

**Linorobot2 Experience**  
James H Phelan MD  
2022.06.23 - present

**SKIP DOWN TO p38 for successful install U22.04 Jammy Jellyfish / ROS2 Humble Hawksbill**

<https://github.com/linorobot/linorobot/wiki/1.-Getting-Started>  
<https://github.com/linorobot/linorobot2>  
Github  
<https://groups.google.com/g/linorobot>  
Google groups  
<https://github.com/linorobot/ros2me>  
Installation file

Tried installing Ubuntu 22.04 Jammy Jellyfish to enable ROS2 Humble Hawksbill but Ubuntu 22.04 won't boot on the RPi4b. There are some online fixes to the config.txt file, but I can't easily get to that on a USB SB card reader.  
Will stay with Ubuntu 20.04 Focal Fossa and ROS2 Foxy Fitzroy.

SD card formatter: **Overwrite format** for a good clean 128G card.  
Raspberry Pi Imager: **Ubuntu Server 20.04 64 bit**  
Means will have to install desktop separately

**2022.06.28**

First SD card failed as "possibly broken". Discarded.  
Start over with another 200 GB card.  
See Fidelity to "AUDACITY.wpd" p400 2021.06.12 for procedure.

```
Boot in RPi4
login ubuntu, ubuntu
change password ubuntu, LINOROBOT, LINOROBOT
ubuntu@ubuntu:~$ hostnamectl set-hostname LINOROBOT
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 dpkg --configure -a
ubuntu@ubuntu:~$ sudo apt install chromium-browser FAILS
ubuntu@ubuntu:~$ sudo apt install terminator
```

**2022.06.29**

Since internet wouldn't consistently work and couldn't install chromium, fell back to older Ubuntu 20.04 ROS2 Foxy image from 2021.10.25.

```
ubuntu@AUDACITY:~$ passwd
Changing password for ubuntu.
Current password: *****
New password: LINOROBOT
Retype new password: LINOROBOT
passwd: password updated successfully
```

```
ubuntu@AUDACITY:~$ hostnamectl set-hostname LINOROBOT
==== 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: LINOROBOT
==== AUTHENTICATION COMPLETE ===
https://github.com/linorobot/ros2me
ubuntu@AUDACITY:~$ git clone https://github.com/linorobot/ros2me.git
ubuntu@AUDACITY:~$ ls -w 1
...
ros2me
...
```

```
ubuntu@AUDACITY:~$ cd ros2me/
ubuntu@AUDACITY:~/ros2me$ ./install
Hit:1 http://packages.ros.org/ros2/ubuntu focal InRelease
Hit:2 http://ports.ubuntu.com/ubuntu-ports focal InRelease
Get:3 http://ports.ubuntu.com/ubuntu-ports focal-updates InRelease [114 kB]
Get:4 http://ports.ubuntu.com/ubuntu-ports focal-backports InRelease [108 kB]
Get:5 http://ports.ubuntu.com/ubuntu-ports focal-security InRelease [114 kB]
Get:6 http://ports.ubuntu.com/ubuntu-ports focal-updates/main arm64 Packages [1348 kB]
Get:7 http://ports.ubuntu.com/ubuntu-ports focal-updates/main arm64 c-n-f Metadata [15.2 kB]
Get:8 http://ports.ubuntu.com/ubuntu-ports focal-updates/universe arm64 Packages [872 kB]
Fetched 2571 kB in 5s (487 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
430 packages can be upgraded. Run 'apt list --upgradable' to see them.
Waiting for cache lock: Could not get lock /var/lib/dpkg/lock-frontend. It is held by process
6228 (unattended-upgr)
...repeats
^C
$ sudo reboot
To pre-empt auto-update, disabled.
ubuntu@LINOROBOT:~$ sudo apt update
ubuntu@LINOROBOT:~$ sudo apt upgrade -y
```

**2022.06.30**

```
ubuntu@AUDACITY:~$ cd ros2me/
ubuntu@AUDACITY:~/ros2me$ ./install
long install in several parts requiring "Y" to proceed.
...
Installing collected packages: argcomplete, py, tomli, iniconfig,
pytest, pytest-rerunfailures
  WARNING: The scripts py.test and pytest 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.
...
Setting up python3-rosdep-modules (0.22.1-1) ...
Setting up python3-rosdep (0.22.1-1) ...
WARNING: Skipping em as it is not installed.
Wrote /etc/ros/rosdep/sources.list.d/20-default.list
Recommended: please run

  rosdep update
...
Set up your environment by sourcing the following file.
source /opt/ros/galactic/setup.bash

Or do you want to save this on your .bashrc (y/n)? y
Done
ubuntu@LINOROBOT:~/ros2me$ rosdep update
to be sure it ran. It had as same output as script.
ubuntu@LINOROBOT:~/ros2me$ sudo apt autoremove
ubuntu@LINOROBOT:~/ros2me$ echo $PATH
/opt/ros/foxy/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/b
in:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
ubuntu@LINOROBOT:~/ros2me$ export
PATH="/home/ubuntu/.local/bin:$PATH"
ubuntu@LINOROBOT:~/ros2me$ echo $PATH
/home/ubuntu/.local/bin:/opt/ros/foxy/bin:/usr/local/sbin:/usr/lo
cal/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games
:/snap/bin
I think /usr/local/bin is the same as /home/ubuntu/.local/bin but
it's taken care of anyway? But this is TEMPORARY path addition.
I'm not going to edit ~/.bashrc as I think the path is already
there.
```

<https://github.com/linorobot/linorobot2>

## Installation

### 1. Robot Computer - linorobot2 Package

The easiest way to install this package on the robot computer is to run the bash script found in this package's root directory. It will install all the dependencies, set the ENV variables for the robot base and sensors, and create a linorobot2\_ws (robot\_computer\_ws) on the robot computer's \$HOME directory. If you're using a ZED camera with a Jetson Nano, you must create a custom Ubuntu 20.04 image for CUDA and the GPU driver to work. Here's a quick [guide](#) on how to create a custom image for Jetson Nano.

*Would be interesting to run a parallel track with the Nano as I see it as the future of the Open Source Rover w/ its AI capability. The guide above is about creating a custom minimal Ubuntu image for the robot to save memory from unnecessary apps like Desktop, browser, etc. which I actually like having.*

*Otherwise it's the same install. I'll try it LATER!*

<https://github.com/Qengineering/Jetson-Nano-Ubuntu-20-image>

```
source /opt/ros/<ros_distro>/setup.bash
cd /tmp
wget
https://raw.githubusercontent.com/linorobot/linorobot2/\${ROS\_DISTRO}/install\_linorobot2.bash
bash install_linorobot2.bash <robot_type> <laser_sensor>
<depth_sensor>
source ~/.bashrc

ubuntu@LINOROBOT:~$ source /opt/ros/galactic/setup.bash
ubuntu@LINOROBOT:~$ cd /tmp
ubuntu@LINOROBOT:/tmp$ wget
https://raw.githubusercontent.com/linorobot/linorobot2/galactic/install\_linorobot2.bash
ubuntu@LINOROBOT:/tmp$ bash install_linorobot2.bash 4wd realsense
realsense
install_linorobot2.bash: line 18: rosversion: command not found

ubuntu@LINOROBOT:~$ echo $(rosversion -d)
Command 'rosversion' not found, but can be installed with:
sudo apt install python3-rosPKG

ubuntu@LINOROBOT:~$ sudo apt install python3-rosPKG
done
```

```

ubuntu@LINOROBOT:~$ echo $(rosversion -d)
galactic
ubuntu@LINOROBOT:/tmp$ bash install_linorobot2.bash 4wd realsense
realsense
You are installing linorobot2 on your robot computer.
=====SUMMARY=====
ROBOT TYPE : 4wd
LASER SENSOR :
DEPTH SENSOR :

This installer will edit your ~/.bashrc.
Create a linorobot2_ws on your /home/ubuntu directory.
Install linorobot2 ROS2 dependencies.
Install udev rules on /etc/udev/rules.d folder.
Enter [y] to continue. y
long install...
In file included from
/home/ubuntu/linorobot2_ws/install/micro_ros_agent/include/uxr/agent/middleware/fastdds/FastDDSEn
tities.hpp:22,
    from
/home/ubuntu/linorobot2_ws/install/micro_ros_agent/include/uxr/agent/middleware/fastdds/FastDDSMi
ddleware.hpp:19,
    from
/home/ubuntu/linorobot2_ws/install/micro_ros_agent/include/uxr/agent/middleware/utils/Callbacks.h
pp:22,
    from
/home/ubuntu/linorobot2_ws/src/uros/micro-ROS-Agent/micro_ros_agent/include/agent/Agent.hpp:20,
    from
/home/ubuntu/linorobot2_ws/src/uros/micro-ROS-Agent/micro_ros_agent/src/agent/Agent.cpp:18:
/opt/ros/foxy/include/fastdds/dds/publisher/DataWriter.hpp:162:47: note:   in call to 'const
eProsima::fastrtps::rtt::GUID_t& eProsima::fastdds::dds::DataWriter::guid()'
162 |     RTPS_DllAPI const fastrtps::rtt::GUID_t& guid();
|           ^
make[5]: *** [CMakeFiles/micro_ros_agent.dir/build.make:89:
CMakeFiles/micro_ros_agent.dir/src/agent/graph_manager/graph_manager.cpp.o] Error 1
make[5]: *** Waiting for unfinished jobs...
make[5]: *** [CMakeFiles/micro_ros_agent.dir/build.make:76:
CMakeFiles/micro_ros_agent.dir/src/agent/Agent.cpp.o] Error 1
make[4]: *** [CMakeFiles/Makefile2:78: CMakeFiles/micro_ros_agent.dir/all] Error 2
make[3]: *** [Makefile:141: all] Error 2
make[2]: *** [CMakeFiles/micro_ros_agent.dir/build.make:113:
micro_ros_agent-prefix/src/micro_ros_agent-stamp/micro_ros_agent-build] Error 2
make[1]: *** [CMakeFiles/Makefile2:78: CMakeFiles/micro_ros_agent.dir/all] Error 2
make: *** [Makefile:84: all] Error 2
---
Failed  <<< micro_ros_agent [8min 53s, exited with code 2]

Summary: 1 package finished [9min 36s]
1 package failed: micro_ros_agent
1 package had stderr output: micro_ros_agent

```

2022.07.03

Google: “1 package failed: micro\_ros\_agent”  
[https://answers.ros.org/question/382329/micro-ros-package-micro\\_ros\\_agent-not-found/](https://answers.ros.org/question/382329/micro-ros-package-micro_ros_agent-not-found/)  
ubuntu@LINOROBOT:~\$ ros2 run micro\_ros\_setup create\_agent\_ws.sh  
Package 'micro\_ros\_setup' not found  
*I don't think I need micro\_ros as I'm not trying to run a minimal system. Ignore for now.*

## 2. Host Machine / Development Computer - Gazebo Simulation (Optional)

This step is only required if you plan to use Gazebo later. This comes in handy if you want to fine-tune parameters (ie. SLAM Toolbox, AMCL, Nav2) or test your applications on a virtual robot.

### 2.1 Install linorobot2 Package

Install linorobot2 package on the host machine:

```
cd <host_machine_ws>
git clone -b $ROS_DISTRO https://github.com/linorobot/linorobot2
src/linorobot2
rosdep update && rosdep install --from-path src --ignore-src -y --skip-keys
microxrcedds_agent --skip-keys micro_ros_agent
colcon build
source install/setup.bash
```

*Which translates to:*

```
ubuntu@LINOROBOT:~$ cd linorobot2_ws/
ubuntu@LINOROBOT:~/linorobot2_ws$ git clone -b $ROS_DISTRO
https://github.com/linorobot/linorobot2 src/linorobot2
Resolving deltas: 100% (673/673), done.
ubuntu@LINOROBOT:~/linorobot2_ws$ rosdep update && rosdep install
--from-path src --ignore-src -y --skip-keys microxrcedds_agent
--skip-keys micro_ros_agent
long install...
#All required rosdeps installed successfully
ubuntu@LINOROBOT:~/linorobot2_ws$ colcon build
...
Failed  <<< micro_ros_agent [51.6s, exited with code 2]
Aborted <<< drive_base_msgs [1min 27s]
Summary: 7 packages finished [1min 29s]
  1 package failed: micro_ros_agent
  1 package aborted: drive_base_msgs
  1 package had stderr output: micro_ros_agent
  1 package not processed
```

*Again, is micro\_ros\_agent necessary? Command says to skip-keys micro\_ros\_agent.*

*Not sure about drive\_base\_msgs though?*

```
ubuntu@LINOROBOT:~/linorobot2_ws$ source install/setup.bash
ROS_DISTRO was set to 'galactic' before. Please make sure that the environment
does not mix paths from different distributions.
ROS_DISTRO was set to 'foxy' before. Please make sure that the environment
does not mix paths from different distributions.
not found:
"/home/ubuntu/linorobot2_ws/install/micro_ros_agent/share/micro_ros_agent/loc
l_setup.bash"
```

```
ubuntu@LINOROBOT:~$ sudo nano ~/.bashrc
...
source /opt/ros/foxy/setup.bash
source /opt/ros/galactic/setup.bash
```

microxrcedds\_agent and micro\_ros\_agent dependency checks are skipped to prevent this issue of finding its keys. This means that you have to always add --skip-keys microxrcedds\_agent --skip-keys micro\_ros\_agent whenever you have to run rosdep install on the ROS2 workspace where you installed linorobot2.

## 2.2 Define Robot Type

Set LINOROBOT2\_BASE env variable to the type of robot base used. Available env variables are 2wd, 4wd, and mecanum. For example:

```
echo "export LINOROBOT2_BASE=2wd" >> ~/.bashrc
source ~/.bashrc
```

*I'll use 4wd even though the OSR is a 6wd, 4 corner steering robot. The drive wheel numbers would be different also. Will have to figure out the appropriate changes later. (Maybe w/ help of HBRC?) Just want to see if the rover responds at all, or at least if the program runs.*

```
ubuntu@LINOROBOT:~$ echo "export LINOROBOT2_BASE=4wd" >>
~/.bashrc
ubuntu@LINOROBOT:~$ source ~/.bashrc
```

You can skip the next step (Host Machine - RVIZ Configurations) since this package already contains the same RVIZ configurations to visualize the robot.

## Hardware and Robot Firmware

All the hardware documentation and robot microcontroller's firmware can be found [here](#).

*Not sure what to do with that info..?*

## URDF

### 1. Define robot properties

linorobot2\_description package has parameterized xacro files that can help you kickstart writing the robot's URDF. Open `<robot_type>.properties.urdf.xacro` in linorobot2\_description/urdf directory and change the values according to the robot's specification/dimensions. All pose definitions must be measured from the `base_link` (center of base) and wheel positions (ie `wheel_pos_x`) are referring to wheel 1.

*It isn't:*

`<robot_type>.properties.urdf.xacro` (period)  
*but rather*  
`<robot_type>_properties.urdf.xacro` (underscore)

For custom URDFs, you can change the `urdf_path` in `description.launch.py` found in linorobot2\_description/launch directory.

```
ubuntu@LINOROBOT:~/linorobot2_ws$ sudo find . -name  
linorobot2_description  
.install/linorobot2_description  
.install/linorobot2_description/share/linorobot2_description  
.install/linorobot2_description/share/colcon-core/packages/linorobot2_description  
.install/linorobot2_description/share/ament_index/resource_index/packages/linorobot2_description  
.install/linorobot2_description/share/ament_index/resource_index/package_run_dependencies/linoro  
bot2_description  
.install/linorobot2_description/share/ament_index/resource_index/parent_prefix_path/linorobot2_d  
escription  
.log/build_2022-07-03_13-30-34/linorobot2_description  
.src/linorobot2/linorobot2_description  
.build/linorobot2_description  
.build/linorobot2_description/ament_cmake_index/share/ament_index/resource_index/packages/linoro  
bot2_description  
.build/linorobot2_description/ament_cmake_index/share/ament_index/resource_index/package_run_dep  
endencies/linorobot2_description  
.build/linorobot2_description/ament_cmake_index/share/ament_index/resource_index/parent_prefix_p  
ath/linorobot2_description
```

```
ubuntu@LINOROBOT:~/linorobot2_ws$ sudo find . -name  
4wd_properties.urdf.xacro  
.install/linorobot2_description/share/linorobot2_description/urdf/4wd_prop  
erties.urdf.xacro  
.src/linorobot2/linorobot2_description/urdf/4wd_properties.urdf.xacro
```

I'm assuming that the "install" rather than "src" is the one to modify(?)

*Skip over URDF for now*

## Quickstart

All commands below are to be run on the robot computer unless you're running a simulation or rviz2 to visualize the robot remotely from the host machine. SLAM and Navigation launch files are the same for both real and simulated robots in Gazebo.

### 1. Booting up the robot

#### 1.1a Using a real robot:

```
ros2 launch linorobot2_bringup bringup.launch.py
```

```
ubuntu@LINOROBOT:~$ ros2 launch linorobot2_bringup  
bringup.launch.py
```

Package 'linorobot2\_bringup' not found: "package 'linorobot2\_bringup' not found, searching: ['/opt/ros/galactic']"

*Got to build the package first after creating URDF*

#### DETOUR TO URDF TUTORIAL:

<https://docs.ros.org/en/foxy/Tutorials/Intermediate/URDF/Building-a-Visual-Robot-Model-with-URDF-from-Scratch.html>

and

C:\Users\Me\Documents\My Downloads\Robotics\USAi Labs\Mars Rover\AUDACITY\NAV2\URDF Tutorial.wpd

*Try again with Ubuntu 22.04 Galactic + ROS2 Humble Hawksbill get image from:*

<https://cdimage.ubuntu.com/releases/22.04/release/>

Raspberry Pi Generic (64-bit ARM) preinstalled desktop image  
For modern Raspberry Pi boards (Pi 2, Pi 3 and Pi 4).

*Joined HBRC Tue night (2022.07.05) ROS discussion. Lot of help from Camp Peavy, Michael Wimble & Scott Horton (in Dallas who is the only one running Linorobot).*

*Try again upgrading from Ubuntu 20.04 Focal Fossa to 22.04 Jammy Jellyfish and ROS2 Foxy Fitzroy to Humble Hawksbill.*

Ubuntu 22 ARM64 image from ubuntu.com failed to boot.

Trying from Raspberry Pi Imager: **Ubuntu 22 Desktop**.

**FAILED to boot.**

Now try:

<https://ubuntu.com/tutorials/how-to-install-ubuntu-desktop-on-raspberry-pi-4#1-overview>



*The choices I'm told I'd have don't appear. I have v1.4. I click link to get latest version for Windows. It's 1.7.2. Run.*

Scroll down the menu click “Other general-purpose OS”.

You will then be able to see a list of Ubuntu downloads to choose from. Select the “**Ubuntu 20.10 Desktop** (Raspberry Pi 4)” option. As indicated in the imager this only works for the Raspberry Pi 4 with 4GB or 8GB RAM.

*That's not one of the choices. Their screenshot shows 21.04.*

*My app only shows 20.04 or 22.04. No 21.04.*

*I'll pick the 22.04 Desktop 64 bit (again!). Boot FAILS again!*

<https://ubuntu.com/#download>

*Ubuntu Desktop for ARM doesn't seem to be an option. Will have to do Server for ARM then install Mate.*

*Again failure to boot!*

## 2022.07.08

Raspberry Pi Imager: Ubuntu 22.04 64 bit Server. **BOOTS!**

login: ubuntu password: ubuntu >> LINOROBOT

eth0 10.0.0.23

wlan0 null

ubuntu@ubuntu:~\$ sudo apt update

ubuntu@ubuntu:~\$ sudo apt upgrade -y

kernel upgraded

\$ sudo reboot

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.**

No passwordcircle. Defaults to MATE.

ubuntu@ubuntu:~\$ hostnamectl set-hostname LINOROBOT

ubuntu@LINOROBOT:~\$ sudo apt install chromium-browser

ubuntu@ubuntu:~\$ sudo apt install terminator

ubuntu@LINOROBOT:~\$ git clone

<https://github.com/linorobot/ros2me.git>

ubuntu@AUDACITY:~\$ cd ros2me/

ubuntu@AUDACITY:~/ros2me\$ ./install

ubuntu@LINOROBOT:~/ros2me\$ echo \$ROS\_DISTRO

*nothing*

*So where is ROS2 Humble Hawksbill?*

ubuntu@LINOROBOT:~/ros2me\$ sudo apt autoremove

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

**2022.07.09**

Posted to Linorobot github:

<https://github.com/linorobot/ros2me/issues/2#issuecomment-117954333>

and

<https://github.com/linorobot/linorobot2/issues/34#issue-1299682918>

JHPHELAN commented 4 hours ago

*On Raspberry Pi 4 4GB installed Ubuntu 22.04 Jammy Jellyfish 64 bit Server then MATE Desktop after great frustration as the images for the Desktop versions all failed to boot. Cloned and ran ros2me just fine but then echo \$ROS\_DISTRO came up blank indicating that ROS2 failed to install. (have created Issue in ros2me repo). Since I seem to need to install ROS2 Humble Hawksbill manually, is there any harm in installing the full version rather than just BASE?*

grassjelly commented 4 hours ago

*did you source .bashrc?*

*Ah, I did not. So I did and it installed ok. Thanks!*

*I am a rank amateur so did not realize to do that.*

*I barely know enough to know how to git clone the ros2me repo.*

*I would offer to make a pull request and update the readme.md for us total newbies, but am not yet confident enough in git to do that.*

*Can "source ~/.bashrc" be made part of .install to avoid this oversight?*

*I, and I know many others, are extremely impressed and grateful for Linorobot - an extremely sophisticated platform yet with much flexibility that is, more than most, "plug and play". Thank you!*

*My plan is to adapt Linorobot to the NASA/JPL Open Source Rover:*

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

*and*

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

*to take it from remote control to autonomous.*

*The challenge will be to adapt to the rover's 6-wheel-drive, 4-wheel-steering configuration.*

*Not sure whether to call it "6wd", "6x4" or "rover"*

*Thanks again,*

*Jim*

grassjelly commented 24 minutes ago

Glad that worked. That's a good idea - added a prompt here:

<https://github.com/linorobot/ros2me/blob/master/install#L90> but please feel free to send a PR on the README too.

