly created catkin workspace you just made, clone this repo:

```
sudo apt install git
```

```
cd ~/osr_ws/src
```

```
git clone https://github.com/nasa-jpl/osr-rover-code.git
```

```
cd osr-rover-code
```

```
git fetch origin
```

```
git checkout foxy-devel
```

install the dependencies using rosdep

```
sudo apt install python3-rosdep
```

```
cd ..
```

```
sudo rosdep init
```

```
rosdep update
```

```
rosdep install --from-paths src --ignore-src
```

```
# build the ROS packages
```

```
colcon build --symlink-install
```

```
ubuntu@AUDACITY:~/osr_ws$ sudo apt install git
ubuntu@AUDACITY:~/osr_ws$ cd ~/osr_ws/src
ubuntu@AUDACITY:~/osr_ws/src$ git clone
https://github.com/nasa-jpl/osr-rover-code.git
ubuntu@AUDACITY:~/osr_ws/src$ cd osr-rover-code
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git fetch origin
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git checkout
foxy-devel
Branch 'foxy-devel' set up to track remote branch 'foxy-devel'
from 'origin'.
Switched to a new branch 'foxy-devel'
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ sudo apt install
python3-rosdep
Reading package lists... Done
Building dependency tree
Reading state information... Done
python3-rosdep is already the newest version (0.20.1-1).
The following package was automatically installed and is no longer
required:
  laptop-detect
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ sudo apt autoremove
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ cd ..
ubuntu@AUDACITY:~/osr_ws/src$ sudo rosdep init
ERROR: default sources list file already exists:
        /etc/ros/rosdep/sources.list.d/20-default.list
Please delete if you wish to re-initialize
ubuntu@AUDACITY:~/osr_ws/src$ rosdep update
...
updated cache in /home/ubuntu/.ros/rosdep/sources.cache
ubuntu@AUDACITY:~/osr_ws/src$ rosdep install --from-paths src
--ignore-src
given path 'src' does not exist
```

Post to Slack:

@Achille am trying to upgrade to Ubuntu 20 and ROS2 via your
<https://github.com/Achille/osr-rover-code/blob/foxy/nav2/setup/rpi.md>

All went reasonably well (except I absolutely could NOT get a GUI to install with tasksel so I'm doing without) up until "4.2 Clone and build the rover code" when I get to
rosdep install --from-paths src --ignore-src

I get the error
given path 'src' does not exist

Achille 8:31 AM

It's best to follow the instructions from the official branch for that, which is in the main repo:

<https://github.com/nasa-jpl/osr-rover-code/tree/foxy-devel> instead of using my fork.

The instructions look like this:

```
git clone https://github.com/nasa-jpl/osr-rover-code.git
```

```
cd osr-rover-code
```

```
git fetch origin
```

```
git checkout foxy-devel
```

```
[...]
```

```
cd ..
```

```
sudo rosdep init
```

```
rosdep update
```

```
rosdep install --from-paths src --ignore-src
```

If 'src' doesn't exist, you either failed to clone the repository or aren't in the correct folder (cd ..)

My reply:

@Achille

apparently one cd .. isn't enough. That just got me from

\$/ osr_ws/src/osr-rover-code up to

\$/ osr_ws/src but it needs to be above /src with another cd ..

when I did that then the rosdep worked ok

2021.05.26

```
# build the ROS packages
colcon build --symlink-install
```

```
ubuntu@AUDACITY:~/osr_ws$ colcon build --symlink-install
```

```
success
```

```
ubuntu@AUDACITY:~/osr_ws$ source install/setup.bash
```

The rover has some customizable settings that will overwrite the default values. Whether you have any changes compared to the defaults or not, you have to manually create these files:

```
cd ~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
```

```
touch osr_params_mod.yaml roboclaw_params_mod.yaml
```

```
ubuntu@AUDACITY:~/osr_ws$ cd
```

```
~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
```

```
$ touch osr_params_mod.yaml roboclaw_params_mod.yaml
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
```

```
$ ls
```

```
osr_params.yaml osr_params_mod.yaml roboclaw_params.yaml
```

```
roboclaw_params_mod.yaml
```

To change any values from the default (if your rover doesn't match the default instructions), modify these files (the `_mod.yaml` ones) instead of the original ones. This way your changes don't get committed to git. The files follow the same structure as the default. Just include the values that you need to change as the default values for other parameters may change over time.

You might also want to modify the file `osr-rover-code/ROS/osr_bringup/launch/osr_launch.py` to change the velocities the gamepad controller will send to the rover. These values in the node `joy_to_twist` are of interest:

```
{"scale_linear": 0.8}, # scale to apply to drive speed, in m/s: drive_motor_rpm * 2pi / 60 * wheel radius * slowdown_factor {"scale_angular": 1.75}, # scale to apply to angular speed, in rad/s: scale_linear / min_radius {"scale_linear_turbo": 1.78}, # scale to apply to linear speed, in m/s
```

The maximum speed your rover can go is determined by the no-load speed of your drive motors. The default no-load speed is located in the file `osr_params.yaml` as `drive_no_load_rpm`, unless you modified it in the corresponding `_mod.yaml` file. This maximum speed corresponds to `scale_linear_turbo` and can be calculated as `drive_no_load_rpm * 2pi / 60 * wheel radius (=0.075m)`. Based on this upper limit, let's set our regular moving speed to a sensible fraction of that which you can configure to your liking. Start with e.g. `0.75 * scale_linear_turbo`. If you think it's too slow or too fast, simply scale it up or down.

The turning speed of the rover, just like a regular car, depends on how fast it's going. As a result, `scale_angular` should be set to `scale_linear / min_radius`. For the default configuration, the `min_radius` equals `0.45m`. The maximum speed your rover can go is determined by the no-load speed of your drive motors. The default no-load speed is located in the file `osr_params.yaml` as `drive_no_load_rpm`, unless you modified it in the corresponding `_mod.yaml` file. This maximum speed corresponds to `scale_linear_turbo` and can be calculated as `drive_no_load_rpm * 2pi / 60 * wheel radius (=0.075m)`. Based on this upper limit, let's set our regular moving speed to a sensible fraction of that which you can configure to your liking. Start with e.g. `0.75 * scale_linear_turbo`. If you think it's too slow or too fast, simply scale it up or down.

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The turning speed of the rover, just like a regular car, depends on how fast it's going. As a result, `scale_angular` should be set to `scale_linear / min_radius`. For the default configuration, the `min_radius` equals 0.45m.

4.3 Add ROS config scripts to `.bashrc`

The `source...foo.bash` lines above are used to manually configure your ROS environment. We can do this automatically in the future by doing:

```
cd ~  
echo "source /opt/ros/foxy/setup.bash" >> ~/.bashrc  
echo "source ~/osr_ws/install/setup.bash" >> ~/.bashrc
```

This adds the source lines to `~/.bashrc`, which runs whenever a new shell is opened on the RPi - by logging in via ssh, for example. So, from now on, when you log into the RPi your new command line environment will have the appropriate configuration for ROS and the rover code.

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
$ cd ~
ubuntu@AUDACITY:~$ echo "source /opt/ros/foxy/setup.bash" >>
~/.bashrc
ubuntu@AUDACITY:~$ echo "source ~/osr_ws/install/setup.bash" >>
~/.bashrc
```

SHUTDOWN TO ALLOW RECONNECTION OF THE Pi TO THE PCB POWER SUPPLY,
GPIO RIBBON STRIP AND XBOX DONGLE.

5 Setting up serial communication on the RPi

The RPi will talk to the motor controllers over serial.

5.1 Disable [serial-getty@ttyS0.service](#)

Because we are using the serial port for communicating with the roboclaw motor controllers, we have to disable the `serial-getty@ttyS0.service` service. This service has some level of control over serial devices that we use, so if we leave it on it we'll get weird errors (source). Note that the masking step was suggested here. It seems to be necessary for some setups of the rpi4 - just using `systemctl disable` won't cut it for disabling the service.

Note that the following will stop you from being able to communicate with the RPi over the serial, wired connection. However, it won't affect communication with the rpi with SSH over wifi.

```
sudo systemctl stop serial-getty@ttyS0.service
sudo systemctl disable serial-getty@ttyS0.service
sudo systemctl mask serial-getty@ttyS0.service
```

```
ubuntu@AUDACITY:~$ sudo systemctl stop serial-getty@ttyS0.service
ubuntu@AUDACITY:~$ sudo systemctl disable
serial-getty@ttyS0.service
ubuntu@AUDACITY:~$ sudo systemctl mask serial-getty@ttyS0.service
Created symlink /etc/systemd/system/serial-getty@ttyS0.service →
/dev/null.
```

5.2 Copy udev rules

Now we'll need to copy over a udev rules file, which is used to configure needed device files in /dev; namely, ttyS0 and ttyAMA0. Here's a good primer on udev.

```
# copy udev file from the repo to your system
cd ~/osr_ws/src/osr-rover-code/config
sudo cp serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules

# reload the udev rules so that the devices files are set up
# correctly.
sudo udevadm control --reload-rules && sudo udevadm trigger

ubuntu@AUDACITY:~$ cd ~/osr_ws/src/osr-rover-code/config
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ sudo cp
serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ sudo udevadm
control --reload-rules && sudo udevadm trigger
This configuration should persist across RPi reboots.
```

5.3 Add user to tty group

Finally, add the user to the tty group:

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ sudo adduser
ubuntu tty
```

5.4 Remove console line in cmdline.txt boot config file

Do the following steps:

```
cd /boot/firmware
sudo cp cmdline.txt cmdline.txt.bak
sudo nano cmdline.txt
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ cd
```

/boot/firmware

```
ubuntu@AUDACITY:/boot/firmware$ sudo cp cmdline.txt
cmdline.txt.bak
```

```
ubuntu@AUDACITY:/boot/firmware$ sudo nano cmdline.txt
```

*And then delete the substring **console=serial0,115200** from the single line of text in the file. Save and exit.*

*You can confirm that you edited the file correctly using **cat cmdline.txt** from the command line, and inspecting the output.*

```
ubuntu@AUDACITY:/boot/firmware$ cat cmdline.txt
net.ifnames=0 dwc_otg.lpm_enable=0 console=tty1
root=LABEL=writable rootfstype=ext4 elevator=deadline rootwait
fixrtc
```

5.5 Disable bluetooth in config.txt boot config file

Execute the following commands

```
cd /boot/firmware  
sudo cp config.txt config.txt.bak  
sudo nano config.txt
```

```
ubuntu@AUDACITY:/boot/firmware$ cd /boot/firmware [already there]  
ubuntu@AUDACITY:/boot/firmware$ sudo cp config.txt config.txt.bak  
ubuntu@AUDACITY:/boot/firmware$ sudo nano config.txt
```

*And then add the new line **dtoverlay=disable-bt** immediately after the existing line **cmdline=cmdline.txt** towards the bottom of the file*

5.6 Restart the RPi

We need to restart for all of these changes to take effect.

*Execute: **sudo reboot now***

6 Testing serial comm with the Roboclaw motors controllers
Run the roboclawtest.py script with all of the motor addresses:

```
cd ~/osr_ws/src/osr-rover-code/scripts  
python roboclawtest.py 128  
python roboclawtest.py 129  
python roboclawtest.py 130  
python roboclawtest.py 131  
python roboclawtest.py 132
```

```
ubuntu@AUDACITY:~$ cd ~/osr_ws/src/osr-rover-code/scripts  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python  
roboclawtest.py 128  
Command 'python' not found, did you mean:  
  command 'python3' from deb python3  
  command 'python' from deb python-is-python3  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3  
roboclawtest.py 128  
Connected to /dev/serial1.  
(1, 'USB Roboclaw 2x7a v4.1.34\\n')  
(1, 0, 128)
```

CONTINUE in Main Repo:

Launch:

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_control/osr_co  
ntrol$ cd
```

```
ubuntu@AUDACITY:~$ roslaunch osr Bringup osr.launch
```

Command 'roslaunch' not found, but can be installed with:

```
    sudo apt install python3-roslaunch
```

```
ubuntu@AUDACITY:~$ sudo apt install python3-roslaunch
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 128
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 129
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 130
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 131
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 763, 130)
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 132
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 868, 130)
```

Post to Slack:

Shouldn't the response match the call? 129>129 instead of
129>128?

Will have to peruse the code....

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ ls
make_readme_pdf.sh  roboclawtest.py
```

```

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ cat
roboclawtest.py
# A short and sweet script to test communication with a single
# roboclaw motor controller.
# usage
#   $ python3 roboclawtest.py 128
# Things are working if you don't get an error and you see
# something like:
# (1, 'USB Roboclaw 2x7a v4.1.34\n')
# (1, 4314, 128)

from time import sleep
import sys
from os import path
# need to add the roboclaw.py file in the path
sys.path.append(path.join(path.expanduser('~'),
'osr_ws/src/osr-rover-code/ROS/osr_control/osr_control'))
from roboclaw import Roboclaw

if __name__ == "__main__":
    address = int(sys.argv[1])          #sys.argv[1] = 128
    roboclaw0 = Roboclaw("/dev/serial0", 115200)
    roboclaw1 = Roboclaw("/dev/serial1", 115200)
    connected0 = roboclaw0.Open() == 1
    connected1 = roboclaw1.Open() == 1
    if connected0:
        print("Connected to /dev/serial0.")
        print(roboclaw0.ReadVersion(address))
        print(roboclaw0.ReadEncM1(address))
    elif connected1:
        print("Connected to /dev/serial1.")
        print(roboclaw1.ReadVersion(address))
        print(roboclaw1.ReadEncM1(address))
    else:
        print("Could not open comport /dev/serial0 or
/dev/serial1, make sure it has the correct permissions and is
available")

```

```

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 128
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)

```

```
from roboclaw import Roboclaw
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ sudo find / -name roboclaw.* /home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_control/osr_control/roboclaw.py
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ cd /home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_control/osr_control/
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_control/osr_control$ ls __init__.py __pycache__ roboclaw.py roboclaw_wrapper.py rover.py
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_control/osr_control$ cat roboclaw.py
[program too long!]
```

Post to Slack:

Shouldn't the response match the call? 129>129 instead of 129>128?
Will have to peruse the code....

2021.05.27

Reply from Slack:

Eric Junkins 3 hours ago

If I remember correctly the third place isn't address, it's something about the Settings, which is different between the drive motors and corner motors. The roboclaw documentation would have the answer to this

```
(1, 0, 128)
comes from:
print(roboclaw1.ReadEncM1(address))
which comes from:
def ReadEncM1(self,address):
    return self._read4_1(address,self.Cmd.GETM1ENC)
    return self._read4_1(128      ,self.Cmd.16)
```

which comes from:

```
#Command Enums
class Cmd():
    ...
    GETM1ENC = 16
```

and

```
def _read4_1(self,address,cmd):
def _read4_1(self,128      ,16 ):
```

[...which doesn't make sense to me. Oh, well!]

Launch files:

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo cp
LaunchOSR.sh /usr/bin/LaunchOSR.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
chmod +x /usr/bin/LaunchOSR.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo cp
osr_startup.service /etc/systemd/system/osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
chmod 644 /etc/systemd/system/osr_startup.service
```

```
ubuntu@AUDACITY:~$ roslaunch osr Bringup osr.launch
```

```
Traceback (most recent call last):
```

```
  File "/usr/bin/roslaunch", line 34, in <module>
    import roslaunch
  File "/usr/lib/python3/dist-packages/roslaunch/__init__.py",
line 62, in <module>
    from .scriptapi import ROSLaunch
  File "/usr/lib/python3/dist-packages/roslaunch/scriptapi.py",
line 42, in <module>
    import roslaunch.parent
  File "/usr/lib/python3/dist-packages/roslaunch/parent.py", line
54, in <module>
    import roslaunch.server
  File "/usr/lib/python3/dist-packages/roslaunch/server.py", line
79, in <module>
    from rosgraph_msgs.msg import Log
ImportError: cannot import name 'Log' from 'rosgraph_msgs.msg'
(/opt/ros/foxy/lib/python3.8/site-packages/roslaunch/msg/_ini
t__.py)
```

```
ubuntu@AUDACITY:/usr/bin$ sudo shutdown -h now
```

2021.05.28

OSR Patches arrived & prepared for mailing in the am.
Only 4 patches from break even if all goes well.
Otherwise night off.

2021.05.29

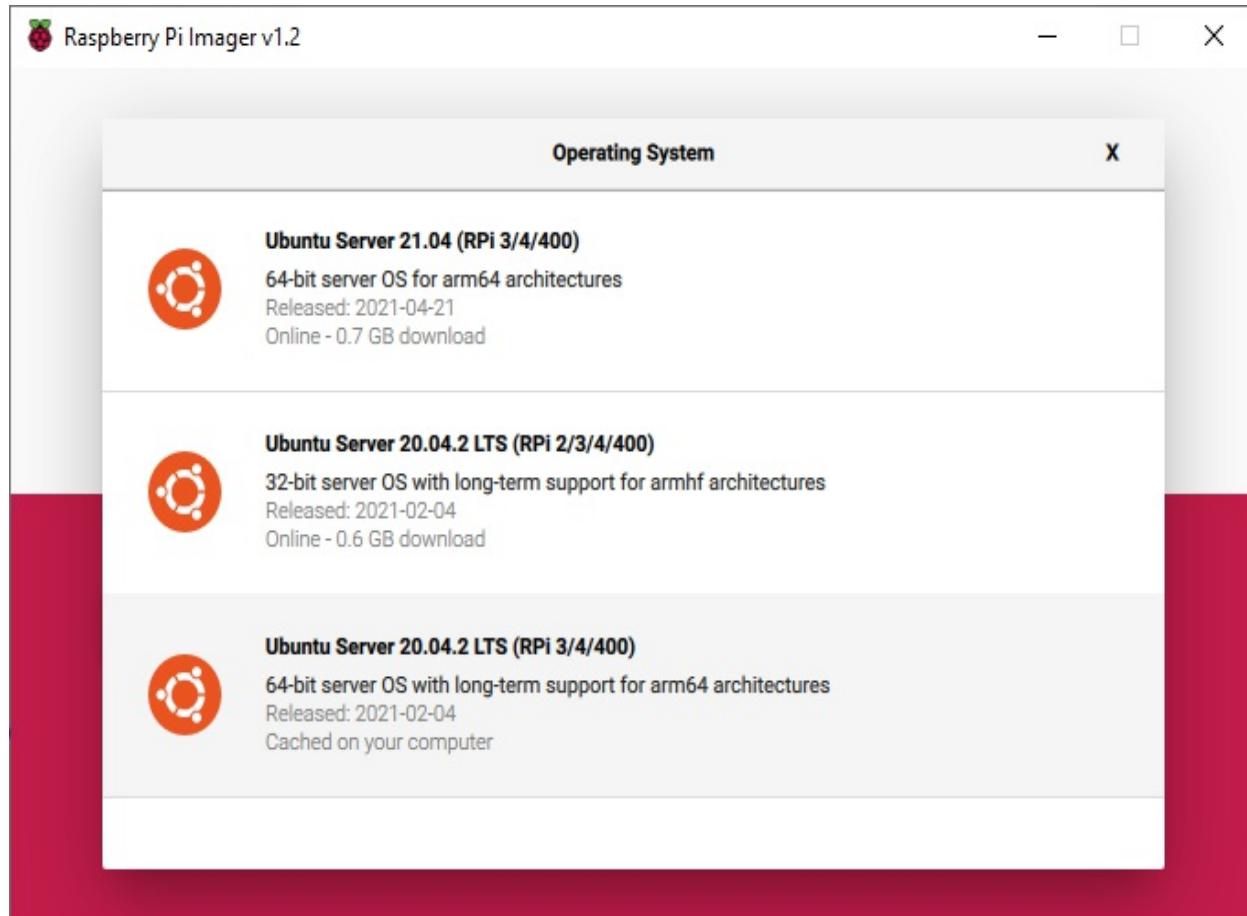
Start over

```
flash Ubuntu 20.04 Sever Focal Fossa  
enable wan0  
add MATE desktop  
install ROS2 Foxy Fitzroy  
install OSR
```

<https://homenetworkguy.com/how-to/install-ubuntu-mate-20-04-lts-on-raspberry-pi-4/>

SD Card Formatter

Overwrite format (Several recent quick formats. Want full)
Raspberry Pi Imager, F:, OS: Ubuntu Server 20.04.2 LTS arm-64

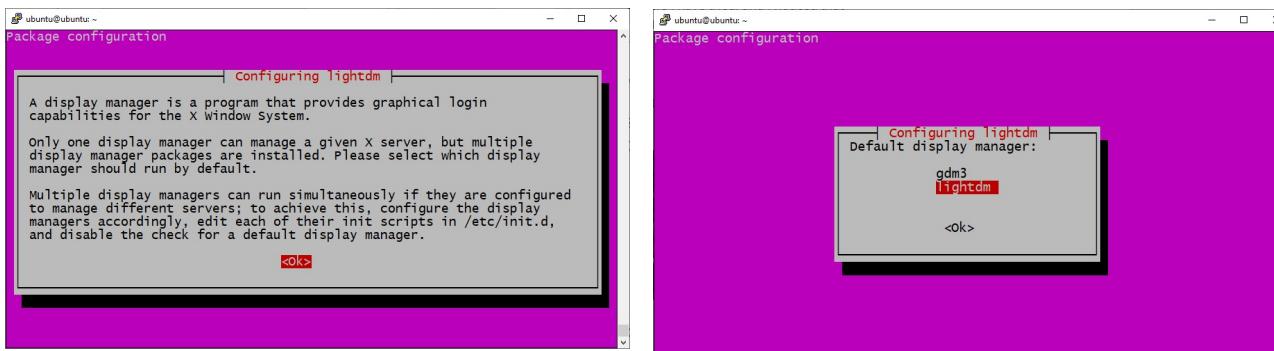


Once it is finished, install the microSD card into your Raspberry Pi 4's microSD slot. Then turn it on to boot it up!

Enter the username “ubuntu” and the password “ubuntu”. It will prompt you to change your password (which is a good security practice) so you will need to enter “ubuntu” as your current password and then you can enter your new password twice.

```
sudo apt update  
sudo apt upgrade  
sudo apt install ubuntu-mate-desktop
```

```
ubuntu@ubuntu:~$ sudo apt update  
ubuntu@ubuntu:~$ sudo apt upgrade -y  
ubuntu@ubuntu:~$ sudo apt install ubuntu-mate-desktop
```



This will take a little while because it has to download and install a lot of packages. During the installation process, you will be prompted for the display manager of your choice: gdm or lightdm. I do not think it matters which one you choose. I ended up choosing lightdm based on an installation guide I read and when I was reading about the differences between the two. I have read where gdm is tied to gnome so if you want to use a desktop environment other than gnome, you may need to use lightdm or some other display manager. Since Ubuntu MATE is a fork of Gnome 2, either display manager may be ok to use.

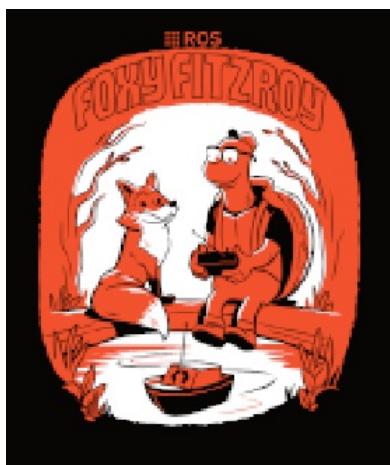
When you first log into Ubuntu MATE, the default session is set to “Ubuntu” instead of “Ubuntu MATE”. You will need to change the session by clicking on the icon beside the username/password prompt in order to log into the Ubuntu MATE desktop environment.

```
ubuntu@ubuntu:~$ sudo reboot  
first reboot timed out to locked blank screen  
hard reboot to desktop & selected Ubuntu MATE GUI  
Set wlan0 via desktop icon, not /etc/netplan/50-...  
Printers already discovered & installed.
```

*When running Ubuntu MATE 20.04, the latest Firefox version is available. Also the latest version of Chromium is available. I noticed during installation using the typical **sudo apt install chromium-browser** install command that it actually installs the snap package, which makes getting the latest version even easier especially as Ubuntu 20.04 starts aging. They usually freeze feature updates the old repositories and only include bug or security fixes.*

```
ubuntu@ubuntu:~$ sudo apt install chromium-browser
```

Next, install ROS2.



2021.05.30

ubuntu@ubuntu:~\$ **sudo apt install terminator**
have to launch terminator from command window, can't find in menu.

Installing ROS

We'll install ROS2 (*Robot Operating System*) Foxy on the RPi. If you're new to ROS, we recommend learning it as it is a crucial part in the code base.

You'll need to be logged in to the RPi via ssh, or open a terminal in the desktop GUI if you installed it above.

Follow the [instructions](#) for installing ROS2.

[This confused me before as it leads to Debian packages which I thought were for the Debian OS. Previously I installed via the alternative "Installing ROS 2 on Ubuntu Linux". This didn't do well and I could never get a GUI to install via the tasksel app. This time I'm going with the advised Debian package and do the simple "apt get install..." path.]

You can choose to either install the 'full version' (`sudo apt install ros-foxy-desktop`) which comes with graphical packages like RViz and QT or install just the barebones version (`sudo apt install ros-foxy-ros-base`). The latter allows you to install packages in the full version whenever you need them. If you didn't install the GUI on Ubuntu, definitely install the base version as you will have little use for GUI applications in the full version.

Resources

Status Page:

ROS 2 Foxy (Ubuntu Focal): amd64, arm64

Jenkins Instance

Repositories

[Looked into this out of curiosity. Total gibberish to me.]

Set locale

Make sure you have a locale which supports UTF-8.

[Pretty sure I am. No docker containers, etc]

Setup Sources

You will need to add the ROS 2 apt repositories to your system. To do so, first authorize our GPG key with apt like this:

`sudo apt update && sudo apt install curl gnupg2 lsb-release
sudo curl -sSL`

`https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -o /usr/share/keyrings/ros-archive-keyring.gpg`

```
ubuntu@ubuntu:~$ sudo apt update && sudo apt install curl gnupg2  
lsb-release  
[install]  
ubuntu@ubuntu:~$ sudo curl -sSL  
https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -o  
/usr/share/keyrings/ros-archive-keyring.gpg
```

And then add the repository to your sources list:

```
echo "deb [arch=$(dpkg --print-architecture)  
signed-by=/usr/share/keyrings/ros-archive-keyring.gpg]  
http://packages.ros.org/ros2/ubuntu $(lsb_release -cs) main" |  
sudo tee /etc/apt/sources.list.d/ros2.list > /dev/null
```

Install ROS 2 packages

Update your apt repository caches after setting up the repositories.

```
sudo apt update
```

```
ubuntu@ubuntu:~$ sudo apt update  
All packages are up to date.
```

Desktop Install (Recommended): ROS, RViz, demos, tutorials.
sudo apt install ros-foxy-desktop

```
ubuntu@ubuntu:~$ sudo apt install ros-foxy-desktop  
[install...]  
Error: Timeout was reached      [!?!]  
[re-run on desktop...]  
...  
ros-foxy-desktop is already the newest...
```

Environment setup

Sourcing the setup script

Set up your environment by sourcing the following file:

```
source /opt/ros/foxy/setup.bash
```

```
ubuntu@ubuntu:~$ source /opt/ros/foxy/setup.bash
```

Install argcomplete (optional) [Yes! Quite handy!]

ROS 2 command line tools use argcomplete to autocompletion. So if you want autocompletion, installing argcomplete is necessary.

```
sudo apt install -y python3-argcomplete
```

```
ubuntu@ubuntu:~$ sudo apt install -y python3-argcomplete
```

Try some examples

If you installed ros-foxy-desktop above you can try some examples. In one terminal, source the setup file and then run a C++ talker:

```
source /opt/ros/foxy/setup.bash
ros2 run demo_nodes_cpp talker
```

[Terminal A]

```
ubuntu@ubuntu:~$ source /opt/ros/foxy/setup.bash
ubuntu@ubuntu:~$ ros2 run demo_nodes_cpp talker
...
[INFO] [1622397714.614417695] [talker]: Publishing: 'Hello World:
132'
[INFO] [1622397715.614401939] [talker]: Publishing: 'Hello World:
133'
[INFO] [1622397716.614366808] [talker]: Publishing: 'Hello World:
134'
[INFO] [1622397717.614356226] [talker]: Publishing: 'Hello World:
135'
[INFO] [1622397718.614343639] [talker]: Publishing: 'Hello World:
136'
```

In another terminal source the setup file and then run a Python listener:

```
source /opt/ros/foxy/setup.bash
ros2 run demo_nodes_py listener
```

[Terminal B]

```
ubuntu@ubuntu:~$ source /opt/ros/foxy/setup.bash
ubuntu@ubuntu:~$ ros2 run demo_nodes_py listener
[INFO] [1622397714.782945110] [listener]: I heard: [Hello World:
132]
[INFO] [1622397715.620978697] [listener]: I heard: [Hello World:
133]
[INFO] [1622397716.620420220] [listener]: I heard: [Hello World:
134]
[INFO] [1622397717.620406657] [listener]: I heard: [Hello World:
135]
[INFO] [1622397718.620437014] [listener]: I heard: [Hello World:
136]
...
```

4 Setting up ROS environment and building the rover code

4.1 Setup ROS build environment

First we'll create a ROS workspace for the rover code.

```
# Create a colcon workspace directory, which will contain all ROS  
compilation and
```

```
# source code files, and navigate into it
```

```
mkdir -p ~/osr_ws/src && cd ~/osr_ws
```

```
# Source your newly created ROS environment
```

```
source /opt/ros/foxy/setup.bash
```

```
# install the build tool colcon
```

```
sudo apt install python3-colcon-common-extensions
```

```
ubuntu@ubuntu:~$ mkdir -p ~/osr_ws/src && cd ~/osr_ws
```

```
ubuntu@ubuntu:~/osr_ws$ source /opt/ros/foxy/setup.bash
```

```
ubuntu@ubuntu:~/osr_ws$ sudo apt install
```

```
python3-colcon-common-extensions
```

```
[install]
```

4.2 Clone and build the rover code

For this section, you'll be working with the version control software git. Now's a good time to read up on how that works if you're new to it and make a GitHub account! In the newly created catkin workspace you just made, clone this repo:

```
sudo apt install git
```

```
cd ~/osr_ws/src
```

```
git clone https://github.com/nasa-jpl/osr-rover-code.git
```

```
cd osr-rover-code
```

```
git fetch origin
```

```
git checkout foxy-devel
```

```
# install the dependencies using rosdep
```

```
sudo apt install python3-rosdep
```

```
cd ..
```

```
sudo rosdep init
```

```
rosdep update
```

```
rosdep install --from-paths src --ignore-src
```

```
# build the ROS packages
```

```
colcon build --symlink-install
```

```

ubuntu@ubuntu:~/osr_ws$ sudo apt install git
git is already the newest version (1:2.25.1-1ubuntu3.1).
ubuntu@ubuntu:~/osr_ws$ cd ~/osr_ws/src
ubuntu@ubuntu:~/osr_ws/src$ git clone
https://github.com/nasa-jpl/osr-rover-code.git
Cloning into 'osr-rover-code'...
ubuntu@ubuntu:~/osr_ws/src$ cd osr-rover-code
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git fetch origin
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git checkout foxy-devel
Switched to a new branch 'foxy-devel'
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ sudo apt install
python3-rosdep
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ cd ..
ubuntu@ubuntu:~/osr_ws/src$ sudo rosdep init
Recommended: please run rosdep update
ubuntu@ubuntu:~/osr_ws/src$ rosdep update
ubuntu@ubuntu:~/osr_ws/src$ rosdep install --from-paths src
--ignore-src
given path 'src' does not exist
[need to cd .. one more level]
ubuntu@ubuntu:~/osr_ws/src$ cd ..
ubuntu@ubuntu:~/osr_ws$ rosdep install --from-paths src
--ignore-src
#All required rosdeps installed successfully
ubuntu@ubuntu:~/osr_ws$ colcon build --symlink-install
Starting >>> osr_interfaces
Starting >>> osr_bringup
Finished <<< osr_bringup [12.7s]
[Processing: osr_interfaces]
[Processing: osr_interfaces]
Finished <<< osr_interfaces [1min 14s]
Starting >>> osr_control
Finished <<< osr_control [20.4s]

Summary: 3 packages finished [1min 35s]

```

Now let's add the generated files to the path so ROS can find them

```
ubuntu@ubuntu:~/osr_ws$ source install/setup.bash
```

The rover has some customizable settings that will overwrite the default values. Whether you have any changes compared to the defaults or not, you have to manually create these files:

```
cd ~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
touch osr_params_mod.yaml roboclaw_params_mod.yaml
```

```
ubuntu@ubuntu:~/osr_ws$ cd  
~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config$  
touch osr_params_mod.yaml roboclaw_params_mod.yaml
```

To change any values from the default (if your rover doesn't match the default instructions), modify these files (the _mod.yaml ones) instead of the original ones. This way your changes don't get committed to git. The files follow the same structure as the default. Just include the values that you need to change as the default values for other parameters may change over time.

You might also want to modify the file osr-rover-code/ROS/osr Bringup/launch/osr.launch.py to change the velocities the gamepad controller will send to the rover. These values in the node joy_to_twist are of interest:

```
{"scale_linear": 0.8}, # scale to apply to drive speed, in m/s: drive_motor_rpm * 2pi / 60 * wheel radius * slowdown_factor  
 {"scale_angular": 1.75}, # scale to apply to angular speed, in rad/s: scale_linear / min_radius  
 {"scale_linear_turbo": 1.78}, # scale to apply to linear speed, in m/s
```

The maximum speed your rover can go is determined by the no-load speed of your drive motors. The default no-load speed is located in the file osr_params.yaml as drive_no_load_rpm, unless you modified it in the corresponding _mod.yaml file. This maximum speed corresponds to scale_linear_turbo and can be calculated as

```
scale_linear_turbo:  
drive_no_load_rpm * 2pi / 60 * wheel radius (=0.075m)  
[(rpm / 60 = rpsec)(2 pi radius = circumference)]  
[(223 rpm / 60 = 3.717rps) (19.25" > 0.49m)]  
[ 1.82m/s]
```

*Based on this upper limit, let's set our regular moving speed to a sensible fraction of that which you can configure to your liking. Start with e.g. 0.75 * scale_linear_turbo. If you think it's too slow or too fast, simply scale it up or down.*

The turning speed of the rover, just like a regular car, depends on how fast it's going. As a result, scale_angular should be set to scale_linear / min_radius. For the default configuration, the min_radius equals 0.45m.

4.3 Add ROS config scripts to .bashrc

The source...foo.bash lines above are used to manually configure your ROS environment. We can do this automatically in the future by doing:

```
cd ~           [already there]
echo "source /opt/ros/foxy/setup.bash" >> ~/.bashrc
echo "source ~/osr_ws/install/setup.bash" >> ~/.bashrc
```

This adds the source lines to ~/.bashrc, which runs whenever a new shell is opened on the RPi - by logging in via ssh, for example. So, from now on, when you log into the RPi your new command line environment will have the appropriate configuration for ROS and the rover code.

```
ubuntu@ubuntu:~$ echo "source /opt/ros/foxy/setup.bash" >>
~/.bashrc
ubuntu@ubuntu:~$ echo "source ~/osr_ws/install/setup.bash" >>
~/.bashrc
```

5 Setting up serial communication on the RPi

The RPi will talk to the motor controllers over serial.

5.1 Disable serial-getty@ttyS0.service

Because we are using the serial port for communicating with the roboclaw motor controllers, we have to disable the serial-getty@ttyS0.service service. This service has some level of control over serial devices that we use, so if we leave it on it we'll get weird errors (source). Note that the masking step was suggested here. It seems to be necessary for some setups of the rpi4 - just using systemctl disable won't cut it for disabling the service.

Note that the following will stop you from being able to communicate with the RPi over the serial, wired connection. However, it won't affect communication with the rpi with SSH over wifi.

```
sudo systemctl stop serial-getty@ttyS0.service
sudo systemctl disable serial-getty@ttyS0.service
sudo systemctl mask serial-getty@ttyS0.service
```

```
ubuntu@ubuntu:~$ sudo systemctl stop serial-getty@ttyS0.service
ubuntu@ubuntu:~$ sudo systemctl disable serial-getty@ttyS0.service
ubuntu@ubuntu:~$ sudo systemctl mask serial-getty@ttyS0.service
Created symlink /etc/systemd/system/serial-getty@ttyS0.service →
/dev/null.
```

5.2 Copy udev rules

Now we'll need to copy over a udev rules file, which is used to configure needed device files in /dev; namely, ttyS0 and ttyAMA0. Here's a good primer on udev.

```
# copy udev file from the repo to your system
cd ~/osr_ws/src/osr-rover-code/config
sudo cp serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules

# reload the udev rules so that the devices files are set up
correctly.
sudo udevadm control --reload-rules && sudo udevadm trigger
```

This configuration should persist across RPi reboots.

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code/config
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo cp
serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo udevadm
control --reload-rules && sudo udevadm trigger
```

5.3 Add user to tty group

Finally, add the user to the tty group:

```
sudo adduser ubuntu tty
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo adduser
ubuntu tty
```

5.4 Remove console line in cmdline.txt boot config file

Do the following steps:

```
cd /boot/firmware
sudo cp cmdline.txt cmdline.txt.bak
sudo nano cmdline.txt
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ cd
/boot/firmware
ubuntu@ubuntu:/boot/firmware$ sudo cp cmdline.txt cmdline.txt.bak
ubuntu@ubuntu:/boot/firmware$ sudo nano cmdline.txt
And then delete the substring console=serial0,115200 from the
single line of text in the file. Save and exit.
[done]
```

5.5 Disable bluetooth in config.txt boot config file Execute the following commands

```
cd /boot/firmware      [already there]  
sudo cp config.txt config.txt.bak  
sudo nano config.txt
```

And then add the new line dtoverlay=disable-bt immediately after the existing line cmdline=cmdline.txt towards the bottom of the file

```
ubuntu@ubuntu:/boot/firmware$ cd /boot/firmware  
ubuntu@ubuntu:/boot/firmware$ sudo cp config.txt config.txt.bak  
ubuntu@ubuntu:/boot/firmware$ sudo nano config.txt  
enable_uart=1  
cmdline=cmdline.txt  
dtoverlay=disable-bt  
include syscfg.txt  
include usercfg.txt
```

5.6 Restart the RPi

*We need to restart for all of these changes to take effect.
Execute: sudo reboot now*

```
ubuntu@ubuntu:/boot/firmware$ sudo reboot now
```

6 Testing serial comm with the Roboclaw motors controllers

Run the roboclawtest.py script with all of the motor addresses:

```
cd ~/osr_ws/src/osr-rover-code/scripts  
python roboclawtest.py 128  
python roboclawtest.py 129  
python roboclawtest.py 130  
python roboclawtest.py 131  
python roboclawtest.py 132
```

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code/scripts
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python
roboclawtest.py 128
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 129
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 1, 128)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 130
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 131
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 765, 128)
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 132
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 849, 130)

ubuntu@ubuntu:~$ sudo systemctl start osr_startup.service
```

2021.05.31

Slack post:

James Phelan 7:52 AM

@Achille re OSR code in ROS2. Successfully ROS2 on Ubuntu 20.04 and git checkout foxy-devel. Having done the ROS2 tutorial I recognize commands are different in ROS2 and the system will be expecting launch files in different locations. It doesn't recognize roslaunch, roscd, nor osr_startup.service and there's no launch folder in foxy. Any guidance before I stumble around and misconfigure everything in my own?

2021.06.02

Slack reply:

Achille 5:02 AM

You're in luck! See this [PR](#).

git add remote Achllle

<https://github.com/Achllle/osr-rover-code.git>

(or

git@github.com:Achllle/osr-rover-code.git

if you use SSH keys) if you haven't already. Note Achllle with three 'L's, no 'i'.

git fetch Achllle

git checkout enh/services

follow the instructions in that branch. This PR should be merged in soon.

[#137 Improve systemd service](#)

- support for cases where the home folder isn't /home/ubuntu
- move symlinked scripts to /usr/bin/local (best practice)
- remove the old LaunchOSR.sh

port to ROS1

Assignees

Achllle

Labels

enhancement, foxy

<<https://github.com/nasa-jpl/osr-rover-code>|[nasa-jpl/osr-rover-code](https://github.com/nasa-jpl/osr-rover-code) | May 8th | Added by GitHub>

2021.06.05

<https://app.slack.com/client/T01CMHZLGPL/C01K4G4TUA1/thread/C01CTNRDERJ-1622600198.050500>

"git fetch Achllle
git checkout enh/services
follow the instructions in that branch. This PR should be merged in soon."

<https://github.com/Achllle/osr-rover-code/tree/enh/services>
README.md

JPL Open Source Rover Code

*This repository contains the code that runs on the Raspberry Pi (RPI) and Arduino to control the JPL open source rover (osr). This includes the Arduino code that controls the LED matrix. **The rover runs on ROS2 (tested on Foxy), mostly using Python 3.***

Internals & structure

The [ROS overview](#) gives an overview of the setup related to ROS and links to specific implementations such as how the drive and corner commands are being calculated

The Arduino readme [SKIP. Not using the LED display]

Setup

Raspberry Pi setup with Ubuntu 20.04 [Yeah, did all that]

[Rover code bringup](#) [Pay attention - this is the tricky part]

Bringing up the rover code

Note that these instructions assume you followed the steps in rpi setup.

1 Manual rover bringup

In a sourced terminal (

```
source /opt/ros/foxy/setup.bash &&
source ~/osr_ws/install/setup.bash
```

) run

```
ros2 launch osr_bringup osr_launch.py
```

to run the rover.

```
ubuntu@ubuntu:~$ source /opt/ros/foxy/setup.bash && source
~/osr_ws/install/setup.bash
```

```
ubuntu@ubuntu:~$ ros2 launch osr_bringup osr_launch.py
```

```
[INFO] [launch]: All log files can be found below  
/home/ubuntu/.ros/log/2021-06-05-19-34-46-644978-ubuntu-5542  
[INFO] [launch]: Default logging verbosity is set to INFO  
[INFO] [roboclaw_wrapper-1]: process started with pid [5544]  
[INFO] [rover-2]: process started with pid [5546]  
[INFO] [teleop_node-3]: process started with pid [5548]  
[INFO] [joy_node-4]: process started with pid [5550]  
[teleop_node-3] [INFO] [1622939687.342065545] [TeleopTwistJoy]:  
Teleop enable button 4.  
[teleop_node-3] [INFO] [1622939687.342463058] [TeleopTwistJoy]:  
Turbo on button 5.  
[teleop_node-3] [INFO] [1622939687.342572389] [TeleopTwistJoy]:  
Linear axis x on 1 at scale 0.800000.  
[teleop_node-3] [INFO] [1622939687.342679517] [TeleopTwistJoy]:  
Turbo for linear axis x is scale 1.780000.  
[teleop_node-3] [INFO] [1622939687.342768349] [TeleopTwistJoy]:  
Angular axis yaw on 3 at scale 1.750000.  
[teleop_node-3] [INFO] [1622939687.342853626] [TeleopTwistJoy]:  
Turbo for angular axis yaw is scale 3.950000.  
[joy_node-4] [INFO] [1622939687.917965018] [joy]: Opened joystick:  
Microsoft X-Box 360 pad. deadzone: 0.050000  
[roboclaw_wrapper-1] [INFO] [1622939696.124295893]  
[roboclaw_wrapper]: Initializing motor controllers  
[roboclaw_wrapper-1] [INFO] [1622939696.325962345]  
[roboclaw_wrapper]: Sucessfully connected to RoboClaw motor  
controllers  
[rover-2] [INFO] [1622939697.104614364] [rover]: Initializing  
Rover  
[roboclaw_wrapper-1] [ERROR] [1622939774.892269425]  
[roboclaw_wrapper]: Motor controller '129' reported error code  
131072  
[does not appear to be a serious error]  
[Google: "Roboclaw error code 131072" not helpful]  
[Need to examine the roboclaw_wrapper.py code]
```

Xbox controller continues to flash all 4 green buttons instead of just the upper left, but pairs & runs. The Right Button "Turbo" has no effect. [turbo parameter not yet configured].

^C

to kill rover code.

Any errors or warnings will be displayed there in case something went wrong. If you're using the Xbox wireless controller, command the rover by holding the left back button (LB) down and moving the joysticks. You can boost as described in the RPi setup by holding down the right back button (RB) instead. If this isn't working for you, `ros2 topic echo /joy`, press buttons, and adjust `osr_launch.py` to point to the corresponding buttons and axes. If you have questions, please submit an issue or post on the Slack forum.

```
ubuntu@ubuntu:~$ ros2 topic echo /joy
header:
  stamp:
    sec: 1622943339
    nanosec: 573206190
  frame_id: joy
axes:
- -0.0    0    Left Joy      +left -right
- -0.0    1    Left Joy    +up -down
- -0.0    2    Left Trigger  +1 released -1 pressed
- -0.0    3    Right Joy   +left -right
- -0.0    4    Right Joy     +up -down
- -0.0    5    Right Trigger +1 released -1 pressed
- -0.0    6    Left Pad      +left -right
- -0.0    7    Left Pad      +up -down
buttons:
- 0      0    Button A
- 0      1    Button B
- 0      2    Button C
- 0      3    Button D
- 0      4    Left Button  enable
- 0      5    Right Button turbo
- 0      6    Back Button
- 0      7    Start Button
- 0      8    Xbox Button
- 0      9    Left Joy Press
- 0     10    Right Joy Press
---
```

[Need to examine the roboclaw_wrapper.py code, above]
ubuntu@ubuntu:~\$ **sudo find / -name roboclaw_wrapper.py**
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_control/osr_control
/roboclaw_wrapper.py

Notepad++ open **roboclaw_wrapper.py** from local cc:

Find “reported error code”:

```
def read_errors(self):
    """Checks error status of each motor controller, returns 0
if no errors reported"""
    err = [0] * 5
    for i in range(len(self.address)):
        err[i] = self.rc.ReadError(self.address[i])[1]
        if err[i] != 0:
            self.get_logger().error("Motor controller '{}'"
reported error code {}".format(self.address[i], err[i]))
    return err
```

Find “rc”:

```
self.rc = Roboclaw(serial_port, baud_rate)
```

Find “Roboclaw”:

```
from osr_control.roboclaw import Roboclaw
```

ubuntu@ubuntu:~\$ **sudo find / -name osr_control.roboclaw**
nothing
ubuntu@ubuntu:~\$ **sudo find / -name osr_control**
/home/ubuntu/osr_ws/build/osr_control
/home/ubuntu/osr_ws/build/osr_control/share/osr_control
/home/ubuntu/osr_ws/build/osr_control/osr_control
/home/ubuntu/osr_ws/build/osr_control/resource/osr_control
/home/ubuntu/osr_ws/log/build_2021-05-30_15-11-09/osr_control
/home/ubuntu/osr_ws/install/osr_control
/home/ubuntu/osr_ws/install/osr_control/lib/osr_control
/home/ubuntu/osr_ws/install/osr_control/share/colcon-core/packages
/osr_control
/home/ubuntu/osr_ws/install/osr_control/share/ament_index/resource
_index/packages/osr_control
/home/ubuntu/osr_ws/install/osr_control/share/osr_control
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_control
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_control/osr_control
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_control/resource/os
r_control

```

ubuntu@ubuntu:~$ sudo find / -name roboclaw
nothing

ubuntu@ubuntu:~$ cd
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_control

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_control$ ls
dimensions_wheels_illustration.png  package.xml  setup.cfg  src
osr_control                         resource      setup.py   test

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_control/src$ ls
test_controller.py

ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_control/osr_control$ ls
__init__.py  __pycache__  roboclaw.py  roboclaw_wrapper.py
rover.py

Notepad++ open roboclaw.py from local cc:
Find "ReadError":
    def ReadError(self,address):
        return self._read4(address,self.Cmd.GETERROR)

Find "GETERROR":
    GETERROR = 90
Find "read4":
    def _read4(self,address,cmd):
        trys = self._trystimeout
        while 1:
            self._port.flushInput()
            self._sendcommand(address,cmd)
            val1 = self._readlong()
Find "_readlong":
    def _readlong(self):
        val1 = self._readbyte()
        if val1[0]:
            val2 = self._readbyte()
            if val2[0]:
                val3 = self._readbyte()
                if val3[0]:
                    val4 = self._readbyte()
                    if val4[0]:
                        return
(1,val1[1]<<24|val2[1]<<16|val3[1]<<8|val4[1])
                    return (0,0)

```

90 - Read Status

Read the current unit status.

Send: [Address, 90]
 Receive: [Status, CRC(2 bytes)]

Function	Status Bit Mask
Normal	0x000000
E-Stop	0x000001
Temperature Error	0x000002
Temperature 2 Error	0x000004
Main Voltage High Error	0x000008
Logic Voltage High Error	0x000010
Logic Voltage Low Error	0x000020
M1 Driver Fault Error	0x000040
M2 Driver Fault Error	0x000080
M1 Speed Error	0x000100
M2 Speed Error	0x000200
M1 Position Error	0x000400
M2 Position Error	0x000800
M1 Current Error	0x001000
M2 Current Error	0x002000
M1 Over Current Warning	0x010000
M2 Over Current Warning	0x020000
Main Voltage High Warning	0x040000
Main Voltage Low Warning	0x080000
Temperature Warning	0x100000
Temperature 2 Warning	0x200000
S4 Signal Triggered	0x400000
S5 Signal Triggered	0x800000
Speed Error Limit Warning	0x01000000
Position Error Limit Warning	0x02000000

https://downloads.basicmicro.com/docs/roboclaw_user_manual.pdf
 RoboClaw 129 (both rear motors)

131072 =

Temperature Error	0x000002
Logic Voltage High Error	0x000010
Logic Voltage Low Error	0x000020
M1 Driver Fault Error	0x000040
M1 Current Error	0x001000
M1 Over Current Warning	0x010000
M2 Over Current Warning	0x020000
Temperature Warning	0x100000

2021.06.06

Slack post:

Roboclaw Error Codes:

After successfully (I hope!) upgrading AUDACITY's Pi4 from Ubuntu 18 > 20 and ROS > ROS2 following (@Achille)

<https://github.com/Achllle/osr-rover-code/tree/enh/services>

I successfully

```
ubuntu@ubuntu:~$ source /opt/ros/foxy/setup.bash && source  
~/osr_ws/install/setup.bash
```

```
ubuntu@ubuntu:~$ ros2 launch osr_bringup osr_launch.py
```

without errors.

The Xbox controller paired (but all the lights stayed on, not just the upper left) and the rover responded appropriately to all the controls except "turbo" which hadn't been set yet.

Then I started getting

```
[roboclaw_wrapper-1] [ERROR] [1622939774.892269425]
```

```
[roboclaw_wrapper]: Motor controller '129' reported error code  
131072
```

Google "RoboClaw error 131072": nada

In roboclaw_wrapper.py find "reported error code" reveals:

```
def read_errors(self):  
    """Checks error status of each motor controller, returns 0  
if no errors reported"""  
    err = [0] * 5  
    for i in range(len(self.address)):  
        err[i] = self.rc.ReadError(self.address[i])[1]  
        if err[i] != 0:  
            self.get_logger().error("Motor controller '{}'  
reported error code {}".format(self.address[i], err[i]))  
    return err
```

in the line

```
err[i] = self.rc.ReadError(self.address[i])[1]
```

the self.rc refers to Roboclaw.

Peeling the onion of roboclaw.py you find it's sending command "90" to the RoboClaw and reading back a long (4 byte) response.

In the RoboClaw manual -

https://downloads.basicmicro.com/docs/roboclaw_user_manual.pdf

under "Advanced Packet Serial / Commands" you find "90 - Read Status". There you find a list of octal error codes.

If I understand correctly how this works, each code represents one bit of the returned response so all the errors are "added up" and returned together. So...

131072 =

Temperature Error 0x000002

Logic Voltage High Error 0x000010

Logic Voltage Low Error 0x000020

```
M1 Driver Fault Error      0x000040
M1 Current Error          0x001000
M1 Over Current Warning   0x010000
M2 Over Current Warning   0x020000
Temperature Warning        0x100000
tells me RC 129 isn't happy!
Further investigation in progress...
```

Using 5.5" HDMI monitor on rover to free for laptop.
Unless plugged in & powered on bootup, it shows "No Signal".
Need to make HDMI port hotplug.

Did see a few low power lightning bolts on monitor at bootup but
not after.

```
ubuntu@ubuntu:~$ source /opt/ros/foxy/setup.bash && source
~/osr_ws/install/setup.bash
ubuntu@ubuntu:~$ ros2 launch osr_bringup osr_launch.py
```

Not showing roboclaw_wrapper errors now, not even after running
motors.

[Using 7" HDMI monitor on rover to free for laptop.
Unless plugged in & powered on bootup, it shows "No Signal".
Need to make HDMI port hotplug]

<https://askubuntu.com/questions/1322760/rpi4-and-ubuntu-20-04-lts-switch-between-headless-and-hdmi-mode-without-any-cha>

```
ubuntu@ubuntu:~$ sudo nano /boot/firmware/config.txt
# Please DO NOT modify this file; if you need to modify the boot
config, the
# "usercfg.txt" file is the place to include user changes.
```

```
ubuntu@ubuntu:~$ sudo nano /boot/firmware/usercfg.txt
ubuntu@ubuntu:~$ sudo reboot
```

Bringing up the rover code

Optional arguments

If you want the code to calculate and publish wheel odometry, launch with the argument enable_odometry:=true. [save this for boot config]

2 Custom osr_mod.launch file

If you want to customize your osr.launch file, make a copy of it in the same directory (osr-rover-code/ROS/osr Bringup/launch/) and name it osr_mod.launch. The systemd script will automatically find it.

This is useful, for example, when you don't have the LED screen. In that case you would just remove the <node name="led_screen" pkg="led_screen" type="arduino_comm.py"/> line in osr_mod.launch.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch$  
ls
```

`osr_launch.py`

[It's not there. It's now `osr_launch.py` instead of `osr.launch`. Need to get Achille's code:]

```
ubuntu@ubuntu:~$ git add remote Achllle  
https://github.com/Achllle/osr-rover-code.git  
fatal: not a git repository (or any of the parent directories): .git  
ubuntu@ubuntu:~$ git@github.com:Achllle/osr-rover-code.git  
-bash: git@github.com:Achllle/osr-rover-code.git: No such file or directory
```

Posted above errors to Slack.

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch$  
cp osr_launch.py osr_launch.original  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch$  
nano osr_launch.py
```

Meanwhile, fix the missing “turbo” config: [it appears to already be there, just not working?!]

```
ubuntu@ubuntu:~$ cd  
~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config$  
ls  
osr_params.yaml  osr_params_mod.yaml  roboclaw_params.yaml  
roboclaw_params_mod.yaml  
[both -mod.yaml are blank.  
The osr_params.yaml just contains dimensions  
The roboclaw_params.yaml just defines the RoboClaw parameters]
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch$  
ls  
osr_launch.py  
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch$  
cat osr_launch.py  
import os  
from launch import LaunchDescription  
from launch.actions import DeclareLaunchArgument  
from launch.substitutions import LaunchConfiguration  
from launch_ros.actions import Node  
from ament_index_python.packages import get_package_share_directory  
  
def generate_launch_description():  
    roboclaw_params = os.path.join(  
        get_package_share_directory('osr_bringup'),  
        'config',  
        'roboclaw_params.yaml'  
    )  
    osr_params = os.path.join(  
        get_package_share_directory('osr_bringup'),  
        'config',  
        'osr_params.yaml'  
    )  
  
    ld = LaunchDescription()  
  
    ld.add_action(  
        Node(  
            package='osr_control',  
            executable='roboclaw_wrapper',  
            name='roboclaw_wrapper',  
            output='screen',  
            emulate_tty=True,  
            parameters=[roboclaw_params]  
        )  
    )  
    ld.add_action(  
        DeclareLaunchArgument('enable_odometry', default_value='false')  
    )
```

```

ld.add_action(
    Node(
        package='osr_control',
        executable='rover',
        name='rover',
        output='screen',
        emulate_tty=True,
        parameters=[osr_params,
                    {'enable_odometry':
                     LaunchConfiguration('enable_odometry')}])
)
ld.add_action(
    Node(
        package='teleop_twist_joy',
        executable='teleop_node',
        name='teleop_twist_joy',
        output='screen',
        emulate_tty=True,
        parameters=[
            {"scale_linear.x": 0.8}, # scale to apply to drive speed, in
m/s: drive_motor_rpm * 2pi / 60 * wheel radius * slowdown_factor
            {"axis_linear.x": 1},
            {"axis_angular.yaw": 3}, # which joystick axis to use for
driving
            {"scale_angular.yaw": 1.75}, # scale to apply to angular
speed, in rad/s: scale_linear / min_radius(=0.45m)
            {"scale_angular_turbo.yaw": 3.95}, # scale to apply to angular
speed, in rad/s: scale_linear_turbo / min_radius
            {"scale_linear_turbo.x": 1.78}, # scale to apply to linear
speed, in m/s
            {"enable_button": 4}, # which button to press to enable
movement
            {"enable_turbo_button": 5} # -1 to disable turbo
        ],
        remappings=[
            ('/cmd_vel', '/cmd_vel_intuitive')
        ]
    )
)
ld.add_action(
    Node(
        package='joy',
        executable='joy_node',
        name='joy',
        output='screen',
        emulate_tty=True,
        parameters=[
            {"autorepeat_rate": 5.0},
            {"device_id": 0}, # This might be different on your computer.
Run `ls -l /dev/input/js0`. If you have js1, put 1.
        ]
    )
)
return ld

```

In rover.py find “turbo” negative.

NOW I'm getting the roboclaw_wrapper error 131072 on 129, 130, 131,132. [Just no 128 so far. Was able to cause 128 error by grabbing R front & middle wheels and slowing them so it doesn't feel left out].

3 Automatic bringup with launch script

<https://github.com/Achllle/osr-rover-code/blob/foxy/nav2/setup/rover Bringup.md>

Starting scripts on boot using ROS can be a little more difficult than starting scripts on boot normally from the Raspberry Pi because of the default permission settings on the RPi and the fact that that ROS cannot be ran as the root user. The way that we will starting our rover code automatically on boot is to create a service that starts our roslaunch script, and then automatically run that service on boot of the robot. Further information on system service scripts running at boot.

There are two scripts in the "init_scripts" folder. The first is the bash file that runs the roslaunch file, and the other creates a system service to start that bash script. Open up a terminal on the raspberry Pi and execute the following commands.

```
cd ~/osr_ws/src/osr-rover-code/init_scripts
# use symbolic links so we capture updates to these files in the
service
ln -s $(pwd)/launch_osr.sh ~/launch_osr.sh
ln -s $(pwd)/osr_paths.sh ~/osr_paths.sh
sudo cp osr_startup.service
/etc/systemd/system/osr_startup.service
sudo chmod 644 /etc/systemd/system/osr_startup.service
```

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code/init_scripts
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ ls
LaunchOSR.sh  launch_osr.sh  osr_paths.sh  osr_startup.service
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/launch_osr.sh ~/launch_osr.sh
ln: failed to create symbolic link '/home/ubuntu/launch_osr.sh':
File exists
```

[I think it's because I accidentally cc the whole set to the command line at once, so it did some things already. Now I'm going step-by-step to be sure they all got done.]

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/osr_paths.sh ~/osr_paths.sh
ln: failed to create symbolic link '/home/ubuntu/osr_paths.sh':
File exists
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ sudo cp
osr_startup.service /etc/systemd/system/osr_startup.service
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ sudo chmod
644 /etc/systemd/system/osr_startup.service
```

Your osr startup service is now installed on the Pi and ready to be used. The following are some commands related to managing this service which you might find useful:

Description	Command
Start service	sudo systemctl start osr_startup.service
Stop service	sudo systemctl stop osr_startup.service
Enable service	sudo systemctl enable osr_startup.service (runs on boot of RPi)
Disable service	sudo systemctl disable osr_startup.service (doesn't run on boot of RPi)
Check status	sudo systemctl status osr_startup.service
View service list	sudo journalctl -f

Note: We do not recommend enabling the service until you have verified that everything on your robot runs successfully manually. Once you enable the service, as soon as you power on the RPi it will try and run everything. This could cause issues if everything has not yet been fully tested and verified. Additionally, if you are doing development of your own software for the robot we suggest disabling the service and doing manual launch of the scripts during testing phases. This will help you more easily debug any issues with your code.

Once you have fully tested the robot and made sure that everything is running correctly by starting the rover code manually via ros2 launch osr_bringup osr_launch.py, enable the startup service on the robot with the command below:

```
sudo systemctl enable osr_startup.service
```

At this point, your rover should be fully functional and automatically run whenever you boot it up! Congratulations and happy roving!!

Killed manual launch with ^C.

```
ubuntu@ubuntu:~$ sudo systemctl stop osr_startup.service
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
  Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
    Active: inactive (dead) (Result: exit-code) since Sun
           2021-06-06 14:32:52 CDT; 8s ago
      Process: 4992 ExecStart=/home/ubuntu/launch_osr.sh
                 (code=exited, status=1/FAILURE)
     Main PID: 4992 (code=exited, status=1/FAILURE)
Jun 06 14:32:52 ubuntu systemd[1]: Stopped OSR service.

ubuntu@ubuntu:~$ sudo systemctl start osr_startup.service
ubuntu@ubuntu:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
  Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
    Active: active (running) since Sun 2021-06-06 14:33:51 CDT;
           178ms ago
      Main PID: 5238 (launch_osr.sh)
        Tasks: 3 (limit: 4430)
       CGroup: /system.slice/osr_startup.service
                 └─5238 /bin/bash /home/ubuntu/launch_osr.sh
                   ├─5239 bash -c . /home/ubuntu/osr_ws/install/setup.sh
                   └─5240 /usr/bin/python3
/opt/ros/foxy/_local_setup_util.py sh

Jun 06 14:33:51 ubuntu systemd[1]: Started OSR service.
Jun 06 14:33:51 ubuntu launch_osr.sh[5238]: + source osr_paths.sh
Jun 06 14:33:51 ubuntu launch_osr.sh[5238]: ++ export
OSR_CODE_DIR=/home/ubuntu/osr_ws/src/osr-rover-code
Jun 06 14:33:51 ubuntu launch_osr.sh[5238]: ++
OSR_CODE_DIR=/home/ubuntu/osr_ws/src/osr-rover-code
Jun 06 14:33:51 ubuntu launch_osr.sh[5238]: +
launch_dir=/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/
launch
Jun 06 14:33:51 ubuntu launch_osr.sh[5238]: + bash -c '.
/home/ubuntu/osr_ws/install/setup.sh'
```

But the rover DOESN'T RESPOND.

Post to Slack:

@Achille

3 Automatic bringup with launch script doesn't work because it's doing osr.launch instead of osr_launch.py. It tells you it's working but the rover doesn't respond whereas it does to the manual launch.

```
ubuntu@ubuntu:~$ sudo systemctl disable osr_startup.service  
[...until this is fixed]
```

ERROR CODES

Unmounted the PCB to be able to see the Rcs. No red lights despite error codes. Remount.

Shutdown.

2021.06.09

Reply from Achille @ Slack:

Achille 4 days ago

```
ubuntu@ubuntu:~$ git add remote Achllle  
https://github.com/Achllle/osr-rover-code.git  
fatal: not a git repository (or any of the parent directories):  
.git  
ubuntu@ubuntu:~$ git@github.com:Achllle/osr-rover-code.git  
-bash: git@github.com:Achllle/osr-rover-code.git: No such file or  
directory
```

It says right there: “not a git repository”. You simply have to cd to osr-rover-code.

Do we make a osr_launch_mod.py

Yes.

turbo function isn't working

It helps to understand how that works. When the turbo button is pressed (button 5), it sends the higher velocity to /cmd_vel.

There's no code for turbo, the node that converts `joy` messages to `cmd_vel` is just determining a speed. What's probably happening is that you're using different motors and the rover is already going at full speed and your configuration files aren't properly set?

Automatic bringup with launch script doesn't work because it's doing osr.launch instead of osr_launch.py. It tells you it's working but the rover doesn't respond whereas it does to the manual launch.

Of course it's not working, you failed to add my fork in step 1 which introduces those fixes...

2021.06.10

STARTING OVER

Somewhat the SD card got totally corrupted and wouldn't boot with multiple errors while trying. Don't have an image of the working card so have to start over. Perhaps this will allow me to correct the last step I missed from Achille? [due to his inadequate instructions, but I'll deal w/ that when I figure out what to do]

The Xbox controller started acting funny and would pair but with all lights flashing instead of just #1 lit steadily making it unclear whether it had paired or not. Replacing battery - no change. Paired just fine w/ laptop. Unplugging receiver dongle - no change.

Left rear drive motor ran away and unresponsive to change in speed. Only stopped some time after L button (enable) released. Turbo button no effect even tho echo shows is being received. Investigated frequent low power warning lightning bolts. No help from Slack post x- check Max Power setting. Used BasicMicro Motion Studio to check it out. Somehow the MaxAmps was set to 3.0A instead of 15A as intended. This may explain the overcurrent error message on M2 (buy why not M1 when all wheels were dragged?). Retuned 129. Inspected wiring and cleared any whiskers.

Tried using the 5.5" HDMI mountable display w/ success using external USB power and long cable w/ adapter. Using rover's USB power and short cable less so. Perhaps contributed to SD card failure.

- ✓ SD Card Formatter - overwrite
- ✓ Raspberry Pi Imager, F:, OS: Ubuntu Server 20.04.2 LTS arm-64
- ✓ Boot SD card in rover
change password

```
ubuntu@ubuntu:~$ sudo hostname AUDACITY
```

```
ubuntu@ubuntu:~$ sudo apt update
ubuntu@ubuntu:~$ sudo apt upgrade -y
ubuntu@ubuntu:~$ sudo apt install ubuntu-mate-desktop
choose lightdm
[let it install overnight.]
```

2021.06.11

Saw YouTube tutorial on second HDMI port on Pi4.

Main monitor on port 1.

Plugged in 2nd 5.5" monitor, externally powered w/ new short 1' cable in port 2.

Shutdown. Reboot. Darn! Meant to externally power the Pi also due to freq low power warnings overnight.

Shutdown. Plug in Pi power supply - powers on.

Net: eth0: ethernet@7d580000

starting USB...

No working controllers found

Hit any key to stop autoboot: 0

U-Boot> tho: eth0: eth0:

Power off. Remove HDMI 2.

Power on.

Same thing...?

Power off.

Go back to normal rover PCB USB power. Power on.

Hit any key to reboot. Hit key fast enough this time.

Booted to log-in. Password.

Blue desktop, not normal green MATE desktop.

I recall having to click something at log-in:

When you first log into Ubuntu MATE, the default session is set to "Ubuntu" instead of "Ubuntu MATE". You will need to change the session by clicking on the icon beside the username/password prompt in order to log into the Ubuntu MATE desktop environment.

Power off.

Try HDMI monitor 2 again.

Power on. ANY KEY hit in time.

Login - click icon:

MATE

Ubuntu (Default)

Ubuntu on Wayland [??]

Click on MATE

Password

familiar green MATE screen. 2nd HDMI blank.

"WiFi Networks Available" flashed.

Clicked WiFi icon and logged into home network.

Search DISPLAY

Monitor Preferences

only sees one Unknown monitor. Detect monitors ineffective.

May have to try hotplug config or check some other config for HDMI-2.

2021.06.11

2nd HDMI port problem:

<https://askubuntu.com/questions/1246654/ubuntu-20-04-second-monitor-on-hdmi-port-not-detected> [DIDN'T HELP:]

ubuntu@ubuntu:~\$ **sudo ubuntu-drivers autoinstall**

No drivers found for installation.

MATE desktop / setup /

SoftwareUpdater

Ubuntu base [close w/o updating]

Additional Drivers

none

Turn OFF auto updates

ubuntu@ubuntu:~\$ **sudo nano /boot/firmware/usercfg.txt**
hdmi_force_hotplug=1

^X, Y, RETURN

\$ **sudo shutdown -h now**

Inserted 5.5" monitor in HDMI-1.

Boot-up. Came up ok.

Screen res is acceptable.

ubuntu@ubuntu:~\$ **sudo apt install chromium-browser**

E: Unable to locate package chromium-browser

ubuntu@ubuntu:~\$ **sudo apt-get install chromium-browser**

E: Unable to locate package chromium-browser

ubuntu@ubuntu:~\$ **sudo snap install chromium**

success

moved to task bar

ubuntu@ubuntu:~\$ **sudo apt install terminator**

E: Unable to locate package terminator

ubuntu@ubuntu:~\$ **sudo apt-get install terminator**

E: Unable to locate package terminator

[WTF?? This worked before!]

```
ubuntu@ubuntu:~$ cat /etc/apt/sources.list
## Note, this file is written by cloud-init on first boot of an
instance
## modifications made here will not survive a re-bundle.
## if you wish to make changes you can:
## a.) add 'apt_preserve_sources_list: true' to
/etc/cloud/cloud.cfg
## or do the same in user-data
## b.) add sources in /etc/apt/sources.list.d
## c.) make changes to template file
/etc/cloud/templates/sources.list.tpl

# See http://help.ubuntu.com/community/UpgradeNotes for how to
upgrade to
# newer versions of the distribution.
# deb-src http://ports.ubuntu.com/ubuntu-ports focal main
restricted

## Major bug fix updates produced after the final release of the
## distribution.
# deb-src http://ports.ubuntu.com/ubuntu-ports focal-updates main
restricted

## N.B. software from this repository is ENTIRELY UNSUPPORTED by
the Ubuntu
## team. Also, please note that software in universe WILL NOT
receive any
## review or updates from the Ubuntu security team.
# deb-src http://ports.ubuntu.com/ubuntu-ports focal universe
# deb-src http://ports.ubuntu.com/ubuntu-ports focal-updates
universe

## N.B. software from this repository is ENTIRELY UNSUPPORTED by
the Ubuntu
## team, and may not be under a free licence. Please satisfy
yourself as to
## your rights to use the software. Also, please note that
software in
## multiverse WILL NOT receive any review or updates from the
Ubuntu
## security team.
# deb-src http://ports.ubuntu.com/ubuntu-ports focal multiverse
# deb-src http://ports.ubuntu.com/ubuntu-ports focal-updates
multiverse

## N.B. software from this repository may not have been tested as
```

```
## extensively as that contained in the main release, although it
includes
## newer versions of some applications which may provide useful
features.
## Also, please note that software in backports WILL NOT receive
any review
## or updates from the Ubuntu security team.
# deb-src http://ports.ubuntu.com/ubuntu-ports focal-backports
main restricted universe multiverse

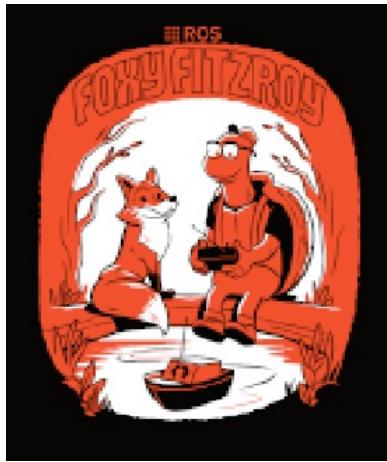
## Uncomment the following two lines to add software from
Canonical's
## 'partner' repository.
## This software is not part of Ubuntu, but is offered by
Canonical and the
## respective vendors as a service to Ubuntu users.
# deb http://archive.canonical.com/ubuntu focal partner
# deb-src http://archive.canonical.com/ubuntu focal partner

# deb-src http://ports.ubuntu.com/ubuntu-ports focal-security main
restricted
# deb-src http://ports.ubuntu.com/ubuntu-ports focal-security
universe
# deb-src http://ports.ubuntu.com/ubuntu-ports focal-security
multiverse
```

[Ah! ALL sources are # out!]
MATE task bar / Settings / System Settings / Software & Updates
recheck unchecked boxes. Can't navigate window @ resolution.
Close.

[keep getting PuTTY crashes @ Network error: Software caused
connection abort?!]

```
ubuntu@ubuntu:~$ cat /etc/apt/sources.list
now shows sources un#d
```



Next install ROS2 Foxy Fitzroy

<https://docs.ros.org/en/foxy/Installation/Ubuntu-Install-Debians.html>

Set locale - assume ok

Setup Sources

```
ubuntu@ubuntu:~$ sudo apt update && sudo apt
install curl gnupg2 lsb-release
ubuntu@ubuntu:~$ sudo curl -SSL
https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -o
/usr/share/keyrings/ros-archive-keyring.gpg
```

```
ubuntu@ubuntu:~$ echo "deb [arch=$(dpkg --print-architecture)
signed-by=/usr/share/keyrings/ros-archive-keyring.gpg]
http://packages.ros.org/ros2/ubuntu $(lsb_release -cs) main" |
```

```
sudo tee /etc/apt/sources.list.d/ros2.list > /dev/null
```

```
ubuntu@ubuntu:~$ sudo apt update
```

```
ubuntu@ubuntu:~$ sudo apt install ros-foxy-desktop
```

Reading package lists... Done

Building dependency tree

Reading state information... Done

Some packages could not be installed. This may mean that you have requested an impossible situation or if you are using the unstable distribution that some required packages have not yet been created or been moved out of Incoming.

The following information may help to resolve the situation:

The following packages have unmet dependencies:.....

E: Unable to correct problems, you have held broken packages.

[WAIT! I don't want ROS, I want ROS2!! Foxy IS ROS2]

Recheck sources:

```
ubuntu@ubuntu:~$ sudo apt update && sudo apt install curl gnupg2
lsb-release
```

```
ubuntu@ubuntu:~$ sudo curl -SSL
```

```
https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -o
/usr/share/keyrings/ros-archive-keyring.gpg
```

```
ubuntu@ubuntu:~$ echo "deb [arch=$(dpkg --print-architecture)
signed-by=/usr/share/keyrings/ros-archive-keyring.gpg]
http://packages.ros.org/ros2/ubuntu $(lsb_release -cs) main" |
```

```
sudo tee /etc/apt/sources.list.d/ros2.list > /dev/null
```

```
ubuntu@ubuntu:~$ sudo apt update
```

```
ubuntu@ubuntu:~$ sudo apt install ros-foxy-desktop
```

again FAILED. Suspect sources incomplete

```
ubuntu@ubuntu:~$ sudo nano /etc/apt/sources.list
      un-# ALL sources
try again ---
ubuntu@ubuntu:~$ sudo apt install ros-foxy-desktop
FAIL
```

2021.06.12

Starting over, over, over –
SD Card Formatter
Raspberry Pi Imager, F:, OS: Ubuntu Server 20.04.2 LTS arm-64
Boot in RPi4
login ubuntu, ubuntu
change password ubuntu, <password>, <password>
ubuntu@ubuntu:~\$ **sudo apt update**
ubuntu@ubuntu:~\$ **sudo apt upgrade -y**
ubuntu@ubuntu:~\$ **sudo apt install ubuntu-mate-desktop -y**
down-arrow > lightdm, [TAB], [ENTER]
*** System restart required ***
ubuntu@ubuntu:~\$ **sudo reboot**
On log-in screen, click circle by password and choose MATE.
ubuntu@ubuntu:~\$ **sudo apt install chromium-browser**
got stuck. ^C
ubuntu@ubuntu:~\$ **sudo apt install chromium-browser**
E: dpkg was interrupted, you must manually run 'sudo dpkg
--configure -a' to correct the problem.
ubuntu@ubuntu:~\$ **sudo dpkg --configure -a**
ubuntu@ubuntu:~\$ **sudo apt install chromium-browser && echo \$'\a'**

The **&& echo \$'\a'** part rings the bell on the PuTTy terminal when the job is done. The rover itself has no sound as configured.
Issue for another time.

ubuntu@ubuntu:~\$ **sudo apt install terminator && echo \$'\a'**
ubuntu@ubuntu:~\$ **sudo nano /boot/firmware/usercfg.txt**
 hdmi_force_hotplug=1

^X, Y, RETURN

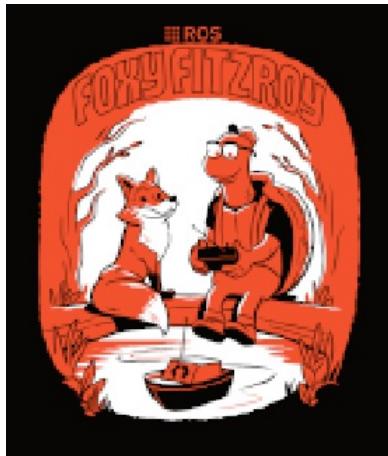
ubuntu@ubuntu:/etc/netplan\$ **sudo nano /etc/netplan/50-cloud-init.yaml**
network:

```
ethernets:  
    eth0:  
        dhcp4: true  
        optional: true  
version: 2  
wifis:  
    wlan0:  
        optional: true  
        access-points:  
            "SSID-NAME":  
                password: "PASSWORD"  
        dhcp4: true
```

ubuntu@ubuntu:/etc/netplan\$ **sudo netplan apply**
ubuntu@ubuntu:/etc/netplan\$ **ip a** doesn't show wifi

```
ubuntu@ubuntu:~$ ip a
...
3: wlan0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc fq_codel state DOWN
    group default qlen 1000
    link/ether dc:a6:32:16:0e:51 brd ff:ff:ff:ff:ff:ff

ubuntu@ubuntu:~$ hostnamectl set-hostname AUDACITY
ubuntu@ubuntu:~$ sudo reboot
#####
ubuntu@ubuntu:~$ ip a
3: wlan0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether dc:a6:32:16:0e:51 brd ff:ff:ff:ff:ff:ff
        inet 192.168.1.17/24 brd 192.168.1.255 scope global dynamic
wlan0
    valid_lft 83952sec preferred_lft 83952sec
```



Install ROS2 Foxy Fitzroy
<https://docs.ros.org/en/foxy/Installation/Ubuntu-Install-Debians.html>

Locale
ubuntu@AUDACITY:~\$ **locale**
UTF-8 confirmed

Setup Sources
ubuntu@AUDACITY:~\$ **sudo apt update && sudo apt install curl gnupg2 lsb-release**
done

ubuntu@AUDACITY:~\$ **sudo curl -sSL**
<https://raw.githubusercontent.com/ros/rosdistro/master/ros.key> -o /usr/share/keyrings/ros-archive-keyring.gpg

ubuntu@AUDACITY:~\$ **echo "deb [arch=\$(dpkg --print-architecture)
signed-by=/usr/share/keyrings/ros-archive-keyring.gpg]
http://packages.ros.org/ros2/ubuntu \$(lsb_release -cs) main" |
sudo tee /etc/apt/sources.list.d/ros2.list > /dev/null**

Install ROS 2 packages
ubuntu@AUDACITY:~\$ **sudo apt update**
...All packages are up to date.

ubuntu@AUDACITY:~\$ **sudo apt install ros-foxy-desktop**
[save this for tomorrow]
ubuntu@AUDACITY:~\$ **sudo shutdown -h now**

2021.06.13

```
ubuntu@AUDACITY:~$ sudo apt install ros-foxy-desktop
Y
done
Sourcing the setup script
ubuntu@AUDACITY:~$ source /opt/ros/foxy/setup.bash
Install argcomplete (optional)
ubuntu@AUDACITY:~$ sudo apt install -y python3-argcomplete
Try some examples
[term 1]
ubuntu@AUDACITY:~$ source /opt/ros/foxy/setup.bash
[term 2]
ubuntu@AUDACITY:~$ source /opt/ros/foxy/setup.bash
[term 1]
ubuntu@AUDACITY:~$ ros2 run demo_nodes_cpp talker
[term 2]
ubuntu@AUDACITY:~$ ros2 run demo_nodes_py listener
[term 1]
[INFO] [1623607080.720160460] [talker]: Publishing: 'Hello World:
51'
[term 2]
[INFO] [1623607080.726032314] [listener]: I heard: [Hello World:
51]
ubuntu@AUDACITY:~$ sudo shutdown -h now
save U20ROS2.img for fall-back precaution!
reboot
on to install OSR code - below
```

2021.06.13 cont'd

4 Setting up ROS environment and building the rover code
4.1 Setup ROS build environment
ubuntu@AUDACITY:~\$ **mkdir -p ~/osr_ws/src && cd ~/osr_ws**
ubuntu@AUDACITY:~/osr_ws\$ **source /opt/ros/foxy/setup.bash**
ubuntu@AUDACITY:~/osr_ws\$ **sudo apt install python3-colcon-common-extensions**
Extracting templates from packages: 100%
Selecting previously unselected package libjs-jquery-hotkeys.
dpkg: unrecoverable fatal error, aborting:
loading files list file for package 'libpcl-keypoints1.10:arm64':
cannot read /var/lib/dpkg/info/libpcl-keypoints1.10:arm64.list
(Input/output error)
sh: 1: /usr/bin/test: Input/output error
sh: 1: /bin/echo: Input/output error
E: Sub-process /usr/bin/dpkg returned an error code (2)
W: Problem unlinking the file /var/cache/apt/pkgcache.bin -
pkgDPkgPM::Go (30: Read-only file system)
E: Problem executing scripts DPkg::Post-Invoke '/usr/bin/test -e
/usr/share/dbus-1/system-services/org.freedesktop.PackageKit.servi
ce && /usr/bin/test -S /var/run/dbus/system_bus_socket &&
/usr/bin/gdbus call --system --dest org.freedesktop.PackageKit
--object-path /org/freedesktop/PackageKit --timeout 4 --method
org.freedesktop.PackageKit.StateHasChanged cache-update >
/dev/null; /bin/echo > /dev/null'
E: Sub-process returned an error code

system suddenly doesn't understand ANY commands!

ie

```
$ sudo reboot  
sudo: command not found
```

WTF?!

Suspect corrupted / damaged SD card given prior crash.

Thankfully I have the .img saved to start over w/ new SD card.

2021.06.13 cont'd

Starting over, over, over, over! – [ref back to p. 400]

SD Card Formatter, overwrite, "U20ROS2"

write successful

boot

WiFi ok

see if this helps previous crash problem:

```
ubuntu@ubuntu:~$ sudo dpkg --configure -a
```

4 Setting up ROS environment and building the rover code

4.1 Setup ROS build environment

```
ubuntu@AUDACITY:~$ mkdir -p ~/osr_ws/src && cd ~/osr_ws
```

```
ubuntu@AUDACITY:~/osr_ws$ source /opt/ros/foxy/setup.bash
```

```
ubuntu@AUDACITY:~/osr_ws$ sudo apt install
```

python3-colcon-common-extensions

4.2 Clone and build the rover code

```
ubuntu@AUDACITY:~/osr_ws$ sudo apt install git
```

```
ubuntu@AUDACITY:~/osr_ws$ cd ~/osr_ws/src
```

```
ubuntu@AUDACITY:~/osr_ws/src$ git clone
```

https://github.com/nasa-jpl/osr-rover-code.git

```
ubuntu@AUDACITY:~/osr_ws/src$ cd osr-rover-code
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git fetch origin
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git checkout
```

foxy-devel

Branch 'foxy-devel' set up to track remote branch 'foxy-devel' from 'origin'.

Switched to a new branch 'foxy-devel'

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ sudo apt install
```

python3-rosdep

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ cd ..
```

[need to cd .. one more level]

```
ubuntu@AUDACITY:~/osr_ws/src$ cd ..
```

```
ubuntu@AUDACITY:~/osr_ws$ sudo rosdep init
```

```
ubuntu@AUDACITY:~/osr_ws$ rosdep update
```

```
ubuntu@AUDACITY:~/osr_ws$ rosdep install --from-paths src  
--ignore-src
```

```
ubuntu@AUDACITY:~/osr_ws$ colcon build --symlink-install
```

```
ubuntu@AUDACITY:~/osr_ws$ source install/setup.bash
```

```
ubuntu@AUDACITY:~/osr_ws$ cd
```

~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
```

```
$ touch osr_params_mod.yaml roboclaw_params_mod.yaml
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
```

```
4.3 Add ROS config scripts to .bashrc
$ cd ~
ubuntu@AUDACITY:~$ echo "source /opt/ros/foxy/setup.bash" >>
~/.bashrc
ubuntu@AUDACITY:~$ echo "source ~/osr_ws/install/setup.bash" >>
~/.bashrc
5   Setting up serial communication on the Rpi
5.1 Disable serial-getty@ttyS0.service
ubuntu@AUDACITY:~$ sudo systemctl stop serial-getty@ttyS0.service
ubuntu@AUDACITY:~$ sudo systemctl disable
serial-getty@ttyS0.service
ubuntu@AUDACITY:~$ sudo systemctl mask serial-getty@ttyS0.service
5.2 Copy udev rules
ubuntu@AUDACITY:~$ cd ~/osr_ws/src/osr-rover-code/config
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ sudo cp
serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ sudo udevadm
control --reload-rules && sudo udevadm trigger
5.3 Add user to tty group
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ sudo adduser
ubuntu tty
5.4 Remove console line in cmdline.txt boot config file
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ cd
/boot/firmware
ubuntu@AUDACITY:~/boot/firmware$ sudo cp cmdline.txt
cmdline.txt.bak
ubuntu@AUDACITY:~/boot/firmware$ sudo nano cmdline.txt
console=serial0,115200
5.5 Disable bluetooth in config.txt boot config file
cd /boot/firmware
sudo cp config.txt config.txt.bak
sudo nano config.txt
sudo nano usercfg.txt
dtoverlay=disable-bt
5.6 Restart the Rpi
sudo shutdown -h now
read SD card to U2R20SR.img
#####
boot
```

```
6 Testing serial comm with the Roboclaw motors controllers
cd ~/osr_ws/src/osr-rover-code/scripts
python3 roboclawtest.py 128
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
python3 roboclawtest.py 129
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
python3 roboclawtest.py 130
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
python3 roboclawtest.py 131
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 729, 130)python3 roboclawtest.py 132
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 902, 130)
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ sudo shutdown
-h now
```

NEXT add Achille's bringup code

2021.06.21

Following 1wk hiatus due to R total hip replacement surgery 6/14.
Cannot assess Netgear router after refresh.

