Individual Lab Report 6

Progress Review 7

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Team F - Falcon Eye
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Individual Progress

After FVE, I was mainly working on different issues we faced with the Husky and Beebop which includes testing and configuring WiFi network for range test with Husky & Bebop, solving the Mini-PC slow speed issue with Husky, and detecting obstacles using Velodyne Lidar.

1. Configuring WiFi network for Range testing

I along with Danendar looked on the internet for a good range WiFi. Then after talking to Team C we realized that they are facing similar issue and they have ordered a WiFi access point for the same. They already had experimented a lot with that hardware and were getting much better results.

After getting the WiFi access point from them, I logged into the drone to make the changes required to connect it to this access point. I used telnet via a wired connection. This involved making changes to the shell script which we wrote during the previous semester making sure that even if something goes wrong I do not lose the connection to the drone.

After successful connection of the Bebop to the hosted network, we connected the Husky, remote base station and tested the network with the both the systems moving with Bebop streaming live video to the base station computer. Using this we did range test to verify if the range is as per the commitment in the FVE.

```
#!/bin/sh
#Set the SSID, Password and IP
SSID='teamf'    # Change this to your SSID
PW='clearpath'          # Change this to the password of your wifi network
IP=192.168.1.101        # Change this to the desired Bebop IP

#Connect to defined Network
BLDC_Test_Bench -M 2 >/dev/null
sleep 1 &&
mount -o remount,rw / &&
sleep 1 &&
wpa_passphrase $SSID $PW > /etc/wpa_supplicant.conf &&
sleep 1 &&
ifconfig eth0 $IP &&
sleep 1 &&
mount -o remount,rw / &&
sleep 1 &&
wpa_passphrase $SSID $PW > /etc/wpa_supplicant.conf &&
sleep 1 &&
ifconfig eth0 $IP &&
sleep 1 &&
wpa_supplicant -B -D wext -i eth0 -c /etc/wpa_supplicant.conf &&
sleep 1 &&
BLDC_Test_Bench -M 2 >/dev/null
sleep 1 &&
BLDC_Test_Bench -M 2 >/dev/null
#wait 5 &&
#/sbin/udhcpc -i eth0
~
~
~
```

Fig1: Shell script to connect bebop as a client to teamf network

2. Mini-PC upgrades

We faced a lot of problems with Mini-PC being slow and not able to handle the processing of Velodyne Data. I looked on the internet and ordered an extra ram stick along with a SSD HDD. Before starting any work on the Husky I made sure that the mini-PC was upgraded. Pratibha helped me in taking backup from the older HDD and burning it to the new HDD. I then upgraded

the PC with new RAM and HDD. I ran all the tests including Velodyne puck test to check the change in performance.

3. Obstacle detection using Velodyne Lidar

I primarily contributed to localizing the obstacles from velodyne lidar's point cloud along with Rahul. We installed the basic ROS drivers on the mini-pc along with the pointcloud library. We could visualize the point cloud from Lidar in real time without any lag after upgrading the specs of mini-pc.

