Individual Lab Report 04

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Team C: FlySense
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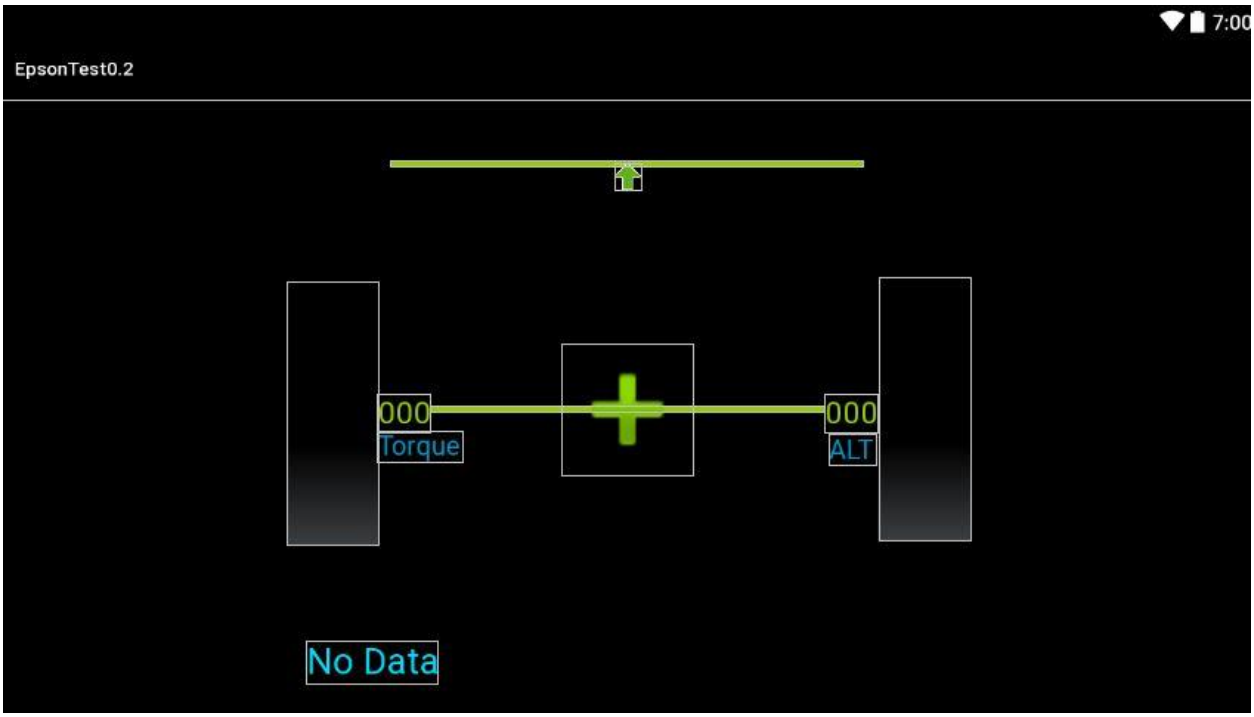
Work done:

- Developed an updated version (fig. 1) of the AR GUI with scrolls showing the Altitude and Speed information.
- Also added the required Speed and required Altitude field views.
- Established the communication between the AR headset and on-board computer using ROSJAVA nodes on android environment (AR headset is an android device). (fig. 2)
- Started integrating different software subsystems namely the XML (GUI front end) and the ROSJAVA and JAVA (backend).
- Helped Joao get started with Android and JAVA so that he can start working on speech recognition aspect of the project.
- Collaborated with Shivang in interfacing the Jetson with AR headset.
- Identified libraries for sound warnings for the pilot.

Problems Faced:

