FlySense

Sai Nihar Tadichetty

Team C: FlySense

Teammates: Shivang Baveja, Joao Fonseca, Harikrishnan Suresh, Nicholas Crispie

ILR 06

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Work done:

The main priority of the team has been to get the quad up in the air with all the functionality we had in the last semester. Talking about my work, I have delivered my targets for this semester in fall itself so I am currently looking for ways to increase the scope of the project based on suggestions from Basti.

Basti suggested that instead of just having the obstacles being represented as dots on the screen, we can make the obstacles look better by giving it form. I have been looking into detection and segmentation to see if it fits the project's requirements. I have finalized the 'Detectron' algorithm that was recently published by Facebook which provides state of the art detection capabilities. I have been working with a senior MS ECE student to branch out from the Detectron network and see if I can add a segmentation layer to it. It seems doable, but we still aren't sure about how many classes it will be able to segment with the limited processing we have on the Jetson TX2. Hopefully we wont need to detect many classes based on typical use case scenarios for quadcopters or helicopters. We still need to discuss with Basti about specific classes we will be looking to classify.

Coming to the speech recognition, Near Earth Autonomy hasn't been very keen on pursuing that path as they don't really want us to spend time on making an accurate speech recognition system when they can just buy an expensive headset which can remove all noise from the microphone. I have stopped working on collecting datasets and deep hidden markov model architectures for speech now.

Coming to the Epson, I haven't been able to work much on this because I spilled water on my laptop which corrupted the memory and the OS on it. The laptop is under repair and will be back this weekend, and the first task after that would be to test the FPV camera feed on the Epson.
We are planning to change the way the screens look because of the fact that we'll be flying with a camera now. So we will be doing some image processing before showing it to the pilot, the birds eye view will be overlapping the FPV video so that the pilot need not change screens while in flight.

Because we are planning to increase the scope of the project, we planned to off-board the image processing and detection/segmentation algorithms. We bought another Jetson TX2 which will serve as a ground station (see fig. 1) which will process images before sending it off to the Epson. There will be some expected lag in the video stream, but we expect it to not be very noticeable specially since we will be flying very slow.

This is pretty much everything that has been going with my end. Trying to find and increase scope of the project such that it sets up a base for the internship at NEA this summer.
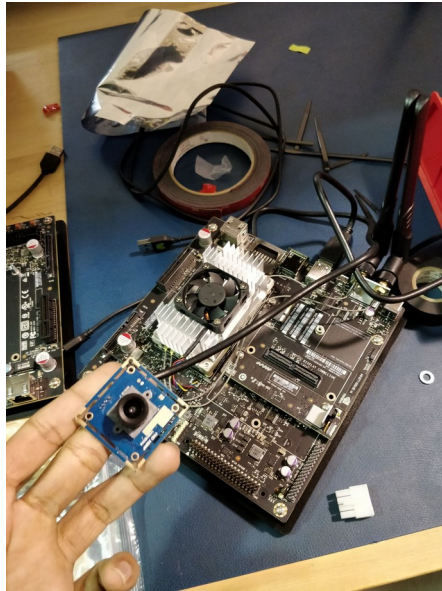
Illustration 1: Ground Station Setup

Challenges Faced:

- The new Jetson has issues with its setup, the fans do not run as soon as it is switched on so I had to write scripts to make it turn on.
- The camera that we bought for the FPV has fish eye distortion, wondering if it is a good investment of time to try and undistort it.
- Assignments this semester are a bit too big, all of us have been spending way too much time on them than we anticipated.

Teamwork:

Shivang Baveja	• Flight tests • Radio Communication • Quad setup
Joao Fonseca Reis	• Algorithms for flight path and sound warnings • 2D to 3D conversion of fall algorithms
Harikrishnan Suresh	• Flight tests • Hardware Procurement
Nicholas Crispie	• Jetson TX2 setup on the orbitty carrier board • 3D mapping of environment fo r

Plans for next PR:
- FVE test on the quadcopter in flight
- Setup the Velodyne, Jetson and camera on quad for data collection