Plugging ethernet into laptop seem to inhibit internet access.
Perhaps also for rover? WiFi intact & reachable.
Plan to reboot laptop.

Left off websites:

<https://github.com/Achille/osr-rover-code/tree/enh/services>

<https://app.slack.com/client/T01CMHZLGPL/C01K4G4TUA1/thread/C01K4G4TUA1-1622628143.003300>

https://github.com/Achille/osr-rover-code/blob/enh/services/setup_rover_bringup.md

After laptop & router reboot:

Netgear router showing both eth & wifi ip addresses for AUDACITY
AUDACITY \$ ip a shows both eth0 & wlan0

ubuntu@AUDACITY:~\$ **ros2 launch osr_bringup osr_launch.py**

Brings up rover program w/o error.

Try to pair Xbox: pair w/ indicator #1 only lit!

Rover, after shaking out bootup hinks w/ right/left & fwd/rev commands responds ok, x- turbo command doesn't work.

Let's see the configuration re turbo:

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
\$ **nano osr_launch.py**

```
...
parameters=[
    {"scale_linear.x": 0.8}, # scale to apply to drive speed, in m/s: drive_motor_rpm * 2pi /
60 * wheel_radius * slowdown_factor
    {"axis_linear.x": 1},
    {"axis_angular.yaw": 3}, # which joystick axis to use for driving
    {"scale_angular.yaw": 1.75}, # scale to apply to angular speed, in rad/s: scale_linear /
min_radius(=0.45m)
    {"scale_angular_turbo.yaw": 3.95}, # scale to apply to angular speed, in rad/s:
scale_linear_turbo / min_radius
    {"scale_linear_turbo.x": 1.78}, # scale to apply to linear speed, in m/s
    {"enable_button": 4}, # which button to press to enable movement
    {"enable_turbo_button": 5} # -1 to disable turbo
],
```

Posted to Slack and await reply from Achille if prior instructions are still valid given my absence.

Switched rover to battery power. On bringup Xbox controller pairs with 4 lights. Still responds ok. Able to run to bedroom & back though slow w/ no turbo function. Will need to play w/ configuration above.

2021.06.23

Tried powering the Elecrow 5" TFT HDMI screen from the auxillary J14 USB power port on the PCB w/ good success (so far) w/o killing the Pi.

Response from Slack:

Nevermind, I found the issue! Turns out there was a change that hadn't gotten merged in yet. The default speed for the drive motors was still set to the old value of 31 rpm while they should run at 223. See this PR. So turbo was working, your rover was just super slow. Careful, the rover is pretty quick with this change. All you need to do is git pull (assuming you're on the foxy-devel branch). If that doesn't fix it, please still perform above two steps.

#139 Fix default drive motor speed

Assignees

Achille

Comments

1

<<https://github.com/nasa-jpl/osr-rover-code>|nasa-jpl/osr-rover-code>nasa-jpl/osr-rover-code | Jun 21st | Added by GitHub

Achille 15 hours ago

Just made a small fix to the systemd launch script. It was pointing to the wrong location. The latest update should work. I also fixed the _mod.py references in the documentation

My reply:

James Phelan 9 minutes ago

I've not been getting from
nasa-jph/osr-rover-code/foxy-devel
but rather from the

Achille/osr-rover-code/enh/services

So...given my weakness in git, I'm going to need some very concrete

"#1 go here. #2 do this..." directions. Thanks! :wink:

Will be visiting Chardonnay this weekend so will have to wait til next week to do response.

Achille 6 days ago

Learn git. I won't be around forever to show you the steps :wink:

James Phelan 6 days ago

In the meantime....

Achille 6 days ago

In the meantime I have a full job :wink:

James Phelan 6 days ago

I learn by example seeing how others do it.

Achille 6 days ago

I've shown you a few times already!

PM to Achille:

Achille,

I need HELP, please. Not sass. I'm lost and confused. I'm a doctor, not a robotics engineer. Two git tutorials only taught me the basics, not edge cases like this. So far I've done pretty well following the many changes as the project has evolved over the last 3 years: Pi3>Pi4; Raspbian>Ubuntu 18>Ubuntu 20; ROS>ROS2; new launch and configuration procedures. As a total amateur all I can do is follow directions and learn along the way. Sometimes I can figure out when instructions are incomplete like needing an extra \$ cd.. and when I do I can feed that back to the project to improve documentation. But when things get really complicated like pulling code from Achille/.../enh/services then from nasa-jpl/.../foxy-devel or when something doesn't get merged or points to the wrong location I'm understandably roadblocked. I'm inspired by your work and trying to follow your footsteps over very rocky ground to take AUDACITY from a dumb RC car eventually toward some kind of (semi-?) autonomous vehicle. Then I can take that knowledge and teach others in my group. But for now, I just need some clear and complete instructions how to get from A to B. Then, when I see how you do it, I get deeper understanding that I can apply to future cases that all the tutorials in the world won't teach me. Explaining things to a dumbass like me will also strengthen your documenting skills. I'm a lost dog trying to follow you home. If you're going to throw something my direction, I'd rather it be a bone than a rock.

Thanks as always for your help! :pray:

P.S. I recently did a complete clean reinstall of everything up through ROS2 and the basic osr code (from .../enh/services) hoping that might clean out some trash that may have been responsible for the latency w/ FR dashboard. I really don't want to clutter (or

some other verb) things up by stupidly stumbling around from here! I'm visiting my daughter out of town this weekend so won't be able to try anything til next week anyway. Again, thanks for your inspiration and assistance!

Jim (edited)

Achille 12:32 PM

Hi Jim, I'm happy to help as much as I can but you have to understand that I'm only human and have limited time/patience. This is the case for ALL non-paid open source projects. A lot of maintainers don't even bother helping end users setting things up and troubleshooting and it's in their full right as contributing is fully optional.

I'm a doctor, not a robotics engineer

You keep saying this. I'm the only robotics engineer in this entire project and there are plenty of other folks who've made this work. This doesn't help, and you imply that I'm not making an effort to make the instructions as simple as possible

As a total amateur all I can do is follow directions and learn along the way.

In my experience good learning means building an understanding and then executing. What you're suggesting is to follow instructions first and then try figuring out what you did. This doesn't work because as soon as you run into an issue (which is inevitable with complex projects), you have no understanding to fix it yourself take AUDACITY from a dumb RC car eventually toward some kind of (semi-?) autonomous vehicle

How are you planning on doing this if you expect to follow detailed step by step instructions for even building the dumb RC car? You want to deviate from the very basics and you surely understand that going on unknown terrain means that you have to figure some stuff out on your own.

But when things get really complicated like pulling code from Achille/.../enh/services then from nasa-jpl/.../foxy-devel or when something doesn't get merged or points to the wrong location I'm understandably roadblocked.

This is basic git and shows that you either followed the wrong tutorial or didn't pay attention. I'd suggest you take a look at for example [this tutorial for working with multiple remotes](#). If you have any specific questions I'm happy to answer them, generic 'tell me what to do' without showing what exactly you've already tried I will not answer.

I just need some clear and complete instructions how to get from A to B.

There's something new each week and each time it comes down to figuring out once and for all how git works. 'just' some clear and

complete instructions takes a lot of time and I can't know what A and B exactly are.

My options are:

ignore you going forward. I'd hate to do this because I like your mission of teaching

dedicate time and effort to try to help you with your A --> B. This isn't an option because I don't have this time, there are others who need my help, and it's also not efficient because you'll keep coming back and getting stuck because you don't know what you're doing. You also won't be able to pass on knowledge because you just blindly followed the steps and don't know why something does or does not work

convince you that you should learn yourself and ask questions when you're genuinely stuck and have shown that you've put effort into understanding the basics. Right now a major roadblock that I see is that you do not understand how git works and it is essential to doing anything more advanced than just making the master branch work

2021.06.29

Following

<https://github.com/nasa-jpl/osr-rover-code/pull/137/commits/dff0de7c654dcdd33b3e67cd3e65e6d8f0987f2a>

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch
$ cp osr_launch.py osr_mod_launch.py
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch
$ nano osr_mod_launch.py
```

There's no mention of LED display, probably because Achille isn't using it.

See caution in his reply above about changes in motor parameters do don't change them here now. See PR below.

Motor Speed correction

<https://github.com/nasa-jpl/osr-rover-code/pull/139/commits/b2981f500550cf9cebba65fc4a2ecc087d3c8a74>

```
ROS/osr Bringup/config/osr_params.yaml
```

(-) drive_no_load_rpm: 31.0 # no load speed for the drive motors. NOTE: needs to be a float value

(+) drive_no_load_rpm: 223.0 # no load speed for the drive motors. NOTE: needs to be a float value

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/config
```

\$ nano osr_params.yaml

31.0 > 233.0

```
ubuntu@AUDACITY:~$ ros2 launch osr Bringup osr_launch.py
```

Rover definitely kicks ass now and turbo works as it's 7 times faster!

Bringup scripts

following:

<https://github.com/nasa-jpl/osr-rover-code/pull/137/commits/30efb75d26ea488c9ba9d38a5293814db8d42716>

Still fuzzy about this as to what the latest config is. Defer.

Achille 23 days ago

```
ubuntu@ubuntu:~$ git add remote Achllle
https://github.com/Achllle/osr-rover-code.git
fatal: not a git repository (or any of the parent directories):
.git
ubuntu@ubuntu:~$ git@github.com:Achllle/osr-rover-code.git
-bash: git@github.com:Achllle/osr-rover-code.git: No such file or
directory
It says right there: "not a git repository". You simply have to cd
to osr-rover-code.
```

Still fuzzy on this git error, too. Will have to try that tutorial.

2021.06.30

Looking to

<https://github.com/nasa-jpl/osr-rover-code/tree/foxy-devel>

```
osr-rover-code/ROS/
    led_screen
        ignore
    osr_bringup
        config
            osr_params.yaml
            roboclaw_params.yaml
    launch
        .gitignore
            add osr_mod.launch
        osr_launch.py
            actual launch file
            fix odometry
osr-rover-code/config/
    serial_udev_ubuntu.rules
osr-rover-code/init_scripts/
    LaunchOSR.sh
        launch ... osr_launch.py
    launch_osr.sh
        ... osr.launch OBSOLETE
    osr_paths.sh
        need to source this file
    osr_startup.service
        startup script
osr-rover-code/scripts
    make_readme_pdf.sh
        move some ? files
    roboclawtest.py
        test program
osr-rover-code/setup
    arduino.md
        not used
    rover_bringup.md
        defer til underlying code is pulled or pasted
    rpi.md
        install directions, some PR may be missing
    rpi_raspbian.md
        using ROS2 on Raspbian, not used
    serial_config_info.md
        serial setup already done?
wheel_odom_example.png
    pic of wheel odometry
```

<https://www.computerhope.com/unix/tree.htm>

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code\$ sudo apt install tree

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code\$ cat OSR_tree.txt

```
└── Arduino
    ├── OsrScreen.cpp
    ├── OsrScreen.h
    └── README.md
    └── examples
        └── Osr_Screen
            └── Osr_Screen.ino
└── LICENSE.txt
└── OSR_tree.txt
└── README.md
└── ROS
    ├── README.md
    ├── led_screen
    │   ├── CMakeLists.txt
    │   ├── COLCON_IGNORE
    │   ├── package.xml
    │   └── src
    │       ├── arduino_comm.py
    │       └── screen.py
    ├── osr_bringup
    │   ├── CMakeLists.txt
    │   ├── config
    │   │   ├── osr_params.yaml
    │   │   ├── osr_params_mod.yaml
    │   │   ├── roboclaw_params.yaml
    │   │   └── roboclaw_params_mod.yaml
    │   ├── launch
    │   │   ├── osr_launch.py
    │   │   ├── osr_launch_old.py
    │   │   └── osr_mod_launch.py
    │   └── package.xml
    ├── osr_control
    │   ├── dimensions_wheels_illustration.png
    │   ├── osr_control
    │   │   ├── __init__.py
    │   │   ├── __pycache__
    │   │   │   ├── __init__.cpython-38.pyc
    │   │   │   ├── roboclaw.cpython-38.pyc
    │   │   │   └── roboclaw_wrapper.cpython-38.pyc
    │   │   └── rover.cpython-38.pyc
    │   ├── roboclaw.py
    │   ├── roboclaw_wrapper.py
    │   └── rover.py
    ├── package.xml
    └── resource
        └── osr_control
            ├── setup.cfg
            ├── setup.py
            └── src
                └── test_controller.py
            └── test
                ├── test_copyright.py
                ├── test_flake8.py
                └── test_pep257.py
    └── osr_interfaces
        ├── CMakeLists.txt
        ├── msg
        │   ├── CommandCorner.msg
        │   ├── CommandDrive.msg
        │   └── Status.msg
        └── package.xml
    └── config
        └── serial_udev_ubuntu.rules
    └── init_scripts
        ├── launch_osr.sh
        ├── osr_paths.sh
        └── osr_startup.service
    └── scripts
        ├── make_readme_pdf.sh
        └── roboclawtest.py
    └── setup
        ├── arduino.md
        ├── rover_bringup.md
        ├── rpi.md
        ├── rpi_raspbian.md
        ├── serial_config_info.md
        └── wheel_odom_example.png
```

LEARING GIT (again)

<https://git-scm.com/book/en/v2/Getting-Started-About-Version-Control>

1.7 Getting Started - Getting Help

```
$ git help <verb>
$ git <verb> --help
$ man git-<verb>

$ git help config
```

In addition, if you don't need the full-blown manpage help, but just need a quick refresher on the available options for a Git command, you can ask for the more concise "help" output with the -h option, as in:

```
$ git add -h
```

2.1 Git Basics - Getting a Git Repository for Windows:

```
$ cd C:/Users/user/my_project
```

```
C:\Users\Me>cd C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git Tutorial
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git Tutorial>git init
```

```
Initialized empty Git repository in C:/Users/Me/Documents/My Downloads/Robotics/USAi Labs/Git Tutorial/.git/
```

If you want to start version-controlling existing files (as opposed to an empty directory), you should probably begin tracking those files and do an initial commit. You can accomplish that with a few git add commands that specify the files you want to track, followed by a git commit:

```
$ git add *.c
$ git add LICENSE
$ git commit -m 'Initial project version'
```

create "Bogus..." .txt, .wpd, .qpw files

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>dir  
Volume in drive C has no label.  
Volume Serial Number is A6EB-4E48  
  
Directory of C:\Users\Me\Documents\My Downloads\Robotics\USAi  
Labs\Git Tutorial  
  
06/30/2021  05:56 PM    <DIR>          .  
06/30/2021  05:56 PM    <DIR>          ..  
06/30/2021  05:56 PM            4,096 Bogus Quattro Pro X9  
Notebook.QPW  
06/30/2021  05:55 PM            0 Bogus Text Document.TXT  
06/30/2021  05:56 PM            30 Bogus WordPerfect X9  
Document.wpd  
          3 File(s)           4,126 bytes  
          2 Dir(s)   693,855,215,616 bytes free
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git add Bogus*.*
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git commit -m 'Initial project version'  
error: pathspec 'project' did not match any file(s) known to git  
error: pathspec 'version' did not match any file(s) known to git  
' should be ", see successful command below.
```

Cloning an Existing Repository
I don't want to right now

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git commit -m "Initial project version"  
[master (root-commit) 0b2808b] Initial project version  
 3 files changed, 0 insertions(+), 0 deletions(-)  
  create mode 100644 Bogus Quattro Pro X9 Notebook.QPW  
  create mode 100644 Bogus Text Document.TXT  
  create mode 100644 Bogus WordPerfect X9 Document.wpd
```

Checking the Status of Your Files
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>**git status**
On branch master
nothing to commit, working tree clean

Let's say you add a new file to your project, a simple README file. If the file didn't exist before, and you run git status, you see your untracked file like so:

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>echo 'My Project' > README
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>DIR
```

```
Volume in drive C has no label.  
Volume Serial Number is A6EB-4E48
```

```
Directory of C:\Users\Me\Documents\My Downloads\Robotics\USAi  
Labs\Git Tutorial
```

06/30/2021 06:25 PM	<DIR>	.
06/30/2021 06:25 PM	<DIR>	..
06/30/2021 05:56 PM		4,096 Bogus Quattro Pro X9
Notebook.QPW		
06/30/2021 05:55 PM		0 Bogus Text Document.TXT
06/30/2021 05:56 PM		30 Bogus WordPerfect X9
Document.wpd		
06/30/2021 06:25 PM		15 README

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git status
```

```
On branch master
```

```
Untracked files:
```

```
(use "git add <file>..." to include in what will be committed)  
 README
```

```
nothing added to commit but untracked files present (use "git add"  
 to track)
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git add README
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git status
```

```
On branch master
```

```
Changes to be committed:
```

```
(use "git restore --staged <file>..." to unstage)  
 new file: README
```

Staging Modified Files

Let's change a file that was already tracked.

Edit "Bogus Text Document.txt"

Now there is some text in this file.

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git status
```

On branch master

Changes to be committed:

```
  (use "git restore --staged <file>..." to unstage)
    new file: README
```

Changes not staged for commit:

```
  (use "git add <file>..." to update what will be committed)
    (use "git restore <file>..." to discard changes in working
     directory)
```

```
      modified: Bogus Text Document.TXT
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git add "Bogus Text Document.TXT"
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git status
```

On branch master

Changes to be committed:

```
  (use "git restore --staged <file>..." to unstage)
    modified: Bogus Text Document.TXT
    new file: README
```

Short Status

```
$ git status -s
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git status -s
```

```
M "Bogus Text Document.TXT"
```

```
A README
```

.gitignore

The rules for the patterns you can put in the **.gitignore** file are as follows:

Blank lines or lines starting with # are ignored.

Standard glob patterns work, and will be applied recursively throughout the entire working tree.

You can start patterns with a forward slash (/) to avoid recursivity.

You can end patterns with a forward slash (/) to specify a directory.

You can negate a pattern by starting it with an exclamation point (!).

Glob patterns are like simplified regular expressions that shells use. An asterisk (*) matches zero or more characters; [abc] matches any character inside the brackets (in this case a, b, or c); a question mark (?) matches a single character; and brackets enclosing characters separated by a hyphen ([0-9]) matches any character between them (in this case 0 through 9). You can also use two asterisks to match nested directories; a/**/z would match a/z, a/b/z, a/b/c/z, and so on.

To see what you've changed but not yet staged, type **git diff** with no other arguments:

nothing at present

Skipping the Staging Area

\$ git commit -a -m 'Add new benchmarks'

-a = "all"

doesn't work

2021.07.01

Viewing the Commit History

\$ git log

One of the more helpful options is -p or --patch, which shows the difference (the patch output) introduced in each commit. You can also limit the number of log entries displayed, such as using -2 to show only the last two entries.

\$ git log -p -2

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git log -p  
commit 127875c32b95b95a19452d20f0ac62834a58ba45 (HEAD -> master)  
Author: JHPhelan <jhphelan@hal.pc.org>  
Date:   Wed Jun 30 19:26:09 2021 -0500
```

git tutorial chapter 2

```
diff --git a/Bogus Text Document.TXT b/Bogus Text Document.TXT  
index e69de29..dd43388 100644  
--- a/Bogus Text Document.TXT  
+++ b/Bogus Text Document.TXT  
@@ -0,0 +1 @@  
+Now there is some text in this file.  
\ No newline at end of file  
diff --git a/README b/README  
new file mode 100644  
index 0000000..af257a1  
--- /dev/null  
+++ b/README  
@@ -0,0 +1 @@  
+'My Project'
```

```
commit 0b2808b7b3f646388dc82c70dd9f313db767cef0  
Author: JHPhelan <jhphelan@hal.pc.org>  
Date:   Wed Jun 30 18:14:42 2021 -0500
```

Initial project version

```
diff --git a/Bogus Quattro Pro X9 Notebook.QPW b/Bogus Quattro Pro  
X9 Notebook.QPW  
new file mode 100644  
index 0000000..1d50b4e  
Binary files /dev/null and b/Bogus Quattro Pro X9 Notebook.QPW  
differ  
diff --git a/Bogus Text Document.TXT b/Bogus Text Document.TXT  
new file mode 100644  
index 0000000..e69de29  
diff --git a/Bogus WordPerfect X9 Document.wpd b/Bogus WordPerfect  
X9 Document.wpd  
new file mode 100644  
index 0000000..9221342  
Binary files /dev/null and b/Bogus WordPerfect X9 Document.wpd  
differ
```

if you want to see some abbreviated stats for each commit, you can use the **--stat** option:

```
$ git log --stat
```

Another really useful option is **--pretty**

A few prebuilt option values are available:

oneline this option prints each commit on a single line

```
$ git log --pretty=oneline
```

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git

Tutorial>**git log --pretty=oneline**

```
127875c32b95b95a19452d20f0ac62834a58ba45 (HEAD -> master) git
tutorial chapter 20b2808b7b3f646388dc82c70dd9f313db767cef0 Initial
project version
```

*Looks like it prints it ALL on one line, not one line each.
The proper format is git log --oneline, not --pretty=oneline*

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git

Tutorial>**git log --oneline**

```
127875c (HEAD -> master) git tutorial chapter 2
0b2808b Initial project version
```

the **short**, **full**, and **fuller** values show the output in roughly the same format but with less or more information, respectively:

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git

Tutorial>**git log --pretty=short**

```
commit 127875c32b95b95a19452d20f0ac62834a58ba45 (HEAD -> master)
Author: JHPhelan <jhphelan@hal-pc.org>
```

```
git tutorial chapter 2
```

```
commit 0b2808b7b3f646388dc82c70dd9f313db767cef0
```

```
Author: JHPhelan <jhphelan@hal-pc.org>
```

```
Initial project version
```

format

```
$ git log --pretty=format:"%h - %an, %ar : %s"
```

Specifier Description of Output

%H	Commit hash
%h	Abbreviated commit hash
%T	Tree hash
%t	Abbreviated tree hash
%P	Parent hashes
%p	Abbreviated parent hashes
%an	Author name
%ae	Author email
%ad	Author date (format respects the --date=option)
%ar	Author date, relative
%cn	Committer name
%ce	Committer email
%cd	Committer date
%cr	Committer date, relative
%s	Subject

Option Description

-p	Show the patch introduced with each commit.
--stat	Show statistics for files modified in each commit.
--shortstat	Display only the changed/insertions/deletions line from the --stat command.
--name-only	Show the list of files modified after the commit information.
--name-status	Show the list of files affected with added/modified/deleted information as well.
--abbrev-commit	Show only the first few characters of the SHA-1 checksum instead of all 40.
--relative-date	Display the date in a relative format (for example, "2 weeks ago") instead of using the full date format.
--graph	Display an ASCII graph of the branch and merge history beside the log output.
--pretty	Show commits in an alternate format. Option values include oneline, short, full, fuller, and format (where you specify your own format).
--oneline	Shorthand for --pretty=oneline --abbrev-commit used together.

The oneline and format option values are particularly useful with another log option called **--graph**. This option adds a nice little ASCII graph showing your branch and merge history:

```
$ git log --pretty=format:"%h %s" --graph
```

Undoing Things

Be careful, because you can't always undo some of these undos. This is one of the few areas in Git where you may lose some work if you do it wrong.

```
$ git commit --amend
```

Only amend commits that are still local and have not been pushed somewhere. Amending previously pushed commits and force pushing the branch will cause problems for your collaborators

```
$ git commit -m 'Initial commit'
```

```
$ git add forgotten_file
```

```
$ git commit --amend
```

Unstaging a Staged File

...

Changes to be committed:

(use "git **reset** HEAD <file>..." to unstage)

See **git restore** below

Unmodifying a Modified File

...

(use "git **checkout** -- <file>..." to discard changes in working directory)

It's important to understand that `git checkout -- <file>` is a dangerous command. Any local changes you made to that file are gone – Git just replaced that file with the last staged or committed version. Don't ever use this command unless you absolutely know that you don't want those unsaved local changes.

Git version 2.23.0 introduced a new command: **git restore**. It's basically an alternative to **git reset** which we just covered. From Git version 2.23.0 onwards, Git will use **git restore** instead of `git reset` for many undo operations.

Change the 3 sample files by adding data.

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git status
```

On branch master

Changes not staged for commit:

(use "git add <file>..." to update what will be committed)

(use "git **restore** <file>..." to discard changes in working directory)

modified: Bogus Quattro Pro X9 Notebook.QPW

modified: Bogus Text Document.TXT

modified: Bogus WordPerfect X9 Document.wpd

```
no changes added to commit (use "git add" and/or "git commit -a")
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git add *
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git status
```

```
On branch master
```

```
Changes to be committed:
```

```
  (use "git restore --staged <file>..." to unstage)  
    modified:   Bogus Quattro Pro X9 Notebook.QPW  
    modified:   Bogus Text Document.TXT  
    modified:   Bogus WordPerfect X9 Document.wpd
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git restore --staged Bogus Text Document.TXT
```

```
error: pathspec 'Bogus' did not match any file(s) known to git  
error: pathspec 'Text' did not match any file(s) known to git  
error: pathspec 'Document.TXT' did not match any file(s) known to git
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git restore --staged <Bogus Text Document.TXT>
```

```
The syntax of the command is incorrect.
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git restore --staged "Bogus Text Document.TXT"
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git status
```

```
On branch master
```

```
Changes to be committed:
```

```
  (use "git restore --staged <file>..." to unstage)  
    modified:   Bogus Quattro Pro X9 Notebook.QPW  
    modified:   Bogus WordPerfect X9 Document.wpd
```

```
Changes not staged for commit:
```

```
  (use "git add <file>..." to update what will be committed)
```

```
    (use "git restore <file>..." to discard changes in working  
    directory)
```

```
      modified:   Bogus Text Document.TXT
```

I suspect the “_” in the document names is a problem. Eliminate by renaming files.

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git status  
On branch master  
Changes to be committed:  
  (use "git restore --staged <file>..." to unstage)  
    modified:   Bogus Quattro Pro X9 Notebook.QPW  
    modified:   Bogus WordPerfect X9 Document.wpd  
  
Changes not staged for commit:  
  (use "git add/rm <file>..." to update what will be committed)  
    (use "git restore <file>..." to discard changes in working  
     directory)  
      deleted:   Bogus Quattro Pro X9 Notebook.QPW  
      deleted:   Bogus Text Document.TXT  
      deleted:   Bogus WordPerfect X9 Document.wpd
```

```
Untracked files:  
  (use "git add <file>..." to include in what will be committed)  
  BogusQuattro ProX9Notebook.QPW  
  BogusTextDocument.TXT  
  BogusWordPerfectX9Document.wpd
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git rm "Bogus Quattro Pro X9 Notebook.QPW"  
rm 'Bogus Quattro Pro X9 Notebook.QPW'
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git status  
On branch master  
Changes to be committed:  
  (use "git restore --staged <file>..." to unstage)  
    deleted:   Bogus Quattro Pro X9 Notebook.QPW  
    modified:   Bogus WordPerfect X9 Document.wpd
```

```
Changes not staged for commit:  
  (use "git add/rm <file>..." to update what will be committed)  
    (use "git restore <file>..." to discard changes in working  
     directory)  
      deleted:   Bogus Text Document.TXT  
      deleted:   Bogus WordPerfect X9 Document.wpd
```

```
Untracked files:  
  (use "git add <file>..." to include in what will be committed)  
  BogusQuattro ProX9Notebook.QPW  
  BogusTextDocument.TXT  
  BogusWordPerfectX9Document.wpd
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git add *  
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git commit -m "Blank lines removed from file names"  
[master 6bc263c] Blank lines removed from file names  
 6 files changed, 2 insertions(+), 1 deletion(-)  
 delete mode 100644 Bogus Quattro Pro X9 Notebook.QPW  
 delete mode 100644 Bogus Text Document.TXT  
 delete mode 100644 Bogus WordPerfect X9 Document.wpd  
 create mode 100644 BogusQuattro ProX9Notebook.QPW  
 create mode 100644 BogusTextDocument.TXT  
 create mode 100644 BogusWordPerfectX9Document.wpd  
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git status  
On branch master  
nothing to commit, working tree clean
```

Unmodifying a Modified File with git restore

```
...  
  (use "git restore <file>..." to discard changes in working  
  directory)  
    modified:   CONTRIBUTING.md  
$ git restore CONTRIBUTING.md
```

It's important to understand that `git restore <file>` is a dangerous command. Any local changes you made to that file are gone – Git just replaced that file with the last staged or committed version. Don't ever use this command unless you absolutely know that you don't want those unsaved local changes.

2.5 Git Basics - Working with Remotes

Showing Your Remotes

```
$ git remote  
blank, I have no remotes at present
```

<https://github.com/JHPHELAN/Git-Tutorial>
deleted old repository
created new Git-Tutorial repository
Quick setup --
...or push an existing repository from the command line
git remote add origin https://github.com/JHPHELAN/Git-Tutorial.git
git branch -M main master
git push -u origin main master
remote: Invalid username or password.
fatal: Authentication failed for
'https://github.com/JHPHELAN/Git-Tutorial.git/'
Let's try "main" instead of "master" even tho my local is
"master". Don't see any provision for password. Cut/paste from
example:
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>**git remote add origin**
<https://github.com/JHPHELAN/Git-Tutorial.git>
error: **remote origin already exists.**

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>**git branch -M main**

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>**git push -u origin main**
Select an authentication method for 'https://github.com/':
1. Web browser (default)
2. Personal access token
option (enter for default): **1**
info: please complete authentication in your browser...

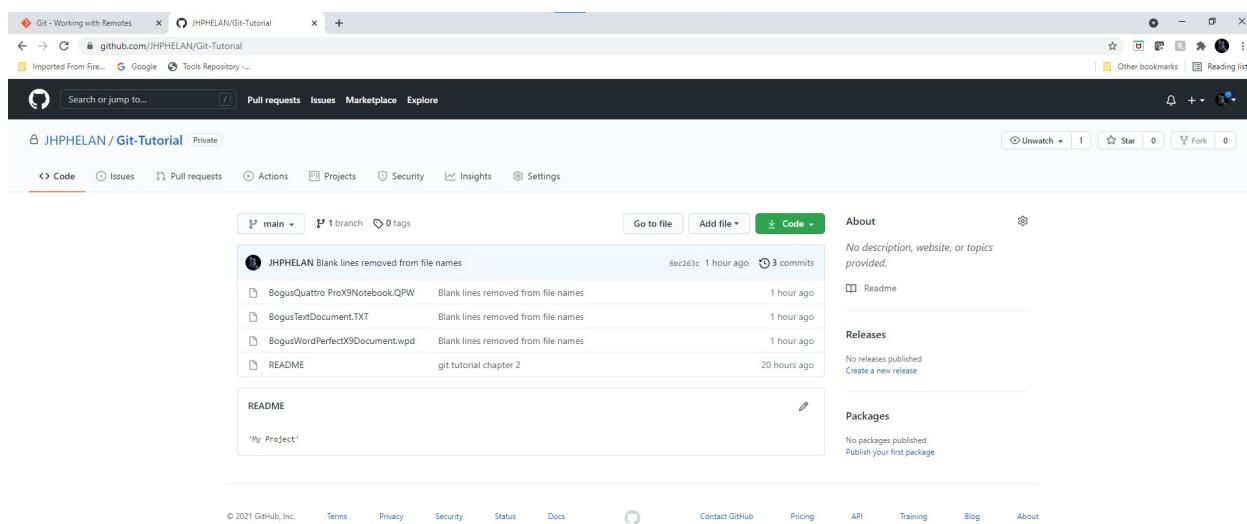
*Click authenticate button in browser, no password needed, I guess
because I'm already logged into Github.*

```

Enumerating objects: 14, done.
Counting objects: 100% (14/14), done.
Delta compression using up to 4 threads
Compressing objects: 100% (10/10), done.
Writing objects: 100% (14/14), 92.84 KiB | 1.05 MiB/s, done.
Total 14 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), done.
To https://github.com/JHPHELAN/Git-Tutorial.git
 * [new branch]      main -> main
Branch 'main' set up to track remote branch 'main' from 'origin'.

```

Refresh Github browser:



```

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git status
On branch main
Your branch is up to date with 'origin/main'.

nothing to commit, working tree clean

```

```

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git remote
origin

```

*Hooray!! What happened to branch **master**?*

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git remote -v  
origin https://github.com/JHPHELAN/Git-Tutorial.git (fetch)  
origin https://github.com/JHPHELAN/Git-Tutorial.git (push)  
  
ubuntu@AUDACITY:~$ git remote  
fatal: not a git repository (or any of the parent directories):  
.git  
ubuntu@AUDACITY:~$ ls  
Desktop Documents Downloads Music Pictures Public Templates  
Videos launch_osr.sh osr_paths.sh osr_ws  
ubuntu@AUDACITY:~$ cd osr_ws/  
ubuntu@AUDACITY:~/osr_ws$ git remote  
fatal: not a git repository (or any of the parent directories):  
.git  
ubuntu@AUDACITY:~/osr_ws$ ls  
build install log src  
ubuntu@AUDACITY:~/osr_ws$ cd src  
ubuntu@AUDACITY:~/osr_ws/src$ ls  
osr-rover-code  
ubuntu@AUDACITY:~/osr_ws/src$ git remote  
fatal: not a git repository (or any of the parent directories):  
.git  
ubuntu@AUDACITY:~/osr_ws/src$ cd osr-rover-code/  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git remote  
origin
```

Adding Remote Repositories

We've mentioned and given some demonstrations of how the **git clone** command implicitly adds the **origin** remote for you. Here's how to add a new remote explicitly. To add a new remote Git repository as a shortname you can reference easily, run

```
git remote add <shortname> <url>
```

Fetching and Pulling from Your Remotes

```
$ git fetch <remote>
```

The command goes out to that remote project and pulls down all the data from that remote project that you don't have yet

If you clone a repository, the command automatically adds that remote repository under the name "origin". So, **git fetch origin** fetches any new work that has been pushed to that server since you cloned (or last fetched from) it. It's important to note that the **git fetch command only downloads the data to your local repository** – it doesn't automatically merge it with any of your work or modify what you're currently working on. You have to merge it manually into your work when you're ready.

use the **git pull** command to automatically fetch and then merge that remote branch into your current branch.

Pushing to Your Remotes

```
git push <remote> <branch>
$ git push origin master
```

This command works only if you cloned from a server to which you have write access and if nobody has pushed in the meantime. If you and someone else clone at the same time and they push upstream and then you push upstream, your push will rightly be rejected. You'll have to fetch their work first and incorporate it into yours before you'll be allowed to push. See Git Branching for more detailed information on how to push to remote servers.

Inspecting a Remote

If you want to see more information about a particular remote, you can use the **git remote show <remote>** command.

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git remote show origin
```

```
* remote origin
  Fetch URL: https://github.com/JHPHELAN/Git-Tutorial.git
  Push URL: https://github.com/JHPHELAN/Git-Tutorial.git
  HEAD branch: main
  Remote branch:
    main tracked
  Local branch configured for 'git pull':
    main merges with remote main
  Local ref configured for 'git push':
    main pushes to main (up to date)
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git remote show
origin
```

```
* remote origin
  Fetch URL: https://github.com/nasa-jpl/osr-rover-code.git
  Push URL: https://github.com/nasa-jpl/osr-rover-code.git
  HEAD branch: master
  Remote branches:
    foxy-devel tracked
    master      tracked
    melodic-devel tracked
  Local branches configured for 'git pull':
    foxy-devel merges with remote foxy-devel
    master      merges with remote master
  Local refs configured for 'git push':
    foxy-devel pushes to foxy-devel (local out of date)
    master      pushes to master      (up to date)
```

Renaming and Removing Remotes

```
$ git remote rename pb paul  
($ git remote remove paul)      don't expect to use this soon
```

Tagging

Typically, people use this functionality to mark release points (v1.0, v2.0 and so on)

```
$ git tag
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git tag  
v1.0
```

Annotated Tags

```
$ git tag -a v1.4 -m "my version 1.4"  
$ git show  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git show v1.0  
commit 4bbb29a21cea7f7cf28d9235b8d22b1250dbcbed (tag: v1.0)  
Merge: 1c13c5f 2a44e93  
Author: Mik (Michael) Cox <mixter.c@gmail.com>  
Date: Thu Dec 13 12:03:32 2018 -0800
```

Merge pull request #17 from
daniel-s-ingram/daniel-s-ingram/issue-5-python3-support

Add support for Python3 while preserving Python2 compatibility

Tagging Later

```
$ git tag -a v1.2 9fce02
```

Sharing Tags

```
$ git push origin <tagname>  
$ git push origin --tags
```

Deleting Tags

o delete a tag on your **local** repository, you can use `git tag -d <tagname>`

```
$ git tag -d v1.4-lw
```

The second (and more intuitive) way to delete a **remote** tag is with:

```
$ git push origin --delete <tagname>
```

Git Aliases

```
$ git config --global alias.co checkout  
$ git config --global alias.br branch  
$ git config --global alias.ci commit  
$ git config --global alias.st status
```

```
$ git config --global alias.last 'log -1 HEAD'  
This way, you can see the last commit easily
```

3.1 Git Branching

```
$ git branch testing
```

The git branch command only created a new branch – it didn't switch to that branch.

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git log --oneline --decorate  
6bc263c (HEAD -> main, origin/main) Blank lines removed from file  
names  
127875c git tutorial chapter 2  
0b2808b Initial project version
```

Switching Branches

```
$ git checkout testing
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git branch testing
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git log --oneline --decorate  
6bc263c (HEAD -> main, origin/main, testing) Blank lines removed  
from file names  
127875c git tutorial chapter 2  
0b2808b Initial project version
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git checkout testing  
Switched to branch 'testing'
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git status  
On branch testing  
nothing to commit, working tree clean  
  
create in folder TestBranchGibberish.txt
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git status  
On branch testing  
Untracked files:  
  (use "git add <file>..." to include in what will be committed)  
    TestBranchGibberish.txt  
nothing added to commit but untracked files present (use "git add"  
to track)
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git add TestBranchGibberish.txt
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git status
On branch testing
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
    new file:  TestBranchGibberish.txt
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git commit
[testing 9c98b3d] File added to Testing branch
  1 file changed, 0 insertions(+), 0 deletions(-)
  create mode 100644 TestBranchGibberish.txt
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git log --oneline --decorate
9c98b3d (HEAD -> testing) File added to Testing branch
6bc263c (origin/main, main) Blank lines removed from file names
127875c git tutorial chapter 2
0b2808b Initial project version

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git checkout main
Switched to branch 'main'
Your branch is up to date with 'origin/main'.

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git log --all
commit 9c98b3db187454e0f4c00c75f99f3e508a46cba9 (testing)
Author: JHPhelan <jhphelan@hal-pc.org>
Date:   Fri Jul 2 19:01:43 2021 -0500

    File added to Testing branch

commit 6bc263cc4dfcc409109d9dba351ef81ad9afb3dd (HEAD -> main,
origin/main)
Author: JHPhelan <jhphelan@hal-pc.org>
Date:   Thu Jul 1 14:40:33 2021 -0500

    Blank lines removed from file names

commit 127875c32b95b95a19452d20f0ac62834a58ba45
Author: JHPhelan <jhphelan@hal-pc.org>
Date:   Wed Jun 30 19:26:09 2021 -0500

    git tutorial chapter 2
```

```
commit 0b2808b7b3f646388dc82c70dd9f313db767cef0
Author: JHPhelan <jhphelan@hal-pc.org>
Date:   Wed Jun 30 18:14:42 2021 -0500
```

Initial project version

```
you can use git switch instead of git checkout
Create a new branch and switch to it: git switch -c new-branch.
The -c flag stands for create, you can also use the full flag:
--create
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git switch testing
Switched to branch 'testing'
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git switch main
Switched to branch 'main'
Your branch is up to date with 'origin/main'.
```

3.2 Git Branching - Basic Branching and Merging

```
$ git checkout -b iss53
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git checkout -b iss53
Switched to a new branch 'iss53'
create file WebDocument.html

$ git commit -a -m 'Create new footer [issue 53]'

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git commit -a -m 'Create new footer [issue 53]'
fatal: paths 'new ...' with -a does not make sense
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git commit -a -m "Create new footer [issue 53]"
On branch iss53
Untracked files:
  (use "git add <file>..." to include in what will be committed)
    WebDocument.html
```

```
nothing added to commit but untracked files present (use "git add"
to track)
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git add WebDocument.html
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git commit -m "Create new footer [issue 53]"
[iss53 d7ec86d] Create new footer [issue 53]
 1 file changed, 0 insertions(+), 0 deletions(-)
  create mode 100644 WebDocument.html
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git switch main
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git checkout -b hotfix
Switched to a new branch 'hotfix'
create document index.html
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git commit -a -m 'Fix broken email address'
fatal: paths 'broken ...' with -a does not make sense
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git commit -a -m "Fix broken email address"
On branch hotfix
Untracked files:
  (use "git add <file>..." to include in what will be committed)
    index.html

nothing added to commit but untracked files present (use "git add"
to track)
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git add index.html

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git commit -m "Fix broken email address"
[hotfix f47225d] Fix broken email address
 1 file changed, 0 insertions(+), 0 deletions(-)
  create mode 100644 index.html

merge won't work here since .html files have different names.
Need to rename one to the other. index.html > WebDocument.html
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>ren index.html WebDocument.html

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git add WebDocument.html

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git commit -m "fixed and renamed web file"
[hotfix 9f445eb] fixed and renamed web file
 1 file changed, 0 insertions(+), 0 deletions(-)
  create mode 100644 WebDocument.html
```

You can run your tests, make sure the hotfix is what you want, and finally merge the hotfix branch back into your master branch to deploy to production. You do this with the git merge command:

```
$ git checkout master main  
$ git merge hotfix
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git merge hotfix
```

Updating 6bc263c..9f445eb

Fast-forward

```
 WebDocument.html | 0  
index.html       | 0  
 2 files changed, 0 insertions(+), 0 deletions(-)  
 create mode 100644 WebDocument.html  
 create mode 100644 index.html
```

should have rm index.html?

I did a cmd line ren instead of git mv

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git rm index.html
```

```
rm 'index.html'
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git log --oneline --decorate --graph --all
```

```
* 9f445eb (HEAD -> main, hotfix) fixed and renamed web file  
* f47225d Fix broken email address  
| * d7ec86d (iss53) Create new footer [issue 53]  
|/  
| * 9c98b3d (testing) File added to Testing branch  
|/  
* 6bc263c (origin/main) Blank lines removed from file names  
* 127875c git tutorial chapter 2  
* 0b2808b Initial project version
```

After your super-important fix is deployed, you're ready to switch back to the work you were doing before you were interrupted.

However, first you'll delete the hotfix branch, because you no longer need it – the master branch points at the same place. You can delete it with the -d option to git branch:

```
$ git branch -d hotfix  
Deleted branch hotfix (3a0874c).
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git branch -d hotfix
```

```
Deleted branch hotfix (was 9f445eb).
```

Now you can switch back to your work-in-progress branch on issue #53 and continue working on it.

```
$ git checkout iss53
Switched to branch "iss53"
$ vim index.html      use text editor in Windows file instead
$ git commit -a -m 'Finish the new footer [issue 53]'
[iss53 ad82d7a] Finish the new footer [issue 53]
1 file changed, 1 insertion(+)
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git checkout iss53
Switched to branch 'iss53'
use text editor in Windows file WebDocument.html
Adding text to document
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git status
On branch iss53
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
    (use "git restore <file>..." to discard changes in working
     directory)
        modified:   WebDocument.html

no changes added to commit (use "git add" and/or "git commit -a")
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git add WebDocument.html

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git commit -m "fix finish web document iss53"
[iss53 445ea1] fix finish web document iss53
  1 file changed, 1 insertion(+)
```

Basic Merging

Suppose you've decided that your issue #53 work is complete and ready to be merged into your master branch. In order to do that, you'll merge your iss53 branch into master, much like you merged your hotfix branch earlier. All you have to do is check out the branch you wish to merge into and then run the git merge command:

```
$ git checkout master main
Switched to branch 'master'
$ git merge iss53
Merge made by the 'recursive' strategy.
index.html |    1 +
1 file changed, 1 insertion(+)
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git checkout main  
Switched to branch 'main'  
Your branch is ahead of 'origin/main' by 2 commits.  
(use "git push" to publish your local commits)
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git merge iss53  
CONFLICT (add/add): Merge conflict in WebDocument.html  
Auto-merging WebDocument.html  
Merge made by the 'recursive' strategy.  
WebDocument.html | 1 +  
1 file changed, 1 insertion(+)
```

Now that your work is merged in, you have no further need for the iss53 branch. You can close the issue in your issue-tracking system, and delete the branch:

```
$ git branch -d iss53
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git branch -d iss53  
Deleted branch iss53 (was 445ea1).
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git log --oneline --decorate --graph --all  
*   a1c85d8 (HEAD -> main) Merge branch 'iss53'  
|\  
| * 445ea1 fix finish web document iss53  
| * d7ec86d Create new footer [issue 53]  
* | 9f445eb fixed and renamed web file  
* | f47225d Fix broken email address  
|/  
| * 9c98b3d (testing) File added to Testing branch  
|/  
* 6bc263c (origin/main) Blank lines removed from file names  
* 127875c git tutorial chapter 2  
* 0b2808b Initial project version
```

Merge.txt created in both main and Testing branches with only difference being the branch name in the text.
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git Tutorial>**git merge Testing**
CONFLICT (add/add): Merge conflict in Merge.txt
Auto-merging Merge.txt
Automatic merge failed; fix conflicts and then commit the result.

Changed Merge.txt to same text in both files. Or thought I did

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git Tutorial>**git merge Testing**
Auto-merging Merge.txt
CONFLICT (content): Merge conflict in Merge.txt
Automatic merge failed; fix conflicts and then commit the result.

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git Tutorial>**git mergetool**

This message is displayed because 'merge.tool' is not configured.
See 'git mergetool --tool-help' or 'git help config' for more details.

'git mergetool' will now attempt to use one of the following tools:
tortoisesmerge emerge vimdiff nvimdiff
Merging:
Merge.txt

vimdiff makes no sense how to use

Normal merge conflict for 'Merge.txt':
 {local}: modified file
 {remote}: modified file
Hit return to start merge resolution tool (vimdiff):RETURN

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git Tutorial>**git merge Testing**
Already up to date.
Curious, I expected more than this.

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git log --oneline --decorate --graph --all  
* cf13331 (HEAD -> main) edit Merge.txt  
|\  
| * 461aec8 (Testing) Fixed Merge.txt to both  
* | 32e00b5 Fixed Merge.txt to both  
|\|\  
| * a4d41d8 Merge.txt Testing branch  
| * 9c98b3d File added to Testing branch  
* | dbef7be Merge.txt main change  
* | a1c85d8 Merge branch 'iss53'  
|\ |\  
| * | 445eaal fix finish web document iss53  
| * | d7ec86d Create new footer [issue 53]  
| |\  
* | 9f445eb fixed and renamed web file  
* | f47225d Fix broken email address  
|/  
* 6bc263c (origin/main) Blank lines removed from file names  
* 127875c git tutorial chapter 2  
* 0b2808b Initial project version
```

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git branch -d Testing  
Deleted branch Testing (was 461aec8).  
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git  
Tutorial>git log --oneline --decorate --graph --all  
* cf13331 (HEAD -> main) edit Merge.txt  
|\  
| * 461aec8 Fixed Merge.txt to both  
* | 32e00b5 Fixed Merge.txt to both  
|\|\  
| * a4d41d8 Merge.txt Testing branch  
| * 9c98b3d File added to Testing branch  
* | dbef7be Merge.txt main change  
* | a1c85d8 Merge branch 'iss53'  
|\ |\  
| * | 445eaal fix finish web document iss53  
| * | d7ec86d Create new footer [issue 53]  
| |\  
* | 9f445eb fixed and renamed web file  
* | f47225d Fix broken email address  
|/  
* 6bc263c (origin/main) Blank lines removed from file names  
* 127875c git tutorial chapter 2  
* 0b2808b Initial project version
```

DETOUR: RPi4 unknown display problem

<https://www.noobslab.com/2012/10/fix-your-unknown-display-problem-in.html>

Fix your "Unknown Display" problem in Ubuntu/Linux Mint
If you are facing Unknown Display problem in any Ubuntu/Linux Mint. This problem can be fixed with integrated cards like Intel display cards. Probably with proprietary cards you need to install drivers for Linux Like Nvidia, ATI Cards then you can fix this problem also with proprietary cards.

```
sudo apt-get install mesa-utils
ubuntu@AUDACITY:~$ sudo apt-get install mesa-utils
Reading package lists... Done
Building dependency tree
Reading state information... Done
mesa-utils is already the newest version (8.4.0-1build1).
mesa-utils set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 61 not upgraded.
```

After installation **reboot** and enter following command in terminal to check display info:

```
glxinfo | grep render
ubuntu@AUDACITY:~$ glxinfo
Error: unable to open display
run from PuTTY, try from desktop terminal
ubuntu@AUDACITY:~$ glxinfo
large data dump
ubuntu@AUDACITY:~$ glxinfo | grep render
smaller data dump but unclear meaning
```

```
glxgears
ubuntu@AUDACITY:~$ glxgears
shows inset window graphic of 3 revolving interconnected gears,
blue, red and green.
close window
That's it.
```

Didn't fix unknown monitor problem.

From PuTTY: ubuntu@AUDACITY:~\$ **xrandr**
Can't open display

From desktop terminal: ubuntu@AUDACITY:~\$ **xrandr**
xrandr: Failed to get size of gamma for output default
Screen 0: minimum 1824 x 964, maximum 1824 x 964
default connected primary 1824x964+0+0mm x 0mm
1824x964 0.00*

Google(past year): "**raspberry pi 4 ubuntu 20.04 unknown monitor**"
<https://askubuntu.com/questions/1285723/how-to-let-ubuntu-20-04-1-recognize-an-unknown-display-to-adjust-its-resolution>

Google(past year): "**raspberry pi 4 second monitor**"
<https://support.thepihut.com/hc/en-us/articles/360015638017-Raspberry-Pi-dual-display-second-screen-not-working>
Force Dual-screen mode - A little tweak of the Raspberry Pi's configuration can help to 'force' the second display to work.
Taken from a discussion on the Raspberry Pi forum, try the following fix:

Open a new terminal window and edit the config file by using the following command:

`sudo nano /boot/config.txt`

Now add the following lines to the file:

`hdmi_edid_file:1=1`
`hdmi_edid_filename:1=edid.dat`
`hdmi_force_hotplug:1=1`

Save the file by pressing `Ctrl+X` then selecting 'Y' to save

2nd monitor not displaying 0=5" 1=Vizio external; nothing on 1
try swapping...

Now 0=Vizio, 1=5". Only display on 0

Multiple Google searches – no progress. Suspect Ubuntu 20.04 doesn't handle dual HDMI ports on Pi4.

When in doubt RTFM!!

Looking at user manual provided with Elecrow 5" TFT HDMI Display:

Step 2: Modify the “config.txt” changed to usercfg.txt

THIS DOESN'T WORK

```
ubuntu@AUDACITY:~$ cd /boot/firmware/
ubuntu@AUDACITY:/boot/firmware$ sudo nano usercfg.txt
# --- added by elecrow-pitft-setup ---
hdmi_force_hotplug=1
max_usb_current=1
hdmi_drive=1
hdmi_group=2
hdmi_mode=1
hdmi_mode=87
hdmi_cvt 800 480 60 6 0 0 0
dtoverlay=ads7846,cs=1,penirq_pull=2,speed=50000,keep_vref_ob=0,sw
apxy=0,pmax=255,xohms=150,xmin=200,xmax=3900,ymin=200,ymax=3900
display_rotate=0
#---end elecrow-pitft-setup ---
ubuntu@AUDACITY:~$ git clone
    https://github.com/goodtft/LCD-show.git
ubuntu@AUDACITY:~$ chmod -R 755 LCD-show
ubuntu@AUDACITY:~$ cd LCD-show/
ubuntu@AUDACITY:~$ sudo ./LCD5-show
auto rebooted
```

HDMI0 on 5" LCD shows “unknown monitor” 800x460.

Can't change any settings other than show monitor on taskbar

Still no HDMI1

BACK TO GIT -

3.5 Git Branching - Remote Branches

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git ls-remote origin
```

6bc263cc4dfcc409109d9dba351ef81ad9afb3dd	HEAD
6bc263cc4dfcc409109d9dba351ef81ad9afb3dd	refs/heads/main

```
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
```

```
Tutorial>git remote show origin
```

```
* remote origin
  Fetch URL: https://github.com/JHPHELAN/Git-Tutorial.git
  Push URL: https://github.com/JHPHELAN/Git-Tutorial.git
  HEAD branch: main
  Remote branch:
    main tracked
    Local branch configured for 'git pull':
      main merges with remote main
    Local ref configured for 'git push':
      main pushes to main (fast-forwardable)
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git ls-remote origin
```

c8a7ea60dbc2bee105cc91bbc76d0d5aeaa4f16a	HEAD
851676f9cca8fa8a661926125770ff1550774c08	refs/heads/foxy-devel
c8a7ea60dbc2bee105cc91bbc76d0d5aeaa4f16a	refs/heads/master
63572d165e3d517194819a35367cf96374d4691d	refs/heads/melodic-devel
c9759b99b242a45ae557495086270c87808ff805	refs/pull/1/head
d3e12bcd051b52eb9bf74b8b527430aedbd3e4f	refs/pull/10/head
47d84dfb068ee344c38307a4137ad6515eacfab1	refs/pull/101/head
9ec4e990e5a46abde0f2e42abce5432edf238cf8	refs/pull/103/head

```
...
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git remote show origin
```

```
* remote origin
  Fetch URL: https://github.com/nasa-jpl/osr-rover-code.git
  Push URL: https://github.com/nasa-jpl/osr-rover-code.git
  HEAD branch: master
  Remote branches:
    foxy-devel tracked
    master tracked
    melodic-devel tracked
  Local branches configured for 'git pull':
    foxy-devel merges with remote foxy-devel
    master merges with remote master
  Local refs configured for 'git push':
    foxy-devel pushes to foxy-devel (local out of date)
    master pushes to master (up to date)
```

```
$ git fetch --all; git branch -vv
error: unknown option `all;'

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git fetch --all
Fetching origin
C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git branch -vv
* main cf13331 [origin/main: ahead 11] edit Merge.txt

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Git
Tutorial>git push origin
Enumerating objects: 29, done.
Counting objects: 100% (29/29), done.
Delta compression using up to 4 threads
Compressing objects: 100% (22/22), done.
Writing objects: 100% (28/28), 2.59 KiB | 94.00 KiB/s, done.
Total 28 (delta 11), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (11/11), done.
To https://github.com/JHPHELAN/Git-Tutorial.git
  6bc263c..cf13331  main -> main
```

3.6 Git Branching - Rebasing

Rebasing

In Git, there are two main ways to integrate changes from one branch into another: the merge and the rebase. In this section you'll learn what rebasing is, how to do it, why it's a pretty amazing tool, and in what cases you won't want to use it.

With the rebase command, you can take all the changes that were committed on one branch and replay them on a different branch.

For this example, you would check out the experiment branch, and then rebase it onto the master branch as follows:

```
$ git checkout experiment
```

```
$ git rebase master
```

First, rewinding head to replay your work on top of it...

Applying: added staged command

At this point, you can go back to the master branch and do a fast-forward merge.

```
$ git checkout master
```

```
$ git merge experiment
```

The Perils of Rebasing

Ahh, but the bliss of rebasing isn't without its drawbacks, which can be summed up in a single line:

Do not rebase commits that exist outside your repository and that people may have based work on.

4.1 Git on the Server - The Protocols

meh, use Github

5.1 Distributed Git - Distributed Workflows

5.2 Distributed Git - Contributing to a Project

First, your submissions should not contain any whitespace errors. Git provides an easy way to check for this – before you commit, run `git diff --check`, which identifies possible whitespace errors and lists them for you.

Next, try to make each commit a logically separate changeset. If you can, try to make your changes digestible – don't code for a whole weekend on five different issues and then submit them all as one massive commit on Monday. Even if you don't commit during the weekend, use the staging area on Monday to split your work into at least one commit per issue, with a useful message per commit.

If some of the changes modify the same file, try to use `git add --patch` to partially stage files (covered in detail in Interactive Staging).

Message template:

Capitalized, short (50 chars or less) summary

More detailed explanatory text, if necessary. Wrap it to about 72 characters or so. In some contexts, the first line is treated as the subject of an email and the rest of the text as the body. The blank line separating the summary from the body is critical (unless you omit the body entirely); tools like rebase will confuse you if you run the two together.

Write your commit message in the imperative: "Fix bug" and not "Fixed bug" or "Fixes bug." This convention matches up with commit messages generated by commands like `git merge` and `git revert`.

Further paragraphs come after blank lines.

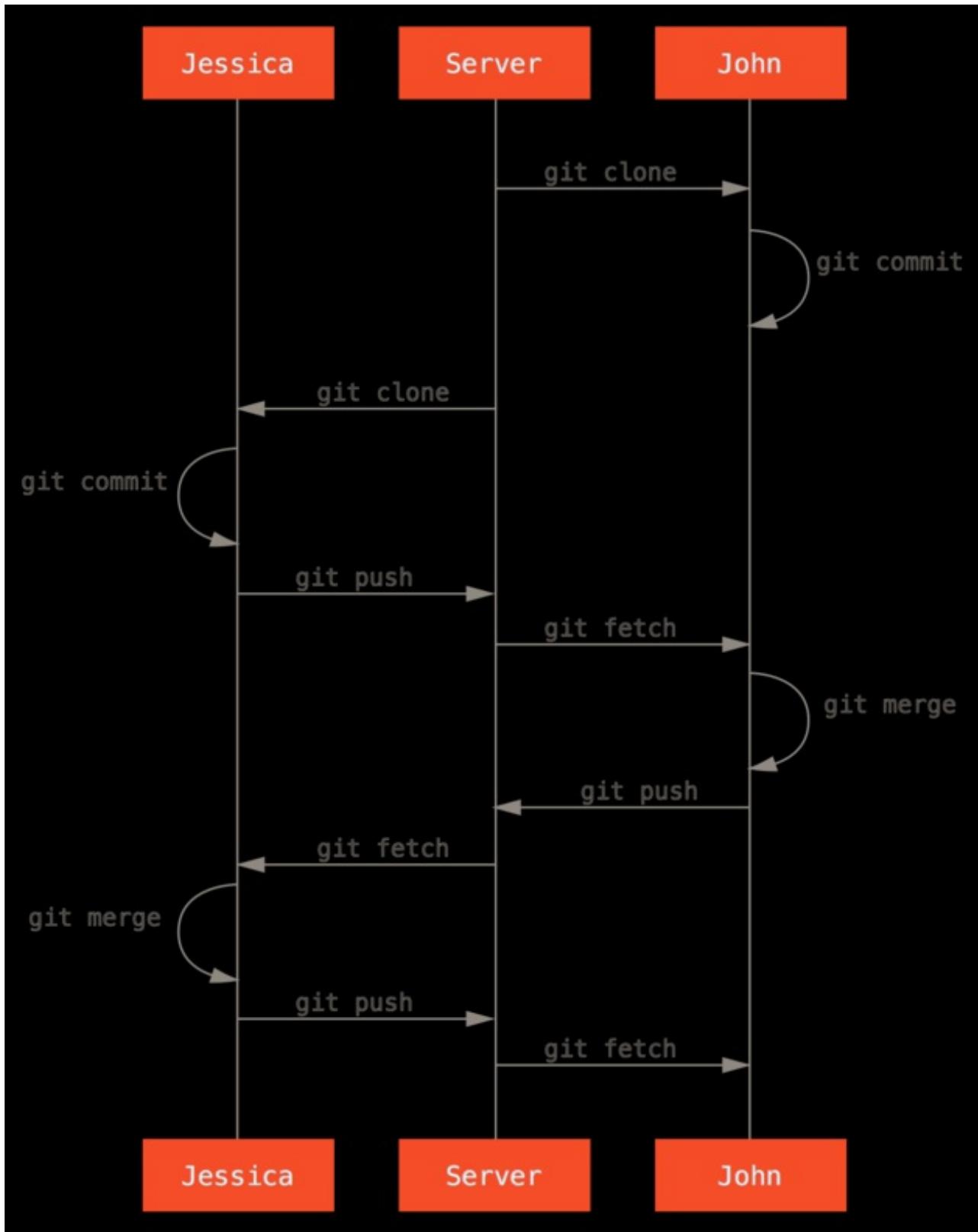
- Bullet points are okay, too
- Typically a hyphen or asterisk is used for the bullet, followed by a single space, with blank lines in between, but conventions vary here

- Use a hanging indent

see Private Small Team:

<https://git-scm.com/book/en/v2/Distributed-Git-Contributing-to-a-Project>

to see how to resolve simultaneous changes.



This is relevant as it seems to interfere later on...

DETOUR create desktop shortcut to osr_code directory

ubuntu@AUDACITY:/usr/local/bin\$ **cat rover.sh**

```
#!/bin/sh
```

```
# this is known as a haskbang or shebang and
```

```
# indicates that the rest of the line is an interpreter directive.
```

```
# In this case it identifies this as a bash script and
```

```
# so will ask bash to interpret the file and run as appropriate
```

```
cd ~/osr_ws/src/osr-rover-code
```

ubuntu@AUDACITY:~\$ **source rover.sh**

\$ *rover.sh* alone doesn't work

2021.07.10

Examine changes by Achille to update startup configuration.

Located in:

<https://github.com/Achllle/osr-rover-code/tree/enh/services>

NOT yet merged into

<https://github.com/nasa-jpl/osr-rover-code/tree/foxy-devel>

2021.07.11

Going to try to fetch Achille's change again:

<https://app.slack.com/client/T01CMHZLGPL/C01K4G4TUA1/thread/C01K4G4TUA1-1622628143.003300> June 2nd

```
ubuntu@AUDACITY:~$ source rover.sh      bash to log to osr-rover-  
code
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git add remote
```

```
Achllle https://github.com/Achllle/osr-rover-code.git
```

```
fatal: pathspec 'remote' did not match any files
```

searching above:

Adding Remote Repositories

We've mentioned and given some demonstrations of how the **git clone** command implicitly adds the **origin** remote for you. Here's how to add a new remote explicitly. To add a new remote Git repository as a shortname you can reference easily, run

```
git remote add <shortname> <url>
```

so it should probably be remote before add or it's thinking I want to add a file to stage a commit:

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git remote add
```

```
Achllle https://github.com/Achllle/osr-rover-code.git
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git remote add  
Achllle https://github.com/Achllle/osr-rover-code.git
```

no errors

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git fetch Achllle
```

remote: Enumerating objects: 469, done.

remote: Counting objects: 100% (265/265), done.

remote: Compressing objects: 100% (55/55), done.

remote: Total 469 (delta 217), reused 254 (delta 210), pack-reused 204

Receiving objects: 100% (469/469), 29.28 MiB | 10.49 MiB/s, done.

Resolving deltas: 100% (259/259), completed with 61 local objects.

From <https://github.com/Achllle/osr-rover-code>

```
* [new branch]      acceleration_param      ->
```

```
Achllle/acceleration_param
```

```
* [new branch]      add_diagram           ->
```

```
Achllle/add_diagram
```

```
* [new branch]      enh/services         ->
```

```

Achllle/enh/services
 * [new branch]      fix/covariance_reset      ->
Achllle/fix/covariance_reset
 * [new branch]      foxy/nav2                  ->
Achllle/foxy/nav2
 * [new branch]      iss45                     -> Achllle/iss45
 * [new branch]      iss50                     -> Achllle/iss50
 * [new branch]      iss55                     -> Achllle/iss55
 * [new branch]      iss68_urdf                ->
Achllle/iss68_urdf
 * [new branch]      iss69                     -> Achllle/iss69
 * [new branch]      iss94                     -> Achllle/iss94
 * [new branch]      master                    -> Achllle/master
 * [new branch]      melodic-devel             ->
Achllle/melodic-devel
 * [new branch]      melodic_devel            ->
Achllle/melodic-devel
 * [new branch]      missing_underscore_service ->
Achllle/missing_underscore_service
 * [new branch]      ros_control               ->
Achllle/ros_control
 * [new branch]      startup_service          ->
Achllle/startup_service

```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git checkout enh/services
```

error: Your local changes to the following files would be overwritten by checkout:

ROS/osr_bringup/config/osr_params.yaml

Please commit your changes or stash them before you switch branches.

Aborting

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git add osr_params.yaml
```

fatal: pathspec 'osr_params.yaml' did not match any files

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git add ROS/osr_bringup/config/osr_params.yaml
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git checkout enh/services
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git commit
```

```
*** Please tell me who you are.
```

Run

```
git config --global user.email "you@example.com"  
git config --global user.name "Your Name"
```

```
to set your account's default identity.
```

```
Omit --global to set the identity only in this repository.
```

```
fatal: unable to auto-detect email address (got  
'ubuntu@AUDACITY.(none)')
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git config --global  
user.email "jhphelan@hal-pc.org"
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git config --global  
user.names "James Phelan"
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git commit  
nano pop-up to add message:
```

```
"tidy up to accept Achille's bringup changes"
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git checkout  
enh/services
```

```
Branch 'enh/services' set up to track remote branch 'enh/services'  
from 'Achllle'.
```

```
Switched to a new branch 'enh/services'
```

<https://github.com/nasa-jpl/osr-rover-code/pull/137>

>>

<https://github.com/Achllle/osr-rover-code/tree/enh/services>

"follow the instructions in that branch. This PR should be merged
in soon." *They haven't been yet as far as I can tell...*

>>

Rover code bringup:

https://github.com/Achllle/osr-rover-code/blob/enh/services/setup/rover_bringup.md

1 Manual rover bringup

In a sourced terminal (source /opt/ros/foxy/setup.bash && source ~/osr_ws/install/setup.bash), run
ros2 launch osr Bringup osr_launch.py

2 Custom osr_mod_launch.py file

If you want to customize your osr_launch.py file, make a copy of it in the same directory (osr-rover-code/ROS/osr_bringup/launch/) and name it **osr_mod_launch.py**. The systemd script will automatically find it.

This is useful, for example, when you don't have the LED screen. In that case you would just remove the <node name="led_screen" pkg="led_screen" type="arduino_comm.py"/> line in osr_mod_launch.py.

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ cd  
/ROS/osr_bringup/launch/  
-bash: cd: /ROS/osr_bringup/launch/: No such file or directory  
probably should have been  
cd ./ROS/osr_bringup/launch/  
else is looking from root directory!
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ ls  
Arduino LICENSE.txt OSR_tree.txt README.md ROS config  
init_scripts scripts setup  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ cd ROS  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS$ ls  
README.md led_screen osr_bringup osr_control osr_interfaces  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS$ cd osr_bringup/  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup$ ls  
CMakeLists.txt config launch package.xml  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup$ cd  
launch/  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch  
$ ls  
osr_launch.py osr_launch_old.py osr_mod_launch.py
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch
$ cat osr_mod_launch.py
import os

from launch import LaunchDescription
from launch.actions import DeclareLaunchArgument
from launch.substitutions import LaunchConfiguration
from launch_ros.actions import Node
from ament_index_python.packages import get_package_share_directory

def generate_launch_description():

    roboclaw_params = os.path.join(
        get_package_share_directory('osr_bringup'),
        'config',
        'roboclaw_params.yaml'
    )
    osr_params = os.path.join(
        get_package_share_directory('osr_bringup'),
        'config',
        'osr_params.yaml'
    )

    ld = LaunchDescription()

    ld.add_action(
        Node(
            package='osr_control',
            executable='roboclaw_wrapper',
            name='roboclaw_wrapper',
            output='screen',
            emulate_tty=True,
            parameters=[roboclaw_params]
        )
    )
    ld.add_action(
        DeclareLaunchArgument('enable_odometry', default_value='false')
    )
    ld.add_action(
        Node(
            package='osr_control',
            executable='rover',
            name='rover',
            output='screen',
            emulate_tty=True,
            parameters=[osr_params,
                        {'enable_odometry':
                         LaunchConfiguration('enable_odometry')}]
        )
    )
    ld.add_action(
        Node(
            package='teleop_twist_joy',
            executable='teleop_node',
            name='teleop_twist_joy',
```

```

        output='screen',
        emulate_tty=True,
        parameters=[
            {"scale_linear.x": 0.8}, # scale to apply to drive speed, in
m/s: drive_motor_rpm * 2pi / 60 * wheel radius * slowdown_factor
            {"axis_linear.x": 1},
            {"axis_angular.yaw": 3}, # which joystick axis to use for
driving
            {"scale_angular.yaw": 1.75}, # scale to apply to angular
speed, in rad/s: scale_linear / min_radius(=0.45m)
            {"scale_angular_turbo.yaw": 3.95}, # scale to apply to angular
speed, in rad/s: scale_linear_turbo / min_radius
            {"scale_linear_turbo.x": 1.78}, # scale to apply to linear
speed, in m/s
            {"enable_button": 4}, # which button to press to enable
movement
            {"enable_turbo_button": 5} # -1 to disable turbo
        ],
        remappings=[
            ('/cmd_vel', '/cmd_vel_intuitive')
        ]
    )
)
ld.add_action(
Node(
    package='joy',
    executable='joy_node',
    name='joy',
    output='screen',
    emulate_tty=True,
    parameters=[
        {"autorepeat_rate": 5.0},
        {"device_id": 0}, # This might be different on your computer.
Run `ls -l /dev/input/js0`. If you have js1, put 1.
    ]
)
)
return ld

```

*ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code\$ ls -l /dev/input/js0
crw-rw-r-- 1 root input 13, 0 Mar 17 21:36 /dev/input/js0*

3 Automatic bringup with launch script

Starting scripts on boot using ROS can be a little more difficult than starting scripts on boot normally from the Raspberry Pi because of the default permission settings on the RPi and the fact that that ROS cannot be ran as the root user. The way that we will starting our rover code automatically on boot is to create a service that starts our roslaunch script, and then automatically run that service on boot of the robot. Further information on system service scripts running at boot.

There are two scripts in the "init_scripts" folder. The first is the bash file that runs the roslaunch file, and the other creates a system service to start that bash script. Open up a terminal on the raspberry Pi and execute the following commands.

```
cd ~/osr_ws/src/osr-rover-code/init_scripts
# use symbolic links so we capture updates to these files in the
service
ln -s $(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln -s $(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
sudo cp osr_startup.service
    /etc/systemd/system/osr_startup.service
sudo chmod 644 /etc/systemd/system/osr_startup.service

cd ~/osr_ws/src/osr-rover-code/init_scripts
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ls
launch_osr.sh  osr_paths.sh  osr_startup.service

# use symbolic links so we capture updates to these files in the
service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln: failed to create symbolic link '/usr/local/bin/launch_osr.sh':
Permission denied
maybe should be sudo...
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo ln
-s $(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo ln
-s $(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ls
launch_osr.sh  osr_paths.sh  osr_startup.service
...to make sure it's there
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo cp
osr_startup.service /etc/systemd/system/osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
chmod 644 /etc/systemd/system/osr_startup.service
```

Your osr startup service is now installed on the Pi and ready to be used. The following are some commands related to managing this service which you might find useful:

Description	Command
Start service	<code>sudo systemctl start osr_startup.service</code>
Stop service	<code>sudo systemctl stop osr_startup.service</code>
Enable service	<code>sudo systemctl enable osr_startup.service</code> (runs on boot of RPi)
Disable service	<code>sudo systemctl disable osr_startup.service</code> (doesn't run on boot of RPi)
Check status	<code>sudo systemctl status osr_startup.service</code>
View service list	<code>sudo journalctl -f</code>

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl status osr_startup.service
Warning: The unit file, source configuration file or drop-ins of
osr_startup.service changed on disk. Run 'systemctl daemon-reload'
to reload >
● osr_startup.service - OSR service
   Loaded: loaded (/etc/systemd/system/osr_startup.service;
   enabled; vendor preset: enabled)
     Active: activating (auto-restart) (Result: exit-code) since
Sun 2021-07-11 17:30:43 UTC; 2s ago
       Process: 40362 ExecStart=/home/ubuntu/launch_osr.sh
(code=exited, status=1/FAILURE)
      Main PID: 40362 (code=exited, status=1/FAILURE)
expected as hasn't been enabled nor started
```

```
Jul 11 17:30:46 AUDACITY launch_osr.sh[40458]: +
launch_dir=/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
Jul 11 17:30:46 AUDACITY launch_osr.sh[40458]: + bash -c '.
/opt/ros/foxy/setup.bash'
Jul 11 17:30:47 AUDACITY launch_osr.sh[40458]: + bash -c '.
/home/ubuntu/osr_ws/install/setup.sh'
Jul 11 17:30:47 AUDACITY launch_osr.sh[40458]: + '[' -e
'/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch/osr_mod_launch.py
']'
Jul 11 17:30:47 AUDACITY launch_osr.sh[40458]: + echo 'Launching
osr_mod_launch.py'
Jul 11 17:30:47 AUDACITY launch_osr.sh[40458]: Launching osr_mod_launch.py
Jul 11 17:30:47 AUDACITY launch_osr.sh[40458]: + bash -i -c 'ros2 launch
osr_bringup osr_mod_launch.py'
Jul 11 17:30:47 AUDACITY launch_osr.sh[40508]: bash: cannot set terminal
process group (40458): Inappropriate ioctl for device
Jul 11 17:30:47 AUDACITY launch_osr.sh[40508]: bash: no job control in this
shell
Jul 11 17:30:49 AUDACITY launch_osr.sh[40508]: bash:
/home/ubuntu/usr/local/bin/rover.sh: No such file or directory
^C
```

```
Warning: The unit file, source configuration file or drop-ins of
osr_startup.service changed on disk. Run 'systemctl daemon-reload'
to reload >
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ systemctl daemon-reload
==== AUTHENTICATING FOR org.freedesktop.systemd1.reload-daemon ====
Authentication is required to reload the systemd state.
Authenticating as: Ubuntu (ubuntu)
Password: <password>
==== AUTHENTICATION COMPLETE ===

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl enable osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl start osr_startup.service
unresponsive to Xbox controller. Doesn't seem to be started.
ubuntu@AUDACITY:~$ ros2 launch osr_bringup osr_launch.py
started appropriately:
[INFO] [launch]: All log files can be found below
/home/ubuntu/.ros/log/2021-07-11-17-44-15-752343-AUDACITY-50640
[INFO] [launch]: Default logging verbosity is set to INFO
[INFO] [roboclaw_wrapper-1]: process started with pid [50670]
[INFO] [rover-2]: process started with pid [50672]
[INFO] [teleop_node-3]: process started with pid [50674]
[INFO] [joy_node-4]: process started with pid [50676]
[teleop_node-3] [INFO] [1626025457.030410110] [TeleopTwistJoy]: Teleop enable button 4.
[teleop_node-3] [INFO] [1626025457.037845228] [TeleopTwistJoy]: Turbo on button 5.
[teleop_node-3] [INFO] [1626025457.037993170] [TeleopTwistJoy]: Linear axis x on 1 at
scale 0.800000.
[teleop_node-3] [INFO] [1626025457.038102168] [TeleopTwistJoy]: Turbo for linear axis x
is scale 1.780000.
[teleop_node-3] [INFO] [1626025457.038190352] [TeleopTwistJoy]: Angular axis yaw on 3 at
scale 1.750000.
[teleop_node-3] [INFO] [1626025457.038274721] [TeleopTwistJoy]: Turbo for angular axis
yaw is scale 3.950000.
[joy_node-4] [INFO] [1626025457.646834251] [joy]: Opened joystick: Microsoft X-Box 360
pad. deadzone: 0.050000
[roboclaw_wrapper-1] [INFO] [1626025460.935265989] [roboclaw_wrapper]: Initializing
motor controllers
[roboclaw_wrapper-1] [INFO] [1626025461.164203337] [roboclaw_wrapper]: Sucessfully
connected to RoboClaw motor controllers
[rover-2] [INFO] [1626025461.908215249] [rover]: Initializing Rover
unresponsive to Xbox controller.
```

REBOOT

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo  
reboot
```

did not bringup automatically

```
ubuntu@AUDACITY:~$ ros2 launch osr Bringup osr_launch.py  
Xbox blinks 4 but responds appropriately
```

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service  
● osr_startup.service - OSR service  
   Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor  
   preset: enabled)  
   Active: activating (auto-restart) (Result: exit-code) since Sun 2021-07-11  
   17:59:45 UTC; 1s ago  
     Process: 9626 ExecStart=/usr/local/bin/launch_osr.sh (code=exited,  
   status=1/FAILURE)  
      Main PID: 9626 (code=exited, status=1/FAILURE)
```

```
Jul 11 17:59:48 AUDACITY launch_osr.sh[9721]: +  
launch_dir=/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osrBringup/launch  
Jul 11 17:59:48 AUDACITY launch_osr.sh[9721]: + bash -c '.  
/opt/ros/foxy/setup.bash'  
Jul 11 17:59:49 AUDACITY launch_osr.sh[9721]: + bash -c '.  
/home/ubuntu/osr_ws/install/setup.sh'  
Jul 11 17:59:49 AUDACITY launch_osr.sh[9721]: + '[' -e  
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osrBringup/launch/osr_mod_launch.py  
'']'  
Jul 11 17:59:49 AUDACITY launch_osr.sh[9721]: + echo 'Launching  
osr_mod_launch.py'  
Jul 11 17:59:49 AUDACITY launch_osr.sh[9721]: Launching osr_mod_launch.py  
Jul 11 17:59:49 AUDACITY launch_osr.sh[9721]: + bash -i -c 'ros2 launch  
osrBringup osr_mod_launch.py'  
Jul 11 17:59:49 AUDACITY launch_osr.sh[9771]: bash: cannot set terminal process  
group (9721): Inappropriate ioctl for device  
Jul 11 17:59:49 AUDACITY launch_osr.sh[9771]: bash: no job control in this  
shell  
Jul 11 17:59:52 AUDACITY launch_osr.sh[9771]: bash:  
/home/ubuntu/usr/local/bin/rover.sh: No such file or directory  
rover.sh is a bash file I created to CD me to the osr-rover-code  
directory:  
ubuntu@AUDACITY:~$ source rover.sh  
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$  
apparently it's interfering with the bringup code. Delete.  
ubuntu@AUDACITY:/usr/local/bin$ sudo rm rover.sh
```

```

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ sudo systemctl status
osr_startup.service
● osr_startup.service - OSR service
   Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
     Active: activating (auto-restart) (Result: exit-code) since
           Sun 2021-07-11 18:11:10 UTC; 1s ago
       Process: 18037 ExecStart=/usr/local/bin/launch_osr.sh
                  (code=exited, status=1/FAILURE)
    Main PID: 18037 (code=exited, status=1/FAILURE)
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ sudo systemctl enable
osr_startup.service

```

STOP osr code already running in terminal with ^C

```

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ sudo systemctl start
osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ sudo systemctl status
osr_startup.service
● osr_startup.service - OSR service
   Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor
preset: enabled)
     Active: active (running) since Sun 2021-07-11 18:15:07 UTC; 2s ago
   Main PID: 21078 (launch_osr.sh)
      Tasks: 3 (limit: 4430)
     CGroup: /system.slice/osr_startup.service
             ├─21078 /bin/bash /usr/local/bin/launch_osr.sh
             ├─21128 bash -i -c ros2 launch osr_bringup osr_mod_launch.py
             └─21164 /usr/bin/python3 /usr/bin/register-python-argcomplete3
ros2

```

```

Jul 11 18:15:07 AUDACITY launch_osr.sh[21078]: ++
OSR_CODE_DIR=/home/ubuntu/osr_ws/src/osr-rover-code
Jul 11 18:15:07 AUDACITY launch_osr.sh[21078]: +
launch_dir=/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
Jul 11 18:15:07 AUDACITY launch_osr.sh[21078]: + bash -c `'.
/opt/ros/foxy/setup.bash'
Jul 11 18:15:08 AUDACITY launch_osr.sh[21078]: + bash -c `'.
/home/ubuntu/osr_ws/install/setup.sh'
Jul 11 18:15:08 AUDACITY launch_osr.sh[21078]: + '[' -e
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch/osr_mod_launch.py
']'
Jul 11 18:15:08 AUDACITY launch_osr.sh[21078]: + echo 'Launching
osr_mod_launch.py'
Jul 11 18:15:08 AUDACITY launch_osr.sh[21078]: Launching osr_mod_launch.py
Jul 11 18:15:08 AUDACITY launch_osr.sh[21078]: + bash -i -c `ros2 launch
osr_bringup osr_mod_launch.py'
Jul 11 18:15:08 AUDACITY launch_osr.sh[21128]: bash: cannot set terminal
process group (21078): Inappropriate ioctl for device
Jul 11 18:15:08 AUDACITY launch_osr.sh[21128]: bash: no job control in this
shell

```

Try eliminating osr_mod_launch.py:

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch  
$ mv osr_mod_launch.py osr_mod_launch_PHELAN.py
```

from osr_mod_launch.py:

*"{"device_id": 0}, # This might be different on your computer.
Run `ls -l /dev/input/js0`. If you have js1, put 1."*

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ ls -l /dev/input/js0  
crw-rw-r--+ 1 root input 13, 0 Mar 17 21:36 /dev/input/js0
```

REBOOT

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS$ sudo reboot
```

Eliminating osr_mod_launch.py SOLVED the problem.

WinMerge of osr_launch.py and osr_mod_launch_PHELAN.py are
“identical”??!

Shutdown, disconnect hard wiring & reboot from battery:
Boots to desktop login ok

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service  
is normal.
```

Does NOT respond to Xbox controller.