That's a really cool project. Let me know if you need more help. Would love to see Linorobot power more robot form factors.

Since Installation failed before (see p.5) need to do this first:

```
ubuntu@LINOROBOT:~$ echo $(rosversion -d)
```

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

```
sudo apt install python3-ros pkg
```

```
ubuntu@LINOROBOT:~$ sudo apt install python3-ros pkg
```

```
done
```

Now, reprise p.5:

```
https://github.com/linorobot/linorobot2#installation
```

```
source /opt/ros/<ros_distro>/setup.bash
```

```
cd /tmp
```

```
wget https://raw.githubusercontent.com/linorobot/linorobot2/${ROS_DISTRO}/install_linorobot2.bash
```

```
bash install_linorobot2.bash <robot_type> <laser_sensor> <depth_sensor>
```

```
source ~/.bashrc
```

```
ubuntu@LINOROBOT:~$ source /opt/ros/humble/setup.bash
```

```
ubuntu@LINOROBOT:~$ cd /tmp
```

```
ubuntu@LINOROBOT:/tmp$ wget
```

```
https://raw.githubusercontent.com/linorobot/linorobot2/\${ROS\_DISTRO}/install\_linorobot2.bash
```

```
--2022-07-09 18:18:25--
```

```
https://raw.githubusercontent.com/linorobot/linorobot2/humble/install\_linorobot2.bash
```

```
Resolving raw.githubusercontent.com (raw.githubusercontent.com)...
```

```
2606:50c0:8001::154, 2606:50c0:8003::154, 2606:50c0:8002::154, ...
```

```
Connecting to raw.githubusercontent.com
```

```
(raw.githubusercontent.com)|2606:50c0:8001::154|:443... connected.
```

```
HTTP request sent, awaiting response... 404 Not Found
```

```
2022-07-09 18:18:25 ERROR 404: Not Found.
```

*Similarly fails if \${ROS\_DISTRO} is given explicitly as "humble".*

*Similarly fails whether run SSH or from Desktop.*

*Apparently that particular repo is not ready.*

*ROS2 humble -BASE doesn't include RViz or examples.*

```
ubuntu@LINOROBOT:~$ sudo apt install ros-humble-desktop
```

```
ubuntu@LINOROBOT:~$ ros2 run demo_nodes_cpp talker
```

```
[INFO] [1657415080.614464065] [talker]: Publishing: 'Hello World: 1'
```

```
[INFO] [1657415081.614420934] [talker]: Publishing: 'Hello World: 2'
```

```
[INFO] [1657415082.614411494] [talker]: Publishing: 'Hello World: 3'
```

```
...
```

```
ubuntu@LINOROBOT:~$ ros2 run demo_nodes_cpp listener
```

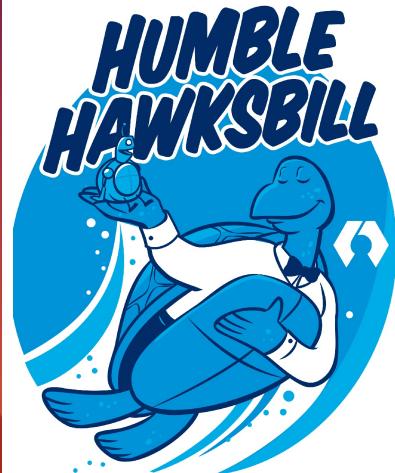
```
[INFO] [1657415080.615453439] [listener]: I heard: [Hello World: 1]
```

```
[INFO] [1657415081.615179089] [listener]: I heard: [Hello World: 2]
```

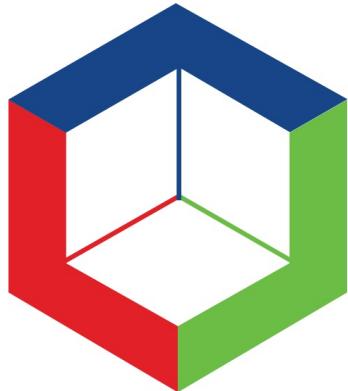
```
[INFO] [1657415082.615131335] [listener]: I heard: [Hello World: 3]
```

```
...
```

2022.07.10



<https://github.com/linorobot/linorobot2/issues/35#issuecomment-1179646366>



Linorobot

hey @JHPHELAN . Just created a humble branch. Could you try again?

```
ubuntu@LINOROBOT:~$ wget
https://raw.githubusercontent.com/linorobot/linorobot2/${ROS_DISTRO}/install_linorobot2.bash
--2022-07-10 07:43:56--
https://raw.githubusercontent.com/linorobot/linorobot2/humble/install_linorobot2.bash
```

```
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 2606:50c0:8002::154,
2606:50c0:8003::154, 2606:50c0:8001::154, ...
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|2606:50c0:8002::154|:443...
connected.
HTTP request sent, awaiting response... 200 OK
Length: 10309 (10K) [text/plain]
Saving to: 'install_linorobot2.bash'
install_linorobot2.bash
100%[=====] 10.07K
--.-KB/s   in 0.003s
2022-07-10 07:43:56 (3.76 MB/s) - 'install_linorobot2.bash' saved [10309/10309]
```

```

bash install_linorobot2.bash <robot_type> <laser_sensor> <depth_sensor>
becomes
ubuntu@LINOROBOT:~$ bash install_linorobot2.bash 4wd realsense
realsense
worked ok up until
...
Summary: 1 package finished [7.98s]
EE
== ./uros/micro-ROS-Agent (git) ==
Could not determine ref type of version: fatal: unable to access
'https://github.com/micro-ROS/micro-ROS-Agent.git/': Failed to connect to github.com port 443
after 27 ms: Network is unreachable
== ./uros/micro_ros_msgs (git) ==
Could not determine ref type of version: fatal: unable to access.
'https://github.com/micro-ROS/micro_ros_msgs.git/': Failed to connect to github.com port 443
after 27 ms: Network is unreachable
[ros2run]: Process exited with failure 1

```

*I think this is a firewall issue. Thought firewall was disabled. Changed it to enable and accept outgoing & incoming. No still same error.*

```

ubuntu@LINOROBOT:/tmp$ ping github.com
PING github.com (140.82.114.4) 56(84) bytes of data.
From _gateway (10.0.0.1) icmp_seq=1 Destination Net Unreachable
From _gateway (10.0.0.1) icmp_seq=2 Destination Net Unreachable
ubuntu@LINOROBOT:/tmp$ ping google.com
PING google.com(rw-in-f100.1e100.net (2607:f8b0:4023:1006::64)) 56 data bytes
64 bytes from rw-in-f100.1e100.net (2607:f8b0:4023:1006::64): icmp_seq=1 ttl=105 time=18.2 ms
64 bytes from rw-in-f100.1e100.net (2607:f8b0:4023:1006::64): icmp_seq=2 ttl=105 time=21.0 ms
and github is reachable by browser

```

## 2. Host Machine / Development Computer - Gazebo Simulation (Optional)

This step is only required if you plan to use Gazebo later. This comes in handy if you want to fine-tune parameters (ie. SLAM Toolbox, AMCL, Nav2) or test your applications on a virtual robot.

*Which I DO want to do.*

### 2.1 Install linorobot2 Package

```

cd <host_machine_ws>
git clone -b $ROS_DISTRO https://github.com/linorobot/linorobot2
src/linorobot2
rosdep update && rosdep install --from-path src --ignore-src -y --skip-keys
microxrcedds_agent --skip-keys micro_ros_agent
colcon build
source install/setup.bash
This needs doing as linorobot2_description is not included in
ros2me install
ubuntu@LINOROBOT:~$ cd linorobot2_ws/
ubuntu@LINOROBOT:~/linorobot2_ws$ git clone -b $ROS_DISTRO
https://github.com/linorobot/linorobot2 src/linorobot2
Cloning into 'src/linorobot2'...
fatal: unable to access 'https://github.com/linorobot/linorobot2/': Failed to
connect to github.com port 443 after 25 ms: Network is unreachable

```

## 2.2 Define Robot Type

Set LINOROBOT2\_BASE env variable to the type of robot base used. Available env variables are 2wd, 4wd, and mecanum. For example:

```
echo "export LINOROBOT2_BASE=2wd" >> ~/.bashrc  
source ~/.bashrc
```

```
ubuntu@LINOROBOT:~$ echo "export LINOROBOT2_BASE=4wd" >>  
~/.bashrc
```

You can skip the next step (Host Machine - RVIZ Configurations) since this package already contains the same RVIZ configurations to visualize the robot.

## 3. Host Machine - RVIZ Configurations

*skipping*

### URDF

#### 1. Define robot properties

linorobot2\_description package has parameterized xacro files that can help you kickstart writing the robot's URDF. Open <robot\_type>.properties.urdf.xacro in linorobot2\_description/urdf directory and change the values according to the robot's specification/dimensions. All pose definitions must be measured from the base\_link (center of base) and wheel positions (ie wheel\_pos\_x) are referring to wheel 1.

For custom URDFs, you can change the urdf\_path in description.launch.py found in linorobot2\_description/launch directory.

Robot Orientation:

```
-----FRONT-----  
WHEEL1 WHEEL2 (2WD/4WD)  
WHEEL3 WHEEL4 (4WD)  
-----BACK-----
```

Build the robot computer's workspace to load the new URDF:

```
cd <robot_computer_ws>  
colcon build
```

The same changes must be made on the host machine's <robot\_type>.properties.urdf.xacro if you're simulating the robot in Gazebo. Remember to also build the host machine's workspace after editing the xacro file.

```
cd <host_machine_ws>  
colcon build
```

```

ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_description/urdf$ nano OSR_properties.urdf.xacro
<!-- this is a legal comment, use Ctrl+hyphen -->
<?xml version="1.0"?>
<robot xmlns:xacro="http://ros.org/wiki/xacro">
  <xacro:property name="base_length" value="0.31" />
  <!-- default value="0.445" meters-->
  <xacro:property name="base_width" value="0.235" />
  <!-- default value= "0.200" -->
  <xacro:property name="base_height" value="0.114" />
  <!-- default value= "0.129" -->
  <xacro:property name="base_mass" value="7.19" />
  <!-- default value="10" kilograms-->
  <!--steering motor torque = 153 kgf-cm = 15 N m -->
  <xacro:property name="wheel_radius" value="0.076" />
  <!-- default value="0.07162" 6"dia/2 -->
  <xacro:property name="wheel_width" value="0.086" />
  <!-- default value="0.05" 3.4" -->
  <xacro:property name="wheel_pos_x" value="0.0915" />
  <!-- Left Center wheel -->
  <!-- default values="0.120" 0.0915m ~3 5/8" front of center chassis -->
  <xacro:property name="wheel_pos_y" value="0.240" />
  <!-- default value="0.1355" 0.24m ~9.5" out (left) from center chassis -->
  <xacro:property name="wheel_pos_z" value="-0.206" />
  <!-- default value="-0.04788 top 0.330m, bot 0.216m, cen = 0.273m -0.067 wh rad = 0.206m -->
  <xacro:property name="wheel_mass" value="0.235" />
  <!-- Traxis wheels 0.47kg/pr -->
  <xacro:property name="wheel_torque" value="3.73" />
  <!--Gobilda motor torque = 38.0 kg.cm (530 oz-in) = 3.726527 N m -->
  <xacro:property name="laser_pose">
    <origin xyz="0.1081 0 0.100" rpy="0 0 0"/>
    <!-- default value = xyz="-0.0475 0 0.125" rpy="0 0 0" -->
    <!-- ydlidar on top of rover, midline y=0, -->
    <!-- center of lidar = -0.0353m from front mount. Front mount -0.009 from front edge -->
    <!-- Top plate = 12" = 0.3048m /2 = 0.1524m -->
    <!-- 0.1524 -0.0353 -0.009 = 0.1081m from center chassis. -->
    <!-- ydlidar height = 0.0503m, beam -0.0079m from top, 0.0503-0.0079=0.0424m from top-->
    <!-- chassis height = 4.5" = 0.1143m /2 = 0.05715m +0.0424m = 0.09955m = 0.1m = z -->
  </xacro:property-->
  <xacro:property name="depth_sensor_pose">
    <origin xyz="0.1784 0 0.04265" rpy="0 0 0"/>
    <!-- default value xyz="-0.065 0 0.255" rpy="0 0 0" -->
    <!-- Intel RealSense D455 Depth Camera = 0.026m thick + 0.1524 = 0.1784m = x -->
    <!-- camera mounted center line, y = 0 -->
    <!-- Intel RealSense D455 Depth Camera = 0.029m high, /2 = -0.0145 -->
    <!-- chassis height = 4.5" = 0.1143m /2 = 0.05715 -0.0145 = 0.04265m = z -->
  </xacro:property>
</robot>

```

*there are 2 locations for Linorobot urdf's:*

ubuntu@LINOROBOT:~/linorobot2\_ws/install/linorobot2\_description/share/linorobot2\_description/urdf/  
and

ubuntu@LINOROBOT:~/linorobot2\_ws/src/linorobot2/linorobot2\_description/urdf/  
which is the correct one? I assume src gets compiled into install so change src.

URDF resources NOTE look for ROS2 examples, not ROS(1):  
<https://docs.ros.org/en/humble/Tutorials/Intermediate/URDF/URDF-Main.html>

Units:

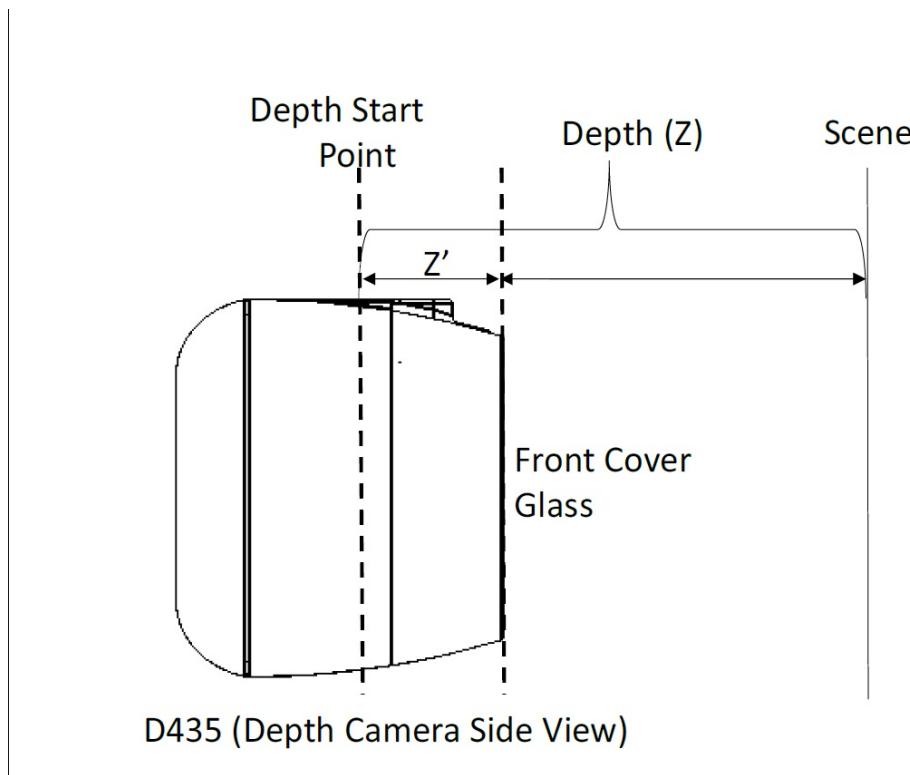
distance: meters  
weight: kilograms  
torque: Newton-meters

Axes:

x / red / +forward -backward  
y / green / +left -right  
z / blue / +up -down

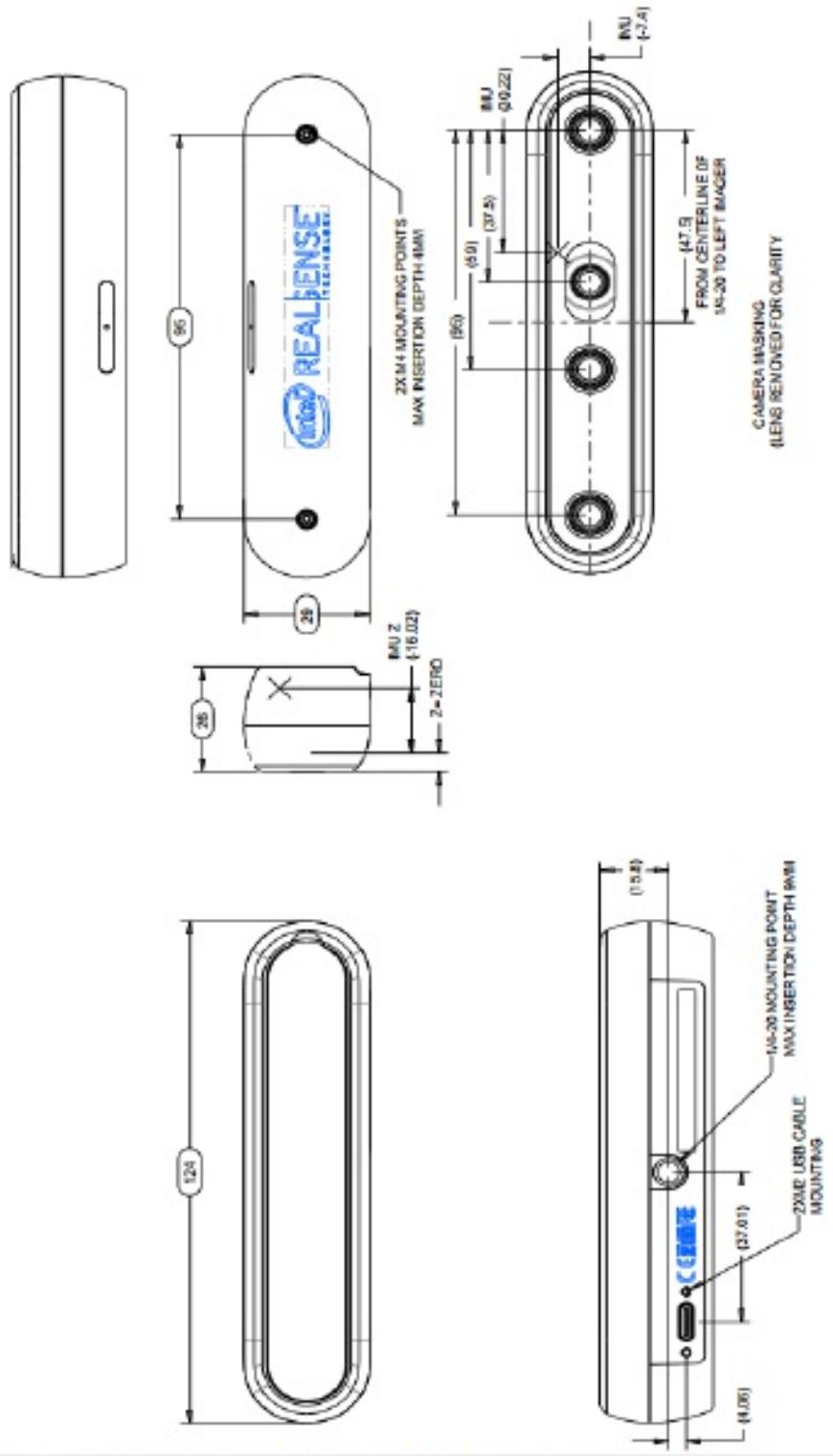
```
# disassembling rover to weigh each section untenable
# Assume all weight is in base except where other measured parts are
# subtracted
# gross weight of robot                                12.6kg
# subtract 6 wheels @ 0.235 = 1.41                  12.6-1.41 = 11.19kg
# subtract 6 drive motors @ .420 = 2.520            11.19-2.52 = 8.67kg
# subtract 4 steering motors @ 0.370 = 1.48          8.67-1.48 = 7.19kg
```

RealSense D455 Depthcamera (way too detailed) urdf located:  
[https://github.com/IntelRealSense/realsense-ros/blob/development/realsense2\\_description/urdf/\\_d455.urdf.xacro](https://github.com/IntelRealSense/realsense-ros/blob/development/realsense2_description/urdf/_d455.urdf.xacro)



