EE / CprE / SE 491/492 – sdmay20-47
Real-time volumetric analysis
Third be-weekly report
Feb 23 - March 12, 2020
Client: Prof. Ali Jannesari
Faculty Adviser: Prof. Ali Jannesari

Team members

Kenneth Lange – Team Lead
Alain Njipwo – Chief Hardware Developer
Luke Bell – Chief Interface Developer
Daniil Olshanskyi – Chief Software Developer
Max Medberry – Chief Backend Developer

Past weeks accomplishments

- Test flight successful - a rather big accomplishment!
- Jetson & Zed camera power issues solved - should just use 14+ voltage (preferably from the battery)
- One more custom simulation environment done
- Finished a prototype of wind simulation
- Can get images from ZEDM via python

Pending issues

- Drone battery died, have to get a new one
- Jetson fan burned out, have to get a replacement one
- Drone mass distribution is uneven, have to replace and rewire everything and do another test flight

Individual contributions

Team member	Contribution	Bi-weekly hours	Total hours
Kenneth Lange	These last two weeks have been spent working on a new environment to train the drone to better navigate a room with more accuracy. This is to provide better learning in a tighter environment. In the past it had been noticed that the drone was following the character as expected, but had more difficulty following when the character went behind a wall in a way that would be tight for the drone to reach without adjusting location first. The hope is that with this environment we are able to limit the struggles of the drone learning and teach it more consistently how to approach this problem when faced in the real world. After finishing this higher priority item, the goal is to return to Lidar to depict the values that have been received. Additionally, the Lidar will have some test code going over the correctness of the sensor and calibration will be needed to ensure that it is accurate despite the scenario it is in.	13	54
Daniil Olshanskyi	Did a drone test flight to be able to analyze if the model construction and programmable settings and connections are made correctly and the drone is capable of flying. Analysis of the flight shows that the drone is slightly imbalanced in terms of mass distribution and aerodynamics even without the SoC attached to it, so the drone will have to be slightly rebuilt and rebalanced. Also worked with the battery to understand if it is safe to charge and use it under low voltage. Also worked on zed stereo camera scripts to find out the ways to implement them into the Reinforced Learning Algorithm instead of simulation images to be able to launch the RLA on the drone autonomously. So far this task seems doable, but may be risky in terms of testing, thus the problem of the drone "wiggling" in the air has to	12	62

	be solved first, which in it's turn requires to solve the battery issue.		
Luke Bell	Worked on creating launch files to easily activate/deactivate the various systems on the drone (camera, neural network, etc.). Read into documentation about existing ROS packages for communicating with the drone hardware and controlling/accessing data from the ZED camera. Began working on interfacing ROS with the drone's controller to obtain data from its various components (GPS, accelerometer, etc.) and to send movement commands to it through MavLink.	12	54
Max Medberry	Worked in ROS and airsim to make use ROS nodes to control airsim through airsim APIs. Decided ROS compatibility was not necessary for this aspect of the project. Moved on to focusing on controlling the drone through API via a Python script. Location nodes were read from a CSV formatted .txt file. A series of locations and battery levels at each location are used to control the drone through a single trial run. After the run the drone resets itself to the initial state. After being provided with files to feed to the script, undertook the task creating an airsim environment in Unreal Engine to be the testing environment. Created landmarks for start, target, and battery charge positions, and boundaries to indicate the edge of the testing areas. Finally filmed the drone simulating through multiple runs with differing data sets simulating high wind and low wind conditions.	20	62
Alain Njipwo	These past weeks, I've done research on the stability of the drone. The frame was tightened and secured. This resulted in improved stability during subsequent test flights. I am further investigating the potential causes of the observed instability of the drone. We are currently unable to hover completely still at a given altitude. I am doing further research into the payload the drone can safely carry. As well as doing early positional prototyping of all the	14	57

	components that will comprise the finished project. The new Lipo battery that was purchased is currently malfunctioning and I am also in the process of determining through testing if that depleted cell(s) can be brought up to operating voltage for further usage.		

Plans for the upcoming week:

- Troubleshoot Lipo batteries. Recover dead cell/repurchase if needed
- Get the Jetson fan
- Troubleshoot the Jetson carrier board - something seems malfunctioning there
- Finish figuring out ROS <-AirSim-> UE4 simulation integration
- Find out how to get drone telemetry and ZEDM into ROS