Placed Xbox receiver on OUTSIDE of rover via hole from deleted
stop button. Pairs with SINGLE light & responds.

Speed is TOO FAST! Steering is too dramatic & slow to return to
normal.

Error looking for rover.sh, need to delete from .bashrc:

```
ubuntu@AUDACITY:~$ sudo nano .bashrc
```

~~source /usr/local/bin/rover.sh~~

```

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch
$ nano osr_mod_launch.py
...
    parameters=[
        {"scale_linear.x": 0.5}, # 0.8 > 0.5 scale to
apply to drive speed, in m/s: drive_motor_rpm * 2pi / 60 * wheel
radius * slowdown_factor
        {"axis_linear.x": 1},
        {"axis_angular.yaw": 3}, # which joystick axis to
use for driving
        {"scale_angular.yaw": 1.00}, # 1.75 > 1.00 scale
to apply to angular speed, in rad/s: scale_linear /
min_radius(=0.45m)
        {"scale_angular_turbo.yaw": 3.95}, # scale to
apply to angular speed, in rad/s: scale_linear_turbo / min_radius
        {"scale_linear_turbo.x": 1.00}, # 1.78 > 1.00
scale to apply to linear speed, in m/s
        {"enable_button": 4}, # which button to press to
enable movement
        {"enable_turbo_button": 5} # -1 to disable turbo
    ],
...

```

REBOOT
Xbox not pairing nor responding

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
```

```
Jul 11 21:17:58 AUDACITY launch_osr.sh[3939]: file
'osr_mod_launch.py' was not found in the share directory of
package 'osrBringup' which is > [off the screen]
```

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
   Loaded: loaded (/etc/systemd/system/osr_startup.service;
             enabled; vendor preset: enabled)
     Active: activating (auto-restart) (Result: exit-code) since
             Sun 2021-07-11 21:21:23 UTC; 685ms ago
       Process: 6419 ExecStart=/usr/local/bin/launch_osr.sh
                  (code=exited, status=1/FAILURE)
      Main PID: 6419 (code=exited, status=1/FAILURE)
```

```

ubuntu@AUDACITY:~$ sudo systemctl start osr_startup.service
   Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor
preset: enabled)
     Active: active (running) since Sun 2021-07-11 22:28:15 UTC; 2s ago
       Main PID: 56440 (launch_osr.sh)
          Tasks: 2 (limit: 4430)
        CGroup: /system.slice/osr_startup.service
                  ├─56440 /bin/bash /usr/local/bin/launch_osr.sh
                  └─56490 /usr/bin/python3 /opt/ros/foxy/bin/ros2 launch osr Bringup
osr_mod_launch.py

Jul 11 22:28:15 AUDACITY launch_osr.sh[56440]: ++
OSR_CODE_DIR=/home/ubuntu/osr_ws/src/osr-rover-code
Jul 11 22:28:15 AUDACITY launch_osr.sh[56440]: +
launch_dir=/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osrBringup/launch
Jul 11 22:28:15 AUDACITY launch_osr.sh[56440]: + bash -c '.
/opt/ros/foxy/setup.bash'
Jul 11 22:28:16 AUDACITY launch_osr.sh[56440]: + bash -c '.
/home/ubuntu/osr_ws/install/setup.sh'
Jul 11 22:28:17 AUDACITY launch_osr.sh[56440]: + '[' -e
'/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osrBringup/launch/osr_mod_launch.py
']'
Jul 11 22:28:17 AUDACITY launch_osr.sh[56440]: + echo 'Launching
osr_mod_launch.py'
Jul 11 22:28:17 AUDACITY launch_osr.sh[56440]: Launching osr_mod_launch.py
Jul 11 22:28:17 AUDACITY launch_osr.sh[56440]: + bash -i -c 'ros2 launch
osrBringup osr_mod_launch.py'
Jul 11 22:28:17 AUDACITY launch_osr.sh[56490]: bash: cannot set terminal
process group (56440): Inappropriate ioctl for device
Jul 11 22:28:17 AUDACITY launch_osr.sh[56490]: bash: no job control in this
shell

```

Look for the package directory for osr_bringup: [it's EVERYWHERE!]

```

ubuntu@AUDACITY:~$ sudo find / -name osr_bringup
find: '/run/user/114/gvfs': Permission denied
/home/ubuntu/osr_ws/build/osr_bringup
/home/ubuntu/osr_ws/build/osr_bringup/ament_cmake_index/share/ament_index/resource_index/parent_prefix_path/osr_bringup
/home/ubuntu/osr_ws/build/osr_bringup/ament_cmake_index/share/ament_index/resource_index/package_run_dependencies/osr_bringup
/home/ubuntu/osr_ws/build/osr_bringup/ament_cmake_index/share/ament_index/resource_index/packages/osr_bringup
/home/ubuntu/osr_ws/log/build_2021-06-13_22-37-48/osr_bringup
/home/ubuntu/osr_ws/install/osr_bringup
/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup
/home/ubuntu/osr_ws/install/osr_bringup/share/colcon-core/packages/osr_bringup
/home/ubuntu/osr_ws/install/osr_bringup/share/ament_index/resource_index/parent_prefix_path/osr_bringup
/home/ubuntu/osr_ws/install/osr_bringup/share/ament_index/resource_index/packages/osr_bringup
/home/ubuntu/osr_ws/install/osr_bringup/share/ament_index/resource_index/packages/osr_bringup

```

Have to find the expected directory for osr_bringup

```
ubuntu@AUDACITY:~$ sudo systemctl stop osr_startup.service
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
ubuntu@AUDACITY:~$ sudo systemctl start osr_startup.service
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
   Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
     Active: activating (auto-restart) (Result: exit-code) since
           Sun 2021-07-11 22:38:10 UTC; 294ms ago
       Process: 62780 ExecStart=/usr/local/bin/launch_osr.sh
                  (code=exited, status=1/FAILURE)
    Main PID: 62780 (code=exited, status=1/FAILURE)
```

can't get necessary directory. Try REBOOT.

"If you want to customize your osr_launch.py file, make a copy of it in the same directory (osr-rover-code/ROS/osr_bringup/launch/) and name it osr_mod_launch.py."

An error message in **sudo systemctl status osr_startup.service** seems to want it to be in:
home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup.

```
ubuntu@AUDACITY:~/osr_ws/install/osr_bringup/share/osr_bringup/lau
nch$ cp
~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch/osr_mod_launch.
py .
```

```
ubuntu@AUDACITY:~/osr_ws/install/osr_bringup/share/osr_bringup/lau
nch$ sudo reboot
```

bootup warning:
a stop job is running for osr service (Mmin Ss /1min 30s)

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
normal start with no errors. Xbox controller pairs 1 light.
Rover responsive to controls.
```

Ran rover through house on battery power. Made video: iPhone / iPhone clamp / tripod head / top of rover. Nice rover's-eye-view of the race through the house.

POWER DOWN & recharge battery.

2021.07.12

Recharged battery overnight. Brought up on battery power.

Boots ok.

ubuntu@AUDACITY:~\$ **sudo systemctl status osr_startup.service**
shows no errors and system supposedly running.

BUT Xbox won't pair. System unresponsive.

Moved Xbox receiver to different USB port. No change.

(May need R0B00T?)

ubuntu@AUDACITY:~\$ **ros2 node list**

/joy

/roboclaw_wrapper

/rover

/teleop_twist_joy

ubuntu@AUDACITY:~\$ **ros2 topic echo /joy**

no response to controller

REBOOT

Logged in prior to trying to pair. Don't know if that's relevant.

Works ok on a USB-3 Port.

AUDACITY upgrade: lighting

Idea:

headlights that respond to controller button.

Turn signals that respond to R/L commands (or buttons?)

Backup lights (beep?) that respond to reverse command.

Questions:

Does /joy publish all buttons?

ubuntu@AUDACITY:~\$ **ros2 topic echo /joy**

responds to all buttons, pads

ubuntu@AUDACITY:~\$ **ros2 node list**

/joy

/roboclaw_wrapper

/rover

/teleop_twist_joy

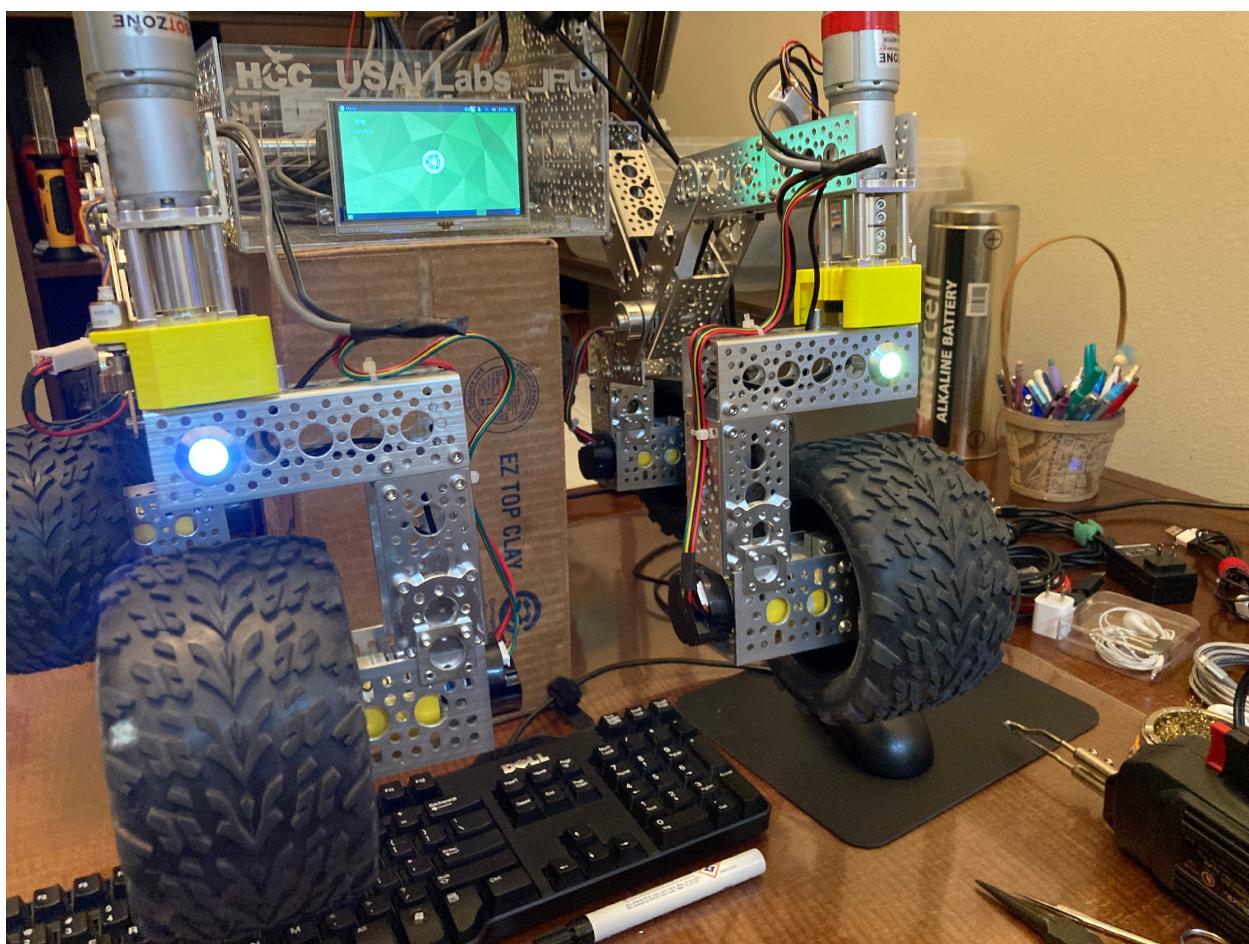
Trying to write a node to control the lights is too complicated. Maybe just wire them in to the motors...?

Geetans LED card lights very bright at +12V, don't light nor burn out at -12V. HOSTSYSTEM Eagle Eye white similar.

Spliced right headlight into the drive motor cable after struggling with the Molex connectors! Lit up when I ran the motors but in the OPPOSITE direction! It only lit when in reverse! Forgot that +/- may vary depending on the side the motor is on, regardless of the wire color! Lesson: TEST before you solder. It would stay partly lit when the motor stopped and completely extinguish if I reversed the motors. The front drive (and steering) motors have the Molex connectors which are a PAIN and sometimes flaky. I'd prev hard-wired the rear motors for this reason. May a well go ahead and hard-wire the front drive motors.

2021.07.13

Hard-wire both front drive motors to include the new headlights.



Slack discussion:

James Phelan Yesterday at 7:25 PM

HEADLIGHTS

Took a hardware break from software issues to add headlights from our wish list. They're wired into the drive motor circuit so they only illuminate when driving forward but not, and they don't burn out, when in reverse.

IMG_6571.jpg

Eric Junkins 17 hours ago

What do you mean wired into the drive circuit?

Me:

spliced directly into the power cable to the front drive motors. You can see the black cable coming up out of the U-channel next to the stop post and the heat shrink tubing in the resulting spaghetti above. It includes the power and encoder wiring. I used to use Molex connectors but they're DIFFICULT and flaky so have gradually changed to hard wiring/soldering. These are what I used, or similar:Amazon HOTSYSTEM Eagle Eye White

Eric Junkins 16 hours ago

In series with the motor?

James Phelan 16 hours ago

Parallel.

Eric Junkins 16 hours ago

Also I have to disagree the molex connectors are not flaky, if you have the right crimp tool it is my absolute favorite connector

Eric Junkins 16 hours ago

Idk if I would suggest doing them with the motor line, it feels like it isn't very safe for the led. But :shrug: it'll probably be fine. It definitely will add extra resistance and maybe some inductance to the system that is not expecting, maybe it can be calibrated out.

James Phelan 16 hours ago

I'm using the mini-fit and find it too crowded for some of the larger wires. Even when well crimped and soldered, I found the connection intermittent causing loss of encoder feedback and run-away motors.

Eric Junkins 16 hours ago

Did you follow their guide on how to do their crimps? They have

specific dimensions of how much to strip etc so it's done proper.
That and having their tool made for it makes all the difference

James Phelan 16 hours ago

I tested the LEDs to be sure they wouldn't blow out with reverse current. 9W at 12V = 0.75A.

I don't have the official Molex crimp tool, so maybe that would make a difference.

Eric Junkins 15 hours ago

I suppose `r_led >> r_motor` so actually it might not make a difference in the motor characteristics.

James Phelan 14 minutes ago

I initially considered creating a `lights.py` ROS2 node to listen to the unused buttons via `/joy` then activate a free GPIO pin on the Pi to open up a MOSFET from +12 to power the LEDs. But then -- KISS!

Slack thread with Achille:

Achille 10:23 AM

Glad to hear you learned more about git! It'll come in handy for sure.

It doesn't seem like anything is attached. If you ran into issues you think exist in either of the OSR's repositories, please create issues for them there. That way they're not forgotten.

James Phelan 7:16 PM

try attachment again. Then see proj-moving-toward-autonomy thread. Got systemctl status error that said it wanted osr_mod_launch.py to be in a different directory. Copied it there and it worked. Seems, however, I must log in to the rover desktop before the rover will pair and respond even tho systemctl status says it's running ok. PuTTY log-in doesn't seem sufficient but still testing. Also, there's a 1:30 STOP order during boot-up for OSR service and rover won't continue to boot until that time passes. Need to look into the code a little deeper to see what that's about.

PDF

Achille launch codes.pdf

84 kB PDF84 kB – Click to view

Achille 7:23 PM

I don't know / have time to make sense of 15 pages of data/logs and I don't understand what you're talking about with STOP orders and such. Can you simplify this / make this super clear?

7:23

If you believe there is an issue in the code, please use issues

James Phelan 7:41 PM

6/21 05:12 "Let us know if it works - then we'll be able to merge it in."

That's why I sent you the log so you can see exactly what I did, what problems I encountered and how I addressed them. It may be 15pp but should be easy to follow. Before I create an issue, I'd like to know that it's real and not some error on my part. The warnings, errors and fixes are highlighted in color.

During bootup a statement appears on the screen: a stop job is running for osr service with a 1:30 countdown, after which it proceeds.

Achille 7:55 PM

You can tell me what you did without communicating what you had for breakfast that morning. It's so much detail I can't go look where it is. I have 2 minutes at the end of my workday to look

into something and if I can't immediately figure out if it's worth my attention, I won't look at it.

At no point in your text do you say what problems you ran into concisely. I don't even know what I'm looking for

James Phelan 8:01 PM

I'll see if I can make you an Executive Summary...

Achille 8:02 PM

I don't see anything about stop orders but I see errors on the last page.

James Phelan 8:03 PM

The part about the stop job is in the Slack thread [*not true*]

Achille 8:06 PM

<https://github.com/nasa-jpl/osr-rover-code/pull/137/files>

8:06

This is what changed in that PR. (edited)

8:07

If I google that error 'inappropriate ioctl device', I saw something about running bash in interactive mode. I didn't touch that in that PR and it's the same in the master branch, but you could try getting rid of interactive mode and seeing if it works.

8:08

You do that by opening the launch_osr.sh file and deleting -i in it everywhere.

8:10

When you stop the service (sudo service osr_startup stop), and launch manually, do you see any errors?

James Phelan 8:10 PM

When I cp the osr_mod_launch.py file to the directory the systemctl start/status report said it should be in, they stopped.

Achille 8:10 PM

Next thing to try is running the command the same way the startup service does, using the bash -i -c ros2 launch... command

8:11

So it works?

8:14

I'm confused by the logs you wrote. It seemed to be working and except the joystick and then you rebooted and it stopped working (edited)

James Phelan 8:15 PM

Yes, BUT - 1) only by moving the osr_mod_launch.py file. 2) Also I have to log into the desktop for the system to pair & respond. It won't do it without that where it did in the old system. 3) there's a 1:30 stop job on bootup that slows down bootup. The same command runs upon \$ sudo shutdown -h now. (edited)

Achille 8:16 PM

Permissions on your RPi seem incorrect somehow. The fact that you had to use sudo to create a symlink to a local directory isn't right I think.

8:16

You shouldn't need to copy over the file to the systemd directory. I have it set up like in the instructions and didn't have to copy over any files.

James Phelan 8:19 PM

"When you stop the service (sudo service osr_startup stop), and launch manually, do you see any errors?"

I'll give that a try...

Achille 8:20 PM

I can't find anything about a stop job. I won't have time to look into it today, but if you can tag me in the relevant location I'll try to look into it (edited)

James Phelan 8:21 PM

"tag me in the relevant location" ??

Achille 8:29 PM

@Achille wherever you mention stop job

James Phelan 8:29 PM

```
ubuntu@AUDACITY:~$ sudo service osr_startup stop
ubuntu@AUDACITY:~$ ros2 launch osr_bringup osr_mod_launch.py
pairs and responds normally
```

James Phelan 8:34 PM

stop job is only mentioned in this thread, I believe. I noticed it after I sent the log.

8:37

When I do:

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln: failed to create symbolic link '/usr/local/bin/launch_osr.sh':
Permission denied
```

am I supposed to substitute my actual password in place of (pwd)?

If so, that could explain why I needed sudo and why it won't run unless I log in?? (edited)

Achille 8:48 PM

Pwd is a linux command which stands for print working directory.
Nothing to do with password

8:48

I'm not sure why it's asking for sudo

8:49

Try `sudo chown -R \$USER /usr/local/bin

James Phelan 8:49 PM

pwd: ah, right.

Achille 8:50 PM

Chown (change ownership) the ownership of that folder recursively (-R) to yourself (\$USER) instead of root (which requires sudo)

James Phelan 8:55 PM

```
ubuntu@AUDACITY:~$ chown -R ubuntu /usr/local/bin
chown: changing ownership of '/usr/local/bin/script-template.sh':
Operation not permitted
chown: changing ownership of '/usr/local/bin/launch_osr.sh':
Operation not permitted
chown: changing ownership of '/usr/local/bin/osr_paths.sh':
Operation not permitted
chown: changing ownership of '/usr/local/bin': Operation not
permitted
ubuntu@AUDACITY:~$ sudo chown -R ubuntu /usr/local/bin
ubuntu@AUDACITY:~$ ls -l /usr/local/bin
total 12
lrwxrwxrwx 1 ubuntu root 65 Jul 11 17:20 launch_osr.sh ->
/home/ubuntu/osr_ws/src/osr-rover-code/init_scripts/launch_osr.sh
lrwxrwxrwx 1 ubuntu root 64 Jul 11 17:21 osr_paths.sh ->
/home/ubuntu/osr_ws/src/osr-rover-code/init_scripts/osr_paths.sh
-rw-r--r-- 1 ubuntu root 243 Jul 5 20:47 script-template.sh
```

2021.07.14

Whoa!!!

This time on boot-up, once past the stop job on OSR, without having to log in or pair the controller, the front & middle drive motors on both sides ran forward full speed. Rear wheels did NOT run!? Unresponsive to controller. Had to do shutdown then power-off to stop.

On restart no such behavior! Just usual stop job pause, log-in, pairing, activate, steering motors turning right, response to fwd/reverse to stabilize.

Slack Post:

James Phelan 3:14 PM

The chown did not solve the required log-in issue. Googling the stop job running on OSR suggests that OSR is waiting on something, but it's not clear what that could be.

I'm going to go back to my last good SD card image and try again. QUESTION: after I fetch your branch as described, do I need to merge it into the main branch for it to work?

Flashed **2021.06.13U2R20SR.img** onto new SD card and booted up.

There's also the latest **2021.07.11 U20 ROS2 bringup.img** but I'm not sure if it's before or **after** the Achille fetch. Will flash that too. This is the BAD ONE!

```
ubuntu@AUDACITY:~$ ros2 launch osr_bringup osr_mod_launch.py  
No such file
```

```
ubuntu@AUDACITY:~$ ros2 launch osr_bringup osr_launch.py  
Booted normally, logged in, paired & responded appropriately
```

Look to get Achille's enh/services again (again).

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git status  
On branch foxy-devel  
Your branch is up to date with 'origin/foxy-devel'.  
nothing to commit, working tree clean
```

So, I'm on the right branch.

Rebooted to **2021.06.13U2R20SR.img**
5" LCD not configured right. Need to reconfig p445.
Motor setting too slow. Need to reset p413
THEN consider enh/systems.

Ubuntu updater suggested new files. Time to update:
ubuntu@AUDACITY:~\$ **sudo apt update**
64 packages can be upgraded. Run 'apt list --upgradable' to see them.
ubuntu@AUDACITY:~\$ **sudo apt upgrade**
Y

Looking at user manual provided with Elecrow 5" TFT HDMI Display:
Step 2: Modify the "config.txt" changed to usercfg.txt
THIS DOESN'T WORK

```
ubuntu@AUDACITY:~$ cd /boot/firmware/
ubuntu@AUDACITY:/boot/firmware$ sudo nano usercfg.txt
# --- added by elecrow-pitft-setup ---
hdmi_force_hotplug=1
max_usb_current=1
hdmi_drive=1
hdmi_group=2
hdmi_mode=1
hdmi_mode=87
hdmi_cvt 800 480 60 6 0 0 0
dtoverlay=ads7846,cs=1,penirq_pull=2,speed=50000,keep_vref_ob=0,sw
apxy=0,pmax=255,xohms=150,xmin=200,xmax=3900,ymin=200,ymax=3900
display_rotate=0
#---end elecrow-pitft-setup ---
ubuntu@AUDACITY:~$ git clone
    https://github.com/goodtft/LCD-show.git
ubuntu@AUDACITY:~$ chmod -R 755 LCD-show
ubuntu@AUDACITY:~$ cd LCD-show/
ubuntu@AUDACITY:~$ sudo ./LCD5-show
auto rebooted
```

5" monitor looks pretty good.
MATE terminal looks ok.

```
ubuntu@AUDACITY:~$ cd
~/osr_ws/src/osr-rover-code/ROS/osrBringup/config
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config
$ nano osr_params.yaml
drive_no_load_rpm: 223.0 # no load speed for the drive motors.
NOTE: needs to be a float value
```

"If you want to customize your osr_launch.py file, make a copy of it in the same directory (osr-rover-code/ROS/osr Bringup/launch/) and name it **osr_mod_launch.py**."

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ cp osr_launch.py osr_mod_launch.py
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ nano osr_mod_launch.py
```

```
parameters=[  
    {"scale_linear.x": 0.5}, # 0.8 > 0.5 scale to  
apply to drive speed, in m/s: drive_motor_rpm * 2pi / 60 * wheel  
radius * slowdown_factor  
    {"axis_linear.x": 1},  
    {"axis_angular.yaw": 3}, # which joystick axis to  
use for driving  
    {"scale_angular.yaw": 1.00}, # 1.75 > 1.00 scale  
to apply to angular speed, in rad/s: scale_linear /  
min_radius(=0.45m)  
    {"scale_angular_turbo.yaw": 3.95}, # scale to  
apply to angular speed, in rad/s: scale_linear_turbo / min_radius  
    {"scale_linear_turbo.x": 1.00}, # 1.78 > 1.00  
scale to apply to linear speed, in m/s  
    {"enable_button": 4}, # which button to press to  
enable movement  
    {"enable_turbo_button": 5} # -1 to disable turbo  
],
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ sudo reboot
```

2021.07.17

Re-re-examine **3 Automatic bringup with launch script** from
https://github.com/Achille/osl-rover-code/blob/enh/services/setup/rover_bringup.md

Start with background suggested by above:

<https://www.linode.com/docs/guides/start-service-at-boot/>

The sequence is:

```
linode >
    osr-rover-code/init_scripts/osr_startup.service
    which points to >
        osr-rover-code/init_scripts/launch_osr.sh
        which points to >
            bash -c ". /opt/ros/foxy/setup.bash"
                Which refers to AMENT files
            bash -c ". /home/$USER/osr_ws/install/setup.sh"
                Which refers to COLCON files
        And executes if available
            "ros2 launch osr_bringup osr_mod_launch.py"
                Which contains user modified parameters
    Otherwise executes
        "ros2 launch osr_bringup osr_launch.py"
            Which contains default launch parameters
```

Let's try Achille's directions again:

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln: failed to create symbolic link '/usr/local/bin/launch_osr.sh':
Permission denied
```

```
ubuntu@AUDACITY:/usr/local$ ls -l
total 32
drwxr-xr-x 2 root root 4096 Feb  1 05:02 bin
...

```

```
ubuntu@AUDACITY:/usr/local$ cd bin
ubuntu@AUDACITY:/usr/local/bin$ sudo chown -R $USER /usr/local/bin
ubuntu@AUDACITY:/usr/local/bin$ cd ..
ubuntu@AUDACITY:/usr/local$ ls -l
total 32
drwxr-xr-x 2 ubuntu root 4096 Feb  1 05:02 bin
...

```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s $(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s $(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo cp osr_startup.service /etc/systemd/system/osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo chmod 644 /etc/systemd/system/osr_startup.service
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo reboot
```

Bootup normal without stop job delays!
Fails to pair or respond after bootup.
Fails to pair or respond after login.
ubuntu@AUDACITY:~\$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service;
enabled; vendor preset: enabled)
 Active: activating (auto-restart) (Result: exit-code) since
Sat 2021-07-17 14:29:53 CDT; 8ms ago
 Process: 3220 ExecStart=/home/ubuntu/launch_osr.sh
(code=exited, status=203/EXEC)
 Main PID: 3220 (code=exited, status=203/EXEC)

```
ubuntu@AUDACITY:/etc/systemd/system$ ls -l
-rw-r--r-- 1 root root 258 Jul 17 14:12 osr_startup.service
should it be x- executable?
```

Advice from:

<https://unix.stackexchange.com/questions/472950/systemd-status-203-exec-error-when-creating-new-service>

Try

```
pi@raspberrypi:~ $ systemctl status ReadPressure.service
Paraphrasing @Ingo from I fail to start a python program in Thonny
on startup. The error message (code=exited, status=203/EXEC) is
often seen when the script itself or its interpreter cannot be
executed.
```

It could have these reasons:

```
wrong path to script (e.g. /home/py/ReadPressure2AndPostToMqtt.py)
script not executable
no shebang (first line)
wrong path in shebang (e.g. /bin/python3)
internal files in your script might be missing access permissions.
```

launch_osr.sh
HAS a shebang (!#/bin/bash)
osr_paths.sh
DOES NOT have a shebang.
Try adding one
REBOOT
Nope, didn't fix it, remove it.
ubuntu@AUDACITY:/opt/ros/foxy\$ cat setup.bash
NO SHEBANG
ubuntu@AUDACITY:~/osr_ws/install\$ cat setup.sh
NO SHEBANG
launch_osr.sh
"\$launch_dir/osr_mod_launch.py" exists
"ros2 launch osr_bringup osr_mod_launch.py" exists
Haven't tested other suggestions yet. Post to Slack>Achille.

2021.07.18

~/osr_ws/src/osr-rover-code/init_scripts/**launch_osr.sh**:

```
#!/bin/bash
# exit on error, and output executed commands to stdout
set -ex

source osr_paths.sh
#works ok run via terminal
launch_dir=$OSR_CODE_DIR/ROS/osr_bringup/launch
#works ok run via terminal
bash -c ". /opt/ros/foxy/setup.bash"
#works ok run via terminal
bash -c ". /home/$USER/osr_ws/install/setup.sh"
#works ok run via terminal

# execute the custom mod launch file if it's available
if [ -e "$launch_dir/osr_mod_launch.py" ]; then
    echo "Launching osr_mod_launch.py"
    bash -i -c "ros2 launch osr_bringup osr_mod_launch.py"
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ bash -i -c "ros2 launch osr_bringup osr_mod_launch.py"
file 'osr_mod_launch.py' was not found in the share directory of
package 'osr_bringup' which is at
'/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup'
```

```
# otherwise go with the default
else
    echo "Launching osr.launch"
    bash -i -c "ros2 launch osr_bringup osr_launch.py"
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ bash -i -c "ros2 launch osr_bringup osr_launch.py"
launches normally & rover responds appropriately.
```

fi

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ cp osr_mod_launch.py
/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup/osr_mod_
launch.py
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ bash -i -c "ros2 launch osr_bringup osr_launch.py"
launches normally
```

REBOOT

```
Failed to pair or respond on boot-up. Also after login.  
ubuntu@AUDACITY:~$ sudo systemctl enable osr_startup.service  
ubuntu@AUDACITY:~$ sudo systemctl start osr_startup.service  
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service  
● osr_startup.service - OSR service  
...  
Jul 18 06:15:01 AUDACITY systemd[1]: osr_startup.service:  
Scheduled restart job, restart counter is at 49.  
Jul 18 06:15:01 AUDACITY systemd[1]: Stopped OSR service.  
Jul 18 06:15:01 AUDACITY systemd[1]: Started OSR service.  
Jul 18 06:15:01 AUDACITY systemd[2540]: osr_startup.service:  
Failed to execute command: No such file or directory  
Jul 18 06:15:01 AUDACITY systemd[2540]: osr_startup.service:  
Failed at step EXEC spawning /home/ubuntu/launch_osr.sh: No such  
file or directory  
Jul 18 06:15:01 AUDACITY systemd[1]: osr_startup.service: Main  
process exited, code=exited, status=203/EXEC  
Jul 18 06:15:01 AUDACITY systemd[1]: osr_startup.service: Failed  
with result 'exit-code'.
```

```
ubuntu@AUDACITY:/usr/local/bin$ cat launch_osr.sh  
This shows OLD (melodic) version:  
#!/bin/bash  
# exit on error, and output executed commands to stdout  
set -ex  
  
source osr_paths.sh  
launch_dir=$OSR_CODE_DIR/ROS/osr_bringup/launch  
  
bash -c ". /home/$USER/osr_ws/install/setup.sh"  
bash -c ". /home/$USER/osr_ws-devel/setup.bash"  
bash -c ". /opt/ros/melodic/setup.sh"  
bash -c ". /opt/ros/melodic/setup.bash"  
  
# execute the custom mod launch file if it's available  
if [ -e "$launch_dir/osr_mod.launch" ]; then  
    echo "Launching osr_mod.launch"  
    bash -i -c "roslaunch osr_bringup osr_mod.launch"  
# otherwise go with the default  
else  
    echo "Launching osr.launch"  
    bash -i -c "roslaunch osr_bringup osr.launch"  
fi
```

```

ubuntu@AUDACITY:/usr/local/bin$ mv launch_osr.sh launch_osr_BAD.sh
ubuntu@AUDACITY:/usr/local/bin$ nano launch_osr.sh
#!/bin/bash
# exit on error, and output executed commands to stdout
set -ex

source osr_paths.sh
launch_dir=$OSR_CODE_DIR/ROS/osr_bringup/launch

bash -c ". /opt/ros/foxy/setup.bash"
bash -c ". /home/$USER/osr_ws/install/setup.sh"

# execute the custom mod launch file if it's available
if [ -e "$launch_dir/osr_mod_launch.py" ]; then
    echo "Launching osr_mod_launch.py"
    bash -i -c "ros2 launch osr_bringup osr_mod_launch.py"
# otherwise go with the default
else
    echo "Launching osr.launch"
    bash -i -c "ros2 launch osr_bringup osr_launch.py"
fi

```

```

ubuntu@AUDACITY:/usr/local/bin$ sudo reboot
Failed to pair or respond on boot-up. Also after login.
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
    Loaded: loaded (/etc/systemd/system/osr_startup.service;
   enabled; vendor preset: enabled)
      Active: activating (auto-restart) (Result: exit-code) since
Sun 2021-07-18 06:42:59 CDT; 853ms ago
        Process: 2589 ExecStart=/home/ubuntu/launch_osr.sh
(code=exited, status=203/EXEC)
      Main PID: 2589 (code=exited, status=203/EXEC)

```

```

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ bash
launch_osr.sh
+ source osr_paths.sh
++ export OSR_CODE_DIR=/home/ubuntu/osr_ws/src/osr-rover-code
++ OSR_CODE_DIR=/home/ubuntu/osr_ws/src/osr-rover-code
+
launch_dir=/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/
launch
+ bash -c '. /home/ubuntu/osr_ws/install/setup.sh'
+ bash -c '. /home/ubuntu/osr_ws-devel/setup.bash'
bash: /home/ubuntu/osr_ws-devel/setup.bash: No such file or
directory

```

```
setup.bash isn't in /devel/ but in /install/
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ cp
launch_osr.sh launch_osr.BAD.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ nano
launch_osr.sh
    change /devel/ > /install/

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
reboot
Failed to pair or respond on boot-up. Also after login.

ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ sudo systemctl status
osr_startup.service
● osr_startup.service - OSR service
   Loaded: loaded (/etc/systemd/system/osr_startup.service;
   enabled; vendor preset: enabled)
     Active: activating (auto-restart) (Result: exit-code) since
Sun 2021-07-18 07:28:02 CDT; 651ms ago
       Process: 3085 ExecStart=/home/ubuntu/launch_osr.sh
(code=exited, status=203/EXEC)
      Main PID: 3085 (code=exited, status=203/EXEC)
```

```
ubuntu@AUDACITY:~$ bash launch_osr.sh
There should be a link to its directory
rover launches & responds appropriately
^C to kill
```

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
   Loaded: loaded (/etc/systemd/system/osr_startup.service;
   enabled; vendor preset: enabled)
     Active: activating (auto-restart) (Result: exit-code) since
Sun 2021-07-18 07:33:37 CDT; 1s ago
       Process: 3326 ExecStart=/home/ubuntu/launch_osr.sh
(code=exited, status=203/EXEC)
      Main PID: 3326 (code=exited, status=203/EXEC)
```

```
ubuntu@AUDACITY:~$ sudo systemctl start osr_startup.service

Looking at launch_osr.sh again, somehow the changes didn't take.
Changed it again.
Still same error.
```

Posted to Slack

Achille 2:38 PM

If it's not in the install directory you simply didn't run `colcon build`. Copying it over manually is bad practice and will lead to future errors

2:41

```
> bash: /home/ubuntu/osr_ws/devel/setup.bash: No such file or
directory setup.bash is in /install/ not /devel/.
```

This tells me you're still running the melodic script. The code in enh/services clearly points to install, not devel

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ colcon build
```

Starting >>> osr_interfaces

Starting >>> osrBringup

Finished <<< osrBringup [1.51s]

Finished <<< osr_interfaces [3.99s]

Starting >>> osr_control

Finished <<< osr_control [2.67s]

Summary: 3 packages finished [7.38s]

proceeded w/o error.

REBOOT.

Fails to pair or respond on reboot or login.

Same "status" error.

2021.07.21

Taking cue from last re-install:
Change dir from ~/osr_ws/src/osr-rover-code to ~/osr_ws/src/
Run colcon build with --symlink-install

```
ubuntu@AUDACITY:~/osr_ws/src$ colcon build --symlink-install
Starting >>> osr_interfaces
Starting >>> osrBringup
Finished <<< osrBringup [13.2s]
[Processing: osr_interfaces]
[Processing: osr_interfaces]
Finished <<< osr_interfaces [1min 17s]
Starting >>> osr_control
Finished <<< osr_control [5.97s]
```

Summary: 3 packages finished [1min 24s]

```
ubuntu@AUDACITY:~/osr_ws/src$ sudo reboot
Fails to pair or respond on reboot or login.
```

```
ubuntu@AUDACITY:~$ sudo find / -name melodic
nothing
```

```
ubuntu@AUDACITY:/opt/ros$ ls
foxy
This is where ROS foxy lives
```

```
ubuntu@AUDACITY:~$ sudo find / -name ros
/opt/ros
/etc/ros
```

```
ubuntu@AUDACITY:/etc/ros$ ls -R
rosdep
    sources.list.d
        20-default.list
```

2021.07.22

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
  Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
    Active: activating (auto-restart) (Result: exit-code) since
      Thu 2021-07-22 15:25:58 CDT; 2s ago
      Process: 30043 ExecStart=/home/ubuntu/launch_osr.sh
                 (code=exited, status=203/EXEC)
        Main PID: 30043 (code=exited, status=203/EXEC)
```

```
Jul 22 15:26:01 AUDACITY systemd[1]: osr_startup.service:
Scheduled restart job, restart counter is at 23322.
Jul 22 15:26:01 AUDACITY systemd[1]: Stopped OSR service.
Jul 22 15:26:01 AUDACITY systemd[1]: Started OSR service.
Jul 22 15:26:01 AUDACITY systemd[30047]: osr_startup.service:
Failed to execute command: No such file or directory
Jul 22 15:26:01 AUDACITY systemd[30047]: osr_startup.service:
Failed at step EXEC spawning /home/ubuntu/launch_osr.sh: No such
file or directo>
Jul 22 15:26:01 AUDACITY systemd[1]: osr_startup.service: Main
process exited, code=exited, status=203/EXEC
Jul 22 15:26:01 AUDACITY systemd[1]: osr_startup.service: Failed
with result 'exit-code'.
```

```
ubuntu@AUDACITY:~$ sudo find / -name launch_osr.sh
/usr/local/bin/launch_osr.sh
/home/ubuntu/osr_ws/src/osr-rover-code/init_scripts/launch_osr.sh
```

They're the same, see below:

2021.07.23

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ cat
/usr/local/bin/launch_osr.sh
#!/bin/bash
# exit on error, and output executed commands to stdout
set -ex

source osr_paths.sh
launch_dir=$OSR_CODE_DIR/ROS/osr_bringup/launch

bash -c ". /opt/ros/foxy/setup.bash"
bash -c ". /home/$USER/osr_ws/install/setup.sh"

# execute the custom mod launch file if it's available
if [ -e "$launch_dir/osr_mod_launch.py" ]; then
    echo "Launching osr_mod_launch.py"
    bash -i -c "ros2 launch osr_bringup osr_mod_launch.py"
# otherwise go with the default
else
    echo "Launching osr.launch"
    bash -i -c "ros2 launch osr_bringup osr_launch.py"
fi
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ cat
/home/ubuntu/osr_ws/src/osr-rover-code/init_scripts/launch_osr.sh
#!/bin/bash
# exit on error, and output executed commands to stdout
set -ex

source osr_paths.sh
launch_dir=$OSR_CODE_DIR/ROS/osr_bringup/launch

bash -c ". /opt/ros/foxy/setup.bash"
bash -c ". /home/$USER/osr_ws/install/setup.sh"

# execute the custom mod launch file if it's available
if [ -e "$launch_dir/osr_mod_launch.py" ]; then
    echo "Launching osr_mod_launch.py"
    bash -i -c "ros2 launch osr_bringup osr_mod_launch.py"
# otherwise go with the default
else
    echo "Launching osr.launch"
    bash -i -c "ros2 launch osr_bringup osr_launch.py"
fi
```

```
ubuntu@AUDACITY:~/osr_ws$ colcon list
osrBringup      src/osr-rover-code/ROS/osrBringup
(ros.ament_cmake)
osrControl      src/osr-rover-code/ROS/osrControl
(ros.ament_python)
osrInterfaces   src/osr-rover-code/ROS/osrInterfaces
(ros.ament_cmake)
```

```
ubuntu@AUDACITY:~/osr_ws$ colcon build --symlink-install
Starting >>> osrInterfaces
Starting >>> osrBringup
Finished <<< osrBringup [3.22s]
Finished <<< osrInterfaces [10.2s]
Starting >>> osrControl
Finished <<< osrControl [4.44s]
```

Summary: 3 packages finished [15.1s]

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ls -l
total 20
-rw-rw-r-- 1 ubuntu ubuntu 233 Jun 13 17:22 LaunchOSR.sh.DELETE
-rwxrwxr-x 1 ubuntu ubuntu 633 Jul 18 07:21 launch_osr.BAD.sh
-rwxrwxr-x 1 ubuntu ubuntu 560 Jul 18 07:51 launch_osr.sh
-rw-rw-r-- 1 ubuntu ubuntu 140 Jul 17 20:54 osr_paths.sh
-rw-rw-r-- 1 ubuntu ubuntu 258 Jun 13 16:24 osr_startup.service
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln: failed to create symbolic link '/usr/local/bin/launch_osr.sh':
File exists
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
ln: failed to create symbolic link '/usr/local/bin/osr_paths.sh':
File exists
```

2021.07.24

OSR Bringup on bootup problem

GOAL: To create a system service to launch the OSR code on bootup.

PROBLEM: It doesn't work. On bootup controller doesn't pair.

Rover doesn't respond to controller. System status shows this error:

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
  Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
            Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
            Active: activating (auto-restart) (Result: exit-code) since
Thu 2021-07-22 15:25:58 CDT; 2s ago
          Process: 30043 ExecStart=/home/ubuntu/launch_osr.sh
(code=exited, status=203/EXEC)
        Main PID: 30043 (code=exited, status=203/EXEC)
```

```
Jul 22 15:26:01 AUDACITY systemd[1]: osr_startup.service:
Scheduled restart job, restart counter is at 23322.
Jul 22 15:26:01 AUDACITY systemd[1]: Stopped OSR service.
Jul 22 15:26:01 AUDACITY systemd[1]: Started OSR service.
Jul 22 15:26:01 AUDACITY systemd[30047]: osr_startup.service:
Failed to execute command: No such file or directory
Jul 22 15:26:01 AUDACITY systemd[30047]: osr_startup.service:
Failed at step EXEC spawning /home/ubuntu/launch_osr.sh: No such
file or directo>
Jul 22 15:26:01 AUDACITY systemd[1]: osr_startup.service: Main
process exited, code=exited, status=203/EXEC
Jul 22 15:26:01 AUDACITY systemd[1]: osr_startup.service: Failed
with result 'exit-code'.
```

```
ubuntu@AUDACITY:~$ ls -a
. .bash_history.cache .gnupg .profile
.sudo_as_admin_successful .xsession-errors.old Downloads
Pictures Videos ... .bash_logout .config .icons .ros
.themes Desktop LCD-show Public osr_ws .Xauthority
.bashrc .dmrc .local .ssh .xsession-errors Documents
Music Templates
```

launch_osr.sh is not there

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/init_scripts$ cat osr_startup.service
...
WorkingDirectory=/home/ubuntu/
ExecStart=/home/ubuntu/LaunchOSR.sh
...
```

*osr_startup.service is looking in the wrong directory!
The symlink is being made here:*

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
```

Slack post yesterday to Achille:

I THINK I've found the problem:

*The osr_startup.service is looking to /home/ubuntu/launch_osr.sh
and says "No such file or directory"*

That's because the symlink is created for /usr/local/bin:

```
ln -s $(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
```

*I think we either tell osr_startup.service the home directory is
/usr/local/bin OR*

put the symlink in /home/ubuntu.

2021.07.25

Reply All to:

c.demontaigu centiasoftware.com <c.demontaigu@centiasoftware.com>

David Taylor <davidtaylor@ricealumni.net>

Sachit Bhasker <sachitb96@gmail.com>

Vessa <vpykala@hotmail.com>

Re: **Intel RealSense camera install for ROS2/Ubuntu 20.04?**

Team,

To become autonomous we need eyes.

With *HUGE difficulty* I installed the RealSense camera under ROS(1) melodic/Ubuntu 18.04.

Now ROS2 is likely a "horse of a different color"!

Do you have a link to a STRAIGHTFORWARD set of directions to install it under ROS2/Ubuntu 20.04?

I'll do some research but don't want to stumble around and load a bunch of crap that could gum up the system.

J

Freedom Robotics Dashboard

Next step is to install the FR dashboard.

<https://app.freedomrobotics.ai/#/devices/DAAA0C665B06524A3A897346970/setup?=&customSetup=false>

```
curl -sSf
"https://api.freedomrobotics.ai/accounts/A6124B5AB85968B6435933C21
/devices/DAAA0C665B06524A3A897346970/installscript?mc_token=T2C8B0
170E55ABAD5F98950BC&mc_secret=Sffd1576527908e3bc96d1c3f&install_el
ements=webrtc&auto_install_deps=true&ppa_is_allowed=true" | python
```

Command 'python' not found, did you mean:

```
command 'python3' from deb python3
command 'python' from deb python-is-python3
```

change to:

```
| python3
```

```
#####
Installing FREEDOM ROBOTICS Micro Service
Copyright Freedom Robotics Inc 2021. All rights reserved.
Confidential.
#####
Please enter the sudo password to enable install to set up the
Freedom SYSTEM SERVICE, Remote SSH, etc... for the Freedom Agent.
(This will time out after 60 seconds and continue without
installing
the services.)
```

```
[sudo] password for ubuntu: <password>
We can not use sudo for the current install.
```

```
#####
Step 1/6: VERIFYING PREREQUISITES
```

```
#####
INSTALL DID NOT COMPLETE SUCCESSFULLY
```

```
Dependency python3 `pip`, is not installed. Please run `sudo
apt-get update && sudo apt-get install -y python3-pip` or `curl
https://bootstrap.pypa.io/get-pip.py | python3` and then rerun
this script.
```

```
#####
(NO STACK TRACE REPORTED)
```

```
#####
STOPPING AGENT IF NECESSARY AND UNINSTALLING
```

- AGENT NOT RUNNING
- PACKAGE NOT INSTALLED (3.8)

```
UPLOADING INSTALL ERROR REPORT
```

```
COMPLETE
```

```
#####
ubuntu@AUDACITY:~$ sudo apt-get update && sudo apt-get install -y
python3-pip
[clean install]
```

```
ubuntu@AUDACITY:~$ curl -sSf ... | python3
```

We can not use sudo for the current install.

```
#####
#####
```

Step 1/6: VERIFYING PREREQUISITES

FAILED

WARNING: Installer was not able to run `sudo` for extra privileges, so the

system services could not be set up.

Assuming the sudo privileges for the `ubuntu` user are `ALL` and `timestamp_timeout` for sudo password cache expiration is not set to 0, here

are a few ways to solve this.

SOLUTIONS:

1. If you run this interactively, make sure you provide the user password when asked.
2. Run sudo (ex: `sudo -l`) right before running this script.
3. For non-interactive installation, make sure the user is able to run `sudo` with NOPASSWD.

WARNING: Missing system prerequisites.

SOLUTIONS:

1. Allow installer to run `sudo` (check other details on how to do it).
2. Install the prerequisites:
`sudo apt-get install -y libopus-dev libvpx-dev libsrtplib2-dev`.
[...etc as prev]

```
ubuntu@AUDACITY:~$ sudo apt-get install -y libopus-dev libvpx-dev  
libsrtplib2-dev  
[clean install]
```

```
ubuntu@AUDACITY:~$ curl -sSf ... | python3
Step 1/6: VERIFYING PREREQUISITES
    COMPLETE
Step 2/6: INSTALLING CREDENTIALS
    COMPLETE
Step 3/6: REMOTE CONNECTION
    COMPLETE
Step 4/6: INSTALLING PACKAGE (python3.8)
Installing agent and its direct dependencies for python 3.8. This
might take a few minutes.
    COMPLETE
Step 5/6: RTC DEPENDENCIES
Installing webrtc dependencies. First installation might take a
few minutes.
    COMPLETE
Step 6/6: INSTALLING MICRO SERVICE
    COMPLETE
#####
INSTALL COMPLETE
```

```
MICRO AGENT      : INSTALLED AND ACTIVE
ROS SHADOW       : INSTALLED
REMOTE SSH        : INSTALLED
PYTHON3.8 PACKAGE : INSTALLED
RTC DEPENDENCIES  : INSTALLED

ACCOUNT          : A6124B5AB85968B6435933C21
DEVICE           : DAAA0C665B06524A3A897346970
```

```
#####
#####
```

Back to FR dashboard on laptop:

PROCEED

WHAT'S YOUR ROBOT'S NAME?

AUDACITY

PROCEED

WHAT TYPE OF ROBOT IS AUDACITY? Dropdown select "New Type"

NASA/JPL Open Source Rover

PROCEED

Congratulations! You've just added your device!

Go to Device

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch  
$ ros2 launch osr_mod_launch.py  
Paired & responded to Xbox controller.  
[properly displayed encoder reading.  
Responded to joystick in Pilot mode.]
```

Try just plugging in Spinel fisheye USB camera.
FR doesn't see it, no surprise.

The webcamtests.com website from the rover desktop does see the USB camera as noted somewhere above in the old system.

Want to focus on the Intel RealSense D455 depth camera as it has more potential toward SLAM and NAV2 than just a USB camera.

2021.07.26

Using a copy of the latest SD card image in case of crash --
Following these instructions:

https://github.com/IntelRealSense/realsense-ros/blob/development/R_EADME.md#installation-instructions

*Method 1: The ROS distribution:
Ubuntu*

realsense2_camera is available as a debian package of ROS distribution. It can be installed by typing:

```
sudo apt-get install ros-$ROS_DISTRO-realsense2-camera
```

This will install both realsense2_camera and its dependents, including librealsense library and matching udev-rules.

Notice:

The version of librealsense2 is almost always behind the one available in RealSense™ official repository.

librealsense2 is not built to use native v4l2 driver but the less stable RS-USB protocol. That is because the last is more general and operational on a larger variety of platforms.

*realsense2_description is available as a separate debian package of ROS distribution. It includes the 3D-models of the devices and is necessary for running launch files that include these models (i.e. rs_d435_camera_with_model.launch). It can be installed by typing: sudo apt-get install
ros-\$ROS_DISTRO-realsense2-description*

first do update:

```
ubuntu@AUDACITY:~$ sudo apt update
ubuntu@AUDACITY:~$ sudo apt upgrade
```

```
ubuntu@AUDACITY:~$ sudo apt-get install
ros-$ROS_DISTRO-realsense2-camera
```

Reading package lists... Done

Building dependency tree

Reading state information... Done

The following additional packages will be installed:

```
    ros-foxy-librealsense2 ros-foxy-realsense2-camera-msgs
```

The following NEW packages will be installed:

```
    ros-foxy-librealsense2 ros-foxy-realsense2-camera
    ros-foxy-realsense2-camera-msgs
```

```
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.  
Need to get 12.9 MB of archives.  
After this operation, 37.1 MB of additional disk space will be  
used.  
Do you want to continue? [Y/n] Y  
Get:1 http://packages.ros.org/ros2/ubuntu focal/main arm64  
ros-foxy-librealsense2 arm64 2.45.0-1focal.20210506.170031 [12.6  
MB]  
Get:2 http://packages.ros.org/ros2/ubuntu focal/main arm64  
ros-foxy-realsense2-camera-msgs arm64 3.2.1-1focal.20210513.205037  
[38.4 kB]  
Get:3 http://packages.ros.org/ros2/ubuntu focal/main arm64  
ros-foxy-realsense2-camera arm64 3.2.1-1focal.20210513.235157 [330  
kB]  
Fetched 12.9 MB in 3s (4796 kB/s)  
Selecting previously unselected package ros-foxy-librealsense2.  
(Reading database ... 315345 files and directories currently  
installed.)  
Preparing to unpack  
.../ros-foxy-librealsense2_2.45.0-1focal.20210506.170031_arm64.deb  
...  
Unpacking ros-foxy-librealsense2 (2.45.0-1focal.20210506.170031)  
...  
Selecting previously unselected package  
ros-foxy-realsense2-camera-msgs.  
Preparing to unpack  
.../ros-foxy-realsense2-camera-msgs_3.2.1-1focal.20210513.205037_a  
rm64.deb ...  
Unpacking ros-foxy-realsense2-camera-msgs  
(3.2.1-1focal.20210513.205037) ...  
Selecting previously unselected package  
ros-foxy-realsense2-camera.  
Preparing to unpack  
.../ros-foxy-realsense2-camera_3.2.1-1focal.20210513.235157_arm64.  
deb ...  
Unpacking ros-foxy-realsense2-camera  
(3.2.1-1focal.20210513.235157) ...  
Setting up ros-foxy-realsense2-camera-msgs  
(3.2.1-1focal.20210513.205037) ...  
Setting up ros-foxy-librealsense2 (2.45.0-1focal.20210506.170031)  
...  
Setting up ros-foxy-realsense2-camera  
(3.2.1-1focal.20210513.235157) ...  
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
```

www.webcamtests.com via Chromium on rover MATE desktop recognizes RealSense Depth Camera but displays the point cloud, not the color image. At least we see it's working on the Pi.

Let's see in the FR dashboard can see it (doubt it!)
Launch rover code (from rover desktop terminal by chance):
ubuntu@AUDACITY:~\$ **ros2 launch osr_mod_launch.py**
No launch file supplied
[Hmmmm. Will have to straighten this out tomorrow]
FR Dashboard: DEVICE NOT CURRENTLY ACTIVE

Need to try the other SD card....

2021.07.28

Running SD .img: 2021.07.14 pre-enh.img

Ubuntu 20; ROS2 foxy

No network connections !?!

REBOOT

getting stop job on osr service again

still no network

try falling back to 2021.06.13U2R20SR.img

2021.07.29

2021.06.13U2R20SR.img

No network.

/etc/netplan/50-cloud-init.yaml present & correct

sudo netplan generate done

sudo netplan apply done

sudo nmcli networking off

sudo nmcli networking on

sudo nmcli networking connectivity

none

ifconfig

no eth0: nor wlan0: IP addresses

2021.07.30

Network issue SOLVED!!

Tried multiple SD card images. NONE of them had network!

Maybe it was the Pi4. Tried some old Pi3s. No luck.

The Hue Bridge had also malfunctioned w/ no internet. Laptop WiFi worked but not ethernet. Therefore it was a network issue, not rover issue! Reset router; fail. Reset main modem & router; fail. Reset modem & router & moved study internet cable to unused port. SOLVED! Changed iPhone to NUTHOUSE instead of NUTHOUSE2 and Hue Bridge was able to find it! Reconfigured lights.

Rover has network connection!

Note from supplier: TX8 LIDAR out of stock, cancel.

Wouldn't have arrived for 1-2 mos! (Slow boat from China??).

Ordered EAI YDLIDAR X2L. Prime. Arriving day after tomorrow:

https://www.amazon.com/gp/product/B07W613C1K/ref=ppx_od_dt_b_asin_title_s00?ie=UTF8&psc=1

21.07.31

Good USAi Labs virtual Meetup this morning!

Charles pointed to tutorial on NAVIGATION2:

https://navigation.ros.org/getting_started/index.html

Current short-term goal is to get nav2 running on AUDACITY to do SLAM. For this we need 2D LIDAR. (ORDERED due tomorrow).

Medium-term goal is manipulator arm. Extensive discussion today. Use Boston Dynamics Spot-arm as role model.

Exploring universal gripper (coffee ground vacuum balloon) with “ant foot” gripper as secondary if universal can’t do it.

<https://navigation.ros.org/concepts/index.html>

recommended “More information can be found in this book. I strongly recommend reading chapters 1-3 to get a good understanding of the nomenclature and workflow. It should only take about 30 minutes.”

<https://arxiv.org/pdf/1709.00084.pdf>

Install USB camera for FR Pilot

Plug Spinel USB fisheye into higher speed USB port
<https://webcamtests.com/>

Data:

USB 2.0 camera P600
5.04MP
PNG filesize 3.64MP
JPEG filesize 1.96MP
resolution 2592x1944
aspect 1.33

Suspect may be different for ROS2, research:
Google "ROS2 install USB camera"
https://index.ros.org/r/v4l2_camera/

also promising for later Gazebo URDF:
"Deep Dark ROS E5: Get an RGB Camera in ROS2 Working and in RVIZ2"
<https://www.youtube.com/watch?v=PjMrzIdtU0w>

```
ubuntu@AUDACITY:~$ sudo apt-get install ros-foxy-v4l2-camera
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  linux-headers-5.4.0-1036-raspi linux-image-5.4.0-1036-raspi linux-modules-5.4.0-1036-raspi
  linux-raspi-headers-5.4.0-1036
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  ros-foxy-camera-calibration-parsers ros-foxy-camera-info-manager
The following NEW packages will be installed:
  ros-foxy-camera-calibration-parsers ros-foxy-camera-info-manager ros-foxy-v4l2-camera
0 upgraded, 3 newly installed, 0 to remove and 15 not upgraded.
Need to get 219 kB of archives.
After this operation, 1060 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-camera-calibration-parsers
arm64 2.3.0-1focal.20210513.220733 [53.1 kB]
Get:2 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-camera-info-manager arm64
2.3.0-1focal.20210513.222217 [39.0 kB]
Get:3 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-v4l2-camera arm64
0.4.0-1focal.20210513.222733 [127 kB]
Fetched 219 kB in 1s (369 kB/s)
Selecting previously unselected package ros-foxy-camera-calibration-parsers.
(Reading database ... 347919 files and directories currently installed.)
Preparing to unpack .../ros-foxy-camera-calibration-parsers_2.3.0-1focal.20210513.220733_arm64.deb
...
Unpacking ros-foxy-camera-calibration-parsers (2.3.0-1focal.20210513.220733) ...
Selecting previously unselected package ros-foxy-camera-info-manager.
Preparing to unpack .../ros-foxy-camera-info-manager_2.3.0-1focal.20210513.222217_arm64.deb ...
Unpacking ros-foxy-camera-info-manager (2.3.0-1focal.20210513.222217) ...
Selecting previously unselected package ros-foxy-v4l2-camera.
Preparing to unpack .../ros-foxy-v4l2-camera_0.4.0-1focal.20210513.222733_arm64.deb ...
Unpacking ros-foxy-v4l2-camera (0.4.0-1focal.20210513.222733) ...
Setting up ros-foxy-camera-calibration-parsers (2.3.0-1focal.20210513.220733) ...
Setting up ros-foxy-camera-info-manager (2.3.0-1focal.20210513.222217) ...
Setting up ros-foxy-v4l2-camera (0.4.0-1focal.20210513.222733) ...
ubuntu@AUDACITY:~/Downloads$ sudo apt autoremove
```

```
ubuntu@AUDACITY:~$ colcon build --packages-select v4l2_camera  
--symlink-install  
[2.885s] WARNING:colcon.colcon_core.package_selection:ignoring  
unknown package 'v4l2_camera' in --packages-select
```

```
ubuntu@AUDACITY:/opt/ros/foxy/lib/v4l2_camera$ ros2 run  
v4l2_camera v4l2_camera_node  
[ERROR] [1627836558.221921016] [v4l2_camera]: Failed opening  
device /dev/video0: No such file or directory (2)
```

Try REBOOT

```
ubuntu@AUDACITY:~$ ros2 run v4l2_camera v4l2_camera_node  
[INFO] [1627838360.434471968] [v4l2_camera]: Driver: uvcvideo  
[INFO] [1627838360.435209105] [v4l2_camera]: Version: 328828  
[INFO] [1627838360.435417102] [v4l2_camera]: Device: USB 2.0 Camera: P600  
[INFO] [1627838360.435544082] [v4l2_camera]: Location: usb-0000:01:00.0-1.1  
[INFO] [1627838360.435797152] [v4l2_camera]: Capabilities:  
[INFO] [1627838360.435930743] [v4l2_camera]: Read/write: NO  
[INFO] [1627838360.436039130] [v4l2_camera]: Streaming: YES  
[INFO] [1627838360.436179239] [v4l2_camera]: Current pixel format: MJPG @ 2592x1944  
[INFO] [1627838360.447646907] [v4l2_camera]: Available pixel formats:  
[INFO] [1627838360.447909404] [v4l2_camera]: MJPG - Motion-JPEG  
[INFO] [1627838360.448202862] [v4l2_camera]: YUYV - YUYV 4:2:2  
[INFO] [1627838360.448332342] [v4l2_camera]: Available controls:  
[INFO] [1627838360.448768410] [v4l2_camera]: Brightness (1) = 0  
[INFO] [1627838360.449417789] [v4l2_camera]: Contrast (1) = 32  
[INFO] [1627838360.450463367] [v4l2_camera]: Saturation (1) = 64  
[INFO] [1627838360.451168560] [v4l2_camera]: Hue (1) = 0  
[INFO] [1627838360.451443501] [v4l2_camera]: White Balance Temperature, Auto (2) = 1  
[INFO] [1627838360.452064288] [v4l2_camera]: Gamma (1) = 100  
[INFO] [1627838360.452940961] [v4l2_camera]: Gain (1) = 0  
[INFO] [1627838360.454392106] [v4l2_camera]: Power Line Frequency (3) = 1  
[INFO] [1627838360.455750124] [v4l2_camera]: White Balance Temperature (1) = 4600  
[INFO] [1627838360.457119549] [v4l2_camera]: Sharpness (1) = 3  
[INFO] [1627838360.457691466] [v4l2_camera]: Backlight Compensation (1) = 1  
[INFO] [1627838360.457975388] [v4l2_camera]: Exposure, Auto (3) = 3  
[INFO] [1627838360.458459455] [v4l2_camera]: Exposure (Absolute) (1) = 157  
[INFO] [1627838360.458939059] [v4l2_camera]: Exposure, Auto Priority (2) = 1  
[INFO] [1627838360.463566122] [v4l2_camera]: Requesting format: 2592x1944  
[INFO] [1627838360.479691908] [v4l2_camera]: Success  
[INFO] [1627838360.480338251] [v4l2_camera]: Requesting format: 640x480  
[INFO] [1627838360.497229748] [v4l2_camera]: Success  
[INFO] [1627838360.664010937] [v4l2_camera]: Starting camera  
[INFO] [1627838361.491381337] [v4l2_camera]: using default calibration URL  
[INFO] [1627838361.491800183] [v4l2_camera]: camera calibration URL:  
file:///home/ubuntu/.ros/camera_info/usb_2.0_camera:_p600.yaml  
[ERROR] [1627838361.492850205] [camera_calibration_parsers]: Unable to open camera calibration file  
/home/ubuntu/.ros/camera_info/usb_2.0_camera:_p600.yaml  
[WARN] [1627838361.493078961] [ls_camera]: Camera calibration file  
/home/ubuntu/.ros/camera_info/usb_2.0_camera:_p600.yaml not found
```

Google "usb 2.0 camera:_p600.yaml" NEGATIVE

via PuTTY:

```
ubuntu@AUDACITY:~$ ros2 run rqt_image_view rqt_image_view  
could not connect to display
```

via Desktop terminal:

ubuntu@AUDACITY:~\$ **ros2 run rqt_image_view rqt_image_view**
rqt opens but only shows gray gradient image.

Try FR Dashboard

No camera seen

Sent email to USAi Labs team for help

LIDAR

YDLIDAR X2 arrived!

Team,

When I plug it into the USB it spins. So far, so good.

The mounting holes are metric spaced & I find no adapters online (not even Thingiverse) to match to rover's pattern plate top.

Will need to create one & "give back". Roberto??

<<https://www.ydlidar.com/Public/upload/files/2020-04-13/YDLIDAR%20X2%20Datasheet.pdf>>

<<https://www.servocity.com/9-x-12-aluminum-pattern-plate/>>

There are 2 similar github repos for the YDLIDAR X2:

This older one:

<https://github.com/yangfuyuan/ydlidar_ros2>

and this newer one that specifically mentions ROS2 drivers:

<https://github.com/YDLIDAR/ydlidar_ros2_driver>

unless advised otherwise, I'll try the newer one.

Tips or tricks before I blunder on?

J

Backup SD card to 2021.08.01 image

2021.08.02

With Elecrow 5" TFT touch screen display:

On bootup get popup window with "could not apply the stored configuration for monitors"

Google:"could not apply the stored configuration for monitors"

<https://titanwolf.org/Network/Articles/Article?AID=4889b8d8-17c6-411e-af2c-d0b7e2fedc5e#gsc.tab=0>

ubuntu@AUDACITY:~/config\$ mv monitors.xml monitors.old.xml

Problem solved. May need to repeat if boot up with another monitor later.

2021.08.03

Retry install Spinel fisheye USB camera

Set up a Webcam with Linux:

http://www.linuxintro.org/wiki/Set_up_a_Webcam_with_Linux

First let's try if it works out of the box, so, connect your webcam (if it's not inbuilt), open a terminal and start the application cheese:

ubuntu@AUDACITY:~\$ **cheese**



...so it works.

Ubuntu

This has been tested with Ubuntu 8.10 x32 but should work with any Ubuntu version. Find out the driver activation command of your webcam. For this, first install the software hwinfo. Open a console and type:

```
ubuntu@AUDACITY:~$ sudo apt install hwinfo  
installed ok
```

```
ubuntu@AUDACITY:~$ hwinfo --usb
```

```
...  
04: USB 00.0: 0000 Unclassified device  
  [Created at usb.122]  
  Unique ID: lfzD.1FtpzWRy3C  
  Parent ID: ADDn.mUqILwxEtWB  
  SysFS ID:  
/devices/platform/scb/fd500000.pcie/pci0000:00/0000:00:00.0/0000:01:00.0/usb1/1-1/1-1.1/  
1-1.1:1.0  
  SysFS BusID: 1-1.1:1.0  
  Hardware Class: unknown  
  Model: "Sonix USB 2.0 Camera"  
  Hotplug: USB  
  Vendor: usb 0x1b17 "Sonix Technology Co., Ltd."  
  Device: usb 0x0522 "USB 2.0 Camera"  
  Revision: "1.00"  
  Serial ID: "SN0001"  
  Driver: "uvcvideo"  
  Driver Modules: "uvcvideo"  
  Device File: /dev/input/event3  
  Device Files: /dev/input/event3,  
/dev/input/by-path/platform-fd500000.pcie-pci-0000:01:00.0-usb-0:1.1:1.0-event,  
/dev/input/by-id/usb-Sonix_Technology_Co._Ltd._USB_2.0_Camera_SN0001-event-if00  
  Device Number: char 13:67  
  Speed: 480 Mbps  
  Module Alias: "usb:v1B17p0522d0100dcEFdsc02dp01ic0Eisc01ip00in00"  
  Driver Info #0:  
    Driver Status: uvcvideo is active  
    Driver Activation Cmd: "modprobe uvcvideo"  
  Config Status: cfg=new, avail=yes, need=no, active=unknown  
  Attached to: #11 (Hub)
```

Now to get it to work with ROS2 & FR dashboard...

Google:"usb camera ros2"
ROS2 Image Pipeline Tutorial
Usb_cam orphaned - offer to support
but lead to:
ros2_v4l2_camera
Raspicam Raspbian
[ROS Q&A] 220 - How to Install a USB Camera in TurtleBot3
Just ROS(1)
Deep Dark ROS E5: Get an RGB Camera in ROS2 Working and in RVIZ2
Not helpful
[ROS2 Q&A] 217 - How to Mix ROS1 and ROS2 Packages
A list of ROS2 supported sensors for robots
But lead to:
ros2_usb_camera
Adding Video Capture in ROS 2
ROS packages for working with Cameras on Jetson Nano
ROS(1) Nano

Looking back to prev error:

[ERROR] [1627838361.492850205] [camera_calibration_parsers]:
Unable to open camera calibration file
[/home/ubuntu/.ros/camera_info/usb_2.0_camera:_p600.yaml]

Google: "ros2 usb camera .yaml"

ROS2 USB Camera Node

ros2_usb_camera/config/camera.yaml:

```
image_width: 640
image_height: 480
camera_name: camera
camera_matrix:
  rows: 3
  cols: 3
  data: [944.012173, 0.000000, 534.248944, 0.000000, 893.428920, 358.594765, 0.000000, 0.000000,
1.000000]
distortion_model: plumb_bob
distortion_coefficients:
  rows: 1
  cols: 5
  data: [0.260086, -0.025048, 0.089063, 0.138628, 0.000000]
rectification_matrix:
  rows: 3
  cols: 3
  data: [1.000000, 0.000000, 0.000000, 0.000000, 1.000000, 0.000000, 0.000000, 0.000000, 1.000000]
projection_matrix:
  rows: 3
  cols: 4
  data: [852.395142, 0.000000, 565.897630, 0.000000, 0.000000, 922.066223, 386.586250, 0.000000,
0.000000, 0.000000, 1.000000, 0.000000]
```

```
ubuntu@AUDACITY:~$ cd .ros
ubuntu@AUDACITY:~/ros$ mkdir camera_info
ubuntu@AUDACITY:~/ros$ cd camera_info/
ubuntu@AUDACITY:~/ros/camera_info$ nano usb_2.0_camera:_p600.yaml
paste from above ros2_usb_camera/config/camera.yaml
CR at end, ^O, ^X
```

```
ubuntu@AUDACITY:~$ cd /opt/ros/foxy/include/v4l2_camera
ubuntu@AUDACITY:/opt/ros/foxy/include/v4l2_camera$ ros2 run
v4l2_camera v4l2_camera_node
[WARN] [1628042948.991861189] [v4l2_camera]:
[usb_2.0_camera:_p600] does not match camera in file
/home/ubuntu/.ros/camera_info/usb_2.0_camera:_p600.yaml
```

via Desktop terminal:

```
ubuntu@AUDACITY:~$ ros2 run rqt_image_view rqt_image_view
rqt opens but only shows gray gradient image. [again]
```

Try changing camera name in .yaml:

```
camera_name: camera >> usb_2.0_camera:_p600
```

```
$ ros2 run v4l2_camera v4l2_camera_node
```

No mismatch warning but still no image

shutdown

2021.08.04

DUAL MONITORS

Trial of dual regular monitors on RPi4:

- 1) Vizio from home which works on laptop
- 2) Septre 19" from office which work on laptop

Together only 1) displays

System/Display/Monitor Preferences

 Detect monitors nonfunctional

 sees 1) as 800x480 as if still Elecrow 5" TFT

Try:

```
ubuntu@AUDACITY:~/config$ mv monitors.xml monitors.old.xml
```

there is no monitors.xml to remove.

Need to look to usercfg.txt

```
ubuntu@AUDACITY:/boot/firmware$ sudo nano usercfg.txt
```

Google: "raspberry pi 4 dual monitor ubuntu 20.04"

[dual monitors on ubuntu server 20.04 on pi 4](#)

which pointed to

[How ushds in Lubuntu 19.10?](#)

Which says

You probably need the FKMS overlay loaded. On the boot partition (normally mounted under /boot/firmware in Ubuntu), add the following line to syscfg.txt or usercfg.txt (doesn't matter which): **dtoverlay=vc4-fkms-v3d**

```
ubuntu@AUDACITY:/boot/firmware$ sudo nano usercfg.txt
```

```
# Place "config.txt" changes (dtparam, dtoverlay, disable_overscan, etc.) in  
# this file. Please refer to the README file for a description of the various  
# configuration files on the boot partition.
```

```
dtoverlay=disable-bt  
# for DUAL HDMI monitors
```

```
# --- added by elecrow-pitft-setup ---  
# for single Elecrow 5" TFT display  
#hdmi_force_hotplug=1  
#max_usb_current=1  
#hdmi_drive=1  
#hdmi_group=2  
#hdmi_mode=1  
#hdmi_mode=87  
#hdmi_cvt 800 480 60 6 0 0 0  
#dtoverlay=ads7846,cs=1,penirq_pull=2,speed=50000,keep_vref_low=0,swapxy=0,pmax=  
>  
#display_rotate=0  
#---end elecrow-pitft-setup ---
```

REBOOT

MATE desktop extends across both monitors correctly, side-by-side!
Detect monitors works.

Replace monitors w/
 #0: Elecrow 5" TFT
 #1: Sceptre 19" from office

REBOOT

shows both screen in high res so 5" is too small to work.
Setting both screen same res too low so only partial windows.

Try restoring Elecrow in usercfg.txt

REBOOT

Desktop extended across both monitors.
Displays/Detect monitors - disabled.
Same image in all monitors - disabled.
Unknown HDMI-1 = 800x480
Sceptre 19" HDMI-2 = 1360x768

Unplug Sceptre 19" monitor.

REBOOT

ubuntu@AUDACITY:~/.config\$ no *monitors.xml* to change

ubuntu@AUDACITY:/boot/firmware\$ sudo nano usercfg.txt
remove: dtoverlay=vc4-fkms-v3d

REBOOT

Displays properly on solo 5" monitor.

USB camera / ROS2

https://github.com/klintan/ros2_usb_camera/blob/foxy-devel/launch/usb_camera_node.launch.py

Look to "foxy-devel adaptations" for solution:

ubuntu@AUDACITY:~\$ sudo find / -name **usb_camera_node.launch.py**
NEG

SHUTDOWN

save .img of today's build

2021.08.07

Plan for installing YDLIDAR:

[YDLIDAR / ydlidar_ros2_driver](#)

which points to required SDK:

<https://github.com/YDLIDAR/YDLidar-SDK>

Installation

Fork and then Clone YDLidar-SDK's GitHub code

Build and Install - This step is required

Install Cmake

YDLidar SDK requires CMake 2.8.2+ as dependencies

ubuntu@AUDACITY:~\$ **cmake --version**

cmake version 3.16.3

This I didn't do at first:

if you want to use python API, you need to install python and swig(3.0 or higher):

sudo apt-get install python swig

sudo apt-get install python-pip

So I did this afterward:

python API install separately:

The Next operation only installs the python API, if the above command has been executed, there is no need to perform the next operation.

cd YDLidar-SDK

pip install .

ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK\$ **pip install .**

Defaulting to user installation because normal site-packages is not writeable

Processing /home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK

DEPRECATION: A future pip version will change local packages to be built in-place without first copying to a temporary directory. We recommend you use --use-feature=in-tree-build to test your packages with this new behavior before it becomes the default.

pip 21.3 will remove support for this functionality. You can find discussion regarding this at

<https://github.com/pypa/pip/issues/7555>.

Building wheels for collected packages: ydlidar

Building wheel for ydlidar (setup.py) ... error

... lot of red text ...

Running setup.py clean for ydlidar

Failed to build ydlidar

Installing collected packages: ydlidar

Running setup.py install for ydlidar ... error

... lot of red text ...

```
# Another method
python setup.py build
python setup.py install

ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK$ python setup.py build
Command 'python' not found, did you mean:
  command 'python3' from deb python3
  command 'python' from deb python-is-python3
```

Build YDLidar-SDK

Ubuntu 18.04/16.04/14.04 LTS
No mention of 20.04 I assume came later & is compatible
In the YDLidar SDK directory,..
Need to make directory
ubuntu@AUDACITY:~\$ **mkdir -p YDLidar_SDK.ws**
ubuntu@AUDACITY:~\$ **cd YDLidar_SDK.ws**
run the following commands to compile the project:

```
ubuntu@AUDACITY:~/YDLidar_SDK.ws$ git clone
  https://github.com/YDLIDAR/YDLidar-SDK.git
Cloning into 'YDLidar-SDK'...
remote: Enumerating objects: 449, done.
remote: Counting objects: 100% (449/449), done.
remote: Compressing objects: 100% (328/328), done.
remote: Total 449 (delta 230), reused 328 (delta 116), pack-reused 0
Receiving objects: 100% (449/449), 6.86 MiB | 5.66 MiB/s, done.
Resolving deltas: 100% (230/230), done.
```

```
ubuntu@AUDACITY:~/YDLidar_SDK.ws$ ls
YDLidar-SDK
ubuntu@AUDACITY:~/YDLidar_SDK.ws$ cd YDLidar-SDK/
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK$ ls
CMakeLists.txt LICENSE.txt README.pdf cmake csharp python
setup.py startup ydlidar_config.h.in
Doxyfile README.md build core doc samples
src test
```

```
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK$ cd build/
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ ls
notes.txt
```

```

ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ cmake ..
-- The C compiler identification is GNU 9.3.0
-- The CXX compiler identification is GNU 9.3.0
-- Check for working C compiler: /usr/bin/cc
-- Check for working C compiler: /usr/bin/cc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Detecting C compile features
-- Detecting C compile features - done
-- Check for working CXX compiler: /usr/bin/c++
-- Check for working CXX compiler: /usr/bin/c++ -- works
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Detecting CXX compile features
-- Detecting CXX compile features - done
[Cmake depreciation warnings. Not relevant]
The file

/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/build/ydlidar_sdkTargets.cmake

was generated by the export() command. It should not be installed with the
install() command. Use the install(EXPORT) mechanism instead. See the
cmake-packages(7) manual for more.

Call Stack (most recent call first):
CMakeLists.txt:161 (install_package)
This warning is for project developers. Use -Wno-dev to suppress it.

--
-- +===== Resulting configuration for =====+
-- |                                         |
-- +=====+
--          PLATFORM
-- Host           : Linux5.4.0-1041-raspiaarch64
-- Is the system big endian?   : No
-- Word size (32/64 bit)     : 64
-- CMake version         : 3.16.3
-- CMake generator       : Unix Makefiles
-- CMake build tool      : /usr/bin/make
-- Compiler           : GNU
-- Configuration        :
--          OPTIONS
-- Build YDLidar-SDK as a shared library?  : No
-- Build Examples?          : Yes
-- Build C Sharp API?       : No
-- Build TEST?              : Yes
--          INSTALL
-- Install prefix          : /usr/local
--          WRAPPERS/BINDINGS
-- Python bindings (pyydlidar) : No
-- - dep: Swig found?       : No [Version: ]
-- - dep: PythonLibs found? : Yes [Version: 3.8.10]
-- Configuring done
-- Generating done
-- Build files have been written to: /home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/build

```

```

ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ make
[make successful with warnings]
Scanning dependencies of target ydlidar_sdk
[ 4%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/base/timer.cpp.o
[ 8%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/common/ydlidar_def.cpp.o
[ 12%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/network/ActiveSocket.cpp.o
[ 16%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/network/PassiveSocket.cpp.o
[ 20%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/network/SimpleSocket.cpp.o
[ 25%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/serial/serial.cpp.o
[ 29%] Building C object CMakeFiles/ydlidar_sdk.dir/core/serial/impl/unix/lock.c.o
[ 33%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/serial/impl/unix/list_ports_linux.cpp.o
[ 37%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/serial/impl/unix/unix_serial.cpp.o
[ 41%] Building CXX object CMakeFiles/ydlidar_sdk.dir/src/CYdLidar.cpp.o
[ 45%] Building CXX object CMakeFiles/ydlidar_sdk.dir/src/ETLidarDriver.cpp.o
[ 50%] Building CXX object CMakeFiles/ydlidar_sdk.dir/src/ydlidar_driver.cpp.o
[ 54%] Building CXX object CMakeFiles/ydlidar_sdk.dir/src/ydlidar_sdk.cpp.o
[ 58%] Linking CXX static library libydlidar_sdk.a
[ 58%] Built target ydlidar_sdk
Scanning dependencies of target ydlidar_test
[ 62%] Building CXX object samples/CMakeFiles/ydlidar_test.dir/ydlidar_test.cpp.o
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/samples/ydlidar_test.cpp: In function 'int main(int, char**)':
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/samples/ydlidar_test.cpp:262:41: warning: format '%llu' expects argument of type 'long long unsigned int', but argument 3 has type 'uint64_t' {aka 'long unsigned int'} [-Wformat=]
  262 |         fprintf(stdout, "Scan received[%llu]: %u ranges is [%f]Hz\n",
           |           ~~~^
           |           |
           |           long long unsigned int
           |           %lu
  263 |         scan.stamp,
           | ~~~~~
           |         |
           |         uint64_t {aka long unsigned int}
[ 66%] Linking CXX executable ../ydlidar_test
[ 66%] Built target ydlidar_test
Scanning dependencies of target tof_test
[ 70%] Building CXX object samples/CMakeFiles/tof_test.dir/tof_test.cpp.o
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/samples/tof_test.cpp: In function 'int main(int, char**)':
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/samples/tof_test.cpp:259:41: warning: format '%llu' expects argument of type 'long long unsigned int', but argument 3 has type 'uint64_t' {aka 'long unsigned int'} [-Wformat=]
  259 |         fprintf(stdout, "Scan received[%llu]: %u ranges is [%f]Hz\n",
           |           ~~~^
           |           |
           |           long long unsigned int
           |           %lu
  260 |         scan.stamp,
           | ~~~~~
           |         |
           |         uint64_t {aka long unsigned int}
[ 75%] Linking CXX executable ../tof_test
[ 75%] Built target tof_test
Scanning dependencies of target lidar_c_api_test
[ 79%] Building C object samples/CMakeFiles/lidar_c_api_test.dir/lidar_c_api_test.c.o
ccl: warning: command line option '-std=c++11' is valid for C++/ObjC++ but not for C
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/samples/lidar_c_api_test.c: In function 'main':
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/samples/lidar_c_api_test.c:102:47: warning: format '%llu' expects argument of type 'long long unsigned int', but argument 3 has type 'uint64_t' {aka 'long unsigned int'} [-Wformat=]
  102 |         fprintf(stdout, "Scan received[%llu]: %u ranges is [%f]Hz\n",
           |           ~~~^
           |           |
           |           long long unsigned int
           |           %lu
  103 |         scan.stamp,
           | ~~~~~
           |         |
           |         uint64_t {aka long unsigned int}

```

```
[ 83%] Linking CXX executable ../lidar_c_api_test
[ 83%] Built target lidar_c_api_test
Scanning dependencies of target etlidar_test
[ 87%] Building CXX object samples/CMakeFiles/etlidar_test.dir/etlidar_test.cpp.o
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/samples/etlidar_test.cpp: In function 'int main(int,
char**)':
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/samples/etlidar_test.cpp:178:41: warning: format '%llu'
expects argument of type 'long long unsigned int', but argument 3 has type 'uint64_t' {aka 'long
unsigned int'} [-Wformat=]
    178 |         fprintf(stdout, "Scan received[%llu]: %u ranges is [%f]Hz\n",
           |             ~~~^
           |             | long long unsigned int
           |             %lu
  179 |         scan.stamp,
           | ~~~~~~
           |         |
           |         | uint64_t {aka long unsigned int}
[ 91%] Linking CXX executable ../etlidar_test
[ 91%] Built target etlidar_test
Scanning dependencies of target lidar_test
[ 95%] Building CXX object test/CMakeFiles/lidar_test.dir/lidar_test.cpp.o
[100%] Linking CXX executable lidar_test
[100%] Built target lidar_test
```

```
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ sudo make
install
[install successful]
```

Packaging Project
Cpack
I don't think I need to package this

Run this from the desktop on the rover, not via PuTTY.
ubuntu@AUDACITY:~\$./ydlidar_test
-bash: ./ydlidar_test: No such file or directory

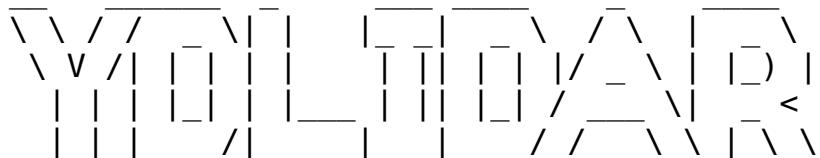
```
ubuntu@AUDACITY:~$ sudo find / -name ydlidar_test
/usr/local/bin/ydlidar_test
```

```
ubuntu@AUDACITY:~$ cd /usr/local/bin/
ubuntu@AUDACITY:/usr/local/bin$ ls
etlidar_test  lidar_c_api_test  tof_test  ydlidar_test

ubuntu@AUDACITY:/usr/local/bin$ ydlidar_test
```

Run YDLidar SDK Sample (see above)
For Ubuntu 18.04/16.04/14.04 LTS,
run the ydlidar_test if connect with the Triangle LiDAR
unit(s) or TOF LiDAR unit(s):

```
./ydlidar_test
[Plese select the lidar baudrate]: input LiDAR BaudRate.
[Whether the Lidar is one-way communication[yes/no] ]:
    Whether The Current LiDAR is single-channel.
[Plese enter the lidar scan frequency[5-12] ]:
    input LiDAR Scan Frequency.
```



Baudrate:

- 0. 115200
- 1. 128000
- 2. 153600
- 3. 230400
- 4. 512000

Please select the lidar baudrate:**4**

Whether the Lidar is one-way communication[yes/no] :**no**

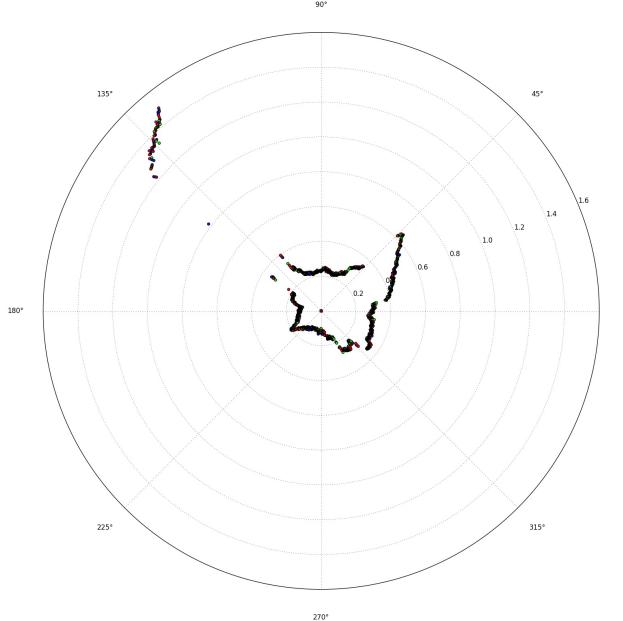
Please enter the lidar scan frequency[5-12] :**10**

I have both python2.7 & python3 installed but it's defaulting to
python3. I may have to be explicit with python2?

