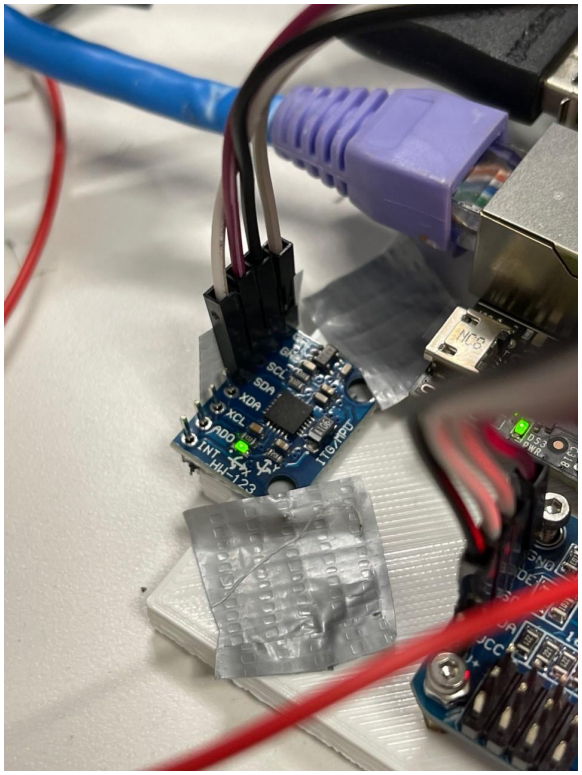
This is an informal walkthrough / troubleshoot guide detailing how I got the gyroscope to work in ROS, for any future students who might need this information. Before following this guide, ensure that a catkin_ws workspace has already been created.



This is the physical gyroscope.

Jetson Nano Dev-Board Expansion Header

Alt Function	Linux(BCM)	Board Label			Board Label	Linux(BCM)	Alt Function
DAP4_DOUT	78(21)	D21	40	39	GND		
DAP4_DIN	77(20)	D20	38	37	D26	12(26)	SPI2_MOSI
UART2_CTS	51(16)	D16	36	35	D19	76(19)	DAP4_FS
		GND	34	33	D13	38(13)	GPIO_PE6
LCD_BL_PWM	168(12)	D12	32	31	D6	200(6)	GPIO_PZ0
		GND	30	29	D5	149(5)	CAM_AF_EN
		D1/ID_SC	28	27	D0/ID_SD		
SPI1_CS1	20(7)	D7	26	25	GND		
SPI1_CS0	19(8)	D8	24	23	D11	18(11)	SPI1_SCK
SPI2_MISO	13(25)	D25	22	21	D9	17(9)	SPI1_MISO
		GND	20	19	D10	16(10)	SPI1_MOSI
SPI2_CS0	15(24)	D24	18	17	3.3V		
SPI2_CS1	232(23)	D23	16	15	D22	194(22)	LCD_TE
		GND	14	13	D27	14(27)	SPI2_SCK
DAP4_SCLK	79(18)	D18	12	11	D17	50(17)	UART2_RTS
		RXD/D15	10	9	GND		
		TXD/D14	8	7	D4	216(4)	AUDIO_MCLK
		GND	6	5	SCL/D3		
		5V	4	3	SDA/D2		
		5V	2	1	3.3V		

Please follow along with this tutorial:
https://automaticaddison.com/visualize-imu-data-using-the-mpu6050-ros-and-jetson-nano/

and only follow Option 1: for both the starting programs and the ROS part of this tutorial.

Attach to the Jetson Nano using female-to-female jumper wires. The connection between the wire and the gyroscope is tenuous, the author heavily recommends soldering the gyroscope and/or the pins it comes with in order to avoid future issues.

Some diagrams will claim that there is an SCL/SDA pin in 27/28, but this is just false. No other pins will work besides pins 3 and 5 on a barebones Jetson Nano without any arduino.

If you run the command:

sudo i2cdetect -r -y 1

and the gyroscope is not being detected, you will have to make sure that all the wires are properly fitted and that the issue doesn't lie with an incorrect pin configuration.

The next command I had issue with is:

pip3 install adafruit-blinka

where sometimes errors are thrown stating that the installation could not be completed. In this case you will have to uninstall any previous adafruit installations your teammates may have installed. Or, if that fails / you have issues, try the commands listed here:

https://github.com/facebook/prophet/issues/418

namely:

