

MicroCart (Microprocessor Controlled Aerial Robotics Team)

sdmay19-20

Week 9 Report

October 15 — October 21

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

- Created the software project in the new tools. Most of the source code could be carried over from the old project, but the toolset needed to be configured to use the external files for the main quad application (everything but the Hardware Abstraction Layer).
 - Initial tests are positive, but the code enters a failure condition due to the I2C sensors not being installed. To fully test the system, we need to either build a new quad, replace the Zybo on an existing quad (we have 2), or install the sensors with flying wires in a benchtop setup.
- Created a proposal with cost requirements and high-level design for a test setup that runs on the zybo, but runs automatically from the GitLab server (CI).

● Sarah

- I familiarized myself with the software Tina and I will be using the design the custom PCB (UltiBoard)
- I expanded the scope of my communications with former team members to include inquiries into the software implementation of the controls algorithm and continued work on creating controls documentation
- I continued discussion with the team and Dr Jones concerning what features are desired for the custom PCB, splitting this list into necessary features and bonus features. We decided to expand the scope of the board to include testing/debugging features in addition to improved board/module/motor connections and power management features.

● Tony

- I discussed with Dr Jones the current standard for splitting and displaying flight log data that currently exists within the project documentation. In addition, I explored documentation pointed out by Dr Jones that details the MATLAB scripts that have been written to display the various forms of flight data.
- I began modifying my UI design to reflect the flight data standards detailed in the

documentation of the project.

- **Tina**
 - I discussed with my teammates what was needed for the new PCB board and helped create a project plan. I spent time trying to understand what problems needed to be solved : the voltage monitor, the lack of documentation and the wiring of the PCB, and the debugging LEDS, etc.
 - I also installed EAGLE, which is a type of PCB design software, and started familiarizing myself with how to use it
 - I talked with Tony about how best to communicate with ground station, and explored alternate ways to implement the sensor data sending
 - Talked to Sarah about how to test the controls output
 - **Nina**
 - Absent
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Pending Issues

- **James**
 - It is difficult to test the functioning of the hardware platform automatically, as it requires running a design on the zybo, which usually means user intervention (creating the BOOT.BIN file and installing the SD card to the zybo).
 - Running manual tests of the new hardware platform requires all the sensors and external modules to be installed to avoid built-in fault conditions. We need to build a testbench of some sort to verify the hardware platform before running a test flight.
 - **Sarah**
 - As reported last week, previous MicroCART members have been reliable in answering questions concerning project functionality, but communications are slow-paced due to their other obligations (full-time jobs)
 - The documentation for a power management board that was designed by a previous team was lost. This may slow our PCB design, but has also caused us to reconsider what function we would like the board to serve.
 - **Tony**
 - It may be difficult to send the entirety of flight data over the UART connection during a normal duty cycle due to the raw amount of data being passed. This may require us to force the user to choose the type of data they want to be sent in real time rather than sending all data and then parsing (this will be determined by future testing)
 - **Tina**
 - The second quad needs to be wired correctly, or else I am blocked on figuring out which wires go where.
 - Controls output testing - need to determine if virt-quad data is reliable
 - Research best ways to monitor a LiPo battery : our current idea is to check the voltage - at low battery levels the operating voltage drops below a certain threshold - test this idea?
 - **Nina**
 - Absent
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Plans for Upcoming Reporting Period

- **James**
 - Next week, I will test the updated platform with all sensors and attempt a test flight.
 - I will also work to come to a decision on the autonomous hardware testing system with our advisor.
- **Sarah**
 - I will be familiarizing myself with a different PCB design software, Eagle, which Dr. Jones has recommended. When I have worked with both, a decision will be made as to which software is preferred for the PCB design.
 - I will continue communications with previous MicroCART members and update the Controls Documentation accordingly.
 - Tina and I will conclude the gathering of specifications and functionalities for the custom PCB and create a Specs sheet to base our design work off of
- **Tony**
 - I will fully update the UI to reflect the types of MATLAB applications already written for this project.
 - I will continue to familiarize myself with the flight data structure as well as modify my current code to parse data in this structure.
- **Tina**
 - Write documentation on how to hook up the PCB, create rudimentary PCB diagram
 - Test code I wrote for sensor sending in RT, check using sniffer to see if packets are sent correctly
 - Write the controls output testing - there's some code in the virt-quad that can be used to get the expected output
 - Write test plan for this in case it doesn't get done
- **Nina**
 - Absent

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
James Talbert	<ul style="list-style-type: none"> ● Began testing the quad software with new HW platform and sensors ● Developed an automated HW test station proposal 	7	48
Sarah Koch	<ul style="list-style-type: none"> ● Continued work on the Controls Documentation ● Expanded the scope of the PCB 	5	37

	<ul style="list-style-type: none"> ● Practiced using UltiBoard software 		
Anthony Bertucci	<ul style="list-style-type: none"> ● Began to update UI elements to reflect existing MATLAB applications ● Explored the current flight data standard documentation and began to modify code structure to reflect this 	4	35
Tina Li	<ul style="list-style-type: none"> ● Planned what needs to be added to the PCB we're making for the quadcopter ● Looked at the wiring configuration documentation ● Talked to team members about pending issues 	5	32
Nina Moriguchi		0	17

Gitlab Activity Summary

Action: pushed to, Wed Oct 17 2018

Author: James Talbert

Title: Get the SDK running again with the timer re-installed

Action: pushed to, Wed Oct 17 2018

Author: James Talbert

Title: Confirmed that the IMU works on the new HW platform.
