sdmay19-35: Implementing a Web Portal System for Drone Simulation and Control
Biweekly Report 4
March 12th - April 2nd
Client: Ali Jannesari
Faculty Advisor: Ali Jannesari

Team Members
Bansho — *Test Engineer. Sensors Hardware Developer.*
Ian — *Scrum Master. Full Stack Developer.*
Li — *Test Engineer. Back-end Developer.*
Jawad — *Meeting Manager. Embedded Systems Developer.*
Mehul — *Project Lead. Computer Vision Developer.*
Sammy — *Report Manager. Lead Front-end Developer.*

Summary of Progress this Report
- Established communication between the drone and client
  - Connect to a TCP socket on the Raspberry PI to communicate with the web-client.
  - Set up a web-socket to establish communication
  - Added a terminal to the flight web-page that displays the output from the drone and allows the user to send commands to it
- Switched to ArduPilot for running flight physics in the Gazebo simulator
  - Attempted to install ROS Indigo on a testing VM (failed due to OS incompatibility)
  - Abandoned Erle-Copter simulator since the cost of dealing with the installation and compatibility issues outweighs the potential benefits
  - Documented installation problems on the wiki for knowledge retention purposes
  - Installed ArduPilot on a testing VM
  - Established communication between ArduPilot and Gazebo using the ArduPilot plugin and SITL (software in the loop) simulator
- Built the ROS package on the drone that handles communication between it and web-client
  - Built a ROS package - which is meant to be our serial node, for communicating with the web client
  - Used the websockify to wrap around the tcp communication
- Conversion of file formats for generating the virtual environment
  - .obj (from ODM) ---> .stl ---> .dae ---> included in .sdf (.world of Gazebo)

- Setup ESCs calibration
  - Calibrated it with four ESCs together, but they were not calibrated correctly.

- ○ Researched how to calibrate the ESCs.
- ○ Tried to calibrate the ESCs separately many times.

- ● Researched PID tuning and Basic tuning
  - ○ Researched the PID tuning setup in the APM
  - ○ Researched the basic tuning setup in the APM

Pending Issues

- ● Sometimes the socket connection gets closed due to invalid data being sent. This is 'bandaged' by reconnecting but time is lost by doing so.
- ● Automating the path of 3d files from ODM to Gazebo and reconfiguring, texturing aligning the object files to make one compact world.
- ● Drone cannot be controlled using ROS after trying different methods for days. Tried to contact the company but got absolutely no response. Should switch to some other method for controlling the drone using a computer - probably will just use APM.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Bansho	Find the way to building the geotag-photo, getting gps coordinate from gps module	22	140
Ian	Installed ArduPilot. Established communication between ArduPilot and Gazebo.	25	143
Jawad	Built the ROS package on the drone that handles communication between it and web-client	22	147
Li	Calibrated the ESC manually and researched the setup ways of PID tuning and basic tuning, and did Motor Power Up Test	21	139
Mehul	Found the right combination of files needed to generate a virtual environment. Did this manually using multiple softwares.	23	144
Sammy	Established communication between the drone and web-client	23	155

Plans for Upcoming Reporting Period

- ● Integrate ArduPilot into our Gazebo/GzWeb container in order to have realistic controls in our simulator.

- Generate some environments using the Computer Vision component and load them into the simulator.
- Bring everything on the same network.
- After able to calibrate the drone through APM, will try to adjust the values in APM next: PID tuning, basic tuning and some parameter values in the APM.