pip install --upgrade setuptools

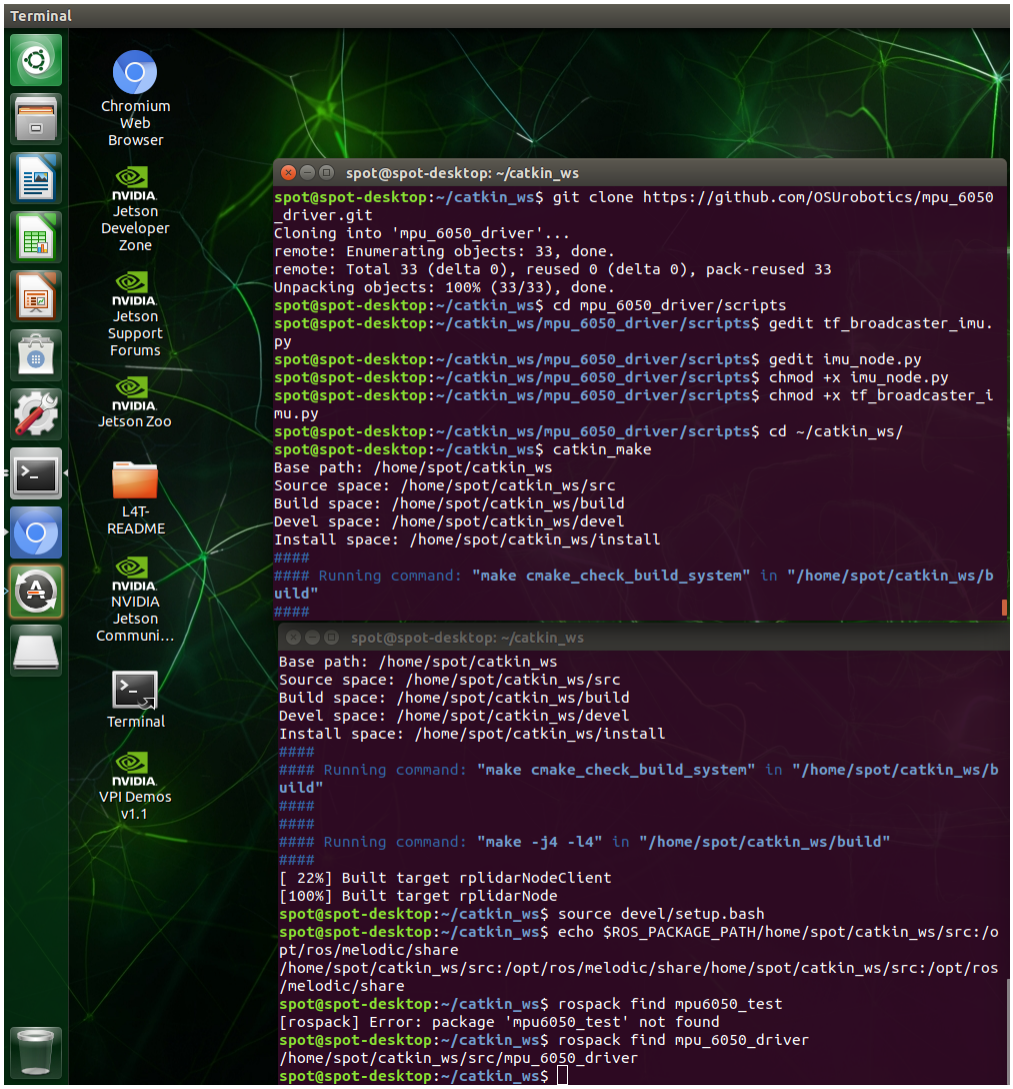
sudo apt-get install python3.6-dev libmysqlclient-dev

Now, follow the automatic addison tutorial. The next error I encountered was when I tried running the second program:

```
Traceback (most recent call last):
  File "mpu6050_simpletest.py", line 10, in <module>
    mpu = adafruit_mpu6050.MPU6050(i2c)
  File "/home/spotmicro/.local/lib/python3.8/site-packages/adafruit_mpu6050.py", line 205, in
__init__
    self.i2c_device = i2c_device.I2CDevice(i2c_bus, address)
  File "/home/spotmicro/.local/lib/python3.8/site-packages/adafruit_bus_device/i2c_device.py",
line 63, in __init__
    self.__probe_for_device()
  File "/home/spotmicro/.local/lib/python3.8/site-packages/adafruit_bus_device/i2c_device.py",
line 185, in __probe_for_device
    raise ValueError("No I2C device at address: 0x%x" % self.device_address)
ValueError: No I2C device at address: 0x68
```

