<u>Individual Lab Report – 6</u>

Progress Review 7

By Pratibha Tripathi

<u>Team F – Falcon Eye</u>

Team Members:
Danendra Singh
Pulkit Goyal
Rahul Ramakrishnan
Yuchi wang

February 1,2017

Individual Progress

I was responsible for following tasks:
  a) Calibrating IMU and reading its data on ROS
 b) Upgrading and taking back up of both the mini PCs

IMU

During our FVE and FVE Encore, we faced issues pertaining to our IMU. We were not able to calibrate it and get accurate readings from it. So, at last, we opted to use our mobile as IMU. So, this was one of the critical tasks. We got a new IMU SparkFun 9DOF Razor. Danendra and I worked on this. We first read the reading of it directly on Arduino terminal. One good thing about this board is that we don't need any separate board like Arduino mega or Teensy to get readings from it. They have directly given some softwares, so that we can read SparkFun board and get the readings.
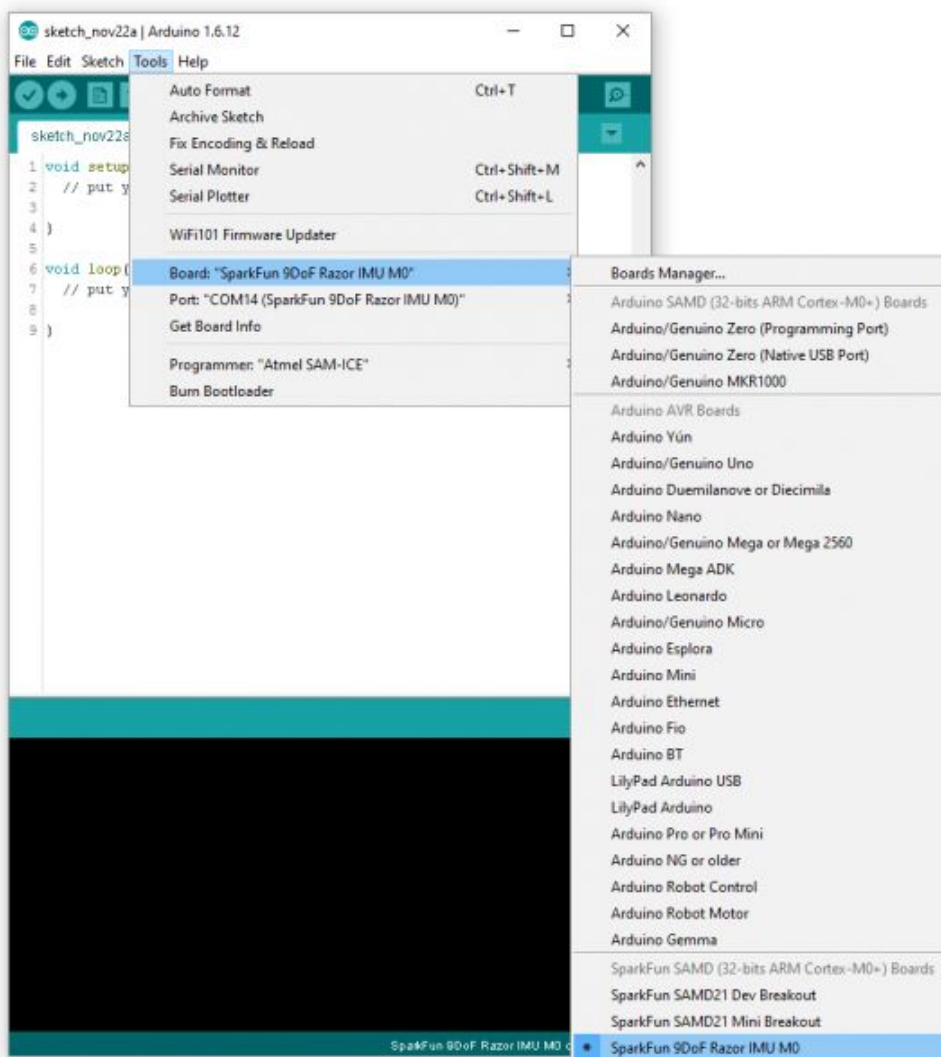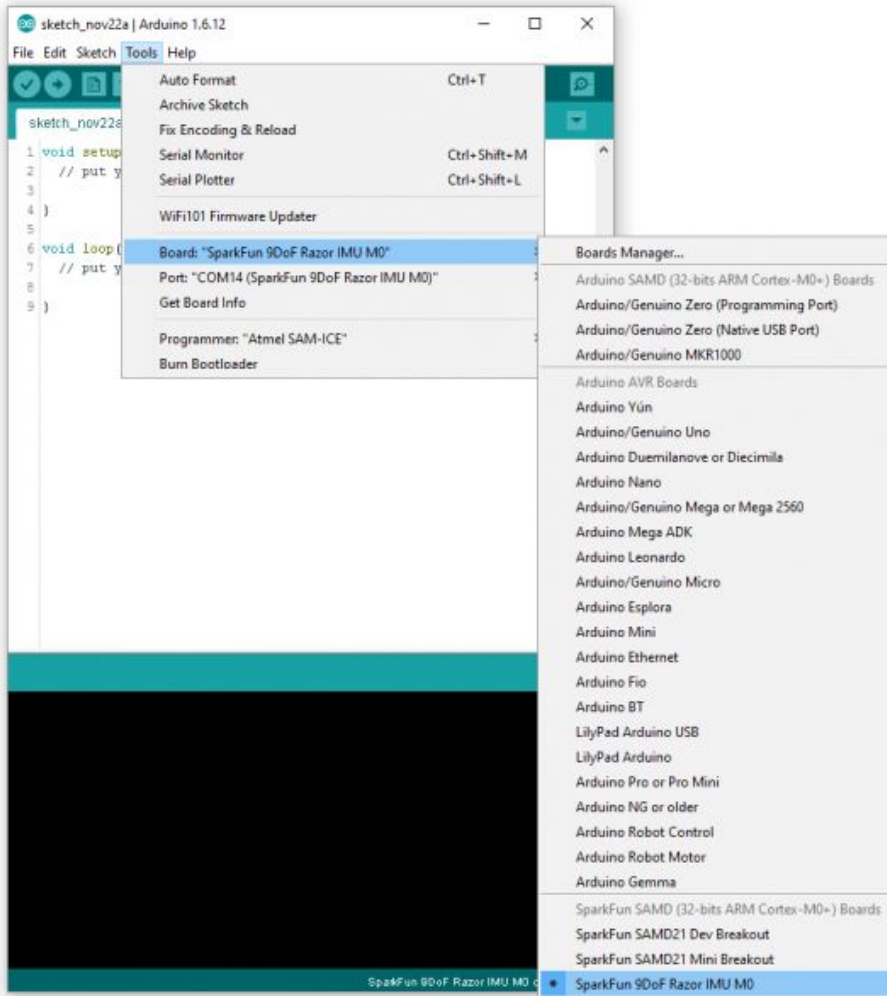
and by using their firmware we were able to get reading on monitor.
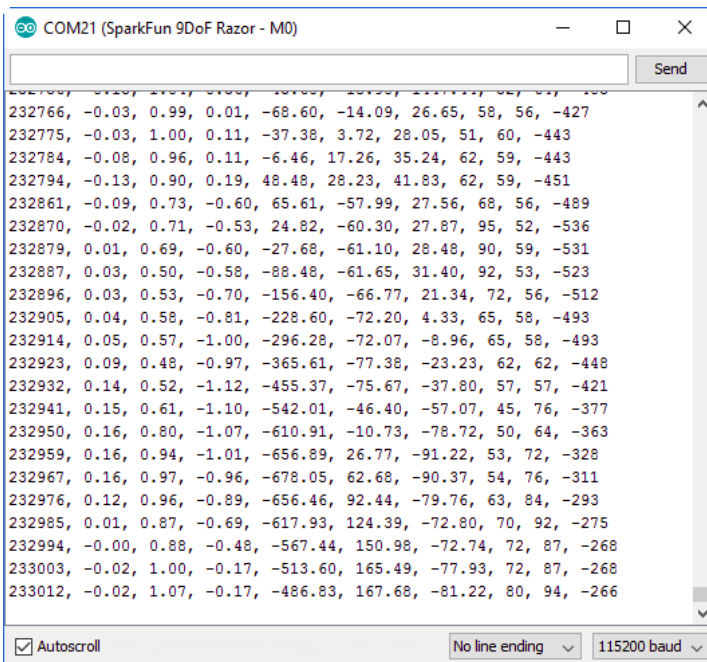
But to get the readings on ROS we flashed a new firmware. And we were able to graphically visualise it also.

we followed the following steps:

