MicroCart (Microprocessor Controlled Aerial Robotics Team)
sdmay19-20

December 17 — February 2
Client/Advisor: Dr. Phillip Jones

Team Members

James Talbert — *Hardware*
Sarah Koch — *Controls*
Anthony Bertucci — *Ground Station*

Summary of Progress this Report

- **James**
    - Completed design changes for the PCB, I was unable to identify the short in the design, but I increased clearances to reduce the likelihood of the error occuring.
    - Tested boards on arrival.
    - Assembled the board with components (incomplete)
- **Sarah**
    - Worked on troubleshooting the manufactured Rev. 1 PCB, looking for potential causes of tied power planes which caused the board to fail
        - Consulted with Professor Tuttle but we were unable to find the root of the failure, but we suspect there may be an unwanted via connection
    - Tested Rev 2 PCBs on arrival, and after milling out the switch window
    - Created a parameter header file for the LQR flight parameters
    - Documented the "black-box" relationship between inputs and outputs for the LQR controller with focus on supplying the same controller output parameters currently given by the PID controller to the actuators
    - Scrapped work on implementing the LQR controller using the computational graph structure currently in place for the PID controller, instead focusing on a more straightforward implementation
- **Tony**
    - Wrote testing scripts to test the ability of the matlab tool to react to incoming data
    - Began modifying backend code to grab flight log data every control cycle from the quad

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Pending Issues

- **James**
    - Nothing is specifically blocking my tasks, but it is entirely possible that there is an as-yet-undetected flaw in the PCB that will cause problems as we build them up.

- **Sarah**
  - Still uncertain as to what the cause of the tied power planes is. As no continuity tests were done between the power planes before the board was soldered, it may be possible that poor soldering created an unwanted connection. At this point, since Rev 2 is working it is a minor issue.
- **Tony**
  - Once quad data is confirmed to be sending over the communication channel between quad and ground station, it is still possible that the quad will not be able to send all of the necessary information with current timing constraints. If this is the case, a more complicated solution will be required to send data.

Plans for Upcoming Reporting Period
- **James**
  - Work primarily with Sarah to diagram the existing code, with the aim of removing duplicate data, potentially simplifying the controller interface, and creating handoff documentation for research users/future teams.
- **Sarah**
  - Continue working on code for the LQR controller and creating corresponding documentation
  - Define specs for code abstraction with the rest of the team
- **Tony**
  - Work with James and Sarah to understand the operating code, clean it up, and create documentation.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
James Talbert	● PCB testing and assembly	12	106
Sarah Koch	● PCB testing & failure analysis ● LQR control implementation	35	88
Anthony Bertucci	● Created tests for the real-time logging display setup ● Began developing the backend system for the real-time logging on the groundstation	30	82

Gitlab Activity Summary