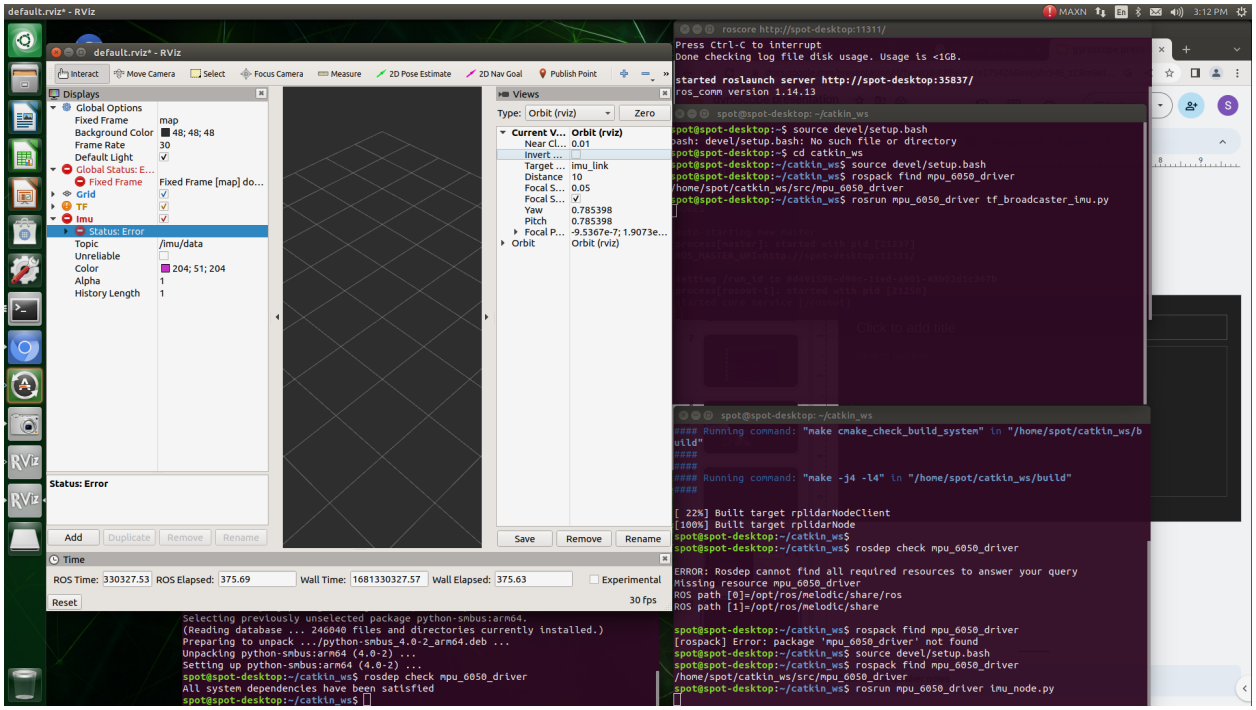
If you get this error, this means that while adafruit-blinka is working your device is not showing up. The author used duct tape temporarily, as seen in the first photo in this guide, in order to fix the pins in place. Later, another teammate soldered the pins in place. Ensure not only that the

light is on, but use the i2c detect command to ensure that the SCL/SDA pins are working properly.



You should already have a catkin workspace if you installed ROS correctly.

Keep opening terminals as the automatic addison guide says to.



Around the part in the guide where it says to “Change the Fixed Frame parameter under Global Options to imu_link.”:

Some options will be drop down menus on the right of the .rviz file you just created.

Do not forget to Ctrl+C every single terminal once you are done, otherwise you run the risk of messing up critical files.

Helpful links:

https://automaticaddison.com/visualize-imu-data-using-the-mpu6050-ros-and-jetson-nano/

- Majority of work on the jetson nano / gyroscope implementation was done using this link.
- Also where the first image in this document comes from.
- Also has more information on physical implementation of gyroscope, including which head-to-head connections you will need.
- Last accessed April 13, 2023.

https://robotics.stackexchange.com/questions/9680/getting-rospack-package-not-found-error-in-ros

- As soon as you open a terminal, type in `source devel/setup.bash` in order to make the ROS commands work properly. This is for all 9-12 terminals you'll need to have up.
- Last accessed April 13, 2023.

https://github.com/facebook/prophet/issues/418

- Has commands that help fix a variety of pip command issues.
- Last accessed April 11, 2023.

https://www.odoo.com/forum/help-1/how-to-install-pip-in-python-3-on-ubuntu-18-04-167715

- pip installation for python 3 / ubuntu.
- Last accessed April 11, 2023.

https://github.com/NVIDIA/jetson-gpio

- Installing Jetson GPIO.
- Last accessed April 12, 2023.

https://answers.ros.org/question/353123/unable-to-locate-package-ros-noetic-desktop-full/

- Helpful docker commanders if you want to use ROS Noetic on ubuntu, however this is not recommended our team stuck with ROS Melodic.
- Last accessed April 12, 2023.

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

- ROS Melodic installation.
- Last accessed April 12, 2023.

http://wiki.ros.org/ROS/Tutorials/InstallingandConfiguringROSEnvironment

- Configuring the ROS environment, specifically maintaining a catkin_ws workspace.
- Last accessed April 12, 2023.

https://stackoverflow.com/questions/27053334/ros-package-not-found-after-catkin-make

- If ROS package doesn't show using other commands.
- Last accessed April 12, 2023.