Z = -4.55mm for D455

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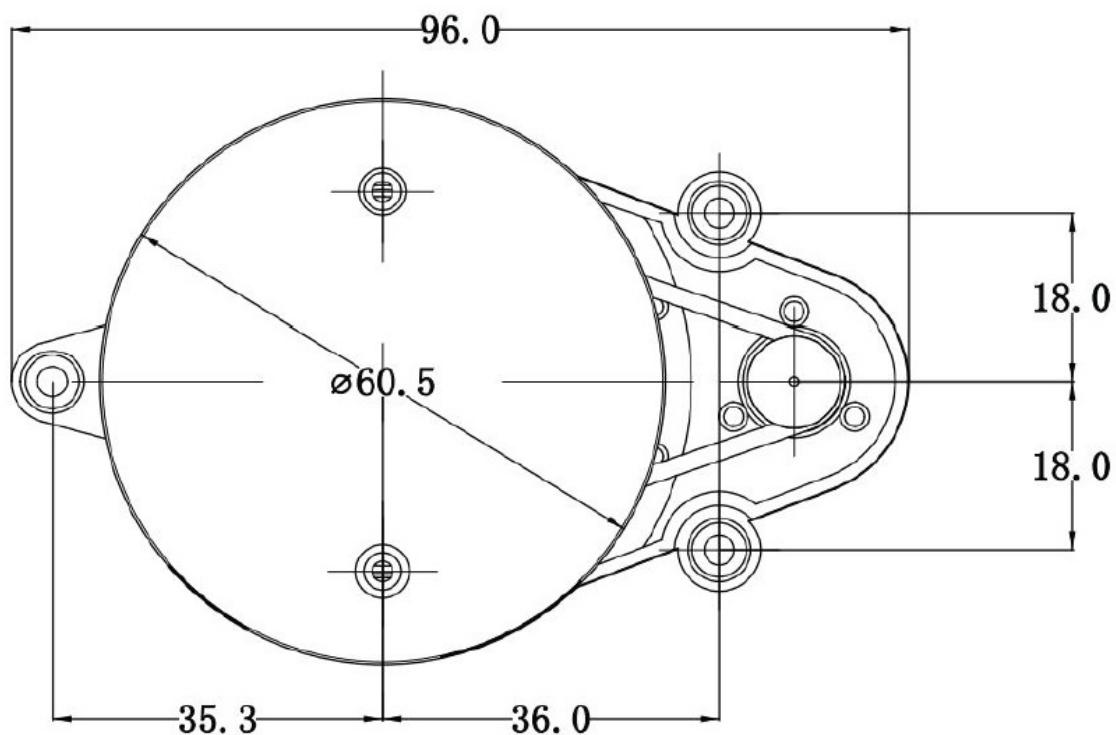
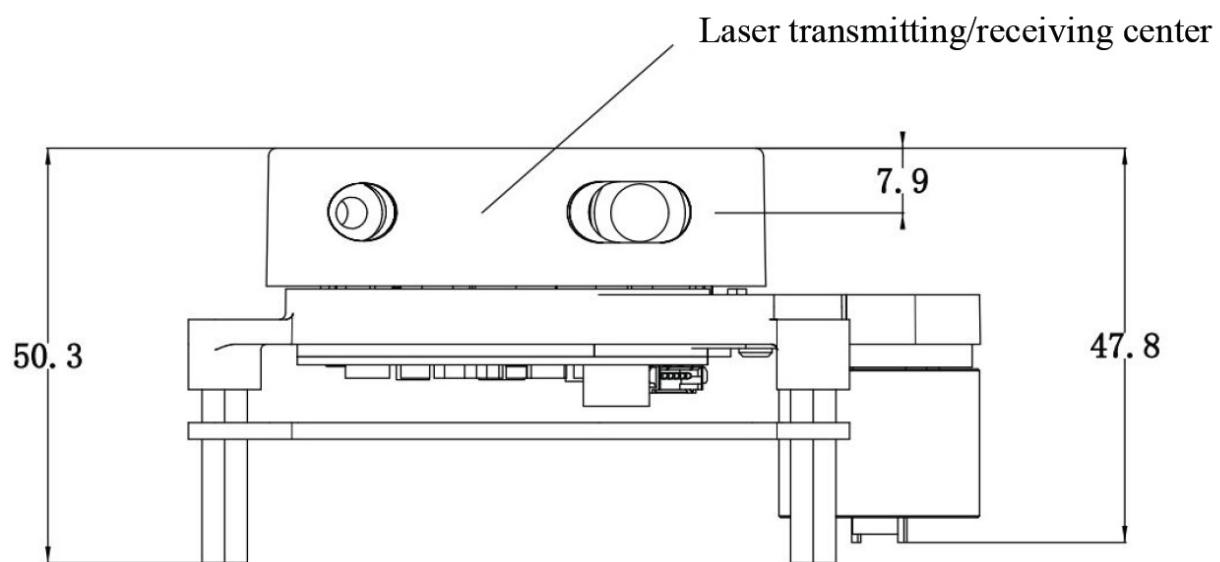
DEPARTMENT	REV.	DATE	DRAWN BY	VER.	MM
INTEL	A2	MD264501	1.00	02	MM

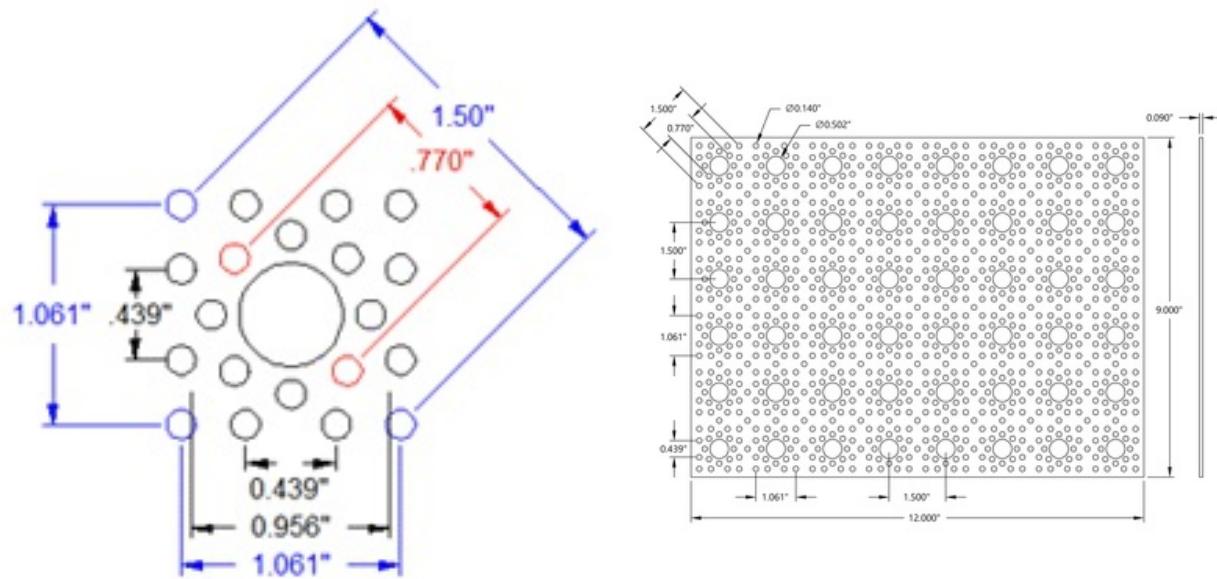
1220 INNOVATION BLVD., SUITE 110  
MCLEAN, VA 22102  
SANTA CLARA, CA 95051-9193  
SCALE: 1:500  
02/16/2016 DRAWN  
Sheet 3 of 3

TELEMEASURED MODEL

*Ydlidar (way too detailed) urdf located:*

<https://github.com/EAIBOT/ydlidar/blob/master/urdf/ydlidar.urdf>





*Pattern Plate on top of rover that ydlidar (above) needs an adapter plate for.*

*Roberto is back in town! Joined HBRC. Asked him to make an adapter plate for the vdlidar.*

*Ydlidar mounting screws are apparently M3x10mm (datasheet doesn't say!). M4 is too big. Don't have M3.5 to try. Screw heads are 6mm diameter. 1/4" countersink should be sufficient.*

*Pattern plate holes accept #6-32 screws, 1/8" diameter.*

## 2022.07.21

posted to github 2022.07.10:

@grassjelly

Thanks for the very prompt responses!

Downloaded ok. Then

```
ubuntu@LINOROBOT:~$ bash install_linorobot2.bash 4wd realsense realsense
```

```
Summary: 1 package finished [7.98s] EE === ./uros/micro-ROS-Agent (git) === Could not determine ref type of version: fatal: unable to access 'https://github.com/micro-ROS/micro-ROS-Agent.git/': Failed to connect to github.com port 443 after 27 ms: Network is unreachable === ./uros/micro_ros_msgs (git) === Could not determine ref type of version: fatal: unable to access 'https://github.com/micro-ROS/micro_ros_msgs.git/': Failed to connect to github.com port 443 after 27 ms: Network is unreachable [ros2run]: Process exited with failure 1
```

Does this have anything to do with the caveat about skipping micro-ROS keys when running rosdep install?

Is micro-ROS necessary to this project?

Recalled earlier issue about doing source... so did

```
ubuntu@LINOROBOT:~$ source /opt/ros/humble/setup.bash
ubuntu@LINOROBOT:~$ bash install_linorobot2.bash 4wd realsense realsense
`You are installing linorobot2 on your robot computer.
```

=====SUMMARY=====

ROBOT TYPE : 4wd

LASER SENSOR :

DEPTH SENSOR :

This installer will edit your ~/.bashrc.

Create a linorobot2\_ws on your /home/ubuntu directory.

Install linorobot2 ROS2 dependencies.

Install udev rules on /etc/udev/rules.d folder.

Enter [y] to continue. y

INSTALLING NOW....

Starting >>> micro\_ros\_setup

Finished <<< micro\_ros\_setup [0.79s]

Summary: 1 package finished [1.66s]

Usage: grep [OPTION]... PATTERN [FILE]...

Try 'grep --help' for more information.

Usage: grep [OPTION]... PATTERN [FILE]...

Try 'grep --help' for more information.

fatal: destination path 'src/micro\_ros\_setup' already exists and is not an empty directory.

so removed the directory, resourced, and tried again. Same github error.

## 2022.07.18

response from grassjelly:

hey, sorry need to find bandwidth to take a look at this as ROS2 Humble is not currently supported yet.

```
ubuntu@LINOROBOT:~$ bash install_lenorobot2.bash 4wd realsense  
realsense  
extensive install then:  
updated cache in /home/ubuntu/.ros/rosdep/sources.cache  
#All required rosdeps installed successfully  
Starting >>> micro_ros_setup  
Finished <<< micro_ros_setup [6.56s]  
  
Summary: 1 package finished [8.83s]  
Repo-file ros2.repos already present, overwriting!  
. . .  
== ./uros/micro-ROS-Agent (git) ===  
Skipped existing directory  
== ./uros/micro_ros_msgs (git) ===  
Skipped existing directory  
#All required rosdeps installed successfully  
Building micro-ROS Agent  
Package 'micro_ros_agent' specified with --packages-up-to was not found  
[ros2run]: Process exited with failure 1  
  
try again from p7 above:  
ubuntu@LINOROBOT:~/linorobot2_ws$ rosdep update && rosdep install  
--from-path src --ignore-src -y --skip-keys microxrcedds_agent  
--skip-keys micro_ros_agent  
. . .  
updated cache in /home/ubuntu/.ros/rosdep/sources.cache  
#All required rosdeps installed successfully  
ubuntu@LINOROBOT:~/linorobot2_ws$ colcon build  
Starting >>> micro_ros_setup  
Finished <<< micro_ros_setup [1.86s]  
Summary: 1 package finished [4.19s]  
ubuntu@LINOROBOT:~$ source /opt/ros/humble/setup.bash  
ubuntu@LINOROBOT:~$ bash install_lenorobot2.bash 4wd realsense  
realsense  
. . .  
fatal: destination path 'src/micro_ros_setup' already exists and is not an  
empty directory.  
ubuntu@LINOROBOT:~/linorobot2_ws/src$ rm -rf micro_ros_setup/  
ubuntu@LINOROBOT:~$ bash install_lenorobot2.bash 4wd realsense  
realsense  
gets hung up by auto-updater locks.  
reboot  
run Software Updater
```

```
ubuntu@LINOROBOT:~$ rm -rf ~/linorobot2_ws/src/micro_ros_setup/
ubuntu@LINOROBOT:~/linorobot2_ws$ rosdep update && rosdep install
--from-path src --ignore-src -y --skip-keys microxrcedds_agent
--skip-keys micro_ros_agent
ubuntu@LINOROBOT:~/linorobot2_ws$ colcon build
ubuntu@LINOROBOT:~$ source /opt/ros/humble/setup.bash
ubuntu@LINOROBOT:~$ bash install_linorobot2.bash 4wd realsense
realsense
#All required rosdeps installed successfully
Building micro-ROS Agent
Package 'micro_ros_agent' specified with --packages-up-to was not found
[ros2run]: Process exited with failure 1
```

posted to <https://github.com/linorobot/linorobot2/issues/35>

**2022.07.23**

```
ubuntu@LINOROBOT:~$ ros2 launch linorobot2_bringup  
bringup.launch.py
```

Package 'linorobot2\_bringup' not found: "package 'linorobot2\_bringup' not found, searching: ['/opt/ros/humble']"

```
ubuntu@LINOROBOT:~$ ros2 launch linorobot2_description  
description.launch.py rviz:=true
```

Package 'linorobot2\_description' not found: "package 'linorobot2\_description' not found, searching: ['/opt/ros/humble']"

*something's missing. Let's try starting the install over from:  
<https://github.com/linorobot/linorobot2#1-robot-computer---linorobot2-package>*

*First, let's clean house -*

```
ubuntu@LINOROBOT:~$ ls -w 1
```

```
Desktop  
Documents  
Downloads  
install_linorobot2.bash  
linorobot2_ws  
Music  
Pictures  
Public  
ros2me  
snap  
Templates  
Videos
```

```
ubuntu@LINOROBOT:~$ rm install_linorobot2.bash
```

```
ubuntu@LINOROBOT:~$ rm -rf linorobot2_ws/
```

```
ubuntu@LINOROBOT:/tmp$ rm install_linorobot2.bash
```

*now start over -*

## **1. Robot Computer - linorobot2 Package**

```
ubuntu@LINOROBOT:~$ source /opt/ros/humble/setup.bash
```

```
ubuntu@LINOROBOT:~$ cd /tmp
```

```
ubuntu@LINOROBOT:/tmp$ wget
```

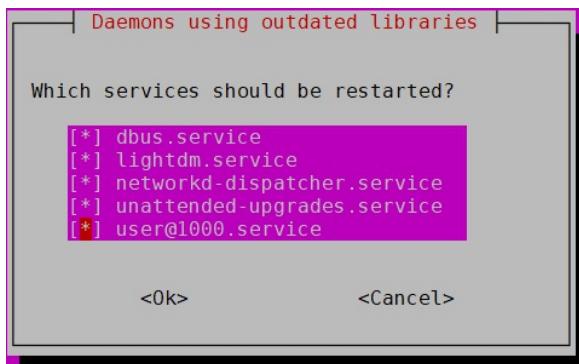
```
https://raw.githubusercontent.com/linorobot/linorobot2/\${ROS\_DISTRO}/install\_linorobot2.bash
```

```
bash install_linorobot2.bash <robot_type> <laser_sensor>  
<depth_sensor>
```

*becomes with 4 wheel drive, RealSense camera, and ydlidar:*

```
bash install_linorobot2.bash 4wd ydlidar realsense
```

```
ubuntu@LINOROBOT:/tmp$ bash install_linorobot2.bash 4wd ydlidar  
realsense
```



this didn't pop up before, but seem reasonable to restart all outdated libraries?  
Progressing normally after Ok.

Should have done update/upgrade but that was done recently

Do you want to add sourcing of linorobot2\_ws on your ~/.bashrc?

Yes [y] or No [n]: y

INSTALLATION DONE.

Restart your robot computer now.

ubuntu@LINOROBOT:/tmp\$ sudo reboot

...

ubuntu@LINOROBOT:~\$ source ~/.bashrc

## 2. Host Machine / Development Computer - Gazebo Simulation (Optional)

This step is only required if you plan to use Gazebo later. This comes in handy if you want to fine-tune parameters (ie. SLAM Toolbox, AMCL, Nav2) or test your applications on a virtual robot.

### 2.1 Install linorobot2 Package

Install linorobot2 package on the host machine:

cd <host\_machine\_ws>

ubuntu@LINOROBOT:~\$ cd linorobot2\_ws/

ubuntu@LINOROBOT:~/linorobot2\_ws\$ git clone -b \$ROS\_DISTRO

<https://github.com/linorobot/linorobot2> src/linorobot2

fatal: destination path 'src/linorobot2' already exists and is not an empty directory.

I think this is assuming that the "host machine" is a separate linux machine to run gazebo. Already installed on the Rpi.

I suspect I may need to install ubuntu 22.04 on a Virtual Machine to do Rviz and Gazebo.

### URDF

In discussion w/ Homebrew Robotics, they suggested I just substitute the AWS OSR urdf for the Linorobot2 urdf. However, Linorobot just has xacro descriptions that get compiled into a true urdf. It will take a lot of obsessing to modify the 4wd\_properties.urdf.xacro to osr6x4.urdf.xacro! Let's get started.

The AWS OSR .urdf is 1206 lines!

The Linorobot 4wd .xacro is 23 lines!

Retreat!

## Quickstart

1. Booting up the robot

1.1a Using a real robot:

```
ubuntu@LINOROBOT:~$ ros2 launch linorobot2_bringup  
bringup.launch.py
```

```
[INFO] [launch]: All log files can be found below  
/home/ubuntu/.ros/log/2022-07-23-17-06-59-626760-LINOROBOT-3943  
[INFO] [launch]: Default logging verbosity is set to INFO  
[INFO] [micro_ros_agent-1]: process started with pid [3945]  
[INFO] [ekf_node-2]: process started with pid [3947]  
[INFO] [joint_state_publisher-3]: process started with pid [3949]  
[INFO] [robot_state_publisher-4]: process started with pid [3951]  
[micro_ros_agent-1] [1658614022.577361] info | TermiosAgentLinux.cpp | init |  
Serial port not found. | device: /dev/ttyACM0, error 2, waiting for connection...  
[robot_state_publisher-4] Link base_link had 7 children  
[robot_state_publisher-4] Link camera_link had 1 children  
[robot_state_publisher-4] Link camera_depth_link had 0 children  
[robot_state_publisher-4] Link front_left_wheel_link had 0 children  
[robot_state_publisher-4] Link front_right_wheel_link had 0 children  
[robot_state_publisher-4] Link imu_link had 0 children  
[robot_state_publisher-4] Link laser had 0 children  
[robot_state_publisher-4] Link rear_left_wheel_link had 0 children  
[robot_state_publisher-4] Link rear_right_wheel_link had 0 children  
[robot_state_publisher-4] [INFO] [1658614022.824471238] [robot_state_publisher]: got segment  
base_footprint  
[robot_state_publisher-4] [INFO] [1658614022.825662836] [robot_state_publisher]: got segment  
base_link  
[robot_state_publisher-4] [INFO] [1658614022.825871833] [robot_state_publisher]: got segment  
camera_depth_link  
[robot_state_publisher-4] [INFO] [1658614022.825972480] [robot_state_publisher]: got segment  
camera_link  
[robot_state_publisher-4] [INFO] [1658614022.826061572] [robot_state_publisher]: got segment  
front_left_wheel_link  
[robot_state_publisher-4] [INFO] [1658614022.826147219] [robot_state_publisher]: got segment  
front_right_wheel_link  
[robot_state_publisher-4] [INFO] [1658614022.826308180] [robot_state_publisher]: got segment  
imu_link  
[robot_state_publisher-4] [INFO] [1658614022.826483660] [robot_state_publisher]: got segment  
laser  
[robot_state_publisher-4] [INFO] [1658614022.826581807] [robot_state_publisher]: got segment  
rear_left_wheel_link  
[robot_state_publisher-4] [INFO] [1658614022.826680713] [robot_state_publisher]: got segment  
rear_right_wheel_link  
[micro_ros_agent-1] [1658614022.577361] info | TermiosAgentLinux.cpp | init |  
Serial port not found. | device: /dev/ttyACM0, error 2, waiting for connection...  
...repeats...
```

```
ubuntu@LINOROBOT:~$ ls /dev/tt*y*
```

```
/dev/ttyAMA0
```

*Even to there's no other microprocessor on the OSR, try -*

```
ubuntu@LINOROBOT:~$ ros2 launch linorobot2_bringup
```

```
bringup.launch.py base_serial_port:=/dev/tt*yAMA0
```

*... as above but stops at*

```
[robot_state_publisher-4] Link rear_right_wheel_link had 0 children  
[joint_state_publisher-3] [INFO] [1658614567.782143960] [joint_state_publisher]: Waiting for  
robot_description to be published on the robot_description topic.
```

```

ubuntu@LINOROBOT:~$ ros2 topic list
/diagnostics
 imu/data
/joint_states
/odom
/odom/unfiltered
/parameter_events
/robot_description
/rosout
/set_pose
/tf
/tf_static

ubuntu@LINOROBOT:~$ ros2 topic echo /robot_description
data: <?xml version="1.0" ?> <!--
=====
--> <!-- | Th...
freezes here.

ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_descri
ption/urdf$ cp 4wd_properties.urdf.xacro
OSR6x4_properties.urdf.xacro

ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_descri
ption/urdf$ cat OSR6x4_properties.urdf.xacro
<?xml version="1.0"?>
<robot xmlns:xacro="http://ros.org/wiki/xacro">
  <xacro:property name="base_length" value="0.445" />
  <xacro:property name="base_width" value="0.200" />
  <xacro:property name="base_height" value="0.129" />
  <xacro:property name="base_mass" value="10" />

  <xacro:property name="wheel_radius" value="0.07162" />
  <xacro:property name="wheel_width" value="0.05" />
  <xacro:property name="wheel_pos_x" value="0.120" />
  <xacro:property name="wheel_pos_y" value="0.1355" />
  <xacro:property name="wheel_pos_z" value="-0.04788" />
  <xacro:property name="wheel_mass" value=".6" />
  <xacro:property name="wheel_torque" value="20" />

  <xacro:property name="laser_pose">
    <origin xyz="-0.0475 0 0.125" rpy="0 0 0"/>
  </xacro:property>

  <xacro:property name="depth_sensor_pose">
    <origin xyz="-0.065 0 0.255" rpy="0 0 0"/>
  </xacro:property>