Python Run

```
cd python/examples
# Console
python tof_test.py
# If it's a drawing
pip install numpy
pip install matplotlib
python plot_tof_test.py
```

```
ubuntu@AUDACITY:~$ sudo find / -name tof_test.py
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/python/examples/tof_test.py
ubuntu@AUDACITY:~$ python3
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/python/examples/tof_test.py
Traceback (most recent call last):
  File "/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/python/examples/tof_test.py",
    line 2, in
<module>
    import ydlidar
ModuleNotFoundError: No module named 'ydlidar'
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/python/examples$ sudo find / -name
ydlidar.py          NEGATIVE
```



So the above sample image did NOT appear.

YDLIDAR ROS2 Driver

```
Clone ydlidar_ros2_driver
create workspace folder:
ubuntu@AUDACITY:~$ mkdir ydlidar_ros2_ws
ubuntu@AUDACITY:~$ cd ydlidar_ros2_ws/
Clone ydlidar_ros2_driver package for github :
    git clone https://github.com/YDLIDAR/ydlidar_ros2_driver.git
ydlidar_ros2_ws/src/ydlidar_ros2_driver

ubuntu@AUDACITY:~/ydlidar_ros2_ws$ git clone
https://github.com/YDLIDAR/ydlidar_ros2_driver.git
Cloning into 'ydlidar_ros2_driver'...
remote: Enumerating objects: 38, done.
remote: Counting objects: 100% (38/38), done.
remote: Compressing objects: 100% (26/26), done.
remote: Total 38 (delta 8), reused 37 (delta 7), pack-reused 0
Unpacking objects: 100% (38/38), 806.10 KiB | 1.89 MiB/s, done.

ubuntu@AUDACITY:~/ydlidar_ros2_ws$ ls
ydlidar_ros2_driver
```

Summary: 1 package finished [1min 16s]
1 package had stderr output: ydlidar_ros2_driver

Package environment setup :

```
source ./install/setup.bash
```

Note: Add permanent workspace environment variables. It's convenient if the ROS2 environment variables are automatically added to your bash session every time a new shell is launched:
\$ echo "source ~/ydlidar_ros2_ws/install/setup.bash" >> ~/.bashrc
\$ source ~/.bashrc

```
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ echo "source  
~/ydlidar_ros2_ws/install/setup.bash" >> ~/.bashrc
```

```
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ source ~/.bashrc
```

```
Configure LiDAR paramters
ubuntu@AUDACITY:~/ydlidar_ros2_ws/ydlidar_ros2_driver/params$ cat
ydlidar.yaml
```

```
ydlidar_ros2_driver_node:
  ros_parameters:
    port: /dev/ttyUSB0
    frame_id: laser_frame
    ignore_array: ""
    baudrate: 230400
    lidar_type: 1
    device_type: 0
    sample_rate: 9
    abnormal_check_count: 4
    resolution_fixed: true
    reversion: true
    inverted: true
    auto_reconnect: true
    isSingleChannel: false
    intensity: false
    support_motor_dtr: false
    angle_max: 180.0
    angle_min: -180.0
    range_max: 64.0
    range_min: 0.01
    frequency: 10.0
    invalid_range_is_inf: false
```

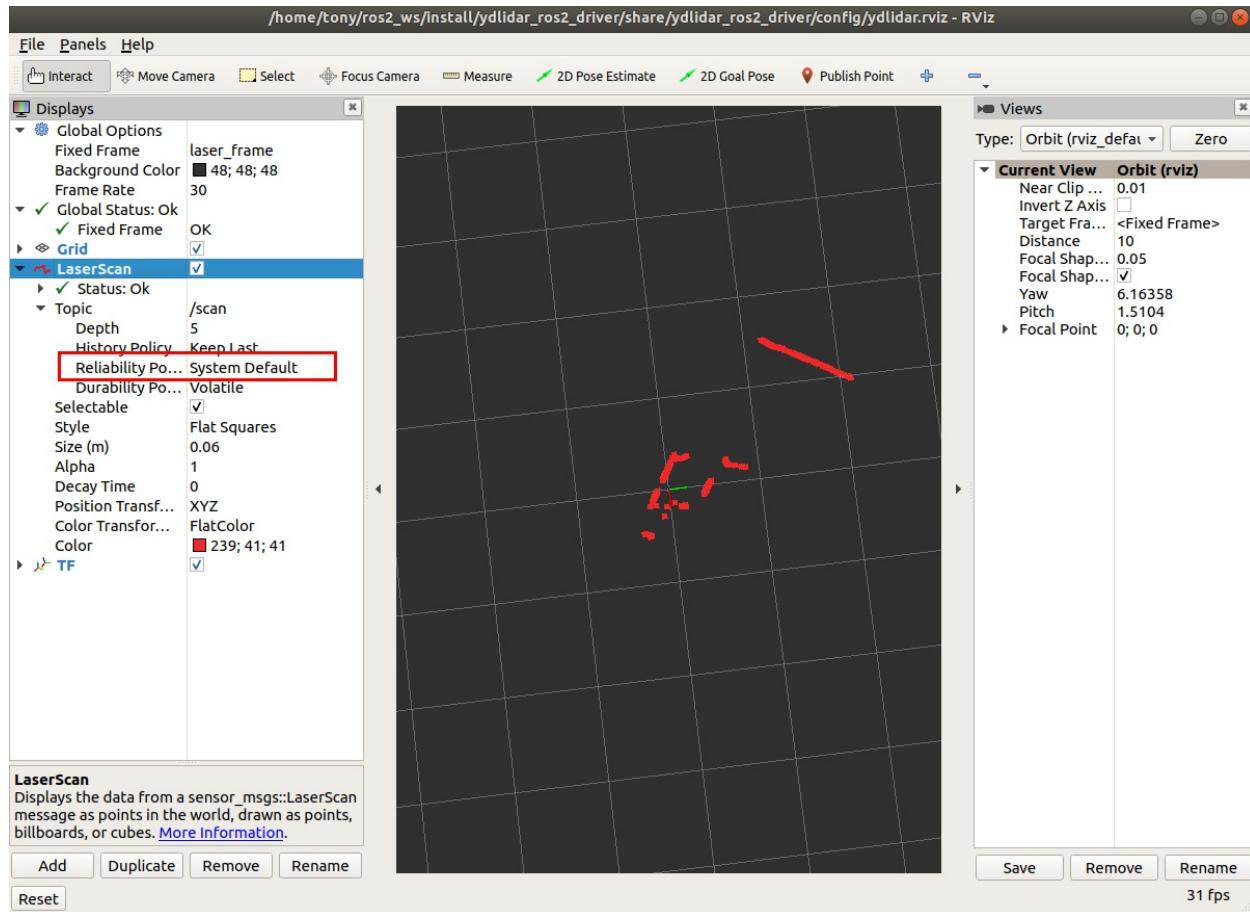
Run **ydlidar_ros2_driver**

```
ros2 launch ydlidar_ros2_driver [launch file].py
      ros2 launch ydlidar_ros2_driver ydlidar_launch.py
or
      launch $(ros2 pkg prefix
ydlidar_ros2_driver)/share/ydlidar_ros2_driver/launch/ydlidar.py
```

```
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ ros2 launch ydlidar_ros2_driver
ydlidar_launch.py
[INFO] [launch]: All log files can be found below
/home/ubuntu/.ros/log/2021-08-07-13-03-783925-AUDACITY-20218
[INFO] [launch]: Default logging verbosity is set to INFO
/opt/ros/foxy/lib/python3.8/site-packages/launch_ros/actions/lifecycle_node.py:
84: UserWarning: The parameter 'node_name' is deprecated, use 'name' instead
    warnings.warn("The parameter 'node_name' is deprecated, use 'name' instead")
/opt/ros/foxy/lib/python3.8/site-packages/launch_ros/actions/lifecycle_node.py:
95: UserWarning: The parameter 'node_executable' is deprecated, use
'executable' instead
    super().__init__(name=name, namespace=namespace, **kwargs)
/opt/ros/foxy/lib/python3.8/site-packages/launch_ros/actions/node.py:185:
UserWarning: The parameter 'node_namespace' is deprecated, use 'namespace'
instead
    warnings.warn("The parameter 'node_namespace' is deprecated, use 'namespace'
instead")
/home/ubuntu/ydlidar_ros2_ws/install/ydlidar_ros2_driver/share/ydlidar_ros2_dri
ver/launch/ydlidar_launch.py:46: UserWarning: The parameter 'node_executable'
is deprecated, use 'executable' instead
    tf2_node = Node(package='tf2_ros',
/home/ubuntu/ydlidar_ros2_ws/install/ydlidar_ros2_driver/share/ydlidar_ros2_dri
ver/launch/ydlidar_launch.py:46: UserWarning: The parameter 'node_name' is
deprecated, use 'name' instead
    tf2_node = Node(package='tf2_ros',
[INFO] [ydlidar_ros2_driver_node-1]: process started with pid [20242]
[INFO] [static_transform_publisher-2]: process started with pid [20244]
[ydlidar_ros2_driver_node-1] [INFO] [1628377984.401749174]
[ydlidar_ros2_driver_node]: [YDLIDAR INFO] Current ROS Driver Version: 1.0.1
[ydlidar_ros2_driver_node-1]
[ydlidar_ros2_driver_node-1] YDLidar SDK initializing
[ydlidar_ros2_driver_node-1] YDLidar SDK has been initialized
[ydlidar_ros2_driver_node-1] [YDLIDAR]:SDK Version: 1.0.3
[static_transform_publisher-2] [INFO] [1628377984.441821548]
[static_tf_pub_laser]: Spinning until killed publishing transform from
'base_link' to 'laser_frame'
[ydlidar_ros2_driver_node-1] LiDAR successfully connected
[ydlidar_ros2_driver_node-1] Error, cannot retrieve YDLidar health code:
ffffffff
[ydlidar_ros2_driver_node-1] get Device Information Error
[ydlidar_ros2_driver_node-1] [CYdLidar::initialize] Error initializing YDLIDAR
check status under [/dev/ttyUSB0] and [230400].
[ydlidar_ros2_driver_node-1] [ERROR] [1628377987.089596832]
[ydlidar_ros2_driver_node]: Unknown error
[ydlidar_ros2_driver_node-1]
[ydlidar_ros2_driver_node-1] [INFO] [1628377987.101070981]
[ydlidar_ros2_driver_node]: [YDLIDAR INFO] Now YDLIDAR is stopping .....
[INFO] [ydlidar_ros2_driver_node-1]: process has finished cleanly [pid 20242]
```

RVIZ

```
ros2 launch ydlidar_ros2_driver ydlidar_launch_view.py
```



```
echo scan topic
ross run ydlidar_ros2_driver ydlidar_ros2_driver_client
no output, ^C
or
ross topic echo /scan
no output, ^C
```

```
ubuntu@AUDACITY:~$ lsusb
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 006: ID 045e:028e Microsoft Corp. Xbox360
Controller
Bus 001 Device 005: ID 413c:3012 Dell Computer Corp. Optical Wheel
Mouse
Bus 001 Device 004: ID 413c:2105 Dell Computer Corp. Model L100
Keyboard
Bus 001 Device 009: ID 10c4:ea60 Silicon Labs CP210x UART Bridge
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

START OVER & REINSTALL

```
ubuntu@AUDACITY:~$ rm -rf YDLidar_SDK.ws/
ubuntu@AUDACITY:~$ rm -rf ydlidar_ros2_ws/
ubuntu@AUDACITY:~$ sudo apt update
ubuntu@AUDACITY:~$ sudo apt upgrade
```

if you want to use python API, you need to install python and swig(3.0 or higher):

```
sudo apt-get install python swig
sudo apt-get install python-pip
```

```
ubuntu@AUDACITY:~$ sudo apt-get install python swig
```

...

Note, selecting 'python-is-python2' instead of 'python'

The following package was automatically installed and is no longer required:

 liblvm11

Use 'sudo apt autoremove' to remove it.

The following additional packages will be installed:

 swig4.0

...

```
ubuntu@AUDACITY:~$ sudo apt autoremove
```

```
ubuntu@AUDACITY:~$ sudo apt-get install python-pip
```

Reading package lists... Done

Building dependency tree

Reading state information... Done

Package python-pip is not available, but is referred to by another package.

This may mean that the package is missing, has been obsoleted, or is only available from another source

However the following packages replace it:

 python3-pip

E: Package 'python-pip' has no installation candidate

Build YDLidar-SDK

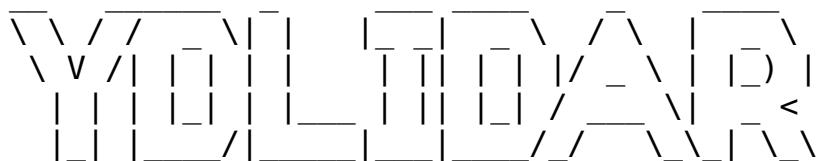
In the YDLidar SDK directory, run the following commands to compile the project:

```
ubuntu@AUDACITY:~$ mkdir YDLidar_SDK.ws
ubuntu@AUDACITY:~$ cd YDLidar_SDK.ws/
ubuntu@AUDACITY:~/YDLidar_SDK.ws$ ls
empty
```

```
ubuntu@AUDACITY:~/YDLidar_SDK.ws$ git clone
https://github.com/YDLIDAR/YDLidar-SDK.git
done
ubuntu@AUDACITY:~/YDLidar_SDK.ws$ ls
YDLidar-SDK
ubuntu@AUDACITY:~/YDLidar_SDK.ws$ cd YDLidar-SDK
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK$ ls
CMakeLists.txt LICENSE.txt README.pdf cmake csharp python
setup.py startup ydlidar_config.h.in
Doxyfile README.md build core doc samples
src test
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK$ cd build/
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ ls
notes.txt
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ cmake ..
done
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ make
same "long long unsigned int" warnings as prev
done
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ sudo make
install
done
Note: If already installed python and swig, sudo make install
command will also install python API without the following
operations.
```

Run YDLidar SDK Sample

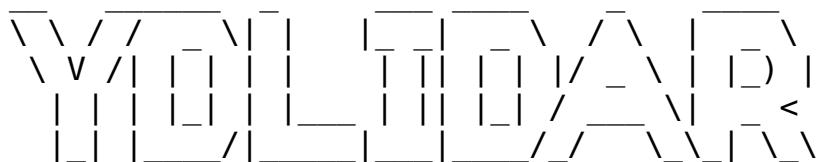
```
connect LIDAR
./ydlidar_test
```



Not Lidar was detected. Please enter the lidar serial port:

```
$ lsusb
failed to show bridge
fiddled with plug
$ lsusb
bridge now displays
```

```
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ ./ydlidar_test
```



Baudrate:

- 0. 115200
- 1. 128000
- 2. 153600
- 3. 230400
- 4. 512000

Please select the lidar baudrate: 4

Whether the Lidar is one-way communication[yes/no]:no

Please enter the lidar scan frequency[5-12]:10

YDLidar SDK initializing

YDLidar SDK has been initialized

[YDLIDAR]:SDK Version: 1.0.3

LiDAR successfully connected

Error, cannot retrieve YDLidar health code: ffffffff

get Device Information Error

[CYdLidar::initialize] Error initializing YDLIDAR check status
under [/dev/ttyUSB0] and [512000].

Unknown error

Try REBOOT

No Signal on 5" monitor

PuTTY timed out w/o response

only red light on RPi

not seen on router's attached devices

POWER OFF

Make Vizio HDMI#0, Elecrow 5" HDMI#1

POWER ON

No Signal on 5" monitor

PuTTY timed out w/o response

only red light on Rpi

not seen on router's attached devices

POWER OFF

Corrupted SD card??

2021.08.08

Test LIDAR install again:

```
ubuntu@AUDACITY:~$ lsusb
...
Bus 001 Device 013: ID 10c4:ea60 Silicon Labs CP210x UART Bridge

ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ ./ydlidar_test
Please select the lidar baudrate:4
Whether the Lidar is one-way communication[yes/no]:no
Please enter the lidar scan frequency[5-12]:10
YDLidar SDK initializing
YDLidar SDK has been initialized
[YDLIDAR]:SDK Version: 1.0.3
LiDAR successfully connected
Error, cannot retrieve YDLidar health code: fffffff
get Device Information Error
[CYdLidar::initialize] Error initializing YDLIDAR check status
under [/dev/ttyUSB0] and [512000].
Unknown error
```

Google: “Error, cannot retrieve YDLidar health code: fffffff”
<https://answers.ros.org/question/339376/ydlidar-x2-health-code-fffff/>

...
This worked after making the serial port executable, adding my user to the DIALOUT group, and restarting.

find the serial port your Lidar is at and change perms chmod 666 /dev/ttYS0

Make sure your user is part of dialout group **sudo adduser YOURUSER dialout...**

This was an issue with the Xbox controller, I believe, and should already be configured.

```
ubuntu@AUDACITY:~$ groups ubuntu
ubuntu : ubuntu adm tty dialout cdrom floppy sudo audio dip video
plugdev netdev lxd
```

```
ubuntu@AUDACITY:~$ ls -l /dev/ttYS*
crw-rw---- 1 root dialout 188, 0 Aug 8 14:22 /dev/ttYS0
```

https://github.com/YDLIDAR/ydlidar_ros/issues/16

Debugged using **socat**: I see the health status query bytes going to the lidar, but the lidar (or the adapter) only return an endless stream of @^

Adapter was broken. Wired up my own serial + motor pwm, works now.

Google search: “socat”

<https://www.redhat.com/sysadmin/getting-started-socat>

informative but examples not useful

links to

<https://linux.die.net/man/1/socat>

Also not helpful

<http://www.dest-unreach.org/socat/>

not helpful

<https://copyconstruct.medium.com/socat-29453e9fc8a6>

informative but examples not useful

<https://www.cyberciti.biz/faq/linux-unix-tcp-port-forwarding/>

informative but examples not useful

Google search: “socat ttyusb0”

<https://unix.stackexchange.com/questions/201757/how-can-i-set-up-a-usb-proxy-for-dev-ttyusb0-over-the-network>

ubuntu@AUDACITY:~\$ **socat /dev/ttyUSB0**

Command 'socat' not found, but can be installed with:

sudo apt install socat

ubuntu@AUDACITY:~\$ **sudo apt install socat**

done

ubuntu@AUDACITY:~\$ **socat /dev/ttyUSB0**

2021/08/08 15:46:00 socat[37556] E exactly 2 addresses required
(there are 1); use option "-h" for help

ubuntu@AUDACITY:~\$ **socat /dev/ttyUSB0 stdout**

A grid of 'X' characters representing lidar data points. The grid is approximately 10 columns wide and 10 rows high. The 'X's are distributed in a pattern that suggests a 3D environment, with more points appearing in the center and fewer towards the edges. This visual representation is a common way to display lidar sensor data.

well, we're getting somewhere?

Google search:"view ttyUSB0 traffic"
<https://serverfault.com/questions/112957/sniff-serial-port-on-linux/112981>

How can I sniff packets communicated through a serial port on Linux?

Links at bottom of list to:

<https://sourceforge.net/projects/slsnif/>

Download slsnif to laptop/Downloads

FileZilla slsnif laptop > Rpi/Downloads

using Desktop on Rpi (not PuTTY):

right-click & extract here

enter extracted folder

find "install" file, read

create folder ~/slsnif

move extracted folder there

delete tar.gz from Downloads

cd to ~/slsnif/slsnif-0.4.4

ubuntu@AUDACITY:~/slsnif/slsnif-0.4.4/\$ **./configure**

done

ubuntu@AUDACITY:~/slsnif/slsnif-0.4.4/\$ **make**

some [-Wformat-overflow=] warnings

ubuntu@AUDACITY:~/slsnif/slsnif-0.4.4/\$ **make install**

...permission denied...

ubuntu@AUDACITY:~/slsnif/slsnif-0.4.4/\$ **sudo make install**

done

ubuntu@AUDACITY:~/slsnif/slsnif-0.4.4/\$ **make clean**

ubuntu@AUDACITY:~\$ **slsnif /dev/ttyUSB0**

and many variations thereof...

...

Failed to open a pty: No such file or directory

look to slsnif "tickets" tab--

#1 Allows other devices such as USB serial:

<https://sourceforge.net/p/slsnif/patches/1/>

Google: "how to apply a .patch file"

<https://www.thegeekstuff.com/2014/12/patch-command-examples/>
download "usbdevices.patch"

FileZilla to Rpi ~/slsnif/slsnif-0.4.4/

ubuntu@AUDACITY:~/slsnif/slsnif-0.4.4/src\$ **patch slsnif.c
usbdevices.patch**

ubuntu@AUDACITY:~/slsnif/slsnif-0.4.4\$ **./configure**

ubuntu@AUDACITY:~/slsnif/slsnif-0.4.4/\$ **make**

ubuntu@AUDACITY:~/slsnif/slsnif-0.4.4/\$ **sudo make install**

ubuntu@AUDACITY:~/slsnif/slsnif-0.4.4/\$ **make clean**

```
ubuntu@AUDACITY:~/slnsnif/slnsnif-0.4.4$ slsnif /dev/ttyUSB0
Failed to open a pty: No such file or directory
ubuntu@AUDACITY:~/slnsnif/slnsnif-0.4.4$ sudo slsnif /dev/ttyUSB0
displayed a torrent of such as:
...
Device --> (156) <DC2> (018)
Device --> (134) (249)
Device --> ( (040)
Device --> ! (033)
Device --> <NUL> (000)
Device --> (128)
Device --> % (037)
Device --> (160)
Device --> <BS> (008) (255)
Device --> <ENQ> (005)
Device --> <SPACE> (032) D (068) <LF> (010) ) (041) (133)
...
```

Test example indicates 512000 baud but datasheet says 115200

```
ubuntu@AUDACITY:~/slnif/slnif-0.4.4$ sudo slnif -i input.txt -o output.txt -s 115200 /dev/ttyUSB0
ubuntu@AUDACITY:~/slnif/slnif-0.4.4$ cat output.txt
empty
ubuntu@AUDACITY:~/slnif/slnif-0.4.4$ cat input.txt
a lot of gibberish like this:
#6 W m Y i M 6
.
.
M
U( 6 S
```

then ending with this:

Let's try changing the test parameters to match datasheet specs--
Datasheet baud rate = **115200**, not 515000 as test example suggests.
Developer manual suggests is two-way but gives no further info as
to sending commands. Assume **unidirectional**.

```
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/build$ ./ydlidar_test
baud 115200; assume comm is unidirectional:
Please select the lidar baudrate:0      [=115200]
Whether the Lidar is one-way communication[yes/no] :yes
```

```
YDLidar SDK initializing
YDLidar SDK has been initialized
[YDLIDAR]:SDK Version: 1.0.3
LiDAR successfully connected
[YDLIDAR]:Lidar running correctly ! The health status: good
LiDAR init success!
[YDLIDAR3]:Fixed Size: 720
[YDLIDAR3]:Sample Rate: 4K
[YDLIDAR]:Single Fixed Size: 470
[YDLIDAR]:Sample Rate: 4K
[YDLIDAR INFO] Current Sampling Rate : 4K
[YDLIDAR INFO] Now YDLIDAR is scanning .....
Scan received[1628445908677342000]: 468 ranges is [8.565310]Hz
Scan received[1628445908794342000]: 468 ranges is [8.565310]Hz
Scan received[1628445908911557000]: 468 ranges is [8.565310]Hz
Scan received[1628445909028580000]: 470 ranges is [8.528784]Hz
Scan received[1628445909147006000]: 471 ranges is [8.510638]Hz
...
...
```

Now for further testing...

```
ubuntu@AUDACITY:~/YDLidar_SDK.ws/YDLidar-SDK/python/examples$ python tof_test.py
Traceback (most recent call last):
  File "tof_test.py", line 2, in <module>
    import ydlidar
  File "/usr/local/lib/python2.7/dist-packages/ydlidar.py", line
15, in <module>
    import _ydlidar
ImportError: dynamic module does not define init function
(_init_ydlidar).

...python3 same error.
...other ...test.py same error
```

Google research suggests it's a python/python3 conflict and suggests recompiling swig/python or swig/python3

```
ubuntu@AUDACITY:~$ sudo find / -name swig  
/usr/bin/swig  
/usr/share/doc/swig  
none contain python
```

```
ubuntu@AUDACITY:~$ sudo find / -name python  
...  
/usr/share/swig4.0/python
```

```
ubuntu@AUDACITY:/usr/share/swig4.0/python$ make  
make: *** No targets specified and no makefile found. Stop.
```

MEANWHILE, ON TO INSTALL ROS2 Driver...

YDLIDAR ROS2 Driver

ref back to p518 install...following:

https://github.com/YDLIDAR/ydlidar_ros2_driver

```
ubuntu@AUDACITY:~$ mkdir ydlidar_ros2_ws
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ cd ydlidar_ros2_ws/
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ git clone
https://github.com/YDLIDAR/ydlidar_ros2_driver.git
ydlidar_ros2_ws/src/ydlidar_ros2_driver
created nested ydlidar_ros2_ws folders. Remove & start over.
```

```
ubuntu@AUDACITY:~$ rm -rf ydlidar_ros2_ws/
done
ubuntu@AUDACITY:~$ cd ydlidar_ros2_ws/
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ colcon build --symlink-install
Done?
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ source ./install/setup.bash
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ echo "source
~/ydlidar_ros2_ws/install/setup.bash" >> ~/.bashrc
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ source ~/.bashrc
```

Confirmation To confirm that your package path has been set, printenv the grep -i ROS variable.

```
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ printenv | grep -i ROS
```

You should see something similar to:

```
OLDPWD=/home/tony/ydlidar_ros2_ws/install
ROS_VERSION=2
ROS_PYTHON_VERSION=3
PWD=/home/ubuntu/ydlidar_ros2_ws
AMENT_PREFIX_PATH=/home/ubuntu/ydlidar_ros2_ws/install/ydlidar_ros2_driver:/opt/ros/foxy
CMAKE_PREFIX_PATH=/home/ubuntu/ydlidar_ros2_ws/install/ydlidar_ros2_driver
COLCON_PREFIX_PATH=/home/ubuntu/ydlidar_ros2_ws/install
PYTHONPATH=/opt/ros/foxy/lib/python3.8/site-packages
LD_LIBRARY_PATH=/opt/ros/foxy/opt/yaml_cpp_vendor/lib:/opt/ros/foxy/opt/rviz_ogre_vendor/lib:/opt/ros/foxy/lib/aarch64-linux-gnu:/opt/ros/foxy/lib
ROS_LOCALHOST_ONLY=0
PATH=/home/ubuntu/.local/bin:/opt/ros/foxy/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
ROS_DISTRO=foxy
```

Run `ydlidar_ros2_driver`

```
ubuntu@AUDACITY:~$ ros2 launch ydlidar_ros2_driver
ydlidar_launch.py
...
[ydlidar_ros2_driver_node-1] Error, cannot retrieve YDLidar health code:
ffffffff
[ydlidar_ros2_driver_node-1] get Device Information Error
[ydlidar_ros2_driver_node-1] [CYdLidar::initialize] Error initializing YDLIDAR
check status under [/dev/ttyUSB0] and [230400].
[ydlidar_ros2_driver_node-1] [ERROR] [1628460129.241122333]
[ydlidar_ros2_driver_node]: Unknown error
[ydlidar_ros2_driver_node-1]
[ydlidar_ros2_driver_node-1] [INFO] [1628460129.256331552]
[ydlidar_ros2_driver_node]: [YDLIDAR INFO] Now YDLIDAR is stopping .....
[INFO] [ydlidar_ros2_driver_node-1]: process has finished cleanly [pid 106502]
```

Configure LiDAR parameters

These are apparently configured wrong for this LIDAR

`ydlidar_ros2_driver_node`:

```
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ sudo find . -name
ydlidar_ros2_driver_node
./build/ydlidar_ros2_driver/ydlidar_ros2_driver_node
./install/ydlidar_ros2_driver/lib/ydlidar_ros2_driver/ydlidar_ros2
_driver_node
```

The node itself is executable code.

The parameters are here:

`ydlidar_ros2_driver/params/ydlidar.yaml`

```
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ sudo find . -name ydlidar.yaml
./install/ydlidar_ros2_driver/share/ydlidar_ros2_driver/params/ydl
idar.yaml
./src/ydlidar_ros2_driver/params/ydlidar.yaml
ubuntu@AUDACITY:~/ydlidar_ros2_ws$ cd
./src/ydlidar_ros2_driver/params/
```

```
ubuntu@AUDACITY:~/ydlidar_ros2_ws/src/ydlidar_ros2_driver/params$ nano ydlidar.yaml
```

`baudrate: 230400 >> 115200`

```
ubuntu@AUDACITY:~/ydlidar_ros2_ws/src/ydlidar_ros2_driver/params$ ros2 launch ydlidar_ros2_driver ydlidar_launch.py
```

Same error

Fix the other .yaml

```
ubuntu@AUDACITY:~/ydlidar_ros2_ws/install/ydlidar_ros2_driver/shar
e/ydlidar_ros2_driver/params$ nano ydlidar.yaml
```

apparently is symlink as .yaml baud rate is already corrected.

Must be another parameter. Which one for 1 vs 2 way comm?

Based YDLIDAR ROS PACKAGE(V1.4.6)

From:

https://github.com/YDLIDAR/ydlidar_ros

LIDAR	X2/X2L
Model	6
Baudrate	115200
SampleRate(K)	3
Range(m)	0.10~8.0
Frequency(HZ)	4~8(PWM)
Intensity(bit)	false
SingleChannel	true
voltage(V)	4.8~5.2

ubuntu@AUDACITY:~/ydlidar_ros2_ws/src/ydlidar_ros2_driver/params\$
nano ydlidar.yaml

```
ydlidar_ros2_driver_node:  
  ros_parameters:  
    port: /dev/ttyUSB0  
    frame_id: laser_frame  
    ignore_array: ""  
    baudrate: 230400 >> 115200  
    lidar_type: 1  
    device_type: 0  
    sample_rate: 9 >> 3  
    abnormal_check_count: 4  
    resolution_fixed: true  
    reversion: true  
    inverted: true  
    auto_reconnect: true  
    isSingleChannel: false >> true  
    intensity: false  
    support_motor_dtr: false  
    angle_max: 180.0  
    angle_min: -180.0  
    range_max: 64.0  
    range_min: 0.01  
    frequency: 10.0  
    invalid_range_is_inf: false
```

```

ubuntu@AUDACITY:~$ ros2 launch ydlidar_ros2_driver
ydlidar_launch.py
```
/opt/ros/foxy/lib/python3.8/site-packages/launch_ros/actions/lifecycle_node.py:84: UserWarning: The
parameter 'node_name' is deprecated, use 'name' instead
 warnings.warn("The parameter 'node_name' is deprecated, use 'name' instead")
/opt/ros/foxy/lib/python3.8/site-packages/launch_ros/actions/lifecycle_node.py:95: UserWarning: The
parameter 'node_executable' is deprecated, use 'executable' instead
 super().__init__(name=name, namespace=namespace, **kwargs)
/opt/ros/foxy/lib/python3.8/site-packages/launch_ros/actions/node.py:185: UserWarning: The
parameter 'node_namespace' is deprecated, use 'namespace' instead
 warnings.warn("The parameter 'node_namespace' is deprecated, use 'namespace' instead")
/home/ubuntu/ydlidar_ros2_ws/install/ydlidar_ros2_driver/share/ydlidar_ros2_driver/launch/ydlidar_l
aunch.py:46: UserWarning: The parameter 'node_executable' is deprecated, use 'executable' instead
 tf2_node = Node(package='tf2_ros',
/home/ubuntu/ydlidar_ros2_ws/install/ydlidar_ros2_driver/share/ydlidar_ros2_driver/launch/ydlidar_l
aunch.py:46: UserWarning: The parameter 'node_name' is deprecated, use 'name' instead
 tf2_node = Node(package='tf2_ros',
[INFO] [ydlidar_ros2_driver_node-1]: process started with pid [114175]
[INFO] [static_transform_publisher-2]: process started with pid [114177]
[ydlidar_ros2_driver_node-1] [INFO] [1628462769.156486794] [ydlidar_ros2_driver_node]: [YDLIDAR
INFO] Current ROS Driver Version: 1.0.1
[ydlidar_ros2_driver_node-1]
[ydlidar_ros2_driver_node-1] YDLidar SDK initializing
[ydlidar_ros2_driver_node-1] YDLidar SDK has been initialized
[ydlidar_ros2_driver_node-1] [YDLIDAR]:SDK Version: 1.0.3
[static_transform_publisher-2] [INFO] [1628462769.178078198] [static_tf_pub_laser]: Spinning until
killed publishing transform from 'base_link' to 'laser_frame'
[ydlidar_ros2_driver_node-1] LiDAR successfully connected
[ydlidar_ros2_driver_node-1] [YDLIDAR]:Lidar running correctly ! The health status: good
[ydlidar_ros2_driver_node-1] LiDAR init success!
[ydlidar_ros2_driver_node-1] [YDLIDAR3]:Fixed Size: 720
[ydlidar_ros2_driver_node-1] [YDLIDAR3]:Sample Rate: 4K [NOT 3 AS IN .YAML?]
[ydlidar_ros2_driver_node-1] [YDLIDAR]:Single Fixed Size: 230
[ydlidar_ros2_driver_node-1] [YDLIDAR]:Sample Rate: 4K
[ydlidar_ros2_driver_node-1] [YDLIDAR INFO] Current Sampling Rate : 4K
[ydlidar_ros2_driver_node-1] [YDLIDAR INFO] Now YDLIDAR is scanning
```

HOORAY!!

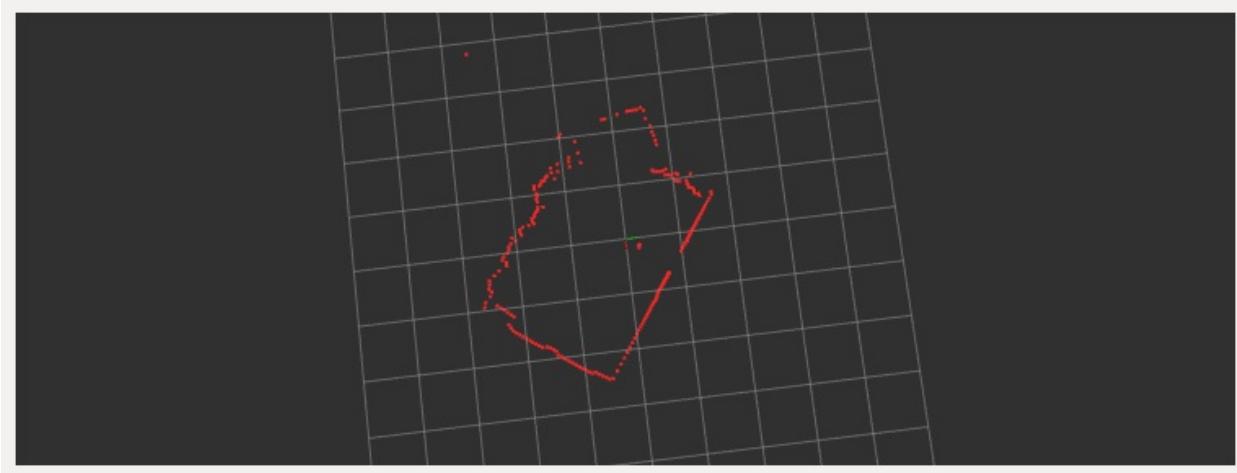
Remove slsnif as not useful:  
~\$ rm -rf slsnif

## RVIZ

```
from desktop:
ros2 launch ydlidar_ros2_driver ydlidar_launch_view.py
failed, duplicate in PuTTY--
ubuntu@AUDACITY:~$ ros2 launch ydlidar_ros2_driver
ydlidar_launch_view.py
Runs in PuTTY but can't display (as expected):
[rviz2-3] qt.qpa.xcb: could not connect to display
[rviz2-3] qt.qpa.plugin: Could not load the Qt platform plugin "xcb" in "" even though it was
found.
[rviz2-3] This application failed to start because no Qt platform plugin could be initialized.
Reinstalling the application may fix this problem.
[rviz2-3]
[rviz2-3] Available platform plugins are: eglfs, linuxfb, minimal, minimalegl, offscreen, vnc, xcb.
```

*-view.py launches driver too. Driver was already running in another terminal. Try again from desktop.  
Couldn't find package. Terminal open long time. Not "sourced". Close and open another.*

**SUCCESS! Rviz opens and displays scan!!!!**



[https://github.com/YDLIDAR/ydlidar\\_ros2\\_driver](https://github.com/YDLIDAR/ydlidar_ros2_driver)

```
ubuntu@AUDACITY:~$ ros2 topic echo /scan
header:
 stamp:
 sec: 1628467791
 nanosec: 297564000
 frame_id: laser_frame
angle_min: -3.1415927410125732
angle_max: 3.1415927410125732
angle_increment: 0.026289477944374084
time_increment: 0.0002499998277053237
scan_time: 0.05974999815225601
range_min: 0.009999999776482582
range_max: 64.0
ranges:
- 0.0
- 1.871500015258789
- 1.7944999933242798
- 1.6722500324249268
- 1.707249990463257
- 1.7372499704360962
- 1.7762500047683716
- 1.80649995803833
- 0.0
- 2.0815000534057617
- 1.7584999799728394
- 1.9325000047683716
- 0.0
...
intensities:
- 0.0
- 1016.0
- 1016.0
- 1012.0
- 1012.0
- 1012.0
- 1016.0
- 0.0
- 1016.0
- 1016.0
- 1016.0
- 0.0
- 1008.0
- 1012.0
...

```

DETOUR to URDF\_Tutorial.wpd

James Phelan 7/24/21 2:48 PM  
I THINK I've found the problem:  
The osr\_startup.service is looking to /home/ubuntu/launch\_osr.sh  
and says "No such file or directory"  
That's because the symlink is created for /usr/local/bin:  
`ln -s $(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh`  
I think we either tell osr\_startup.service the home directory is  
/usr/local/bin OR  
put the symlink in /home/ubuntu.

Achille 8/10/21 8:40 AM  
[https://github.com/Achllle/osr-rover-code/blob/enh/services/init\\_scripts/osr\\_startup.service](https://github.com/Achllle/osr-rover-code/blob/enh/services/init_scripts/osr_startup.service)  
It's not looking at that folder. It's clearly looking at  
/usr/local/bin . Either you're on the wrong branch or you haven't  
run  
`sudo cp osr_startup.service`  
`/etc/systemd/system/osr_startup.service`

*My osr\_startup.service says working directory /home/ubuntu.  
Changed it to /usr/local/bin:*

```
[Unit]
Description=OSR service
After=network.target

[Service]
User=ubuntu
Group=ubuntu
WorkingDirectory=/usr/local/bin
ExecStart=/home/ubuntu/launch_osr.sh
ExecReload=/bin/kill -HUP $MAINPID
Restart=always

RestartSec=3

[Install]
WantedBy=multi-user.target
```

ubuntu@AUDACITY:~/osr\_ws/src/osr-rover-code/init\_scripts\$ **sudo cp osr\_startup.service /etc/systemd/system/osr\_startup.service**

ubuntu@AUDACITY:~/osr\_ws/src/osr-rover-code/init\_scripts\$ **sudo chmod 644 /etc/systemd/system/osr\_startup.service**

*Also did the cp to /etc/systemd/system/ as advised which had not been done (and don't recall being directed to do so).*

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln: failed to create symbolic link '/usr/local/bin/launch_osr.sh':
Permission denied
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
ln: failed to create symbolic link '/usr/local/bin/osr_paths.sh':
Permission denied
Try sudo:
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo ln
-s $(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo ln
-s $(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo cp
osr_startup.service /etc/systemd/system/osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
chmod 644 /etc/systemd/system/osr_startup.service
ubuntu@AUDACITY:~$ sudo systemctl enable osr_startup.service
Created symlink
/etc/systemd/system/multi-user.target.wants/osr_startup.service →
/etc/systemd/system/osr_startup.service.
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service;
 enabled; vendor preset: enabled)
 Active: inactive (dead)
ubuntu@AUDACITY:~$ sudo systemctl start osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service;
 enabled; vendor preset: enabled)
 Active: activating (auto-restart) (Result: exit-code) since
Wed 2021-08-11 00:31:48 UTC; 2s ago
 Process: 321202 ExecStart=/home/ubuntu/launch_osr.sh
(code=exited, status=203/EXEC)
 Main PID: 321202 (code=exited, status=203/EXEC)
ubuntu@AUDACITY:~$ launch_osr.sh
+ source osr_paths.sh
++ export OSR_CODE_DIR=/home/ubuntu/osr_ws/src/osr-rover-code
++ OSR_CODE_DIR=/home/ubuntu/osr_ws/src/osr-rover-code
+
launch_dir=/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/
launch
+ bash -c '. /home/ubuntu/osr_ws/install/setup.sh'
+ bash -c '. /home/ubuntu/osr_ws/devel/setup.bash'
bash: /home/ubuntu/osr_ws/devel/setup.bash: No such file or
directory
```

```
ubuntu@AUDACITY:~/osr_ws$ ls
build install log src
No devel directory
ubuntu@AUDACITY:~/osr_ws$ colcon build --symlink-install
Starting >>> osr_interfaces
Starting >>> osr Bringup
Finished <<< osr Bringup [2.89s]
Finished <<< osr_interfaces [8.88s]
Starting >>> osr_control
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'script-dir' will not be supported in
future versions. Please use the underscore name 'script_dir' instead
 warnings.warn(
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'install-scripts' will not be supported in
future versions. Please use the underscore name 'install_scripts' instead
 warnings.warn(
--- stderr: osr_control
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'script-dir' will not be supported in
future versions. Please use the underscore name 'script_dir' instead
 warnings.warn(
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'install-scripts' will not be supported in
future versions. Please use the underscore name 'install_scripts' instead
 warnings.warn(

Finished <<< osr_control [4.35s]

Summary: 3 packages finished [14.0s]
 1 package had stderr output: osr_control

+ bash -c '. /home/ubuntu/osr_ws/devel/setup.bash'
bash: /home/ubuntu/osr_ws/devel/setup.bash: No such file or
directory

launch_osr.sh is WRONG. It's somehow the melodic version!!
Change /devel/ to /install/
```

Need to install the Achille/enh-service branch AGAIN!

**2021.08.12**

What happened to foxy-devel repo? Closest I see is foxy-NAV2. There I'm finding references to melodic in the launch\_osr.sh. I think that is where I went off course.

[https://github.com/Achllle/osr-rover-code/tree/enh/services/init\\_scripts](https://github.com/Achllle/osr-rover-code/tree/enh/services/init_scripts)

Achille 9:59 AM

nitpick on wording: foxy-devel is a branch, not a repo. Make sure you're looking at the right repository, you're probably looking at someone's forked repository. foxy-devel is still on the nasa-jpl repo.

James Phelan 3:42 PM

Ok BRANCH. I thought it was in your repo, but it's in the NASA/JPL foxy-devel branch -- a reference to melodic in the foxy init\_scripts that I believe doesn't belong there:

[https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/init\\_scripts/launch\\_osr.sh](https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/init_scripts/launch_osr.sh)

I couldn't figure out how I was getting melodic code in a foxy branch. Now I know.

We're looking at your foxy-nav2 branch for inspiration as we're looking to add nav2 to our rover. Any cautions or disclaimers?

Got my LIDAR 2 weekends ago and got the code working last weekend. :smiley:  
(edited)

```
launch_osr.sh
#!/bin/bash
exit on error, and output executed commands to stdout
set -ex

source osr_paths.sh
Show more
<https://github.com/nasa-jpl/osr-rover-code>|nasa-jpl/osr-rover-code>nasa-jpl/osr-rover-code | Added by GitHub
```

Achille 3:44 PM

Yes, which is fixed in my branch (enh/services ).

3:44

So make sure you are on my branch when you follow the instructions and it should point to the launch\_osr.sh file without any reference to melodic

New

Achille 3:54 PM

I finally got a positive review on that PR so enh/services and foxy-devel now point to the same thing. Checkout the foxy-devel branch and pull in the updates  
#137 Improve systemd service

- support for cases where the home folder isn't /home/ubuntu
- move symlinked scripts to /usr/bin/local (best practice)
- remove the old LaunchOSR.sh

Assignees

Achllle

Labels

enhancement, foxy

<<https://github.com/nasa-jpl/osr-rover-code>>|nasa-jpl/osr-rover-code>nasa-jpl/osr-rover-code | May 8th | Added by GitHub

Crew,

**Let do a quick debug session and knock this out tonight 5:30 pm ? Archill has all the needed nuggets ..**

Chaz

From: James H Phelan <jhphelan@hal-pc.org>  
Sent: Thursday, August 12, 2021 5:40 AM  
To: c.demontaigu centiasoftware.com <c.demontaigu@centiasoftware.com>  
Subject: Re: NAV2 example setup

C,

**Yes, this is where it messes up. There's inappropriate melodic reverences in his launch\_osr.sh.**

J

James H Phelan  
"Nihil est sine ratione cur potius sit quam non sit"  
Leibniz

On 8/11/2021 9:19 PM, c.demontaigu centiasoftware.com wrote:  
> <https://github.com/Achllle/osr-rover-code/blob/foxy/nav2/setup/rover Bringup.md>  
>  
> osr-rover-code/rover Bringup.md at foxy/nav2 · Achllle/osr-rover-code  
> Code that runs on the Open Source Rover. Contribute to Achllle/osr-rover-code development by  
creating an account on GitHub.  
> github.com  
>  
> From: c.demontaigu centiasoftware.com <c.demontaigu@centiasoftware.com>  
> Sent: Wednesday, August 11, 2021 8:06 PM  
> To: James H Phelan <jhphelan@hal-pc.org>  
> Subject: Re: NAV2 example setup  
>  
> Looks like he did it. Go for it ! Keep us posted  
>  
> C  
> From: James H Phelan <jhphelan@hal-pc.org>  
> Sent: Wednesday, August 11, 2021 7:29 PM  
> To: c.demontaigu centiasoftware.com <c.demontaigu@centiasoftware.com>  
> Subject: NAV2 example setup  
>  
>  
> C,  
>  
> This is a branch from that guy.  
>  
> Maybe you can use it as an example...?  
>  
> <https://github.com/Achllle/osr-rover-code/tree/foxy/nav2>  
>  
>  
> Still having trouble getting this particular repo to install !  
>  
> [https://github.com/Achllle/osr-rover-code/tree/enh/services/init\\_scripts](https://github.com/Achllle/osr-rover-code/tree/enh/services/init_scripts)  
>  
> J  
> --  
> James H Phelan  
> "Nihil est sine ratione cur potius sit quam non sit"  
> Leibniz

follow:

[https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/rover\\_bringup.md](https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/rover_bringup.md)

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git pull
cd ~/osr_ws/src/osr-rover-code/init_scripts
use symbolic links so we capture updates to these files in the
service
ln -s $(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln -s $(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
sudo cp osr_startup.service
/etc/systemd/system/osr_startup.service
sudo chmod 644 /etc/systemd/system/osr_startup.service
```

NOW Pi won't boot at all!

May have to start over with another SC card from:

<https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/pi.md>

**2021.08.15**

Rebooted from “faulty” 2021.08.08 SD card & it booted fine after a weekend rest.

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git status
On branch foxy-devel
Your branch is up to date with 'origin/foxy-devel'.
nothing to commit, working tree clean
```

```
ubuntu@AUDACITY:~$ cat .bashrc
```

```
...
source /opt/ros/foxy/setup.bash
source ~/osr_ws/install/setup.bash
source ~/ydlidar_ros2_ws/install/setup.bash
```

terminal crashed, reopen PuTTY:

```
...
13 updates can be applied immediately.
...
```

```
ubuntu@AUDACITY:~$ sudo apt upgrade
to finish last update
```

```
ubuntu@AUDACITY:~$ sudo apt update
to see if anything new
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

```
ubuntu@AUDACITY:~$ sudo apt upgrade
The following packages have been kept back:
 fwupd fwupd-signed
0 upgraded, 0 newly installed, 0 to remove and 2 not upgraded.
```

```
ubuntu@AUDACITY:~$ ros2 launch osr_bringup osr_launch.py
[roboclaw_wrapper-1] Traceback (most recent call last):
[roboclaw_wrapper-1] File
"/home/ubuntu/osr_ws/install/osr_control/lib/osr_control/roboclaw_
wrapper", line 33, in <module>
[roboclaw_wrapper-1] sys.exit(load_entry_point('osr-control',
'console_scripts', 'roboclaw_wrapper')())
[roboclaw_wrapper-1] File
"/home/ubuntu/osr_ws/build/osr_control/osr_control/roboclaw_wrapp
er.py", line 544, in main
[roboclaw_wrapper-1] wrapper = RoboclawWrapper()
[roboclaw_wrapper-1] File
"/home/ubuntu/osr_ws/build/osr_control/osr_control/roboclaw_wrapp
er.py", line 127, in __init__
[roboclaw_wrapper-1] self.setup_encoders()
[roboclaw_wrapper-1] File
"/home/ubuntu/osr_ws/build/osr_control/osr_control/roboclaw_wrapp
er.py", line 253, in setup_encoders
[roboclaw_wrapper-1] enc_min, enc_max =
self.read_encoder_limits(properties["address"],
properties["channel"])
[roboclaw_wrapper-1] File
"/home/ubuntu/osr_ws/build/osr_control/osr_control/roboclaw_wrapp
er.py", line 401, in read_encoder_limits
[roboclaw_wrapper-1] assert result[0] == 1
[roboclaw_wrapper-1] AssertionError
[ERROR] [roboclaw_wrapper-1]: process has died [pid 10331, exit
code 1, cmd
'/home/ubuntu/osr_ws/install/osr_control/lib/osr_control/roboclaw_
wrapper --ros-args -r __node:=roboclaw_wrapper --params-file
/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup/config/r
oboclaw_params.yaml'].
^C to quit
```

*This file exists:*

/home/ubuntu/osr\_ws/install/osr\_bringup/share/osr\_bringup/config/r
oboclaw\_params.yaml

PuTTY Fatal Error

Network error: Software caused connection abort.

Again, why??

```
ubuntu@AUDACITY:~$ cd
osr_ws/src/osr-rover-code/ROS/osr Bringup/launch/
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch
$ nano osr_mod.launch.py
```

*as per p477 plus:*

```
 DeclareLaunchArgument('enable_odometry',
default_value='true')
```

```
ubuntu@AUDACITY:~$ launch_osr.sh
```

*Same error*

*SHUTDOWN*

**a stop job is running for OSR service**

*Will need to disable osr\_startup\_service*

**2021.08.18**

\$ sudo systemctl disable osr\_startup.service

\$ sudo reboot

\$ ip a

10.0.0.22

No internet

rebooted routers, laptop getting internet, not Rpi?!

2021.08.21

```
ubuntu@AUDACITY:~$ nano .bashrc
commented out last 3 lines:
source /opt/ros/foxy/setup.bash
source ~/osr_ws/install/setup.bash
source ~/ydlidar_ros2_ws/install/setup.bash

ubuntu@AUDACITY:~$ cd osr_ws/src/osr-rover-code/
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git status
On branch foxy-devel
Your branch is up to date with 'origin/foxy-devel'.

Untracked files:
 (use "git add <file>..." to include in what will be committed)
 ROS/osr_bringup/launch/osr_mod.launch.py

nothing added to commit but untracked files present (use "git add" to track)
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git checkout foxy-devel
Already on 'foxy-devel'
Your branch is up to date with 'origin/foxy-devel'.
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git pull
remote: Enumerating objects: 37, done.
remote: Counting objects: 100% (37/37), done.
remote: Compressing objects: 100% (37/37), done.
remote: Total 37 (delta 21), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (37/37), 11.96 KiB | 153.00 KiB/s, done.
From https://github.com/nasa-jpl/osr-rover-code
 66e2094..260b230 foxy-devel -> origin/foxy-devel
 c8a7ea6..fd0bed9 master -> origin/master
Updating 66e2094..260b230
Fast-forward
 ROS/osr_control/osr_control/rover.py | 9 +++++-----
 1 file changed, 4 insertions(+), 5 deletions(-)
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ cd ../..
ubuntu@AUDACITY:~/osr_ws$ sudo rosdep init
ERROR: default sources list file already exists:
 /etc/ros/rosdep/sources.list.d/20-default.list
Please delete if you wish to re-initialize
ubuntu@AUDACITY:~/osr_ws$ rosdep update
reading in sources list data from /etc/ros/rosdep/sources.list.d
...
updated cache in /home/ubuntu/.ros/rosdep/sources.cache
ubuntu@AUDACITY:~/osr_ws$ rosdep install --from-paths src --ignore-src
#All required rosdeps installed successfully
```

```

ubuntu@AUDACITY:~/osr_ws$ colcon build --symlink-install
Starting >>> osr_interfaces
Starting >>> osr Bringup
Finished <<< osr Bringup [1.53s]
Finished <<< osr_interfaces [3.87s]
Starting >>> osr_control
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'script-dir' will not be supported in
future versions. Please use the underscore name 'script_dir' instead
 warnings.warn(
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'install-scripts' will not be supported in
future versions. Please use the underscore name 'install_scripts' instead
 warnings.warn(
--- stderr: osr_control
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'script-dir' will not be supported in
future versions. Please use the underscore name 'script_dir' instead
 warnings.warn(
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'install-scripts' will not be supported in
future versions. Please use the underscore name 'install_scripts' instead
 warnings.warn(

Finished <<< osr_control [3.92s]

Summary: 3 packages finished [8.90s]
 1 package had stderr output: osr_control

```

*Following the directions in:*

<https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/rpi.md>

*In section:*

5.5 Disable bluetooth in config.txt boot config file

Execute the following commands

```

cd /boot/firmware
sudo cp config.txt config.txt.bak
sudo nano config.txt

```

And then add the new line dtoverlay=disable-bt immediately after the existing line cmdline=cmdline.txt towards the bottom of the file.

**PROBLEM – there is no cmdline=cmdline.txt line in the file.**

This has been changed to:

```

ubuntu@AUDACITY:/boot/firmware$ sudo nano usercfg.txt
Place "config.txt" changes (dtparam, dtoverlay,
disable_overscan, etc.) in
this file. Please refer to the README file for a description of
the various
configuration files on the boot partition. (edited)
5.6 Restart the RPi

```

6 Testing serial comm with the Roboclaw motors controllers  
Run the roboclawtest.py script with all of the motor addresses:

```
cd ~/osr_ws/src/osr-rover-code/scripts
python roboclawtest.py 128
python roboclawtest.py 129
python roboclawtest.py 130
python roboclawtest.py 131
python roboclawtest.py 132
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python
roboclawtest.py 128
Traceback (most recent call last):
 File "roboclawtest.py", line 13, in <module>
 from roboclaw import Roboclaw
 File
"/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_control/osr_contro
l/roboc
law.py", line 2, in <module>
 import serial
ImportError: No module named serial
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 128
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
```

3 Automatic bringup with launch script  
DEFER this until I save an .img of the SD card

Dang! I formatted the card instead of reading it!  
I'll have to start over w/ 2021.08.08

*FOLLOWING FROM P550 above*

```
ubuntu@AUDACITY:~$ sudo apt update
ubuntu@AUDACITY:~$ sudo apt upgrade
ubuntu@AUDACITY:~$ sudo apt autoremove
ubuntu@AUDACITY:~$ cd osr_ws/src/osr-rover-code/
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git status
On branch foxy-devel
Your branch is up to date with 'origin/foxy-devel'
ubuntu@AUDACITY:~$ nano .bashrc
comment out last 3 lines:
#source /opt/ros/foxy/setup.bash
#source ~/osr_ws/install/setup.bash
#source ~/ydlidar_ros2_ws/install/setup.bash
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git pull
error: Your local changes to the following files would be
overwritten by merge:
 ROS/osr_bringup/config/osr_params.yaml
Please commit your changes or stash them before you merge
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
$ mv osr_params.yaml osr_params_mod.yaml
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git pull
Updating 3c8ad97..260b230
Fast-forward
 ROS/osr_bringup/config/osr_params.yaml | 2 +-+
 ROS/osr_control/osr_control/rover.py | 9 +++++-----
 init_scripts/LaunchOSR.sh | 6 -----
 init_scripts/launch_osr.sh | 12 +++++-----
 init_scripts/osr_startup.service | 4 +--
 setup/rover_bringup.md | 10 +++++-----
6 files changed, 17 insertions(+), 26 deletions(-)
 delete mode 100644 init_scripts/LaunchOSR.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ cd ../..
ubuntu@AUDACITY:~/osr_ws$ sudo rosdep init
ERROR: default sources list file already exists:
 /etc/ros/rosdep/sources.list.d/20-default.list
Please delete if you wish to re-initialize
ubuntu@AUDACITY:~/osr_ws$ rosdep update
...
ubuntu@AUDACITY:~/osr_ws$ rosdep install --from-paths src
--ignore-src
#All required rosdeps installed successfully
ubuntu@AUDACITY:~/osr_ws$ colcon build --symlink-install
Finished <<< osr_control [3.89s]

Summary: 3 packages finished [13.8s]
1 package had stderr output: osr_control
```

```
ubuntu@AUDACITY:~/osr_ws$ source install/setup.bash
ubuntu@AUDACITY:~/osr_ws$ cd
~/osr_ws/src/osr-rover-code/ROS/osrBringup/config
roboclaw_params_mod.yaml already exists
~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch
osr_mod_launch.py already exists
```

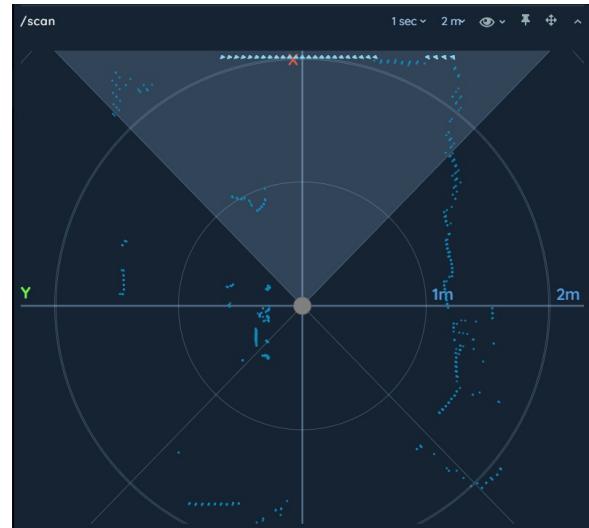
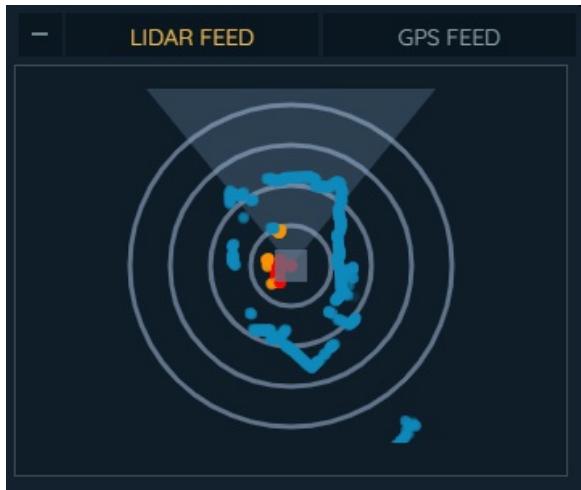
```
4.3 Add ROS config scripts to .bashrc
already done
5 Setting up serial communication on the RPi
already done
5.1 Disable serial-getty@ttyS0.service
already done
5.2 Copy udev rules
already done
5.3 Add user to tty group
already done
5.4 Remove console line in cmdline.txt boot config file
already done
5.5 Disable bluetooth in config.txt boot config file
already done but in usercfg.txt file
5.6 Restart the RPi
ubuntu@AUDACITY:/boot/firmware$ sudo reboot
```

```
ubuntu@AUDACITY:~$ ros2 launch ydlidar_ros2_driver
ydlidar_launch_view.py
Success!
```

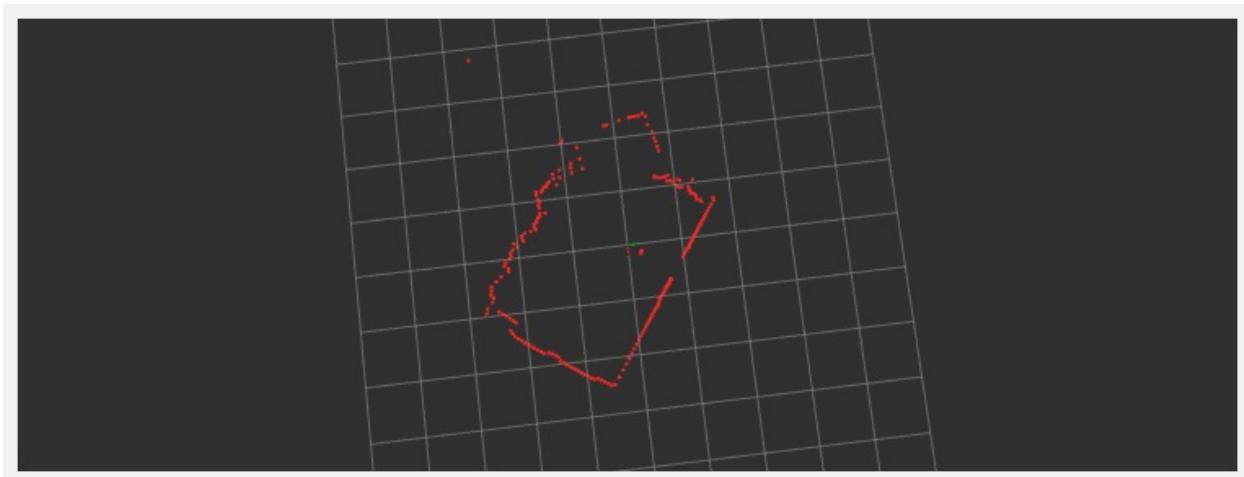
```
ubuntu@AUDACITY:~$ cd ~/osr_ws/src/osr-rover-code/scripts
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 128
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
Success!
```

```
ubuntu@AUDACITY:~$ ros2 launch osrBringup osrLaunch.py
Success!
```

## Freedom Robotics Pilot dashboard & Stream LIDAR FEED window:



Rviz LIDAR view (same, just rotated)



shutdown & SAVE: 2021.08.21 Ubuntu 20.04, ROS2, OSR foxy-devel,  
Freedom Robotics dashboard, ydlidar. NOT osr\_startup.service.

**2021.08.22**

2021.08.21 Ubuntu 20.04, ROS2, OSR foxy-devel, Freedom Robotics dashboard, ydlidar. NOT osr\_startup.service

Shall we try this again...?

<https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/rover Bringup.md>

3 Automatic bringup with launch script

```
cd ~/osr_ws/src/osr-rover-code/init_scripts
use symbolic links so we capture updates to these files in
the service
ln -s $(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln -s $(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
sudo cp osr_startup.service
/etc/systemd/system/osr_startup.service
sudo chmod 644 /etc/systemd/system/osr_startup.service
```

*Before I do this, let's check out the pieces:*

```
ubuntu@AUDACITY:~$ cd ~/osr_ws/src/osr-rover-code/init_scripts
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ls -l
total 12
-rwxrwxr-x 1 ubuntu ubuntu 560 Aug 21 22:51 launch_osr.sh
-rw-rw-r-- 1 ubuntu ubuntu 139 Jun 13 21:24 osr_paths.sh
-rw-rw-r-- 1 ubuntu ubuntu 261 Aug 21 22:51 osr_startup.service
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ cat
```

**launch\_osr.sh**

```
#!/bin/bash
exit on error, and output executed commands to stdout
set -ex

source osr_paths.sh
launch_dir=$OSR_CODE_DIR/ROS/osr_bringup/launch

bash -c ". /opt/ros/foxy/setup.bash"
bash -c ". /home/$USER/osr_ws/install/setup.sh"

execute the custom mod launch file if it's available
if [-e "$launch_dir/osr_mod_launch.py"]; then
 echo "Launching osr_mod_launch.py"
 bash -i -c "ros2 launch osr_bringup osr_mod_launch.py"
otherwise go with the default
else
 echo "Launching osr.launch"
 bash -i -c "ros2 launch osr_bringup osr_launch.py"
fi
```

*This seems ok as it refers to foxy, not melodic*

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ cat
osr_paths.sh
```

```
Paths used for OSR code
make sure to source (`$ source osr_paths.sh`) this script!
export OSR_CODE_DIR=$HOME/osr_ws/src/osr-rover-code
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ cat
osr_startup.service
```

```
[Unit]
Description=OSR service
After=network.target

[Service]
User=ubuntu
Group=ubuntu
WorkingDirectory=/usr/local/bin
ExecStart=/usr/local/bin/launch_osr.sh
ExecReload=/bin/kill -HUP $MAINPID
Restart=always

RestartSec=3

[Install]
WantedBy=multi-user.target
```

*All seems reasonable. Here goes...*

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln: failed to create symbolic link '/usr/local/bin/launch_osr.sh':
Permission denied
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo ln
-s $(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
OK
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
ln: failed to create symbolic link '/usr/local/bin/osr_paths.sh':
Permission denied
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo ln
-s $(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
OK
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo cp
osr_startup.service /etc/systemd/system/osr_startup.service
OK
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
Chard0nna8
 644 /etc/systemd/system/osr_startup.service
OK
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl start osr_startup.service
no response. (The service hadn't been enabled yet!)
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl enable osr_startup.service
Created symlink
/etc/systemd/system/multi-user.target.wants/osr_startup.service →
/etc/systemd/system/osr_startup.service.
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl start osr_startup.service
no response? But Xbox controller pairs & rover responds. Success!
Now let's try on reboot...
This causes error, runs 3 times:
A stop job is running for OSR service (countdown / 1min 43s)
Xbox controller fails to pair & rover doesn't respond
REBOOT
```

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
shows active (running)
After log-in on DESKTOP ONLY, not PuTTY, Xbox controller pairs &
rover responds.
```

Try REBOOT again and see if A stop job reappears... it does!

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
active (running)
ubuntu@AUDACITY:~$ sudo systemctl stop osr_startup.service
hangs terminal til ^C
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
failed (Result: timeout)
ubuntu@AUDACITY:~$ sudo systemctl disable osr_startup.service
Removed
/etc/systemd/system/multi-user.target.wants/osr_startup.service.
REBOOT
No more "A stop job..."
```

**System program problem detected**

keeps popping up on boot-up

Google “ubuntu system program problem detected”:

<https://itsfoss.com/how-to-fix-system-program-problem-detected-ubuntu/>

<https://askubuntu.com/questions/1160113/system-program-problem-detected>

<https://www.binarytides.com/ubuntu-fix-system-program-error/>

ubuntu@AUDACITY:~\$ cd /var/crash/

ubuntu@AUDACITY:/var/crash\$ ls

\_usr\_libexec\_fwupd\_fwupd.0.crash

ubuntu@AUDACITY:/var/crash\$ cat \_usr\_libexec\_fwupd\_fwupd.0.crash

cat: \_usr\_libexec\_fwupd\_fwupd.0.crash: Permission denied

ubuntu@AUDACITY:/var/crash\$ sudo cat

**\_usr\_libexec\_fwupd\_fwupd.0.crash**

*Displays binary gibberish*

ubuntu@AUDACITY:/var/crash\$ sudo rm \*

*Removes crash report. We'll see if it stays gone...*

REBOOT

*No warning this time, but retest on cold boot later.*

**Try Achille's foxy/nav2:**

start w/ SD: 2021.08.21 Ubuntu 20.04, ROS2, OSR foxy-devel, Freedom Robotics dashboard, ydlidar. NOT osr\_startup.service.

Remove crash reports:

```
ubuntu@AUDACITY:/var/crash$ sudo rm *
```

*Clear out foxy-devel ws in favor of foxy/nav2*

```
ubuntu@AUDACITY:~$ rm -rf osr_ws/
```

```
ubuntu@AUDACITY:~$ mkdir -p ~/osr_ws/src && cd ~/osr_ws/
```

```
ubuntu@AUDACITY:~/osr_ws$ source /opt/ros/foxy/setup.bash
```

```
ubuntu@AUDACITY:~/osr_ws$ sudo apt install
```

**python3-colcon-common-extensions**

python3-colcon-common-extensions is already the newest version (0.2.1-1).

```
ubuntu@AUDACITY:~/osr_ws$ sudo apt install git
```

git is already the newest version (1:2.25.1-1lubuntu3.1).

```
ubuntu@AUDACITY:~/osr_ws$ cd ~/osr_ws/src
```

```
git clone https://github.com/nasa-jpl/osr-rover-code.git
```

This needs to change to:

```
git clone https://github.com/Achllle/osr-rover-code.git
```

```
ubuntu@AUDACITY:~/osr_ws/src$ git clone
```

**https://github.com/Achllle/osr-rover-code.git**

```
ubuntu@AUDACITY:~/osr_ws/src$ cd osr-rover-code
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git fetch origin
```

```
git checkout foxy-devel
```

This needs to change to foxy/nav2

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git checkout
```

**foxy/nav2**

Branch 'foxy/nav2' set up to track remote branch 'foxy/nav2' from 'origin'.

Switched to a new branch 'foxy/nav2'

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ sudo apt install
```

**python3-rosdep**

python3-rosdep is already the newest version (0.21.0-1).

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ cd ..
```

```
ubuntu@AUDACITY:~/osr_ws/src$ sudo rosdep init
```

ERROR: default sources list file already exists:

```
ubuntu@AUDACITY:~/osr_ws/src$ rosdep update
```

updated cache in /home/ubuntu/.ros/rosdep/sources.cache

```
ubuntu@AUDACITY:~/osr_ws/src$ rosdep install --from-paths src
--ignore-src
given path 'src' does not exist
ubuntu@AUDACITY:~/osr_ws/src$ cd ..
ubuntu@AUDACITY:~/osr_ws$ rosdep install --from-paths src
--ignore-src
#All required rosdeps installed successfully
ubuntu@AUDACITY:~/osr_ws$ colcon build --symlink-install
Starting >>> osr_interfaces
[2.130s] WARNING:colcon.colcon_ros.prefix_path.ament:The path
'/home/ubuntu/osr_ws/install/osr_control' in the environment variable
AMENT_PREFIX_PATH doesn't exist
[2.130s] WARNING:colcon.colcon_ros.prefix_path.ament:The path
'/home/ubuntu/osr_ws/install/osr_interfaces' in the environment variable
AMENT_PREFIX_PATH doesn't exist
[2.130s] WARNING:colcon.colcon_ros.prefix_path.ament:The path
'/home/ubuntu/osr_ws/install/osr_bringup' in the environment variable
AMENT_PREFIX_PATH doesn't exist
[2.132s] WARNING:colcon.colcon_ros.prefix_path.catkin:The path
'/home/ubuntu/osr_ws/install/osr_interfaces' in the environment variable
CMAKE_PREFIX_PATH doesn't exist
[2.132s] WARNING:colcon.colcon_ros.prefix_path.catkin:The path
'/home/ubuntu/osr_ws/install/osr_bringup' in the environment variable
CMAKE_PREFIX_PATH doesn't exist
Starting >>> osr_bringup
Finished <<< osr_bringup [7.17s]
[Processing: osr_interfaces]
Finished <<< osr_interfaces [51.4s]
Starting >>> osr_control
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'script-dir' will not be supported in
future versions. Please use the underscore name 'script_dir' instead
 warnings.warn()
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'install-scripts' will not be supported in
future versions. Please use the underscore name 'install_scripts' instead
 warnings.warn()
--- stderr: osr_control
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'script-dir' will not be supported in
future versions. Please use the underscore name 'script_dir' instead
 warnings.warn()
/home/ubuntu/.local/lib/python3.8/site-packages/setuptools/dist.py:697:
UserWarning: Usage of dash-separated 'install-scripts' will not be supported in
future versions. Please use the underscore name 'install_scripts' instead
 warnings.warn()

Finished <<< osr_control [3.87s]

Summary: 3 packages finished [56.0s]
1 package had stderr output: osr_control
```

```

ubuntu@AUDACITY:~/osr_ws/install$ source install/setup.bash
-bash: install/setup.bash: No such file or directory
ubuntu@AUDACITY:~/osr_ws/install$ cd ..
ubuntu@AUDACITY:~/osr_ws$ source install/setup.bash
ubuntu@AUDACITY:~/osr_ws$ cd
~/osr_ws/src/osr-rover-code/ROS/osrBringup/config
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config
$ touch osr_params_mod.yaml roboclaw_params_mod.yaml
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config
$ cd ..
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup$ cd
launch/
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch
$ cp osr_launch.py osr_mod_launch.py
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch
$ nano osr_mod_launch.py
 ld.add_action(
 DeclareLaunchArgument('enable_odometry',
default_value='false')
)
change to 'true' nav2 requires odometry

parameters=[
 {"scale_linear.x": 0.8}, # scale to apply to
drive speed, in m/s: drive_motor_rpm * 2pi / 60 * wheel radius *
slowdown_
 {"axis_linear.x": 1},
 {"axis_angular.yaw": 3}, # which joystick axis to
use for driving
 {"scale_angular.yaw": 1.75}, # scale to apply to
angular speed, in rad/s: scale_linear / min_radius(=0.45m)
 {"scale_angular_turbo.yaw": 3.95}, # scale to
apply to angular speed, in rad/s: scale_linear_turbo / min_radius
 {"scale_linear_turbo.x": 1.78}, # scale to apply
to linear speed, in m/s
 {"enable_button": 4}, # which button to press to
enable movement
 {"enable_turbo_button": 5} # -1 to disable turbo
],
Orange values may need to change.

```

#### 4.3 Add ROS config scripts to .bashrc

```

cd ~
echo "source /opt/ros/foxy/setup.bash" >> ~/.bashrc
echo "source ~/osr_ws/install/setup.bash" >> ~/.bashrc
already done

```

```
5.1 Disable serial-getty@ttyS0.service
already done
5.2 Copy udev rules
already done
5.3 Add user to tty group
already done
5.4 Remove console line in cmdline.txt boot config file
 cd /boot/firmware
 sudo cp cmdline.txt cmdline.txt.bak
 sudo nano cmdline.txt
ubuntu@AUDACITY:/boot/firmware$ sudo cp cmdline.txt
cmdline.txt.bak
ubuntu@AUDACITY:/boot/firmware$ sudo nano cmdline.txt
net.ifnames=0 dwc_otg.lpm_enable=0 console=ttyAMA0,115200
console=tty1 root=/dev/mmcblk0p2 rootfstype=ext4 elevator=deadline
rootwait
```

And then delete the substring **console=serial0,115200** from the single line of text in the file. Save and exit.

**They're not the same...**

Delete **console=ttyAMA0,115200**

*I would have thought this would have been done w/ the prev setup, but no.*

```
5.5 Disable bluetooth in config.txt boot config file
cd /boot/firmware
sudo cp config.txt config.txt.bak
sudo nano config.txt
And then add the new line dtoverlay=disable-bt immediately after
the existing line cmdline=cmdline.txt towards the bottom of the
file
```

Elsewhere the config.txt file said to use usercfg.txt instead.

It doesn't say so in this version...?