1) sudo apt-get install python-visual

2) $ cd catkin_ws/src
   $ git clone https://github.com/KristofRobot/razor_imu_9dof.git
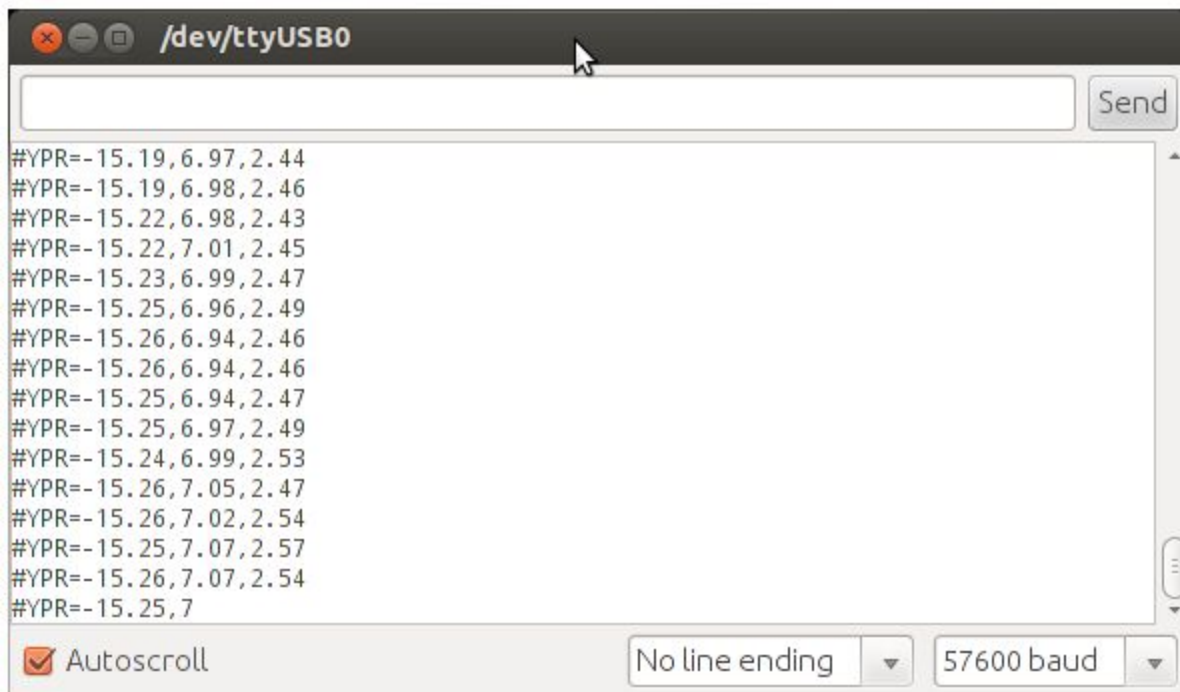 $ cd ..
   $ catkin_make

New package from a repository
3) $ sudo apt-get install ros-indigo-razor-imu-9dof

Loading the new firmware
4) $ roscd razor_imu_9dof
   $ cp -r src/Razor_AHRS ~/Arduino

Creating configuration file
5) $ roscd razor_imu_9dof/config
   $ cp razor.yaml my_razor.yaml

```
/dev/ttyUSB0                                                    Send

#YPR=-15.19,6.97,2.44
#YPR=-15.19,6.98,2.46
#YPR=-15.22,6.98,2.43
#YPR=-15.22,7.01,2.45
#YPR=-15.23,6.99,2.47
#YPR=-15.25,6.96,2.49
#YPR=-15.26,6.94,2.46
#YPR=-15.26,6.94,2.46
#YPR=-15.25,6.94,2.47
#YPR=-15.25,6.97,2.49
#YPR=-15.24,6.99,2.53
#YPR=-15.26,7.05,2.47
#YPR=-15.26,7.02,2.54
#YPR=-15.25,7.07,2.57
#YPR=-15.26,7.07,2.54
#YPR=-15.25,7

☑ Autoscroll                    No line ending  ▼    57600 baud  ▼
```