```

2022.07.24

sent "Experience.pdf" to Linorobot creator [jimenojmm@gmail.com](mailto:jimenojmm@gmail.com)  
Corresponded w/ Roberto re adapter plate specs.

```
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_descri  
ption/urdf$ cp 4wd_properties.urdf.xacro  
OSR4wd_properties.urdf.xacro  
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_descri  
ption/urdf$ nano OSR4wd_properties.urdf.xacro  
ubuntu@LINOROBOT:~/linorobot2_ws$ colcon build  
ubuntu@LINOROBOT:~/linorobot2_ws/install/linorobot2_description/s  
hare/linorobot2_description/urdf$ ls -wl  
2wd_properties.urdf.xacro  
4wd_properties.urdf.xacro  
controllers  
mecanum_properties.urdf.xacro  
mech  
OSR4wd_properties.urdf.xacro           so it got compiled w/ colcon  
OSR6x4_properties.urdf.xacro  
robots  
sensors  
ubuntu@LINOROBOT:~/linorobot2_ws$ ros2 launch linorobot2_bringup  
bringup.launch.py base_serial_port:=/dev/ttyAMA0  
[INFO] [launch]: All log files can be found below /home/ubuntu/.ros/log/2022-07-24-18-37-31-634827-LINOROBOT-9376  
[INFO] [launch]: Default logging verbosity is set to INFO  
[INFO] [micro_ros_agent-1]: process started with pid [9381]  
[INFO] [ekf_node-2]: process started with pid [9383]  
[INFO] [joint_state_publisher-3]: process started with pid [9385]  
[INFO] [robot_state_publisher-4]: process started with pid [9387]  
[INFO] [micro_ros_agent-1] [1658705857.678308] info      | TermiosAgentLinux.cpp | init          | running...          | fd:  
3  
[INFO] [micro_ros_agent-1] [1658705857.680533] info      | Root.cpp            | set_verbose_level | logger setup       |  
verbose_level: 4  
[INFO] [robot_state_publisher-4] Link base_link had 7 children  
[INFO] [robot_state_publisher-4] Link camera_link had 1 children  
[INFO] [robot_state_publisher-4] Link camera_depth_link had 0 children  
[INFO] [robot_state_publisher-4] Link front_left_wheel_link had 0 children  
[INFO] [robot_state_publisher-4] Link front_right_wheel_link had 0 children  
[INFO] [robot_state_publisher-4] Link imu_link had 0 children  
[INFO] [robot_state_publisher-4] Link laser had 0 children  
[INFO] [robot_state_publisher-4] Link rear_left_wheel_link had 0 children  
[INFO] [robot_state_publisher-4] Link rear_right_wheel_link had 0 children  
[INFO] [robot_state_publisher-4] [1658705857.984445445] [robot_state_publisher]: got segment base_footprint  
[INFO] [robot_state_publisher-4] [1658705857.985635874] [robot_state_publisher]: got segment base_link  
[INFO] [robot_state_publisher-4] [1658705857.985850630] [robot_state_publisher]: got segment camera_depth_link  
[INFO] [robot_state_publisher-4] [1658705857.985962499] [robot_state_publisher]: got segment camera_link  
[INFO] [robot_state_publisher-4] [1658705857.986053479] [robot_state_publisher]: got segment front_left_wheel_link  
[INFO] [robot_state_publisher-4] [1658705857.986140904] [robot_state_publisher]: got segment front_right_wheel_link  
[INFO] [robot_state_publisher-4] [1658705857.986224866] [robot_state_publisher]: got segment imu_link  
[INFO] [robot_state_publisher-4] [1658705857.986304217] [robot_state_publisher]: got segment laser  
[INFO] [robot_state_publisher-4] [1658705857.986382660] [robot_state_publisher]: got segment rear_left_wheel_link  
[INFO] [robot_state_publisher-4] [1658705857.986464270] [robot_state_publisher]: got segment rear_right_wheel_link  
[INFO] [joint_state_publisher-3] [1658705860.863746407] [joint_state_publisher]: Waiting for robot_description to be published on  
the robot_description topic...
```

```
ubuntu@LINOROBOT:~$ ros2 topic echo /robot_description
```

```
data: <?xml version="1.0" ?> <!--  
===== --> <!-- | Th...  
-->
```

```
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_descri
ption/urdf$ cat OSR4wd_properties.urdf.xacro
```

```
<?xml version="1.0"?>
<robot xmlns:xacro="http://ros.org/wiki/xacro">
  <xacro:property name="base_length" value="0.31" />
  <xacro:property name="base_width" value="0.235" />
  <xacro:property name="base_height" value="0.114" />
  <xacro:property name="base_mass" value="7.19" />

  <xacro:property name="wheel_radius" value="0.076" />
  <xacro:property name="wheel_width" value="0.086" />
  <xacro:property name="wheel_pos_x" value="0.0915" />
  <xacro:property name="wheel_pos_y" value="0.240" />
  <xacro:property name="wheel_pos_z" value="-0.206" />
  <xacro:property name="wheel_mass" value=".235" />
  <xacro:property name="wheel_torque" value="3.73" />

  <xacro:property name="laser_pose">
    <origin xyz="0.1018 0 0.100" rpy="0 0 0"/>
  </xacro:property>

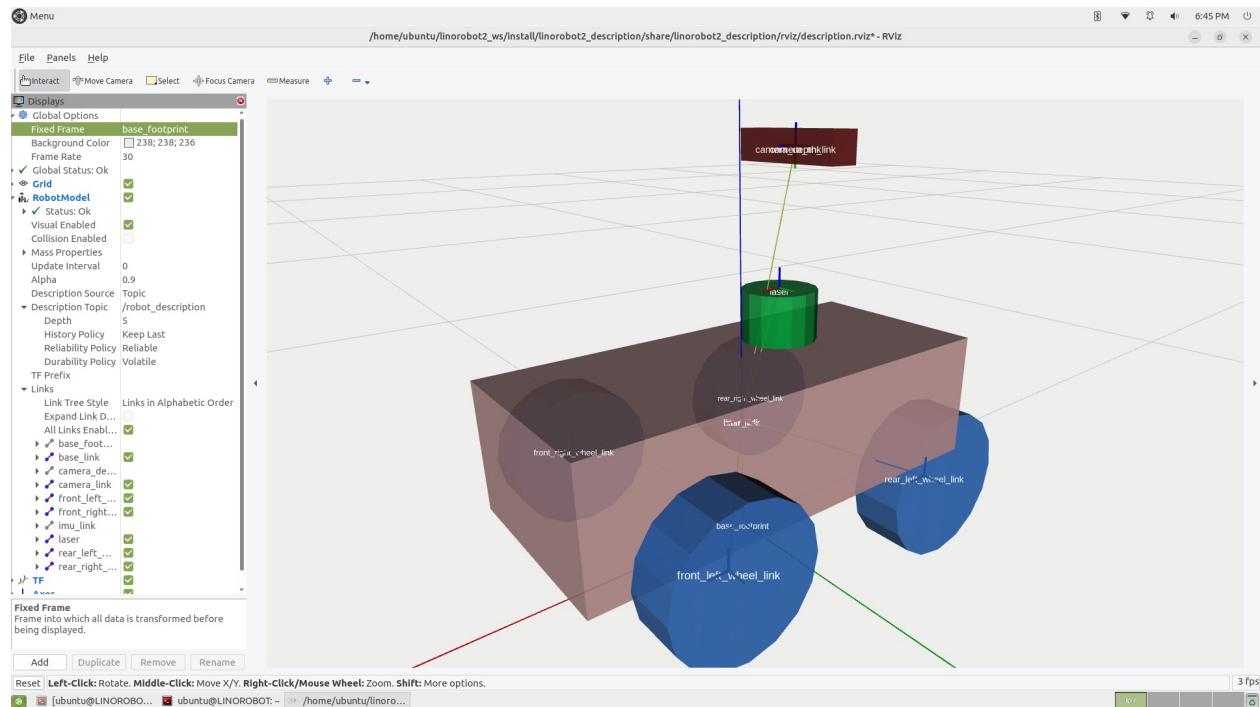
  <xacro:property name="depth_sensor_pose">
    <origin xyz="-0.1784 0 0.04265" rpy="0 0 0"/>
  </xacro:property>
</robot>
```

2022.07.26

```
ubuntu@LINOROBOT:/tmp$ bash install_linorobot2.bash OSR4wd
ydlidar realsense
bash: install_linorobot2.bash: No such file or directory
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2$ bash
install_linorobot2.bash OSR4wd ydlidar realsense
Invalid linorobot base: OSR4wd
Valid Options:
2wd
4wd
mecanum
```

*Just because I created a OSR4wd.xacro, doesn't mean it's an acceptable option to install. Will play with the default 4wd in Gazebo.*

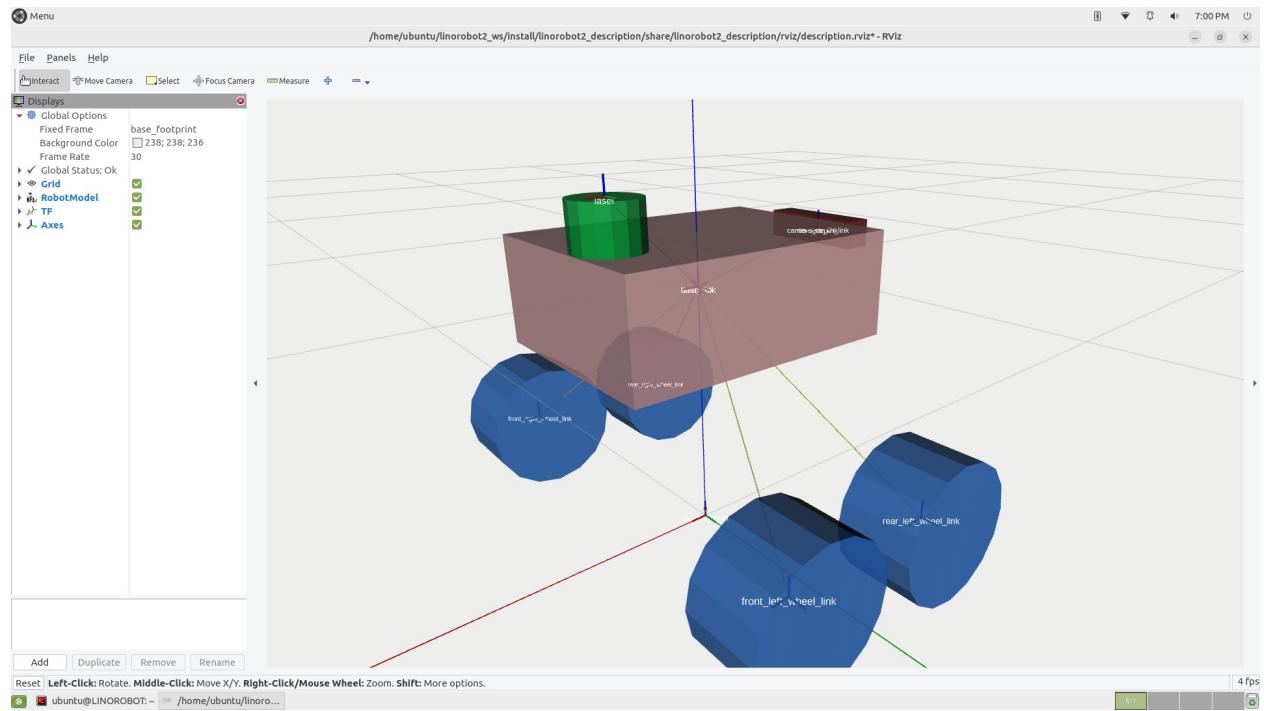
```
ubuntu@LINOROBOT:~$ ros2 launch linorobot2_description
description.launch.py rviz:=true
```



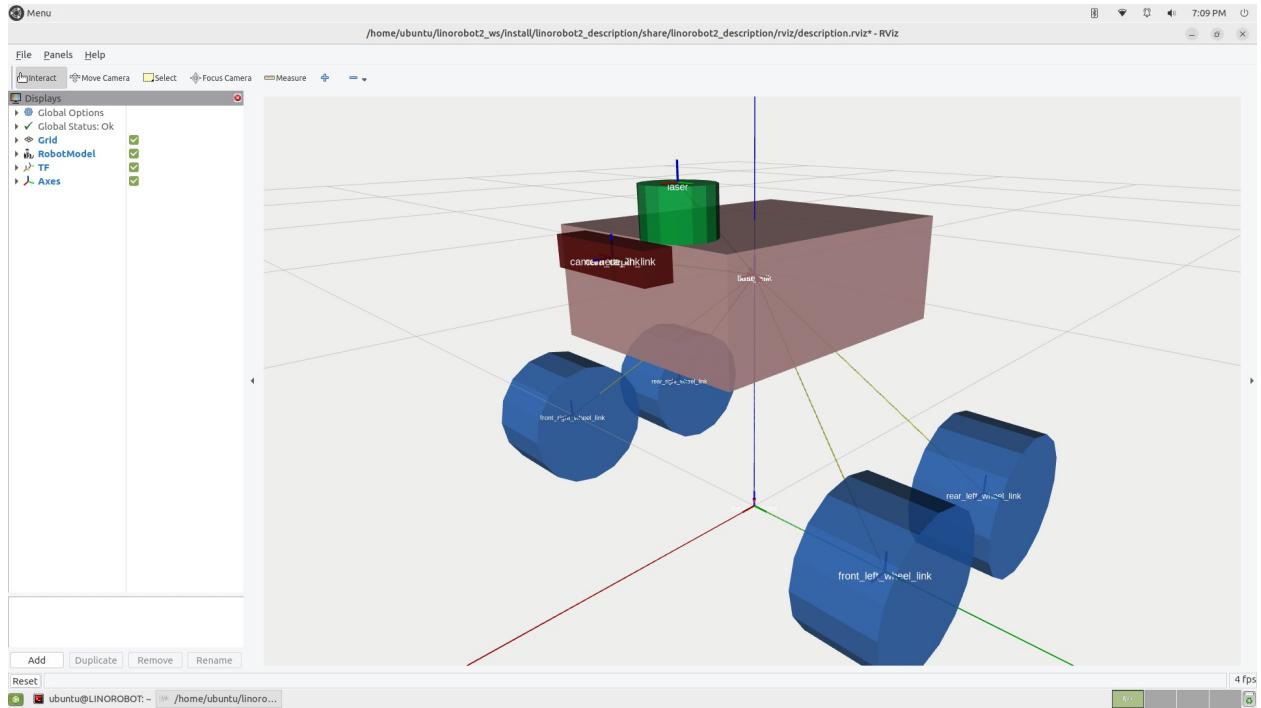
```

Try substituting my OSR4wd.xacro for the default...
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_description/urdf$ mv 4wd_properties.urdf.xacro
4wd_properties.urdf.xacro.ORIGINAL
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_description/urdf$ cp OSR6x4_properties.urdf.xacro
4wd_properties.urdf.xacro
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_description/urdf$ cd ~/linorobot2_ws/
ubuntu@LINOROBOT:~/linorobot2_ws$ colcon build
Rviz shows SAME robot, not my changes.
Change .xacro in install directory instead:
ubuntu@LINOROBOT:~/linorobot2_ws/install/linorobot2_description/share/linorobot2_description/rviz/description.rviz$ cp OSR4wd_properties.urdf.xacro
4wd_properties.urdf.xacro

```



*Good except Depth Camera is in back instead of front!  
Ah! I see a minus sign before x origin!*



*That's better!*

```
ubuntu@LINOROBOT:~$ ros2 launch linorobot2_gazebo
gazebo.launch.py
Package 'linorobot2_gazebo' not found: "package
'linorobot2_gazebo' not found, searching:
['/home/ubuntu/linorobot2_ws/install/micro_ros_setup',
 '/home/ubuntu/linorobot2_ws/install/linorobot2 Bringup',
 '/home/ubuntu/linorobot2_ws/install/micro_ros_agent',
 '/home/ubuntu/linorobot2_ws/install/micro_ros_msgs',
 '/home/ubuntu/linorobot2_ws/install/linorobot2_navigation',
 '/home/ubuntu/linorobot2_ws/install/linorobot2_description',
 '/home/ubuntu/linorobot2_ws/install/linorobot2_base',
 '/home/ubuntu/linorobot2_ws/install/linorobot2',
 '/opt/ros/humble']"
```

*Apparently \_gazebo package not built. Try:*

```
ubuntu@LINOROBOT:~/linorobot2_ws$ colcon build --packages-select
linorobot2_gazebo
```

```
[3.517s] WARNING:colcon.colcon_core.package_selection:ignoring
unknown package 'linorobot2_gazebo' in --packages-select
```

*Apparently \_gazebo package not configured to build?*

```
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_gazebo
$ ls -w1
CMakeLists.txt
COLCON_IGNORE
launch
package.xml
rviz
scripts
worlds
```

*Appears defined here:*

```
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_gazebo
$ cat CMakeLists.txt
cmake_minimum_required(VERSION 3.5)
project(linorobot2_gazebo)

find_package(ament_cmake REQUIRED)
find_package(ament_cmake_python REQUIRED)
find_package(rclpy REQUIRED)
ament_python_install_package(scripts)

install(
    DIRECTORY launch rviz worlds
    DESTINATION share/${PROJECT_NAME}
)

install(PROGRAMS
    scripts/command_timeout.py
    DESTINATION lib/${PROJECT_NAME}
)
ament_package()
```

*Appears defined here:*

```
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_gazebo
$ cat package.xml
<?xml version="1.0"?>
<?xml-model href="http://download.ros.org/schema/package_format3.xsd"
schematypens="http://www.w3.org/2001/XMLSchema"?>
<package format="3">
    <name>linorobot2_gazebo</name>
    <version>0.0.0</version>
    <description>Linorobot2 Gazebo Package</description>
    <maintainer email="jimenojmm@gmail.com">Juan Miguel Jimeno</maintainer>
    <license>Apache 2.0</license>
    <url type="website">linorobot.org</url>
    <url type="repository">https://github.com/linorobot/linorobot2</url>
    <url type="bugtracker">https://github.com/linorobot/linorobot2/issues</url>
    <buildtool_depend>ament_cmake</buildtool_depend>
    <buildtool_depend>ament_cmake_python</buildtool_depend>
    <exec_depend>gazebo_ros_pkgs</exec_depend>
    <exec_depend>rclpy</exec_depend>
    <exec_depend>geometry_msgs</exec_depend>
    <export>
        <build_type>ament_cmake</build_type>
    </export>
</package>
```

*COLCON\_IGNORE is empty*

*So what's missing?*

*posted to hbrobotics email chain & Linorobot Github*

**2022.07.28**

Reply from Ralph Gnauck <[ralphgna@pacbell.net](mailto:ralphgna@pacbell.net)>

Re: [HBRobotics] Linorobot2\_gazebo package failure

Delete the COLCON\_IGNORE file

It tells ROS to ignore the folder

Google: “**colcon ignore**”

<https://docs.ros.org/en/rolling/Tutorials/Beginner-Client-Libraries/Colcon-Tutorial.html>

*at the very end:*

“**Tips**

If you do not want to build a specific package place an empty file named COLCON\_IGNORE in the directory and it will not be indexed.”

```
ubuntu@LINOROBOT:~/linorobot2_ws/src/linorobot2/linorobot2_gazebo
$ mv COLCON_IGNORE dontCOLCON_IGNORE
ubuntu@LINOROBOT:~/linorobot2_ws$ colcon build
Starting >>> micro_ros_msgs
Starting >>> linorobot2
Starting >>> linorobot2_base
Starting >>> linorobot2_description
Finished <<< linorobot2 [2.66s]
Starting >>> linorobot2_gazebo
Finished <<< linorobot2_description [2.85s]
Starting >>> linorobot2_navigation
Finished <<< linorobot2_base [3.30s]
Starting >>> micro_ros_setup
Finished <<< linorobot2_navigation [2.43s]
Finished <<< micro_ros_setup [2.34s]
Finished <<< micro_ros_msgs [10.9s]
Starting >>> micro_ros_agent
Finished <<< micro_ros_agent [2.43s]
Starting >>> linorobot2_bringup
Finished <<< linorobot2_bringup [1.63s]
Finished <<< linorobot2_gazebo [15.8s]

Summary: 9 packages finished [19.6s]
```

```
ubuntu@LINOROBOT:~/linorobot2_ws$ ros2 launch linorobot2_gazebo
gazebo.launch.py
```

*same error*

2022.07.30

```
ubuntu@LINOROBOT:~$ sudo apt update
ubuntu@LINOROBOT:~$ sudo apt upgrade -y
ubuntu@LINOROBOT:~$ source /opt/ros/humble/setup.bash
ubuntu@LINOROBOT:~$ cd /tmp
ubuntu@LINOROBOT:/tmp$ wget
https://raw.githubusercontent.com/linorobot/linorobot2/${ROS_DISTRO}/install_linorobot2.bash
bash install_linorobot2.bash <robot_type> <laser_sensor>
<depth_sensor>
becomes
ubuntu@LINOROBOT:/tmp$ bash install_linorobot2.bash 4wd ydlidar
realsense
fatal: destination path 'src/micro_ros_setup' already exists and is not an
empty directory.
ubuntu@LINOROBOT:~$ rm -rf ~/linorobot2_ws/src/micro_ros_setup/
ubuntu@LINOROBOT:/tmp$ bash install_linorobot2.bash 4wd ydlidar
realsense
prev error didn't happen, but...
Cloning into 'src/micro_ros_setup'...
fatal: unable to access 'https://github.com/micro-ROS/micro_ros_setup.git/':
Failed to connect to github.com port 443 after 26 ms: Network is unreachable
ubuntu@LINOROBOT:/tmp$ ping github.com
PING github.com (140.82.114.3) 56(84) bytes of data.
From _gateway (10.0.0.1) icmp_seq=1 Destination Net Unreachable
ubuntu@LINOROBOT:/tmp$ ping google.com
PING google.com(dfw25s46-in-x0e.1e100.net (2607:f8b0:4000:805::200e)) 56 data
bytes
64 bytes from dfw25s46-in-x0e.1e100.net (2607:f8b0:4000:805::200e): icmp_seq=1
ttl=116 time=17.9 ms
Able to browse to https://github.com/micro-ROS/micro\_ros\_setup

ubuntu@LINOROBOT:/tmp$ cat install_linorobot2.bash
this seems to be the stumbling statement:
git clone -b $ROS_DISTRO https://github.com/micro-ROS/micro_ros_setup.git
src/micro_ros_setup

ubuntu@LINOROBOT:/tmp$ git clone -b $ROS_DISTRO
https://github.com/micro-ROS/micro_ros_setup.git
src/micro_ros_setup
Cloning into 'src/micro_ros_setup'...
remote: Enumerating objects: 3346, done.
remote: Counting objects: 100% (1141/1141), done.
remote: Compressing objects: 100% (507/507), done.
remote: Total 3346 (delta 802), reused 921 (delta 627), pack-reused 2205
Receiving objects: 100% (3346/3346), 782.47 KiB | 2.84 MiB/s, done.
Resolving deltas: 100% (2300/2300), done.
```

*Try bash again:*

```
ubuntu@LINOROBOT:/tmp$ bash install_linorobot2.bash 4wd ydlidar  
realsense
```

```
...  
E: Unable to locate package ros-humble-gazebo-ros-pkgs  
ERROR: the following rosdeps failed to install  
apt: command [sudo -H apt-get install -y ros-humble-gazebo-ros-pkgs] failed
```

```
ubuntu@LINOROBOT:/tmp$ sudo -H apt-get install -y  
ros-humble-gazebo-ros-pkgs
```

*fails*

*according to*

[https://github.com/ros-simulation/gazebo\\_ros\\_pkgs/issues/1158](https://github.com/ros-simulation/gazebo_ros_pkgs/issues/1158)

chapulina commented on Sep 9, 2020

Board: Raspberry Pi4 4Gb of RAM

ros foxy on a Rpi4

This is the problem, **gazebo-ros-pkgs is only available for amd64**:

<http://packages.ros.org/ros2/ubuntu/pool/main/r/ros-foxy-gazebo-ros-pkgs/>

<https://ubuntu.com/blog/install-gazebo-for-ros-2-in-under-a-minute>

```
ubuntu@LINOROBOT:~$ sudo snap install gazebo
```

**--channel=citadel/beta**

error: snap "gazebo" is not available on citadel/beta for this architecture  
(arm64) but exists on other architectures (amd64).

