

Individual Lab Report – 5

Progress Review 4

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Team F – Falcon Eye

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Individual Progress

I was responsible for following tasks:

- a) Reading IMU and GPS data of Husky and testing for its accuracy.
- b) Setting up common launch files for Husky startup.
- c) Power distribution Board – ordering the required components.

Husky

Pulkit, Rahul and I are working on Husky. We have completed following tasks:

- 1) Read IMU and GPS data of Husky. We were facing a lot of problems in reading the data, as we were able to run and read the data separately but as soon as we tried to run and read from both sensors simultaneously the communication with Husky was getting disconnected. I will discuss that in detail in challenges section.
- 2) Made two launch files to separately launch IMU and GPS, which can be run using following commands.

```
roslaunch husky_bringup navsat.launch
```

```
roslaunch husky_bringup um7.launch
```

```
administrator@teamf:~$ roslaunch husky_bringup navsat.launch
... logging to /home/administrator/.ros/log/3d01f764-cfd4-11e7-97eb-a08869248a1a
/roslaunch-teamf-5853.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://teamf:41519/

SUMMARY
=====
PARAMETERS
* /gps/nmea_serial_node/baud: 9600
* /gps/nmea_serial_node/port: /dev/ttygps
* /navsat_transform/broadcast_utm_transform: False
* /navsat_transform/magnetic_declination_radians: 0
* /navsat_transform/pitch_offset: 0
* /navsat_transform/roll_offset: 0
* /navsat_transform/yaw_offset: 0

latitude: nan
longitude: nan
altitude: nan
position_covariance: [9998.0001, 0.0, 0.0, 0.0, 9998.0001, 0.0, 0.0, 0.0, 39992.0004]
position_covariance_type: 1
---
header:
  seq: 39
  stamp:
    secs: 1511391589
    nsecs: 468516216
  frame_id: navsat
status:
  status: -1
  service: 1
latitude: nan
longitude: nan
altitude: nan
position_covariance: [9998.0001, 0.0, 0.0, 0.0, 9998.0001, 0.0, 0.0, 0.0, 39992.0004]
position_covariance_type: 1
---
```

```

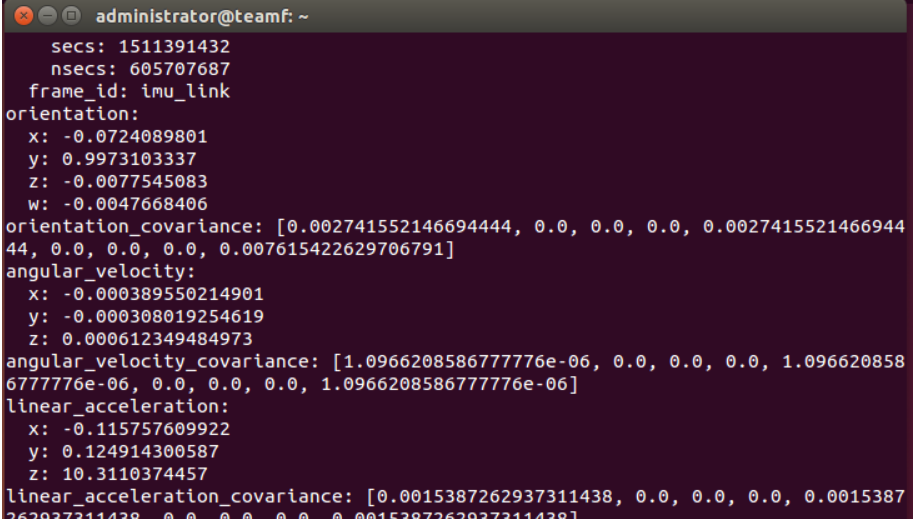
administrator@teamf:~$ roslaunch husky_bringup um7.launch
... logging to /home/administrator/.ros/log/3d01f764-cfd4-11e7-97eb-a08869248a1a
/roslaunch-teamf-4999.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://teamf:45998/

SUMMARY
=====

PARAMETERS
* /imu_data_transformer/target_frame: base_link
* /imu_filter/gain: 0.01
* /imu_filter/mag_bias_x: 0
* /imu_filter/mag_bias_y: 0
* /imu_filter/mag_bias_z: 0
* /imu_filter/orientation_stddev: 0.001
* /imu_filter/publish_tf: False
* /imu_filter/use_mag: False
* /imu_filter/zeta: 0.001

