MicroCart (Microprocessor Controlled Aerial Robotics Team)
sdmay19-20
Week 11 Report
October 29 — November 4
Client/Advisor: Dr. Phillip Jones

Team Members

James Talbert — *Hardware*
Sarah Koch — *Controls*
Anthony Bertucci — *Ground Station*
Tina Li — *Quad Software*
Nina Moriguchi — *Quad Simulation*

Summary of Progress this Report

- **James**
  - Continued testing the new quad platform. The manual mode tests already done prove that the hardware interface to sensors and motors are functioning, but the wifi bridge and other autonomous systems were not tested yet.
  - Testing showed that the ground station cannot connect to the quad. This could be because of a firmware difference between the two WiFi bridges, or due to some other configuration failure.
  - I am looking into the WiFi board and the process by which the ground station connects to it.
- **Sarah**
  - Used Eagle to design a practice PCB. Based on my experience using Eagle and Ultiboard, my preference would be to use Ultiboard for our design. Both platforms are good, but Tina and I can receive assistance from lab assistants with our design more easily if we use Ultiboard.
  - Reviewed the literature for quad PID parametrization procedures and test setups
  - Provided flight data logs and a copy of Matt Rich's thesis to professor Umesh
- **Tony**
  - Tested second quad for functionality with James
  - Continued to write code to attempt to use Data Analysis tool to analyze flight information in real time during flight operations
    - Finished code to allow GUI.m to run from mainwindow.ui GUI as a background process
    - Began modifying Matlab script to run in intervals to allow for real-time updates of plotted data points
- **Tina**
  - I noticed the sensor data I was sending was empty, so I investigated the code and figured out which variables were being populated, then cleaned up the rest of the code
  - I had to re-write the sensor data code and rework the structure completely
  - I wrote documentation detailing the configuration packet sent to the quad by the ground

station, and how that should work. Also wrote documentation for sensor to ground station packets
  - There are now 22 real time variables than can be transmitted. Determinining which data should be sent is determined by which bits are set in a configuration packet sent by the ground station
- **Nina**
  - Absent

Pending Issues

- **James**
  - The ground station will not connect to the second (updated) quad. The reasons are unclear, and we need more understanding of the connection process to debug.
- **Sarah**
  - James and I originally intended to parametrize the second quad so that we could make adjustments to the flight parameters (mass, moment of inertia, etc) that are hard-coded into the PID controller. This was based on the assumption that running the second quad with a PID controller tuned for the parameters of the first quad was contributing to crashes. The problems ended up not being related to the PID controller, which was robust enough to work on both quads. We would still like to parametrize the quads again, but now we plan on doing this after the custom PCBs have been attached, so now this task must wait.
- **Tony**
  - Latency may still end up being an issue on the quad side of things. In addition, matlab script takes considerable time to plot. This may mean that "real-time" data analysis ends up being closer to 10+ second interval data analysis.
- **Tina**
  - The code requires extensive rewriting, and it is not completely done yet
  - The code needs to be refactored so it is easier to read
  - Peter, the previous test lead, noted that there were very few automated tests for ground station.
- **Nina**
  - Absent

Plans for Upcoming Reporting Period
- **James**
  - The objective for next week is to get the quad flying in autonomous mode. Additionally , we want to do some endurance tests of the system, to test for interment problems observed by last years team.
    - Test IP connection between ground station and quad (debug as needed)
    - Test ground station connection to quad through WiFi (debug as needed)
    - Flight Test (debug as needed)
- **Sarah**

- ○ Begin first version of PCB schematic design
  ○ Continue working on creating controls documentation
- **Tony**
  ○ Update GUI.m to be optimized for real-time analysis rather than one time data analysis, as well as determine efficacy of using this program in a real-time setting (determine how fast script can be repeatedly run)
- **Tina**
  ○ Do PCB design, schematics, etc.
  ○ Write documentation for how to use the PCB, describe the test ports, how to use the battery monitor, etc.
  ○ Finish rewriting sensor code
- **Nina**
  ○ Absent

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
James Talbert	● Verified that the quad does not connect to the ground station ● Started working through the available documentation on the connection interface	10	68
Sarah Koch	● Determined Ultiboard was preferred design platform ● Provided data and project literature to a client ● Reviewed procedures and test setups for controls parametrization	6	49
Anthony Bertucci	● Finished implementation of matlab plotting script as background process in mainwindow.ui ● Began updating GUI.m plot function to update at intervals from .txt file rather than all at once. ● Helped to test autonomous and manual functionality of second quad with James	7	46
Tina Li	● Started modifying ground station to receive RT packets	7	44

	● Created documentation for sensor data RT stuff ● Investigated how the quad was hooked up ● Noticed issues (junk code) and cleaned it up ○ Started re-write on RT sensor code		
Nina Moriguchi		0	17

Gitlab Activity Summary

Action: pushed to, Sat Nov 03 2018
Author: bertucci
Title: Adding GUI.m (Matlab plotting) functionality as background process ...

Action: pushed to, Sat Nov 03 2018
Author: tinali
Title: sensor data code cleaned up

Action: pushed to, Sat Nov 03 2018
Author: tinali
Title: py scripts that graph sensor data in real time - working
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