<u>Individual Lab Report – 6</u>

Progress Review 7

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<u> Team F – Falcon Eye</u>

Team Members: Danendra Singh Pulkit Goyal Rahul Ramakrishnan Yuchi wang

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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

<u>IMU</u>

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.



sketch_nov22a	Arduino 1.6.12	- 0	×
File Edit Sketch To	ols Help		
sketch_nov22s	Auto Format Archive Sketch Fix Encoding & Reload	Ctrl+T	
1 void setup	Serial Monitor	Ctrl+Shift+M	^
2 // put y	Serial Plotter	Ctrl+Shift+L	
4)	WiFi101 Firmware Updater		
6 void loop [Board: "SparkFun 9DoF Razor IMU M0"	-	Boards Manager
7 // put y	Port: "COM14 (SparkFun 9DoF Razor IMU	M0)"	Arduino SAMD (32-bits ARM Cortex-M0+) Boards
9)	Get Board Info		Arduino/Genuino Zero (Programming Port)
	Programmer: "Atmel SAM-ICF"		Arduina/Genuino Zero (Native USB Port)
	Burn Bontloader		Arduino/Genuino MKR1000
			Arduino AVR Boards
			Arduino Yún
			Arduino/Genuino Uno
			Arduino Duemilanove or Diecimila
			Arduino Nano
			Arduino/Genuino Mega or Mega 2560
			Arduino Mega ADK
			Arduino Leonardo
			Arduino/Genuino Micro
			Arduino Esplora
			Arduino Mini
			Arduino Ethernet
			Arduino Fio
			Arduino BT
			LilyPad Arduino USB
			LilyPad Arduino
			Arduino Pro or Pro Mini
			Arduino NG or older
			Arduino Robot Control
			Arduino Robot Motor
			Arduino Gemma
			SparkFun SAMD (32-bits ARM Cortex-M0+) Boards
			SparkFun SAMD21 Dev Breakout
			SparkFun SAMD21 Mini Breakout
	Spath	un SDoF Razor IMU MD c	SparkFun 9DoF Razor IMU M0

and by using their firmware we were able to get reading on monitor.

💿 COM21 (SparkFun 9DoF Razor - M0) —	×		
	Send		
	^		
232766, -0.03, 0.99, 0.01, -68.60, -14.09, 26.65, 58, 56, -427			
232775, -0.03, 1.00, 0.11, -37.38, 3.72, 28.05, 51, 60, -443			
232784, -0.08, 0.96, 0.11, -6.46, 17.26, 35.24, 62, 59, -443			
232794, -0.13, 0.90, 0.19, 48.48, 28.23, 41.83, 62, 59, -451			
232861, -0.09, 0.73, -0.60, 65.61, -57.99, 27.56, 68, 56, -489			
232870, -0.02, 0.71, -0.53, 24.82, -60.30, 27.87, 95, 52, -536			
232879, 0.01, 0.69, -0.60, -27.68, -61.10, 28.48, 90, 59, -531			
232887, 0.03, 0.50, -0.58, -88.48, -61.65, 31.40, 92, 53, -523			
232896, 0.03, 0.53, -0.70, -156.40, -66.77, 21.34, 72, 56, -512			
232905, 0.04, 0.58, -0.81, -228.60, -72.20, 4.33, 65, 58, -493			
232914, 0.05, 0.57, -1.00, -296.28, -72.07, -8.96, 65, 58, -493			
232923, 0.09, 0.48, -0.97, -365.61, -77.38, -23.23, 62, 62, -448			
232932, 0.14, 0.52, -1.12, -455.37, -75.67, -37.80, 57, 57, -421			
232941, 0.15, 0.61, -1.10, -542.01, -46.40, -57.07, 45, 76, -377			
232950, 0.16, 0.80, -1.07, -610.91, -10.73, -78.72, 50, 64, -363			
232959, 0.16, 0.94, -1.01, -656.89, 26.77, -91.22, 53, 72, -328			
232967. 0.16. 0.970.96678.05. 62.6890.37. 54. 76311			
232976, 0.12, 0.96, -0.89, -656.46, 92.44, -79.76, 63, 84, -293			
232985 0.01 0.87 -0.69 -617 93 124 39 -72 80 70 92 -275			
232994 -0.00 0.88 -0.48 -567.44 150.98 -72.74 72.87 -268			
233012 _0 02 1 07 _0 17 _486 83 167 68 _91 22 80 04 _266			
200012, 0.02, 1.07, -0.17, -400.03, 107.00, -01.22, 00, 54, -200			
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V Autoscroll No line ending V 115200 baud V			