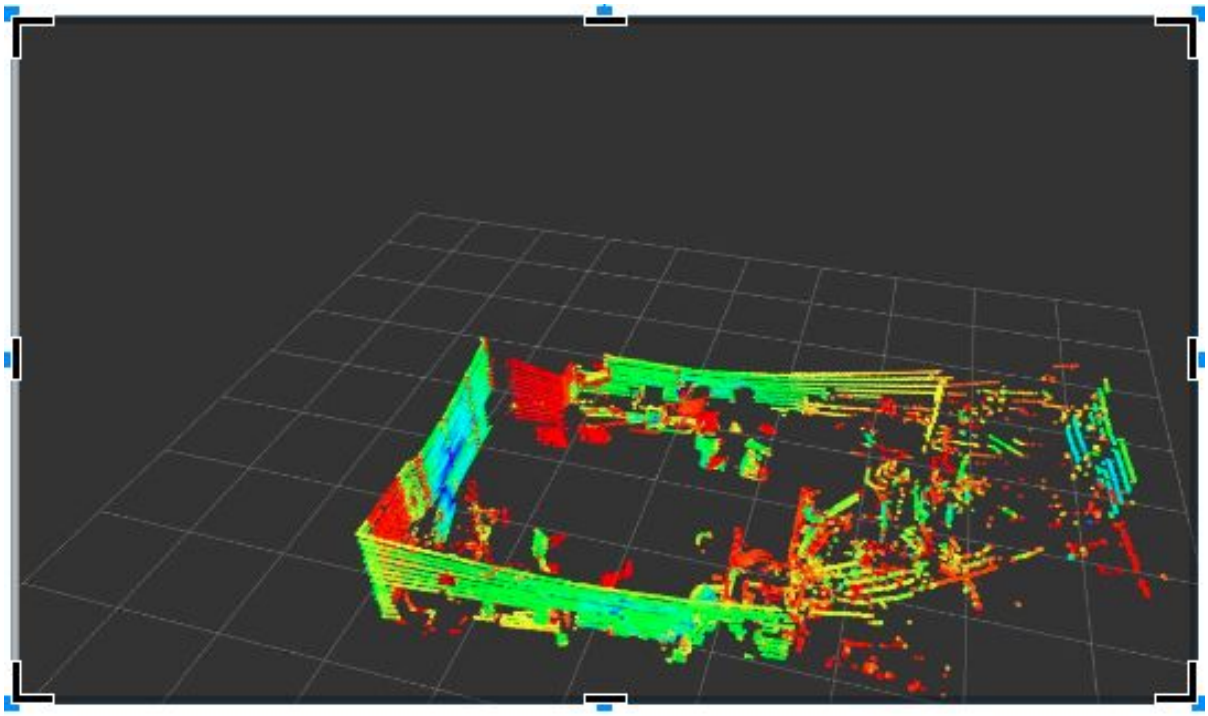

Fig2: point cloud data

We used to velodyne height map to segment the obstacle with certain height from rest of the cloud. The below fig3 shows only obstacle points in 2d plane only for the visualization. Certain information about these obstacles can be obtained by subscribing to the velodyne_obstacles topic.
We wrote a ros node which subscribes to the velodyne_obstacles node and then calculates X,Y and Z coordinates w.r.t. To LiDAR and displays them on the terminal.