```



```

administrator@teamf: ~
secs: 1511391432
nsecs: 605707687
frame_id: imu_link
orientation:
  x: -0.0724089801
  y: 0.9973103337
  z: -0.0077545083
  w: -0.0047668406
orientation_covariance: [0.002741552146694444, 0.0, 0.0, 0.0, 0.0027415521466944
44, 0.0, 0.0, 0.0, 0.007615422629706791]
angular_velocity:
  x: -0.000389550214901
  y: -0.000308019254619
  z: 0.000612349484973
angular_velocity_covariance: [1.0966208586777776e-06, 0.0, 0.0, 0.0, 1.096620858
6777776e-06, 0.0, 0.0, 0.0, 1.0966208586777776e-06]
linear_acceleration:
  x: -0.115757609922
  y: 0.124914300587
  z: 10.3110374457
linear_acceleration_covariance: [0.0015387262937311438, 0.0, 0.0, 0.0, 0.0015387
262937311438, 0.0, 0.0, 0.0, 0.0015387262937311438]

```

- 3) Made one common launch file - including these two launch files and husky basic start up launch files.
roslaunch base.launch
- 4) Testing GPS data outside.

```

header:
  seq: 342
  stamp:
    secs: 1511249734
    nsecs: 466214895
  frame_id: /gps
status:
  status: 1
  service: 1
latitude: 40.4429633333
longitude: -79.94035
altitude: 258.4
position_covariance: [1.0, 0.0, 0.0, 0.0, 1.0, 0.0, 0.0, 0.0, 4.0]
position_covariance_type: 1
---
header:
  seq: 343
  stamp:
    secs: 1511249735
    nsecs: 463175058
  frame_id: /gps
status:
  status: 1
  service: 1
latitude: 40.442965
longitude: -79.9403516667
altitude: 258.3
position_covariance: [1.0, 0.0, 0.0, 0.0, 1.0, 0.0, 0.0, 0.0, 4.0]
position_covariance_type: 1

```

Power Distribution Board

Danendra and I worked on power distribution board. We have already submitted the final schematic and board. We got the final printed, but we were not aware that we are supposed to populate and show the PDB by FVE. As it is not very critical component in our system. Husky platform already comes with the 5V/12V step down levels. We made PDB as a backup to that and to separate the supply of Husky base and other components. So, we had not ordered the components. As of now we have ordered all the components on priority, and we need to complete and test the Power Distribution Board, as soon as we receive all the parts.

Challenges Faced

Some of the Challenges are:

- 1) Four members in Computer vision, and our unending struggle with its assignments and project.
- 2) Cold weather – Testing outside in cold weather is quite difficult.
- 3) Machines are not that predictive, and they can't do the same job repetitively with same efficiency. Our Husky is highly unpredictable, somedays it just decides not to run properly. A night before you debug everything and then go home peacefully that now everything is running, tomorrow we will do something above this and the next day you come to find that the communication is now again getting interrupted. As of now, it is working fine.
- 4) In Power distribution board, we were not aware that we are supposed to populate board and test it in FVE, so we didn't order components timely. We have now placed the orders, but the time is very critical now.

Team Work

Pulkit, Rahul and I worked on reading IMU and GPS data with ROS installed on Husky PC. We also made launch files for IMU, GPS and combine launch file. Pulkit and Rahul also worked on Wifi network for Bebop2, solving the network issue with Husky and changing the dev rules for plugging in different serial components on the Husky. Making the Husky communication stable with all the sensors connected. They also tested the network bandwidth and range after connecting the Husky and Bebop on the same network. They have started with EKF localization. Danendra and Yuchi were working on Bebop2, and they have successfully done the GPS waypoint based navigation of Bebop2. Yuchi was also working on April tag detection, and he has been able to detect April tags with good accuracy.

MRSD Project Progress and Future Plans

Performing successfully all the tests for Fall validation experiment (FVE) is the focus for the whole team. So, we'll work on the tasks required to complete FVE, which are as follows:

Stabilizing Bebop2 GPS based navigation. We can do GPS based navigation through ROS.

We have added a new test of GPS waypoint based navigation of Husky. So, we must test the accuracy of the data we are getting from different sensors like IMU, GPS etc. We need to fuse all this data for better localization and navigation.