```
Place "config.txt" changes (dtparam, dtoverlay, disable_overscan, etc.) in
this file. Please refer to the README file for a description of the various
configuration files on the boot partition.
```

**config.txt changed to usercfg.txt for user configs**

```
ubuntu@AUDACITY:/boot/firmware$ sudo nano usercfg.txt
 dtoverlay=disable-bt
```

5.6 Restart the RPi

REBOOT

Examine Achille's setup:

adapt **sensors.launch.py** to my system  
try **CAMERA**:

```
ubuntu@AUDACITY:~$ cd
osr_ws/src/osr-rover-code/ROS/osrBringup/launch/
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch
$ cp sensors.launch.py sensors.launch.ACHILLE.py
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch
$ nano sensors.launch.PHELAN.py
import os
from ament_index_python.packages import get_package_share_directory
from launch import LaunchDescription
from launch_ros.actions import Node

def generate_launch_description():
 ld = LaunchDescription()
 config = os.path.join(
 get_package_share_directory('osrBringup'),
 'config'
)
 ld.add_action(Node(
 package='v4l2_camera',
 name='front_camera_node',
 executable='v4l2_camera_node',
 parameters=[
 {'video_device': '/dev/video0'},
 {'pixel_format': 'YUYV'},
 {'camera_frame_id': 'front_webcam'},
 {'output_encoding': 'rgb8'},
 {'image_size': [1280, 720]}
]
))
 return ld
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/launch
$ ros2 launch sensors.launch.PHELAN.py
```

```
...
[v4l2_camera_node-1] [ERROR] [1629658278.674926737] [v4l2_camera]: Failed opening device /dev/video0: No such file or directory (2)
```

```
...
Camera wasn't plugged in
REBOOT
```

```
ubuntu@AUDACITY:~$ ls /dev/video*
/dev/video0 /dev/video1 /dev/video10 /dev/video11 /dev/video12
/dev/video13 /dev/video14 /dev/video15 /dev/video16

ubuntu@AUDACITY:~$ cd
~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr Bringup/launch
$ ros2 launch sensors.launch.PHELAN.py
... Starting camera...
Success?
Check FR dashboard:
 No video signal
Check Cheese:
 No video signal
Check webcamtests.com:
 good picture
ubuntu@AUDACITY:~$ sudo find / -name v4l2_camera_node
/opt/ros/foxy/lib/v4l2_camera/v4l2_camera_node
Check Cheese:
 good picture now!
Check FR dashboard:
 No video signal
close Cheese
 No video signal

ubuntu@AUDACITY:~$ ros2 topic list
/camera_info
/cmd_vel
/image_raw
/move_base/cancel
/parameter_events
/rosout

ubuntu@AUDACITY:~$ ros2 topic echo /image_raw
nothing ^C

ubuntu@AUDACITY:~$ sudo find / -name rviz*
multiple incl rviz2
ubuntu@AUDACITY:~$ sudo find / -name rviz2*
ubuntu@AUDACITY:~$ ros2 run rviz2 rviz2
opens but no images
```

*camera launch is stopped, relaunch*

```
ubuntu@AUDACITY:~$ cd
~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ ros2 launch sensors.launch.PHELAN.py
... Starting camera...
ubuntu@AUDACITY:~$ ros2 run rviz2 rviz2
(from desktop) opens but no images
ubuntu@AUDACITY:~$ ros2 topic echo /image_raw
getting streaming single digit integers
```

camera FAILS

**Try nav2.launch.py:**

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ ros2 launch nav2.launch.py
```

...  
**LookupError: Could not find the resource 'nav2\_bringup' of type 'packages'**

```
...
ubuntu@AUDACITY:~/osr_ws$ sudo find / -name nav2_bringup
negative
```

**Try osr\_launch.py:**

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ ros2 launch osr_launch.py
launches, pairs & responds!
```

Try adding nav2 in another terminal:

```
ubuntu@AUDACITY:~$ cd
~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch/
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ ros2 launch nav2.launch.py
LookupError: Could not find the resource 'nav2_bringup' of type 'packages'
```

Try adding camera:

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ ros2 launch sensors.launch.PHELAN.py
camera starts
ubuntu@AUDACITY:~$ ros2 topic echo /image_raw
getting streaming single digit integers
ubuntu@AUDACITY:~$ ros2 run rviz2 rviz2
(from desktop) opens but no images
```

**Try Achille's sensors.launch.ACHILLE.py:**

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ ros2 launch sensors.launch.ACHILLE.py
LookupError: Could not find the resource 'sick_scan2' of type
'packages'
```

**Look for odometry configuration:**

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ nano osr_mod_launch.py
change odometry parameter to true
REBOOT
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ ros2 launch osr_launch.py
```

...  
Initializing Rover

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ ros2 launch nav2.launch.py
LookupError: Could not find the resource 'nav2_bringup' of type
'packages'
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ ros2 topic list
/cmd_corner
/cmd_drive
/cmd_vel
/cmd_vel_intuitive
/encoder
/joy
/joy/set_feedback
/parameter_events
/rosout
/status
/turning_radius
```

*No odometry topic*

e-mail SENT to Charles:

C,

Took a prev configured SD card.

deleted the osr\_ws directory as you suggested rather than start from scratch.

recreated the osr\_ws/src directories

```
ubuntu@AUDACITY:~/osr_ws/src$ git clone https://github.com/Achllle/osr-rover-code.git
ubuntu@AUDACITY:~/osr_ws/src$ cd osr-rover-code
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git fetch origin
git checkout foxy-devel
This changed to foxy/nav2
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git checkout foxy/nav2
Branch 'foxy/nav2' set up to track remote branch 'foxy/nav2' from 'origin'.
Switched to a new branch 'foxy/nav2'
```

[I THINK MAYBE I NEEDED TO DO A "git pull" HERE FIRST. DID I ??]

rebuilt the system as before

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch$ ros2 launch osr_launch.py
ran w/o errors
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch$ ros2 launch nav2.launch.py
LookupError: Could not find the resource 'nav2_bringup' of type 'packages'
```

Error is correct, there is no nav2\_bringup package

I modified his sensors.launch.py to take out the LIDAR and just leave the camera.

Camera works fine on "webcamtests.com"

Camera works fine on Cheese

/image\_raw topic is published w/ stream of single digit integers

rviz2 launches but can't display Camera or Image /image\_raw

Freedom Robotics dashboard can't see camera. (But it CAN SEE lidar when it's running and launched)

Even though "odometry" = "true" on osr\_launch.py, I don't see /odometry published in topics

osr\_startup.system still won't work and causes "A stop job is running for OSR service (countdown / 1min 43s)" delay running 3 times on bootup & shutdown. Disabled.

After dinner I'll focus on URDF unless I need to go back to git checkout foxy/nav2?

J

## 2021.08.23

email reply from Charles:

J,

Did you install Nav2 ?

```
sudo apt install ros-foxy-navigation2 ros-foxy-nav2-bringup
```

[https://navigation.ros.org/build\\_instructions/index.html](https://navigation.ros.org/build_instructions/index.html)

Go back to foxy/nav2 and to “git pull” then proceed from there...  
ubuntu@AUDACITY:~/osr\_ws/src/osr-rover-code\$ **git pull**  
Already up to date.  
*Guess I didn't need to...*

**INSTALL NAV2 per Charles link:**

[https://navigation.ros.org/build\\_instructions/index.html](https://navigation.ros.org/build_instructions/index.html)

Build and Install

Install

Nav2 and its dependencies are released as binaries. You may install it via the following to get the latest stable released version:

(For Ubuntu 20.04 use this command as the parsing of wildcards have been changed:

```
sudo apt install ros-<distro>-navigation2
ros-<distro>-nav2-bringup '~ros-<distro>-turtlebot3-.*'
With foxy translates to:
sudo apt install ros-foxy-navigation2 ros-foxy-nav2-bringup
'~ros-foxy-turtlebot3-.*'
ubuntu@AUDACITY:~$ sudo apt install ros-foxy-navigation2
ros-foxy-nav2-bringup '~ros-foxy-turtlebot3-.*'
Success
ubuntu@AUDACITY:~$ ros2 launch ydlidar_ros2_driver
ydlidar_launch_view.py via desktop
Success
ubuntu@AUDACITY:~$ ros2 launch osr Bringup osr_launch.py
Success
ubuntu@AUDACITY:~ $ ros2 launch nav2.launch.py via desktop
No launch file supplied
ubuntu@AUDACITY:~$ sudo find / -name nav2.launch.py
/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup/launch/n
av2.launch.py
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch/nav2
.launch.py

ubuntu@AUDACITY:~$ cd
/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup/launch/
ubuntu@AUDACITY:~/osr_ws/install/osr_bringup/share/osr_bringup/lau
nch$ ls
__pycache__ nav2.launch.py osr_launch.py sensors.launch.py
```

```

ubuntu@AUDACITY:~/osr_ws/install/osr_bringup/share/osr_bringup/lau
nch$ ros2 launch nav2.launch.py
[INFO] [launch]: All log files can be found below
/home/ubuntu/.ros/log/2021-08-24-00-55-00-999090-AUDACITY-19607
[INFO] [launch]: Default logging verbosity is set to INFO
[INFO] [static_transform_publisher-1]: process started with pid [19609]
[INFO] [map_server-2]: process started with pid [19611]
[INFO] [amcl-3]: process started with pid [19613]
[INFO] [lifecycle_manager-4]: process started with pid [19615]
[static_transform_publisher-1] [INFO] [1629766502.596575398] [footprint_static_tf2]: Spinning until
killed publishing transform from 'base_link' to 'base_footprint'
[lifecycle_manager-4] [INFO] [1629766502.652043566] [lifecycle_manager_localization]: Creating
[lifecycle_manager-4] [INFO] [1629766503.027336801] [lifecycle_manager_localization]: Creating and
initializing lifecycle service clients
[lifecycle_manager-4] [INFO] [1629766503.210608379] [lifecycle_manager_localization]: Starting
managed nodes bringup...
[lifecycle_manager-4] [INFO] [1629766503.219083313] [lifecycle_manager_localization]: Configuring
map_server
[map_server-2] [INFO] [1629766503.328028974] [map_server]:
[map_server-2] map_server lifecycle node launched.
[map_server-2] Waiting on external lifecycle transitions to activate
[map_server-2] See https://design.ros2.org/articles/node_lifecycle.html for more information.
[map_server-2] [INFO] [1629766503.329339400] [map_server]: Creating
[amcl-3] [INFO] [1629766503.379366517] [amcl]:
[amcl-3] amcl lifecycle node launched.
[amcl-3] Waiting on external lifecycle transitions to activate
[amcl-3] See https://design.ros2.org/articles/node_lifecycle.html for more information.
[amcl-3] [INFO] [1629766503.381056604] [amcl]: Creating
[map_server-2] [INFO] [1629766505.837570490] [map_server]: Configuring
[map_server-2] [INFO] [map_io]: Loading yaml file:
/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup/maps/1816fell.yaml
[map_server-2] [DEBUG] [map_io]: resolution: 0.05
[map_server-2] [DEBUG] [map_io]: origin[0]: -8.76
[map_server-2] [DEBUG] [map_io]: origin[1]: -5.1
[map_server-2] [DEBUG] [map_io]: origin[2]: 0
[map_server-2] [DEBUG] [map_io]: free_thresh: 0.196
[map_server-2] [DEBUG] [map_io]: occupied_thresh: 0.65
[map_server-2] [DEBUG] [map_io]: mode: trinary
[map_server-2] [DEBUG] [map_io]: negate: 0
[map_server-2] [INFO] [map_io]: Loading image_file:
/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup/maps/1816fell.pgm
[map_server-2] [DEBUG] [map_io]: Read map
/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup/maps/1816fell.pgm: 264 X 202 map @ 0.05
m/cell
[lifecycle_manager-4] [INFO] [1629766505.899586917] [lifecycle_manager_localization]: Configuring
amcl
[amcl-3] [INFO] [1629766505.901665609] [amcl]: Configuring
[amcl-3] [INFO] [1629766505.901942605] [amcl]: initTransforms
[amcl-3] [INFO] [1629766505.953662661] [amcl]: initPubSub
[amcl-3] [INFO] [1629766505.983307199] [amcl]: Subscribed to map topic.
[lifecycle_manager-4] [INFO] [1629766506.015963658] [lifecycle_manager_localization]: Activating
map_server
[map_server-2] [INFO] [1629766506.020362946] [map_server]: Activating
[lifecycle_manager-4] [INFO] [1629766506.024526313] [lifecycle_manager_localization]: Activating
amcl
[amcl-3] [INFO] [1629766506.027326828] [amcl]: Received a 264 X 202 map @ 0.050 m/pix
[amcl-3] [INFO] [1629766506.038704202] [amcl]: Activating
[amcl-3] [WARN] [1629766506.040748025] [amcl]: Publishing the particle cloud as
geometry_msgs/PoseArray msg is deprecated, will be published as nav2_msgs/ParticleCloud in the
future
[lifecycle_manager-4] [INFO] [1629766506.045351737] [lifecycle_manager_localization]: Managed nodes
are active
[amcl-3] [INFO] [1629766506.572115341] [amcl_rclcpp_node]: Message Filter dropping message: frame
'laser_frame' at time 1629766505.938 for reason 'Unknown'
[amcl-3] [INFO] [1629766506.632220573] [amcl_rclcpp_node]: Message Filter dropping message: frame
'laser_frame' at time 1629766505.988 for reason 'Unknown'
[amcl-3] [INFO] [1629766506.691966421] [amcl_rclcpp_node]: Message Filter dropping message: frame
'laser_frame' at time 1629766506.038 for reason 'Unknown'

```

*Success?!*

**Build: 2021.08.23**  
Ubuntu 20.04  
ROS2 Foxy-Fitzroy  
rover code: Achille foxy/nav2  
ydlidar  
nav2  
Freedom Robotics dashboard  
Elecrow 5" TFT HDMI onboard monitor  
NO CAMERA  
sensor.launch.py FAIL

### **2021.08.24**

Reboot saved build 2021.08.23  
IP addresses have changed  
ubuntu@AUDACITY:/var/crash\$ **sudo rm  
\_usr/libexec/fwupd/fwupd.0.crash**

#### **Disable Apport:**

<https://itsfoss.com/how-to-fix-system-program-problem-detected-ubuntu/>

To disable the Apport and get rid of system crash report completely, open a terminal and use the following command to edit the Apport settings file:

**sudo gedit /etc/default/apport &**  
ubuntu@AUDACITY:~\$ **sudo nano /etc/default/apport**  
    change to **enabled=0**

### **2021.08.25-27**

Working on URDF tutorial, q.v.

**2021.09.17**

Putting urdf on hold

Try config pi for 2 monitors w/ dtoverlay...

*Reboot is slow w/ 5 green/white dots*

*only one monitor shows*

Shutdown and bootup hanging on pulseaudio

Followed this advice:

<https://www.mind-overflow.net/post/how-to-reset-pulseaudio-and-alsa-on-ubuntu/>

but only so far as to uninstall, not reinstall as I don't need audio.

**sudo dpkg --purge --force-depends pulseaudio alsa-base alsa-utils**

**2021.09.21**

Google “ros to ros2 migration”:

<https://docs.ros.org/en/foxy/Contributing/Migration-Guide.html>

<https://roboticsbackend.com/migrate-ros-project-from-ros1-to-ros2/>

<https://github.com/awslabs/ros2-migration-tools>

<https://itfanr.gitbooks.io/ros2-wiki/content/Migration-guide.html>

*Attempt camera again:*

from:

[https://github.com/Achllle/osr-rover-code/blob/foxy/nav2/ROS/osr\\_bringup/launch/sensors.launch.py](https://github.com/Achllle/osr-rover-code/blob/foxy/nav2/ROS/osr_bringup/launch/sensors.launch.py)

```
...
ld.add_action(Node(
 package='v4l2_camera',
 name='front_camera_node',
 executable='v4l2_camera_node',
 parameters=[
 {'video_device': '/dev/video0'},
 {'pixel_format': 'YUYV'},
 {'camera_frame_id': 'front_webcam'},
 {'output_encoding': 'rgb8'},
 {'image_size': [1280, 720]}
]
))

```

ubuntu@AUDACITY:~\$ **sudo find / -name v4l2\_camera\_node**

*NEG*

ubuntu@AUDACITY:~\$ **sudo find / -name v4l2\_camera**

*NEG*

ubuntu@AUDACITY:~\$ **sudo find / -name v4l2**

```
/usr/src/linux-headers-5.4.0-1028-raspi/include/config/v4l2
/usr/src/linux-headers-5.4.0-1028-raspi/include/config/video/v4l2
/usr/src/linux-headers-5.4.0-1036-raspi/include/config/v4l2
/usr/src/linux-headers-5.4.0-1036-raspi/include/config/video/v4l2
/sys/kernel/tracing/events/v4l2
/sys/kernel/debug/tracing/events/v4l2
```

```

Google: "v4l2_camera_node":
https://index.ros.org/r/v4l2_camera/
Install:
apt-get install ros-<ros_version>-v4l2-camera
apt-get install ros-foxy-v4l2-camera
ubuntu@AUDACITY:~$ apt-get install ros-foxy-v4l2-camera
ubuntu@AUDACITY:~$ sudo apt-get install ros-foxy-v4l2-camera
Err:1 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-v4l2-camera
 arm64
0.4.0-1focal.20210701.105154
 404 Not Found [IP: 140.211.166.134 80]
E: Failed to fetch
http://packages.ros.org/ros2/ubuntu/pool/main/r/ros-foxy-v4l2-
-camera/ros-foxy-v4l2-camera_0.4.0-1focal.20210701.105154_arm64.deb 404 Not
Found [IP: 140.211.166.134 80]
E: Unable to fetch some archives, maybe run apt-get update or try with
--fix-missing?

ubuntu@AUDACITY:~$ sudo apt-get update
ubuntu@AUDACITY:~$ sudo apt-get install ros-foxy-v4l2-camera
--fix-missing
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
 ros-foxy-v4l2-camera
0 upgraded, 1 newly installed, 0 to remove and 329 not upgraded.
Need to get 127 kB of archives.
After this operation, 651 kB of additional disk space will be used.
Get:1 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-v4l2-camera
arm64 0.4.0-1focal.20210901.233835 [127 kB]
Fetched 127 kB in 0s (256 kB/s)
Selecting previously unselected package ros-foxy-v4l2-camera.
(Reading database ... 329137 files and directories currently installed.)
Preparing to unpack
.../ros-foxy-v4l2-camera_0.4.0-1focal.20210901.233835_arm64.deb ...
Unpacking ros-foxy-v4l2-camera (0.4.0-1focal.20210901.233835) ...
Setting up ros-foxy-v4l2-camera (0.4.0-1focal.20210901.233835) ...

ubuntu@AUDACITY:~$ sudo find / -name v4l2_camera
/opt/ros/foxy/lib/v4l2_camera
/opt/ros/foxy/share/v4l2_camera
/opt/ros/foxy/share/ament_index/resource_index/parent_prefix_path/v4l2_camera
/opt/ros/foxy/share/ament_index/resource_index/package_run_dependencies/v4l2_ca
mera
/opt/ros/foxy/share/ament_index/resource_index/rclcpp_components/v4l2_camera
/opt/ros/foxy/share/ament_index/resource_index/packages/v4l2_camera
/opt/ros/foxy/include/v4l2_camera

...success, but this is wrong configuration. Need to change to
one with osr and sensors_launch.py to see if can see on F.R. dash.

```

From Desktop GUI terminal:  
ubuntu@AUDACITY:~\$ **cheese**



## 2021.11.20

Recent detour to trying to install the Intel RealSense D455 Depth Camera. Had fair success on Jetson Nano / Ubuntu 18 / RealSense 2.48 ROS2. Then trying on R Pi 4b 4G / Ubuntu 20.04 / ROS2 / and the latest RS 2.50. In progress....

See Jetson NANO Experience and Intel RealSense Camera Experience.

Having frustrating time w/ RealSense SDK. On recent USAi Labs virtual Meetup Dianne suggested OpenCV OAK camera from Luxonis:

<https://shop.luxonis.com/products/1098obcenclosure>

It's on indefinite backorder everywhere but Luxonix which promises to ship in December.

Tested the Ubuntu install next am without error from:

<https://docs.luxonis.com/projects/api/en/latest/install/#raspberry-pi-os>

Full testing will require the camera and additional python installs.

But TODAY disconnected **remote kill switch** from system just leaving the lighted push button. In next iteration of PCB remote kill switch will connect to E-STOP pin of Roboclaw motor controllers.

## 2021.12.05

Try to add fisheye camera to Raspberry Pi 4b 4GB, under Ubuntu 20.04, ROS2 foxy and have it work in the Freedom Robotics Pilot dashboard.

Plug fisheye USB camera into USB2 port on R.Pi directly.

```
ubuntu@AUDACITY:~$ ls /dev/video*
/dev/video0 /dev/video1 /dev/video10 /dev/video11 /dev/video12
/dev/video13 /dev/video14 /dev/video15 /dev/video16
$ cheese
displays normally
Plug fisheye USB camera into Powered external USB3 port.
$ cheese
displays normally
ubuntu@AUDACITY:~$ lsusb
Bus 002 Device 004: ID 2109:0817 VIA Labs, Inc.
Bus 002 Device 003: ID 2109:0817 VIA Labs, Inc. USB3.0 Hub
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 015: ID 1b17:0522
Bus 001 Device 007: ID 2109:2817 VIA Labs, Inc.
Bus 001 Device 006: ID 413c:2105 Dell Computer Corp. Model L100 Keyboard
Bus 001 Device 005: ID 413c:3012 Dell Computer Corp. Optical Wheel Mouse
Bus 001 Device 003: ID 2109:2817 VIA Labs, Inc.
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
can't tell which is camera
```

Plug fisheye USB camera into USB2 port on R.Pi directly.

```
Bus 002 Device 004: ID 2109:0817 VIA Labs, Inc.
Bus 002 Device 003: ID 2109:0817 VIA Labs, Inc. USB3.0 Hub
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 020: ID 045e:028e Microsoft Corp. Xbox360 Controller
Bus 001 Device 021: ID 1b17:0522
Bus 001 Device 007: ID 2109:2817 VIA Labs, Inc.
Bus 001 Device 006: ID 413c:2105 Dell Computer Corp. Model L100 Keyboard
Bus 001 Device 005: ID 413c:3012 Dell Computer Corp. Optical Wheel Mouse
Bus 001 Device 003: ID 2109:2817 VIA Labs, Inc.
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

*Curious as it recognizes Xbox controller now as it hasn't changed.  
Still no indication as to camera. Suspect it's the unlabeled blue one.*

```
ubuntu@AUDACITY:~$ sudo find / -name camera
/opt/ros/foxy/include/rviz_default_plugins/displays/camera
/usr/src/linux-headers-5.4.0-1045-raspi/include/config/media/camera
/usr/src/linux-headers-5.4.0-1042-raspi/include/config/media/camera
/usr/src/linux-headers-5.4.0-1047-raspi/include/config/media/camera
no suggestion of usb_camera node
```

*Look for Freedom Robotics interface*

```
ubuntu@AUDACITY:~$ sudo find / -name freedom
/usr/share/terminfo/f/freedom
ubuntu@AUDACITY:~$ cd /usr/share/terminfo/f/
f100 f110 f110-14w f1720 f200 f200vi falco fenix fixterm
fos freedom freedom100 freedom200
f100-rv f110-14 f110-w f1720a f200-w f200vi-w falco-p fenixw fortune
fox freedom-rv freedom110
Don't think this is FR.
```

*Install FR*

```
ubuntu@AUDACITY:~$ curl -sSf
"https://api.freedomrobotics.ai/accounts/A6124B5AB85968B6435933C21
/devices/DAAA0C665B06524A3A897346970/installscript?mc_token=TAF71A
1FC7678653CF280BAC6&mc_secret=S3d8706af65fb6eb10d71dd79&install_el
ements=webrtc&auto_install_deps=true&ppa_is_allowed=true" |
python3 -3 added for python3 in order to install properly
```

**Google “ros2 USB camera node”:**

[https://github.com/klintan/ros2\\_usb\\_camera](https://github.com/klintan/ros2_usb_camera)  
[https://index.ros.org/r/usb\\_cam/](https://index.ros.org/r/usb_cam/)  
[https://index.ros.org/r/v4l2\\_camera/](https://index.ros.org/r/v4l2_camera/)  
<https://discourse.ros.org/t/ros2-usb-cam-imgui-image-manipulation-nodes/6894>  
[http://wiki.ros.org/usb\\_cam](http://wiki.ros.org/usb_cam)  
<https://discourse.ros.org/t/usb-cam-orphaned-offer-to-support/19367>  
[https://gitlab.com/boldhearts/ros2\\_v4l2\\_camera](https://gitlab.com/boldhearts/ros2_v4l2_camera)  
[https://awesomeopensource.com/project/klintan/ros2\\_usb\\_camera?categoryPage=41](https://awesomeopensource.com/project/klintan/ros2_usb_camera?categoryPage=41)

## **2022.01.19**

Support@freedomrobotics

SSH access to AUDACITY:

**ssh ubuntu@6.tcp.ngrok.io -p 13960**

ubuntu@AUDACITY

PW: **Fr33d0m**

Doug Cooper commented:

Jim,

Our engineer is only available through the morning as they live on the east coast. Freedom can review the device if we have ssh access.

We would need credentials to the device, so if you could provide the password to ssh we can assist 1:1.

Also from your end:

ensure the device is turned on during our troubleshooting hours. We will be troubleshooting around the time 8am - 12pm PST.

Within the app, we allow for devices to enable remote ssh, and then we can review the logs and catkin workspace.

I'll be working with Achille on this to help resolve your issue as quickly as possible.

Thank you,

Doug

## **2022.01.20**

Doug Cooper commented:

Hello Jim,

I have scheduled time tomorrow from 8am - 9am PST where we will log in to the robot and troubleshoot it.

I will send a message when we have finished diagnosing it.

Thank you for all of the information! We may want to also test out our updated pilot experience. It is in beta but could prove useful to you. We can talk more about that after the diagnosis tomorrow.

Thank you,

Doug

**2022.01.21**

Doug Cooper commented:

Hello Jim,

We were able to diagnose the device and saw some interesting things. When we initially started the webrtc session, it did connect and we saw the high latency.

We took a look at the cpu utilization. This is the device with no web\_rtc connection. The device has a Load Average of 5.67, which means you have about 5 processes waiting to be executed by your computer. Given you have 4 cores, this indicates the system is overloaded and not as much processes can be running while trying to include pilot functionality.

[`$ htop` image of high system load]

In this next picture, webrtc is enabled and the load average goes to 6.37, further overloading the system.

[`$ htop` image of even higher system load]

It looks like stereo\_inertial\_node is taking a lot of cpu. Is it necessary for your rover? It may be a good reason to upgrade your processor if you want to handle that many tasks.

Let me know if you have any questions and we will be happy to answer.

Thank you,

Doug

My reply:

Doug,

Good work. Thanks!

Several questions:

- 1) what commands / apps did you use to create the nice enclosed displays?
- 2) I count 8 stereo\_inertial\_node jobs running. Why so many? Is there a separate job for each published topic?
- 3) Similarly, I count 9 fr\_link\_ros2 jobs & 4 fr\_agent jobs. Same question.
- 4) This doesn't even cover multiple root jobs. Is there a way to know which ones are necessary and which are just junk and clean them up?

Thanks,

Jim

## 2022.03.12 PCB RevF

Slack post:

James Phelan Yesterday at 7:30 PM

@Kit Kennedy @David Schooley @Eric Junkins

What do I need to do to view the latest Rev on my PC? I have KiCAD but the last .zip file is almost a year old and the last update just over a week ago. The githup has files scattered everywhere. Thanks!!

Also, would y'all consider adding PCB mounting holes compatible with a Jetson NANO (developer kit) as I can see future upgrades (ie Autonomy) requiring more brain power than the Raspberry Pi can deliver.

It's only a little larger than the Pi. I've searched the web for the mounting hole specs but they're elusive. You'll have to measure one!

Eric Junkins 16 hours ago

Hi @James Phelan, to view the latest changes on this you can get them from the PR here:

<https://github.com/nasa-jpl/open-source-rover/pull/198>

if you scroll all the way down and click 'command line instructions' it will tell you the step by step terminal commands that you run from your open-source-rover repo on your computer

The screenshot shows a GitHub pull request interface for a repository. At the top, there is a button labeled "Merge pull request" and a note saying "You can also open this in GitHub Desktop or view command line instructions." Below this, under the heading "Merging via command line", it says: "If you do not want to use the merge button or an automatic merge cannot be performed, you can perform a manual merge on the command line. However, the following steps are not applicable if the base branch is protected." There are two sections of terminal commands: "Step 1: From your project repository, check out a new branch and test the changes." and "Step 2: Merge the changes and update on GitHub." Each section contains three command-line snippets with copy icons next to them.

Merge pull request You can also open this in GitHub Desktop or view command line instructions.

Merging via command line

If you do not want to use the merge button or an automatic merge cannot be performed, you can perform a manual merge on the command line. However, the following steps are not applicable if the base branch is protected.

Step 1: From your project repository, check out a new branch and test the changes.

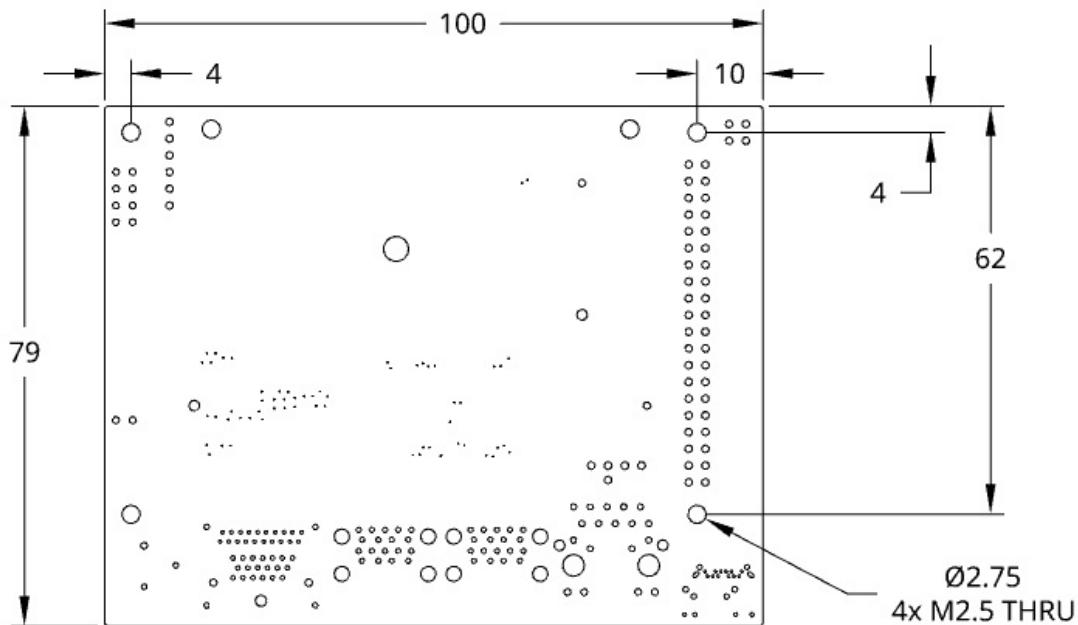
```
git checkout -b dcschooley-revF master
git pull https://github.com/dcschooley/open-source-rover.git revF
```

Step 2: Merge the changes and update on GitHub.

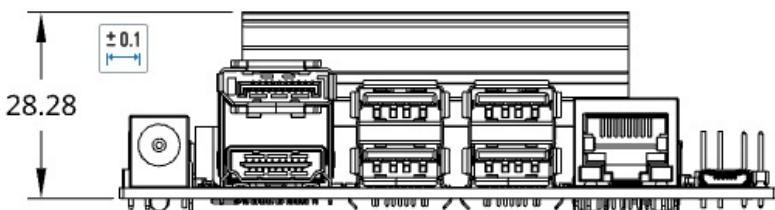
```
git checkout master
git merge --no-ff dcschooley-revF
git push origin master
```

Eric Junkins 16 hours ago

Here you go though, I made you the dimension drawing of the jetson nano, it is for some reason very hard to find the dimension drawing online so I just created it from the CAD model I have (edited)



SCALE 1:1



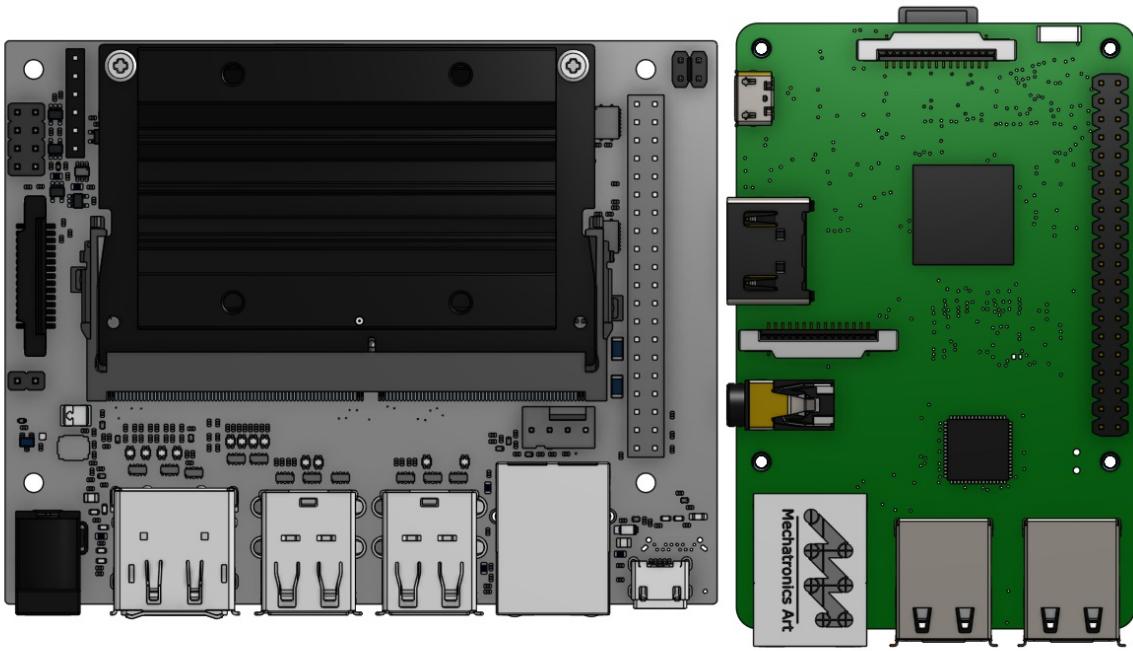
SCALE 1:1

Eric Junkins 16 hours ago

In respect to the question about making the PCB support the Jetson nano, I can't answer that fully right now. The jetson nano is quite a bit bigger however, almost double the footprint. This second image shows our current though of the rough layout and size that the brain board would be, the jetson nano would require a significant increase in size of that board (which directly translates to cost).

My short answer is probably going to be: Considering the 40pin header is the exact same between them, I think a better solution would be to externally mount the Jetson elsewhere from the PCB in the body still, and then run a ribbon cable between them. I'm not sure if the added cost to everyone is worth the convenience of mounting the jetson directly to the PCB stack.

That being said, if there is significant input from others that a wish would be to integrate the jetson into the system natively we could consider it. I will of course ask @David Schooley @Kit Kennedy to weigh in as well



James Phelan 15 hours ago

Pending the ability to see the CAD files myself, is this revision planning to mount the Pi directly via a pin header, or via ribbon cable as in the current version? If the latter, then just making sure there are 4 clear holes in the PCB in appropriate places should allow the Nano to replace the Pi. No?  
Thanks for the links to pull the PCB files! Not quite sure where to go from there but it will probably be clearer once done.

Eric Junkins 15 hours ago

Ribbon cable. But to me that's more of a reason to mount it elsewhere because of all the reasons I listed above

Eric Junkins 14 hours ago

I will see if it seems possible, though it may be awkward if it fits. It certainly is unlikely to be able to fit in the ideal orientation

David Schooley 2 hours ago

I am a fan of keeping things as general as possible until the last possible minute. Translation: If we can find a way to make electrically compatible CPU boards work, we should.

David Schooley 2 hours ago

Maybe it's worth looking at how big the brain board would be if it didn't have the RPi mounted to it. Then the brain board becomes a little thing and we mount the RPi (or any other board) some other way.

Eric Junkins 44 minutes ago

Yeah maybe that's worth exploring @David Schooley. The brain board would be quite small, the entire PCB in fact could shrink a bit saving a little bit of money. If we decided to do the sheet metal body maybe could reduce size slightly too to save some costs. And then give a mint somewhere else that is easily coverable between those two

James Phelan 23 minutes ago  
@Eric\_Junkins  
I can't find in PR198 the "merging via command line" post (even when expanding hidden items". Is there more beyond Step 2?

Eric Junkins 19 minutes ago  
You can follow the picture I sent those are the instructions

David Schooley 5 minutes ago  
Maybe even look at mounting both the brain board and the CPU board (RPi, Jetson, whatever) to the motor board.

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\PCB RevF>**git clone**  
<https://github.com/dcschooley/open-source-rover.git>

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\PCB RevF>**git checkout -b dcschooley-revF master**  
fatal: not a git repository (or any of the parent directories): .git

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\PCB RevF>dir  
Volume in drive C has no label.  
Volume Serial Number is A6EB-4E48

Directory of C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\PCB RevF

```
03/12/2022 01:23 PM <DIR> .
03/12/2022 01:23 PM <DIR> ..
03/12/2022 01:30 PM <DIR> open-source-rover
 0 File(s) 0 bytes
 3 Dir(s) 409,218,801,664 bytes free
```

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\PCB RevF>**cd open-source-rover**

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\PCB RevF\open-source-rover>**git checkout -b dcschooley-revF master**  
Switched to a new branch 'dcschooley-revF'

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\PCB RevF\open-source-rover>**git pull**  
<https://github.com/dcschooley/open-source-rover.git> revF  
From https://github.com/dcschooley/open-source-rover
 \* branch revF -> FETCH\_HEAD
Performing inexact rename detection: 100% (8066/8066), done.
Removing parts\_list/parts\_list\_reference.csv
Removing parts\_list/init.sh
Removing parts\_list/build.py
... many more parts

```
...
Removing electrical/latex_docs/pcb_assembly/PCB Assembly.tex
Removing electrical/latex_docs/pcb_assembly/PCB Assembly.pdf
Removing electrical/PCB Assembly.pdf
Removing electrical/Calibration.pdf
Removing bill_of_materials/Digikey_BOM.csv
Auto-merging README.md
CONFLICT (content): Merge conflict in README.md
Removing .gitmodules
Automatic merge failed; fix conflicts and then commit the result.
```

Went to

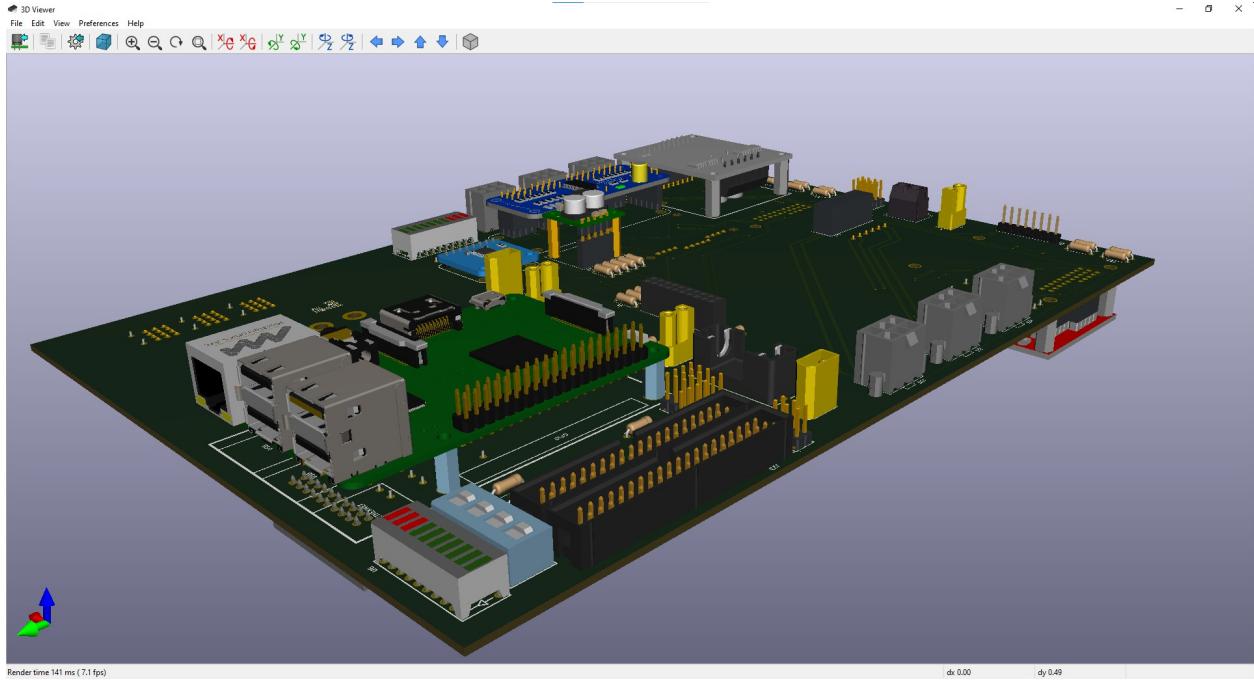
C:\Users\Me\Documents\My Downloads\Robotics\  
USAi Labs\Mars Rover\AUDACITY\PCB RevF\  
open-source-rover\electrical\pcb\control\_board\

Right clicked Control\_Boards.pro and Open With KiCAD.

Select View / 3D Viewer.

Not sure what a lot of these parts are as there have been many changes in the PCB revision. See Github Pull Requests and Discussions:

<https://github.com/nasa-jpl/open-source-rover/tree/dcschooley-revF>



**2022.02.20      Messed up! SKIP DOWN TO 2022.03.24**

Booted 2021.10.25 Ubuntu 20.04 64 server ROS2 foxy image  
WiFi inoperative & doesn't appear on menu bar even tho NUTHOUSE  
shows in network connections.

**\$1p a**

doesn't show wifi.

/etc/netplan/50-cloud-init.yaml edited and wifi added.

/Desktop/SystemConfig.txt        updated

*Check OSR status*

```
ubuntu@AUDACITY:~$ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
```

*No osr\_ws*

Picking up from

<https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/pi.md>

```
ubuntu@AUDACITY:~$ sudo apt update
```

```
ubuntu@AUDACITY:~$ sudo apt upgrade
```

Waiting for cache lock: Could not get lock /var/lib/dpkg/lock-frontend. It is  
held by process 6884 (unattended-upgr)

Had to disable update manager

<https://idroot.us/disable-automatic-updates-on-ubuntu-20-04/>

```
$ sudo nano /etc/apt/apt.conf.d/20auto-upgrades
```

*only top 2 rows in my file.*

*Already disabled rest by system config?*

Set the values in this file to 0:

```
APT::Periodic::Update-Package-Lists "0";
APT::Periodic::Download-Upgradeable-Packages "0";
APT::Periodic::AutocleanInterval "0";
APT::Periodic::Unattended-Upgrade "0";
```

```
ubuntu@AUDACITY:~$ sudo apt update
```

```
ubuntu@AUDACITY:~$ sudo apt upgrade
```

```
ubuntu@AUDACITY:~$ sudo apt autoremove Y
```

## 4 Setting up ROS environment and building the rover code

### 4.1 Setup ROS build environment

First we'll create a ROS workspace for the rover code.

```
Create a colcon workspace directory, which will contain all ROS compilation
and
```

```
source code files, and navigate into it
```

```
mkdir -p ~/osr_ws/src && cd ~/osr_ws
```

```
ubuntu@AUDACITY:~$ mkdir -p ~/osr_ws/src && cd ~/osr_ws
```

```
Source your newly created ROS environment
```

```
source /opt/ros/foxy/setup.bash
```

```
ubuntu@AUDACITY:~/osr_ws$ source /opt/ros/foxy/setup.bash
```

```
install the build tool colcon
```

```
sudo apt install python3-colcon-common-extensions
```

```
ubuntu@AUDACITY:~/osr_ws$ sudo apt install
```

```
python3-colcon-common-extensions
```

### 4.2 Clone and build the rover code

```
sudo apt install git
```

```
cd ~/osr_ws/src
```

```
git clone https://github.com/nasa-jpl/osr-rover-code.git
```

```
cd osr-rover-code
```

```
git fetch origin
```

```
git checkout foxy-devel
```

```
install the dependencies using rosdep
```

```
sudo apt install python3-rosdep
```

```
cd ../../ # go up 2 levels
```

```
sudo rosdep init
```

```
rosdep update
```

```
rosdep install --from-paths src --ignore-src --rosdistro=foxy
```

```
build the ROS packages
```

```
colcon build --symlink-install
```

```
ubuntu@AUDACITY:~/osr_ws$ sudo apt install git
```

```
cd ~/osr_ws/src
```

[already there **NO you're not! This throws off everything below!**]

```
ubuntu@AUDACITY:~/osr_ws$ git clone
```

```
https://github.com/nasa-jpl/osr-rover-code.git
```

```
ubuntu@AUDACITY:~/osr_ws$ cd osr-rover-code
```

```
ubuntu@AUDACITY:~/osr_ws/osr-rover-code$ git fetch origin
```

```
ubuntu@AUDACITY:~/osr_ws/osr-rover-code$ git checkout foxy-devel
```

```
ubuntu@AUDACITY:~/osr_ws/osr-rover-code$ sudo apt install
```

```
python3-rosdep
```

```
ubuntu@AUDACITY:~/osr_ws/osr-rover-code$ cd ../../ [just cd ..]
```

```
ubuntu@AUDACITY:~$ sudo rosdep init
```

```
ubuntu@AUDACITY:~$ rosdep update
```

```
ubuntu@AUDACITY:~$ rosdep install --from-paths src --ignore-src
```

```
--rosdistro=foxy
```

```
given path 'src' does not exist
```

Posted Issue to OSR Github & Slack/troubleshooting:

Revisiting OSR to do a clean install of latest code for Foxy/R0S2:

Following from

<https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/rpi.md>

All went well until part 4.2 Clone and build the rover code

at step

`rosdep install --from-paths src --ignore-src --rosdistro=foxy`

I get error

given path 'src' does not exist

Don't see solution in Issues, Pull requests, nor Google

JHP

**2022.03.22**

Slack reply:

Achille 1 day ago

That means you're running it from the wrong directory. Try `cd osr_ws` and rerun the command

```
ubuntu@AUDACITY:~$ cd osr_ws/
ubuntu@AUDACITY:~/osr_ws$ rosdep install --ignore-src
--rosdistro=foxy
Usage: rosdep [options] <command> <args>
...
rosdep: error: no packages or stacks specified
```

Achille 26 minutes ago

You didn't copy the entire command. Add `--from-paths src`

```
ubuntu@AUDACITY:~/osr_ws$ rosdep install --from-paths src
--ignore-src --rosdistro=foxy
#All required rosdeps installed successfully
```

commented back to Slack and edited the Issue on Github with fix.

```
ubuntu@AUDACITY:~/osr_ws$ colcon build --symlink-install
Starting >>> osr_interfaces
Starting >>> osrBringup
Finished <<< osrBringup [7.74s]
[Processing: osr_interfaces]
Finished <<< osr_interfaces [42.1s]
Starting >>> osr_control
Finished <<< osr_control [5.13s]
```

Summary: 3 packages finished [47.8s]

Now let's add the generated files to the path so ROS can find them

```
ubuntu@AUDACITY:~/osr_ws$ source install/setup.bash
```

The rover has some customizable settings that will overwrite the default values. Whether you have any changes compared to the defaults or not, you have to manually create these files:

```
ubuntu@AUDACITY:~/osr_ws$ cd
~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
-bash: cd: /home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/config: No
such file or directory
ubuntu@AUDACITY:~/osr_ws$ ls
build install log osr-rover-code src
ubuntu@AUDACITY:~/osr_ws$ cd src
ubuntu@AUDACITY:~/osr_ws/src$ ls
directory empty
```

The actual path should be:

```
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/ROS/osr_bringup/config
```

```
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/ROS/osr_bringup/config$
touch osr_params_mod.yaml roboclaw_params_mod.yaml
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/ROS/osr_bringup/config$ ls
osr_params.yaml osr_params_mod.yaml roboclaw_params.yaml
roboclaw_params_mod.yaml
```

To change any values from the default (if your rover doesn't match the default instructions), modify these files (the \_mod.yaml ones) instead of the original ones. This way your changes don't get committed to git. The files follow the same structure as the default. Just include the values that you need to change as the default values for other parameters may change over time.

You might also want to modify the file  
osr-rover-code/ROS/osr\_bringup/launch/osr\_launch.py to change the velocities  
the gamepad controller will send to the rover. These values in the node  
joy\_to\_twist are of interest:

```
{"scale_linear": 0.8}, # scale to apply to drive speed, in m/s:
drive_motor_rpm * 2pi / 60 * wheel radius * slowdown_factor
 {"scale_angular": 1.75}, # scale to apply to angular speed, in rad/s:
scale_linear / min_radius
 {"scale_linear_turbo": 1.78}, # scale to apply to linear speed, in m/s
```

The maximum speed your rover can go is determined by the no-load speed of your drive motors. The default no-load speed is located in the file osr\_params.yaml as drive\_no\_load\_rpm, unless you modified it in the corresponding \_mod.yaml file. This maximum speed corresponds to scale\_linear\_turbo and can be calculated as drive\_no\_load\_rpm \* 2pi / 60 \* wheel radius (=0.075m). Based on this upper limit, let's set our regular moving speed to a sensible fraction of that which you can configure to your liking. Start with e.g. 0.75 \* scale\_linear\_turbo. If you think it's too slow or too fast, simply scale it up or down.

The turning speed of the rover, just like a regular car, depends on how fast it's going. As a result, scale\_angular should be set to scale\_linear / min\_radius. For the default configuration, the min\_radius equals 0.45m.

2022.03.23

#### 4.3 Add ROS config scripts to .bashrc

The source...foo.bash lines above are used to manually configure your ROS environment. We can do this automatically in the future by doing:

```
cd ~
echo "source /opt/ros/foxy/setup.bash" >> ~/.bashrc
echo "source ~/osr_ws/install/setup.bash" >> ~/.bashrc

ubuntu@AUDACITY:~/osr_ws$ cd ~
ubuntu@AUDACITY:~$ echo "source /opt/ros/foxy/setup.bash" >>
~/.bashrc
ubuntu@AUDACITY:~$ echo "source ~/osr_ws/install/setup.bash" >>
~/.bashrc
```

To see what was done:

```
ubuntu@AUDACITY:~$ cat .bashrc
...
source /opt/ros/foxy/setup.bash
source /opt/ros/foxy/setup.bash
source ~/osr_ws/install/setup.bash
```

#### 5 Setting up serial communication on the RPi

The RPi will talk to the motor controllers over serial.

##### 5.1 Disable serial-getty@ttyS0.service

```
sudo systemctl stop serial-getty@ttyS0.service
sudo systemctl disable serial-getty@ttyS0.service
sudo systemctl mask serial-getty@ttyS0.service
```

```
ubuntu@AUDACITY:~$ sudo systemctl stop serial-getty@ttyS0.service
ubuntu@AUDACITY:~$ sudo systemctl disable
serial-getty@ttyS0.service
ubuntu@AUDACITY:~$ sudo systemctl mask serial-getty@ttyS0.service
Created symlink /etc/systemd/system/serial-getty@ttyS0.service → /dev/null.
```

##### 5.2 Copy udev rules

```
copy udev file from the repo to your system
cd ~/osr_ws/src/osr-rover-code/config
cd ~/osr_ws/osr-rover-code/ROS/osr_bringup/config
sudo cp serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules
reload the udev rules so that the devices files are set up correctly.
sudo udevadm control --reload-rules && sudo udevadm trigger
ubuntu@AUDACITY:~$ cd ~/osr_ws/src/osr-rover-code/config
-bash: cd: /home/ubuntu/osr_ws/src/osr-rover-code/config: No such file or
directory
ubuntu@AUDACITY:~$ cd
~/osr_ws/osr-rover-code/ROS/osr_bringup/config
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/ROS/osr_bringup/config$
sudo cp serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules
cp: cannot stat 'serial_udev_ubuntu.rules': No such file or directory
```

```
ubuntu@AUDACITY:~/osr_ws$ sudo find / -name
serial_udev_ubuntu.rules
/home/ubuntu/osr_ws/osr-rover-code/config/serial_udev_ubuntu.rules
ubuntu@AUDACITY:~$ cd ~/osr_ws/osr-rover-code/config
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/config$ sudo cp
serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules
Did it work?
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/config$ ls
/etc/udev/rules.d/0
10-local.rules 70-snap.chromium.rules 70-snap.snapd.rules
Yes
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/config$ sudo udevadm
control --reload-rules && sudo udevadm trigger
```

### 5.3 Add user to tty and dialout groups

```
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/config$ sudo adduser $USER
tty
Adding user `ubuntu' to group `tty' ...
Adding user ubuntu to group tty
Done.
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/config$ sudo adduser $USER
dialout
The user `ubuntu' is already a member of `dialout'.
```

### 5.4 Remove console line in cmdline.txt boot config file

```
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/config$ cd /boot/firmware
ubuntu@AUDACITY:/boot/firmware$ sudo cp cmdline.txt
cmdline.txt.bak
ubuntu@AUDACITY:/boot/firmware$ sudo nano cmdline.txt
delete the substring console=serial0,115200 from the single line
of text in the file. Save and exit.
```

### 5.5 Disable bluetooth in config.txt boot config file

```
cd /boot/firmware [we're already there]
ubuntu@AUDACITY:/boot/firmware$ sudo cp config.txt config.txt.bak
ubuntu@AUDACITY:/boot/firmware$ sudo nano config.txt
And then add the new line dtoverlay=disable-bt immediately after
the existing line cmdline=cmdline.txt towards the bottom of the
file.
```

### 5.6 Restart the RPi

```
ubuntu@AUDACITY:/boot/firmware$ sudo reboot now
```

## **6 Testing serial comm with the Roboclaw motors controllers**

Run the roboclawtest.py script with all of the motor addresses:

```
ubuntu@AUDACITY:~$ cd ~/osr_ws/src/osr-rover-code/scripts
-bash: cd: /home/ubuntu/osr_ws/src/osr-rover-code/scripts: No such file or
directory
ubuntu@AUDACITY:~$ sudo find / -name roboclawtest.py
/home/ubuntu/osr_ws/osr-rover-code/scripts/roboclawtest.py
ubuntu@AUDACITY:~$ cd osr_ws/osr-rover-code/scripts/
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/scripts$ python
roboclawtest.py 128
Command 'python' not found, did you mean:
 command 'python3' from deb python3
 command 'python' from deb python-is-python
ubuntu@AUDACITY:~/osr_ws/osr-rover-code/scripts$ python3
roboclawtest.py 128
Traceback (most recent call last):
 File "roboclawtest.py", line 13, in <module>
 from roboclaw import Roboclaw
ModuleNotFoundError: No module named 'roboclaw'
```

Posted .pdf of progress to this point on Slack.

Reply from Slack:

Achille 4 hours ago  
That's not a format that I can easily parse through. The instructions in section4.2 include:  
cd ~/osr\_ws/src  
git clone https://github.com/nasa-jpl/osr-rover-code.git  
So osr-rover-code should be in src

*I see where I failed to cd ~/osr\_ws/src but just stayed in osr\_ws*

**2022.03.24**

Starting over from 2021.10.25 U20.04 64 server, ROS2 Foxy SD image  
4 Setting up ROS environment and building the rover code

4.1 Setup ROS build environment

```
ubuntu@AUDACITY:~$ mkdir -p ~/osr_ws/src && cd ~/osr_ws
ubuntu@AUDACITY:~/osr_ws$ source /opt/ros/foxy/setup.bash
ubuntu@AUDACITY:~/osr_ws$ sudo apt install
python3-colcon-common-extensions
```

4.2 Clone and build the rover code

```
ubuntu@AUDACITY:~/osr_ws$ sudo apt install git
ubuntu@AUDACITY:~/osr_ws$ cd ~/osr_ws/src
ubuntu@AUDACITY:~/osr_ws/src$ git clone
https://github.com/nasa-jpl/osr-rover-code.git
ubuntu@AUDACITY:~/osr_ws/src$ cd osr-rover-code
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git fetch origin
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ git checkout
foxy-devel
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ sudo apt install
python3-rosdep
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code$ cd .. [not ...]
ubuntu@AUDACITY:~/osr_ws/src$ sudo rosdep init
ubuntu@AUDACITY:~/osr_ws/src$ rosdep update
updated cache in /home/ubuntu/.ros/rosdep/sources.cache
ubuntu@AUDACITY:~/osr_ws/src$ rosdep install --from-paths src
--ignore-src --rosdistro=foxy
given path 'src' does not exist
ubuntu@AUDACITY:~/osr_ws/src$ cd ..
ubuntu@AUDACITY:~/osr_ws$ rosdep install --from-paths src
--ignore-src --rosdistro=foxy
#All required rosdeps installed successfully
ubuntu@AUDACITY:~/osr_ws$ colcon build --symlink-install
Starting >>> osr_interfaces
Starting >>> osrBringup
Finished <<< osrBringup [6.33s]
[Processing: osr_interfaces]
Finished <<< osr_interfaces [36.7s]
Starting >>> osr_control
Finished <<< osr_control [5.09s]
Summary: 3 packages finished [42.3s]
ubuntu@AUDACITY:~/osr_ws$ source install/setup.bash
ubuntu@AUDACITY:~/osr_ws$ cd
~/osr_ws/src/osr-rover-code/ROS/osrBringup/config
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config
$ touch osr_params_mod.yaml roboclaw_params_mod.yaml
```

You might also want to modify the file **osr-rover-code/ROS/osr\_bringup/launch/osr\_launch.py** to change the velocities the gamepad controller will send to the rover. These values in the node `joy_to_twist` are of interest:

```
{"scale_linear": 0.8}, # scale to apply to drive speed, in m/s:
drive_motor_rpm * 2pi / 60 * wheel radius * slowdown_factor
{"scale_angular": 1.75}, # scale to apply to angular speed, in rad/s:
scale_linear / min_radius
{"scale_linear_turbo": 1.78}, # scale to apply to linear speed, in m/s
4.3 Add ROS config scripts to .bashrc
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/config
$ cd ~
ubuntu@AUDACITY:~$ echo "source /opt/ros/foxy/setup.bash" >>
~/.bashrc
ubuntu@AUDACITY:~$ echo "source ~/osr_ws/install/setup.bash" >>
~/.bashrc
5 Setting up serial communication on the RPi
5.1 Disable serial-getty@ttyS0.service
ubuntu@AUDACITY:~$ sudo systemctl stop serial-getty@ttyS0.service
ubuntu@AUDACITY:~$ sudo systemctl disable
serial-getty@ttyS0.service
ubuntu@AUDACITY:~$ sudo systemctl mask serial-getty@ttyS0.service
5.2 Copy udev rules
ubuntu@AUDACITY:~$ cd ~/osr_ws/src/osr-rover-code/config
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ sudo cp
serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ sudo udevadm
control --reload-rules && sudo udevadm trigger
5.3 Add user to tty and dialout groups
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ sudo adduser
$USER tty
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ sudo adduser
$USER dialout
5.4 Remove console line in cmdline.txt boot config file
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/config$ cd
/boot/firmware
ubuntu@AUDACITY:/boot/firmware$ sudo cp cmdline.txt
cmdline.txt.bak
ubuntu@AUDACITY:/boot/firmware$ sudo nano cmdline.txt
And then delete the substring console=serial0,115200 from the
single line of text in the file. Save and exit.
```

5.5 Disable bluetooth in config.txt boot config file  
ubuntu@AUDACITY:/boot/firmware\$ cd /boot/firmware  
ubuntu@AUDACITY:/boot/firmware\$ sudo cp config.txt config.txt.bak  
ubuntu@AUDACITY:/boot/firmware\$ sudo nano config.txt  
And then add the new line dtoverlay=disable-bt immediately after  
the existing line cmdline=cmdline.txt towards the bottom of the  
file

5.6 Restart the RPi

```
ubuntu@AUDACITY:/boot/firmware$ sudo reboot now
```

6 Testing serial comm with the Roboclaw motors controllers

```
ubuntu@AUDACITY:~$ cd ~/osr_ws/src/osr-rover-code/scripts
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 128
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\\n')
(1, 0, 128)
same for 129-132
```

### **Bringing up the rover code**

continuing from:

<https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/rover Bringup.md>

1 Manual rover bringup

In a sourced terminal (source /opt/ros/foxy/setup.bash && source  
~/osr\_ws/install/setup.bash), run

```
ubuntu@AUDACITY:~$ source /opt/ros/foxy/setup.bash && source
~/osr_ws/install/setup.bash
ubuntu@AUDACITY:~$ ros2 launch osr_bringup osr_launch.py
Xbox controller fails to pair w/ OSR. Batteries are replaced.
Dongle & controller blink but fail to connect.
ubuntu@AUDACITY:~$ ls -l /dev/input/*
crw-rw---- 1 root input 13, 63 Mar 24 21:35 /dev/input/mice
no js0 or js1
```

**2022.03.25**

**2022.04.23**

### Xbox controller pairing problem

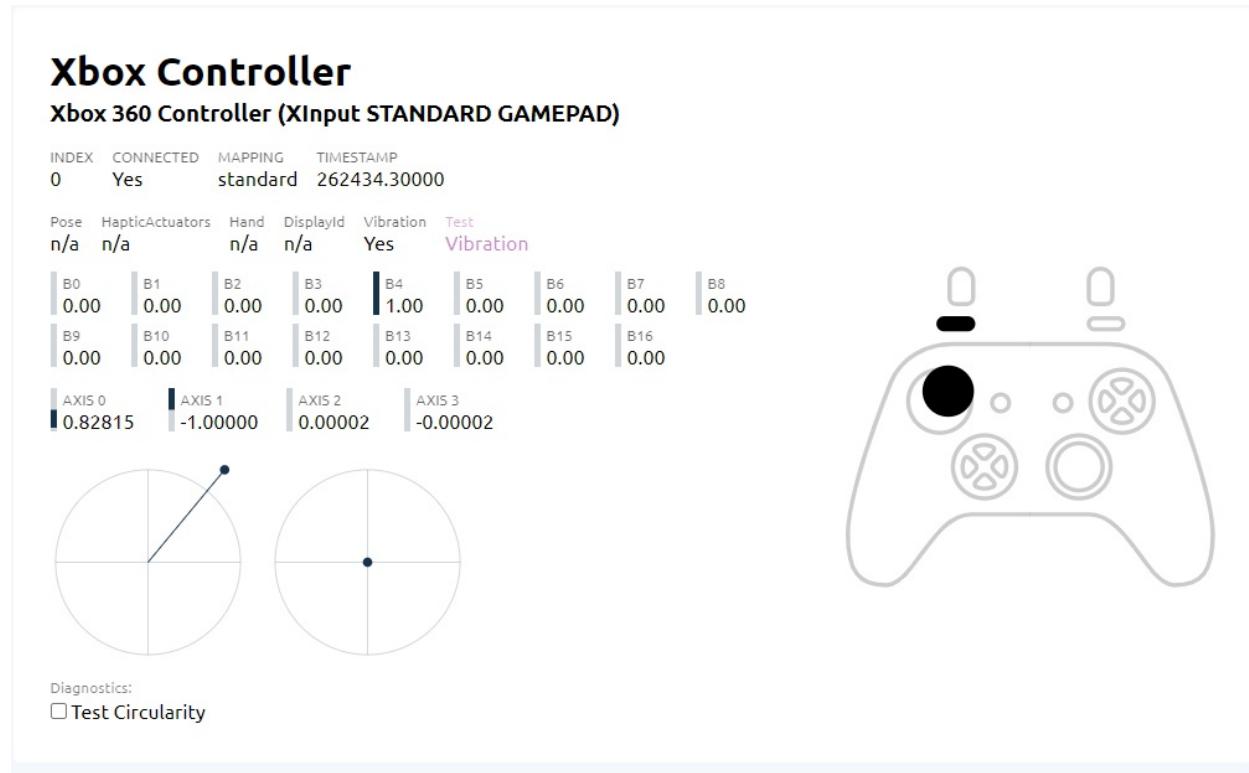
After MUCH fooling around I determined that the Xbox receiver had a flaky connection in that it would change with wiggling the wire. I disassembled the adapter and wasted the afternoon de- and re-soldering the wires on the adapter PCB. It still failed the conductivity test. Turns out the defect is at the USB plug end! Gamestop didn't have a replacement. Fortunately Amazon Prime has a 360 controller w/ adapter for just \$20 for delivery Monday. But may be too late for Show-N-Tell to the visiting honchos from NVIDIA and Shell at the AI Robotics class at HCC monday evening.

**2022.04.25 HCC ITAI class**

2 honchos from NVIDIA came to the class & spent over 2 hrs talking with the class. Fascinating! Many stories about AI problems and solutions in industry. Good discussion on how to land a job in AI.

**2022.04.26**

New Xbox controller & receiver arrived yesterday late. Unboxed this eve. Plugged into PC to test:



Now to try on AUDACITY.

Login: ubuntu/AUDACITY

Slow to boot up w/ hanging stop jobs.

Slow to respond to keyboard.

REBOOT

Eventually boots, login

```
$ ros2 launch osr_bringup osr_launch.py
```

Xbox controller pairs.

Rover responds to controller but R mid wheel runs free.

Responds to fwd/reverse but doesn't stop except runs down on its own. Suspect that encoder may not be connected or perhaps shorted w/ exposure to rain on way to HCC class yesterday?

Enough for today in that new Xbox controller and receiver work.

Shutdown.

## 2022.04.27

OSR booted up this eve w/o hangups. Launched OSR.

R mid wheel freewheeling again. Need to check w/ MotionStudio.

I've forgotten how I hook the RoboClaws upBas...? Ah, yes! I plug short USB-micro-USB cables into each RoboClaw then into a powered USB hub. Hub plugs into PC. BasicMicro Motion Studio is pulled up and displays the 5 Rcs.

**2022.04.2Dang!** The micro-USB socket on RC #5 broke off! At least I don't think that's the one that runs the R mid wheel. [I think that's #2 but I can't find that map online any more since the upgrades! **NOTE: On below diagram Back and Front are BACKWARDS**

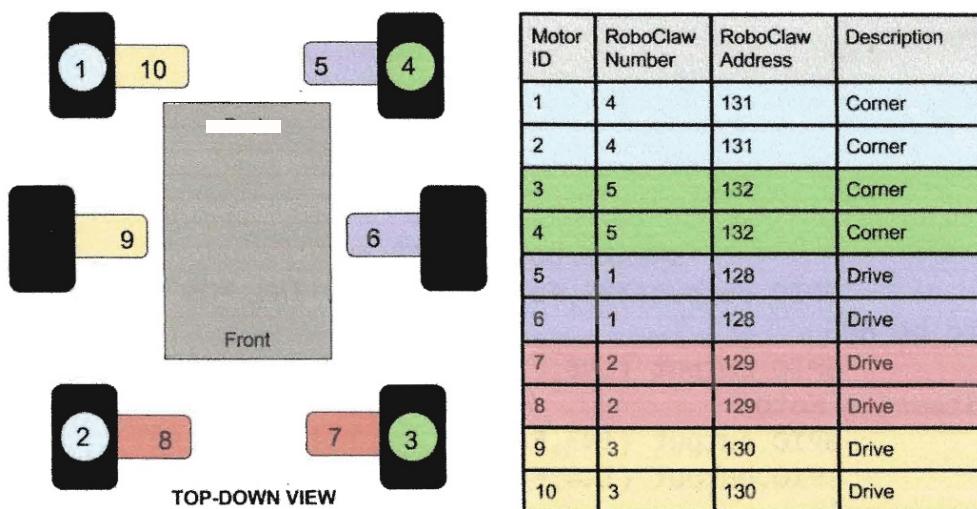


Figure 24: RoboClaw - Motor Assignments

According to this, motor #6, RC #1b, Addr 128  
Motor responds to slider appropriately but encoder is not reading except low level noise. That's the problem, the encoder. Now, is it just a loose connection, or is the encoder bad from the rain, or something? Wiggled the wires and Molex connector. Now it runs ok!? Let's try `osr_launch`.

Bingo! Rover responds appropriately! Now let's try on battery on the floor....

Argh! Not responding even tho the controller pairs ok.  
Reboot fails. WTF?

All USB cables removed from USB hub

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 128
Connected to /dev/serial1.
(1, 'USB Roboclaw 2x7a v4.1.34\n')
(1, 0, 128)
same for 129..132
```

```
ubuntu@AUDACITY:~$ lsusb
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 004: ID 045e:028e Microsoft Corp. Xbox360 Controller
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

Raspberry Pi works

`osr_launch` works

```
ubuntu@AUDACITY:~$ ros2 topic echo /status
 displays numbers
 (none of the other topics echo anything w/ Xbox twiddles)
```

Xbox 360 pairing works

<https://gamepad-tester.com/> works

`roboclawtest.py` works

Motion Studio operates all motors

(x- rear steering @ RC#5 micro-USB port broken)

?????

**2022.05.06**

**Discovered that OSR won't go if osr\_launch is run via SSH/PuTTY but DOES run if run from the desktop terminal. Why?!? Could understand if there was something to display, but no.**

This time it was the right rear drive motor that ran off. Wiggling the connectors solved the problem.

Ran it around the house. Behavior was a bit overzealous. Need to back down on the speed configurations for both drive and steering. Then use turbo mode when I need speed.

May need to address again the auto-launch, but that was so frustrating in the past.

Also got email from Freedom Robotics that there's a new version of the Dashboard that I should try later.

Good thread on Home Brew Robotics Club in Silicon Valley re using depth cameras with ROS2. Will have to address that, too.

2022.05.24

Created Desktop/SystemConfig.txt

Change config to slow down rover x- in turbo mode:

You might also want to modify the file

**osr-rover-code/ROS/osr\_bringup/launch/osr\_launch.py** to change the velocities  
the gamepad controller will send to the rover. These values in the node  
joy\_to\_twist are of interest:

```
{"scale_linear": 0.8}, # scale to apply to drive speed, in m/s:
drive_motor_rpm * 2pi / 60 * wheel radius * slowdown_factor
{"scale_angular": 1.75}, # scale to apply to angular speed, in rad/s:
scale_linear / min_radius
{"scale_linear_turbo": 1.78}, # scale to apply to linear speed, in m/s
```

ubuntu@AUDACITY:~\$ sudo find / -name osr\_launch.py

```
/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup/launch/osr_launch.py
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch/osr_launch.py
```

So, which one is the *correct* one?

I assume it's the */install/* version

ubuntu@AUDACITY:~\$ cd

```
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch/
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch
$ ls
```

osr\_launch.py osr\_mod\_launch.py

Should actually modify the **osr\_mod\_launch.py**.

Is there more than one?

ubuntu@AUDACITY:~/osr\_ws/src/osr-rover-code/ROS/osr\_bringup/launch  
\$ sudo find / -name osr\_mod\_launch.py

```
/home/ubuntu/osr_ws/src/osr-rover-code/ROS/osr_bringup/launch/osr_
mod_launch.py
```

Nope, just in the */launch/* directory. That settles it!

ubuntu@AUDACITY:~/osr\_ws/src/osr-rover-code/ROS/osr\_bringup/launch

\$ nano osr\_mod\_launch.py

```
parameters=[
 {"scale_linear.x": 0.5}, # 0.8 > 0.5 scale to apply to drive speed, in m/s:
 drive_motor_rpm * 2pi / 60 * wheel radius * slowdown_factor
 {"axis_linear.x": 1},
 {"axis_angular.yaw": 3}, # which joystick axis to use for driving
 {"scale_angular.yaw": 1.00}, # 1.75 > 1.00 scale to apply to angular speed, in rad/s:
 scale_linear / min_radius(=0.45m)
 {"scale_angular_turbo.yaw": 3.95}, # scale to apply to angular speed, in rad/s:
 scale_linear_turbo / min_radius
 {"scale_linear_turbo.x": 1.00}, # 1.78 > 1.00 scale to apply to linear speed, in m/s
 {"enable_button": 4}, # which button to press to enable movement
 {"enable_turbo_button": 5} # -1 to disable turbo
],
```

ubuntu@AUDACITY:~\$ ros2 launch osr\_bringup osr\_launch.py

Works as desired not too fast or oversteering but fast turbo.

*Try setting up autolaunch on boot-up.*

*This has been fraught with problems before:*

*This causes error, runs 3 times:*

**A stop job is running for OSR service (countdown / 1min 43s)**

**Xbox controller fails to pair & rover doesn't respond**

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo systemctl enable
osr_startup.service
```

Created symlink /etc/systemd/system/multi-user.target.wants/osr\_startup.service  
→ /etc/systemd/system/osr\_startup.service.

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo systemctl start
osr_startup.service
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl enable osr_startup.service
```

Created symlink

/etc/systemd/system/multi-user.target.wants/osr\_startup.service →  
/etc/systemd/system/osr\_startup.service.

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl start osr_startup.service
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl status osr_startup.service
```

...failed to execute command, permission denied...

From:

[https://github.com/nasa-jpl/osr-rover-code/blob/master/setup/rover\\_bringup.md](https://github.com/nasa-jpl/osr-rover-code/blob/master/setup/rover_bringup.md)

3 Automatic bringup with launch script

Starting scripts on boot using ROS can be a little more difficult than starting scripts on boot normally from the Raspberry Pi because of the default permission settings on the RPi and the fact that that ROS cannot be ran as the root user. The way that we will starting our rover code automatically on boot is to create a service that starts our roslaunch script, and then automatically run that service on boot of the robot. Further information on system service scripts running at boot.

There are two scripts in the "init\_scripts" folder. The first is the bash file that runs the roslaunch file, and the other creates a system service to start that bash script. Open up a terminal on the raspberry Pi and execute the following commands.

```
cd ~/osr_ws/src/osr-rover-code/init_scripts
use symbolic links so we capture updates to these files in the service
ln -s $(pwd)/launch_osr.sh ~/launch_osr.sh
ln -s $(pwd)/osr_paths.sh ~/osr_paths.sh
sudo cp osr_startup.service /etc/systemd/system/osr_startup.service
sudo chmod 644 /etc/systemd/system/osr_startup.service
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl enable osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl start osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor
preset: enabled)
 Active: activating (auto-restart) (Result: exit-code) since Tue 2022-05-24
 20:51:02 CDT; 2s ago
 Process: 6424 ExecStart=/usr/local/bin/launch_osr.sh (code=exited,
status=203/EXEC)
 Main PID: 6424 (code=exited, status=203/EXEC)
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
reboot
```

Rover does NOT launch on reboot. Have to do normal launch command.

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl status osr_startup.service
...failed to execute command, permission denied...
```

Shutdown for today

**2022.05.26**

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
 Active: activating (auto-restart) (Result: exit-code) since Thu 2022-05-26 14:20:13 CDT; 1s ago
 Process: 3650 ExecStart=/usr/local/bin/launch_osr.sh (code=exited, status=203/EXEC)
 Main PID: 3650 (code=exited, status=203/EXEC)
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ cat
launch_osr.sh
#!/bin/bash
exit on error, and output executed commands to stdout
set -ex
source osr_paths.sh
launch_dir=$OSR_CODE_DIR/ROS/osr_bringup/launch
bash -c ". /opt/ros/foxy/setup.bash"
bash -c ". /home/$USER/osr_ws/install/setup.sh"
execute the custom mod launch file if it's available
if [-e "$launch_dir/osr_mod_launch.py"]; then
 echo "Launching osr_mod_launch.py"
 bash -i -c "ros2 launch osr_bringup osr_mod_launch.py"
otherwise go with the default
else
 echo "Launching osr.launch"
 bash -i -c "ros2 launch osr_bringup osr_launch.py"
fi
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ echo
$OSR_CODE_DIR
blank
```

```
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ cd
$OSR_CODE_DIR
ubuntu@AUDACITY:~$
just goes to home dir, not sure if that's what it thinks
$OSR_CODE_DIR is or just going home from cd alone?
```

```
ubuntu@AUDACITY:~$ sudo journalctl -f
May 26 15:21:14 AUDACITY systemd[4947]: osr_startup.service: Failed to execute
command: Permission denied
May 26 15:21:14 AUDACITY systemd[4947]: osr_startup.service: Failed at step
EXEC spawning /usr/local/bin/launch_osr.sh: Permission denied
May 26 15:21:14 AUDACITY systemd[1]: osr_startup.service: Main process exited,
code=exited, status=203/EXEC
May 26 15:21:14 AUDACITY systemd[1]: osr_startup.service: Failed with result
'exit-code'.
```

**2022.05.28**

*Following these directions, added AUDACITY to NASA/JPL OSR  
Examples:*

[https://github.com/nasa-jpl/open-source-rover/blob/master/examples/builders\\_gallery.md](https://github.com/nasa-jpl/open-source-rover/blob/master/examples/builders_gallery.md)

*FIRST TIME PULL REQUEST!!*

*We'll see if it flies.*

*Video didn't seem to show, commented on this w/ PR.*

**2022.05.29**

*Updated Pull Request to add AUDACITY to the OSR Gallery but without videos based on info from Slack thread.*

*Using Git Bash. Note folder path:*

Me@JohnGalt MINGW64 ~/Documents/My Downloads/Robotics/USAi  
Labs/Mars Rover/OSR Git Gallery/examples (USAi\_Labs\_AUDACITY)  
**\$ git push origin USAi\_Labs\_AUDACITY**

*Added first YouTube video of AUDACITY OSR:*

<https://youtu.be/n0Rx8EbABIY>

*to later link to OSR Github gallery*

*Looking at osr\_startup.service again:*

*Looking back at Slack from almost a year ago:*

<https://opensourcerover.slack.com/archives/C01K4G4TUA1/p1622628143003300>

*"If you want to customize your osr\_launch.py file, make a copy of it in the same directory (osr-rover-code/ROS/osr\_bringup/launch/) and name it osr\_mod\_launch.py."*

*But an error message from -*

ubuntu@AUDACITY:~\$ sudo systemctl status osr\_startup.service

*Indicates the startup code seems to want it to be in:*

home/ubuntu/osr\_ws/install/osr\_bringup/share/osr\_bringup.

*So I cp the osr\_mod\_launch.py file to the indicated directory & all is well!*

ubuntu@AUDACITY:~/osr\_ws/install/osr\_bringup/share/osr\_bringup/lau  
nch\$ **sudo find ~/ -name osr\_mod\_launch.py**  
/home/ubuntu/osr\_ws/src/osr-rover-code/ROS/osr\_bringup/launch/osr\_mod\_launch.py

ubuntu@AUDACITY:~/osr\_ws/install/osr\_bringup/share/osr\_bringup/lau  
nch\$ **cp**  
**/home/ubuntu/osr\_ws/src/osr-rover-code/ROS/osr\_bringup/launch/osr\_**  
**mod\_launch.py .**

ubuntu@AUDACITY:~/osr\_ws/install/osr\_bringup/share/osr\_bringup/lau  
nch\$ **ls**  
**\_\_pycache\_\_ osr\_launch.py osr\_mod\_launch.py**

```

ubuntu@AUDACITY:~/osr_ws/install/osrBringup/share/osrBringup/launch$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor
preset: enabled)
 Active: active (running) since Sun 2022-05-29 12:43:58 CDT; 10ms ago
 Main PID: 92723 ((h_osr.sh))
 Tasks: 0 (limit: 4199)
 CGroup: /system.slice/osr_startup.service
 └─92723 [(h_osr.sh)]

May 29 12:43:58 AUDACITY systemd[1]: Started OSR service.
May 29 12:43:58 AUDACITY systemd[92723]: osr_startup.service: Failed to execute
command: Permission denied
May 29 12:43:58 AUDACITY systemd[92723]: osr_startup.service: Failed at step
EXEC spawning /usr/local/bin/launch_osr.sh: Permission denied
May 29 12:43:58 AUDACITY systemd[1]: osr_startup.service: Main process exited,
code=exited, status=203/EXEC
May 29 12:43:58 AUDACITY systemd[1]: osr_startup.service: Failed with result
'exit-code'.

```

*Clearly, the above fix didn't.*

*It's looking for the old launch\_osr.sh instead of osr\_launch.py*

Looking back to:

<https://app.slack.com/client/T01CMHZLGPL/C01K4G4TUA1>

which point to

<https://github.com/nasa-jpl/osr-rover-code/pull/137/commits/30efb75d26ea488c9ba9d38a5293814db8d42716#>

There are two scripts in the "init\_scripts" folder. The first is the bash file that runs the roslaunch file, and the other creates a system service to start that bash script. Open up a terminal on the raspberry Pi and execute the following commands.

```

cd ~/osr_ws/src/osr-rover-code/init_scripts
use symbolic links so we capture updates to these files in the service
ln -s $(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln -s $(pwd)/osr_paths.sh /usr/local/bin/osr_paths.sh
ln -s $(pwd)/launch_osr.sh ~/launch_osr.sh
ln -s $(pwd)/osr_paths.sh ~/osr_paths.sh
sudo cp osr_startup.service /etc/systemd/system/osr_startup.service
sudo chmod 644 /etc/systemd/system/osr_startup.service

```

```

ubuntu@AUDACITY:~$ cd ~/osr_ws/src/osr-rover-code/init_scripts
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ls
launch_osr.sh osr_paths.sh osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/launch_osr.sh /usr/local/bin/launch_osr.sh
ln: failed to create symbolic link '/usr/local/bin/launch_osr.sh': File exists
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ ln -s
$(pwd)/launch_osr.sh /usr/local/bin/osr_paths.sh
ln: failed to create symbolic link '/usr/local/bin/osr_paths.sh': File exists
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo cp
osr_startup.service /etc/systemd/system/osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
chmod 644 /etc/systemd/system/osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl enable osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl start osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor
preset: enabled)
 Active: active (running) since Sun 2022-05-29 13:06:23 CDT; 9ms ago
 Main PID: 93229 ((h_osr.sh))
 Tasks: 0 (limit: 4199)
 CGroup: /system.slice/osr_startup.service
 └─93229 [(h_osr.sh)]

May 29 13:06:23 AUDACITY systemd[1]: Started OSR service.
May 29 13:06:23 AUDACITY systemd[93229]: osr_startup.service: Failed to execute
command: Permission denied
May 29 13:06:23 AUDACITY systemd[93229]: osr_startup.service: Failed at step
EXEC spawning /usr/local/bin/launch_osr.sh: Permission denied
May 29 13:06:23 AUDACITY systemd[1]: osr_startup.service: Main process exited,
code=exited, status=203/EXEC
May 29 13:06:23 AUDACITY systemd[1]: osr_startup.service: Failed with result
'exit-code'.
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
chmod 644 /usr/local/bin/launch_osr.sh
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor
preset: enabled)
 Active: active (running) since Sun 2022-05-29 13:07:38 CDT; 5ms ago
 Main PID: 93259 ((h_osr.sh))
 Tasks: 0 (limit: 4199)
 CGroup: /system.slice/osr_startup.service
 └─93259 (h_osr.sh)

```

```
May 29 13:07:38 AUDACITY systemd[1]: Started OSR service.
May 29 13:07:38 AUDACITY systemd[93259]: osr_startup.service: Failed to execute
command: Permission denied
May 29 13:07:38 AUDACITY systemd[93259]: osr_startup.service: Failed at step
EXEC spawning /usr/local/bin/launch_osr.sh: Permission denied
May 29 13:07:38 AUDACITY systemd[1]: osr_startup.service: Main process exited,
code=exited, status=203/EXEC
May 29 13:07:38 AUDACITY systemd[1]: osr_startup.service: Failed with result
'exit-code'.
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl enable osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl start osr_startup.service
ubuntu@AUDACITY:~/osr_ws/src/osr-rover-code/init_scripts$ sudo
systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor
preset: enabled)
 Active: activating (auto-restart) (Result: exit-code) since Sun 2022-05-29
13:07:55 CDT; 2s ago
 Process: 93302 ExecStart=/usr/local/bin/launch_osr.sh (code=exited,
status=203/EXEC)
 Main PID: 93302 (code=exited, status=203/EXEC)
```

*At least no more “permission denied”*

*reviewing, all seems done correctly:*

[https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/rover\\_bringup.md](https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/rover_bringup.md)

*Curious - I get **different** error messages depending whether I use desktop terminal or SSH:*

**SSH:**

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor
preset: enabled)
 Active: activating (auto-restart) (Result: exit-code) since Sun 2022-05-29
13:37:33 CDT; 169ms ago
 Process: 2528 ExecStart=/usr/local/bin/launch_osr.sh (code=exited,
status=203/EXEC)
 Main PID: 2528 (code=exited, status=203/EXEC)
```

Desktop terminal:

```
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor
preset: enabled)
 Active: active (running) since Sun 2022-05-29 13:37:33 CDT; 10ms ago
 Main PID: 2553 ((h_osr.sh))
 Tasks: 0 (limit: 4199)
 Cgroup: /system.slice/osr_startup.service
May 29 13:37:59 AUDACITY systemd[1]: Started OSR service
May 29 13:37:59 AUDACITY systemd[2553]: osr_startup.service failed to execute
command: Permission denied
May 29 13:37:59 AUDACITY systemd[2553]: osr_startup.service failed at step EXEC
spawning /usr/local/bin/launch_osr.sh: Permission denied
May 29 13:37:59 AUDACITY systemd[1]: osr_startup.service: Main process exited,
code=exited, status=203/EXEC
May 29 13:37:59 AUDACITY systemd[1]: osr_startup.service: Failed with result
'exit-code'.
```

*I'm thinking chmod 644 isn't giving enough permission to  
/usr/local/bin/launch\_osr.sh*

*Let's try 777*

```
ubuntu@AUDACITY:~$ sudo chmod 777 /usr/local/bin/launch_osr.sh
ubuntu@AUDACITY:~$ sudo systemctl status osr_startup.service
● osr_startup.service - OSR service
 Loaded: loaded (/etc/systemd/system/osr_startup.service; enabled; vendor preset: enabled)
 Active: active (running) since Sun 2022-05-29 13:57:35 CDT; 1min 39s ago
 Main PID: 2972 (launch_osr.sh)
 Tasks: 49 (limit: 4199)
 CGroup: /system.slice/osr_startup.service
 ├─2972 /bin/bash /usr/local/bin/launch_osr.sh
 ├─3025 /usr/bin/python3 /opt/ros/foxy/bin/roslaunch osr Bringup osr_mod.launch.py
 ├─3076 /usr/bin/python3
/home/ubuntu/osr_ws/install/osr_control/lib/osr_control/roboclaw_wrapper --ros-args -r
__node:=roboclaw_wrapper --params>
 ├─3078 /usr/bin/python3 /home/ubuntu/osr_ws/install/osr_control/lib/osr_control/rover
--ros-args -r __node:=rover --params-file /home/ubuntu/osr>
 ├─3080 /opt/ros/foxy/lib/roslaunch_twist_joy/teleop_node --ros-args -r
__node:=teleop_twist_joy --params-file /tmp/launch_params_gce6mljl --params->
 └─3082 /opt/ros/foxy/lib/joy/joy_node --ros-args -r __node:=joy --params-file
/tmp/launch_params_9cvjy63v --params-file /tmp/launch_params_djgje>

May 29 13:57:41 AUDACITY launch_osr.sh[3025]: [teleop_node-3] [INFO] [1653850661.251239159]
[TeleopTwistJoy]: Turbo on button 5.
May 29 13:57:41 AUDACITY launch_osr.sh[3025]: [teleop_node-3] [INFO] [1653850661.251458564]
[TeleopTwistJoy]: Linear axis x on 1 at scale 0.500000.
May 29 13:57:41 AUDACITY launch_osr.sh[3025]: [teleop_node-3] [INFO] [1653850661.251644117]
[TeleopTwistJoy]: Turbo for linear axis x is scale 1.000000.
May 29 13:57:41 AUDACITY launch_osr.sh[3025]: [teleop_node-3] [INFO] [1653850661.251806430]
[TeleopTwistJoy]: Angular axis yaw on 3 at scale 1.000000.
May 29 13:57:41 AUDACITY launch_osr.sh[3025]: [teleop_node-3] [INFO] [1653850661.251944650]
[TeleopTwistJoy]: Turbo for angular axis yaw is scale 3.950000.
May 29 13:57:41 AUDACITY launch_osr.sh[3025]: [joy_node-4] [INFO] [1653850661.789659310] [joy]:
Opened joystick: Microsoft X-Box 360 pad. deadzone: 0.050000
May 29 13:57:44 AUDACITY launch_osr.sh[3025]: [roboclaw_wrapper-1] [INFO] [1653850664.987184897]
[roboclaw_wrapper]: Initializing motor controllers
May 29 13:57:45 AUDACITY launch_osr.sh[3025]: [roboclaw_wrapper-1] [INFO] [1653850665.128244735]
[roboclaw_wrapper]: Successfully connected to RoboClaw motor >
May 29 13:57:45 AUDACITY launch_osr.sh[3025]: [rover-2] [INFO] [1653850665.934096941] [rover]:
Initializing Rover
May 29 13:57:45 AUDACITY launch_osr.sh[3025]: [rover-2] [INFO] [1653850665.947947576] [rover]:
Calculating wheel odometry and publishing to /odom topic
```

*Success!*

Shutdown:

```
[numbers] systemd-shutdown[1] Waiting for process pulseaudio
[numbers] shutdown[1] Waiting for process pulseaudio
[numbers] shutdown[1] Waiting for process pulseaudio
finally stops
```

taking advice from:

<https://itsfoss.com/long-shutdown-linux/>

```
ubuntu@AUDACITY:~$ journalctl -rb -l
```

*all I see is a long list of useless data*

*try plan B:*

Speed up shutdown in Linux by reducing default stop timeout [Quick fix]  
The default wait period for the shut down is usually set at 90 seconds. Your system tries to force stop the services after this time period.

If you want your Linux system to shut down quickly, you can change this waiting period.

You'll find all the systemd settings in the config file located at /etc/systemd/system.conf. This file should be filled with lots of line starting with #. They represent the default values of the entries in the file.

Before you do anything, it will be a good idea to make a copy of the original file.