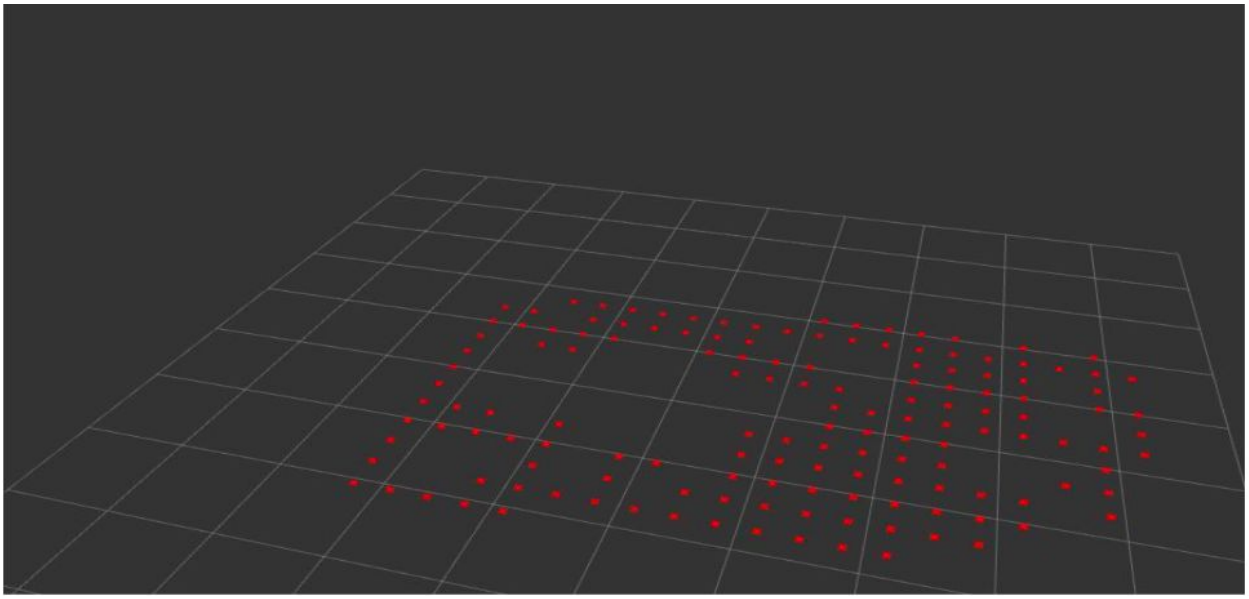

Fig3. Segmented Obstacles

We also made our ros node subscribe to the clear path in order to check the traversable path in the environment.

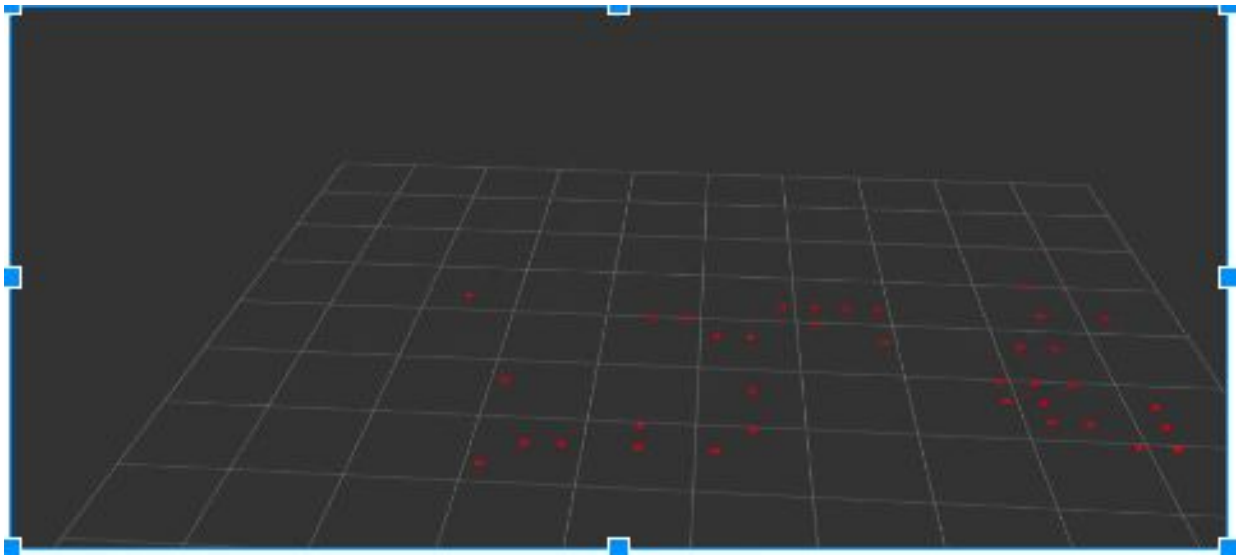

Fig4: Clear path

Challenges

1. Difficulty in accessing the drone. Even after connecting it using wired connection there were issues with accessing the network connection. I had to hard reset it to bring it to

2. Converting the published data to 3d coordinates.
3. This semester is pretty busy for everyone, all the team members are also registered in different courses, it's difficult to have a time sync among the team members. Everyone in general is finding it little tough to manage the time and include everything.

Teamwork

I and danendra worked on solving the WiFI issues as explained above in the ILR. Pratibha and I worked on backing up the PC and upgrading it. I and Rahul worked on LiDAR obstacle detection. I also helped Pratibha and Danendra with calibrating and writing the algo for data fusion in IMU. Yuchi mainly worked on combining april tag's in order to make a graph even when the tags are not visible in drone's frame. We as a team worked to eliminate all the issues we faced during the FVE.

Future Plans

We plan to successfully perform the mentioned tests in FVE. We specifically plan to work on the following tasks.

1. Check the market for availability of a better network access point and order multiple of them to make a mesh network, in order to close this issue asap.
2. I along with Rahul need to work on perfecting the localization of obstacles.
3. Pratibha and Danny need to integrate the IMU with the Husky.
4. Yuchi will be working on the drone to make it detect the april tags from a higher height.