**2022.08.05**

Got notice of this post:

<https://github.com/osrf/gazebo/issues/3236#issuecomment-1204137725>

*Apparently still working out the bugs for gazebo/ humble/ jammy/ arm64*

Discussion on Picamera install moved to [Picamera Experience](#)

**2022.08.08**

email from samuk <[notifications@github.com](mailto:notifications@github.com)>

This has been fixed upstream and I can now install using the PPA listed here: <https://github.com/osrf/gazebo/issues/3236>

*This has apparently been fixed but I'm not sure how to start over. Something about including the package in the sources.*

2022.08.13

Starting from scratch given recent updates:

<https://github.com/linorobot/linorobot2/tree/humble>



**Desktop** version failed TWICE to boot on the Rpi from a brand new 128GB SD card. The 22.04 Desktop is a recent addition. Will Overwrite format the card and try Server version.



**Server** version booted ok. Will need to install desktop separately as before.

```
Boot in RPi4
login ubuntu, ubuntu
change password ubuntu, LINOROBOT, LINOROBOT
ubuntu@ubuntu:~$ hostnamectl set-hostname LINOROBOT
ubuntu@ubuntu:~$ sudo apt update
ubuntu@ubuntu:~$ sudo apt upgrade -y
ubuntu@ubuntu:~$ sudo apt install ubuntu-mate-desktop -y
very long download...
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 dpkg --configure -a
ubuntu@ubuntu:~$ sudo apt install chromium-browser
failed to connect to browser. Had to configure firewall to allow
outgoing (for snap) and incoming (for PuTTY)
ubuntu@ubuntu:~$ sudo apt install terminator
```

```

ecubuntu@LINOROBOT:~$ git clone
https://github.com/linorobot/ros2me.git
ubuntu@AUDACITY:~$ cd ros2me/
ubuntu@AUDACITY:~/ros2me$ ./install
long install...
ROS humble installation complete!
Set up your environment by sourcing the following file.
source /opt/ros/humble/setup.bash
Or do you want to save this on your .bashrc (y/n)? Y
To start using ROS2, run: source /home/ubuntu/.bashrc
ubuntu@LINOROBOT:~/ros2me$ source /opt/ros/humble/setup.bash
ubuntu@LINOROBOT:~/ros2me$ source /home/ubuntu/.bashrc

```

## 1. Robot Computer - linorobot2 Package

```

source /opt/ros/<ros_distro>/setup.bash
cd /tmp
wget
https://raw.githubusercontent.com/linorobot/linorobot2/${ROS_DISTRO}/install_l
inorobot2.bash
bash install_linorobot2.bash <robot_type> <laser_sensor> <depth_sensor>
source ~/.bashrc
already did above:
ubuntu@LINOROBOT:~/ros2me$ source /opt/ros/humble/setup.bash
ubuntu@LINOROBOT:~/ros2me$ cd /tmp
ubuntu@LINOROBOT:/tmp$ wget
https://raw.githubusercontent.com/linorobot/linorobot2/${ROS_DIST
RO}/install_linorobot2.bash
plug in RealSense camera
plug in ydlidar
picamera is plugged in, removed
ubuntu@LINOROBOT:/tmp$ bash install_linorobot2.bash 4wd ydlidar
realsense
install_linorobot2.bash: line 18: rosversion: command not found
See p. 12:
Command 'rosversion' not found, but can be installed with:
sudo apt install python3-rosPKG
Should this be added to ros2me or the read.me? Sent email w/ this
to jimenojmm@gmail.com Juan Miguel Jimeno the maintainer.
ubuntu@LINOROBOT:~$ sudo apt install python3-rosPKG
installed ok
ubuntu@LINOROBOT:/tmp$ bash install_linorobot2.bash 4wd ydlidar
realsense
Summary: 8 packages finished [36.8s]
Do you want to add sourcing of linorobot2_ws on your ~/.bashrc?
Yes [y] or No [n]: y
INSTALLATION DONE.
Restart your robot computer now.
ubuntu@LINOROBOT:/tmp$ sudo reboot

```

2022.08.14

## 1. Booting up the robot

```
ubuntu@LINOROBOT:~$ ros2 launch linorobot2_bringup  
bringup.launch.py
```

```
[micro_ros agent-1] [1660474470.768652] info | TermiosAgentLinux.cpp | init  
| Serial port not found. | device: /dev/ttyACM0, error 2, waiting for connection...  
base_serial_port - Serial port of the robot's microcontroller. The assumed  
value is /dev/ttyACM0. Otherwise, change the default value to the correct  
serial port. For example:
```

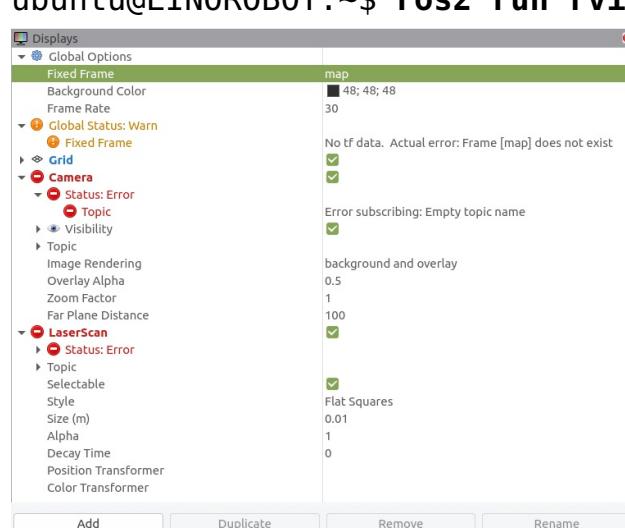
```
ros2 launch linorobot2_bringup bringup.launch.py base_serial_port:=/dev/ttyACM1  
ubuntu@LINOROBOT:~$ ls /dev/ttyA*
```

/dev/ttyAMA0

[https://github.com/linorobot/linorobot2\\_hardware#1-run-the-micro-ros-agent](https://github.com/linorobot/linorobot2_hardware#1-run-the-micro-ros-agent)  
ubuntu@LINOROBOT:~\$ ros2 launch linorobot2\_bringup  
bringup.launch.py base\_serial\_port:=/dev/ttyAMA0

no serial port error

```
ubuntu@LINOROBOT:~$ ros2 run rviz2 rviz2
```

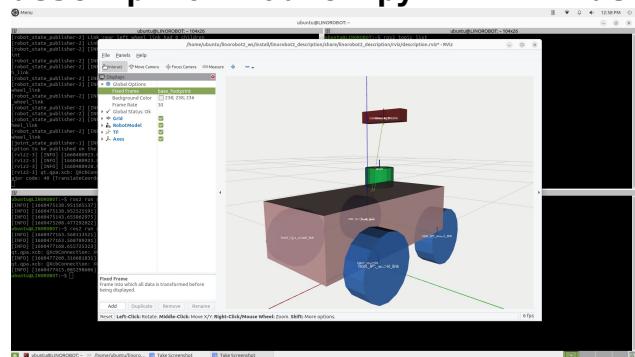


```
ubuntu@LINOROBOT:~$ ros2 topic  
list  
/clicked_point  
/diagnostics  
/goal_pose  
/imu/data  
/initialpose  
/joint_states  
/odom  
/odom/unfiltered  
/parameter_events  
/robot_description  
/rosout  
/set_pose  
/tf  
/tf_static
```

No camera nor laser topics. Since it's configured 4wd / ydlidar / realsense, why aren't they publishing?

Below is using default 4wd urdf, not my modified OSR urdf [need to cc urdf from other SD card]:

```
ubuntu@LINOROBOT:~$ ros2 launch linorobot2_description  
description.launch.py rviz:=true
```



```
ubuntu@LINOROBOT:~$ ros2 topic  
list  
/joint_states  
/parameter_events  
/robot_description  
/rosout  
/tf  
/tf_static
```

**Install Windows Subsystem for Linux (WSL) in order to run Gazebo simulation on the laptop. [For Win10. See below for W11]**

Reviews suggested that any objections to WSL were not functional but philosophical re Microsoft and Linux.

[https://linuxhint.com/install\\_ubuntu\\_windows\\_10\\_wsl/](https://linuxhint.com/install_ubuntu_windows_10_wsl/)

First, you have to enable WSL on Windows 10. It is really easy.

First, from the **Start** menu go to the **Settings** app.

Now, click on **Apps**.

Now, from the Apps & features tab, click on **Programs and Features**

Now click on **Turn Windows features on or off** from Programs and Features.

Now, check the **Windows Subsystem for Linux** checkbox as marked in the screenshot below and click ok OK. [*It's already checked*]

Now, click on **Restart** now. Windows 10 should reboot.

[*Since WSL already checked, no need to restart.*]

From the **Start** menu open **Microsoft Store**.

**Search** for **ubuntu**.

**Ubuntu 18, 20, & 22 available**

**Get 22.04.1 LTS, downloads, Open**

**extensive install...**

Please create a default UNIX user account. The username does not need to match your Windows username.

For more information visit: <https://aka.ms/wslusers>

Enter new UNIX username: **ubuntu**

New password: **ubuntu**

Retype new password: **ubuntu**

passwd: password updated successfully

Installation successful!

**ubuntu@JohnGalt:~\$ sudo apt update**

**ubuntu@JohnGalt:~\$ sudo apt upgrade**

**ubuntu@JohnGalt:~\$ sudo apt autoremove**

*basic linux commands re system info responded appropriately*

For Windows 11:

In a PowerShell command prompt:

C:\Users\jhphe>**wsl --install**

The requested operation requires elevation.

Press [Windows] & type cmd DON'T HIT ENTER.

Right-click **Command Prompt** & choose **Run as administrator**  
then do

C:\Users\jhphe>**wsl --install**

success

REBOOT

```
C:\Windows\system32>wsl --list --online
The following is a list of valid distributions that can be installed.
Install using 'wsl --install -d <Distro>'.
NAME FRIENDLY NAME
Ubuntu Ubuntu
Debian Debian GNU/Linux
kali-linux Kali Linux Rolling
openSUSE-42 openSUSE Leap 42
SLES-12 SUSE Linux Enterprise Server v12
Ubuntu-16.04 Ubuntu 16.04 LTS
Ubuntu-18.04 Ubuntu 18.04 LTS
Ubuntu-20.04 Ubuntu 20.04 LTS
```

Can I get 22.04?

<https://linuxconfig.org/ubuntu-22-04-on-wsl-windows-subsystem-for-linux>

Yes, follow above. However, comes up as root. Need to add user.

```
root@HankRearden:~# adduser ubuntu
```

```
Adding new group `ubuntu' (1000) ...
```

```
Adding new user `ubuntu' (1000) with group `ubuntu' ...
```

```
Creating home directory `/home/ubuntu' ...
```

```
Copying files from `/etc/skel' ...
```

```
New password:
```

```
Retype new password:
```

```
passwd: password updated successfully
```

```
Changing the user information for ubuntu
```

```
Enter the new value, or press ENTER for the default
```

```
  Full Name []:
```

```
  Room Number []:
```

```
  Work Phone []:
```

```
  Home Phone []:
```

```
  Other []:
```

```
Is the information correct? [Y/n]
```

```
Switch User to ubuntu
```

```
root@HankRearden:~# su ubuntu
```

```
ubuntu@HankRearden:/root$ cd
```

```
ubuntu@HankRearden:~$ lsb_release -a
```

```
No LSB modules are available.
```

```
Distributor ID: Ubuntu
```

```
Description: Ubuntu 22.04.1 LTS
```

```
Release: 22.04
```

```
Codename: jammy
```

**2022.09.04**

For Linorobot to work will need ydlidar installed.

Refer to [Fidelity to AUDACITY.wpd](#) p.512 et seq.

Raspberry Pi 4 Model B Rev 1.1 4GB

Ubuntu

```
ubuntu@LINOROBOT:~$ lsb_release -a
Description:    Ubuntu 22.04 LTS
```

```
ubuntu@LINOROBOT:~$ sudo apt update
```

```
ubuntu@LINOROBOT:~$ sudo apt upgrade -y
```

**Dependencies:**

**ROS2**

```
ubuntu@LINOROBOT:~$ echo $ROS_DISTRO
```

humble

**python3**

```
ubuntu@LINOROBOT:~$ python3 --version
```

Python 3.10.4 [why not 3.8?]

<https://www.how2shout.com/linux/install-python-3-9-or-3-8-on-ubuntu-22-04-lts-jammy-jellyfish/>

```
ubuntu@LINOROBOT:~$ sudo apt install software-properties-common
```

```
ubuntu@LINOROBOT:~$ sudo add-apt-repository ppa:deadsnakes/ppa
```

```
ubuntu@LINOROBOT:~$ sudo apt-cache policy python3.8
```

```
ubuntu@LINOROBOT:~$ sudo apt install python3.8
```

```
ubuntu@LINOROBOT:~$ ls /usr/bin/python*
```

3.1 & 3.8 listed

```
ubuntu@LINOROBOT:~$ sudo update-alternatives --list python
```

update-alternatives: error: no alternatives for python

```
ubuntu@LINOROBOT:~$ sudo update-alternatives --install
```

/usr/bin/python python /usr/bin/python3.10 1

```
ubuntu@LINOROBOT:~$ sudo update-alternatives --install
```

/usr/bin/python python /usr/bin/python3.8 2

```
ubuntu@LINOROBOT:~$ sudo update-alternatives --config python
```

There are 2 choices for the alternative python (providing /usr/bin/python).

Selection	Path	Priority	Status
-----			
* 0	/usr/bin/python3.8	2	auto mode
1	/usr/bin/python3.10	1	manual mode
2	/usr/bin/python3.8	2	manual mode

Press <enter> to keep the current choice[\*], or type selection number: 2

```
ubuntu@LINOROBOT:~$ python -V
```

Python 3.8.13

```
ubuntu@LINOROBOT:~$ sudo add-apt-repository --remove
```

ppa:deadsnakes/ppa

```
ubuntu@LINOROBOT:~$ python --version
Python 3.8.13
ubuntu@LINOROBOT:~$ python3 --version
Python 3.10.4
Hope I didn't break anything!

python-pip      [python3]
ubuntu@LINOROBOT:~$ pip3 --version
pip 22.0.2 from /usr/lib/python3/dist-packages/pip (python 3.10)
ubuntu@LINOROBOT:~$ pip3 install -U pip
Defaulting to user installation because normal site-packages is not writeable
Requirement already satisfied: pip in /usr/lib/python3/dist-packages (22.0.2)
Collecting pip
  Downloading pip-22.2.2-py3-none-any.whl (2.0 MB)
    2.0/2.0 MB 5.0 MB/s eta 0:00:00
Installing collected packages: pip
Successfully installed pip-22.2.2
ubuntu@LINOROBOT:~$ pip3 --version
pip 22.2.2 from /home/ubuntu/.local/lib/python3.10/site-packages/pip (python
3.10)

python swig
ubuntu@LINOROBOT:~$ swig --version
Command 'swig' not found, but can be installed with:
sudo apt install swig
ubuntu@LINOROBOT:~$ sudo find / -name swig
empty
ubuntu@LINOROBOT:~$ sudo apt install swig -y
ubuntu@LINOROBOT:~$ swig -version
SWIG Version 4.0.2

cmake
ubuntu@LINOROBOT:~$ cmake --version
cmake version 3.22.1

colcon
appears to be installed w/ ROS but can't find version.
```

Now on to

[https://github.com/YDLIDAR/ydlidar\\_ros2\\_driver](https://github.com/YDLIDAR/ydlidar_ros2_driver)

Create a workspace

```
ubuntu@LINOROBOT:~$ mkdir -p YDLidar_SDK.ws  
ubuntu@LINOROBOT:~$ cd YDLidar_SDK.ws
```

*Compile & Install YDLidar SDK*

```
ubuntu@LINOROBOT:~/ydlidar_sdk.ws$ git clone  
https://github.com/YDLIDAR/YDLidar-SDK.git
```

fatal: unable to access 'https://github.com/YDLIDAR/YDLidar-SDK.git/': Failed to connect to github.com port 443 after 31 ms: Network is unreachable

*Had to check MATE firewall to be sure ON and both send and receive were OK. ✓*

*Check Advance Network Settings to be sure ethernet was installed and configured to AUTO proxy ✓.*

*Then log into my account on Github from Chromium on MATE Desktop with password and phone authorization code. Now it works!*

```
cd YDLidar-SDK/build
```

*but there is NO YDLidar-SDK/build directory!:*

```
ubuntu@LINOROBOT:~/YDLidar_SDK.ws/YDLidar-SDK$ ls -w 1
```

```
cmake  
CMakeLists.txt  
core  
csharp  
doc  
Doxyfile  
LICENSE.txt  
python  
README.md  
README.pdf  
samples  
setup.py  
src  
startup  
test  
ydlidar_config.h.in
```

*According to:*

<https://github.com/YDLIDAR/YDLidar-SDK/issues/21>

micahreich commented on Jun 17 •

The installation tutorial instructs you to cd into YDLidar-SDK/build but this directory does not exist in the repository upon cloning. **For the sake of new users, add the empty build directory to the repository** to circumvent any confusion, since nowhere in the installation instructions does it say to make a new directory.

```
ubuntu@LINOROBOT:~/YDLidar_SDK.ws/YDLidar-SDK$ mkdir build  
ubuntu@LINOROBOT:~/YDLidar_SDK.ws/YDLidar-SDK$ cd build
```

```

ubuntu@LINOROBOT:~/YDLidar_SDK.ws/YDLidar-SDK/build$ cmake ..
CMake Deprecation Warning at CMakeLists.txt:1 (cmake_minimum_required):
  Compatibility with CMake < 2.8.12 will be removed from a future version of
  CMake.

  Update the VERSION argument <min> value or use a ...<max> suffix to tell
  CMake that the project does not need compatibility with older versions.

-- The C compiler identification is GNU 11.2.0
-- The CXX compiler identification is GNU 11.2.0
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Check for working C compiler: /usr/bin/cc - skipped
-- Detecting C compile features
-- Detecting C compile features - done
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Check for working CXX compiler: /usr/bin/c++ - skipped
-- Detecting CXX compile features
-- Detecting CXX compile features - done
-- Current platform: Linux
CMake Deprecation Warning at CMakeLists.txt:50 (cmake_policy):
  The OLD behavior for policy CMP0053 will be removed from a future version
  of CMake.

  The cmake-policies(7) manual explains that the OLD behaviors of all
  policies are deprecated and that a policy should be set to OLD only under
  specific short-term circumstances. Projects should be ported to the NEW
  behavior and not rely on setting a policy to OLD.

CMake Deprecation Warning at CMakeLists.txt:53 (cmake_policy):
  The OLD behavior for policy CMP0037 will be removed from a future version
  of CMake.

  The cmake-policies(7) manual explains that the OLD behaviors of all
  policies are deprecated and that a policy should be set to OLD only under
  specific short-term circumstances. Projects should be ported to the NEW
  behavior and not rely on setting a policy to OLD.

CMake Deprecation Warning at CMakeLists.txt:56 (cmake_policy):
  The OLD behavior for policy CMP0043 will be removed from a future version
  of CMake.

  The cmake-policies(7) manual explains that the OLD behaviors of all
  policies are deprecated and that a policy should be set to OLD only under
  specific short-term circumstances. Projects should be ported to the NEW
  behavior and not rely on setting a policy to OLD.

-- Found SWIG: /usr/bin/swig4.0 (found version "4.0.2")
-- Found PythonInterp: /usr/bin/python (found version "3.8.13")
-- Found PythonLibs: /usr/lib/aarch64-linux-gnu/libpython3.10.so (found version "3.10.4")
-- Found GTest: /usr/lib/aarch64-linux-gnu/cmake/GTest/GTestConfig.cmake (found version "1.11.0")
CMake Deprecation Warning at core/CMakeLists.txt:1 (cmake_minimum_required):
  Compatibility with CMake < 2.8.12 will be removed from a future version of
  CMake.

  Update the VERSION argument <min> value or use a ...<max> suffix to tell
  CMake that the project does not need compatibility with older versions.

CMake Deprecation Warning at samples/CMakeLists.txt:2 (cmake_minimum_required):
  Compatibility with CMake < 2.8.12 will be removed from a future version of
  CMake.

  Update the VERSION argument <min> value or use a ...<max> suffix to tell
  CMake that the project does not need compatibility with older versions.

-- build python API....
CMake Warning (dev) at /usr/share/cmake-3.22/Modules/UseSWIG.cmake:775 (message):
  Policy CMP0078 is not set: UseSWIG generates standard target names. Run
  "cmake --help-policy CMP0078" for policy details. Use the cmake_policy
  command to set the policy and suppress this warning.

Call Stack (most recent call first):
  python/CMakeLists.txt:35 (swig_add_library)
This warning is for project developers. Use -Wno-dev to suppress it.

CMake Warning (dev) at /usr/share/cmake-3.22/Modules/UseSWIG.cmake:617 (message):
  Policy CMP0086 is not set: UseSWIG honors SWIG_MODULE_NAME via -module
  flag. Run "cmake --help-policy CMP0086" for policy details. Use the
  cmake_policy command to set the policy and suppress this warning.

Call Stack (most recent call first):
  /usr/share/cmake-3.22/Modules/UseSWIG.cmake:888 (SWIG_ADD_SOURCE_TO_MODULE)
  python/CMakeLists.txt:35 (swig_add_library)
This warning is for project developers. Use -Wno-dev to suppress it.