Left terminal:

```
* /imu_node/port: /dev/ttyACM0
* /rosdistro: indigo
* /rosversion: 1.11.21

NODES
  /
    imu_node (razor_imu_9dof/imu_node.py)

auto-starting new master
process[master]: started with pid [2553]
ROS_MASTER_URI=http://localhost:11311

setting /run_id to aacfad60-079a-11e8-8c29-080027896dd0
process[rosout-1]: started with pid [2566]
started core service [/rosout]
process[imu_node-2]: started with pid [2577]
[INFO] [WallTime: 1517522152.399470] Reconfigure request for yaw_calibration: 0
[INFO] [WallTime: 1517522152.399779] Set imu_yaw_calibration to 0
[INFO] [WallTime: 1517522152.448440] Opening /dev/ttyACM0...
[INFO] [WallTime: 1517522152.459821] Giving the razor IMU board 5 seconds to boo
t...
[INFO] [WallTime: 1517522158.586918] Writing calibration values to razor IMU board...
[INFO] [WallTime: 1517522160.001017] Printing set calibration values:
ACCEL_X_MIN:-250.00
ACCEL_X_MAX:250.00
ACCEL_Y_MIN:-250.00
ACCEL_Y_MAX:250.00
ACCEL_Z_MIN:-250.00
ACCEL_Z_MAX:250.00

MAGN_X_MIN:-600.00
MAGN_X_MAX:600.00
MAGN_Y_MIN:-600.00
MAGN_Y_MAX:600.00
MAGN_Z_MIN:-600.00
MAGN_Z_MAX:600.00

MAGN_USE_EXTENDED:false
magn_ellipsoid_center:[0.0000,0.0000,0.0000]
magn_ellipsoid_transform:[[0.0000000,0.0000000,0.0000000],[0.0000000,0.0000000,0.0000000],[0.0000000,0
.0000000,0.0000000]]

GYRO_AVERAGE_OFFSET_X:0.00
GYRO_AVERAGE_OFFSET_Y:0.00
GYRO_AVERAGE_OFFSET_Z:0.00

[INFO] [WallTime: 1517522160.002469] Flushing first 200 IMU entries...
[INFO] [WallTime: 1517522177.507748] Publishing IMU data...
```
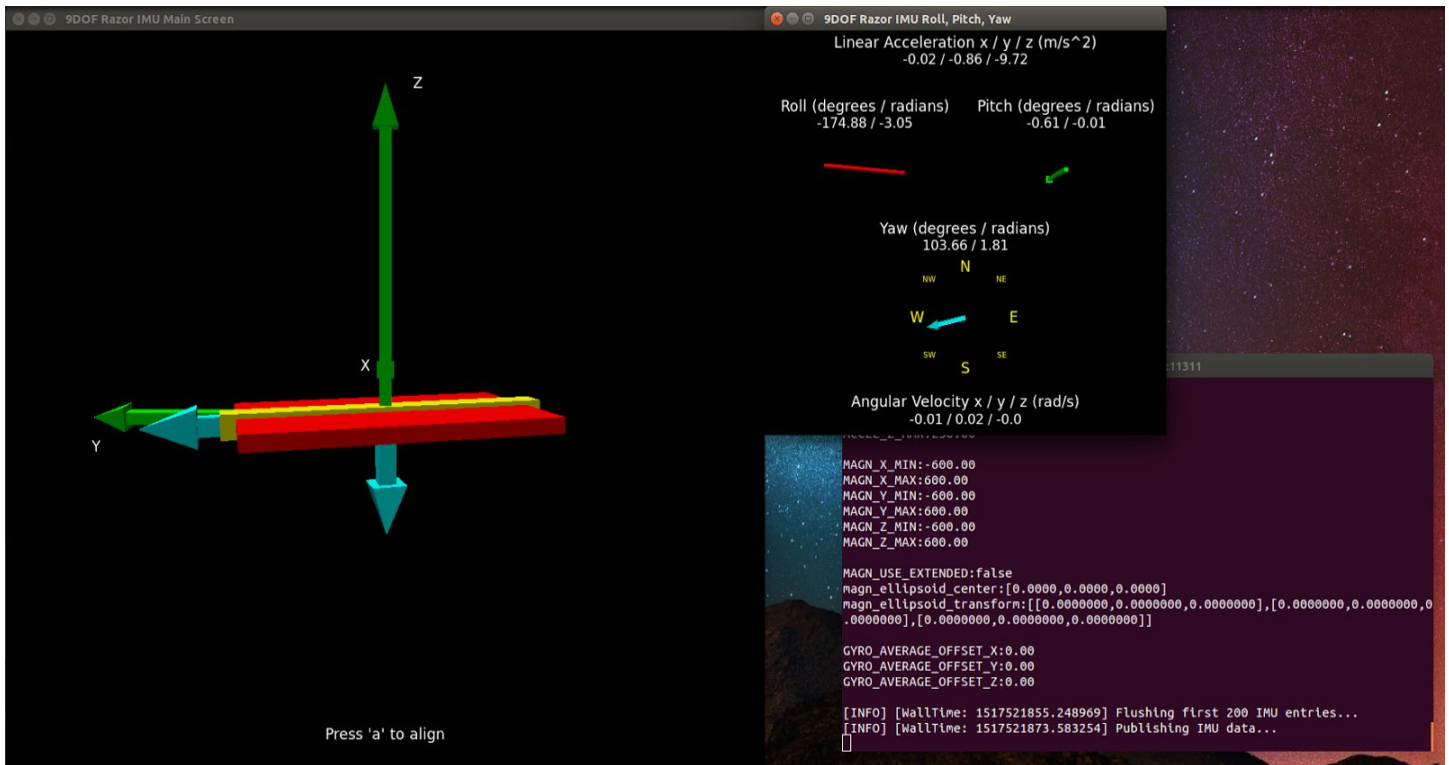
Right terminal:

```
linear_acceleration_covariance: [0.04, 0.0, 0.0, 0.0, 0.04, 0.0, 0.0, 0.0, 0.04]
---
header:
  seq: 194
  stamp:
    secs: 1517522219
    nsecs: 329025983
  frame_id: base_imu_link
orientation:
  x: 0.605017876338
  y: 0.789719298199
  z: 0.100596898023
  w: 0.0133065198684
orientation_covariance: [0.0025, 0.0, 0.0, 0.0, 0.0025, 0.0, 0.0, 0.0, 0.0025]
angular_velocity:
  x: -0.01
  y: 0.02
  z: -0.0
angular_velocity_covariance: [0.02, 0.0, 0.0, 0.0, 0.02, 0.0, 0.0, 0.0, 0.02]
linear_acceleration:
  x: 0.93846484375
  y: 1.76699523437
  z: -9.71521789062
linear_acceleration_covariance: [0.04, 0.0, 0.0, 0.0, 0.04, 0.0, 0.0, 0.0, 0.04]
---
header:
  seq: 195
  stamp:
    secs: 1517522219
    nsecs: 413775920
  frame_id: base_imu_link
orientation:
  x: 0.605087228595
  y: 0.789724468449
  z: 0.0999306831362
  w: 0.0147840553224
orientation_covariance: [0.0025, 0.0, 0.0, 0.0, 0.0025, 0.0, 0.0, 0.0, 0.0025]
angular_velocity:
  x: 0.0
  y: 0.01
  z: -0.0
angular_velocity_covariance: [0.02, 0.0, 0.0, 0.0, 0.02, 0.0, 0.0, 0.0, 0.02]
linear_acceleration:
  x: 0.9193125
  y: 1.69498242187
  z: -9.62903234375
linear_acceleration_covariance: [0.04, 0.0, 0.0, 0.0, 0.04, 0.0, 0.0, 0.0, 0.04]
---
```