```
ubuntu@AUDACITY:~$ sudo cp /etc/systemd/system.conf
/etc/systemd/system.conf.orig
```

```
ubuntu@AUDACITY:/etc/systemd$ sudo nano system.conf
```

Look for DefaultTimeoutStopSec here. It should probably be set to 90 sec.

```
#DefaultTimeoutStopSec=90s
```

You have to change this value to something more convenient like 5 or 10 seconds.

```
DefaultTimeoutStopSec=5s
```

Don't forget to remove the # before DefaultTimeoutStopSec. Save the file and reboot your system.

*Success! Shutdown now only waits 5s.*

*Driving around the speed is good, but the steering seems too brisk. Need to tune down the steering config.*

```
ubuntu@AUDACITY:~/osr_ws/install/osrBringup/share/osrBringup/lau
nch$ nano osr_mod_launch.py (hope this is the right one)
```

```
parameters=[
 {"scale_linear.x": 0.5}, # scale to apply to drive speed, in m/s: drive_motor_rpm * 2pi /
 60 * wheel_radius * slowdown_factor
 {"axis_linear.x": 1},
 {"axis_angular.yaw": 3}, # which joystick axis to use for driving
 {"scale_angular.yaw": 0.75}, # 1.00 > 0.75 scale to apply to angular speed, in rad/s:
 scale_linear / min_radius(=0.45m)
 {"scale_angular_turbo.yaw": 1.00}, # 3.75 > 1.00 scale to apply to angular speed, in
 rad/s: scale_linear_turbo / min_radius
 {"scale_linear_turbo.x": 1.00}, # scale to apply to linear speed, in m/s
 {"enable_button": 4}, # which button to press to enable movement
 {"enable_turbo_button": 5} # -1 to disable turbo
],
```

*Odometry can be published by launching with “enable\_odometry:=true  
Is my rover publishing odometry? Did I set the config right?  
According to osr\_startup.service, yes:*

May 29 13:57:45 AUDACITY launch\_osr.sh[3025]: [rover-2] [INFO] [1653850665.947947576] [rover]: Calculting wheel odometry and **publishing to /odom topic**

```
ubuntu@AUDACITY:~$ ros2 topic list
```

```
/cmd_corner
/cmd_drive
/cmd_vel
/cmd_vel_intuitive
/encoder
/joy
/joy/set_feedback
/odom # yes
/parameter_events
/rosout
/status
/tf
/turning_radius
```

*according to:*

[http://docs.ros.org/en/noetic/api/nav\\_msgs/html/msg/Odometry.html](http://docs.ros.org/en/noetic/api/nav_msgs/html/msg/Odometry.html)

```
nav_msgs/Odometry Message
This represents an estimate of a position and velocity in free space.
The pose in this message should be specified in the coordinate frame given by
header.frame_id.
The twist in this message should be specified in the coordinate frame given
by the child_frame_id
Header header
string child_frame_id
geometry_msgs/PoseWithCovariance pose
geometry_msgs/TwistWithCovariance twist
 header: angular:
 stamp: x: 0.0
 sec: 1653872686 y: 0.0
 nanosec: 562599846 z: 0.0
 frame_id: odom covariance:
 child_frame_id: base_link long list of mostly 0.0, deleted
 pose:
 position:
 x: 1.0882535437962648
 y: 0.01195650493923732
 z: 0.0
 orientation:
 x: 0.0
 y: 0.0
 z: 0.012385377878027471
 w: 0.9999232982658313
 covariance:
 long list of mostly 0.0, deleted
 twist:
 twist:
 linear:
 x: 0.0
 y: 0.0
 z: 0.0
```

**2022.05.30**

**Posted to Slack:**

James Phelan 9:56 AM

Been almost a year exactly since I last stumbled this path!

Looking to start again toward an autonomous OSR what with upgraded motors, PCB, RPi 4, Ubuntu 20.04 and ROS2.

Has anybody else ventured down this trail that can leave a few breadcrumbs?

I'd like to start with just a camera and remote driving. USB easier than picamera in past.

Looking to try the Freedom Robotics Dashboard 2.0!

Then maybe progress to ydlidar (installed successfully in past) with NAV2. Completely in the dark there.

Then on to visual SLAM using either Intel RealSense D455 (very difficult previously) or an OAK-D. (I've tried both).

With y'all's help, if successful I'll write up an OSR Github page.

*Also, maybe try editing and submitting a PR to add me as a source for the Mission Patch. Since the link goes to lschooley's Github, I'll ask her directly:*

Lauren Schooley <lauren.schooley@gmail.com>

Lauren,

I posted an Issue in Dec to your OSR Mission Patch page but haven't taken the opportunity to follow up.

I'm wondering if you'd be willing to add my purchase information to your page so OSR Community members can buy the the patch premade?

It's only \$10 postpaid anywhere in the world. Way cheaper than actual NASA patches!

I'm splitting the profits between you and USAi Labs, our nonprofit robotics educational organization so, the more I sell the more you make.

I doubt you'll be retiring on the royalties but you deserve whatever we generate for your work!

Thanks!!

Jim Phelan

*Today, instead of going down the rabbit hole of a ROS2 camera, I thought I'd take a look at the Rev F OSR PCB from Kit Kennedy.*

*Go here to see it w/o having to download the files:*

<https://kitspace.org/boards/github.com/nasa-jpl/open-source-rover/open-source-rover-control-board/>

Slack post:

James Phelan 11:45 AM

Kit, not sure where to post this as the Issue section of the OSR Github is crowded and not specific to Rev F.

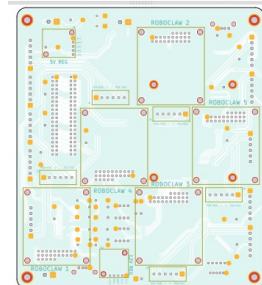
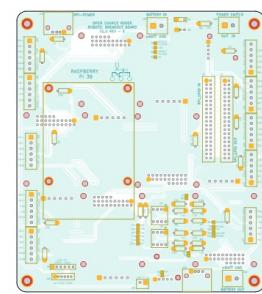
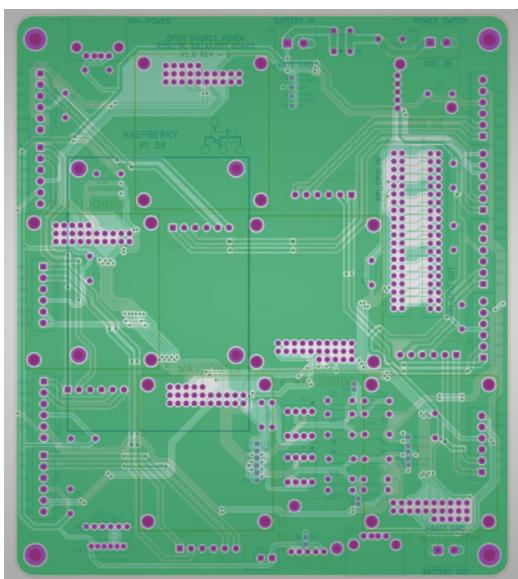
On Control Board Rev F, which is Pin 1 of J6 & J7 the GPIO bus connectors? In most places pin 1 is designated by a square solder pad, but not on these 2. I'm trying to figure out the path to the RoboClaw E\_stop pins.

Do they go anywhere but to the GPIO bus? Looking for a point of attachment of a remote kill switch to, I believe, ground E\_stop in case of run-away robot.

BTW love how in Kitspace you can easily see the Gerbers and how the components are placed. Sweet! Means I didn't have to download and fuss over it!

Nice work!!

JHP



*Looking into bigger battery. The BOM battery is obsolete with this being the alternative & equiv to what I have now \$87 (13.5cm x 3.8cm x 3.8cm; 384gms:*

<https://www.batteryspace.com/li-ion-18650-battery-14-6v-5-2ah-75-92wh-7a-rate-inr18650m26-for-diving-light.aspx>

*Achille uses this one, about twice as big Amazon \$93 (16.6cm x 4.95cm x 4.1cm; 736gms (and MUCH cheaper from than Batteryspace.com).*

*I assume I can use the same battery charger for this one?!*

[https://www.amazon.com/gp/product/B07YP73LMX/ref=ppx\\_yo\\_dt\\_b\\_search\\_asin\\_title?ie=UTF8&psc=1](https://www.amazon.com/gp/product/B07YP73LMX/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1)

*Now, having done all that, I'm ready to go down the rabbit hole of adding a camera, starting with the OAK-D as there is reputed to be a lot of good support (but I'm not finding much!):*

<https://store.opencv.ai/products/oak-d> OAK-D \$199

Learn OAK

<https://store.opencv.ai/blogs/learn-oak>

OAK-D Case Studies: Lot of hype but no code

Easy 30-second setup: Useless video & link to docs broken.

OAK Forum: Useless! Last post was 12/'20 announcing launch of forum in 1/'21. 18m ago and nothing since!

OpenCV AI Competition: Useless! Announcing competition for January 2021. Nothing since!

Google “ROS2 OAK-D”:

*This Github looks hopeful*

<https://github.com/luxonis/depthai-ros>

YouTube videos showing same successful example:

<https://www.youtube.com/watch?v=rT70bNqZ-jg>

<https://www.youtube.com/watch?v=06jcqfZ4Er8>

Best to pause here & save the SD card image!

C:/Users/Me/Documents/My Downloads/Robotics/USAi Labs/SD Card Images/2022.05.30 AUDACITY.img

## Install Dependencies

The following script will install depthai-core and update usb rules and install depthai devices

```
ubuntu@AUDACITY:~$ sudo wget -qO-
https://raw.githubusercontent.com/luxonis/depthai-ros/main/install
_dependencies.sh | sudo bash
...
Get:31 http://ports.ubuntu.com/ubuntu-ports focal-security/multiverse
Translation-en [5376 B]
Fetched 6506 kB in 6s (1069 kB/s)
Extracting templates from packages: 100%
(Reading database ... 347687 files and directories currently installed.)
Preparing to unpack .../libudev-dev_245.4-4ubuntu3.17_arm64.deb ...
Unpacking libudev-dev:arm64 (245.4-4ubuntu3.17) over (245.4-4ubuntu3.15)
...
LONG involved install...
```

if you don't have opencv installed then try sudo apt install libopencv-dev

*Let's see if it's already installed:*

```
ubuntu@AUDACITY:~$ python3 -c "import cv2; print(cv2.__version__)"
ModuleNotFoundError: No module named 'cv2'
```

*Best do some basic housekeeping first*

```
ubuntu@AUDACITY:~$ sudo apt update
```

```
ubuntu@AUDACITY:~$ sudo apt upgrade
```

- a) This github just says do “sudo apt install libopencv-dev”
- b) Another says do “sudo apt install python3-opencv”
- c) Another says do “sudo apt install python3-opencv libopencv-dev”
- d) Another says use pip “sudo pip3 install opencv-contrib-python” or opencv-python (lite version, not recommended) but NOT BOTH
- e) Another says to clone & compile BOTH from source (NO!)

*I'm betting on c)*

```
ubuntu@AUDACITY:~$ sudo apt install python3-opencv libopencv-dev
libopencv-dev is already the newest version (4.2.0+dfsg-5).
The following NEW packages will be installed:
```

```
 python3-opencv
```

```
ubuntu@AUDACITY:~$ sudo apt autoremove
```

```
Setting up python3-opencv (4.2.0+dfsg-5) ...
```

if you don't have rosdep installed and not initialized please execute the following steps:

*I believe it's already installed but could use update?*

```
ubuntu@AUDACITY:~$ rosdep update
```

```
...
updated cache in /home/ubuntu/.ros/rosdep/sources.cache
install the following vcstool sudo apt install python3-vcstool
ubuntu@AUDACITY:~$ sudo apt install python3-vcstool
Setting up python3-vcstool (0.3.0-1) ...
```

### **Setting up procedure**

The following setup procedure assumes you have cmake version >= 3.10.2 (3.16.3 ✓) and OpenCV version >= 4.0.0 (4.2 ✓)

```
ubuntu@AUDACITY:~$ cmake --version
```

```
cmake version 3.16.3
```

*Though I don't see reference to cmake to follow*

```
ubuntu@AUDACITY:~$ python3 -c "import cv2; print(cv2.__version__)"
4.2.0
```

```
mkdir -p <directory_for_workspaces>/src
```

*Let's use oak-d\_ws*

```
ubuntu@AUDACITY:~$ mkdir -p oak-d_ws/src
```

```
cd <directory_for_workspaces>
```

```
ubuntu@AUDACITY:~$ cd oak-d_ws
```

```
ubuntu@AUDACITY:~/oak-d_ws$ wget
```

```
https://raw.githubusercontent.com/luxonis/depthai-ros/main/underlay.repos
```

```
ubuntu@AUDACITY:~/oak-d_ws$ vcs import src < underlay.repos
```

```
...
```

```
== src/luxonis/depthai-ros (git) ==
```

```
Cloning into '...'.
```

```
Updating files: 100% (45/45), done.
```

```
== src/luxonis/depthai-ros-examples (git) ==
```

```
Cloning into '...'.
```

```
ubuntu@AUDACITY:~/oak-d_ws$ rosdep install --from-paths src
```

```
--ignore-src -r -y
```

```
...
```

```
ERROR: the following rosdeps failed to install
```

```
apt: command [sudo -H apt-get install -y ros-foxy-foxbot-msgs] failed
```

```
apt: Failed to detect successful installation of [ros-foxy-foxbot-msgs]
```

Google "ros-foxy-foxbot-msgs": (Google of full error msg failed)

<https://github.com/foxbot/rosmg>

@foxbot/rosmg

The Robot Operating System (ROS) defines a simplified message description language for describing data types. This library parses those message definitions and can round trip them back into a canonical string format suitable for checksum generation. The parsed definitions are useful for serialization or deserialization when paired with other libraries.

*Looks like I could do without it?*

```
source /opt/ros/<ros-distro>/setup.bash
source /opt/ros/foxy/setup.bash
ubuntu@AUDACITY:~/oak-d_ws$ source /opt/ros/foxy/setup.bash
catkin_make (For ROS1) colon build (for ROS2)
ubuntu@AUDACITY:~/oak-d_ws$ colcon build
Seems to be stuck here after LONG build.
 1h 14min 56.0s] [1/3 complete] [depthai_bridge:build 66% - 1h 13min 50.9s]
^C
Summary: 1 package finished [2h 12min 13s]
 1 package had stderr output: depthai_bridge
 2 packages not processed
osr_startup.system has been running all along eating up CPU time!
Need to stop that!
$ sudo systemctl stop osr_startup.system
$ sudo systemctl status osr_startup.system
 stopped
$ top not that informative
$ sudo systemctl disable osr_startup.system
```

## REBOOT

from desktop terminal instead of SSH  
ubuntu@AUDACITY:~\$ cd oak-d\_ws/  
ubuntu@AUDACITY:~/oak-d\_ws\$ colcon build  
*Stuck? No Signal on screens. PuTTY won't connect.*  
Leave overnight.  
Ran overnight.  
depthai\_ros\_msg finished  
depthai\_bridge failed  
1 package not processed

try again  
ubuntu@AUDACITY:~/oak-d\_ws\$ colcon build  
*Interesting they're not suggesting --symlink-install*  
*I could try again using --packages-select but the first went fast*

## 2022.05.31

#2 failed again overnight. Suspect corrupted download. Try again  
ubuntu@AUDACITY:~/oak-d\_ws\$ wget
<https://raw.githubusercontent.com/luxonis/depthai-ros/main/underlay.repos>
ubuntu@AUDACITY:~/oak-d\_ws\$ vcs import src < underlay.repos
ubuntu@AUDACITY:~/oak-d\_ws\$ rosdep install --from-paths src
--ignore-src -r -y
E: Unable to locate package ros-foxy-foxbot-msgs
ERROR: the following rosdeps failed to install
 apt: command [sudo -H apt-get install -y ros-foxy-foxbot-msgs] failed
 apt: Failed to detect successful installation of [ros-foxy-foxbot-msgs]

```

ubuntu@AUDACITY:~/oak-d_ws$ sudo apt-get install
ros-foxy-foxglove-msgs try running by itself
E: Unable to locate package ros-foxy-foxglove-msgs
ubuntu@AUDACITY:~/oak-d_ws$ sudo apt-get install ros-foxy-foxglove
E: Unable to locate package ros-foxy-foxglove
Google "ros-foxy-foxglove-msgs"
 not productive.
 Points to Foxglove Studio but no install directions.

```

```

ubuntu@AUDACITY:~/oak-d_ws$ cat underlay.repos
repositories:
 luxonis/depthai-ros:
 type: git
 url: https://github.com/luxonis/depthai-ros.git
 version: main
 luxonis/depthai-ros-examples:
 type: git
 url: https://github.com/luxonis/depthai-ros-examples.git
 version: main
ubuntu@AUDACITY:~/oak-d_ws$ source /opt/ros/foxy/setup.bash
ubuntu@AUDACITY:~/oak-d_ws$ colcon build --packages-select
depthai_bridge --symlink-install
Starting >>> depthai_bridge
[Processing: depthai_bridge]
Finished <<< depthai_bridge [59.8s]
Summary: 1 package finished [1min 1s]
ubuntu@AUDACITY:~/oak-d_ws$ colcon build --packages-select
depthai_ros_msgs --symlink-install Just to be sure...
Starting >>> depthai_ros_msgs
Finished <<< depthai_ros_msgs [21.4s]
Summary: 1 package finished [22.2s]
ubuntu@AUDACITY:~/oak-d_ws$ source install/setup.bash

```

### **Executing an example**

```

cd ~/ros_ws
in this case >> cd ~/oak-d_ws
ubuntu@AUDACITY:~$ cd oak-d_ws/
source ~/ros_ws/devel/setup.bash >>
source ~/oak-d_ws/devel/setup.bash
ubuntu@AUDACITY:~/oak-d_ws$ source ~/oak-d_ws/devel/setup.bash
-bash: /home/ubuntu/oak-d_ws/devel/setup.bash: No such file or directory
ubuntu@AUDACITY:~/oak-d_ws/install$ source
~/oak-d_ws/install/setup.bash
roslaunch depthai_examples stereo_node.launch
ubuntu@AUDACITY:~/oak-d_ws$ ls
src/luxonis/depthai-ros-examples/depthai_examples/launch/
mobile_publisher.launch rgb_publisher.launch.py stereo.launch.py
stereo_mimicer.launch yolov4_publisher.launch mobile_publisher.launch.py
rgb_stereo_node.launch stereo_inertial_node.launch stereo_node.launch
yolov4_publisher.launch.py rgb_publisher.launch rgb_stereo_node.launch.py
stereo_inertial_node.launch stereo_nodelet.launch

```

*Best do this from desktop terminal:*

```
ubuntu@AUDACITY:~/oak-d_ws$ roslaunch depthai_examples
stereo_node.launch
```

Command 'roslaunch' not found, but can be installed with:  
sudo apt install python3-roslaunch

*This should be*

```
ubuntu@AUDACITY:~/oak-d_ws$ ros2 launch depthai_examples
stereo.launch.py
```

Package 'depthai\_examples' not found: "package 'depthai\_examples' not found, searching: ['/home/ubuntu/oak-d\_ws/install/depthai\_bridge', '/home/ubuntu/oak-d\_ws/install/depthai\_ros\_msgs', '/home/ubuntu/osr\_ws/install/osr\_control', '/home/ubuntu/osr\_ws/install/osr\_interfaces', '/home/ubuntu/osr\_ws/install/osr\_bringup', '/opt/ros/foxy']"

```
ubuntu@AUDACITY:~/oak-d_ws$ colcon build --packages-select
depthai_examples --symlink-install
```

*Got stuck here ^C*

```
ubuntu@AUDACITY:~$ top
```

*Not helpful*

```
ubuntu@AUDACITY:~$ sudo apt install gnome-system-monitor
```

```
ubuntu@AUDACITY:~$ gnome-system-monitor
```

*Not that helpful*

**REBOOT**

```
ubuntu@AUDACITY:~/oak-d_ws$ colcon build --packages-select
depthai_examples --symlink-install
```

*No Google mention of need for swap file for colcon build*

*Posted Issue to luxonis/depthai-ros:*

testing examples fails because colcon build not run on depthai\_examples.

*When running*

```
`colcon build --packages-select depthai_examples --symlink-install`
```

*it crashes with error message:*

```
`[CMakeFiles/mobilenet_node.dir/build.make:63
CMakeFiles/mobilenet_node.dir/ros2_src/mobilenet_publisher.cpp.o] Error 1`
Other errors follow.
```

*Running ROS2 Foxy under Ubuntu 20.04 on a Raspberry Pi 4b 4GB.*

*Goal is to use the OAK-D to make the NASA/JPL Open Source Rover autonomous  
JHP*

**Reply:**

Sachin Guruswamy <[notifications@github.com](mailto:notifications@github.com)>

Re: [luxonis/depthai-ros] depthai\_examples colcon build crashes on  
mobilenet\_node.dir (Issue #117)

```
try this on building
```

```
MAKEFLAGS="-j 1" colcon build --packages-select depthai_ros_msgs depthai_bridge
```

We have foxy packages available. try apt install ros-foxy-depthai-ros

Based on above I try

```
ubuntu@AUDACITY:~$ MAKEFLAGS="-j 1" colcon build --packages-select
```

```
depthai_examples --symlink-install
```

```
Installs OK
```

```
ubuntu@AUDACITY:~/oak-d_ws$ ros2 launch depthai_examples
```

```
stereo.launch.py
```

```
Package 'depthai_examples' not found: "package 'depthai_examples'
```

```
not found, searching: ['/home/ubuntu/osr_ws/install/osr_control',
```

```
'/home/ubuntu/osr_ws/install/osr_interfaces',
```

```
'/home/ubuntu/osr_ws/install/osr_bringup', '/opt/ros/foxy']"
```

My reply:

```
> We have foxy packages available. try apt install ros-foxy-depthai-ros
```

```
This would have been good to know! (or maybe not, see below)
```

```
```
```

```
ubuntu@AUDACITY:~/oak-d_ws$ sudo apt install ros-foxy-depthai-ros
```

```
Reading package lists... Done
```

```
Building dependency tree
```

```
Reading state information... Done
```

```
E: Unable to locate package ros-foxy-depthai-ros
```

```
```
```

```
I successfully ran
```

```
`MAKEFLAGS="-j 1" colcon build --packages-select depthai_ros_msgs depthai_bridge`
```

```
again (BTW what does the MAKEFLAGS= do?) but that part ran ok previously tho it took a couple tries.
```

```
The problem was the example wouldn't work.
```

```
First I did
```

```
`ubuntu@AUDACITY:~/oak-d_ws$ rosrun depthai_examples stereo_node.launch`
```

```
Command 'rosrun' not found, but can be installed with:
```

```
sudo apt install python3-rosrun
```

```
```
```

```
Duh! I'm running ROS2 not ROS. This should be
```

```
`ubuntu@AUDACITY:~/oak-d_ws$ ros2 launch depthai_examples stereo.launch.py`
```

```
Package 'depthai_examples' not found: "package 'depthai_examples' not found,
```

```
searching: ['/home/ubuntu/oak-d_ws/install/depthai_bridge',
```

```
'/home/ubuntu/oak-d_ws/install/depthai_ros_msgs',
```

```
'/home/ubuntu/osr_ws/install/osr_control',
```

```
'/home/ubuntu/osr_ws/install/osr_interfaces',
```

```
'/home/ubuntu/osr_ws/install/osr_bringup', '/opt/ros/foxy']"
```

```
```
```

```
So I tried
```

```
`ubuntu@AUDACITY:~/oak-d_ws$ colcon build --packages-select depthai_examples --symlink-install`
```

```
and it crashed.
```

```
Re-built it with the MAKEFLAGS and it built ok, but when I try
```

```
`ubuntu@AUDACITY:~/oak-d_ws$ ros2 launch depthai_examples stereo.launch.py`
```

```
I get
```

```
```
```

```
Package 'depthai_examples' not found: "package 'depthai_examples' not found,
```

```
searching: ['/home/ubuntu/osr_ws/install/osr_control',
```

```
'/home/ubuntu/osr_ws/install/osr_interfaces',
```

```
'/home/ubuntu/osr_ws/install/osr_bringup', '/opt/ros/foxy']"
```

```
But if I do _ they're clearly there, at least in raw form:
```

```
```
```

```
ubuntu@AUDACITY:~/oak-d_ws$ sudo find / -name stereo.launch.py
```

```
/home/ubuntu/oak-d_ws/install/depthai_examples/share/depthai_examples/launch/stereo.launch.py
```

```
/home/ubuntu/oak-d_ws/src/luxonis/depthai-ros-examples/depthai_examples/launch/stereo.launch.py
```

```
JHP
```

```
ubuntu@AUDACITY:~/oak-d_ws$ apt install ros-foxy-depthai-ros
E: Could not open lock file /var/lib/dpkg/lock-frontend - open (13: Permission
denied)
E: Unable to acquire the dpkg frontend lock (/var/lib/dpkg/lock-frontend), are
you root?
```

```
ubuntu@AUDACITY:~/oak-d_ws$ sudo apt install ros-foxy-depthai-ros
Reading package lists... Done
Building dependency tree
Reading state information... Done
E: Unable to locate package ros-foxy-depthai-ros
```

**2022.06.04**

*Battery arrived 2d ago*



*Changed the plug to PowerPoles. It charged ok w/ the other battery charger.*

*D' just mentioned the NASA Moon to Mars Festival in 2 weeks:*

[https://spacecenter.org/moon2marsfestival/?gclid=Cj0KCQjwheyUBhD-A RIIsAHJNM-NEhCLu08xZsTqkcmeczgEu\\_Bb5VIQOPJhy5Kgm\\_9wPzyDCgAE3LtAaAn-EALw\\_wcB](https://spacecenter.org/moon2marsfestival/?gclid=Cj0KCQjwheyUBhD-A RIIsAHJNM-NEhCLu08xZsTqkcmeczgEu_Bb5VIQOPJhy5Kgm_9wPzyDCgAE3LtAaAn-EALw_wcB)



*Would be fun to take the rover there if possible. Asked about HCC or USAi Labs participating. Promised to get back Monday.*

*Since OAK-D is at an impasse, let's try just a simple USB video camera such as the Spinel fisheye:*

[https://www.spinelectronics.com/5mp\\_usb\\_cameras/UC50MPB](https://www.spinelectronics.com/5mp_usb_cameras/UC50MPB)



Google “ROS2 USB camera”:

[https://index.ros.org/r/usb\\_cam/](https://index.ros.org/r/usb_cam/)

Quickstart

Assuming you have a supported ROS2 distro installed, run the following command to install the binary release:

```
sudo apt get install ros-<ros2-distro>-usb-cam
```

#### *SIDE NOTE - INTERNET*

*Having lot of trouble w/ flaky internet recently. In master closet outside the wiring cabinet I have the Xfinity router connected to Netgear router connected to home ethernet.*

*Tried rebooting both but internet still goes in/out, especially with ethernet. WiFi works most of time. Disabled internal WiFi on my Dell Inspiron and used the WiFi dongle that came with the NVIDIA Jetbot kit. At least works but still iffy.*

*Today I tried taking the Netgear router out of the sistem and plugging the 2 attached ethernet cables to library & sewing room into 2 unused ports of the Xfinity router. Trying to access the usual Library Netgear router at 192.168.1.1/start.htm no longer works.*

```
> ipconfig /all
Ethernet adapter 10.0.0.101
Wireless LAN adapter 10.0.0.174
Default gateway 10.0.0.1
DHCP Server 10.0.0.1
```

*Try re-enabling the internal WiFi & unplug the dongle.*

*Wireless LAN adaper 10.0.0.151*

*seems to work*

*Called Xfinity tech support to get us/pw for Xfinity router:  
admin/password !?!*

*Changed to usual WiFi password!*

*Need to make sure didn't mess up TV.*

*Back to the USB camera:*

*But, before I do, best to save SD card image....*

```
2022.06.04 AUDACITY after OAK-D pre USBcam.img
ubuntu@AUDACITY:~$ sudo apt-get update
ubuntu@AUDACITY:~$ sudo apt-get upgrade
ubuntu@AUDACITY:~$ sudo apt-get install ros-foxy-usb-cam
 success
```

*Building from Source*

*skip for now unless install fails*

*Running*

*check for parts:*

```
ubuntu@AUDACITY:~$ lsusb
Bus 002 Device 003: ID 2109:0817 VIA Labs, Inc.
Bus 002 Device 002: ID 2109:0817 VIA Labs, Inc. USB3.0 Hub
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 009: ID 045e:028e Microsoft Corp. Xbox360 Controller
Bus 001 Device 008: ID 2109:2817 VIA Labs, Inc.
Bus 001 Device 007: ID 413c:3012 Dell Computer Corp. Optical Wheel Mouse
Bus 001 Device 006: ID 413c:2105 Dell Computer Corp. Model L100 Keyboard
Bus 001 Device 004: ID 2109:2817 VIA Labs, Inc.
Bus 001 Device 003: ID 1b17:0522 USB2.0 Hub
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

*doesn't specifically list camera*

```
ubuntu@AUDACITY:~$ ls /dev/video*
/dev/video0 /dev/video1 /dev/video10 /dev/video11 /dev/video12
/dev/video13 /dev/video14 /dev/video15 /dev/video16
```

*Google "ubuntu 22.04 list video cameras":*

<https://linuxconfig.org/how-to-test-webcam-on-ubuntu-22-04-jammy-jellyfish>

```
ubuntu@AUDACITY:~$ dmesg | grep -i "Camera"
[2.276694] usb 1-1.1: Product: USB 2.0 Camera
[12.473957] uvcvideo: Found UVC 1.00 device USB 2.0 Camera (1b17:0522)
[12.506637] input: USB 2.0 Camera: P600 as
/devices/platform/scb/fd500000.pcie/pci0000:00/0000:00:00.0/0000:01:00.0/usb1/1-1/1-1.1/1-1.1:1.0/in
put/input3
```

```
ubuntu@AUDACITY:~$ v4l2-ctl --list-devices
```

```
...
USB 2.0 Camera: P600 (usb-0000:01:00.0-1.1):
 /dev/video0
 /dev/video1
 /dev/media2
```

```
ubuntu@AUDACITY:~$ ls -l /dev/video*
```

```
crw-rw----+ 1 root video 81, 7 Apr 21 07:54 /dev/video0
crw-rw----+ 1 root video 81, 8 Apr 21 07:54 /dev/video1
crw-rw----+ 1 root video 81, 4 Apr 21 07:54 /dev/video10
crw-rw----+ 1 root video 81, 5 Apr 21 07:54 /dev/video11
crw-rw----+ 1 root video 81, 6 Apr 21 07:54 /dev/video12
crw-rw----+ 1 root video 81, 0 Apr 21 07:54 /dev/video13
crw-rw----+ 1 root video 81, 1 Apr 21 07:54 /dev/video14
crw-rw----+ 1 root video 81, 2 Apr 21 07:54 /dev/video15
crw-rw----+ 1 root video 81, 3 Apr 21 07:54 /dev/video16
```

The `usb_cam_node` can be ran with default settings, by setting specific parameters either via the command line or by loading in a parameters file. We provide a "default" params file in the `usb_cam/config/params.yaml` directory to get you started. Feel free to modify this file as you wish. Also provided is a launch file that should launch the `usb_cam_node_exe` executable along with an additional node that displays an image topic. The commands to run each of these different ways of starting the node are shown below:

**NOTE: you only need to run ONE of the commands below to run the node**

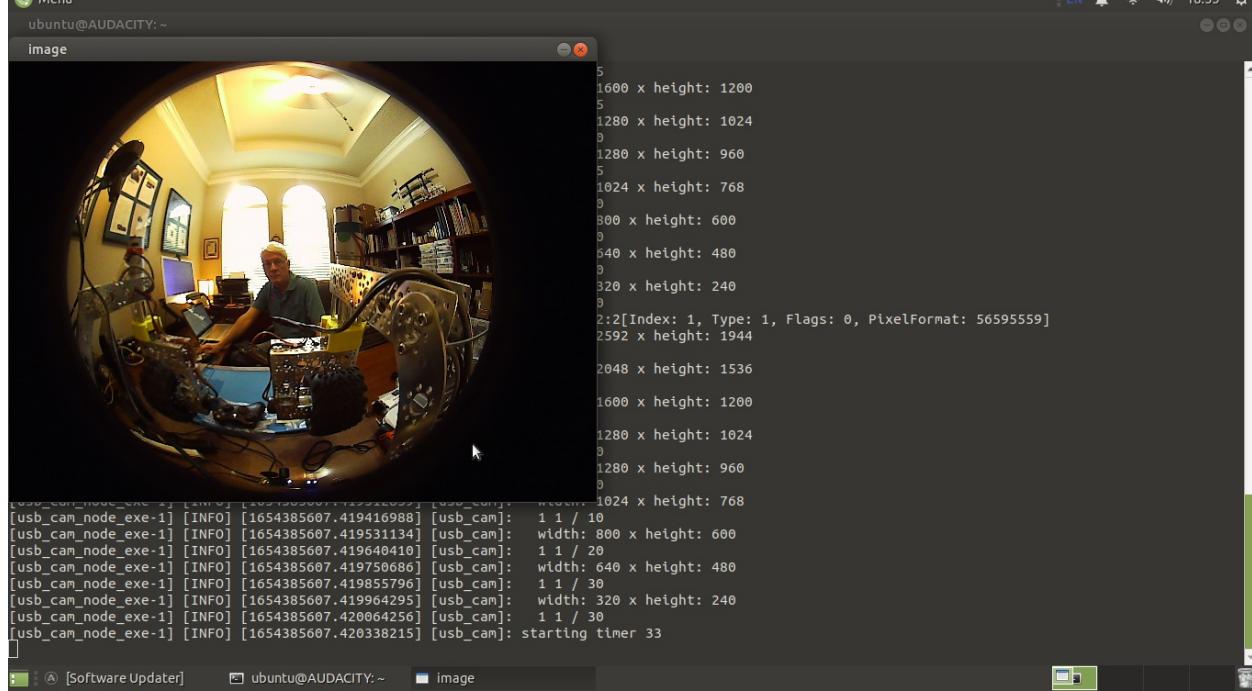
```
run the executable with default settings (without params file)
ros2 run usb_cam usb_cam_node_exe

run the executable while passing in parameters via a yaml file
ros2 run usb_cam usb_cam_node_exe --ros-args --params-file
/path/to/colcon_ws/src/usb_cam/config/params.yaml

launch the usb_cam executable that loads parameters from the same `usb_cam/config/params.yaml` file as above
along with an additional image viewer node
ros2 launch usb_cam demo_launch.py
```

*I'll try #3 from the desktop terminal to allow for viewer*

ubuntu@AUDACITY:~\$ **ros2 launch usb\_cam demo\_launch.py**



*Success!*

Now try adding Freedom Robotics Dashboard 2.0

```
curl -sSf
"https://api.freedomrobotics.ai/accounts/A6124B5AB85968B6435933C21
/devices/DAAA0C665B06524A3A897346970/installscript?mc_token=TA034B
2453AC3B926C72F2C5B&mc_secret=Sb253f266b9c2f7871a59b58a&auto_insta
ll_deps=true&ppa_is_allowed=true" | python3
```

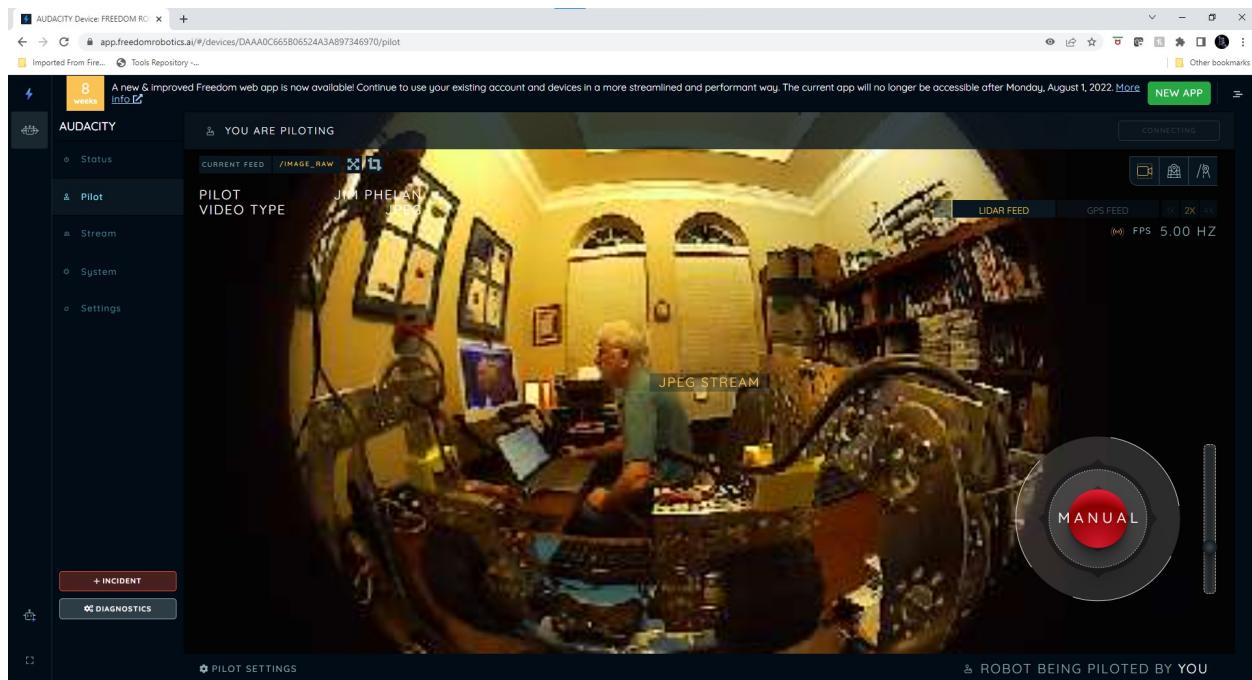
-except that in the past, python didn't work since I'm in a python3 environment. So I just change it to python3.

```
ubuntu@AUDACITY:~$ curl -sSf
"https://api.freedomrobotics.ai/accounts/A6124B5AB85968B6435933C21
/devices/DAAA0C665B06524A3A897346970/installscript?mc_token=TA034B
2453AC3B926C72F2C5B&mc_secret=Sb253f266b9c2f7871a59b58a&auto_insta
ll_deps=true&ppa_is_allowed=true" | python3
curl: (7) Failed to connect to api.freedomrobotics.ai port 443:
Network is unreachable
```

Tried again from OSR Chromium to Freedom Robotics, log-in, select New App, log-in again, cc install code, paste into terminal window, change | python to | python3 (otherwise it tries 2.7). Successfull install for python 3.8

From desktop Terminator window(s):

```
ubuntu@AUDACITY:~$ ros2 launch osr_bringup osr_launch.py
ubuntu@AUDACITY:~$ ros2 launch usb_cam demo_launch.py
```



*.It works (sort of)! With OSR and camera demo running the FR dashboard show OSR and is able to pilot it. However, the video is very grainy and the latency is several seconds w/ slow FPS. Only offers JPEG video, never tries WEBRTC. Will need to contact FR. Might need to run something other than the demo, too.*

To run at office would need for OSR & laptop to join office “Controlled” WiFi (should be easy?).

## 2022.06.05

*Let's see what we have to work with:*

```
ubuntu@AUDACITY:~$ sudo find / -name usb_cam
/opt/ros/foxy/include/usb_cam
/opt/ros/foxy/share/usb_cam
/opt/ros/foxy/share/ament_index/resource_index/packages/usb_cam
/opt/ros/foxy/share/ament_index/resource_index/package_run_dependencies/usb_cam
/opt/ros/foxy/share/ament_index/resource_index/parent_prefix_path/usb_cam
/opt/ros/foxy/share/ament_index/resource_index/rclcpp_components/usb_cam
/opt/ros/foxy/lib/usb_cam
```

*Let's check out the package:*

```
ubuntu@AUDACITY:~$ cd
/opt/ros/foxy/share/ament_index/resource_index/packages/usb_cam
-bash: cd: usb_cam: Not a directory
```

*Good time to do a backup image...*

2022.06.05 USB\_cam FR Dash.img

```
ubuntu@AUDACITY:~$ cd /opt/ros/foxy/include/usb_cam
ubuntu@AUDACITY:/opt/ros/foxy/include/usb_cam$ ls
usb_cam.hpp usb_cam_node.hpp usb_cam_utils.hpp
```

```
ubuntu@AUDACITY:~$ cd /opt/ros/foxy/share/usb_cam
ubuntu@AUDACITY:/opt/ros/foxy/share/usb_cam$ ls
cmake_config_environment.launch local_setup.bash local_setup.dsv
local_setup.sh local_setup.zsh package.dsv package.xml
ubuntu@AUDACITY:/opt/ros/foxy/share/usb_cam$ cd launch/
ubuntu@AUDACITY:/opt/ros/foxy/share/usb_cam/launch$ ls
demo_launch.py
```

```
ubuntu@AUDACITY:/opt/ros/foxy/share/usb_cam/config$ ls
camera_info.yaml params.yaml
ubuntu@AUDACITY:/opt/ros/foxy/share/usb_cam/config$ cat
camera_info.yaml
image_width: 640
image_height: 480
camera_name: test_camera
camera_matrix:
 rows: 3
 cols: 3
 data: [438.783367, 0.000000, 305.593336, 0.000000, 437.302876, 243.738352, 0.000000, 0.000000,
1.000000]
distortion_model: plumb_bob
distortion_coefficients:
 rows: 1
 cols: 5
 data: [-0.361976, 0.110510, 0.001014, 0.000505, 0.000000]
rectification_matrix:
 rows: 3
 cols: 3
 data: [0.999978, 0.002789, -0.006046, -0.002816, 0.999986, -0.004401, 0.006034, 0.004417,
0.999972]
projection_matrix:
 rows: 3
 cols: 4
 data: [393.653800, 0.000000, 322.797939, 0.000000, 0.000000, 393.653800, 241.090902, 0.000000,
0.000000, 0.000000, 1.000000, 0.000000]
ubuntu@AUDACITY:/opt/ros/foxy/share/usb_cam/config$ cat
params.yaml
/**:
ros_parameters:
 video_device: "/dev/video0"
 framerate: 30.0
 io_method: "mmap"
 frame_id: "camera"
 pixel_format: "yuyv"
 image_width: 640
 image_height: 480
 camera_name: "test_camera"
 camera_info_url: "package://usb_cam/config/camera_info.yaml"
```

```

ubuntu@AUDACITY:/opt/ros/foxy/share/usb_cam/launch$ cat
demo_launch.py
import argparse
from launch import LaunchDescription
from launch_ros.actions import Node
import os
import sys
from ament_index_python.packages import get_package_share_directory
def generate_launch_description():
 ld = LaunchDescription()
 parser = argparse.ArgumentParser(description='usb_cam demo')
 parser.add_argument('-n', '--node-name', dest='node_name', type=str,
 help='name for device', default='usb_cam')
 args, unknown = parser.parse_known_args(sys.argv[4:])
 usb_cam_dir = get_package_share_directory('usb_cam')
 # get path to params file
 params_path = os.path.join(
 usb_cam_dir,
 'config',
 'params.yaml'
)
 node_name = args.node_name
 print(params_path)
 ld.add_action(Node(
 package='usb_cam', executable='usb_cam_node_exe', output='screen',
 name=node_name,
 # namespace=ns,
 parameters=[params_path]
))
 ld.add_action(Node(
 package='usb_cam', executable='show_image.py', output='screen',
 # namespace=ns,
 # arguments=[image_manip_dir + "/data/mosaic.jpg"])
 # remappings=[('image_in', 'image_raw')]
))
 return ld

```

*Deleted output='screen' but shows to "image" anyway  
 Probably the executable='show\_image.py' causes display.  
 Restore original.*

```

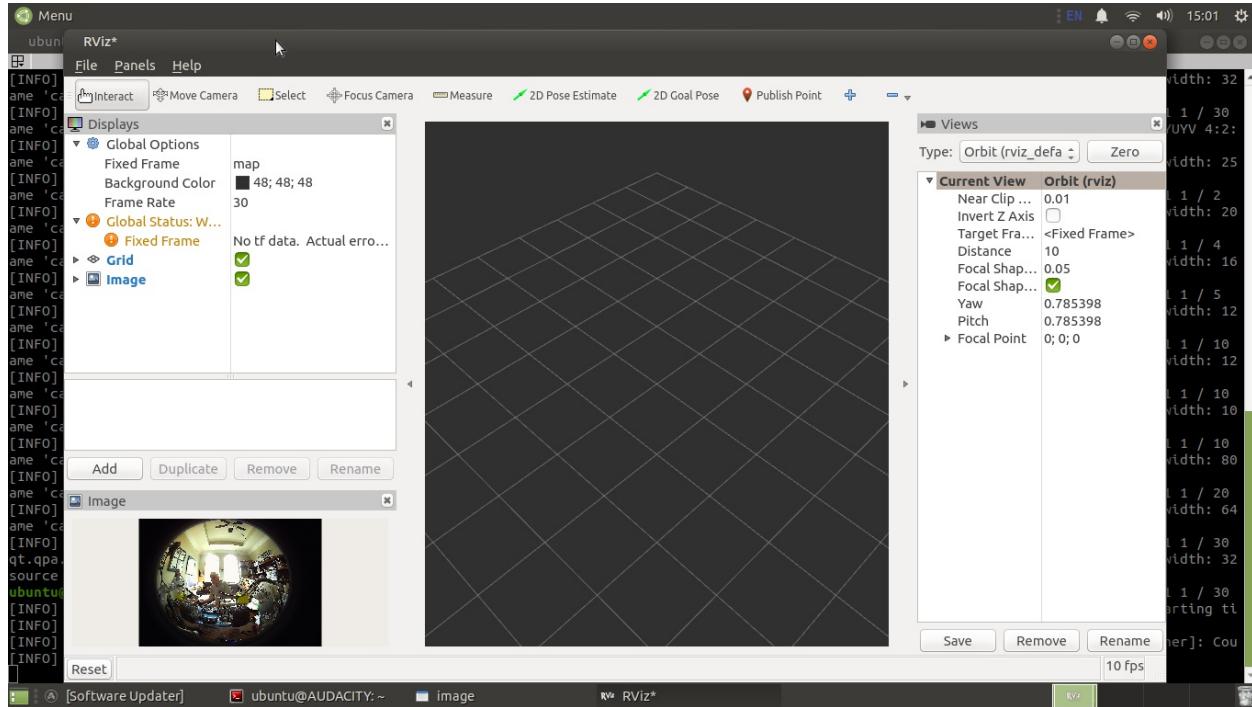
ubuntu@AUDACITY:/opt/ros/foxy/share/usb_cam/launch$ ros2 topic
list
/camera_info
/image_raw
/image_raw/compressed
/image_raw/compressedDepth
/image_raw/theora
/parameter_events
/rosout

```

From desktop terminal

```
ubuntu@AUDACITY:~$ ros2 run rviz2 rviz2
```

```
Add / By topic /image_raw / Image; ok
```



Try FR Dashboard with just the camera running

A screenshot of the Freedom Robotics FR Dashboard. The top navigation bar includes links for "ros2 usb camera - Google Search", "kltan/ros2\_usb\_camera ROS2", "ROS Index", "app.freedomrobotics.ai/#/devices/DAAA0C665B06524A3A897346970/data", and "AUDACITY Device FREEDOM RO". The dashboard has a dark theme. On the left, there's a sidebar with "AUDACITY" and sections for "Status", "Pilot", "Stream" (which is selected), "System", and "Settings". The main area shows "CONNECTED AND ACTIVE" with "Image topics" listed. It displays a circular camera feed showing a room with a person. Below the feed, it says "/image\_raw" and "0.2/0.2 FPS". To the right, there are tables for sensor data. One table for "/camera\_info" shows parameters like "BINNING\_X", "BINNING\_Y", "HEIGHT", "WIDTH", and "DISTORTION\_MODEL". Another table for "/image\_raw/theora" shows "B\_O\_S", "E\_O\_S", "GRANULEPOS", and "PACKETNO". There are also tables for "/cmd\_vel", "/parameter\_events", and "/NODE". At the bottom, there are buttons for "+ INCIDENT" and "DIAGNOSTICS", and a footer with "SELECT DASHBOARD", "TODAY", "2 COLUMNS", "1 HR", "15:42:24.577 (CURRENT)", "SHARE LINK", and "15:42:24.577 (CURRENT)".

Let's try some other USB camera apps:

[https://github.com/klintan/ros2\\_usb\\_camera/tree/foxy-devel](https://github.com/klintan/ros2_usb_camera/tree/foxy-devel)  
doesn't look too promising as is a WIP and poor install instructions.

<https://www.youtube.com/watch?v=PjMrzIdtU0w>

This video addresses ROS2 camera in gazebo

[https://gitlab.com/boldhearts/ros2\\_v4l2\\_camera](https://gitlab.com/boldhearts/ros2_v4l2_camera)

This takes a different (v4l2) approach. Let's try it.

ubuntu@AUDACITY:~\$ apt-get install ros-foxy-v4l2-camera

I'm betting it's going to want sudo. Yup!

ubuntu@AUDACITY:~\$ sudo apt-get install ros-foxy-v4l2-camera

Success.

Usage

Publish camera images, using the default parameters:

ubuntu@AUDACITY:~\$ ros2 run v4l2\_camera v4l2\_camera\_node

ERROR: ...unable to open camera calibration file

[/home/ubuntu/.ros/camera\_info/usb\_2.0\_camera: \_p600.yaml]

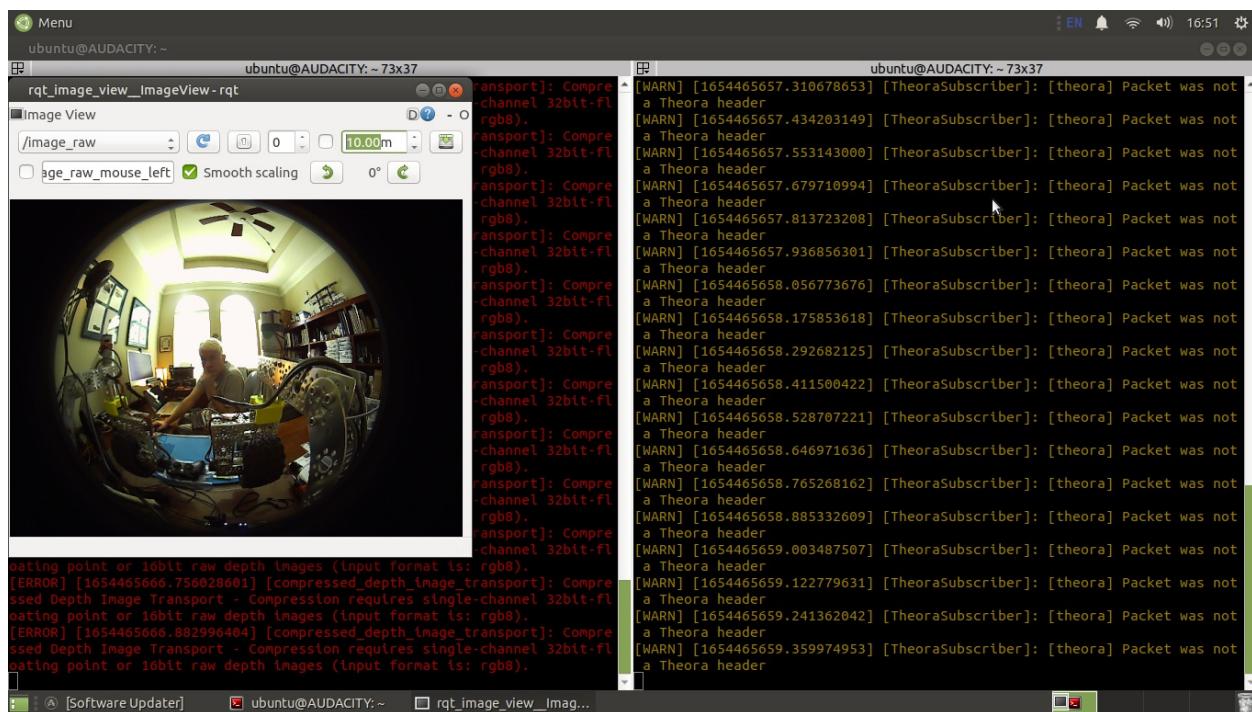
[WARN]...as above...Couldn't set keyframe frequency to 0, actually set to 1

Preview the image (open another terminal):

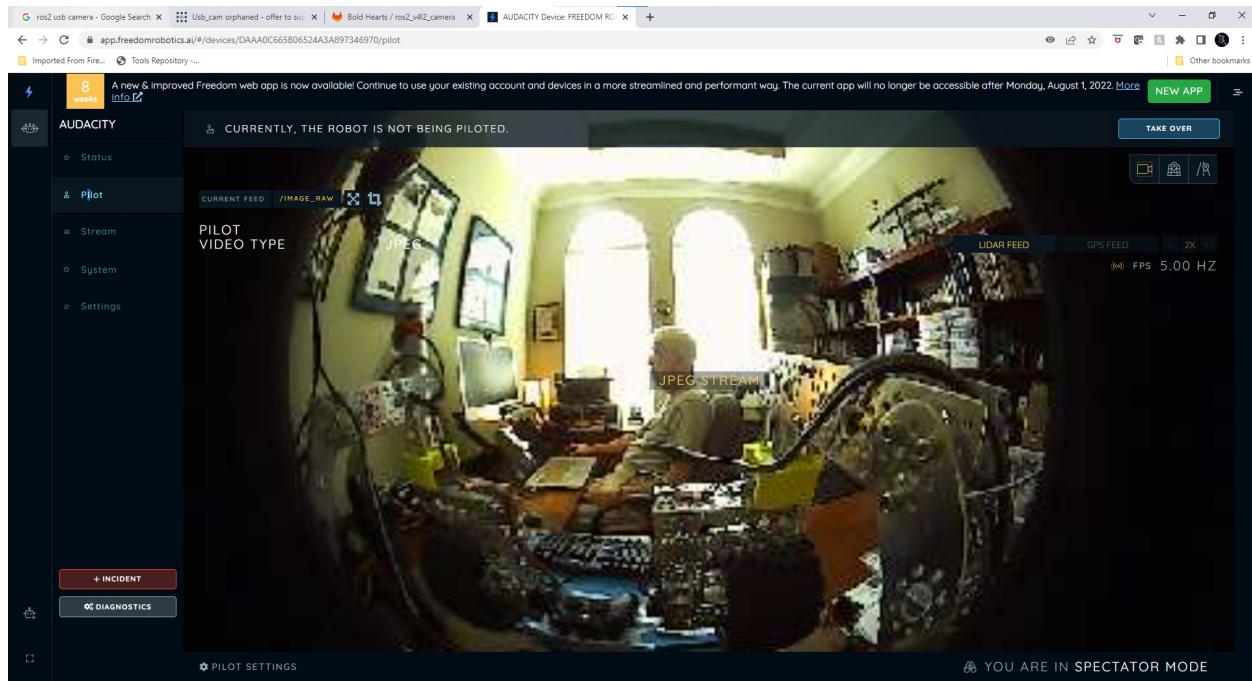
ubuntu@AUDACITY:~\$ ros2 run rqt\_image\_view rqt\_image\_view

select /image\_raw from drop-down menu

✓ Smooth scaling to decrease pixelation.



*Let's see how this looks in the FR Dashboard.*



*Doesn't seem to be any faster*

```
ubuntu@AUDACITY:~$ cat
/opt/ros/foxy/lib/v4l2_camera/v4l2_camera_node
Gibberish. Is bin.
```

*Prepare rover for run at office. Enable osr\_startup.service.  
Video not going to dashboard. Will have to settle for RC.*

Looking to install webrtc.

Looking back in this tome...

<https://raspberrypi.stackexchange.com/questions/39690/configuring-uv4l-for-webrtc-using-usb-camera-on-rpi2-raspbian>

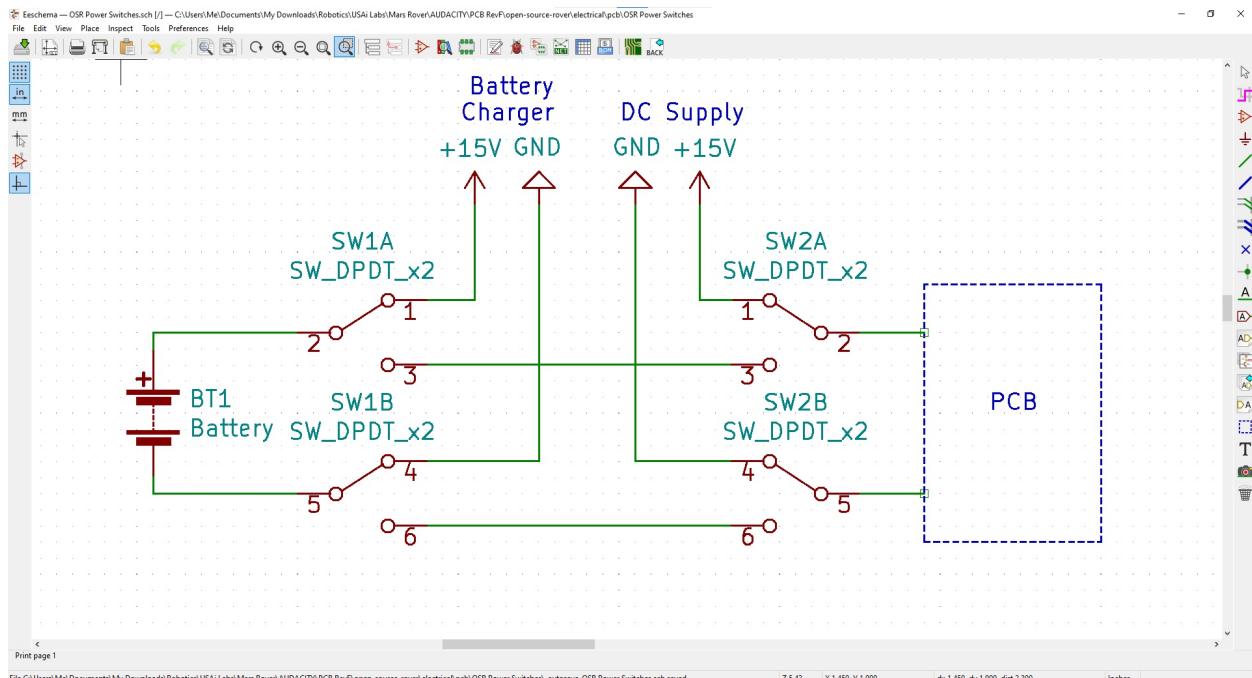
```
ubuntu@AUDACITY:~$ sudo apt-get install uv4l uv4l-server uv4l-uvc
uv4l-server uv4l-webrtc uv4l-xmpp-bridge
Reading package lists... Done
Building dependency tree
Reading state information... Done
E: Unable to locate package uv4l
E: Unable to locate package uv4l-server
E: Unable to locate package uv4l-uvc
E: Unable to locate package uv4l-server
E: Unable to locate package uv4l-webrtc
E: Unable to locate package uv4l-xmpp-bridge
```

*RTC should be installed w/ Freedom Robotics dashboard.  
Reported issues to FR via dashboard.*

**2022.06.10**

Sent "OAK-D Experience" subset of Fidelity to AUDACITY to Steve  
"Dillo" Okay.

**2022.06.12**



<https://opensourcerover.slack.com/archives/C01TU8BFZD3/p1655002369529249>

OAK-D again?

Steve Okay <[espressobot@gmail.com](mailto:espressobot@gmail.com)>

Re: "OAK-D Experience"

Hey James,

I read through some of your notes. In terms of the forums & user support, a lot of that happens on the Luxonis Discord server. Here's an invite link that should let you in or at least take you to a registration page if you don't have a Discord account.

<https://discord.gg/D8Fwpfw8>

There are a bunch of different sub-channels on Raspberry Pi, Ubuntu, ROS, Jetson, Docker, etc.

It can be a little chaotic, but I've been able to get answers to questions there within a few hours to a day or so,

Hope that helps,

----Steve " 'dillo" Okay

Renewed membership in Discord & joined group.

Started w/ Ubuntu OS channel:

<https://discord.com/channels/790680891252932659/924798783521439804>

which pointed to install:

<https://docs.luxonis.com/projects/api/en/latest/install/>

which, in turn, pointed to ubuntu:

<https://docs.luxonis.com/projects/api/en/latest/install/#ubuntu>

[will have to go down that rabbit hole tomorrow...]

Ubuntu

sudo wget -qO- https://docs.luxonis.com/install\_dependencies.sh | bash

*I haven't gone this route before*

ubuntu@AUDACITY:~\$ sudo wget -qO-

**https://docs.luxonis.com/install\_dependencies.sh | bash**

*smooth install*

...

Defaulting to user installation because normal site-packages is not writeable

Requirement already satisfied: pip in /usr/local/lib/python3.8/dist-packages  
(22.1.1)

Collecting pip

  Downloading pip-22.1.2-py3-none-any.whl (2.1 MB)

  2.1/2.1 MB 6.2 MB/s eta 0:00:00

Installing collected packages: pip

Successfully installed pip-22.1.2

Note! If opencv fails with illegal instruction after installing from PyPi, add:

  echo "export OPENBLAS\_CORETYPE=ARMV8" >> ~/.bashrc

  source ~/.bashrc

*Looking ahead:*

ubuntu@AUDACITY:~\$ sudo find / -name depthai-python

*nothing*

Test installation

We have a set of examples that should help you verify if your setup was correct.

First, clone the depthai-python repository and change directory into this repo:

```
git clone https://github.com/luxonis/depthai-python.git
cd depthai-python
```

ubuntu@AUDACITY:~\$ git clone

**https://github.com/luxonis/depthai-python.git**

done

ubuntu@AUDACITY:~\$ cd depthai-python

Using a virtual environment (or system-wide, if you prefer), run the following to install the requirements for this example repository:

ubuntu@AUDACITY:~/depthai-python\$ cd examples

ubuntu@AUDACITY:~/depthai-python/examples\$ python3

**install\_requirements.py**

several

Requirement already satisfied: ...

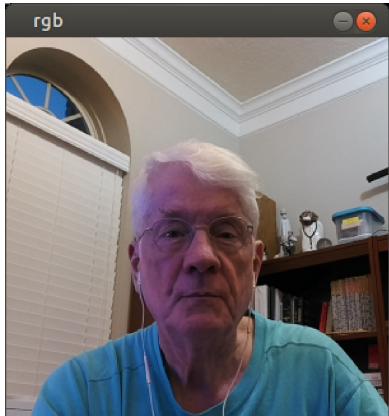
Installing collected packages: depthai

Successfully installed depthai-2.16.0.0

*multiple examples downloaded*

Now, run the `rgb_preview.py` script from within examples directory to make sure everything is working:

**Run from desktop terminal:**



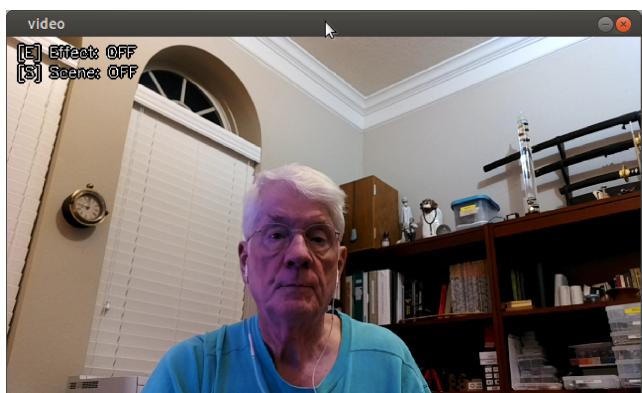
ubuntu@AUDACITY:~/depthai-python/examples\$

**python3 ColorCamera/rgb\_preview.py**

*So far, so good!*

Run Other Examples

After you have run this example, you can run other examples to learn about DepthAI possibilities.



ubuntu@AUDACITY:~/depthai-python/examples\$

**python3**

**ColorCamera/rgb\_scene.py**

ubuntu@AUDACITY:~/depthai-python/examples/ColorCamera\$

**python3**

**rgb\_camera\_control.py**

*Shows tightly cropped square &*

*rectangular scenes.*

*Below says "Sending new crop - x:*

*0 y: 0"*

*Not sure what to do with that.*



ubuntu@AUDACITY:~/depthai-python/examples/ColorCamera\$

**python3**

**rgb\_video.py**

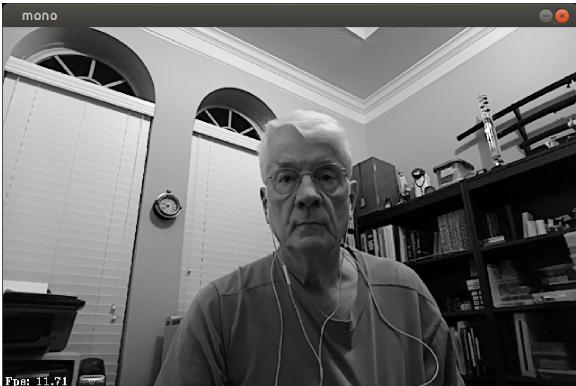
*Shows full-screen video scene*

*with about 2sec latency:*

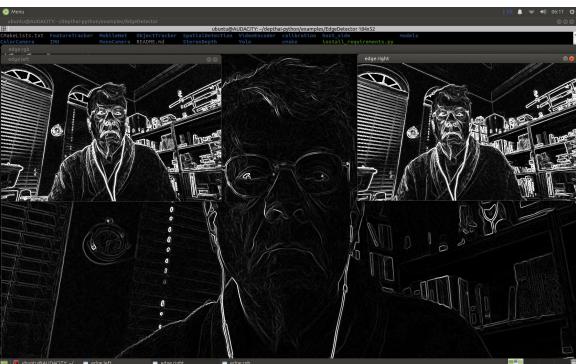


```
ubuntu@AUDACITY:~/depthai-python/examples/Color
Camera$ python3 autoexposure_roi.py
```

*It's good at recognizing person.  
Terrible at recognizing anything else!*

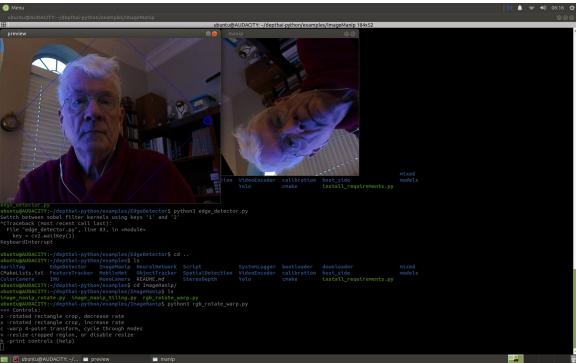


```
ubuntu@AUDACITY:~/depthai-python/examples/AprilTag$ python3 apriltag.py or apriltag_rgb.py same result?
```



2022.06.14

```
ubuntu@AUDACITY:~/depthai-python/examples/EdgeDetector$ python3
edge_detector.py
```



```
ubuntu@AUDACITY:~/depthai-python/examples/ImageManip$ python3
rgb_rotate_warp.py
```

```

ubuntu@AUDACITY:~/depthai-python/examples/ImageManip$ python3 image_manip_rotate.py

```

ubuntu@AUDACITY:~/depthai-python/examples/ImageManip\$ **python3 image\_manip\_rotate.py**

```

ubuntu@AUDACITY:~/depthai-python/examples/ImageManip$ python3 image_manip_tiling.py

```

ubuntu@AUDACITY:~/depthai-python/examples/ImageManip\$ **python3 image\_manip\_tiling.py**

```

ubuntu@AUDACITY:~/depthai-python/examples/NeuralNetwork$ python3 detection_parser.py

```

ubuntu@AUDACITY:~/depthai-python/examples/NeuralNetwork\$ **python3 detection\_parser.py**

Recognizes person and bottle, but not tennis ball. Thinks every rectangle is a terminal.

```

ubuntu@AUDACITY:~/depthai-python/examples/NeuralNetwork$ python3 concat_multi_input.py

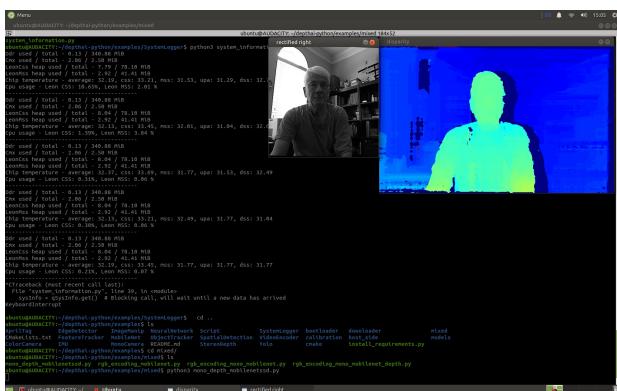
```

ubuntu@AUDACITY:~/depthai-python/examples/NeuralNetwork\$ **python3 concat\_multi\_input.py**

```
ubuntu@AUDACITY:~/depthai-python/examples/Script$ ls -w 1
script_camera_control.py script_forward_frames.py
script_get_ip.py script_http_client.py
script_http_server.py script_json_communication.py
script_mjpeg_server.py script_nndata_example.py
```

*These don't seem to do anything at first try*

```
ubuntu@AUDACITY:~/depthai-python/examples/SystemLogger$ python3
system_information.py
Ddr used / total - 0.13 / 340.88 MiB
Cmx used / total - 2.06 / 2.50 MiB
LeonCss heap used / total - 7.79 / 78.10 MiB
LeonMss heap used / total - 2.92 / 41.41 MiB
Chip temperature - average: 33.86, css: 35.11, mss: 33.69, upa: 33.45, dss: 33.21
Cpu usage - Leon CSS: 10.52%, Leon MSS: 1.98 %
... repeats
```



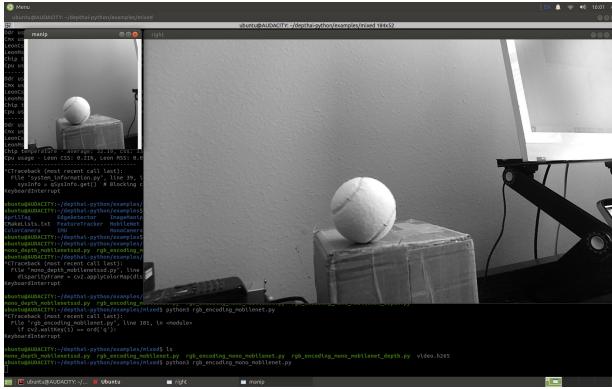
```
ubuntu@AUDACITY:~/depthai-python/e
xamples/mixed$ python3
mono_depth_mobilenetssd.py
```



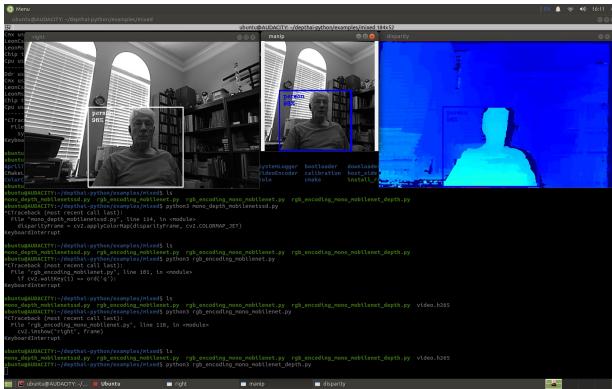
Bottle 97%                    Pottedplant 63%

```
ubuntu@AUDACITY:~/depthai-pyt
hon/examples/mixed$ python3
rgb_encoding_mobilenet.py
```

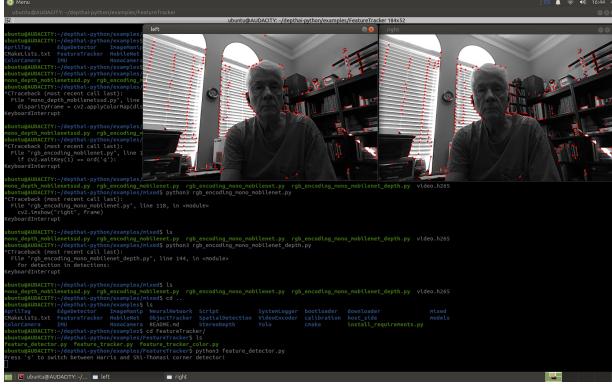
*Sometimes it gets it, sometimes not!*



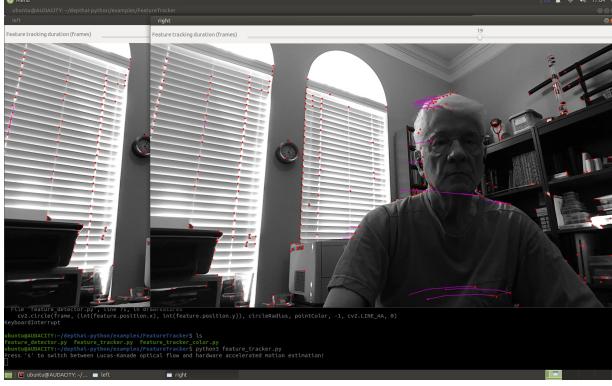
```
ubuntu@AUDACITY:~/depthai-python/examples/mixed$ python3
rgb_encoding_mono_mobilenet.py
```



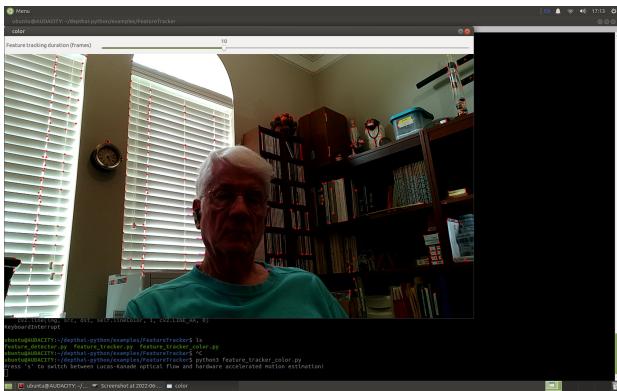
```
ubuntu@AUDACITY:~/depthai-python/examples/mixed$ python3
rgb_encoding_mono_mobilenet_depth.py
```



```
ubuntu@AUDACITY:~/depthai-python/examples/FeatureTracker$ python3
feature_detector.py
```



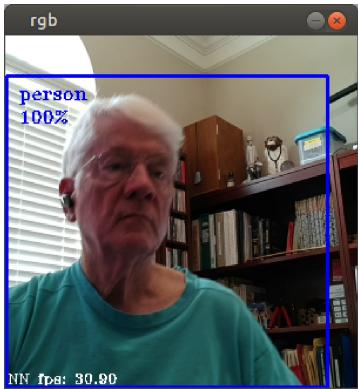
```
ubuntu@AUDACITY:~/depthai-python/examples/FeatureTracker$ python3
feature_tracker.py
```



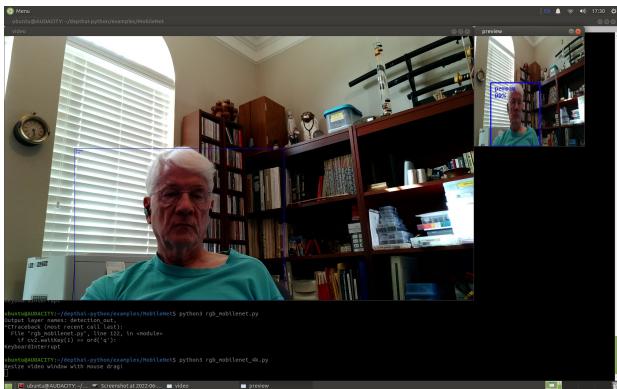
```
ubuntu@AUDACITY:~/depthai-python/examples/FeatureTracker$ python3
feature_tracker_color.py
```



```
ubuntu@AUDACITY:~/depthai-python/examples/MobileNet$ python3 mono_mobilenet.py
```



```
ubuntu@AUDACITY:~/depthai-python/examples/MobileNet$ python3 rgb_mobilenet.py
```



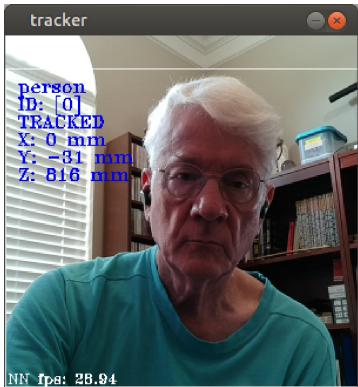
```
ubuntu@AUDACITY:~/depthai-python/examples/MobileNet$ python3
rgb_mobilenet_4k.py
```

```
ubuntu@AUDACITY:~/depthai-python/examples/MobileNet$ python3
video_mobilenet.py
identifies people in video of
hallway
```

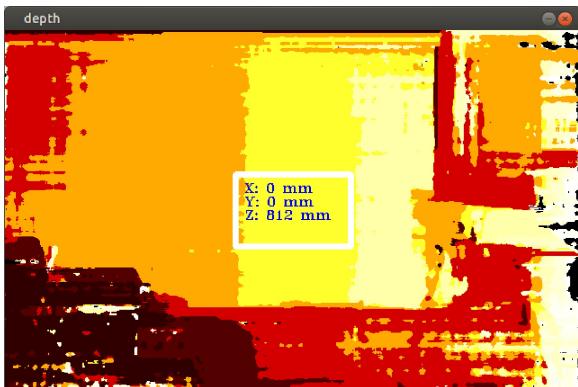


ubuntu@AUDACITY:~/depthai-python/examples/0objectTracker\$ **python3 object\_tracker.py**

ubuntu@AUDACITY:~/depthai-python/examples/0objectTracker\$ **python3 object\_tracker\_video.py**  
*identifies and numbers people appearing together in video of hallway as above but doesn't remember past individuals.*

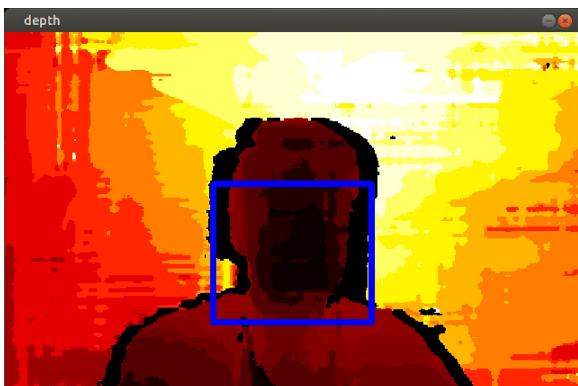


ubuntu@AUDACITY:~/depthai-python/examples/0objectTracker\$ **python3 spatial\_object\_tracker.py**



ubuntu@AUDACITY:~/depthai-python/examples/SpatialDetection\$ **python3 spatial\_location\_calculator.py**

*Provides distance of object at center of screen*



ubuntu@AUDACITY:~/depthai-python/examples/SpatialDetection\$ **python3 spatial\_mobilenet.py**

*Provides x,y,z of identified object*

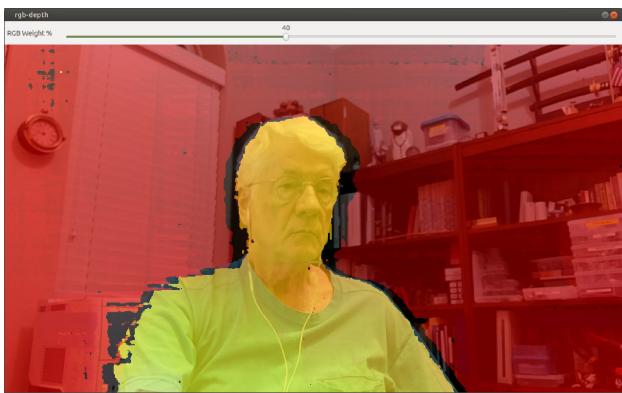


```
ubuntu@AUDACITY:~/depthai-python/examples/SpatialDetection$ python3
spatial_mobilenet_mono.py
Provides x,y,z of identified object
```

```
ubuntu@AUDACITY:~/depthai-python/examples/SpatialDetection$ python3
spatial_tiny_yolo.py
```

```
ubuntu@AUDACITY:~/depthai-python/examples/VideoEncoder$ unable to view results from this directory
ubuntu@AUDACITY:~/depthai-python/examples/calibration$ going to pass on this directory
ubuntu@AUDACITY:~/depthai-python/examples/host_side$ going to pass on this directory
ubuntu@AUDACITY:~/depthai-python/examples/models$ going to pass on this directory
```

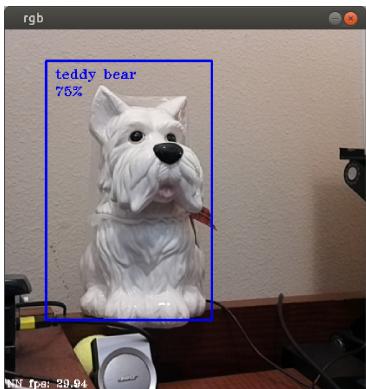
```
ubuntu@AUDACITY:~/depthai-python/examples/IMU$ python3
imu_gyroscope_accelerometer.py
Accelerometer timestamp: 0.000 ms
Accelerometer [m/s^2]: x: -8.188169 y: -0.114922 z: 3.916914
Gyroscope timestamp: 0.996 ms
Gyroscope [rad/s]: x: 0.011718 y: 0.001065 z: 0.014914
ubuntu@AUDACITY:~/depthai-python/examples/IMU$ python3
imu_rotation_vector.py
Rotation vector timestamp: 0.000 ms
Quaternion: i: -0.004761 j: 0.532776 k: -0.002991 real: 0.846252
Accuracy (rad): 3.141602
```



```
ubuntu@AUDACITY:~/depthai-python/examples/StereoDepth$ python3
rgb_depth_aligned.py
```



```
ubuntu@AUDACITY:~/depthai-python/examples/StereoDepth$ python3
rgb_depth_confidence_aligned.py
```



```
ubuntu@AUDACITY:~/depthai-python/examples/Yolo$
python3 tiny_yolo.py
No, it's not a teddy bear
```

*With few exceptions, that's the end of the examples.*

## 2022.06.17

You can also proceed to:

Our tutorials, starting with a Hello World tutorial explaining the API usage step by step ([here](#))

[https://docs.luxonis.com/projects/api/en/latest/tutorials/hello\\_world/#hello-world](https://docs.luxonis.com/projects/api/en/latest/tutorials/hello_world/#hello-world)

Our experiments, containing implementations of various user use cases on DepthAI ([here](#))

<https://github.com/luxonis/depthai-experiments>

## 2022.06.20

Finding very little about OAK-D or Luxonis and ROS2. What examples I find use cmake or catkin make and not the colcon build expected of ROS2 which makes me think they are not fully ported.