```

```

Traceback (most recent call last):
  File "<string>", line 2, in <module>
ImportError: cannot import name 'sysconfig' from 'distutils' (/usr/lib/python3.8/distutils/__init__.py)
CMake Error at python/CMakeLists.txt:54 (install):
  install TARGETS given no LIBRARY DESTINATION for module target "_ydlidar".

CMake Error at python/CMakeLists.txt:55 (install):
  install FILES given no DESTINATION!

-- build test is ON.....
CMake Deprecation Warning at cmake/install_package.cmake:101 (cmake_policy):
  The OLD behavior for policy CMP0026 will be removed from a future version
  of CMake.

  The cmake-policies(7) manual explains that the OLD behaviors of all
  policies are deprecated and that a policy should be set to OLD only under
  specific short-term circumstances. Projects should be ported to the NEW
  behavior and not rely on setting a policy to OLD.
Call Stack (most recent call first):
  CMakeLists.txt:168 (install_package)

CMake Warning (dev) at cmake/install_package.cmake:191 (install):
  Policy CMP0062 is not set: Disallow install() of export() result. Run
  "cmake --help-policy CMP0062" for policy details. Use the cmake_policy
  command to set the policy and suppress this warning.

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:168 (install_package)
This warning is for project developers. Use -Wno-dev to suppress it.

-- +=====
-- |       Resulting configuration for                                |
-- +=====

--          PLATFORM
-- Host           : Linux5.15.0-1013-raspiaarch64
-- Is the system big endian?   : No
-- Word size (32/64 bit)    : 64
-- CMake version       : 3.22.1
-- CMake generator     : Unix Makefiles
-- CMake build tool    : /usr/bin/gmake
-- 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)  : Yes
--   - dep: Swig found?      : Yes [Version: 4.0.2]
--   - dep: PythonLibs found? : Yes [Version: 3.8.13]
-- Configuring incomplete, errors occurred!
See also "/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/build/CMakeFiles/CMakeOutput.log".

```

*Added above error message to issue post listed above.*

**2022.09.05**

*Try this:*

```
# Another method
python setup.py build
python setup.py install
ubuntu@LINOROBOT:~/YDLidar_SDK.ws/YDLidar-SDK$ python3 setup.py
build
running build
running build_ext
build: build/temp.linux-aarch64-3.10
CMake Deprecation Warning at CMakeLists.txt:1 (cmake_minimum_required):
  Compatibility with CMake < 2.8.12 will be removed from a future version of
  CMake.

  Update the VERSION argument <min> value or use a ...<max> suffix to tell
  CMake that the project does not need compatibility with older versions.

-- The C compiler identification is GNU 11.2.0
-- The CXX compiler identification is GNU 11.2.0
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Check for working C compiler: /usr/bin/cc - skipped
-- Detecting C compile features
-- Detecting C compile features - done
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Check for working CXX compiler: /usr/bin/c++ - skipped
-- Detecting CXX compile features
-- Detecting CXX compile features - done
-- Current platform: Linux
CMake Deprecation Warning at CMakeLists.txt:50 (cmake_policy):
  The OLD behavior for policy CMP0053 will be removed from a future version
  of CMake.

  The cmake-policies(7) manual explains that the OLD behaviors of all
  policies are deprecated and that a policy should be set to OLD only under
  specific short-term circumstances. Projects should be ported to the NEW
  behavior and not rely on setting a policy to OLD.

CMake Deprecation Warning at CMakeLists.txt:53 (cmake_policy):
  The OLD behavior for policy CMP0037 will be removed from a future version
  of CMake.

  The cmake-policies(7) manual explains that the OLD behaviors of all
  policies are deprecated and that a policy should be set to OLD only under
  specific short-term circumstances. Projects should be ported to the NEW
  behavior and not rely on setting a policy to OLD.

CMake Deprecation Warning at CMakeLists.txt:56 (cmake_policy):
  The OLD behavior for policy CMP0043 will be removed from a future version
  of CMake.

  The cmake-policies(7) manual explains that the OLD behaviors of all
  policies are deprecated and that a policy should be set to OLD only under
  specific short-term circumstances. Projects should be ported to the NEW
  behavior and not rely on setting a policy to OLD.

-- Found SWIG: /usr/bin/swig4.0 (found version "4.0.2")
-- Found PythonInterp: /usr/bin/python3 (found version "3.10.4")
-- Found PythonLibs: /usr/lib/aarch64-linux-gnu/libpython3.10.so (found version "3.10.4")
-- Found GTest: /usr/lib/aarch64-linux-gnu/cmake/GTest/GTestConfig.cmake (found version "1.11.0")
CMake Deprecation Warning at core/CMakeLists.txt:1 (cmake_minimum_required):
  Compatibility with CMake < 2.8.12 will be removed from a future version of
  CMake.

  Update the VERSION argument <min> value or use a ...<max> suffix to tell
  CMake that the project does not need compatibility with older versions.

CMake Deprecation Warning at samples/CMakeLists.txt:2 (cmake_minimum_required):
  Compatibility with CMake < 2.8.12 will be removed from a future version of
  CMake.

  Update the VERSION argument <min> value or use a ...<max> suffix to tell
  CMake that the project does not need compatibility with older versions.
```

```
-- build python API....
CMake Warning (dev) at /usr/share/cmake-3.22/Modules/UseSWIG.cmake:775 (message):
Policy CMP0078 is not set: UseSWIG generates standard target names. Run
"cmake --help-policy CMP0078" for policy details. Use the cmake_policy
command to set the policy and suppress this warning.

Call Stack (most recent call first):
  python/CMakeLists.txt:35 (swig_add_library)
This warning is for project developers. Use -Wno-dev to suppress it.

CMake Warning (dev) at /usr/share/cmake-3.22/Modules/UseSWIG.cmake:617 (message):
Policy CMP0086 is not set: UseSWIG honors SWIG_MODULE_NAME via -module
flag. Run "cmake --help-policy CMP0086" for policy details. Use the
cmake_policy command to set the policy and suppress this warning.

Call Stack (most recent call first):
  /usr/share/cmake-3.22/Modules/UseSWIG.cmake:888 (SWIG_ADD_SOURCE_TO_MODULE)
  python/CMakeLists.txt:35 (swig_add_library)
This warning is for project developers. Use -Wno-dev to suppress it.

<string>:2: DeprecationWarning: The distutils package is deprecated and slated for removal in Python 3.12. Use setuptools or check
PEP 632 for potential alternatives
<string>:2: DeprecationWarning: The distutils.sysconfig module is deprecated, use sysconfig instead
-- build test is ON.....
CMake Deprecation Warning at cmake/install_package.cmake:101 (cmake_policy):
The OLD behavior for policy CMP0026 will be removed from a future version
of CMake.

The cmake-policies(7) manual explains that the OLD behaviors of all
policies are deprecated and that a policy should be set to OLD only under
specific short-term circumstances. Projects should be ported to the NEW
behavior and not rely on setting a policy to OLD.
Call Stack (most recent call first):
  CMakeLists.txt:168 (install_package)

CMake Warning (dev) at cmake/install_package.cmake:191 (install):
Policy CMP0062 is not set: Disallow install() of export() result. Run
"cmake --help-policy CMP0062" for policy details. Use the cmake_policy
command to set the policy and suppress this warning.

The file
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/build/temp.linux-aarch64-3.10/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:168 (install_package)
This warning is for project developers. Use -Wno-dev to suppress it.

-- +====Resulting configuration for====+
-- | |
-- +====+-----+
-- |   PLATFORM |
-- +-----+
-- Host           : Linux5.15.0-1013-raspiaarch64
-- Is the system big endian?    : No
-- Word size (32/64 bit)       : 64
-- CMake version          : 3.22.1
-- CMake generator        : Unix Makefiles
-- CMake build tool       : /usr/bin/gmake
-- Compiler            : GNU
-- Configuration         : Release
-- C++ flags (Release): -DVERSION_INFO=\"1.0.2\" -std=c++11 -O3 -DNDEBUG
-- 
--   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) : Yes
--   - dep: Swig found?      : Yes [Version: 4.0.2]
--   - dep: PythonLibs found? : Yes [Version: 3.10.4]
-- 
-- Configuring done
-- Generating done
-- Build files have been written to: /home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/build/temp.linux-aarch64-3.10
```

```

Scanning dependencies of target ydlidar_swig_compilation
[ 3%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/base/timer.cpp.o
[ 6%] Swig compile ydlidar_sdk.i for python
[ 9%] 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
[12%] Built target ydlidar_swig_compilation
[15%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/network/PassiveSocket.cpp.o
[18%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/network/SimpleSocket.cpp.o
[21%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/serial/serial.cpp.o
[24%] Building C object CMakeFiles/ydlidar_sdk.dir/core/serial/impl/unix/lock.c
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/core/serial/impl/unix/lock.c: In function 'fhs_lock':
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/core/serial/impl/unix/lock.c:243:3: warning: ignoring return value of 'write' declared
with attribute 'warn_unused_result' [-Wunused-result]
243 |     write(fd, lockinfo, 11);
|     ~~~~~
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/core/serial/impl/unix/lock.c: In function 'uucp_lock':
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/core/serial/impl/unix/lock.c:328:3: warning: ignoring return value of 'write' declared
with attribute 'warn_unused_result' [-Wunused-result]
328 |     write(fd, lockinfo, 11);
|     ~~~~~
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/core/serial/impl/unix/lock.c: In function 'is_device_locked':
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/core/serial/impl/unix/lock.c:773:5: warning: ignoring return value of 'read' declared with
attribute 'warn_unused_result' [-Wunused-result]
773 |     read(fd, pid_buffer, 11);
|     ~~~~~
[ 27%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/serial/impl/unix/list_ports_linux.cpp.o
[ 30%] Building CXX object CMakeFiles/ydlidar_sdk.dir/core/impl/unix_unix_serial.cpp.o
[ 33%] Building CXX object CMakeFiles/ydlidar_sdk.dir/src/CYDlidar.cpp.o
[ 36%] Building CXX object CMakeFiles/ydlidar_sdk.dir/src/ETLidarDriver.cpp.o
In file included from /home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/src/CYDlidar.cpp:33:
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/.core/common/ydlidar_help.h: In member function 'void
CYDlidar::handleVersionInfoByPackage(const LaserDebug&)':
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/.core/common/ydlidar_help.h:917:67: warning: '__builtin_sprintf_chk' writing a
terminating nul past the end of the destination [-Wformat-overflow=]
917 |     sprintf(reinterpret_cast<char *>(value.serialnum + 8), "%08d", Number);
|     ~~~~~
In file included from /usr/include/stdio.h:894,
                  from /home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/.core/base/datatype.h:5,
                  from /home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/.core/base/v8stdint.h:3,
                  from /home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/.core/common/DriverInterface.h:2,
                  from /home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/src/CYdLidar.h:48,
                  from /home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/src/CYdLidar.cpp:29:
/usr/include/aarch64-linux-gnu/bits/stdio2.h:38:34: note: '__builtin_sprintf_chk' output 9 bytes into a destination of size 8
38 |     return __builtin_sprintf_chk (_s, __USE_FORTIFY_LEVEL - 1,
|     ~~~~~
39 |             __libc_objsize (_s), __fmt,
|             ~~~~~
40 |             __va_arg_pack ());
|             ~~~~~
[ 39%] Building CXX object CMakeFiles/ydlidar_sdk.dir/src/GS2LidarDriver.cpp.o
[ 42%] Building CXX object CMakeFiles/ydlidar_sdk.dir/src/YDLidarDriver.cpp.o
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/src/GS2LidarDriver.cpp: In member function 'result_t
ydlidar::GS2LidarDriver::waitPackage(node_info*, uint32_t)':
/home/ubuntu/YDLidar_SDK.ws/YDLidar-SDK/src/GS2LidarDriver.cpp:899:83: warning: taking address of packed member of 'node_info' may
result in an unaligned pointer value [-Waddress-of-packed-member]
899 |     angTransform((*node).distance_q2, package_Sample_Index, &sampleAngle, &(*node).distance_q2);
|     ~~~~~
[ 45%] Building CXX object CMakeFiles/ydlidar_sdk.dir/src/ydlidar_sdk.cpp.o
[ 48%] Building CXX object CMakeFiles/ydlidar_sdk.dir/src/filters/NoiseFilter.cpp.o
[ 51%] Linking CXX static library libydlidar_sdk.a
[ 51%] Built target ydlidar_sdk
[ 54%] Building CXX object samples/CMakeFiles/et_test.dir/et_test.cpp.o
[ 57%] Building CXX object samples/CMakeFiles/gs_test.dir/gs_test.cpp.o
[ 60%] Linking CXX executable ..//et_test
[ 60%] Built target et_test
[ 63%] Building CXX object samples/CMakeFiles/tmini_test.dir/tmini_test.cpp.o
[ 66%] Linking CXX executable ..//gs_test
[ 66%] Built target gs_test
[ 69%] Building CXX object samples/CMakeFiles/tof_test.dir/tof_test.cpp.o
[ 72%] Linking CXX executable ..//tmini_test
[ 72%] Built target tmini_test
[ 75%] Building CXX object samples/CMakeFiles/tri_test.dir/tri_test.cpp.o
[ 78%] Linking CXX executable ..//tof_test
[ 78%] Built target tof_test
[ 81%] Building C object samples/CMakeFiles/lidar_c_api_test.dir/lidar_c_api_test.c.o
cc1: warning: command-line option '-std=c++11' is valid for C++/ObjC++ but not for C
[ 84%] Linking CXX executable ..//lidar_c_api_test
[ 84%] Built target lidar_c_api_test
[ 87%] Building CXX object python/CMakeFiles/_ydlidar.dir/CMakeFiles/_ydlidar.dir/ydlidar_sdkPYTHON_wrap.cxx.o
[ 90%] Linking CXX executable ..//tri_test
[ 90%] Built target tri_test
[ 93%] Building CXX object test/CMakeFiles/lidar_test.dir/lidar_test.cpp.o
[ 96%] Linking CXX executable lidar_test
[ 96%] Built target lidar_test
[100%] Linking CXX shared module ../../lib/linux-aarch64-3.10/_ydlidar.so
[100%] Built target _ydlidar

```

```
ubuntu@LINOROBOT:~/YDLidar_SDK.ws/YDLidar-SDK$ python3 setup.py  
install
```

```
running install  
/usr/lib/python3/dist-packages/setuptools/command/install.py:34: SetuptoolsDeprecationWarning: setup.py install is deprecated. Use  
build and pip and other standards-based tools.  
    warnings.warn(  
/usr/lib/python3/dist-packages/setuptools/command/easy_install.py:158: EasyInstallDeprecationWarning: easy_install command is  
deprecated. Use build and pip and other standards-based tools.  
    warnings.warn(  
error: can't create or remove files in install directory
```

The following error occurred while trying to add or remove files in the  
installation directory:

```
[Errno 13] Permission denied: '/usr/local/lib/python3.10/dist-packages/test-easy-install-58567.write-test'
```

The installation directory you specified (via --install-dir, --prefix, or  
the distutils default setting) was:

```
/usr/local/lib/python3.10/dist-packages/
```

Perhaps your account does not have write access to this directory? If the  
installation directory is a system-owned directory, you may need to sign in  
as the administrator or "root" account. If you do not have administrative  
access to this machine, you may wish to choose a different installation  
directory, preferably one that is listed in your PYTHONPATH environment  
variable.

For information on other options, you may wish to consult the  
documentation at:

```
https://setuptools.pypa.io/en/latest/deprecated/easy\_install.html
```

Please make the appropriate changes for your system and try again.

**On 9/17/2022 8:13 AM, Roberto Pensotti wrote:**

Jim,

I made a new robot that I wanted to program with Linobot.

Here what it looks like:

2 x DC motors with encoders  
Roboclaw 2x7 controlling the motors  
Raspberry Pi4 with 4GB  
Arduino Mega.  
Neato XV11 Lidar  
Pi Camera on the PI4  
HR- Ultrasonic Ranger in front

Everything works fine and Roboclaw is properly supplied with 12V.

Basic Micro Motion Studio works fine and motors respond to sliders and encoder feedback is fine.

The Pi runs the latest Raspian 11 "Bullseye"

I navigated to this page:

<https://github.com/linorobot/linorobot/wiki/1.-Getting-Started>

All my hardware is supported, but I am now stuck.

Do I need to install Ubuntu on the Pi, if so how do I do it?

What version of ROS should I run?

Why is Github so cryptic?

Do you have time to give me a hand?

Are you at our Sat meeting today?

Thank you from your dumb friend

Roberto

P.S. At what time will you be available for a quick phone call?

**2022.12.18**

Returning to Linorobot2 after several Homebrew Robotics Club online ROS sessions w/ Camp and company. He demonstrated Linorobot2 in simulation with Rviz and Gazebo. Would like to try there before going to physical robot. Then adapt Linorobot URDF to the OSR 6-wheel drive, 4-wheel steering configuration.

Using Windows Subsystem for Linux  
(see separate Experience for install)

Installed Ubuntu 22.04 Jammy Jellyfish  
ubuntu@HankRearden:~\$ **lsb\_release -a**  
No LSB modules are available.  
Distributor ID: Ubuntu  
Description: Ubuntu 22.04.1 LTS  
Release: 22.04  
Codename: jammy

Installed ROS2 Humble Hawksbill  
ubuntu@HankRearden:~\$ **echo \$ROS\_DISTRO**  
humble

Install Linorobot2

```
https://github.com/linorobot/linorobot2/tree/humble
source /opt/ros/<ros_distro>/setup.bash      ALREADY DONE
cd /tmp
wget https://raw.githubusercontent.com/linorobot/linorobot2/${ROS_DISTRO}/install_linorobot2.bash
bash install_linorobot2.bash <robot_type> <laser_sensor> <depth_sensor>
source ~/.bashrc

ubuntu@HankRearden:~$ cd /tmp
ubuntu@HankRearden:/tmp$ wget
https://raw.githubusercontent.com/linorobot/linorobot2/\${ROS\_DISTRO}/install\_linorobot2.bash
--2022-12-18 19:16:08--
https://raw.githubusercontent.com/linorobot/linorobot2/humble/install_linorobot2.bash
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 185.199.108.133,
185.199.109.133, 185.199.110.133, ...
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|185.199.108.133|:443...
connected.
HTTP request sent, awaiting response... 200 OK
Length: 10317 (10K) [text/plain]
Saving to: 'install_linorobot2.bash'

install_linorobot2.bash
100%[=====] 10.08K
--.-KB/s   in 0s

2022-12-18 19:16:08 (115 MB/s) - 'install_linorobot2.bash' saved [10317/10317]
```

```

bash install_linorobot2.bash <robot_type> <laser_sensor>
<depth_sensor>
becomes
bash install_linorobot2.bash 4wd ydlidar realsense

ubuntu@HankRearden:/tmp$ bash install_linorobot2.bash 4wd ydlidar
realsense
You are installing linorobot2 on your robot computer.
=====SUMMARY=====
ROBOT TYPE : 4wd
LASER SENSOR : ydlidar
DEPTH SENSOR : realsense

This installer will edit your ~/.bashrc.
Create a linorobot2_ws on your /home/ubuntu directory.
Install linorobot2 ROS2 dependencies.
Install udev rules on /etc/udev/rules.d folder.
Enter [y] to continue. Y
INSTALLING NOW....
install_linorobot2.bash: line 231: colcon: command not found

ubuntu@HankRearden:/tmp$ python3 --version
Python 3.10.6

ubuntu@HankRearden:~$ mkdir linorobot2_ws
ubuntu@HankRearden:~$ cd linorobot2_ws/
ubuntu@HankRearden:~/linorobot2_ws$ git clone -b $ROS_DISTRO
https://github.com/linorobot/linorobot2 src/linorobot2
Cloning into 'src/linorobot2'...
remote: Enumerating objects: 1186, done.
remote: Counting objects: 100% (462/462), done.
remote: Compressing objects: 100% (113/113), done.
remote: Total 1186 (delta 390), reused 377 (delta 348), pack-reused 724
Receiving objects: 100% (1186/1186), 16.12 MiB | 5.99 MiB/s, done.
Resolving deltas: 100% (742/742), done.
ubuntu@HankRearden:~/linorobot2_ws$ rosdep update && rosdep
install --from-path src --ignore-src -y --skip-keys
microxrcedds_agent --skip-keys micro_ros_agent
Command 'rosdep' not found, but can be installed with:
sudo apt install python3-rosdep2
ubuntu@HankRearden:~/linorobot2_ws$ sudo apt install
python3-rosdep2
install ok
ubuntu@HankRearden:~/linorobot2_ws$ colcon build
colcon: command not found
ubuntu@HankRearden:~/linorobot2_ws$ sudo apt install
python3-colcon-common-extensions

...
Err:1 http://packages.ros.org/ros2/ubuntu jammy/main amd64 python3-colcon-core all 0.10.0-1
  404  Not Found [IP: 64.50.236.52 80]

...
E: Failed to fetch
http://packages.ros.org/ros2/ubuntu/pool/main/p/python3-colcon-core/python3-colcon-core_0.10.0-1_
all.deb 404  Not Found [IP: 64.50.236.52 80]
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?