6) $ roslaunch razor_imu_9dof razor-pub-and-display.launch

Mini PCs

Pulkit and I worked on Upgrading and backing up the data of our Mini PCs. Last semester we were facing issues related to the speed of our mini PCs, so we replaced their HDD with SSD and upgraded the RAM. In addition to that to make sure we backed up the image from the previous HDD using Clonezilla and restored that same image on these two new SSDs.

Challenges Faced

Some of the Challenges are:

1) For this Progress review, we were mainly working on the previous issues only, which we faced during our FVE and FVE Encore.
2) Primarily our three main backbone components for our system were not working reliably, so we had to ensure to stabilize the system before doing any further development. IMU, GPS and network issues.
3) As During our FVE, our IMU was not working so we had to use our phone. GPS was working perfectly fine during FVE, but during FVE Encore we were not able to launch it from the common launch file, so we had to launch that node separately and read the data. The network was also not that effective. So we have resolved these problems now.

Team Work

Danendra and I worked on calibrating and reading the data of IMU on ROS. Pulkit and I worked upgrading and backing up the Mini PCs. Pulkit and Rahul worked obstacle localization using LiDAR. Yuchi worked on connecting the April tags as a graph. Danendra and Pulkit worked on resolving the network issue.

MRSD Project Progress and Future Plans

We have to test the IMU on Husky, to ensure that it's working perfectly fine. In addition to that, we have to improve the work on connecting the April tags as a graph. We will also be working on LiDAR for obstacle detection.