The one useful reference I found on the Luxonis Discord is to [Linorobot2](#) which I heard about from Homebrew Robotics:

<https://github.com/linorobot>

The trick will be converting the Linobot2 drive commands to the OSR 6 wheel, 4 steering configuration of the OSR. The package purports to be plug and #uncomment config with various sensors including ydlidar and Intel RealSense D435 depthcamera (supposedly close enough to my D455?). It's recommending upgrading from Ubuntu 20.04 Focal Fossa to 22.04 **Jammy Jellyfish** and ROS2 Foxy Fitzroy to **Humble Hawksbill**.

First flash of JJ failed. Reformatted with overwrite.

Steve Okay <[espressobot@gmail.com](mailto:espressobot@gmail.com)>

Re: "OAK-D Experience"

Dillo,

Followed the Luxonis Discord link to numerous examples and played with them. They performed poorly compared to the NVIDIA AI course examples but then...!

Then, going back to Discord to find ROS2 examples or code, I found very little.

What I did find referenced cmake or catkin make instead of colcon build as I would have expected for ROS2 which made me think they weren't fully ported.

Do you have any other experience?

The one reference that made sense was to y'all's linorobot2! It promises input from ydlidar (which I have) or RealSense D435 (and hopefully my D455).

The trick there will be to convert the linorobot2 drive commands to the 6-wheel drive, 4 wheel steering of the Open Source Rover.

Figured I'd just load Linorobot2 onto the Rover and see what kind of topics get published and any response on the testbed then worry about the conversion.

Jim

<https://github.com/aws-samples/aws-robomaker-sample-application-open-source-rover/issues/7>

*Project Lead of the USAI Labs OSR build team. Hoping to advance from remote control toward autonomy. Some time ago downloaded the robot\_description.urdf and manipulated it using Rviz. The articulations appeared to work in unexpected directions. Has there been any update, particularly compatible with the ROS2 format? Thanks!*

<https://opensourcerover.slack.com/archives/C01K4G4TUA1/p1655775897453859>

*James Phelan*

*8:44 PM*

*URDF of the OSR for ROS2?*

*Looked back at <https://github.com/nasa-jpl/osr-rover-code/issues/68> suggested last year but the robot\_description package appears lost.*

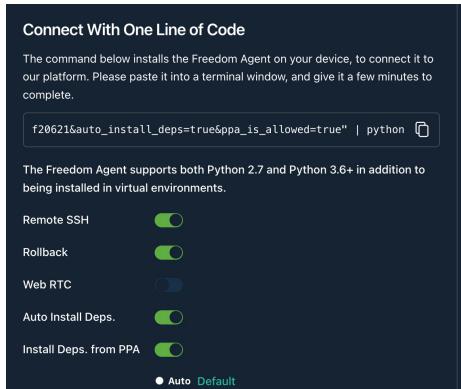
*The URDF in the AWS challenge*

[https://github.com/aws-samples/aws-robomaker-sample-application-open-source-rover/blob/master/simulation\\_ws/src/osr\\_urdf\\_with\\_controllers\\_and\\_launch/rover\\_description/urdf/rover\\_description.urdf](https://github.com/aws-samples/aws-robomaker-sample-application-open-source-rover/blob/master/simulation_ws/src/osr_urdf_with_controllers_and_launch/rover_description/urdf/rover_description.urdf)

*is something but is ROS(1) formatted rather than ROS2. When examined in Rviz, the articulations appear to move all wrong.*

*Could, perhaps, take on the project of creating a ROS2 compatible URDF myself. Would be a 2-bottle Excedrin headache but suited to my “detail oriented” disposition and would be a fine contribution to the OSR community. Dare I?? Would be tempted to ignore the articulations of the rocker-bogey legs and just start with a flat surface 6-wheel drive 4-wheel steering box. Have no idea even how to do that!*

Achille Verheyen <[achille@freedomrobotics.ai](mailto:achille@freedomrobotics.ai)>  
Re: experience w/ new version of Freedom Robotics Dashboard  
Hi Jim,



By default, WebRTC is not installed. Try running the install command again, this time after enabling it in the 'advanced options' (toggle Web RTC on so it shows in green)

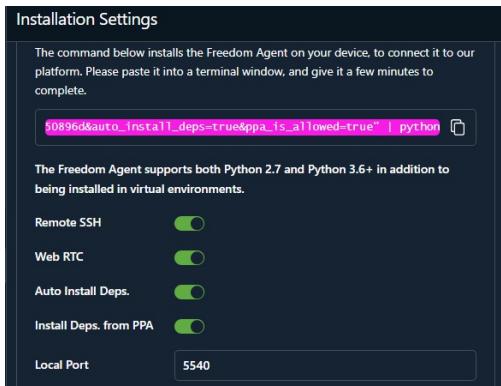
If you had done that already, something else is off and you're best off contacting support@freedomrobotics.ai

The first time you ran the install command and it failed because of a 'failed to connect on port 443', that's just a regular internet connection issue. Rather than opening through a different browser, which gives you the exact same install command, you simply could have run it again.

It does make me wonder if your internet connection is stable (not just fast). But installing Web RTC should do the trick, it works fine for me and I didn't do anything specific.

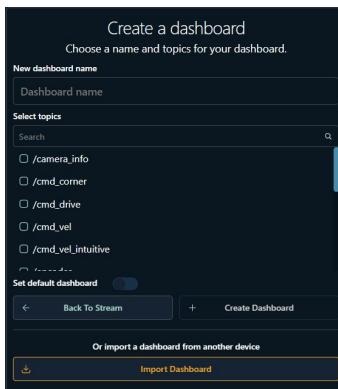
Best of luck  
Achille

*Mine seems to default to install Web RTC:*



*But will re-install anyway...*

```
curl -sSf
"https://api.freedomrobotics.ai/accounts/A6124B5
AB85968B6435933C21/devices/DAAA0C665B06524A3A897
346970/installscript?mc_token=T616929BCA1F267186
4084FCF&mc_secret=S628042ca8393471d5750896d&auto
_install_deps=true&ppa_is_allowed=true" |
python3
```



*This time FR Robotics requests to create a new dashboard. Created "Complete" dashboard and included all topics.*

```
ubuntu@AUDACITY:~$ ros2 launch usb_cam demo_launch.py
ubuntu@AUDACITY:~$ ros2 launch osr_bringup osr_launch.py
To get rover code and camera running
```

AUDACITY Stream - Freedom Robo

Complete Settings Add Dashboard Import Dashboard Share Edit layout mode

Devices Pilot Status Stream System Settings

Imported From Fire... Tools Repository

/camera\_info /cmd\_corner /cmd\_drive

No data is being published No data is being published

/cmd\_vel /cmd\_vel\_intuitive /joy

Search... 79 secs

1: [ "binning\_x": 0, "binning\_y": 0, "d": [ -0.361976, 0.118951, 0.001814, 0.000505, 0 ], "distortion\_model": "plumb\_bob", "header": { "stamp": { "sec": 1656837487, "nanosec": 462848494 }, "frame\_id": "camera" }, "height": 480, "k": [ 0.783367, 0, 305.593336, 0, 437.302876, 243.738352, 0, 0, 1 ], "p": [ ] ]

2: [ "axes": [ 0, 0, 0 ] ]

Thu, Jun. 23, 2022 30 sec 21:25:01 LIVE Go Live

AUDACITY Pilot - Freedom Robo

Imported From Fire... Tools Repository

Pilot Status Stream System Settings

@ Camera View @ Map View

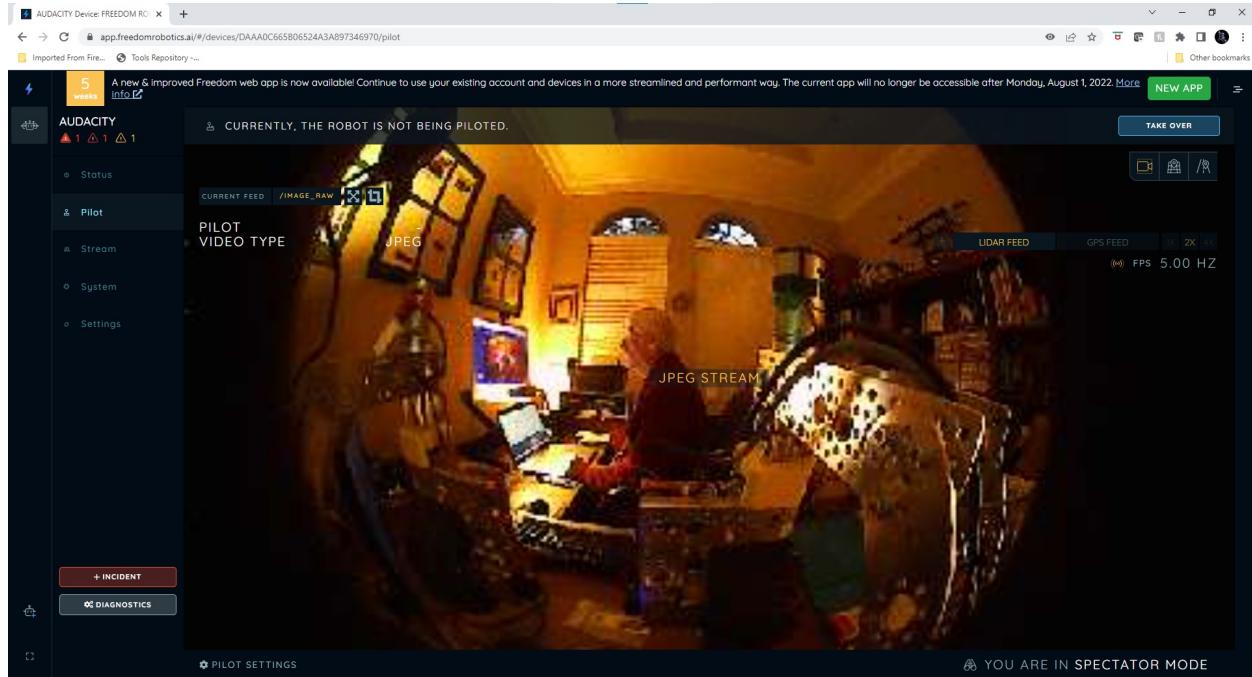
Camera Feeds Environment

Key Metrics Take Over Pilot: none Not Connected

FR dash shows data and JPEG stream but no control joystick giving “unknown error” when trying to Take Over.

**2022.06.24**

Closed and reopened FR Dashboard. This looks more like the old version of FR:



Pulling from “Intel RealSense Camera Experience.wpd”:

```
$ sudo apt-get install ros-$ROS_DISTRO-realsense2-camera
translates to
$ sudo apt-get install ros-foxy-realsense2-camera
installs ok
$ ros2 launch realsense2_camera rs_launch.py
[INFO] [launch]: All log files can be found below
/home/ubuntu/.ros/log/2022-06-25-10-06-10-195455-AUDACITY-111182
[INFO] [launch]: Default logging verbosity is set to INFO
[INFO] [realsense2_camera_node-1]: process started with pid [111197]
[realsense2_camera_node-1] [INFO] [1656169573.241967212] [camera.camera]: RealSense ROS v4.0.4
[realsense2_camera_node-1] [INFO] [1656169573.247721597] [camera.camera]: Built with LibRealSense
v2.50.0
[realsense2_camera_node-1] [INFO] [1656169573.252115944] [camera.camera]: Running with LibRealSense
v2.50.0
[realsense2_camera_node-1] 25/06 10:06:13,688 ERROR [281472325888416] (handle-libusb.h:51) failed
to open usb interface: 0, error: RS2_USB_STATUS_ACCESS
[realsense2_camera_node-1] 25/06 10:06:13,690 ERROR [281472351066528] (sensor.cpp:572)
acquire_power failed: failed to set power state
[realsense2_camera_node-1] [WARN] [1656169573.698863846] [camera.camera]: Device 1/1 failed with
exception: failed to set power state
[realsense2_camera_node-1] [ERROR] [1656169573.699706297] [camera.camera]: The requested device with
is NOT found. Will Try again.
[realsense2_camera_node-1] 25/06 10:06:13,698 WARNING [281472351066528] (rs.cpp:310) null pointer
passed for argument "device"
...repeats
^C
```

```
ubuntu@AUDACITY:~$ v4l2-ctl --list-devices
```

```
...
Intel(R) RealSense(TM) Depth Ca (usb-0000:01:00.0-2.1):
...
```

*It's there*

```
ubuntu@AUDACITY:~$ realsense-viewer
realsense-viewer: command not found
```

*Revisiting the RealSense installation, ARM64 was, and is still not easily supported by librealsense. Give up for now and go with OAK-D:*

```
ubuntu@AUDACITY:~/oak-d_ws$ sudo apt install ros-foxy-depthai-ros
```

```
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
 nlohmann-json3-dev ros-foxy-depthai ros-foxy-depthai-bridge ros-foxy-depthai-examples
 ros-foxy-depthai-ros-msgs ros-foxy-foxglove-msgs
The following NEW packages will be installed:
 nlohmann-json3-dev ros-foxy-depthai ros-foxy-depthai-bridge ros-foxy-depthai-examples
 ros-foxy-depthai-ros ros-foxy-depthai-ros-msgs
 ros-foxy-foxglove-msgs
0 upgraded, 7 newly installed, 0 to remove and 38 not upgraded.
Need to get 42.9 MB of archives.
After this operation, 138 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://ports.ubuntu.com/ubuntu-ports focal/universe arm64 nlohmann-json3-dev all 3.7.3-1 [667 kB]
Get:2 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-depthai arm64
2.15.4-1focal.20220517.215357 [9848 kB]
Get:3 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-depthai-ros-msgs arm64
2.5.1-1focal.20220521.005843 [85.5 kB]
Get:4 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-depthai-bridge arm64
2.5.1-1focal.20220521.010141 [10.5 MB]
Get:5 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-foxglove-msgs arm64
1.2.0-1focal.20220520.220659 [167 kB]
Get:6 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-depthai-examples arm64
2.5.1-1focal.20220521.011619 [21.6 MB]
Get:7 http://packages.ros.org/ros2/ubuntu focal/main arm64 ros-foxy-depthai-ros arm64
2.5.1-1focal.20220521.013404 [5052 B]
Fetched 42.9 MB in 6s (7794 kB/s)
Selecting previously unselected package nlohmann-json3-dev.
(Reading database ... 324632 files and directories currently installed.)
Preparing to unpack .../0-nlohmann-json3-dev_3.7.3-1_all.deb ...
Unpacking nlohmann-json3-dev (3.7.3-1) ...
Selecting previously unselected package ros-foxy-depthai.
Preparing to unpack .../1-ros-foxy-depthai_2.15.4-1focal.20220517.215357_arm64.deb ...
Unpacking ros-foxy-depthai (2.15.4-1focal.20220517.215357) ...
Selecting previously unselected package ros-foxy-depthai-ros-msgs.
Preparing to unpack .../2-ros-foxy-depthai-ros-msgs_2.5.1-1focal.20220521.005843_arm64.deb ...
Unpacking ros-foxy-depthai-ros-msgs (2.5.1-1focal.20220521.005843) ...
Selecting previously unselected package ros-foxy-depthai-bridge.
Preparing to unpack .../3-ros-foxy-depthai-bridge_2.5.1-1focal.20220521.010141_arm64.deb ...
Unpacking ros-foxy-depthai-bridge (2.5.1-1focal.20220521.010141) ...
Selecting previously unselected package ros-foxy-foxglove-msgs.
Preparing to unpack .../4-ros-foxy-foxglove-msgs_1.2.0-1focal.20220520.220659_arm64.deb ...
Unpacking ros-foxy-foxglove-msgs (1.2.0-1focal.20220520.220659) ...
Selecting previously unselected package ros-foxy-depthai-examples.
Preparing to unpack .../5-ros-foxy-depthai-examples_2.5.1-1focal.20220521.011619_arm64.deb ...
Unpacking ros-foxy-depthai-examples (2.5.1-1focal.20220521.011619) ...
Selecting previously unselected package ros-foxy-depthai-ros.
Preparing to unpack .../6-ros-foxy-depthai-ros_2.5.1-1focal.20220521.013404_arm64.deb ...
Unpacking ros-foxy-depthai-ros (2.5.1-1focal.20220521.013404) ...
Setting up ros-foxy-depthai-ros-msgs (2.5.1-1focal.20220521.005843) ...
Setting up nlohmann-json3-dev (3.7.3-1) ...
Setting up ros-foxy-depthai (2.15.4-1focal.20220517.215357) ...
Setting up ros-foxy-foxglove-msgs (1.2.0-1focal.20220520.220659) ...
Setting up ros-foxy-depthai-bridge (2.5.1-1focal.20220521.010141) ...
Setting up ros-foxy-depthai-examples (2.5.1-1focal.20220521.011619) ...
Setting up ros-foxy-depthai-ros (2.5.1-1focal.20220521.013404) ...
Processing triggers for libc-bin (2.31-0ubuntu9.9) ...
```

*This time worked smoothly!*

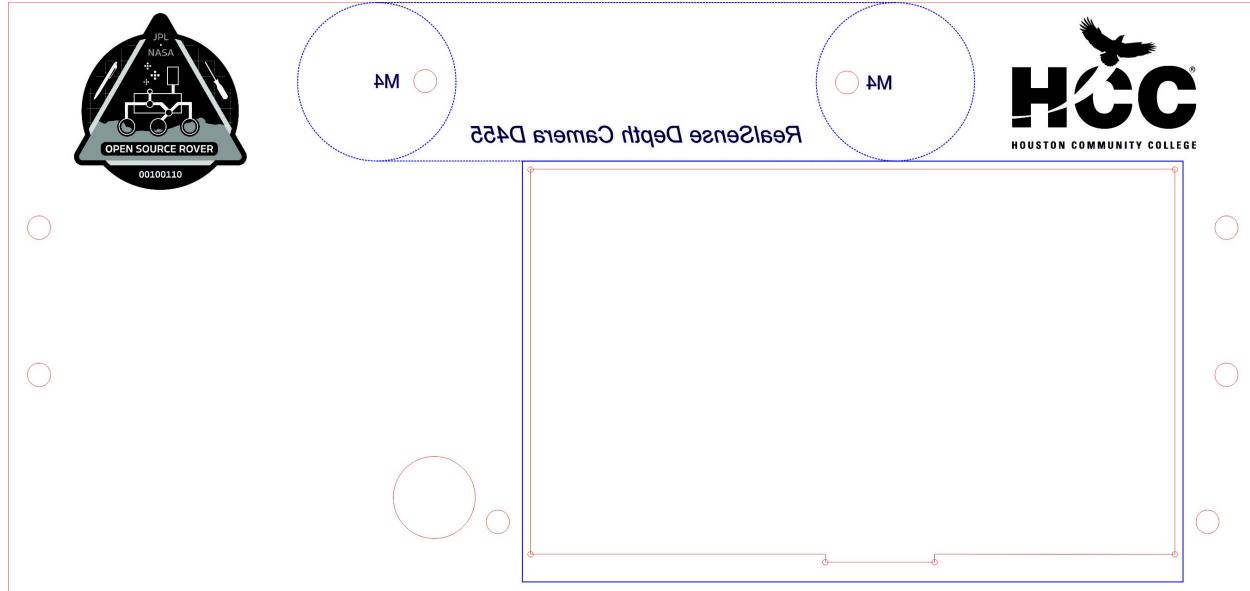
**2022.06.27**

Detour to **linorobot**

See "Linorobot2 Experience.wpd"

**2022.07.04**

Updated front plate to accomodate RealSense 455 & USB cable access



Nespresso **Odacio** official coffee of AUDACITY the Open Source Rover

**2022.07.28**

Steve Okay <[espressobot@gmail.com](mailto:espressobot@gmail.com)>

Hi Jim,

I got your message on the HBRC chat tonight about corner steering on the Open Source Rover. I'm not following the project super-closely, but happy to help. What sort of help were you looking for with corner-steering ?

I'm using 4 AX-12A Dynamixels and the U2D2 interface to talk to the Dynamixels.

[https://www.amazon.com/ROBOTIS-DYNAMIXEL-Actuator-Communication-Protocols/dp/B008WDKBLA/ref=sr\\_1\\_7?crid=1V7YIY9D416RV&keywords=dynamixel+ax12a&qid=1659211456&s=toys-and-games&sprefix=dynamixel+ax12a%2Ctoys-and-games%2C115&sr=1-7](https://www.amazon.com/ROBOTIS-DYNAMIXEL-Actuator-Communication-Protocols/dp/B008WDKBLA/ref=sr_1_7?crid=1V7YIY9D416RV&keywords=dynamixel+ax12a&qid=1659211456&s=toys-and-games&sprefix=dynamixel+ax12a%2Ctoys-and-games%2C115&sr=1-7)

There are other SAWPPY-makers that are using the LewanSoul digital servos found here:

<https://www.amazon.com/Hiwonder-LX-16A-Robotic-Controller-Control/> [LINK BROKEN]

[https://www.amazon.com/LewanSoul-Real-Time-Feedback-Bearing-Brackets/dp/B0748BQ49M/ref=asc\\_df\\_B0748BQ49M/?tag=hyprod-20&linkCode=df0&hvadid=242017695311&hvpos=&hvnetw=g&hvrand=7685058096802359763&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcndl=&hvlocint=&hvloccphy=9027689&hvtargid=pla-442552557723&th=1](https://www.amazon.com/LewanSoul-Real-Time-Feedback-Bearing-Brackets/dp/B0748BQ49M/ref=asc_df_B0748BQ49M/?tag=hyprod-20&linkCode=df0&hvadid=242017695311&hvpos=&hvnetw=g&hvrand=7685058096802359763&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcndl=&hvlocint=&hvloccphy=9027689&hvtargid=pla-442552557723&th=1)

They have the features of the AX-12 series but are quite a bit cheaper. I haven't used them yet though.

Hope that helps,

Steve " 'dillo" Okay

2022.07.30

*dillo*

*The original Open Source Rover was a Community Outreach idea tossed out by a couple interns at JPL and thrown together in just a few weeks. The original code was raw python. The steering done by steering motors guided by separate encoders. The OSR Community via Tapatalk and more recently Slack have been constantly improving it. I just found #osr-upgrade sub-channel:*

<https://app.slack.com/client/T01CMHZLGPL/C039JHYK25B>

*It was concluded a while back that upgrading from complex motor-encoder to simpler and more cost-effective servo motors was desired, along with many other upgrades.*

*I hadn't seen a lot of progress or concrete suggestions until I discovered this sub-channel today. Apparently a lot of thought has been going on behind-the-scenes by some of the major players.*

*Your experience with actually using servos on a rover could be beneficial to the project.*

*Jim*

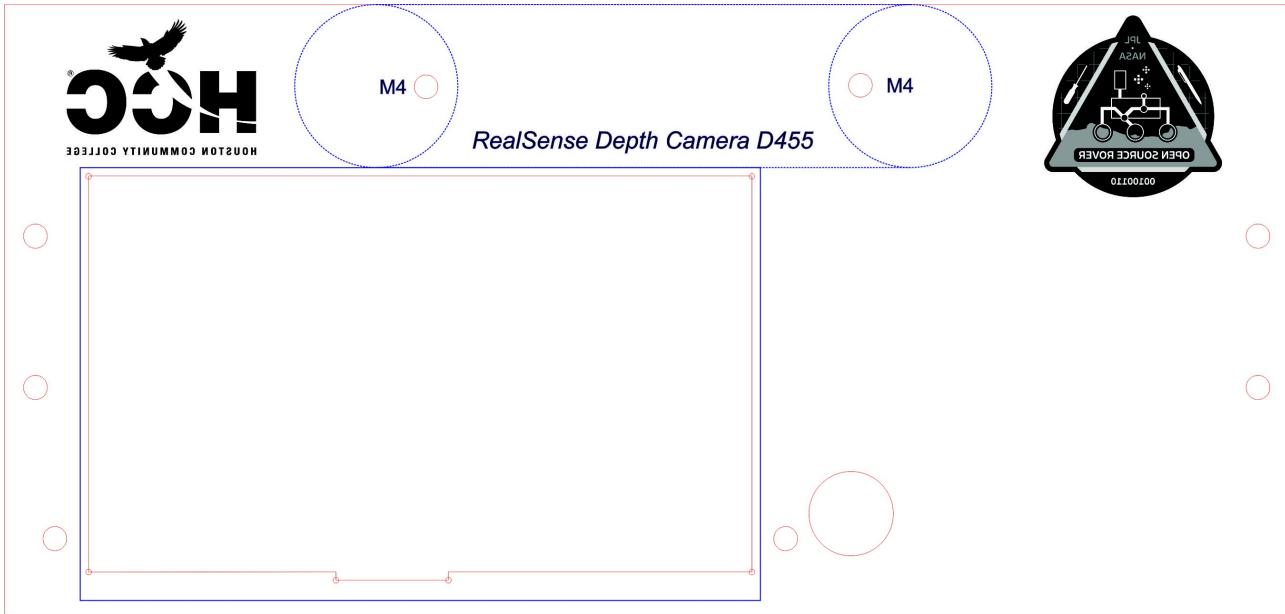
Mechanical upgrades to OSR being worked on in Onshape by Achille:  
<https://cad.onshape.com/documents/e4f00b1a3d2edb1a84bbba1c/w/8ab8f394324bcc586236ef5d/e/f911f27977187e9e310cbf59?renderMode=0&uiState=6258c3d150de854523e6ef1f>

## **2022.09.11**

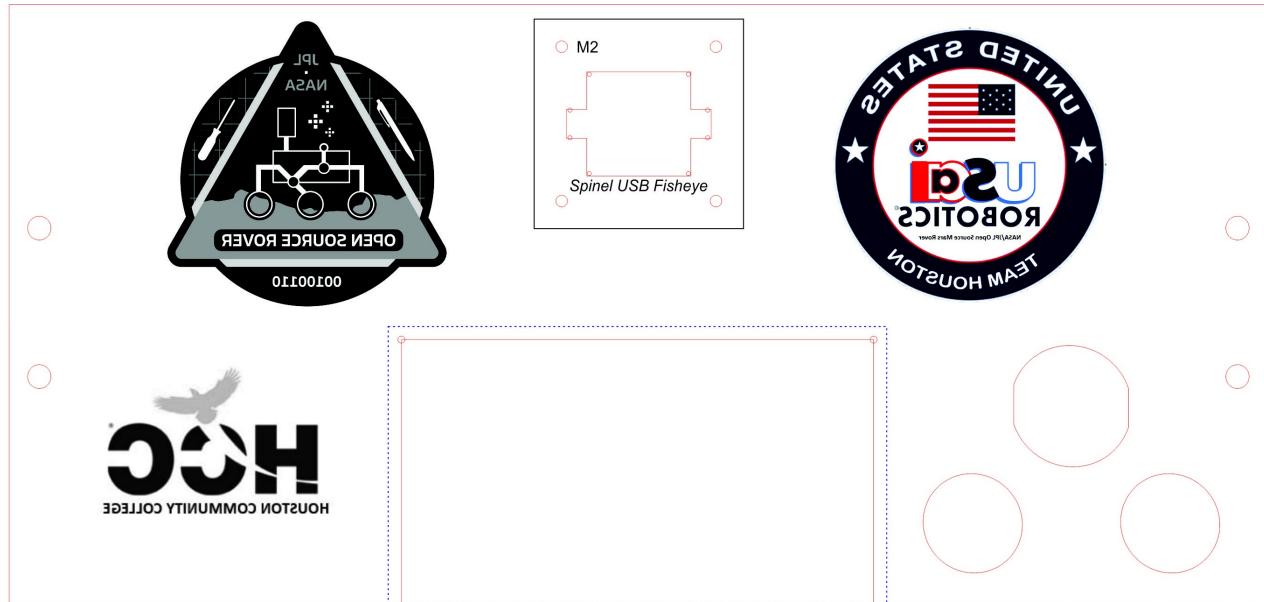
Detouring to ylidar see <C:\Users\jhphe\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\YDLIDAR\YDLidar Experience.wpd>

2022.10.08

2<sup>nd</sup> LIVE Meetup since COVID! (Missed last weekend, out of town)



I discovered the distance between the M4 mounting holes on the D455 Realsense Depthcamera are too close. Will have to re-do next weekend. Also, why did I put the screen so off-center? (To allow for camera USB cable to go into hole next to it.)



**2022.10.11**

The Spinel UC50MPB fisheye camera failed to display.  
Noted that a small 8 pin DIP chip came off the back.  
Maybe the lens will still be useful?



[https://www.spinelectronics.com/5mp\\_usb\\_cameras/UC50MPB](https://www.spinelectronics.com/5mp_usb_cameras/UC50MPB)

Saw this one for only \$22.00 vs \$50+ for others but no pic.

Bought it anyway:

<https://store.spinelectronics.com/index.php?route=product/search&search=F185L155>

Fisheye, 1/2.5", 1.55mm, 185degree, 8MP, F2.0

*Turns out it's the LENS ONLY. Still need a camera.*

[https://www.amazon.com/dp/B0844H6DGX?psc=1&ref=ppx\\_yo2ov\\_dt\\_b\\_product\\_details](https://www.amazon.com/dp/B0844H6DGX?psc=1&ref=ppx_yo2ov_dt_b_product_details)

Took the fisheye lens from old broken camera and put on new one.  
Same lens as the one I just bought. Saved the other lens.



## 2022.10.15

Restarting from p. 592 2022.03.24

4 Setting up ROS environment and building the rover code

4.1 Setup ROS build environment

```
ubuntu@AUDACITY:~$ mkdir -p ~/osr_ws/src && cd ~/osr_ws
```

```
ubuntu@AUDACITY:~/osr_ws$ source /opt/ros/foxy/setup.bash
```

```
 source /opt/ros/humble/setup.bash
```

```
ubuntu@AUDACITY:~/osr_ws$ sudo apt install
```

```
python3-colcon-common-extensions
```

```
python3-colcon-common-extensions is already the newest version (0.3.0-1).
```

### 4.2 Clone and build the rover code

```
ubuntu@U22R2H:~/osr_ws$ sudo apt install git
```

```
git is already the newest version (1:2.34.1-1ubuntu1.4).
```

```
ubuntu@U22R2H:~/osr_ws$ cd ~/osr_ws/src
```

On 10/16/2022 8:28 AM, James H Phelan wrote

Charles de Montaigu <c.demontaigu@centiasoftware.com>:

C,

Do we load nasa-jpl foxy-devel:

<https://github.com/nasa-jpl/osr-rover-code/tree/foxy-devel>

or

Achille's foxy/NAV2?

<https://github.com/Achllle/osr-rover-code/tree/foxy/nav2>

I'm inclined to go with foxy/NAV2 as we want NAV2 in the works.

I hope his repo installs cleanly.

I hope there's no problem because the upgraded Ubuntu 22 or ROS2 Humble environment.

It will mean changing some of the commands accordingly, hope I get that right.

I should be around all day today if you want to Zoom to collaborate.

J

Working from:

<https://github.com/Achllle/osr-rover-code/blob/foxy/nav2/setup/rpi.md>

```
ubuntu@U22R2H:~/osr_ws$ git clone
```

```
https://github.com/Achllle/osr-rover-code.git
```

```
Cloning into 'osr-rover-code'...
```

```
ubuntu@U22R2H:~/osr_ws$ cd osr-rover-code
```

```
ubuntu@U22R2H:~/osr_ws/osr-rover-code$ git fetch origin
```

```
ubuntu@U22R2H:~/osr_ws/osr-rover-code$ git checkout foxy/nav2
```

```
Switched to a new branch 'foxy/nav2'
```

```

install the dependencies using rosdep
ubuntu@U22R2H:~/osr_ws/osr-rover-code$ sudo apt install
python3-rosdep
python3-rosdep is already the newest version (0.22.1-1).
ubuntu@U22R2H:~/osr_ws/osr-rover-code$ cd ..
ubuntu@U22R2H:~/osr_ws$ sudo rosdep init
ERROR: default sources list file already exists:
 /etc/ros/rosdep/sources.list.d/20-default.list
Please delete if you wish to re-initialize
ubuntu@U22R2H:~/osr_ws$ sudo rm
/etc/ros/rosdep/sources.list.d/20-default.list
ubuntu@U22R2H:~/osr_ws$ sudo rosdep init
Wrote /etc/ros/rosdep/sources.list.d/20-default.list
Recommended: please run
 rosdep update
ubuntu@U22R2H:~/osr_ws$ rosdep update
reading in sources list data from /etc/ros/rosdep/sources.list.d
...
updated cache in /home/ubuntu/.ros/rosdep/sources.cache
ubuntu@U22R2H:~/osr_ws$ rosdep install --from-paths src
--ignore-src
#All required rosdeps installed successfully
build the ROS packages
ubuntu@U22R2H:~/osr_ws$ colcon build --symlink-install
...
Summary: 3 packages finished [1min 12s]
 1 package had stderr output: osr_control [was run via SSH]
Now let's add the generated files to the path so ROS can find them
ubuntu@U22R2H:~/osr_ws$ source install/setup.bash
The rover has some customizable settings that will overwrite the
default values. Whether you have any changes compared to the
defaults or not, you have to manually create these files:
ubuntu@U22R2H:~/osr_ws$ cd
~/osr_ws/src/osr-rover-code/ROS/osrBringup/config
-bash: cd: /home/ubuntu/osr_ws/src/osr-rover-code/ROS/osrBringup/config: No
such file or directory
ubuntu@U22R2H:~/osr_ws$ cd
~/osr_ws/osr-rover-code/ROS/osrBringup/config
ubuntu@U22R2H:~/osr_ws/osr-rover-code/ROS/osrBringup/config$ touch osr_params_mod.yaml roboclaw_params_mod.yaml

```

To change any values from the default (if your rover doesn't match the default instructions), modify these files (the \_mod.yaml ones) instead of the original ones. This way your changes don't get committed to git. The files follow the same structure as the default. Just include the values that you need to change as the default values for other parameters may change over time.

You might also want to modify the file osr-rover-code/ROS/osr\_bringup/launch/osr\_launch.py to change the velocities the gamepad controller will send to the rover. These values in the node joy\_to\_twist are of interest:

```
{"scale_linear": 0.8}, # scale to apply to drive speed, in m/s:
drive_motor_rpm * 2pi / 60 * wheel radius * slowdown_factor
{"scale_angular": 1.75}, # scale to apply to angular speed, in rad/s:
scale_linear / min_radius
{"scale_linear_turbo": 1.78}, # scale to apply to linear speed, in m/s
```

Previously I've set to:

```
{"scale_linear.x": 0.5}, # 0.8 > 0.5 scale to apply to drive speed, in m/s:
drive_motor_rpm * 2pi / 60 * wheel radius * slowdown_factor

{"scale_angular.yaw": 1.00}, # 1.75 > 1.00 scale to apply to angular speed, in
rad/s: scale_linear / min_radius(=0.45m)

{"scale_linear_turbo.x": 1.00}, # 1.78 > 1.00 scale to apply to linear speed,
in m/s
```

The maximum speed your rover can go is determined by the no-load speed of your drive motors. The default no-load speed is located in the file osr\_params.yaml as drive\_no\_load\_rpm, unless you modified it in the corresponding \_mod.yaml file. This maximum speed corresponds to scale\_linear\_turbo and can be calculated as drive\_no\_load\_rpm \* 2pi / 60 \* wheel radius (=0.075m). Based on this upper limit, let's set our regular moving speed to a sensible fraction of that which you can configure to your liking. Start with e.g. 0.75 \* scale\_linear\_turbo. If you think it's too slow or too fast, simply scale it up or down.

The turning speed of the rover, just like a regular car, depends on how fast it's going. As a result, scale\_angular should be set to scale\_linear / min\_radius. For the default configuration, the min\_radius equals 0.45m.

#### 4.3 Add ROS config scripts to .bashrc

The source...foo.bash lines above are used to manually configure your ROS environment. We can do this automatically in the future by doing:

```
ubuntu@U22R2H:~/osr_ws/osr-rover-code/ROS/osr_bringup/config$
cd ~
ubuntu@U22R2H:~$ echo "source /opt/ros/foxy/setup.bash" >>
~/.bashrc
ubuntu@U22R2H:~$ echo "source /opt/ros/humble/setup.bash" >>
~/.bashrc
ubuntu@U22R2H:~$ echo "source ~/osr_ws/install/setup.bash" >>
~/.bashrc
```

## 5 Setting up serial communication on the RPi

The RPi will talk to the motor controllers over serial.

### 5.1 Disable serial-getty@ttyS0.service

Because we are using the serial port for communicating with the roboclaw motor controllers, we have to disable the serial-getty@ttyS0.service service. This service has some level of control over serial devices that we use, so if we leave it on it we'll get weird errors (source). Note that the masking step was suggested [here](#). It seems to be necessary for some setups of the rpi4 - just using systemctl disable won't cut it for disabling the service.

Note that the following will stop you from being able to communicate with the RPi over the serial, wired connection. However, it won't affect communication with the rpi with SSH over wifi.

```
ubuntu@U22R2H:~$ sudo systemctl stop serial-getty@ttyS0.service
ubuntu@U22R2H:~$ sudo systemctl disable serial-getty@ttyS0.service
ubuntu@U22R2H:~$ sudo systemctl mask serial-getty@ttyS0.service
Created symlink /etc/systemd/system/serial-getty@ttyS0.service → /dev/null.
```

### 5.2 Copy udev rules

Now we'll need to copy over a udev rules file, which is used to configure needed device files in /dev; namely, ttyS0 and ttyAMA0. Here's a [good primer](#) on udev.

*Maybe not so good as some of the commands don't exist e.g. udevinfo.*

# copy udev file from the repo to your system

*Caution - the path may be different*

```
ubuntu@U22R2H:~$ cd ~/osr_ws/src/osr-rover-code/config
-bash: cd: /home/ubuntu/osr_ws/src/osr-rover-code/config: No such file or
directory
ubuntu@U22R2H:~$ cd ~/osr_ws/osr-rover-code/config
ubuntu@U22R2H:~/osr_ws/osr-rover-code/config$ ls
serial_udev_ubuntu.rules
ubuntu@U22R2H:~/osr_ws/osr-rover-code/config$ sudo cp
serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules
reload the udev rules so that the devices files are set up correctly.
ubuntu@U22R2H:~/osr_ws/osr-rover-code/config$ sudo udevadm control
--reload-rules && sudo udevadm trigger
```

This configuration should persist across RPi reboots.

### 5.3 Add user to tty group

```
ubuntu@U22R2H:~/osr_ws/osr-rover-code/config$ sudo adduser ubuntu
tty
```

Adding user `ubuntu' to group `tty' ...

Adding user ubuntu to group tty

Done.

#### **5.4 Remove console line in cmdline.txt boot config file**

```
ubuntu@U22R2H:~/osr_ws/osr-rover-code/config$ cd /boot/firmware
ubuntu@U22R2H:/boot/firmware$ sudo cp cmdline.txt cmdline.txt.bak
ubuntu@U22R2H:/boot/firmware$ sudo nano cmdline.txt
```

And then delete the substring console=serial0,115200 from the single line of text in the file. Save and exit.

For more background on why we do this, see [serial config info.md](#)

#### **5.5 Disable bluetooth in config.txt boot config file**

```
ubuntu@U22R2H:~$ cd /boot/firmware
ubuntu@U22R2H:/boot/firmware$ sudo cp config.txt config.txt.bak
ubuntu@U22R2H:/boot/firmware$ sudo nano config.txt
```

And then add the new line dtoverlay=disable-bt immediately after the existing line **cmdline=cmdline.txt** towards the bottom of the file

*There is no entry cmdline=cmdline.txt in config.txt*

#### **5.6 Restart the RPi**

```
ubuntu@U22R2H:/boot/firmware$ sudo reboot
```

### **6 Testing serial comm with the Roboclaw motors controllers**

Run the roboclawtest.py script with all of the motor addresses:

```
cd ~/osr_ws/src/osr-rover-code/scripts
```

```
ubuntu@U22R2H:~$ cd ~/osr_ws/osr-rover-code/scripts
```

```
python roboclawtest.py 128
```

```
python3 roboclawtest.py 128
```

```
ubuntu@U22R2H:~/osr_ws/osr-rover-code/scripts$ python
```

```
roboclawtest.py 128
```

Traceback (most recent call last):

```
 File "/home/ubuntu/osr_ws/osr-rover-code/scripts/roboclawtest.py", line 13, in
<module>
```

```
 from roboclaw import Roboclaw
```

```
ModuleNotFoundError: No module named 'roboclaw'
```

```
ubuntu@U22R2H:~/osr_ws/osr-rover-code/scripts$ cat roboclawtest.py
```

```
...
```

```
need to add the roboclaw.py file in the path
```

```
sys.path.append(path.join(path.expanduser('~'),
'osr_ws/src/osr-rover-code/ROS/osr_control/osr_control'))
```

```
...
```

*Path is wrong. Delete the /src/.*

```
ubuntu@U22R2H:~/osr_ws/osr-rover-code/scripts$ python3
```

```
roboclawtest.py 128
```

Connected to /dev/serial0.

```
(1, 'USB Roboclaw 2x7a v4.1.34\n')
```

```
(1, 0, 128)
```

*Same for others 129-132*

## **Bringing up the rover code**

1 Manual rover bringup

```
In a sourced terminal (source /opt/ros/foxy/humble/setup.bash &&
source ~/osr_ws/install/setup.bash), run
ubuntu@U22R2H:~$ source /opt/ros/humble/setup.bash && source
~/osr_ws/install/setup.bash
ubuntu@U22R2H:~$ ros2 launch osr Bringup osr_launch.py
[ERROR] [launch]: Caught exception in launch (see debug for traceback): "package
'teleop_twist_joy' not found, searching:
['/home/ubuntu/osr_ws/install/osr_control',
 '/home/ubuntu/osr_ws/install/osr_interfaces',
 '/home/ubuntu/osr_ws/install/osr_bringup', '/opt/ros/humble']"
```

```
ubuntu@U22R2H:~$ sudo find / -name teleop_twist_joy
nothing
```

**On 10/17/2022 6:39 PM, James H Phelan wrote:**

Charles de Montaigu <c.demontaigu@centiasoftware.com>

C,

I think I see where I went off the rails.

At one point I was to

```
ubuntu@U22R2H:~/osr_ws$ cd ~/osr_ws/src
but when I git cloned, I was just in ~/osr_ws/
That's why subsequent directions seemed misguided.
Will have to reinstall from basis.
```

J

**2022.10.17**

Starting over from U22R2H20220821.img

Flashed the SD card w/ above img.

**2022.10.18**

Booted up to PICAMERA image, SystemConfig003

renamed to ubuntu, password ubuntu to use as basic config .img

## 2022.10.20

```
Restarting again from p. 652 2022.10.15
Which is a restart from p. 592 2022.03.24
ubuntu@ubuntu:~$ mkdir -p ~/osr_ws/src && cd ~/osr_ws
ubuntu@ubuntu:~/osr_ws$ script OSR_Install.txt
Script started, output log file is 'OSR_Install.txt'.
ubuntu@ubuntu:~/osr_ws$ source /opt/ros/humble/setup.bash
ubuntu@ubuntu:~/osr_ws$ cd ~/osr_ws/src
ubuntu@ubuntu:~/osr_ws/src$ git clone
https://github.com/Achllle/osr-rover-code.git
remote: Enumerating objects: 2053, done.
remote: Counting objects: 100% (479/479), done.
remote: Compressing objects: 100% (205/205), done.
remote: Total 2053 (delta 276), reused 458 (delta 269), pack-reused 1574
Receiving objects: 100% (2053/2053), 30.24 MiB | 3.08 MiB/s, done.
Resolving deltas: 100% (1161/1161), done.
ubuntu@ubuntu:~/osr_ws/src$ ls
osr-rover-code
ubuntu@ubuntu:~/osr_ws/src$ cd osr-rover-code
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git fetch origin
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git checkout foxy/nav2
Switched to a new branch 'foxy/nav2'
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ sudo apt install
python3-rosdep
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
python3-rosdep is already the newest version (0.22.1-1).
0 upgraded, 0 newly installed, 0 to remove and 183 not upgraded.
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ cd ..
ubuntu@ubuntu:~/osr_ws/src$ sudo rosdep init
ERROR: default sources list file already exists:
/etc/ros/rosdep/sources.list.d/20-default.list
Please delete if you wish to re-initialize
ubuntu@ubuntu:~/osr_ws/src$ sudo rm
/etc/ros/rosdep/sources.list.d/20-default.list
ubuntu@ubuntu:~/osr_ws/src$ sudo rosdep init
Wrote /etc/ros/rosdep/sources.list.d/20-default.list
Recommended: please run
 rosdep update
ubuntu@ubuntu:~/osr_ws/src$ rosdep update
...
updated cache in /home/ubuntu/.ros/rosdep/sources.cache
ubuntu@ubuntu:~/osr_ws/src$ rosdep install --from-paths src
--ignore-src
given path 'src' does not exist
ubuntu@ubuntu:~/osr_ws/src$ cd ..
```

```
ubuntu@ubuntu:~/osr_ws$ rosdep install --from-paths src
--ignore-src
...extensive install...
#All required rosdeps installed successfully
ubuntu@ubuntu:~/osr_ws$ colcon build --symlink-install
...
Summary: 3 packages finished [1min 12s]
 1 package had stderr output: osr_control
ubuntu@ubuntu:~/osr_ws$ source install/setup.bash
```

The rover has some customizable settings that will overwrite the default values. Whether you have any changes compared to the defaults or not, you have to manually create these files:

```
ubuntu@ubuntu:~/osr_ws$ cd
~/osr_ws/src/osr-rover-code/ROS/osrBringup/config
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/ROS/osrBringup/config$
touch osr_params_mod.yaml roboclaw_params_mod.yaml
already done prev:
echo "source /opt/ros/humble/setup.bash" >> ~/.bashrc
ubuntu@ubuntu:~$ echo "source ~/osr_ws/install/setup.bash" >>
~/.bashrc
```

```
ubuntu@ubuntu:~$ sudo systemctl stop serial-getty@ttyS0.service
ubuntu@ubuntu:~$ sudo systemctl disable serial-getty@ttyS0.service
ubuntu@ubuntu:~$ sudo systemctl mask serial-getty@ttyS0.service
Created symlink /etc/systemd/system/serial-getty@ttyS0.service → /dev/null.
```

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code/config
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo cp
serial_udev_ubuntu.rules /etc/udev/rules.d/10-local.rules
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo udevadm
control --reload-rules && sudo udevadm trigger
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ sudo adduser
ubuntu tty
```

```
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/config$ cd
/boot/firmware
ubuntu@ubuntu:/boot/firmware$ sudo cp cmdline.txt cmdline.txt.bak
ubuntu@ubuntu:/boot/firmware$ sudo nano cmdline.txt
And then delete the substring console=serial0,115200 from the
single line of text in the file. Save and exit.
```

```
ubuntu@ubuntu:/boot/firmware$ sudo cp config.txt config.txt.bak
ubuntu@ubuntu:/boot/firmware$ sudo nano config.txt
And then add the new line dtoverlay=disable-bt
```

```
ubuntu@ubuntu:/boot/firmware$ sudo reboot
```

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src/osr-rover-code/scripts
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code/scripts$ python3
roboclawtest.py 128
Connected to /dev/serial0.
(1, 'USB Roboclaw 2x7a v4.1.34\\n')
(1, 0, 128)
Same for others 129-132
```

```
ubuntu@ubuntu:~$ source /opt/ros/humble/setup.bash
ubuntu@ubuntu:~$ source ~/osr_ws/install/setup.bash
```

```

ubuntu@ubuntu:~$ ros2 launch osr Bringup osr_launch.py
[INFO] [launch]: All log files can be found below
/home/ubuntu/.ros/log/2022-10-21-02-08-55-733924-ubuntu-3039
[INFO] [launch]: Default logging verbosity is set to INFO
[INFO] [roboclaw_wrapper-1]: process started with pid [3040]
[INFO] [rover-2]: process started with pid [3042]
[INFO] [teleop_node-3]: process started with pid [3044]
[INFO] [joy_node-4]: process started with pid [3046]
[teleop_node-3] [INFO] [1666318136.541662903] [TeleopTwistJoy]: Teleop enable button 4.
[teleop_node-3] [INFO] [1666318136.543821886] [TeleopTwistJoy]: Turbo on button 5.
[teleop_node-3] [INFO] [1666318136.544118899] [TeleopTwistJoy]: Linear axis x on 1 at scale
0.800000.
[teleop_node-3] [INFO] [1666318136.545520431] [TeleopTwistJoy]: Turbo for linear axis x is scale
1.780000.
[teleop_node-3] [INFO] [1666318136.545751020] [TeleopTwistJoy]: Angular axis yaw on 3 at scale
1.750000.
[teleop_node-3] [INFO] [1666318136.545964609] [TeleopTwistJoy]: Turbo for angular axis yaw is scale
3.950000.
[joy_node-4] [INFO] [1666318137.186479453] [joy]: Opened joystick: Xbox 360 Controller. deadzone:
0.050000
[roboclaw_wrapper-1] [INFO] [1666318139.687216860] [roboclaw_wrapper]: Initializing motor
controllers
[roboclaw_wrapper-1] Traceback (most recent call last):
[roboclaw_wrapper-1] File
"/home/ubuntu/osr_ws/install/osr_control/lib/osr_control/roboclaw_wrapper", line 33, in <module>
[roboclaw_wrapper-1] sys.exit(load_entry_point('osr-control', 'console_scripts',
'roboclaw_wrapper')())
[roboclaw_wrapper-1] File "/home/ubuntu/osr_ws/build/osr_control/osr_control/roboclaw_wrapper.py",
line 544, in main
[roboclaw_wrapper-1] wrapper = RoboclawWrapper()
[roboclaw_wrapper-1] File "/home/ubuntu/osr_ws/build/osr_control/osr_control/roboclaw_wrapper.py",
line 29, in __init__
[roboclaw_wrapper-1] self.declare_parameters(
[roboclaw_wrapper-1] File "/opt/ros/humble/local/lib/python3.10/dist-packages/rclpy/node.py", line
494, in declare_parameters
[roboclaw_wrapper-1] self._set_parameters(
[roboclaw_wrapper-1] File "/opt/ros/humble/local/lib/python3.10/dist-packages/rclpy/node.py", line
739, in _set_parameters
[roboclaw_wrapper-1] raise InvalidParameterTypeException(
[roboclaw_wrapper-1] rclpy.exceptions.InvalidParameterTypeException: Trying to set parameter
'baud_rate' to '115200' of type 'INTEGER', expecting type 'NOT_SET'
[ERROR] [roboclaw_wrapper-1]: process has died [pid 3040, exit code 1, cmd
'/home/ubuntu/osr_ws/install/osr_control/lib/osr_control/roboclaw_wrapper --ros-args -r
__node:=roboclaw_wrapper --params-file
/home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup/config/roboclaw_params.yaml'].
[rover-2] [INFO] [1666318140.626358164] [rover]: Initializing Rover
[rover-2] Traceback (most recent call last):
[rover-2] File "/home/ubuntu/osr_ws/install/osr_control/lib/osr_control/rover", line 33, in
<module>
[rover-2] sys.exit(load_entry_point('osr-control', 'console_scripts', 'rover')())
[rover-2] File "/home/ubuntu/osr_ws/build/osr_control/osr_control/rover.py", line 362, in main
[rover-2] rover = Rover()
[rover-2] File "/home/ubuntu/osr_ws/build/osr_control/osr_control/rover.py", line 22, in __init__
[rover-2] self.declare_parameters(
[rover-2] File "/opt/ros/humble/local/lib/python3.10/dist-packages/rclpy/node.py", line 494, in
declare_parameters
[rover-2] self._set_parameters(
[rover-2] File "/opt/ros/humble/local/lib/python3.10/dist-packages/rclpy/node.py", line 739, in
_set_parameters
[rover-2] raise InvalidParameterTypeException(
[rover-2] rclpy.exceptions.InvalidParameterTypeException: Trying to set parameter
'rover_dimensions.d1' to '0.184' of type 'DOUBLE', expecting type 'NOT_SET'
[ERROR] [rover-2]: process has died [pid 3042, exit code 1, cmd
'/home/ubuntu/osr_ws/install/osr_control/lib/osr_control/rover --ros-args -r __node:=rover
--params-file /home/ubuntu/osr_ws/install/osr_bringup/share/osr_bringup/config/osr_params.yaml
--params-file /tmp/launch_params_5uhebsp7'].
```

## 2022.10.22

On 10/22/2022 2:01 AM, c.demontaigu centiasoftware.com wrote:

Not sure what is going on since I don't have OSR\_Install.txt  
[not relevant as just a 'script' record file]

Follow Section 4 of

<https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/rpi.md>

[Not helpful. Wrong repo. Doesn't address question.]

What update are needed for RobotClaw look at error in Red ...

[Ungrammatical, don't know what he means.]

*Maybe updating the RoboClaw firm would help?*

*This started cascade of problems:*

*RoboClaw #5's USB jack is broken off. Thought I'd update the other 4 anyway. Downloaded latest Motion Studio from BasicMicro. Attached RC 1-4 via USB and updated the firmware. However - it changed them ALL to port 128! Now I don't know which is which! Thought I'd see if I could fix RC#5. 1/16" hex driver bit is lost! Using hand hex wrench got 3/4 corner screws removed but #4 is stripped! Had to remove Pi to get to bottom screw of standoff. Cost of single bit replacement is WAY more than a whole replacement set! USB jack us unrepairable. RoboClaws from BasicMicro are \$80+\$15.50 shipping = \$95. From Pololu (original source are much more and not in stock). Will ask Roberto if he has an extra. Probably too much to hope that the OSR maint community will upgrade to servos any time soon.*

**2022.10.23**

Trying 2 things today:

1) OnShape to URDF via

Original by Achille:

<https://cad.onshape.com/documents/5c358484057fc4c01d5e5803/w/bdf583acdf29d75695be5fbc/e/e3eb7193ecdec5b0a710978b>

My cc:

<https://cad.onshape.com/documents?nodeId=1&resourceType=filter>

Onshape-to-robot documentation:

<https://onshape-to-robot.readthedocs.io/en/latest/>

OnShape to Robot YouTube tutorial:

<https://onshape-to-robot.readthedocs.io/en/latest/>

told Charles & Roberto of intentions.

2) Install OSR-rover-code / foxy-devel from

<https://github.com/nasa-jpl/osr-rover-code/tree/foxy-devel>

**2022.10.23**

Foxy-devel install from:

<https://github.com/nasa-jpl/osr-rover-code/blob/foxy-devel/setup/rpi.md>

```
ubuntu@ubuntu:~$ mkdir -p ~/osr_ws/src && cd ~/osr_ws
source /opt/ros/foxy/setup.bash
source /opt/ros/humble/setup.bash
ubuntu@ubuntu:~/osr_ws$ source /opt/ros/humble/setup.bash
ubuntu@ubuntu:~/osr_ws$ sudo apt install
python3-colcon-common-extensions
Waiting for cache lock: Could not get lock /var/lib/dpkg/lock-frontend. It is
held by process 3435 (unattended-upgr)
https://idroot.us/disable-automatic-updates-on-ubuntu-20-04/
$ sudo nano /etc/apt/apt.conf.d/20auto-upgrades
only top 2 rows in my file.
Already disabled rest by system config?
Set the values in this file to 0:
APT::Periodic::Update-Package-Lists "0";
APT::Periodic::Download-Upgradeable-Packages "0";
APT::Periodic::AutocleanInterval "0";
APT::Periodic::Unattended-Upgrade "0";
REBOOT
ubuntu@ubuntu:~$ sudo apt update
...
201 packages can be upgraded. Run 'apt list --upgradable' to see them.
ubuntu@ubuntu:~$ sudo apt upgrade -y
Waiting for cache lock: Could not get lock /var/lib/dpkg/lock-frontend. It is
held by process 3435 (unattended-upgr)
This was supposed to be fixed!
REBOOT
ubuntu@ubuntu:~$ sudo apt upgrade -y
long upgrade...
ubuntu@ubuntu:~/osr_ws$ sudo apt install
python3-colcon-common-extensions
python3-colcon-common-extensions is already the newest version (0.3.0-1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
ubuntu@ubuntu:~$ sudo apt install git
git is already the newest version (1:2.34.1-1ubuntu1.5).
ubuntu@ubuntu:~$ cd ~/osr_ws/src
ubuntu@ubuntu:~/osr_ws/src$ git clone
https://github.com/nasa-jpl/osr-rover-code.git
Cloning into 'osr-rover-code'...
fatal: unable to access 'https://github.com/nasa-jpl/osr-rover-code.git/':
Failed to connect to github.com port 443 after 36 ms: Network is unreachable
```

*Log into github from GUI on Pi  
persistent problems connecting to github & some sites.  
Ping google.com works, Drudgereport.com works.  
Ping github.com fails, links from Drudge inconsistently succeed or fail.  
REBOOT again and again w/o improvement. Sometime seems to just take time?*

[https://browserhow.com/how-to-fix-err\\_address\\_unreachable-in-chrome/](https://browserhow.com/how-to-fix-err_address_unreachable-in-chrome/)

*Unplugged router for 3-4 min. Problem fixed!!*

```
ubuntu@ubuntu:~$ cd ~/osr_ws/src
ubuntu@ubuntu:~/osr_ws/src$ git clone
https://github.com/nasa-jpl/osr-rover-code.git
Cloning into 'osr-rover-code'...
remote: Enumerating objects: 1759, done.
remote: Counting objects: 100% (564/564), done.
remote: Compressing objects: 100% (250/250), done.
remote: Total 1759 (delta 333), reused 510 (delta 309), pack-reused 1195
Receiving objects: 100% (1759/1759), 1.01 MiB | 4.68 MiB/s, done.
Resolving deltas: 100% (1001/1001), done.
ubuntu@ubuntu:~/osr_ws/src$ cd osr-rover-code
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git fetch origin
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ git checkout foxy-devel
Branch 'foxy-devel' set up to track remote branch 'foxy-devel' from 'origin'.
Switched to a new branch 'foxy-devel'
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ sudo apt install
python3-rosdep
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
python3-rosdep is already the newest version (0.22.1-1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
ubuntu@ubuntu:~/osr_ws/src/osr-rover-code$ cd ..
ubuntu@ubuntu:~/osr_ws/src$ sudo rosdep init
ERROR: default sources list file already exists:
 /etc/ros/rosdep/sources.list.d/20-default.list
Please delete if you wish to re-initialize
ubuntu@ubuntu:~/osr_ws/src$ rm
/etc/ros/rosdep/sources.list.d/20-default.list
rm: remove write-protected regular file
'./etc/ros/rosdep/sources.list.d/20-default.list'? y
rm: cannot remove '/etc/ros/rosdep/sources.list.d/20-default.list': Permission
denied
ubuntu@ubuntu:~/osr_ws/src$ sudo rm
/etc/ros/rosdep/sources.list.d/20-default.list
```

```
ubuntu@ubuntu:~/osr_ws/src$ rosdep update
ERROR: no data sources in /etc/ros/rosdep/sources.list.d
Please initialize your rosdep with
 sudo rosdep init
ubuntu@ubuntu:~/osr_ws/src$ sudo rosdep init
Wrote /etc/ros/rosdep/sources.list.d/20-default.list
Recommended: please run
 rosdep update
ubuntu@ubuntu:~/osr_ws/src$ rosdep update
reading in sources list data from /etc/ros/rosdep/sources.list.d
Hit https://raw.githubusercontent.com/ros/rosdistro/master/rosdep/osx-homebrew.yaml
Hit https://raw.githubusercontent.com/ros/rosdistro/master/rosdep/base.yaml
Hit https://raw.githubusercontent.com/ros/rosdistro/master/rosdep/python.yaml
Hit https://raw.githubusercontent.com/ros/rosdistro/master/rosdep/ruby.yaml
Hit https://raw.githubusercontent.com/ros/rosdistro/master/releases/fuerte.yaml
Query rosdistro index https://raw.githubusercontent.com/ros/rosdistro/master/index-v4.yaml
Skip end-of-life distro "ardent"
Skip end-of-life distro "bouncy"
Skip end-of-life distro "crystal"
Skip end-of-life distro "dashing"
Skip end-of-life distro "eloquent"
Add distro "foxy"
Add distro "galactic"
Skip end-of-life distro "groovy"
Add distro "humble"
Skip end-of-life distro "hydro"
Skip end-of-life distro "indigo"
Skip end-of-life distro "jade"
Skip end-of-life distro "kinetic"
Skip end-of-life distro "lunar"
Add distro "melodic"
Add distro "noetic"
Add distro "rolling"
updated cache in /home/ubuntu/.ros/rosdep/sources.cache
```

```
rosdep install --from-paths src --ignore-src --rosdistro=foxy
rosdep install --from-paths src --ignore-src --rosdistro=humble
given path 'src' does not exist
```

*Need another cd .. here*

```
ubuntu@ubuntu:~/osr_ws/src$ cd ..
ubuntu@ubuntu:~/osr_ws$ rosdep install --from-paths src
--ignore-src --rosdistro=humble
executing command [sudo -H apt-get install ros-humble-teleop-twist-joy]
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Some packages could not be installed. This may mean that you have
requested an impossible situation or if you are using the unstable
distribution that some required packages have not yet been created
or been moved out of Incoming.
The following information may help to resolve the situation:
```

The following packages have unmet dependencies:

```
libsdl2-dev : Depends: libsdl2-2.0-0 (= 2.0.20+dfsg-2build1) but
2.0.20+dfsg-2ubuntu1.22.04.1 is to be installed
 Depends: libudev-dev but it is not going to be installed
E: Unable to correct problems, you have held broken packages.
```

ERROR: the following rosdeps failed to install

```
apt: command [sudo -H apt-get install ros-humble-teleop-twist-joy] failed
```

*Try installing missing dependency:*

```
ubuntu@ubuntu:~/osr_ws$ sudo apt install libudev-dev
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Some packages could not be installed. This may mean that you have
requested an impossible situation or if you are using the unstable
distribution that some required packages have not yet been created
or been moved out of Incoming.
The following information may help to resolve the situation:
```

The following packages have unmet dependencies:

```
libudev-dev : Depends: libudev1 (= 249.11-0ubuntu3) but 249.11-0ubuntu3.4 is to
be installed
E: Unable to correct problems, you have held broken packages.
```

```
ubuntu@ubuntu:~/osr_ws$ sudo apt install libudev1
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
libudev1 is already the newest version (249.11-0ubuntu3.4).
libudev1 set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
ubuntu@ubuntu:~/osr_ws$ sudo apt install libudev-dev
Same error as above
```

Google error: *[SKIP - THIS DOESN'T WORK!]*  
<https://bugs.launchpad.net/ubuntu/+source/systemd/+bug/1979850>  
which refers to:  
<https://askubuntu.com/questions/1417403/can-not-install-libudev-dev-on-ubuntu-22-04/1417416#1417416>

I have solved this issue by doing the following:  
Go to the "Software & Updates" on Ubuntu.  
Then on "Ubuntu Software" tab, make sure all of the check boxes at "Downloadable from the Internet" section are checked.  
Same goes for the "Other Software" tab.  
Same goes for the "Developer Options" tab where the check box section for: "Pre-released updates" is also checked.

Then on terminal I enter the following commands:

```
sudo apt-get update
sudo apt-get upgrade
sudo apt-get --with-new-pkgs upgrade
sudo aptitude full-upgrade
sudo apt-get update
sudo apt-get upgrade
```

*Do above suggestions & commands...*

```
ubuntu@ubuntu:~$ sudo apt-get update
Hit:1 http://packages.ros.org/ros2/ubuntu jammy InRelease
Hit:2 http://ports.ubuntu.com/ubuntu-ports jammy InRelease
Hit:3 http://ports.ubuntu.com/ubuntu-ports jammy-security InRelease
Get:4 http://ports.ubuntu.com/ubuntu-ports jammy-proposed InRelease [270 kB]
Fetched 270 kB in 2s (152 kB/s)
Reading package lists... Done
ubuntu@ubuntu:~$ sudo apt-get upgrade
Very large upgrade...
```

```
ubuntu@ubuntu:~$ sudo apt autoremove
Continuing from above...
ubuntu@ubuntu:~$ sudo apt-get --with-new-pkgs upgrade
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
ubuntu@ubuntu:~$ sudo aptitude full-upgrade
sudo: aptitude: command not found
ubuntu@ubuntu:~$ sudo apt full-upgrade
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

```
ubuntu@ubuntu:~$ sudo apt-get update
Not sure why/if this is needed again
Hit:1 http://ports.ubuntu.com/ubuntu-ports jammy InRelease
Hit:2 http://packages.ros.org/ros2/ubuntu jammy InRelease
Hit:3 http://ports.ubuntu.com/ubuntu-ports jammy-security InRelease
Get:4 http://ports.ubuntu.com/ubuntu-ports jammy-proposed InRelease [270 kB]
Fetched 270 kB in 2s (137 kB/s)
Reading package lists... Done
ubuntu@ubuntu:~$ sudo apt-get upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
ubuntu@ubuntu:~$ sudo apt autoremove
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

```
ubuntu@ubuntu:~/osr_ws$ rosdep install --from-paths src
--ignore-src --rosdistro=humble
Same error as above
```

Googling error code again:

<https://github.com/ros2/ros2/issues/1287>

which pointed to suggesting to build from source but the target pages don't say how:

<https://launchpad.net/ubuntu/+source/libsdl2/2.0.20+dfsg-2ubuntu1.22.04.1>

and

<https://launchpad.net/ubuntu/jammy/arm64/libsdl2-dev/2.0.20+dfsg-2ubuntu1.22.04.1>

and

<https://launchpad.net/ubuntu/+source/libsdl2/2.0.20+dfsg-2ubuntu1.22.04.1>

*Could it be that the packages just aren't ready for humble yet and that foxy would work just fine??*

*What if I try --rosdistro=foxy??*

```
ubuntu@ubuntu:~/osr_ws$ rosdep install --from-paths src
--ignore-src --rosdistro=foxy
WARNING: given --rosdistro foxy but ROS_DISTRO is "humble". Ignoring
environment.
ERROR: the following packages/stacks could not have their rosdep keys resolved
to system dependencies:
osr_control: No definition of [teleop_twist_joy] for OS version [jammy]
```

*So much for THAT theory!*

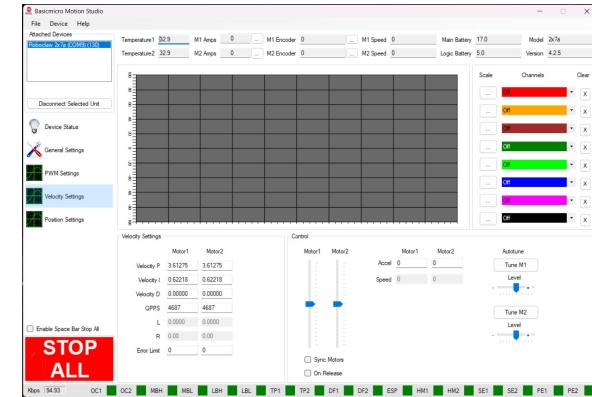
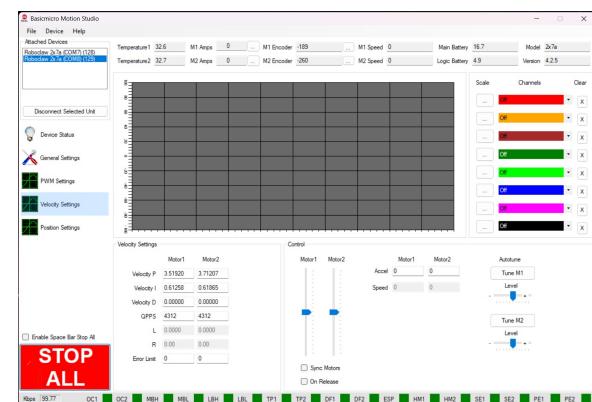
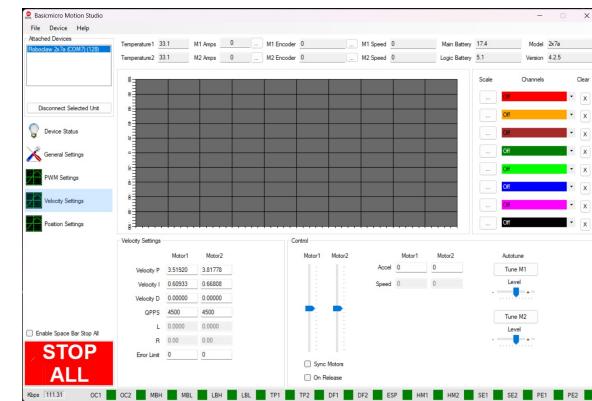
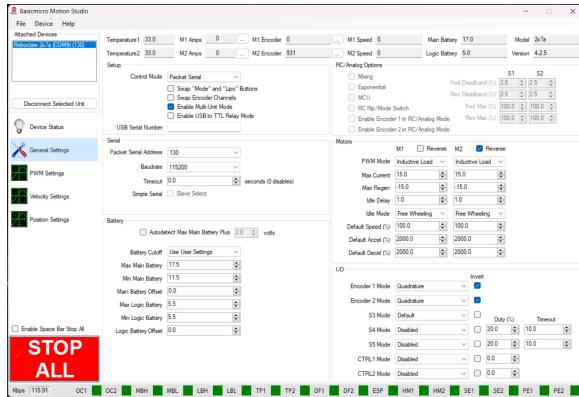
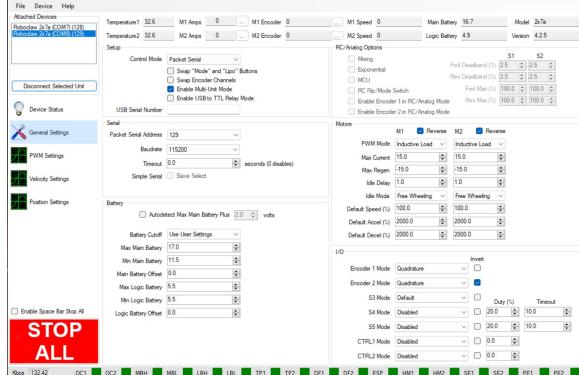
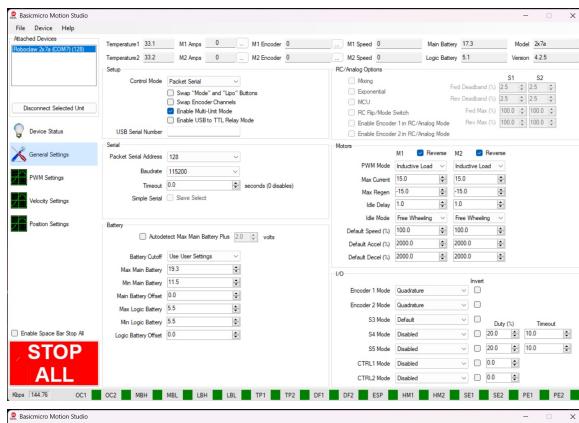
*Apparently OSR-code isn't ready for Humble but Foxy appears to work.*

**2022.11.05**

Replacement RoboClaw for #5 with the broken USB jack arrived yesterday. Installed today. Basicmicro Motion Studio invoked. Replaced all the 4-40 1/4" button head screws, which are ridiculously easy to strip the hex head on, to hex cap screws. Had to use a screw remover bit to remove several stripped screws! Once installed, #3 RoboClaw motors wouldn't respond even though the RC itself registered with Basicmicro Motion Studio and the 12V input was intact. [Hope I don't have to replace another RC!]

**2022.11.06**

Try again w/ Motionstudio:





*Getting frequent error messages and crashes from Motion Studio. Particularly when trying to File/Load or Save Settings or Device/ Read or Write Settings.*

*The version of Motion Studio is different than before (1.0.0.72) and the interface is just a little different.*

*On RC #4 (right front/back steering motors) both motors test ok w/ PWM Settings. With Position Settings / Autotune PID, whichever motor I test second, causes Motion Studio to crash. Then I get a USB device not recognized when I plug it in.*

*On RC #5 (left back/front steering motors) the encoder readings don't change as the motor turns. (Yes, they're set to "absolute")*

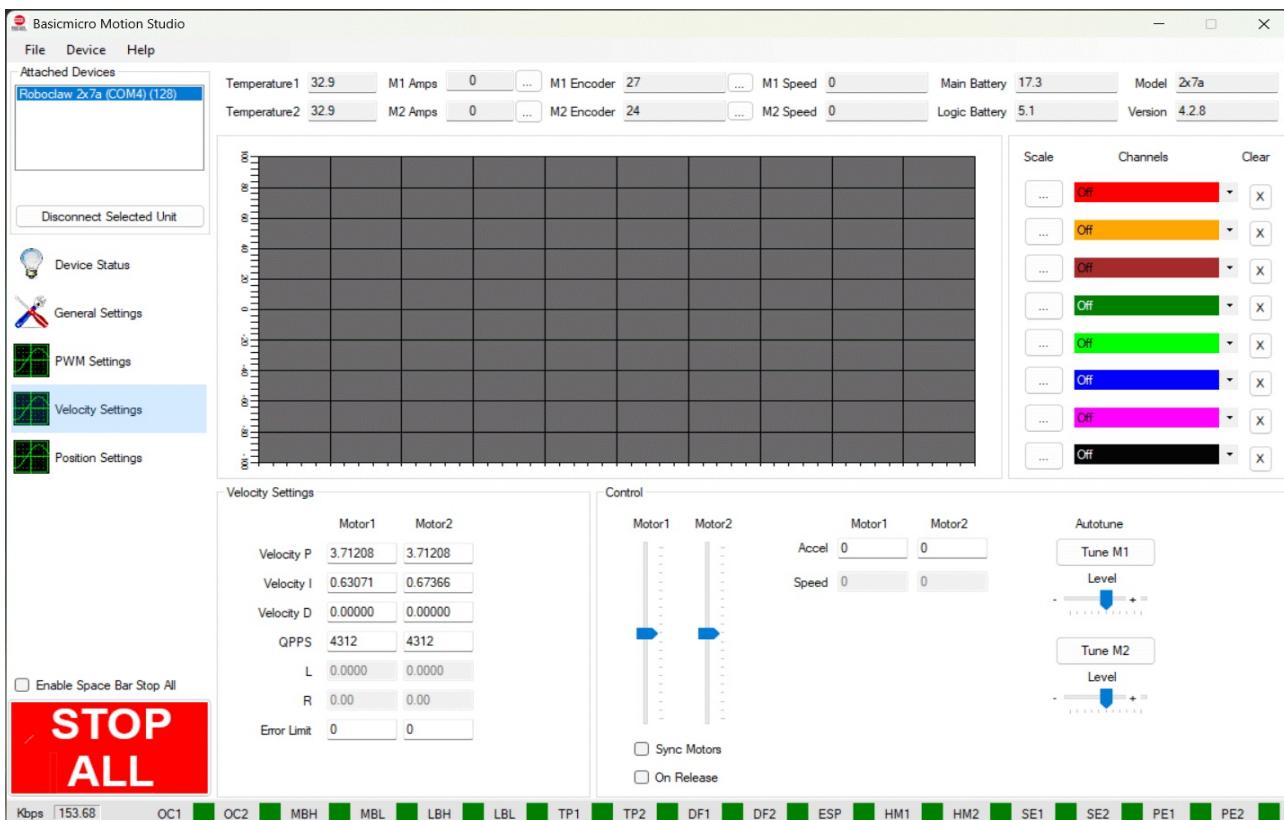
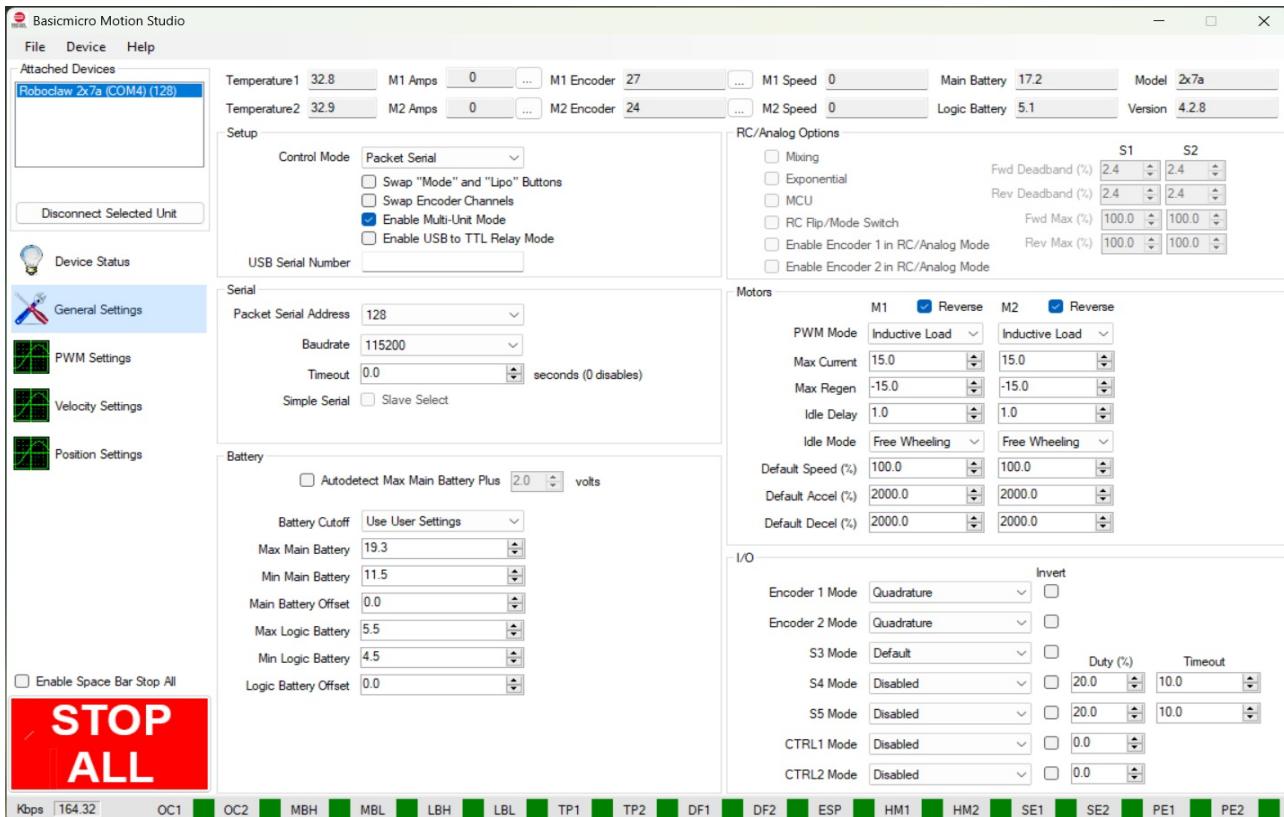
ENOUGH FOR TODAY.