```

*Should have done this FIRST:*

```
ubuntu@HankRearden:~/linorobot2_ws$ sudo apt update
update ok
ubuntu@HankRearden:~/linorobot2_ws$ sudo apt upgrade
very long upgrade ok
ubuntu@HankRearden:~/linorobot2_ws$ sudo apt install
python3-colcon-common-extensions
install ok
ubuntu@HankRearden:~/linorobot2_ws$ sudo apt autoremove
ubuntu@HankRearden:~/linorobot2_ws$ colcon build
Starting >>> linorobot2
Starting >>> linorobot2_base
Starting >>> linorobot2_bringup
Starting >>> linorobot2_description
Starting >>> linorobot2_gazebo
Starting >>> linorobot2_navigation
Finished <<< linorobot2_base [0.80s]
Finished <<< linorobot2 [0.81s]
Finished <<< linorobot2_navigation [0.79s]
Finished <<< linorobot2_bringup [0.84s]
Finished <<< linorobot2_description [0.85s]
Finished <<< linorobot2_gazebo [1.02s]

Summary: 6 packages finished [1.18s]
ubuntu@HankRearden:~/linorobot2_ws$ source install/setup.bash
ubuntu@HankRearden:~/linorobot2_ws$ echo "export
LINOROBOT2_BASE=4wd" >> ~/.bashrc
ubuntu@HankRearden:~/linorobot2_ws$ source ~/.bashrc
ubuntu@HankRearden:~/linorobot2_ws$ ros2 launch
linorobot2_description description.launch.py
[INFO] [launch]: All log files can be found below
/home/ubuntu/.ros/log/2022-12-18-20-07-44-493948-HankRearden-12771
[INFO] [launch]: Default logging verbosity is set to INFO
[ERROR] [launch]: Caught exception in launch (see debug for traceback): "package
'joint_state_publisher' not found, searching:
['/home/ubuntu/linorobot2_ws/install/linorobot2_navigation',
 '/home/ubuntu/linorobot2_ws/install/linorobot2_gazebo',
 '/home/ubuntu/linorobot2_ws/install/linorobot2_description',
 '/home/ubuntu/linorobot2_ws/install/linorobot2_bringup',
 '/home/ubuntu/linorobot2_ws/install/linorobot2_base',
 '/home/ubuntu/linorobot2_ws/install/linorobot2', '/opt/ros/humble']"
ubuntu@HankRearden:~/linorobot2_ws$ sudo apt install
ros-humble-joint-state-publisher-gui
install ok
ubuntu@HankRearden:~/linorobot2_ws$ ros2 launch
linorobot2_description description.launch.py
[INFO] [launch]: All log files can be found below
/home/ubuntu/.ros/log/2022-12-18-20-20-05-330893-HankRearden-12945
[INFO] [launch]: Default logging verbosity is set to INFO
[ERROR] [launch]: Caught exception in launch (see debug for traceback): file not found: [Errno 2]
No such file or directory: 'xacro'
```

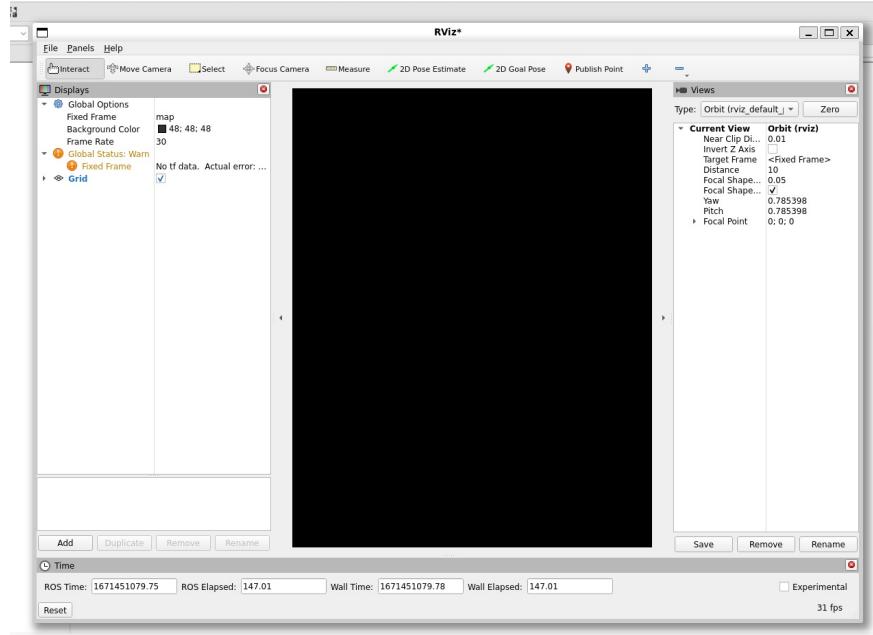
THIS IS MESSED UP. START AGAIN FROM SCRATCH!

```
ubuntu@HankRearden:~$ rm -rf linorobot2_ws/
```

2022.12.20

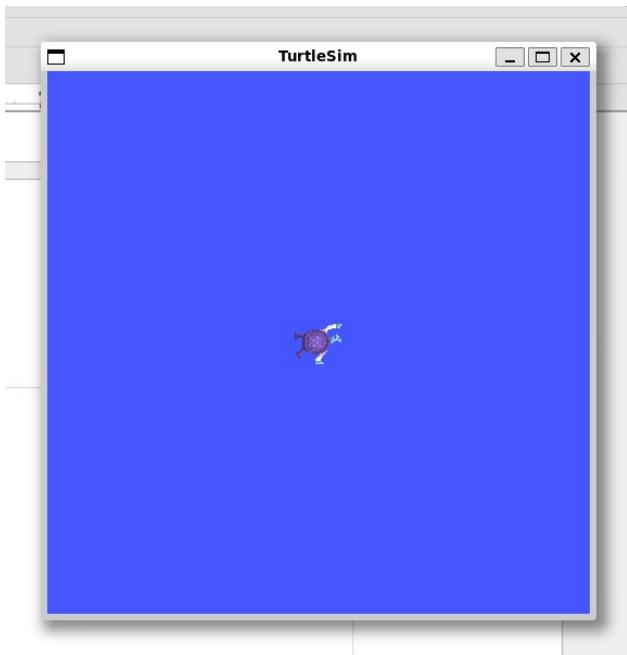


```
root@HankRearden:~#  
root@HankRearden:~# su ubuntu  
ubuntu@HankRearden:/root$ cd  
ubuntu@HankRearden:~$ ls  
blank  
ubuntu@HankRearden:~$ lsb_release -a  
No LSB modules are available.  
Distributor ID: Ubuntu  
Description:    Ubuntu 22.04.1 LTS  
Release:        22.04  
Codename:       jammy  
  
ubuntu@HankRearden:~$ echo $ROS_DISTRO  
humble  
ubuntu@HankRearden:~$ cd /opt/ros/humble/share  
ubuntu@HankRearden:/opt/ros/humble/share$ ls  
... rqt_graph...rviz2  
so it's desktop version of ROS2  
ubuntu@HankRearden:/opt/ros/humble/share$ cd  
ubuntu@HankRearden:~$ ros2 run rviz2 rviz2  
[INFO] [1671450927.914202092] [rviz2]: Stereo is NOT SUPPORTED  
[INFO] [1671450927.914353169] [rviz2]: OpenGL version: 3.3 (GLSL 3.3)  
[INFO] [1671450927.966331086] [rviz2]: Stereo is NOT SUPPORTED
```



rviz works!!

```
ubuntu@HankRearden:~$ ros2 run turtlesim turtlesim_node
```



*in another separate terminal/terminator window:*

```
ubuntu@HankRearden:~$ ros2 run turtlesim turtle_teleop_key  
here you use the arrow keys to drive the turtle
```

*in another separate terminal/terminator window:*

```
ubuntu@HankRearden:~$ ros2 topic list
```

```
/joint_states  
/parameter_events  
/robot_description  
/rosout  
/turtle1/cmd_vel
```

```
ubuntu@HankRearden:~$ ros2 topic echo /turtle1/cmd_vel
```

*as you drive the turtle with the teleop\_key, the cmd\_vel values display here*

```
linear:  
  x: 2.0  
  y: 0.0  
  z: 0.0  
angular:  
  x: 0.0  
  y: 0.0  
  z: 0.0  
---
```

```
linear:  
  x: 0.0  
  y: 0.0  
  z: 0.0  
angular:  
  x: 0.0  
  y: 0.0  
  z: -2.0  
---
```

**2023.02.19**

```
ubuntu@HankRearden:~$ ros2 topic echo /turtle1/pose
theta: 0.0
Rotate turtle 1 turn w/ teleop_key.
theta: 2.016000 radians = 115.51 deg
```

**2023.02.20**

Try installing Linorobot2 on laptop for Gazebo simulation:  
<https://github.com/linorobot/linorobot2/tree/humble>

*2. Host Machine / Development Computer - Gazebo Simulation (Optional)*

*This step is only required if you plan to use Gazebo later. This comes in handy if you want to fine-tune parameters (ie. SLAM Toolbox, AMCL, Nav2) or test your applications on a virtual robot.*

*2.1 Install linorobot2 Package*

```
cd <host_machine_ws>
git clone -b $ROS_DISTRO https://github.com/linorobot/linorobot2
src/linorobot2
rosdep update && rosdep install --from-path src --ignore-src -y --skip-keys
microxrcedds_agent --skip-keys micro_ros_agent
colcon build
source install/setup.bash
```

```
ubuntu@HankRearden:~$ mkdir linorobot2_ws
ubuntu@HankRearden:~$ cd linorobot2_ws/
ubuntu@HankRearden:~/linorobot2_ws$ git clone -b $ROS_DISTRO
https://github.com/linorobot/linorobot2 src/linorobot2
ubuntu@HankRearden:~/linorobot2_ws$ rosdep update && rosdep
install --from-path src --ignore-src -y --skip-keys
microxrcedds_agent --skip-keys micro_ros_agent
#All required rosdeps installed successfully
ubuntu@HankRearden:~/linorobot2_ws$ colcon build
Summary: 6 packages finished [1.46s]
ubuntu@HankRearden:~/linorobot2_ws$ source install/setup.bash
```

*2.2 Define Robot Type*

*Set LINOROBOT2\_BASE env variable to the type of robot base used. Available env variables are 2wd, 4wd, and mecanum. For example:*

```
ubuntu@HankRearden:~/linorobot2_ws$ echo "export
LINOROBOT2_BASE=4wd" >> ~/.bashrc
ubuntu@HankRearden:~/linorobot2_ws$ source ~/.bashrc
```

*3. Host Machine - RVIZ Configurations*

*You can skip the next step (Host Machine - RVIZ Configurations) since this package already contains the same RVIZ configurations to visualize the robot*

```
ubuntu@HankRearden:~/linorobot2_ws$ ros2 run rviz2 rviz2
opens successfully
```

## URDF

### 1. Define robot properties

*linorobot2\_description package has parameterized xacro files that can help you kickstart writing the robot's URDF. Open <robot\_type>.properties.urdf.xacro in linorobot2\_description/urdf directory and change the values according to the robot's specification/dimensions. All pose definitions must be measured from the base\_link (center of base) and wheel positions (ie wheel\_pos\_x) are referring to wheel 1.*  
*For custom URDFs, you can change the urdf\_path in description.launch.py found in linorobot2\_description/launch directory.*

*Robot Orientation:*

```
-----FRONT-----
WHEEL1 WHEEL2 (2WD/4WD)
WHEEL3 WHEEL4 (4WD)
-----BACK-----
```

```
ubuntu@HankRearden:~/linorobot2_ws/src/linorobot2/linorobot2_description/urdf$ cp 4wd_properties.urdf.xacro
```

```
AUDACITY_properties.urdf.xacro
```

```
ubuntu@HankRearden:~/linorobot2_ws/src/linorobot2/linorobot2_description/urdf$ nano AUDACITY_properties.urdf.xacro
```

**leave the urdf properties for now til basic simulation is tested, then adapt to the Open Source Rover.**

*Build the robot computer's workspace to load the new URDF: defer for now as above.*

*The same changes must be made on the host machine's <robot\_type>.properties.urdf.xacro if you're simulating the robot in Gazebo. Remember to also build the host machine's workspace after editing the xacro file:*

```
cd <host_machine_ws>
colcon build
```

```
ubuntu@HankRearden:~$ cd linorobot2_ws/
```

```
ubuntu@HankRearden:~/linorobot2_ws$ colcon build
```

```
--symlink-install
```

```
Starting >>> linorobot2
Starting >>> linorobot2_base
Starting >>> linorobot2Bringup
Starting >>> linorobot2_description
Starting >>> linorobot2_gazebo
Starting >>> linorobot2_navigation
--- stderr: linorobot2_gazebo
failed to create symbolic link
'/home/ubuntu/linorobot2_ws/build/linorobot2_gazebo/ament_cmake_python/scripts/scripts' because
existing path cannot be removed: Is a directory
gmake[2]: *** [CMakeFiles/ament_cmake_python_symlink_scripts.dir/build.make:70:
CMakeFiles/ament_cmake_python_symlink_scripts] Error 1
gmake[1]: *** [CMakeFiles/Makefile2:138: CMakeFiles/ament_cmake_python_symlink_scripts.dir/all]
Error 2
gmake: *** [Makefile:146: all] Error 2
Failed   <<< linorobot2_gazebo [0.43s, exited with code 2]
Aborted  <<< linorobot2 [0.46s]
Aborted  <<< linorobot2_base [0.47s]
Aborted  <<< linorobot2Bringup [0.50s]
Aborted  <<< linorobot2_navigation [0.49s]
Aborted  <<< linorobot2_description [0.58s]
Summary: 0 packages finished [0.73s]
  1 package failed: linorobot2_gazebo
  5 packages aborted: linorobot2 linorobot2_base linorobot2Bringup linorobot2_description
linorobot2_navigation
  1 package had stderr output: linorobot2_gazebo
```

SUCCESS, partial anyway...

Installed ROS2 humble desktop from ROS, not from ros2me which doesn't have it on the Dell laptop / WSL (Windows Subsystem for Linux) / Ubuntu 22.04 Jammy. Test talker / listener apps ran successfully. Rviz2 started successfully but no content.

The Gazebo launch:

```
ros2 launch linorobot2_gazebo gazebo.launch.py
```

successfully launches Gazebo but nothing in it.  
Will need to consult the HBRC gang for advice.

## 2023.02.21

HBRC ROS discussion

Was unable to repeat the launch I had done yesterday.

A source was missing from ~/.bashrc, added.

Gazebo comes up, but still no content.

Team suspected it was a failing of WSL / Gazebo.

More research needs doing.

Suggested starting with  
unset LIBGL\_ALWAYS\_INDIRECT  
before launching Gazebo

Suggested Google: gazebo "windows subsystem linux"

2023.02.28

Googled “ROS2 Gazebo on Windows Subsystem for Linux”

[https://classic.gazebosim.org/tutorials?tut=install\\_on\\_windows&cat=install](https://classic.gazebosim.org/tutorials?tut=install_on_windows&cat=install)

Wasn't much help in itself, just pointed to 3 ways of doing Gazebo on Windows, one of which was WSL. But it did point to Project DAVE:

<https://field-robotics-lab.github.io/dave/doc/contents/installation/Install-Directly-on-Host/>

I plan to adapt their install instructions from  
DIST=noetic

to  
DIST=humble

[https://www.reddit.com/r/ROS/comments/q2bf3i/gazebo\\_running\\_through\\_wsl2\\_in\\_windows\\_11\\_natively/](https://www.reddit.com/r/ROS/comments/q2bf3i/gazebo_running_through_wsl2_in_windows_11_natively/)

mentions WSL2. I think I just have WSL(1)? Reinstalled V2

Install from:

<https://field-robotics-lab.github.io/dave/doc/contents/installation/Install-Directly-on-Host/>

```
ubuntu@HankRearden:~$ sudo apt update
ubuntu@HankRearden:~$ sudo apt full-upgrade
ubuntu@HankRearden:~$ sudo apt install -y build-essential cmake
cppcheck curl git gnupg libeigen3-dev libgles2-mesa-dev
lsb-release pkg-config protobuf-compiler python3-dbg python3-pip
python3-venv qtbase5-dev ruby software-properties-common sudo
wget
ubuntu@HankRearden:~$ sudo sh -c 'echo "deb
http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main" >
/etc/apt/sources.list.d/ros1-latest.list'
ubuntu@HankRearden:~$ sudo apt-key adv --keyserver
'hkp://keyserver.ubuntu.com:80' --recv-keys
C1CF6E31E6BADE8868B172B4F42ED6FBAB17C654
ubuntu@HankRearden:~$ sudo sh -c 'echo "deb
http://packages.osrfoundation.org/gazebo/ubuntu-stable
`lsb_release -cs` main" >
/etc/apt/sources.list.d/gazebo-stable.list'
ubuntu@HankRearden:~$ wget
https://packages.osrfoundation.org/gazebo.key -O - | sudo apt-key
add -
ubuntu@HankRearden:~$ sudo apt update
ubuntu@HankRearden:~$ DIST=humble           changed from 'noetic'
ubuntu@HankRearden:~$ GAZ=gazebo11
```

```
ubuntu@HankRearden:~$ sudo apt install -y ${GAZ} lib${GAZ}-dev
python3-catkin-tools python3-rosdep python3-rosinstall
python3-rosinstall-generator python3-vcstool
ros-${DIST}-gazebo-plugins ros-${DIST}-gazebo-ros
ros-${DIST}-gazebo-ros-control ros-${DIST}-gazebo-ros-pkgs
ros-${DIST}-effort-controllers ros-${DIST}-geographic-info
ros-${DIST}-hector-gazebo-plugins ros-${DIST}-image-view
ros-${DIST}-joint-state-controller
ros-${DIST}-joint-state-publisher ros-${DIST}-joy
ros-${DIST}-joy-teleop ros-${DIST}-kdl-parser-py
ros-${DIST}-key-teleop ros-${DIST}-move-base
ros-${DIST}-moveit-commander ros-${DIST}-moveit-planners
ros-${DIST}-moveit-simple-controller-manager
ros-${DIST}-moveit-ros-visualization ros-${DIST}-pcl-ros
ros-${DIST}-robot-localization ros-${DIST}-robot-state-publisher
ros-${DIST}-ros-base ros-${DIST}-ros-controllers ros-${DIST}-rqt
ros-${DIST}-rqt-common-plugins ros-${DIST}-rqt-robot-plugins
ros-${DIST}-rviz ros-${DIST}-teleop-tools
ros-${DIST}-teleop-twist-joy ros-${DIST}-teleop-twist-keyboard
ros-${DIST}-tf2-geometry-msgs ros-${DIST}-tf2-tools
ros-${DIST}-urdfdom-py ros-${DIST}-velodyne-gazebo-plugins
ros-${DIST}-velodyne-simulator ros-${DIST}-xacro
```

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

Package gazebo11 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

```
E: Package 'gazebo11' has no installation candidate
E: Unable to locate package libgazebo11-dev
E: Unable to locate package python3-catkin-tools
E: Unable to locate package ros-humble-gazebo-ros-control
E: Unable to locate package ros-humble-hector-gazebo-plugins
E: Unable to locate package ros-humble-joint-state-controller
E: Unable to locate package ros-humble-kdl-parser-py
E: Unable to locate package ros-humble-move-base
E: Unable to locate package ros-humble-moveit-commander
E: Unable to locate package ros-humble-ros-controllers
E: Unable to locate package ros-humble-rqt-robot-plugins
E: Unable to locate package ros-humble-rviz
[Maybe rosdep is missing?]
```

**2023.03.24**

Have created a dedicated Unix box out of old Dell Inspiron 7737 laptop and new HDD.

Following from <https://github.com/linorobot/linorobot2>

*1. Robot Computer - linorobot2 Package*

skip for now & install on host Ubuntu laptop for Gazebo simulation.

*2. Host Machine / Development Computer - Gazebo Simulation (Optional)*

*This step is only required if you plan to use Gazebo later. This comes in handy if you want to fine-tune parameters (ie. SLAM Toolbox, AMCL, Nav2) or test your applications on a virtual robot.*

**2.1 Install linorobot2 Package**

```
cd <host_machine_ws>
git clone -b $ROS_DISTRO https://github.com/linorobot/linorobot2
src/linorobot2
rosdep update && rosdep install --from-path src --ignore-src -y --skip-keys
microxrcedds_agent --skip-keys micro_ros_agent
colcon build
source install/setup.bash
```

It's awkward to document activity on another computer.

Tried to PuTTY into LinuxBox but not set up for ssh.

```
ubuntu@LinuxBox:~$ mkdir -p linorobot_ws/
ubuntu@LinuxBox:~$ cd linorobot_ws
ubuntu@LinuxBox:~/linorobot_ws$ git clone -b $ROS_DISTRO
https://github.com/linorobot/linorobot2 src/linorobot2
Command 'git' not found, but can be installed with:
sudo apt install git
ubuntu@LinuxBox:~/linorobot_ws$ sudo apt install git
ubuntu@LinuxBox:~/linorobot_ws$ git clone -b $ROS_DISTRO
https://github.com/linorobot/linorobot2 src/linorobot2
Cloning into 'src/linorobot2'...
remote: Enumerating objects: 1186, done.
remote: Counting objects: 100% (490/490), done.
remote: Compressing objects: 100% (102/102), done.
remote: Total 1186 (delta 432), reused 388 (delta 388), pack-reused 696
Receiving objects: 100% (1186/1186), 16.11 MiB | 10.69 MiB/s, done.
Resolving deltas: 100% (742/742), done.
Oops! Best do this again!
ubuntu@LinuxBox:~/linorobot_ws$ sudo apt update
ubuntu@LinuxBox:~/linorobot_ws$ sudo apt upgrade -y
long upgrade...
ubuntu@LinuxBox:~/linorobot_ws$ rosdep update && rosdep install
--from-path src --ignore-src -y --skip-keys microxrcedds_agent
--skip-keys micro_ros_agent
```

```
Command 'rosdep' not found, but can be installed with:  
sudo apt install python3-rosdep2  
ubuntu@LinuxBox:~/linorobot_ws$ sudo apt install python3-rosdep2  
quick install  
ubuntu@LinuxBox:~/linorobot_ws$ rosdep update && rosdep install  
--from-path src --ignore-src -y --skip-keys microxrcedds_agent  
--skip-keys micro_ros_agent  
long install  
#All required rosdeps installed successfully  
ubuntu@LinuxBox:~/linorobot_ws$ colcon build  
colcon: command not found  
ubuntu@LinuxBox:~/linorobot_ws$ sudo apt install  
python3-colcon-common-extensions  
long install  
ubuntu@LinuxBox:~/linorobot_ws$ colcon build  
...Summary: 6 packages finished [7.98s]  
ubuntu@LinuxBox:~/linorobot_ws$ source install/setup.bash  
ubuntu@LinuxBox:~/linorobot_ws$ echo "export LINOROBOT2_BASE=2wd"  
>> ~/.bashrc  
ubuntu@LinuxBox:~/linorobot_ws$ source ~/.bashrc
```

## 2. Visualize the newly created URDF

2.1 Publish the URDF from the **robot** computer:

```
ros2 launch linorobot2_description description.launch.py
```

*Optional parameters for simulation on host machine:*

*rviz - Set to true to visualize the robot in rviz2 and only if you're configuring the URDF from the host machine. For example:*

```
ros2 launch linorobot2_description description.launch.py rviz:=true
```