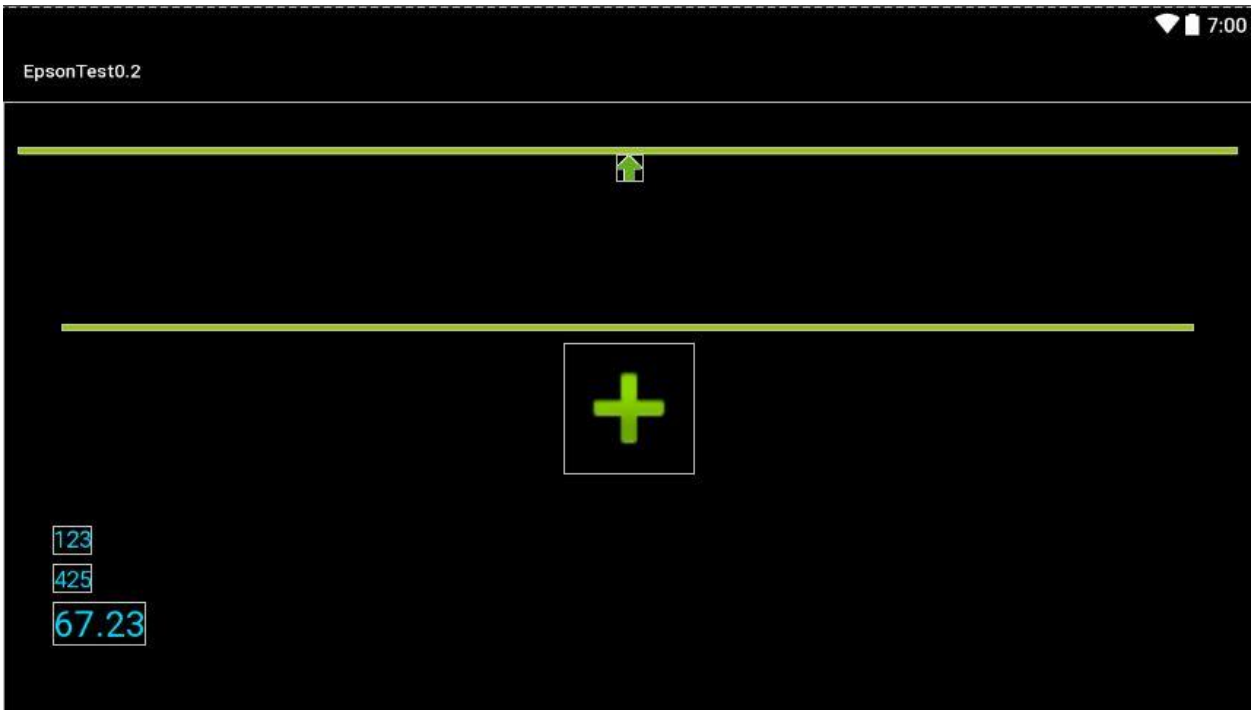
- Sparsely documented ROSJAVA classes; most of the available ones being outdated.
- AR Headset not connecting to the CMU-SECURE wifi, still no idea why.
- Jetson having problems with the wifi connectivity as well, which is one of the reasons our testing is stalled.
- Integrating various subsystems giving problems as expected. Need some help with object oriented programming aspect.
- Random Ubuntu crashes while developing, had to shift permanently to Windows which caused a couple days delay.

Figure 1 Updated GUI with scrolls and other data



(I cannot show working images/videos here because it is on the AR headset without a screencast option. Also ignore the "Torque" label in the image, it is actually "Speed".)

Figure 2 Communication with the Jetson (Random values shown)



(Assume black to be transparent and overlay this on reality)

How I Plan-to/Solved the Problems:

- Random Ubuntu crashes while developing, had to shift permanently to Windows which caused a couple days delay.

1. Sparsely documented ROSJAVA
- My experience in JAVA helped me write my own code. Lack of documentation lead to using some method which might not be a best practice.
- It still has some issues, but hopefully I'll figure it out soon.

2. AR Headset not connecting to CMU-SECURE
- We setup temporary WIFI setup on our mobile devices and getting things to run on this for now.
- We are looking at using a separate WIFI router for our network of devices, which should solve the problem.

3. Jetson having network connectivity problems
- Again, this is some problem with the WIFI module (taken from the lab), looking at buying better modules and praying that this problem doesn't persist.

4. Integrating software subsystems
- There are different classes for each functionality and a lot of message passing between them.
- I want to make this code modular and easy for other to reuse, so still looking for help in this.

5. Random Ubuntu Crashes
- Ported everything to Windows and taking regular backups of everything.

My Plan for Coming Weeks:

1. Improvising the GUI and locking down a final version of how everything looks.
2. Adding audio warnings aspect of the UI.
3. Improving the communication between headset and Jetson.
4. Testing edge cases to make sure that system doesn't fall apart on the day of the test.
5. If time permits, integrating the speech recognition part into the application.

Current Team Progress:

We have some significant progress in all aspects of the project. Individual contribution listed below:

Joao:
- Working on familiarizing himself with Android so that he can start contributing in the technical stuff (we were falling short of people on this).
- Has done a lot of work on developing algorithms for the dynamic window/segmentation. Also wrote pseudo code on C++ for future integration with the system.

Shivang:
- Developed a skeletal version of the backbone of the project. I worked closely with him in integrating the AR headset with the quadcopter.
- Is also helping Hari with mapping segmentation.
- He got the Jetson up and running without problems.

Nick:
- Nick has done a beautiful job managing the team. He schedules everything perfectly so that we do no miss deadlines.
- Even though he is the designated program manager, he is helping Hari in some technical aspects of the Mapping system.
- He has developed the Power Distribution board for providing power to sensors, onboard computer and the velodyne lidar.
- Also designed the CAD model for the hardware setup.

Hari:
- Worked very hard understanding the undocumented ROS Packages from AIR Lab.
- Has got the mapping system up and running.
- Has also been working closely with NEA to get required flight data for our simulation in FVE.

Team Plans:
- Looking at integrating the subsystems as soon as possible.
- First, solve all the problems mentioned a few pages above. Then get the HUD up and lock it down.
- Generate 2d maps and display it on the headset.
- Some working version of the speech recognition.
- Audio warnings also integrated and working.

- Collect some experimental data from our systems (quadcopter and Velodyne) and see if there are any unforeseen issues.
- Generating Bird’s Eye view from the 2d map.