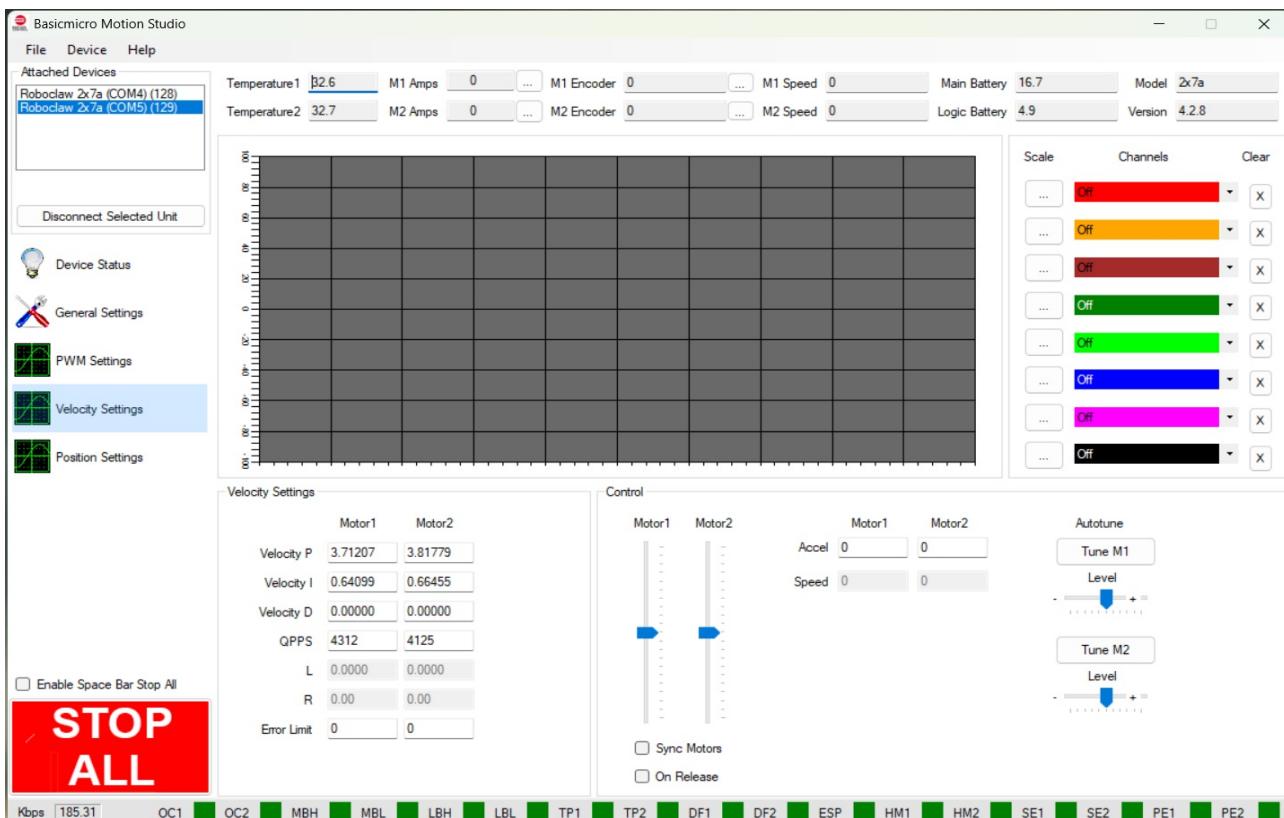
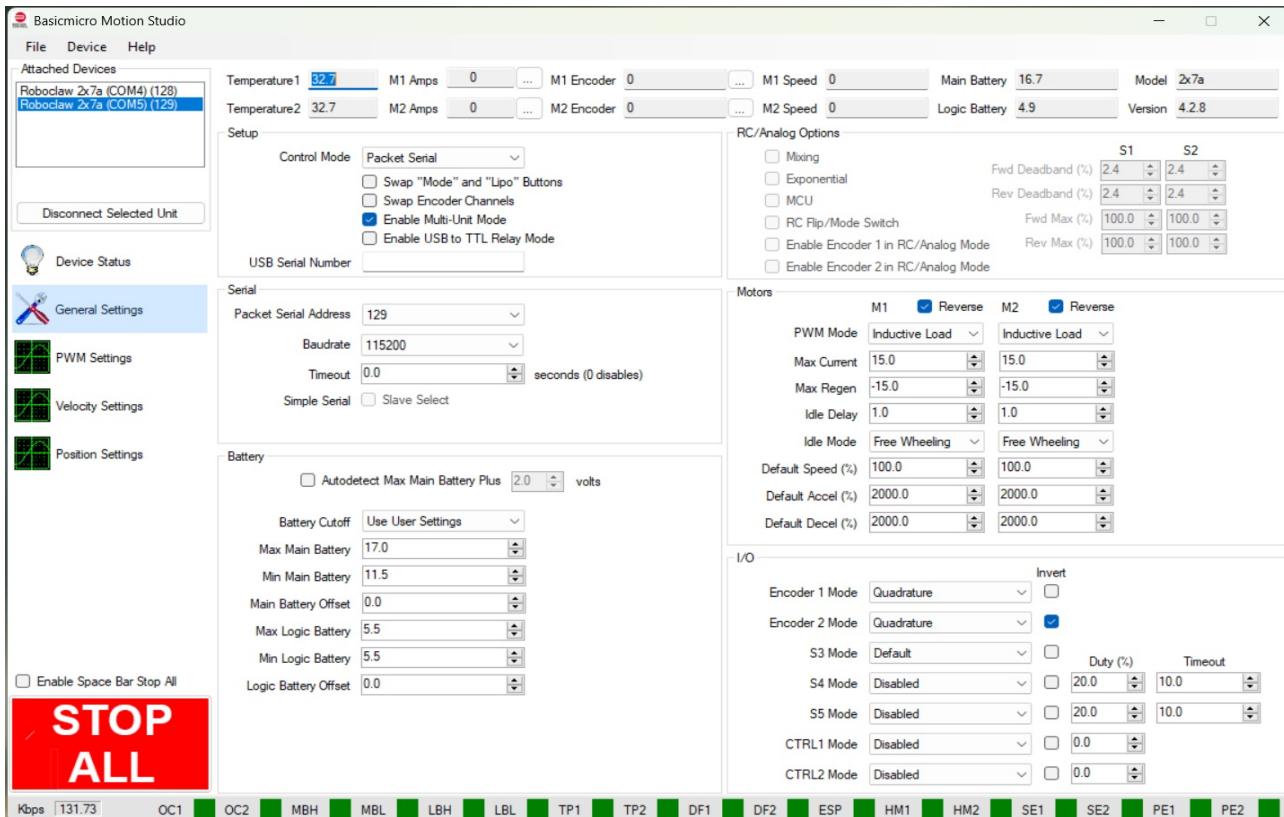
## **2023.02.11**

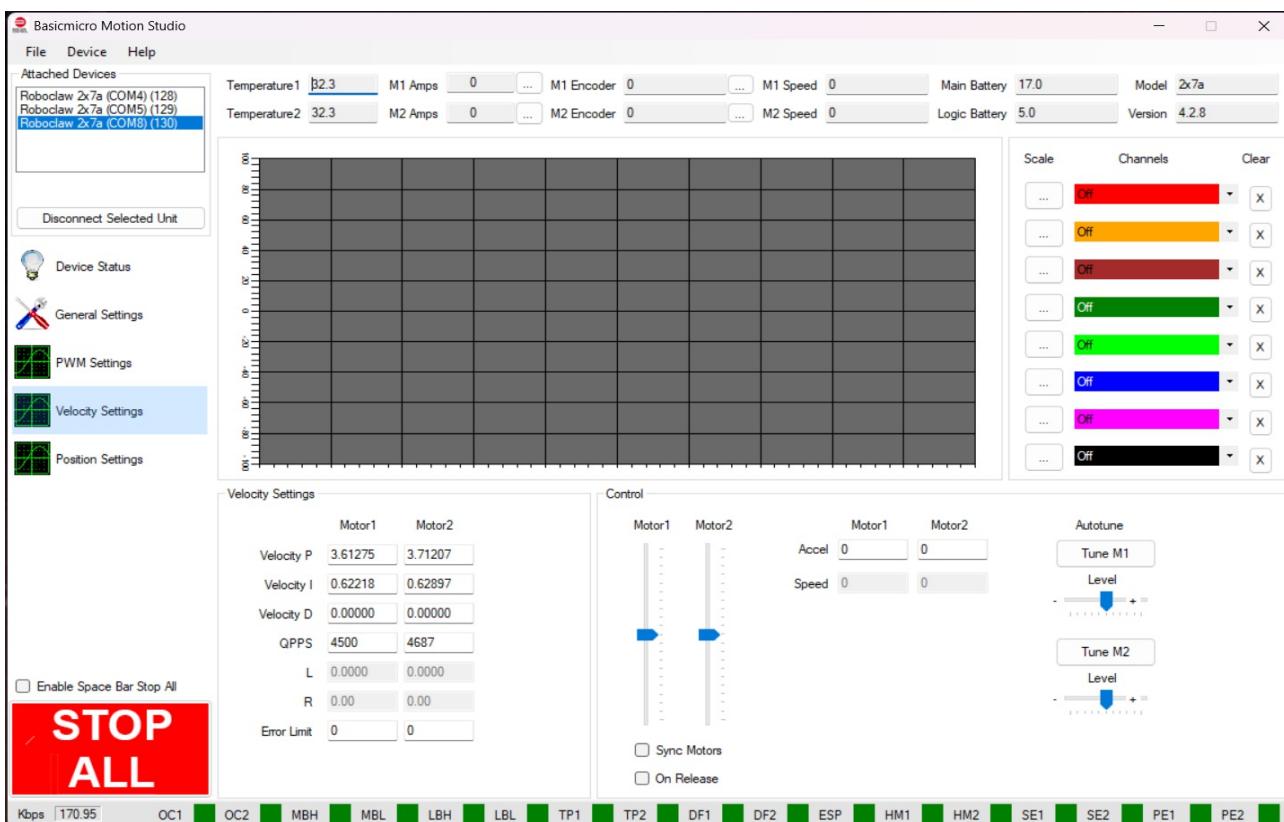
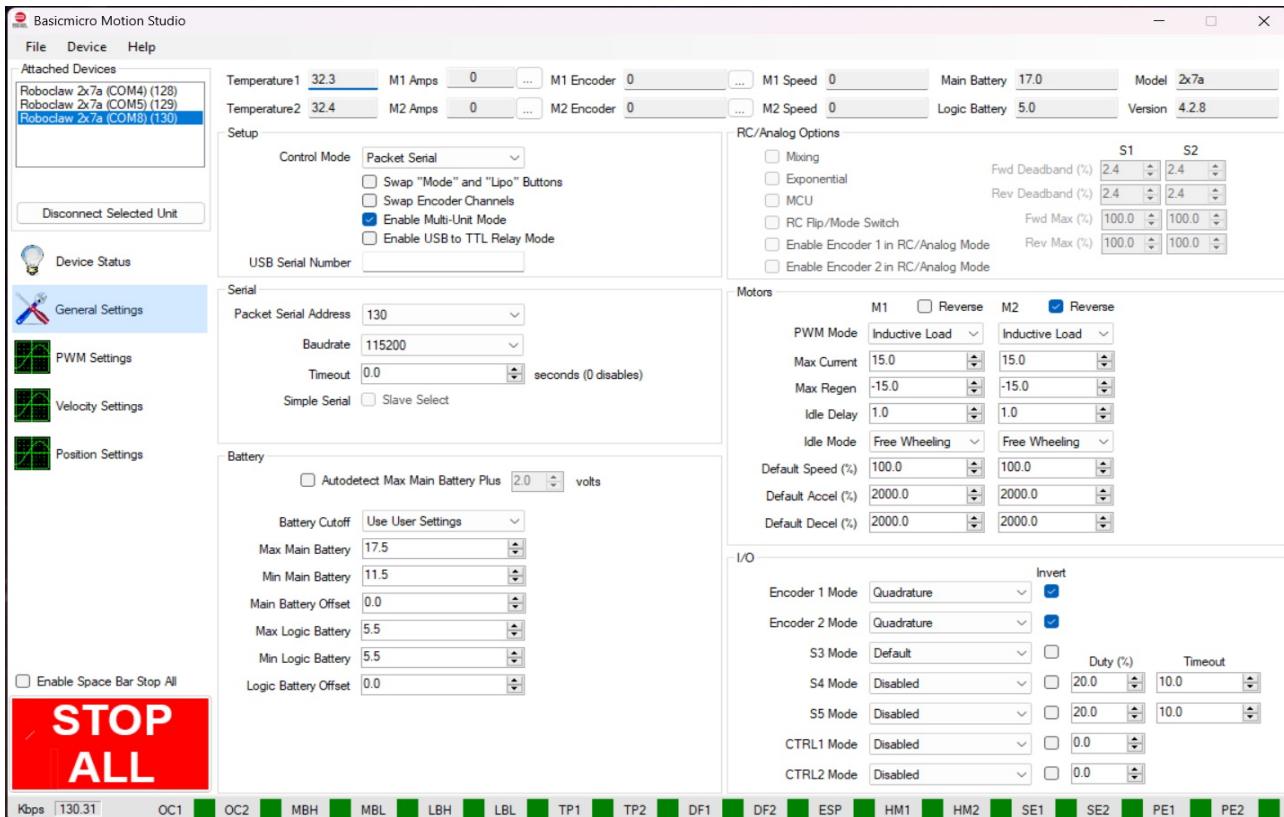
Returned from almost a month in Australia/New Zealand to celebrate daughter's graduation from P.A. school in San Antonio. Will be her only opportunity to travel before she starts working, where yet to be determined.

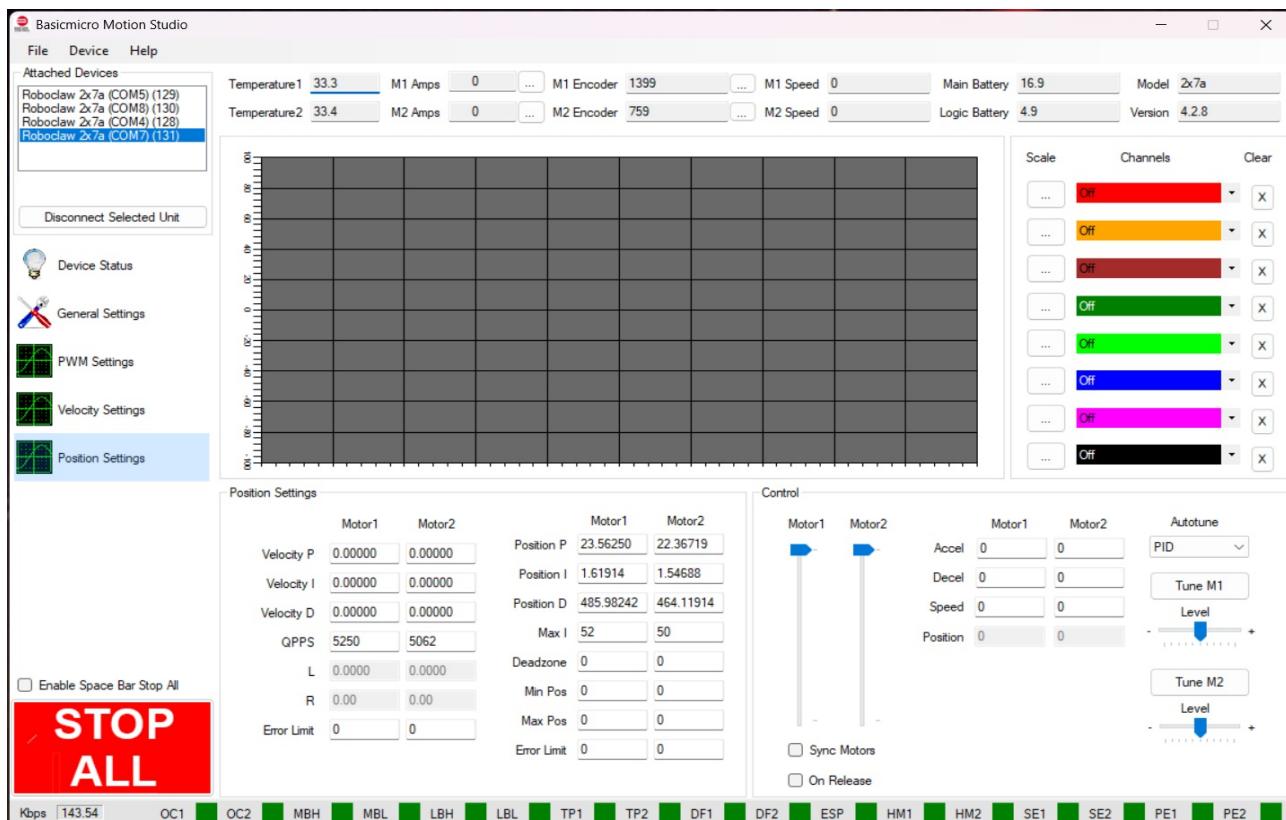
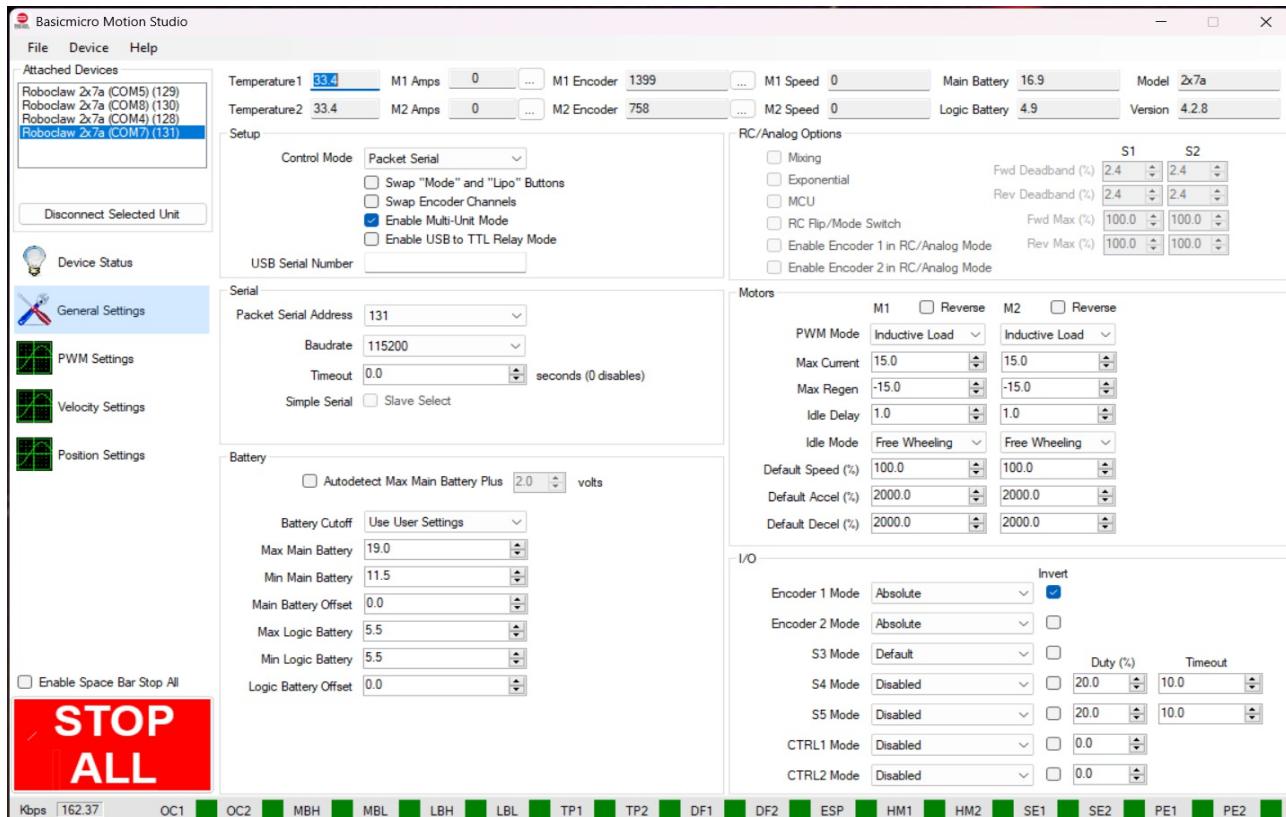
Let's revisit the motor issue above.

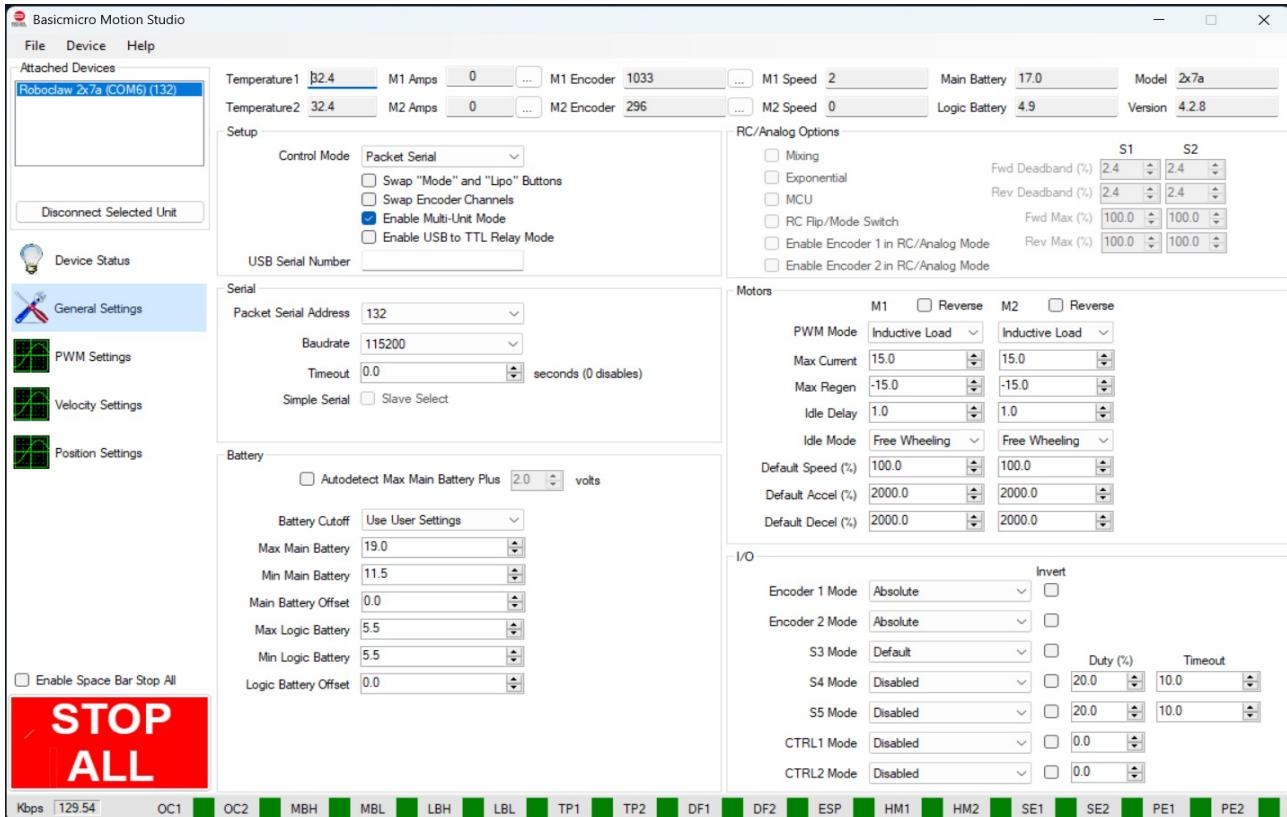
First off, Basicmicro Motion Studio wanted to upgrade the firmware of all the RoboClaws from 4.2.5 > 4.2.8 which messed up all the default settings:











On RC #5 left front/rear steering wheels. While the RC reads encoder values, they don't change significantly from baseline w/ rotation. Both are significantly divergent from the ~700s midpoint. Adjustment is hampered by stripped set screw socket requiring epoxy of the gear to the encoder shaft. Autotuning of either Velocity or Position leads to expected back and forth, then full force in one extreme or the other. The program crashes making controls inoperative. Only POWER OFF on the rover will stop the runaway motor. Examination of the RC, PCB and RPi revealed no obvious defects. Since 2 different motors/encoders are affected, it's hard to blame on a single wire or connector. The RC is a new replacement for a bad one. **I suppose brute force substitution of the two steering RC's would answer the question, but what a pain to do!**

Took the pains to swap RC#4 & #5.  
Hard part is all the short jumper wires from the RC to the PCB!



## 2023.02.12

Using Basicmicro Motion Studio connected to USB #5 attached now to RC #4 (in place of #5) connected to the left rear/front steering motors. The motors move appropriately using PWM settings but both encoders readings remain unchanged w/in noise fluctuation.

RC #5 (in place of #4) behaved normally until I changed its Packet Serial Address 132>131 and wrote to device. It crashed. Ending Task & retrying a couple times got the PSAs to swap successfully. Behavior of the left motors unchanged. THEREFORE it's not the RC's but somehow the encoder circuits to both. Crap!

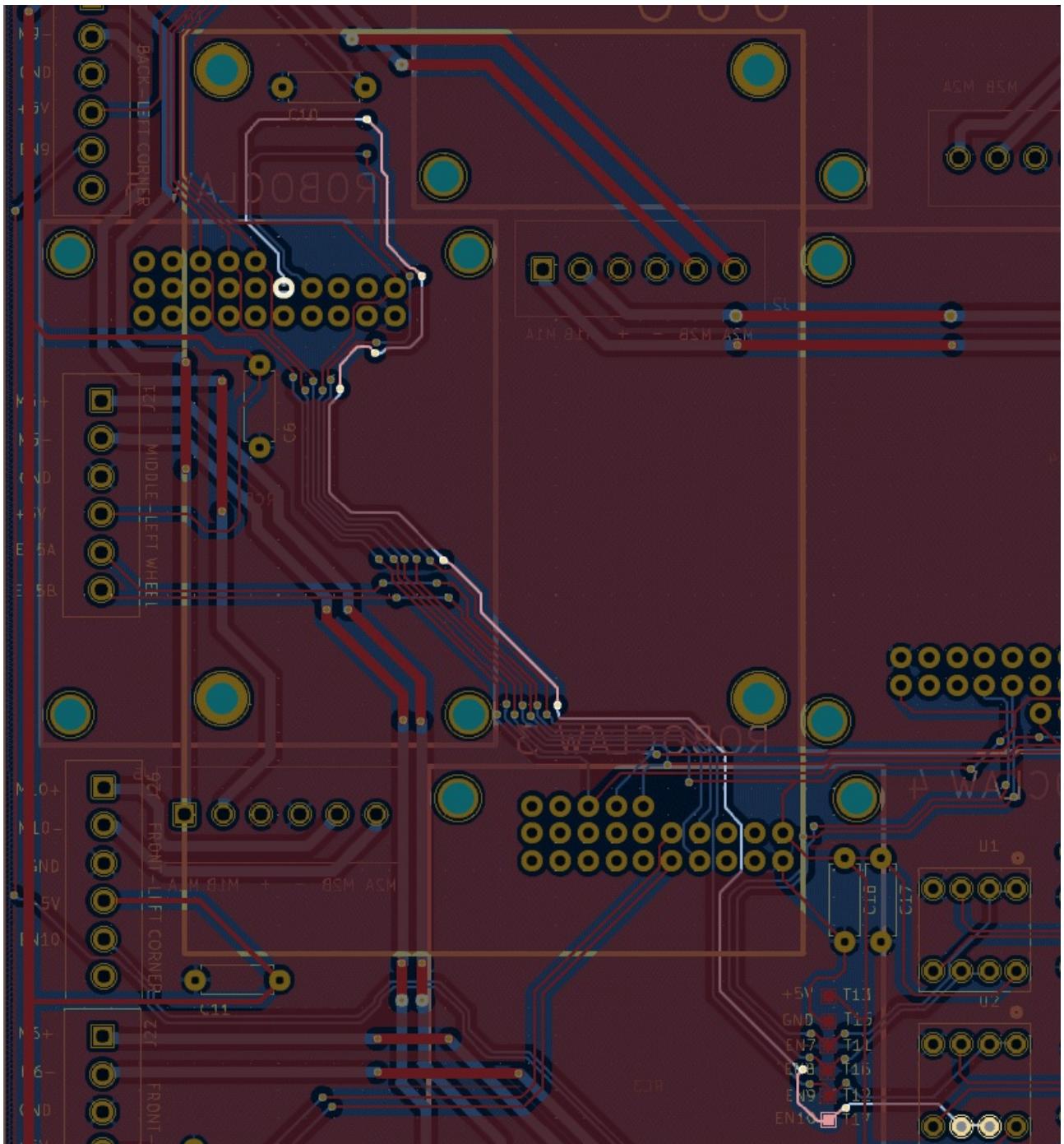
Found a disconnected encoder ground wire where the cable enters the PCB. Reattached & reassembled. Defer testing til tomorrow - I'm tired and the Superbowl is coming on!

## 2023.02.13

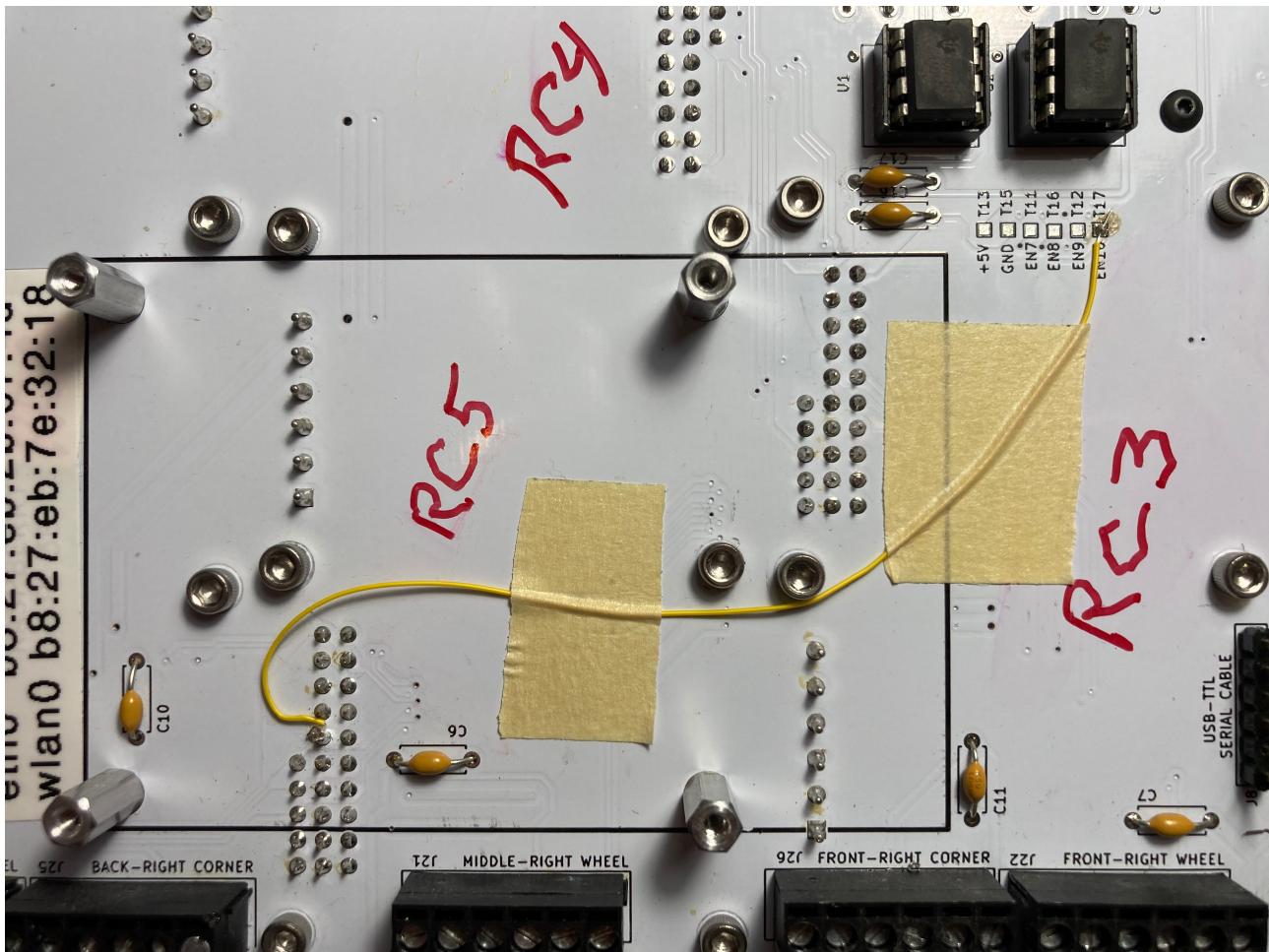
Fixing the ground wire solved the left rear problem, but not the left front. Unclamped and dropped both left steering wheel assemblies from their encoders. Rotated the left rear encoder to find values from 505-2030, midpoint ~760. Rotated it to mid value and replaced the wheel assembly. Calibration deferred until the front wheel is fixed.

Tested the left front encoder at its Molex connector and found the voltage to range from 0-5V between signal out and ground, proving the encoder itself is ok. Traced the circuit to the PCB screw terminals - intact. Trace the circuit through the PCB to the ENC10 RAW to the voltage divider - intact. Voltage variation from encoder rotation is reflected here. **Get no signal between the ENC10 out from the voltage divider to the input pins of RC#5.** But I see no defect in the PCB traces. I guess I'll have to wait for the current revision of the PCB to be complete.

Looking at "C:\Users\jhphe\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\OSR Git Gallery\electrical\pcb\control\_board\Control Board.kicad\_pcb"



Somewhere between the RC5 pad /RC5EN2A and the 3d via upstream from it to Test Point T17-EN10 from the voltage divider the circuit fails. Continuity checks between TP17-EN10 and the 3d from last via, but not to RC5-EN2A. The question is how to bridge this mysterious gap. The vias are so tiny that I don't think any wires can fit. The two endpoints are far apart and on opposite sides of the board. The board revision doesn't seem to be anytime soon. Perhaps directly from pad T17 to RC5EN2A?



Success! Continuity checks ok. Basicmicro Motion Studio recognizes RC5 and reads EC2 ok  $0-1550/2 = 770$  midpoint. EC1 500-2035 = 1268 midpoint. Replaced old 6/32 1/4" button head screws w/ 6/32 socket cap screws. Rotated the clamp on the left front steering assembly to point the screw outward in neutral position. Autotune for Position Settings using default PIV, at the end throws the wheel into an extreme position causing system reboot, sometimes getting wheel stuck trying to keep going til the power is cut. AVOID. Setting the min & max positions didn't help. At first thought it was because encoder crossed the zero mark during travel, but repositioning encoder to neutral didn't help. Tuning Position Settings with PID did ok as did autotune of Velocity Settings.

Basicmicro Motion Studio

File Device Help

Attached Devices

Roboclaw 2x7a (COM3) (132)

Temperature1 32.5 M1 Amps 0 ... M1 Encoder 1225 ... M1 Speed -3 Main Battery 17.0 Model 2x7a

Temperature2 32.6 M2 Amps 0 ... M2 Encoder 934 ... M2 Speed 6 Logic Battery 4.9 Version 4.2.8

Disconnect Selected Unit

Device Status

General Settings

PWM Settings

Velocity Settings

Position Settings

Enable Space Bar Stop All

**STOP ALL**

Kbps 141.43 OC1 OC2 MBH MBL LBH LBL TP1 TP2 DF1 DF2 ESP HM1 HM2 SE1 SE2 PE1 PE2

| Position Settings  |         | Control              |           |
|--------------------|---------|----------------------|-----------|
| Motor1             | Motor2  | Motor1               | Motor2    |
| Velocity P 0.00000 | 0.00000 | Position P 22.74886  | 24.48185  |
| Velocity I 0.00000 | 0.00000 | Position I 1.52606   | 1.63210   |
| Velocity D 0.00000 | 0.00000 | Position D 457.81655 | 489.62952 |
| QPPS 5625          | 5625    | Max I 56             | 56        |
| L 0.0000           | 0.0000  | Deadzone 0           | 0         |
| R 0.00             | 0.00    | Min Pos 700          | 200       |
| Error Limit 0      | 0       | Max Pos 1750         | 1350      |
|                    |         | Error Limit 0        | 0         |

| Position                             |        | Autotune |         |
|--------------------------------------|--------|----------|---------|
| Motor1                               | Motor2 | Motor1   | Motor2  |
| Accel 0                              | 0      | PID      | Tune M1 |
| Decel 0                              | 0      | Level    |         |
| Speed 0                              | 0      | Position | 700 200 |
|                                      |        |          |         |
| <input type="checkbox"/> Sync Motors |        |          |         |
| <input type="checkbox"/> On Release  |        |          |         |

## 2023.03.10

Based on recent HomebrewRobotics ROS online discussion group, the consensus was that running Ubuntu in a Windows Virtual Machine or Windows Subsystem for Linux was fraught with problems.

One such example, trying to run Rviz2 on Dell Inspiron P117F / Win11 home / WSL / Ubuntu 22.04 jammy / ROS2 humble:

```
root@HankRearden:~# su ubuntu
ubuntu@HankRearden:/root$ su ubuntu
Password: password
ubuntu@HankRearden:/root$ cd
ubuntu@HankRearden:~$ ros2 run rviz2 rviz2
qt.qpa.xcb: could not connect to display
qt.qpa.plugin: Could not load the Qt platform plugin "xcb" in "" even though it
was found.
This application failed to start because no Qt platform plugin could be
initialized. Reinstalling the application may fix this problem.
```

Available platform plugins are: eglfs, linuxfb, minimal, minimalegl, offscreen, vnc, xcb.

[ros2run]: Aborted

Google error message:

<https://github.com/NVlabs/instant-ngp/discussions/300>

@ljubomirb  
...I don't know if that was the fix, ... BUT, after I wrote this in console:  
export QT\_QPA\_PLATFORM=offscreen  
everything worked.

```
ubuntu@HankRearden:~$ export QT_QPA_PLATFORM=offscreen [fails!]
ubuntu@HankRearden:~$ ros2 run rviz2 rviz2
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to
'/tmp/runtime-ubuntu'
Unable to open display:
[ERROR] [1678489896.914648670] [rviz2]: RenderingAPIException: Couldn't open X
display in GLXGLSupport::getGLDisplay at
./.obj-x86_64-linux-gnu/ogre-v1.12.1-prefix/src/ogre-v1.12.1/RenderSystems/GLSup
port/src/GLX/OgreGLXGLSupport.cpp (line 481)
terminate called after throwing an instance of 'Ogre::RenderingAPIException'
 what(): RenderingAPIException: Couldn't open X display in
GLXGLSupport::getGLDisplay at
./.obj-x86_64-linux-gnu/ogre-v1.12.1-prefix/src/ogre-v1.12.1/RenderSystems/GLSup
port/src/GLX/OgreGLXGLSupport.cpp (line 481)
[ros2run]: Aborted
```

Clearly THAT didn't work!

<https://stackoverflow.com/questions/59790350/qstandardpaths-xdg-runtime-dir-not-set-defaulting-to-tmp-runtime-aadithyash>

@ben-milanko  
on Jul 19, 2022  
I ran into this issue, it seems to be from open-cv opencv/opencv-python#46.

Using open-cv-python-headless instead seems to work for me:  
<https://stackoverflow.com/a/72090539>

pip uninstall opencv-python  
pip install opencv-python-headless

```
ubuntu@HankRearden:~$ pip uninstall opencv-python
WARNING: Skipping opencv-python as it is not installed.
Maybe that's the problem!? Or should it be python3?
WARNING: Skipping opencv-python as it is not installed.
Nope
Let's try first with head ON:
ubuntu@HankRearden:~$ pip3 install opencv-python3
Defaulting to user installation because normal site-packages is not writeable
ERROR: Could not find a version that satisfies the requirement opencv-python3
(from versions: none)
ERROR: No matching distribution found for opencv-python3
ubuntu@HankRearden:~$ pip3 install opencv-python
Defaulting to user installation because normal site-packages is not writeable
Collecting opencv-python
 Downloading
 opencv_python-4.7.0.72-cp37-abi3-manylinux_2_17_x86_64.manylinux2014_x86_64.whl
 (61.8 MB)
 [progress bar...] 61.8/61.8 MB 5.2 MB/s eta 0:00:00
Requirement already satisfied: numpy>=1.21.2 in /usr/lib/python3/dist-packages
 (from opencv-python) (1.21.5)
Installing collected packages: opencv-python
Successfully installed opencv-python-4.7.0.72
```

```
ubuntu@HankRearden:~$ ros2 run rviz2 rviz2
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-ubuntu'
Unable to open display:
[ERROR] [1678491208.323249205] [rviz2]: RenderingAPIException: Couldn't open X display in
GLXGLSupport::getGLDisplay at
./.obj-x86_64-linux-gnu/ogre-v1.12.1-prefix/src/ogre-v1.12.1/RenderSystems/GLSupport/src/GLX/OgreGLX
GLSupport.cpp (line 481)
terminate called after throwing an instance of 'Ogre::RenderingAPIException'
 what(): RenderingAPIException: Couldn't open X display in GLXGLSupport::getGLDisplay at
./.obj-x86_64-linux-gnu/ogre-v1.12.1-prefix/src/ogre-v1.12.1/RenderSystems/GLSupport/src/GLX/OgreGLX
GLSupport.cpp (line 481)
[ros2run]: Aborted
```

Same error

```

ubuntu@HankRearden:~$ pip3 uninstall opencv-python [>python, fixed]
WARNING: Skipping opencv-python as it is not installed.
ubuntu@HankRearden:~$ pip3 install opencv-python-headless
Defaulting to user installation because normal site-packages is not writeable
Collecting opencv-python-headless
 Downloading opencv_python_headless-4.7.0.72-cp37-abi3-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (49.2 MB)
 [progress bar....] 49.2/49.2 MB 5.8 MB/s eta 0:00:00
Requirement already satisfied: numpy>=1.17.3 in /usr/lib/python3/dist-packages (from opencv-python-headless) (1.21.5)
Installing collected packages: opencv-python-headless
Successfully installed opencv-python-headless-4.7.0.72
ubuntu@HankRearden:~$ pip3 uninstall opencv-python
Found existing installation: opencv-python 4.7.0.72
Uninstalling opencv-python-4.7.0.72:
...
Successfully uninstalled opencv-python-4.7.0.72
ubuntu@HankRearden:~$ pip3 install opencv-python-headless
Defaulting to user installation because normal site-packages is not writeable
Requirement already satisfied: opencv-python-headless in ./local/lib/python3.10/site-packages (4.7.0.72)
Requirement already satisfied: numpy>=1.21.2 in /usr/lib/python3/dist-packages (from opencv-python-headless) (1.21.5)
ubuntu@HankRearden:~$ ros2 run rviz2 rviz2
QStandardPaths: wrong permissions on runtime directory /home/ubuntu/XDG_RUNTIME, 0775 instead of 0700
Unable to open display:
[ERROR] [1678498371.052639732] [rviz2]: RenderingAPIException: Couldn't open X display in GLXGLSupport::getGLDisplay at ./obj-x86_64-linux-gnu/ogre-v1.12.1-prefix/src/ogre-v1.12.1/RenderSystems/GLSupport/src/GLX/OgreGLX GLSupport.cpp (line 481)
terminate called after throwing an instance of 'Ogre::RenderingAPIException'
what(): RenderingAPIException: Couldn't open X display in GLXGLSupport::getGLDisplay at ./obj-x86_64-linux-gnu/ogre-v1.12.1-prefix/src/ogre-v1.12.1/RenderSystems/GLSupport/src/GLX/OgreGLX GLSupport.cpp (line 481)
[ros2run]: Aborted

```

## Ask ChatGPT: “How do I get Rviz2 to work under Windows 11, Windows Subsystem for Linux, Ubuntu 22.04, ROS2 Humble?”

To get Rviz2 to work under Windows 11, Windows Subsystem for Linux, Ubuntu 22.04, ROS2 Humble, you can follow these steps:

Install Windows Subsystem for Linux (WSL) on your Windows 11 machine by following the instructions provided by Microsoft.

Once WSL is installed, open the Microsoft Store and search for Ubuntu. Install Ubuntu 22.04 from the store.

Open Ubuntu 22.04 and install ROS 2 Humble by following the instructions provided by ROS 2.

Once ROS 2 Humble is installed, install Rviz2 by running the following command in the terminal:  
`sudo apt install ros-humble-rviz2`

Launch Rviz2 by running the following command in the terminal:  
`ros2 run rviz2 rviz2`

If Rviz2 doesn't launch, make sure your Windows 11 machine has OpenGL support. You can check by running the following command in the terminal:  
`glxinfo | grep "OpenGL version"`

If you get an output that includes the version number of OpenGL, then your machine has OpenGL support. If not, you may need to install graphics drivers or use a different machine with OpenGL support.

```
ubuntu@HankRearden:~$ sudo apt update
ubuntu@HankRearden:~$ sudo apt upgrade
Ask ChatGPT: "how to install OpenGL"
```

For Ubuntu or Debian-based systems, run the following command in the terminal:  
sudo apt-get install mesa-utils

```
ubuntu@HankRearden:~$ sudo apt install mesa-utils
...mesa-utils is already the newest version (8.4.0-1ubuntu1)...
ubuntu@HankRearden:~$ glxinfo | grep "OpenGL version"
```

Error: unable to open display

From ChatGPT: "Note: If you're using a virtual machine, you may encounter some issues with OpenGL support. Some virtualization software allows you to enable OpenGL support, while others do not."

Test OpenGL: You can test if OpenGL is working by running the following command in the terminal:

```
glxgears
```

This should open a window with gears rotating inside it. If the gears are rotating smoothly, then OpenGL is working properly.

```
ubuntu@HankRearden:~$ glxgears
```

```
 Error: couldn't open display :0
```

The error message "couldn't open display :0" indicates that your system is unable to connect to the X server software.

To fix this error, try the following steps:

Make sure the X server software is running: Start the X server software on your Windows machine before running any graphical applications on WSL. You can do this by opening the X server software and making sure it's running.

Check the value of the DISPLAY environment variable: Run the following command in the terminal to check the value of the DISPLAY environment variable:

```
echo $DISPLAY
```

```
ubuntu@HankRearden:~$ echo $DISPLAY
:0
```

Allow connections to the X server: If you're using the Xming X server software, make sure that it's configured to allow connections from localhost. You can do this by running the following command in the terminal:

```
xhost +localhost
```

```
ubuntu@HankRearden:~$ xhost +localhost
```

```
xhost: unable to open display ":0"
```

Check the X authentication: If the X server software is running but you still get the error, it may be a problem with X authentication. Try running the following command:

```
xauth list $DISPLAY
```

```
ubuntu@HankRearden:~$ xauth list $DISPLAY
```

```
xauth: file /home/ubuntu/.Xauthority does not exist
```

This command should display a list of authentication keys for the X server. If it doesn't, you can create a new authentication key by running the following command:

```
xauth add $(hostname)/unix:0 MIT-MAGIC-COOKIE-1 $(xauth -f ~/.Xauthority
list|tail -1)
```

```
ubuntu@HankRearden:~$ xauth add $(hostname)/unix:0
MIT-MAGIC-COOKIE-1 $(xauth -f ~/.Xauthority list|tail -1)
xauth: file /home/ubuntu/.Xauthority does not exist
xauth: file /home/ubuntu/.Xauthority does not exist
xauth: (argv):1: bad "add" command line
```

The error message "xauth: file /home/ubuntu/.Xauthority does not exist" indicates that the .Xauthority file is missing in your home directory.

The .Xauthority file is used for X authentication, which is a security feature of the X Window System. The X server software uses this file to store authentication keys that are used to authorize connections to the X server.

To fix this error, try the following steps:

Create a new .Xauthority file: Run the following command in the terminal to create a new .Xauthority file:

```
touch ~/.Xauthority
```

This command creates an empty .Xauthority file in your home directory.

Set the ownership and permissions of the .Xauthority file: Run the following command in the terminal to set the ownership and permissions of the .Xauthority file:

```
chmod 600 ~/.Xauthority
```

This command sets the file permissions to allow only the owner to read and write the file.

Restart the X server software: If you're still getting the error after creating the .Xauthority file, try restarting the X server software and running the graphical application again.

Note: If you're using a virtual machine or a remote server, you may need to set up port forwarding or enable X11 forwarding to allow graphical applications to run on your local machine.

```
ubuntu@HankRearden:~$ touch ~/.Xauthority
ubuntu@HankRearden:~$ chmod 600 ~/.Xauthority
ubuntu@HankRearden:~$ ros2 run rviz2 rviz2
Unable to open display: :0...
```

To restart the X server software, you can try the following steps:

Close any open graphical applications.

Close the X server software on your Windows machine.

Open a new terminal window in WSL.

Run the following command to stop any running X server processes:

Close WSL

```
ubuntu@HankRearden:~$ exit / exit / exit
```

Reopen WSL

```
ubuntu@HankRearden:~$ sudo service xrdp stop
[sudo] password for ubuntu: password
```

xrdp: unrecognized service

If you're getting the error message "xrdp: unrecognized service" when trying to restart the X server software in WSL, it's likely that xrdp is not installed on your system.

In that case, you can try installing xrdp by running the following command in a terminal window in WSL:

```
sudo apt-get update
sudo apt-get install xrdp
```

```
ubuntu@HankRearden:~$ sudo apt install xrdp
```

```
ubuntu@HankRearden:~$ sudo service xrdp start
 * Starting Remote Desktop Protocol server
ubuntu@HankRearden:~$ ros2 run rviz2 rviz2
qt.qpa.xcb: could not connect to display :0
qt.qpa.plugin: Could not load the Qt platform plugin "xcb" in "" even though it
was found.
This application failed to start because no Qt platform plugin could be
initialized. Reinstalling the application may fix this problem.
```

Available platform plugins are: eglfs, linuxfb, minimal, minimalegl, offscreen, vnc, xcb.

```
[ros2run]: Aborted
ubuntu@HankRearden:~$ glxgears
Error: couldn't open display :0
ubuntu@HankRearden:~$ export QT_QPA_PLATFORM=xcb
The error message "qt.qpa.xcb: could not connect to display :0 qt.qpa.plugin: Could not load the Qt
platform plugin "xcb" in "" even though it was found." indicates that there is an issue with the Qt
platform plugin "xcb". This plugin is used to provide support for the X11 Window System, which is
the standard windowing system on Unix-based systems.
```

To fix this error, you can try the following steps:

Check that the X11 Window System is running: Run the command echo \$DISPLAY in the terminal to verify
that the X11 Window System is running and that the display is set to :0. If this command returns an
empty string or a different display number, it means that the X11 Window System is not running or
that the display is not set correctly.

Install the required dependencies: Make sure that you have the required dependencies installed for
the Qt platform plugin "xcb". Run the following command in the terminal to install the required
packages:

```
sudo apt-get install libxcb-xinerama0
ubuntu@HankRearden:~$ sudo apt-get install libxcb-xinerama0
...libxcb-xinerama0 is already the newest version (1.14-3ubuntu3)...
If the above steps do not work, you may need to reinstall the Qt libraries and the Qt platform
plugin "xcb". You can do this by running the following command in the terminal:
 sudo apt-get install --reinstall libqt5gui5 libqt5core5a libqt5widgets5
ubuntu@HankRearden:~$ sudo apt-get install --reinstall libqt5gui5
libqt5core5a libqt5widgets5
ubuntu@HankRearden:~$ source .bashrc
ubuntu@HankRearden:~$ ros2 run rviz2 rviz2
qt.qpa.xcb: could not connect to display :0
qt.qpa.plugin: Could not load the Qt platform plugin "xcb" in "" even though it was found.
This application failed to start because no Qt platform plugin could be initialized. Reinstalling
the application may fix this problem.
```

Available platform plugins are: eglfs, linuxfb, minimal, minimalegl, offscreen, vnc, xcb.

```
[ros2run]: Aborted
```

OK, ChatGPT, I give up! Time to try a dedicated Linux machine!
Tomorrow.

### **2023.03.12**

Got 2.5" 7200rpm thin HDD from Amazon.

Placed in CHP's old Inspiron 17-7737

Was able, with some stumbling & reboots to install Ubuntu 22.04 on the HDD.

Trying to install ROS2 Humble failed due to broken packages and failed to respond to fixes. Tomorrow!

### **2023.03.19**

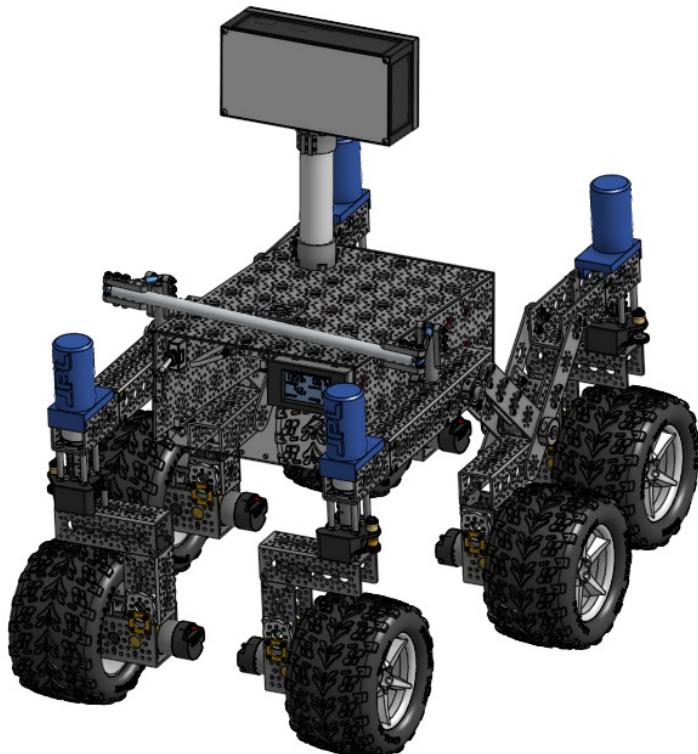
Worked this weekend on YDLidar w/ success on lidar itself but not ROS2. See YDLidar Experience. Still trying.

### **2023.03.31**

Had success w/ Linorobot simulation in Gazebo on a dedicated Ubuntu machine made from daughter's old Dell Inspiron 17 7737. See "Linorobot Experience" file.

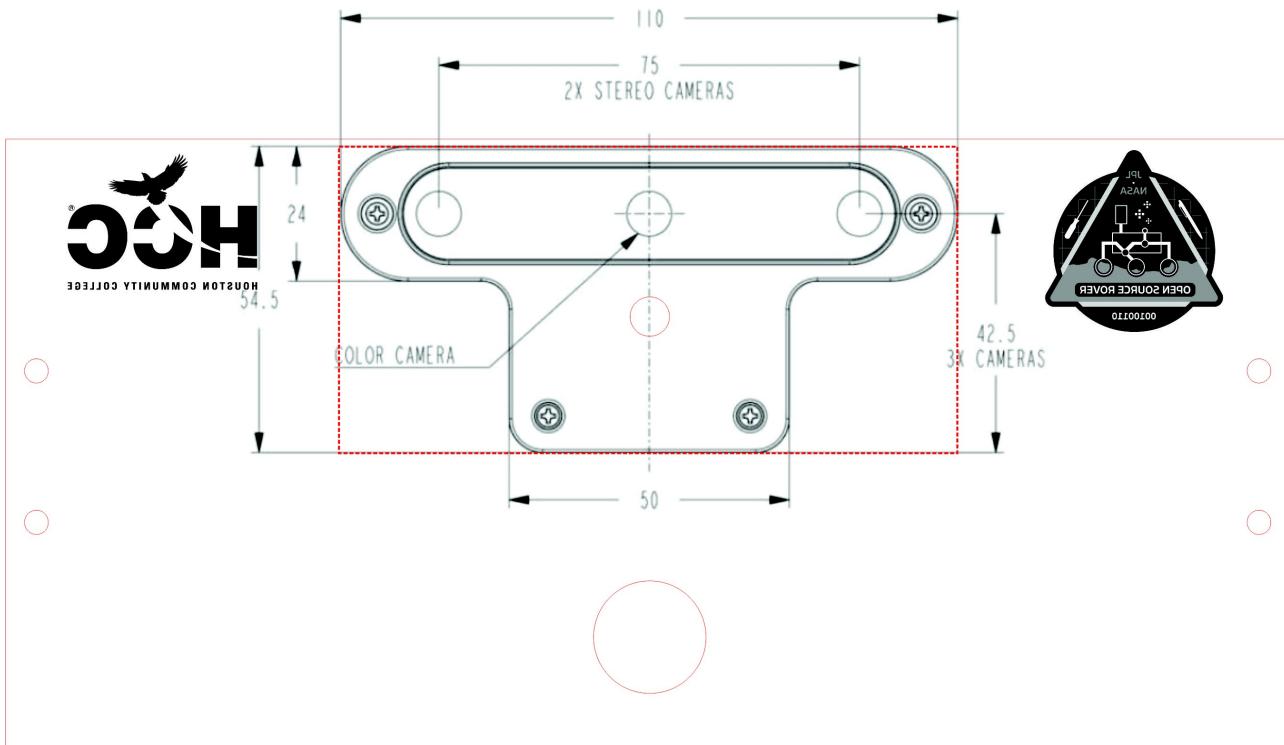
Looking to create urdf.xacro of Open Source Rover from OnShape CAD file:

<https://cad.onshape.com/documents/8f8189d761f726bcf69980f5/w/ec57fc1702d5177d685a86c9/e/ccf42f743a831a145aea7c8a>



2023.04.01

Finalized CorelDraw designs of revised front & back plates:



## 2023.04.01

Working to create a urdf (+/- .xacro) file for the OSR.

There's a CAD file of the original NASA/JPL OSR in OnShape as well as the proposed V2 of the OSR:

<https://cad.onshape.com/documents/5c358484057fc4c01d5e5803/w/bdf583acdf29d75695be5fbc/e/e3eb7193ecdec5b0a710978b>

My copy is here:

<https://cad.onshape.com/documents/8f8189d761f726bcf69980f5/w/ec57fc1702d5177d685a86c9/e/ccf42f743a831a145aea7c8a>

The main documentation for “OnShape-to-robot” conversion tool is here:

<https://onshape-to-robot.readthedocs.io/en/latest/>

and the github is here with examples:

<https://github.com/Rhoban/onshape-to-robot>

It appears to require a Linux environment so will use the UbuntuBox. [per one of the tutorials it can also be installed in Windows]

There's

a dull tutorial here:

<https://www.youtube.com/watch?v=0M2b1p6H20o>

a French accent tutorial here:

<https://www.youtube.com/watch?v=C8oK4uUmbRw>

a completely French tutorial here:

<https://www.youtube.com/watch?v=GeZZH02w3Q>

a ROS Discourse here:

<https://discourse.ros.org/t/onshape-to-sdf-urdf-simulation/8547>

a Hackaday tutorial here:

<https://hackaday.com/2021/02/28/onshape-to-robot-models-made-easier/>

a Reddit tutorial here:

[https://www.reddit.com/r/robotics/comments/lrklf4/onshape\\_to\\_robot\\_tutorial\\_export\\_urdf\\_sdf\\_from/](https://www.reddit.com/r/robotics/comments/lrklf4/onshape_to_robot_tutorial_export_urdf_sdf_from/)

**2023.04.02**

Following: <https://www.youtube.com/watch?v=C8oK4uUmbRw>

Get OnShape API keys:

<https://dev-portal.onshape.com/keys/createkey>

[Create new API key]

check all boxes

click: [Create API key]

## API Key Secret

The API key's access key is QJZ2vl6e9hqj2fochaal2AWp and the secret key is kldFkz1sXGFMskEhvGfepKdiMY8rwDbwms6Xgm17lBz5ef0v Please transfer this securely to your application now as you will not be able to display this secret key string again.

**Close**

access key is QJZ2vl6e9hqj2fochaal2AWp  
secret key is kldFkz1sXGFMskEhvGfepKdiMY8rwDbwms6Xgm17lBz5ef0v

Suggests create a 'keys' file with the keys and 'source' it:

\$ nano OnShape\_keys

```
export ONSHAPE_API=https://cad.onshape.com
export ONSHAPE_ACCESS_KEY=8f8189d761f726bcf69980f5
export ONSHAPE_SECRET_KEY=
 kldFkz1sXGFMskEhvGfepKdiMY8rwDbwms6Xgm17lBz5ef0v
```

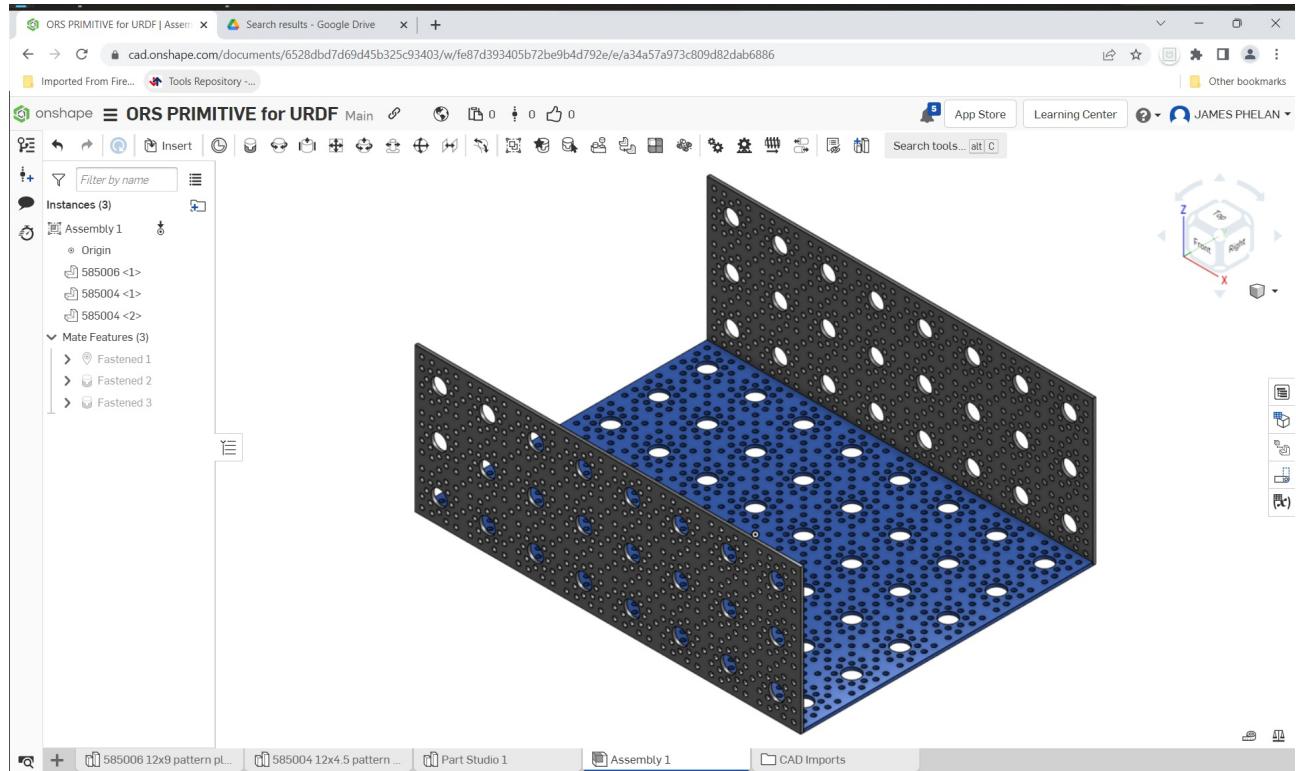
OR

can be included in your .bashrc file

2023.04.04

After several YouTube OnShape tutorials:

<https://cad.onshape.com/documents/6528dbd7d69d45b325c93403/w/fe87d393405b72be9b4d792e/e/a34a57a973c809d82dab6886>



Imported pattern plates from my cc from vendor. OSR had 'modified' plates w/ hole for neck. Mating was tricky but accomplished!

## 2023.04.08

Although successful, I can see that even a skeleton OSR will be a tedious operation! I think I'll try going whole hog w/ the OnShape to robot on my cc of the OSR OnShape.

Recent Slack thread:

James Phelan

8 days ago

Can this be converted to a urdf.xacro for Gazebo simulation? I've heard such is possible.

Achille

8 days ago

Yes, but in my experience too much work (and experience with urdf and xacro) to be worth it. You need to get the linkages correct which is not obvious since they form a closed loop.

Steve Okay

2 days ago

Achille is correct, there's a lot of fiddly work getting the joints and links set up. It's not impossible, but it's not entirely just running it through a converter. Solidworks has a SW Model to URDF converter, which, IME, works well enough to get you started.

Steve Okay

2 days ago

I based my model of Tenacity on the Curio URDF that Rhys Mainwaring put together. There was a good month or so of off-hours work to get Tenacity working in Gazebo the way I wanted. That was also only the 2nd or 3rd functional Gazebo model I'd put together and I learned a lot about XACRO from it. For closed loop linkages, you want the model to be in SDF format vs. URDF

Steve Okay

2 days ago

Let me say I will look at it and get back to this thread with some thoughts. (edited)

Steve Okay

1 day ago

I'm wondering if maybe we could take the basic arrangement of the chassis/frame and rocker-bogie linkages from the Curio model and apply that to the OSR since it's mechanically similar. It's a box, with a rocker-bogie on either side and corner-steering. A URDF/SDF is really about the description of the relationships between different objects, with the objects themselves being represented by STL/OBJ/DAE files.

Thoughts ?

James Phelan

16 minutes ago

@Steve Okay

Agree the OnShape file is WAY more detailed than necessary for simulation. However, the masses of a simplified skeleton version would have to be adjusted for the physics to work properly.

I can try

OnShape > SolidWorks > urdf/sdf

and

OnShape > OnShape-to-robot > urdf/sdf

and see how each performs.

I may try deleting some detail, esp the control boards, from OnShape. Omitting brackets and screws is a whole other matter.

If accomplished, the result would be very useful to the OSR community to test sensors toward the objective of autonomy.

Perhaps a simplified urdf and sdf of OSR v2.0 could be developed along w/ it?

**2023.04.09**

My, apparently old, SolidWorks account won't launch. Guess my free trial is shot. Might try it at Stafford FabLab.

Let's try the Onshape-to-robot route.

```
ubuntu@LinuxBox:~$ sudo apt update
ubuntu@LinuxBox:~$ sudo apt upgrade -y
following from:
https://onshape-to-robot.readthedocs.io/en/latest/installation.html#installation
```

```
pip install onshape-to-robot
>> pip3
ubuntu@LinuxBox:~$ pip3 install onshape-to-robot
 Command 'pip3' not found, but can be installed with:
 sudo apt install python3-pip
ubuntu@LinuxBox:~$ sudo apt install python3-pip
ubuntu@LinuxBox:~$ pip3 install onshape-to-robot
 Defaulting to user installation because normal site-packages is not writeable
 Collecting onshape-to-robot
 Downloading onshape_to_robot-0.3.19-py3-none-any.whl (36 kB)
...
 WARNING: The scripts stl, stl2ascii and stl2bin are installed in '/home/ubuntu/.local/bin'
 which is not on PATH.
 Consider adding this directory to PATH or, if you prefer to suppress this warning, use
 --no-warn-script-location.
 WARNING: The scripts onshape-to-robot, onshape-to-robot-bullet,
 onshape-to-robot-clear-cache, onshape-to-robot-edit-shape and onshape-to-robot-pure-sketch
 are installed in '/home/ubuntu/.local/bin' which is not on PATH.
 Consider adding this directory to PATH or, if you prefer to suppress this warning, use
 --no-warn-script-location.
Successfully installed commentjson-0.9.0 lark-parser-0.7.8 numpy-stl-3.0.1
onshape-to-robot-0.3.19 pybullet-3.2.5 python-utils-3.5.2 transforms3d-0.4.1
```

Add to ~/.bashrc:

```
export PATH="/home/ubuntu/.local/bin:$PATH"
// Obtained at https://dev-portal.onshape.com/keys
export ONSHAPE_API=https://cad.onshape.com
export ONSHAPE_ACCESS_KEY=8f8189d761f726bcf69980f5
export ONSHAPE_SECRET_KEY=kldFkz1sXGFMskEhvGfepKdiMY8rwDbwms6Xgm17lBz5ef0v
```

```
ubuntu@LinuxBox:~$ source .bashrc
-bash: //: Is a directory
// >> #
```

Change ~/.bashrc:

```
export PATH="/home/ubuntu/.local/bin:$PATH"
#Obtained at https://dev-portal.onshape.com/keys
export ONSHAPE_API=https://cad.onshape.com
export ONSHAPE_ACCESS_KEY=8f8189d761f726bcf69980f5
export ONSHAPE_SECRET_KEY=kldFkz1sXGFMskEhvGfepKdiMY8rwDbwms6Xgm17lBz5ef0v
```

*To export your own robot, first create a directory:*

```
mkdir my-robot
```

```
ubuntu@LinuxBox:~$ mkdir OnShape-OSR
```

*Then edit my-robot/config.json, here is the minimum example:*

```
{
 "documentId": "document-id",
 "outputFormat": "urdf"
}
```

```
ubuntu@LinuxBox:~$ cd OnShape-OSR/
```

```
ubuntu@LinuxBox:~/OnShape-OSR$ nano config.json
```

```
{
 "documentId": "8f8189d761f726bcf69980f5",
 "outputFormat": "urdf"
}
```

*Once this is done, if you properly installed and setup your API key, just run:*

```
onshape-to-robot my-robot
```

```
>> onshape-to-robot OnShape-OSR
```

```
ubuntu@LinuxBox:~$ onshape-to-robot OnShape-OSR
```

```
pybullet build time: Apr 9 2023 19:54:23
* Checking OpenSCAD presence...
Can't run openscad -v, disabling OpenSCAD support
TIP: consider installing openscad:
sudo add-apt-repository ppa:openscad/releases
sudo apt-get update
sudo apt-get install openscad
* Checking MeshLab presence...
No /usr/bin/meshlabserver, disabling STL simplification support
TIP: consider installing meshlab:
sudo apt-get install meshlab

* Retrieving workspace ID ...
https://cad.onshape.com/api/documents/8f8189d761f726bcf69980f5?
! ERROR (403) while using OnShape API
!
{
 "message" : "Resource does not exist, or you do not have permission to access it.",
 "moreInfoUrl" : null,
 "status" : 403,
 "code" : 1002
}
```

```
ubuntu@LinuxBox:~$ sudo add-apt-repository ppa:openscad/releases
ubuntu@LinuxBox:~$ sudo apt-get install openscad
```

```
...
```

```
ubuntu@LinuxBox:~$ sudo apt-get install meshlab
```

```
...
```

Maybe old keys not working...?  
Delete old and create new keys:  
<https://dev-portal.onshape.com/keys/createkey>  
The API key's  
access key is **ySnFzBfFiLfm6oYuQveIpS8**  
and the  
secret key is **L2CnbLNL5T160vjPyt9A5m8utXJlf7SsMMGBNlXmQKk5lhuy** Please transfer  
this securely to your application now as you will not be able to display this  
secret key string again.

```
ubuntu@LinuxBox:~$ onshape-to-robot OnShape-OSR
pybullet build time: Apr 9 2023 19:54:23
* Checking OpenSCAD presence...
* Checking MeshLab presence...

* Retrieving workspace ID ...
+ Using workspace id: ec57fc1702d5177d685a86c9

* Retrieving elements in the document, searching for the assembly...
+ Found assembly, id: ccf42f743a831a145aea7c8a, name: "Rover"

* Retrieving assembly "Rover" with id ccf42f743a831a145aea7c8a

* Getting assembly features, scanning for DOFs...
* Found total 0 DOFs

* Building robot tree
* Trunk is Mechanical Integration <1>
Traceback (most recent call last):
 File "/home/ubuntu/.local/bin/onshape-to-robot", line 8, in <module>
 sys.exit(onshape_to_robot.main())
 File "/home/ubuntu/.local/lib/python3.10/site-packages/onshape_to_robot/onshape_to_robot.py", line
17, in main
 from .load_robot import \
 File "/home/ubuntu/.local/lib/python3.10/site-packages/onshape_to_robot/load_robot.py", line 336,
in <module>
 if not occurrence['instance']['suppressed']:
KeyError: 'suppressed'
```

Error message submitted as Issue to:  
<https://github.com/Rhoban/onshape-to-robot/issues/100>

...

The 'KeyError: 'suppressed'' error apparently refers to  
'suppressed' not being in the 'defaultdict' referred to in  
'load\_robot.py'.  
I can't find the actual dictionary despite considerable digging.  
I'll see what happens if I 'comment out' that block of code....

**2023.04.10**

```
ubuntu@LinuxBox:~$ cd /home/ubuntu/.local/bin/
ubuntu@LinuxBox:~/local/bin$ ls -w 1
onshape-to-robot
onshape-to-robot-bullet
onshape-to-robot-clear-cache
onshape-to-robot-edit-shape
onshape-to-robot-pure-sketch
stl
stl2ascii
stl2bin
```

These are all bin files. Nothing to do here. Go on to:

```
ubuntu@LinuxBox:~/local/bin$ cd
/home/ubuntu/.local/lib/python3.10/site-packages/onshape_to_robot/
ubuntu@LinuxBox:~/local/lib/python3.10/site-packages/onshape_to_r
obot$ ls -w 1
bullet
bullet.py
clear_cache.py
config.py
csg.py
edit_shape.py
features.py
__init__.py
load_robot.py
onshape_api
onshape_to_robot.py This is what we're looking for re above errors.
pure_sketch.py
__pycache__
robot_description.py
simulation.py
stl_combine.py
```

```
ubuntu@LinuxBox:~/local/lib/python3.10/site-packages/onshape_to_r
obot$ nano onshape_to_robot.py
^/ 17 to go to line 17
def main():
 # Loading configuration, collecting occurrences and building robot tree
 from .load_robot import \
 config, client, tree, occurrences, getOccurrence, frames
```

Need to go on to:

```
ubuntu@LinuxBox:~$ cd
/home/ubuntu/.local/lib/python3.10/site-packages/onshape_to_robot/
ubuntu@LinuxBox:~/local/lib/python3.10/site-packages/onshape_to_r
obot$ ls -w 1
bullet
bullet.py
clear_cache.py
config.py
csg.py
edit_shape.py
features.py
__init__.py
load_robot.py
onshape_api
onshape_to_robot.py
pure_sketch.py
__pycache__
robot_description.py
simulation.py
stl_combine.py
```

```

ubuntu@LinuxBox:~/local/lib/python3.10/site-packages/onshape_to_r
obot$ nano load_robot.py
^/ 336 GoTo line 336
...
If a sub-assembly is suppressed, we also mark as suppressed the parts in this sub-assembly
for occurrence in occurrences.values():
 if not occurrence['instance'][['suppressed']]:
 for k in range(len(occurrence['path'])-1):
 upper_path = tuple(occurrence['path'][0:k+1])
 if upper_path in occurrences and occurrences[upper_path]['instance'][['suppressed']]:
 occurrence['instance'][['suppressed']] = True
...

```

What does `KeyError: 'suppressed'` mean?

```

^/ 1 GoTo line 1
^W suppressed Search for 'suppressed'; Alt+W for next

else:
 if feature['suppressed']:
 continue

 for feature in features:
 if feature['featureType'] != 'mate' or feature['suppressed']:
 continue

 # If a sub-assembly is suppressed, we also mark as suppressed the parts in this sub-assembly
 if not occurrence['instance'][['suppressed']]:
 if upper_path in occurrences and occurrences[upper_path]['instance'][['suppressed']]:
 occurrence['instance'][['suppressed']] = True

```

Google: `python3 KeyError: 'suppressed'`

<https://www.digitalocean.com/community/tutorials/python-keyerror-exception-handling-examples>

*"Python `KeyError` is raised when we try to access a key from `dict`, which doesn't exist. It's one of the built-in exception classes and raised by many modules that work with `dict` or objects having key-value pairs."*

Meaning '`suppressed`' is missing from some `?_dict` somewhere.

ubuntu@LinuxBox:~\$ `find / -name *dict 2> /dev/null`

Way too many hits!

```

ubuntu@LinuxBox:~$ cd
/home/ubuntu/.local/lib/python3.10/site-packages/onshape_to_robot/
ubuntu@LinuxBox:~/local/lib/python3.10/site-packages/onshape_to_r
obot$ nano load_robot.py
/W dict
from collections import defaultdict
frames = defaultdict(list)

```

```
ubuntu@LinuxBox:~$ find / -name collections 2> /dev/null
/usr/lib/python3.10/collections
/snap/core22/607/usr/lib/python3.10/collections
/snap/core22/583/usr/lib/python3.10/collections
/snap/core20/1828/usr/lib/python3.8/collections
/snap/core20/1852/usr/lib/python3.8/collections
/snap/gnome-42-2204/65/usr/lib/python3.10/collections
/snap/gnome-42-2204/68/usr/lib/python3.10/collections
/home/ubuntu/.local/share/Trash/files/kotlin/collections
/opt/ros/humble/include/fastrtps/fastrtps/utils/collections
```

```
ubuntu@LinuxBox:~$ cd /usr/lib/python3.10/collections
```

```
ubuntu@LinuxBox:/usr/lib/python3.10/collections$ cat __init__.py | grep 'dict'
Way too many instances of 'dict'!
```

```
ubuntu@LinuxBox:/usr/lib/python3.10/collections$ cat __init__.py | grep 'defaultdict'
```

```
* defaultdict dict subclass that calls a factory function to supply missing values
```

```
'defaultdict',
from _collections import defaultdict
return mapping[key] # can't use 'key in mapping' with defaultdict
```

```
ubuntu@LinuxBox:/usr/lib/python3.10/collections$ nano __init__.py
^W defaultdict
above instances noted.
```

```
ubuntu@LinuxBox:/usr/lib/python3.10$ cat _collections_abc.py | grep defaultdict
nothing
```

Try 'commenting out' the offending block of code:

```
ubuntu@LinuxBox:~/OnShape-OSR$ cd
/home/ubuntu/.local/lib/python3.10/site-packages/onshape_to_robot/
ubuntu@LinuxBox:~/.local/lib/python3.10/site-packages/onshape_to_r
obot$ nano load_robot.py
^/ 336
```

```
If a sub-assembly is suppressed, we also mark as suppressed the parts in this sub-assembly
FOLLOWING COMMENTED OUT DUE TO KeyError: 'suppressed' by J.H.Phelan 2023.04.10
#for occurrence in occurrences.values():
if not occurrence['instance']['suppressed']:
for k in range(len(occurrence['path'])-1):
upper_path = tuple(occurrence['path'][0:k+1])
if upper_path in occurrences and occurrences[upper_path]['instance']['suppressed']:
occurrence['instance']['suppressed'] = True
^X Y
```

```

ubuntu@LinuxBox:~$ onshape-to-robot OnShape-OSR
same as above until:
...
* Building robot tree
* Trunk is Mechanical Integration <1>
* Adding top-level instance [Mechanical Integration <1>]
+ Adding part Socket button head cap screw #6-32 x 0.75 <3> (configuration:
JTQwc2NwPXBYSFZzTDVRMjBkMGJCSFZD0XlWcmRvVGv6eWNURkFYQWJuSEplYTFpSkkLM0Q7QmFzaWNEaWFtZXrlcj0wLjAwMzUw
NTIwMDAwMDAwMDAwMDQrbWV0ZXi7RmlsbGV0VHJhbNpdGlvbkRpY1ldGVyPTAuMDA0MDEzMjAwMDAwMDAxK21ldGVy0ohl
YWRewFtZXrlcj0wLjAwNjY1NDgwMDAwMDAwMSttZXrlcj1IZWFkSGVpZ2h0PTAuMDAxODU0MittZXrlcj1IZWFkU2lkZUh
aWdodD0zLjgxMDAwMDAwMDAwMDVfLTQrbWV0ZXi7TGvuz3RoPTAuMDE5MDUrbbWV0ZXi7UGl0Y2g9Ny45MjQ4RS00K21ldGVy
01NvY2tldERlcHRoPTAuMDAxMTE3NittZXrlcj1Tb2NrZXRTaxp1PTAuMDAxOTgxMjAwMDAwMDAwMittZXrlcj1Ucm1hbmds
ZUhlawdodD02Ljg2MzA30DA40TkyMDAwMUUtNCttZXrlcg)
WARNING: part Socket button head cap screw #6-32 x 0.75 <3> has no mass, maybe you should assign a
material to it ?
+ Adding part Pad 2 <1>
https://cad.onshape.com/api/parts/d/4e80c35d6ce2977369966f00/m/7ac9aca0c476e9242713b6a1/e/13c617a504
fd8cb4616fc014/partid/Jjh/stl?mode=binary&units=meter&configuration=default
! ERROR (403) while using OnShape API
{
 "message" : "Resource does not exist, or you do not have permission to access it.",
 "moreInfoUrl" : "",
 "status" : 403,
 "code" : 0
}

```

I think the last error refers to adding Parts that may be elsewhere? All the pieces are in the drawing but some, such as the suspension and motor mounts aren't listed in the mechanical integration except as unidentified "Part <n>"

**4/11/2023, 2:06 AM**

From Grégoire Passault <[notifications@github.com](mailto:notifications@github.com)>  
 Re Re: [Rhoban/onshape-to-robot] KeyError: 'suppressed' (Issue #100)  
 Hello,

Maybe we can consider something like:

```
if 'suppressed' not in occurrence['instance'] or not
occurrence['instance']['suppressed']:
```

About the access problem, unfortunately there is little I can do about that, permissions in onshape are sometime hard to understand. Did you make a copy of the document you are importing to be sure you have all the permissions?

**2023.04.14**

My reply:

@Gregwar

It seems from what I gather it's not that we're not testing correctly for ['suppressed'], but rather that 'suppressed' needs to be added to some dictionary.

I did make a cc of the document. I suspect it's more that the part isn't there than I'm lacking permission. I can find a reference to it, but it lacks detail. Seems to be a solder pad on an Arduino.

```
Try adding 'Pad 2' to Ignore in the config.json file
config.json *
{
 "documentId": "8f8189d761f726bcf69980f5",
 "outputFormat": "urdf",
 "ignore": [
 "Pad 2"
]
}
```

Got same errors.

Try ignoring "Socket button head cap screw #6-32 x 0.75"  
Same errors.

Do '\_', 'part', '<1>', or '<3>' need to be part of description??  
Try adding '\_' to part names.  
Didn't help.