2.2 Visualize the robot from the **host** machine:

*The rviz argument on description.launch.py won't work on headless setup but you can visualize the robot remotely from the host machine:*

```
ros2 launch linorobot2_viz robot_model.launch.py
```

```

ubuntu@LinuxBox:~/linorobot_ws$ ros2 launch
linorobot2_description description.launch.py rviz:=true
[INFO] [launch]: All log files can be found below /home/ubuntu/.ros/log/2023-03-24-20-53-29-688633-LinuxBox-38919
[INFO] [launch]: Default logging verbosity is set to INFO
[ERROR] [launch]: Caught exception in launch (see debug for traceback): executed command failed. Command: xacro
/home/ubuntu/linorobot_ws/install/linorobot2_description/share/linorobot2_description/urdf/robots/None.urdf.xacro
Captured stderr output: Traceback (most recent call last):
  File "/opt/ros/humble/local/lib/python3.10/dist-packages/xacro/__init__.py", line 1012, in parse
    inp = f = open(filename)
FileNotFoundError: [Errno 2] No such file or directory:
'/home/ubuntu/linorobot_ws/install/linorobot2_description/share/linorobot2_description/urdf/robots/None.urdf.xacro'

During handling of the above exception, another exception occurred:

Traceback (most recent call last):
  File "/opt/ros/humble/local/lib/python3.10/dist-packages/xacro/__init__.py", line 1119, in _process
    doc = process_file(input_file_name, **opts)
  File "/opt/ros/humble/local/lib/python3.10/dist-packages/xacro/__init__.py", line 1096, in process_file
    doc = parse(None, input_file_name)
  File "/opt/ros/humble/local/lib/python3.10/dist-packages/xacro/__init__.py", line 1016, in parse
    raise XacroException(e.strerror + ": " + e.filename, exc=e)
xacro.XacroException: No such file or directory:
/home/ubuntu/linorobot_ws/install/linorobot2_description/share/linorobot2_description/urdf/robots/None.urdf.xacro [Errno 2] No
such file or directory:
'/home/ubuntu/linorobot_ws/install/linorobot2_description/share/linorobot2_description/urdf/robots/None.urdf.xacro'

During handling of the above exception, another exception occurred:

Traceback (most recent call last):
  File "/opt/ros/humble/bin/xacro", line 33, in <module>
    sys.exit(load_entry_point('xacro==2.0.8', 'console_scripts', 'xacro')())
  File "/opt/ros/humble/local/lib/python3.10/dist-packages/xacro/__init__.py", line 1171, in main
    _process(input_file_name, vars(opts))
  File "/opt/ros/humble/local/lib/python3.10/dist-packages/xacro/__init__.py", line 1124, in _process
    except xml.parsers.expat.ExpatError as e:
AttributeError: module 'xml' has no attribute 'parsers'

"/opt/ros/humble/local/lib/python3.10/dist-packages/xacro/__init__.py", line
1012
no such file as:
/home/ubuntu/linorobot_ws/install/linorobot2_description/share/linorobot2_desc
ription/urdf/robots/None.urdf.xacro

```

ubuntu@LinuxBox:/opt/ros/humble/local/lib/python3.10/dist-packages/xacro\$ **nano \_\_init\_\_.py**

## 1. Booting up the robot

### 1.1a Using a real robot:

*ros2 launch linorobot2\_bringup bringup.launch.py*

### 1.1b Using Gazebo:

*ros2 launch linorobot2\_gazebo gazebo.launch.py*

same None.urdf.xacro error

Somehow the 2wd config isn't getting to \_\_init\_\_.py

2023.03.25

Brainstorm: since the file None.urdf.xacro is missing, just copy one of the existing urdf.xacro files.

ubuntu@LinuxBox:~\$ cd

/home/ubuntu/linorobot\_ws/install/linorobot2\_description/share/linorobot2\_description/urdf/robots/

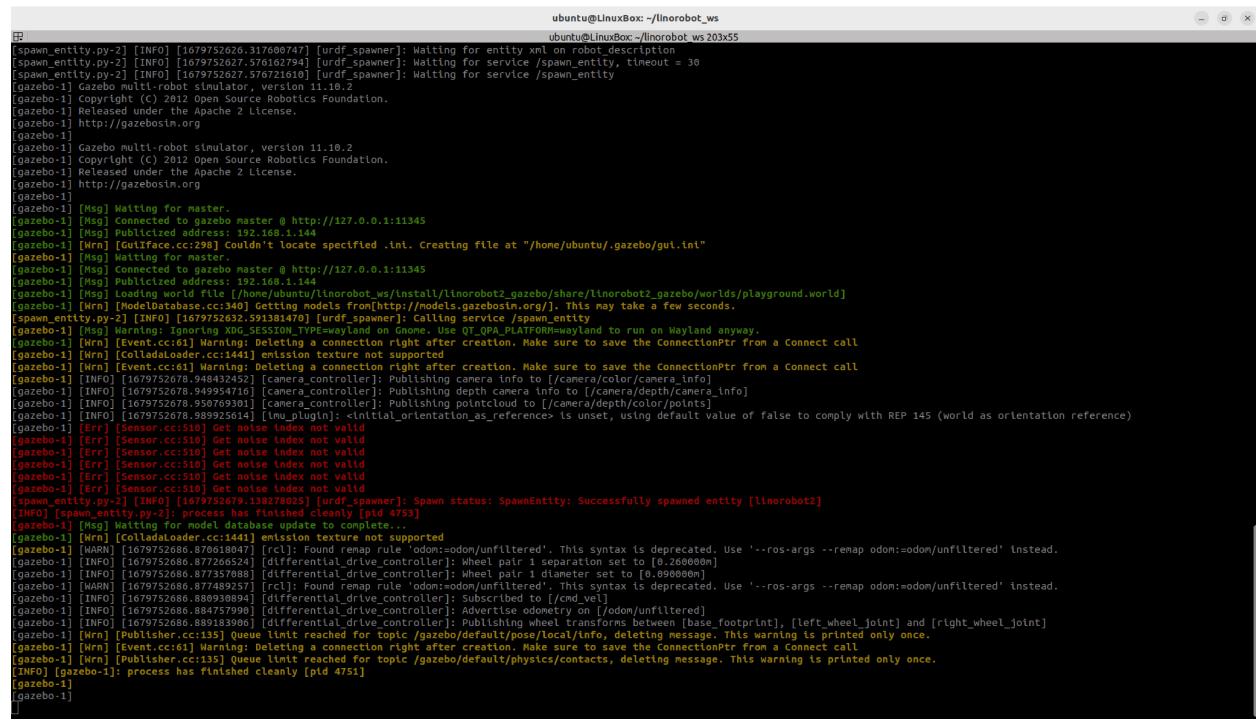
ubuntu@LinuxBox:~/linorobot\_ws/install/linorobot2\_description/share/linorobot2\_description/urdf/robots\$ cp 2wd.urdf.xacro

None.urdf.xacro

ubuntu@LinuxBox:~/linorobot\_ws\$ ros2 launch linorobot2\_gazebo gazebo.launch.py

Package 'linorobot2\_gazebo' not found: "package 'linorobot2\_gazebo' not found, searching: ['/opt/ros/humble']".

Had to source the .bashrc or some such again then it worked and a long Gazebo launch ensued w/ some errors but no crash but no picture, either. See screenshot below.



```
ubuntu@LinuxBox: ~/linorobot_ws
ubuntu@LinuxBox: ~/linorobot_ws 20x55

[spawn_entity.py-2] [INFO] [167952670.317680747] [urdf_spawner]: Waiting for entity xml on robot_description
[spawn_entity.py-2] [INFO] [167952670.317680747] [urdf_spawner]: Waiting for service /spawn_entity, timeout = 30
[gazebo-1] [INFO] [167952670.317680747] [urdf_spawner]: Waiting for service /spawn_entity
[gazebo-1] Gazebo multi-robot simulator, version 11.10.2
[gazebo-1] Copyright (C) 2012 Open Source Robotics Foundation.
[gazebo-1] Released under the Apache 2 License.
[gazebo-1] http://gazebosim.org
[gazebo-1]
[gazebo-1] Gazebo multi-robot simulator, version 11.10.2
[gazebo-1] Copyright (C) 2012 Open Source Robotics Foundation.
[gazebo-1] Released under the Apache 2 License.
[gazebo-1] http://gazebosim.org
[gazebo-1]
[gazebo-1] [Msg] Waiting for master.
[gazebo-1] [Msg] Connected to gazebo master @ http://127.0.0.1:11345
[gazebo-1] [Msg] Publicized address: 192.168.1.144
[gazebo-1] [Err] [Event.cc:61] Warning: Deleting a connection right after creation. Couldn't locate specified .ini. Creating file at "/home/ubuntu/.gazebo/gui.ini"
[gazebo-1] [Msg] Waiting for master
[gazebo-1] [Msg] Connected to gazebo master @ http://127.0.0.1:11345
[gazebo-1] [Msg] Publicized address: 192.168.1.144
[gazebo-1] [Msg] Loading world file [/home/ubuntu/linorobot_ws/install/linorobot2_gazebo/share/linorobot2_gazebo/worlds/playground.world]
[gazebo-1] [Msg] [ModelDatabase.cc:340] Getting models from [http://models.gazebosim.org/]. This may take a few seconds.
[spawn_entity.py-2] [INFO] [167952670.317680747] [urdf_spawner]: Calling service /spawn_entity
[gazebo-1] [Wrn] [Event.cc:61] Warning: Deleting a connection right after creation. Use @QPA_PLAYFORM=wayland to run on Wayland anyway.
[gazebo-1] [Wrn] [Event.cc:61] Warning: Deleting a connection right after creation. Make sure to save the ConnectionPtr from a Connect call
[gazebo-1] [Wrn] [ColladaLoader.cc:1441] emission texture not supported
[gazebo-1] [Wrn] [Event.cc:61] Warning: Deleting a connection right after creation. Make sure to save the ConnectionPtr from a Connect call
[gazebo-1] [INFO] [167952670.317680747] [camera_controller]: Publishing camera info to [/camera/color/camera_info]
[gazebo-1] [INFO] [167952670.317680747] [camera_controller]: Publishing depth camera info to [/camera/depth/camera_info]
[gazebo-1] [INFO] [167952670.317680747] [camera_controller]: Publishing pointcloud to [/camera/depth/color/points]
[gazebo-1] [INFO] [167952670.317680747] [imu_plugin]: initial_orientation_as_reference is unset, using default value of false to comply with REP 145 (world as orientation reference)
[gazebo-1] [Err] [Sensor.cc:510] Get noise index not valid
[spawn_entity.py-2] [INFO] [167952670.318278025] [urdf_spawner]: Spawn status: SpawnEntity: Successfully spawned entity [linorobot2]
[INFO] [gazebo-1] [Msg] Waiting for node database update to complete.
[gazebo-1] [Wrn] [ColladaLoader.cc:1441] emission texture not supported
[gazebo-1] [Warn] [167952670.318278025] [rcl]: Found remap rule 'odom:=odom/unfiltered'. This syntax is deprecated. Use '--ros-args --remap odom:=odom/unfiltered' instead.
[gazebo-1] [INFO] [167952670.318278025] [differential_drive_controller]: wheel pair 1 separation set to [0.260000m]
[gazebo-1] [INFO] [167952670.318278025] [differential_drive_controller]: wheel pair 1 diameter set to [0.090000m]
[gazebo-1] [Warn] [167952670.318278025] [rcl]: Found remap rule 'odom:=odom/unfiltered'. This syntax is deprecated. Use '--ros-args --remap odom:=odom/unfiltered' instead.
[gazebo-1] [INFO] [167952670.318278025] [differential_drive_controller]: wheel pair 1 separation set to [0.260000m]
[gazebo-1] [INFO] [167952670.318278025] [differential_drive_controller]: wheel pair 1 diameter set to [0.090000m]
[gazebo-1] [INFO] [167952670.318278025] [differential_drive_controller]: Publishing wheel transforms between [base_footprint], [left_wheelJoint] and [right_wheelJoint]
[gazebo-1] [Wrn] [Publisher.cc:135] Queue limit reached for topic /gazebo/default/pose/local/info, deleting message. This warning is printed only once.
[gazebo-1] [Wrn] [Event.cc:61] Warning: Deleting a connection right after creation. Make sure to save the ConnectionPtr from a Connect call
[gazebo-1] [Wrn] [Publisher.cc:135] Queue limit reached for topic /gazebo/default/physics/contacts, deleting message. This warning is printed only once.
[INFO] [gazebo-1] process has finished cleanly [pid 4751]
[gazebo-1]
[gazebo-1]
```

It's a pain that the basic Ubuntu desktop doesn't have a Favorites. So I installed the Mate desktop for convenience.

2023.03.26

Recompiled w/ colon build from

```
ubuntu@LinuxBox:~/linorobot_ws$ colcon build
```

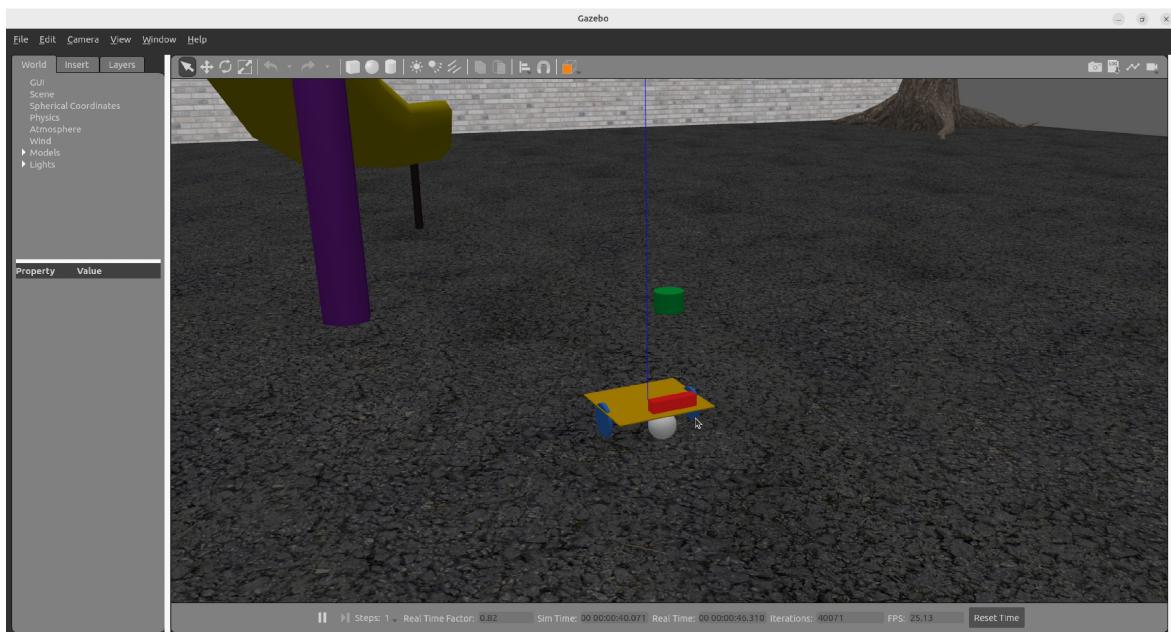
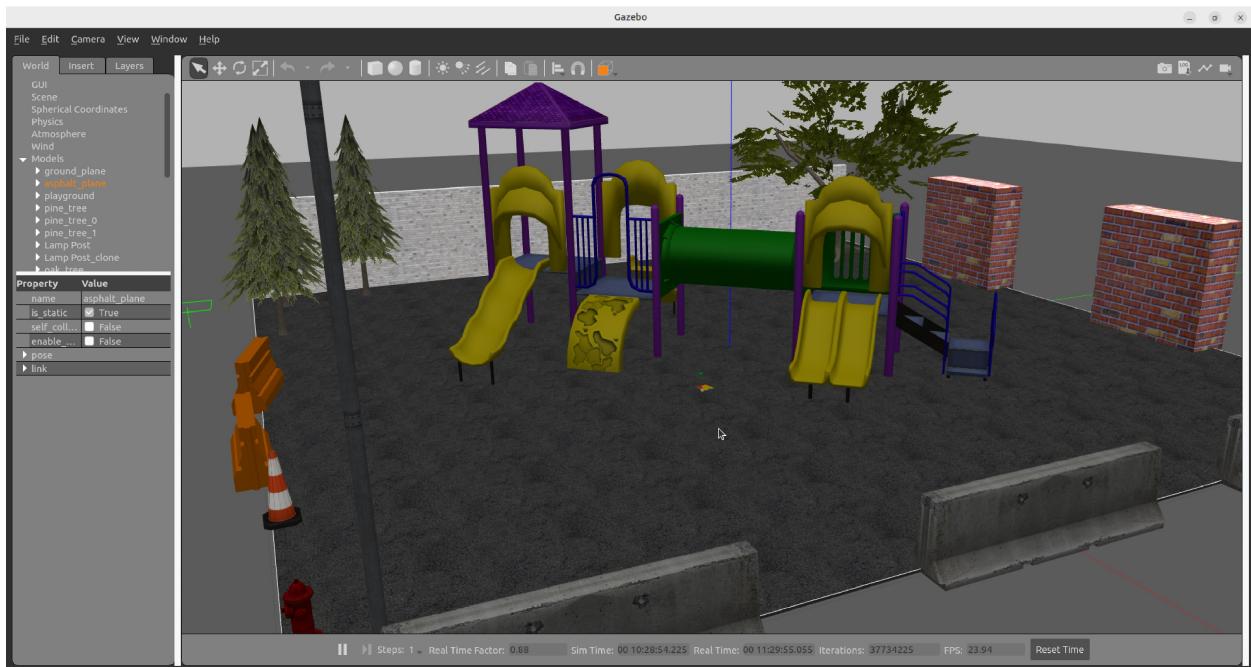
Updated ~/.bashrc to include the rviz code:

```
source /opt/ros/humble/setup.bash
source ~/linorobot_ws/install/setup.bash
export LINOROBOT2_BASE=2wd
```

No when I run

```
ubuntu@LinuxBox:~$ ros2 launch linorobot2_gazebo gazebolaunch.py
```

I get a Gazebo window with the robot and environment:



**2023.03.28**

Gazebo simulation expanded trial.

Now let's see if I can open

- 1) a teleop\_twist terminal to drive it around and
- 2) an Rviz2 terminal to see what it sees

On the LinuxBox laptop, open Terminator, create 4 windows, \$ source ~/.bashrc in each one.

Terminator Window #1 launches Gazebo

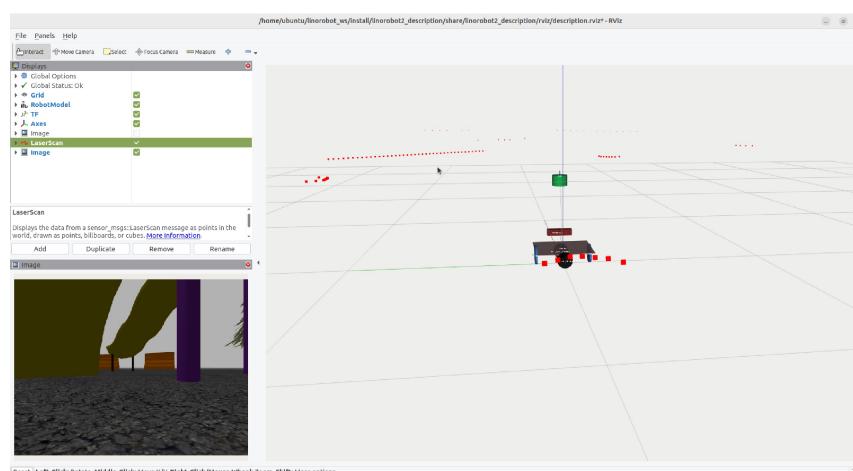
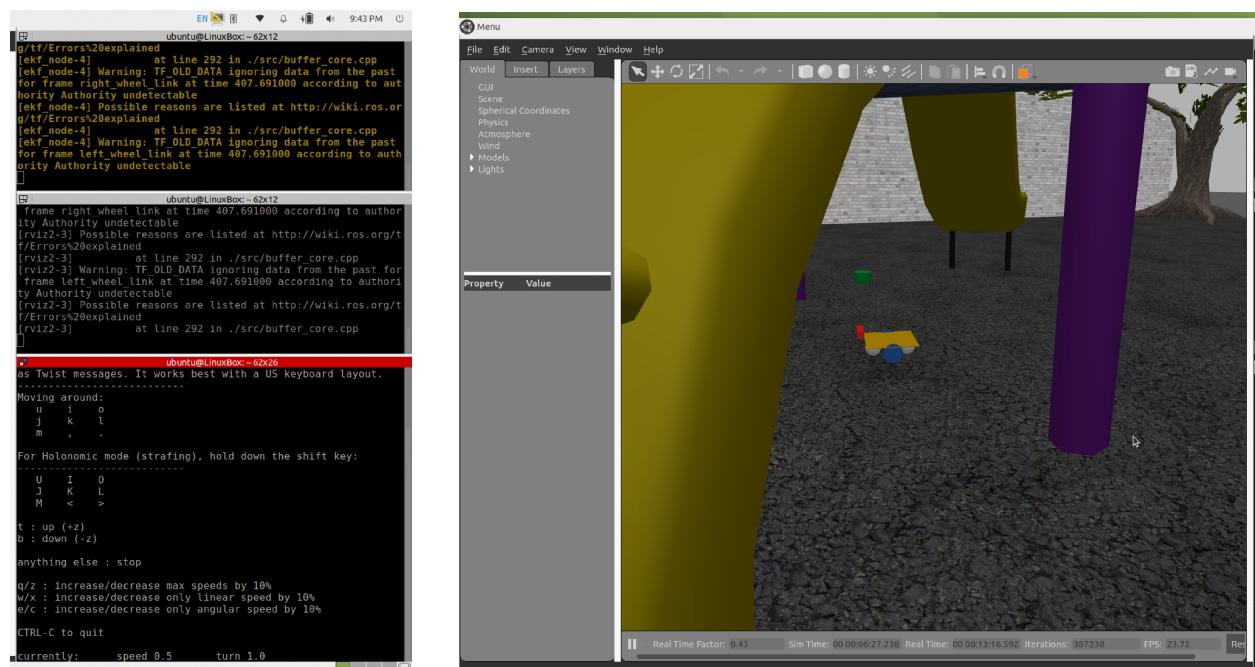
```
$ ros2 launch linorobot2_gazebo gazebo.launch.py
```

Terminator Window #2 launches Rviz2

```
$ ros2 launch linorobot2_description description.launch.py  
rviz:=true
```

Terminator Window #3 launches keyboard robot driver

```
$ ros2 run teleop_twist_keyboard teleop_twist_keyboard
```



Rviz2 showing:  
robot model  
LIDAR scan red dots  
robot's camera view