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
<pre>#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=-15.25,6.99,2.47 #YPR=-15.25,6.96,2.49 #YPR=-15.26,6.94,2.46 #YPR=-15.26,6.94,2.46 #YPR=-15.25,6.97,2.49 #YPR=-15.25,6.97,2.49 #YPR=-15.26,7.05,2.47 #YPR=-15.26,7.07,2.54 #YPR=-15.26,7.07,2.54</pre>	
S Autoscroll	No line ending 💌 57600 baud 💌

🕲 😑 🐵 razor-pub.launch http://localhost:11311	🛿 😸 🗇 🕕 danendra@danendra-VirtualBox: ~
* /jmu node/port: /dev/ttvACMB	linear acceleration covariance: [0.04.0.0.0.0.0.0.0.0.0.4.0.0.0.0.0.0.0.
* /rosdistro: indiao	
* /rosversion: 1.11.21	beader:
	sen: 194
NODES	stano,
	storp, 1517522210
imu pode (razor imu Adof/imu pode pu)	5C5. 1511522217
auto-starting new master	ortentation:
process[master]: started with pid [2553]	X: 0.00501/8/0338
ROS_MASTER_URI=http://localhost:11311	y: 0.789719298199
	z: 0.100596898023
setting /run_ld to aacfad60-079a-11e8-8c29-080027896dd0	w: 0.0133065198684
process[rosout-1]: started with pid [2566]	orientation_covariance: [0.0025, 0.0, 0.0, 0.0, 0.0025, 0.0, 0.0, 0.0, 0.0025]
started core service [/rosout]	angular_velocity:
process[imu_node-2]: started with pid [2577]	x: -0.01
[INFO] [WallTime: 1517522152.399470] Reconfigure request for yaw_calibration: 0	y: 0.02
[INFO] [WallTime: 1517522152.399779] Set imu_yaw_calibration to 0	z: -0.0
[INFO] [WallTime: 1517522152.448440] Opening /dev/ttyACM0	angular_velocity_covariance: [0.02, 0.0, 0.0, 0.0, 0.02, 0.0, 0.0, 0.0
[INFO] [WallTime: 1517522152.459821] Giving the razor IMU board 5 seconds to boo	linear_acceleration:
t	x: 0.93846484375
[INFO] [WallTime: 1517522158.586918] Writing calibration values to razor IMU board	y: 1.76699523437
[INFO] [WallTime: 1517522160.001017] Printing set calibration values:	z: -9.71521789062
ACCEL X MIN:-250.00	linear acceleration covariance: [0.04, 0.0, 0.0, 0.0, 0.04, 0.0, 0.0, 0.0
ACCEL X MAX:250.00	
ACCEL Y MIN: -250.00	header:
ACCEL Y MAX:250.00	seg: 195
ACCEL 7 MIN: -250.00	stamp:
ACCEL 7 MAX:250.00	secs: 1517522219
	nsers: 413775920
MACN X MTN+-600 00	frame id: base imu link
	orientation:
	x 6 665697228505
	v. 6 700727/60/40
	y, 0,763724400443
	2. 0.0377500031302
Mun_2_MAX:000.00	
	or tentation_covariance: [0.0025, 0.0, 0.0, 0.0, 0.0025, 0.0, 0.0, 0.0, 0.0025]
	y: 6.01
. 0000000 , 0. 0000000]]	Z: -0.0
	angular_velocity_covariance: [0.02, 0.0, 0.0, 0.0, 0.02, 0.0, 0.0, 0.0
GYRD_AVERAGE_OFFSET_X10.00	thear_acceleration:
GYRO_AVERAGE_OFFSET_Y10.00	x: 0.9193125
GYRO_AVERAGE_OFFSET_Z:0.00	y: 1.69498242187
	z: -9.62903234375
[INFO] [WallTime: 1517522160.002469] Flushing first 200 IMU entries	linear_acceleration_covariance: [0.04, 0.0, 0.0, 0.0, 0.04, 0.0, 0.0, 0.0
[INFO] [WallTime: 1517522177.507748] Publishing IMU data	

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





<u>Mini PCs</u>

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.

<u>Team Work</u>

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.