**MicroCart (Microprocessor Controlled Aerial Robotics Team)**
**sdmay19-20**

Start February 11 — February 17
Client/Advisor: Dr. Phillip Jones

### Team Members

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

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## Summary of Progress this Report

- **James**
  - Finished unit-testing of the PCB (Rev 2.0)
    - Some sensors require calibration due to placement changes
  - Finished user requirements exploration for user-handoff
- **Sarah**
  - Began creating a testing plan detailing procedures to follow when a new controller is placed on the quad
    - Researched similar plans created for other projects
- **Tony**
  - Attempted to get a working build functional on machines other than previous groundstation

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## Pending Issues

- **James**
  - The quad does not currently fly in the air effectively
    - Autonomous is disabled by the groundstation being out of commision this week
    - Manual mode requires tighter sensor calibrations
  - Merging into or from the hardware development branch in git is going to be entirely manual as the software and hardware workspaces have changed paths
- **Sarah**
  - Obtained the a matrix library being used by Matt Cauwels to be used in implementing the LQR controller but it appears that our access has been revoked
    - Will need to get in contact with Matt to fix this
- **Tony**
  - Still not able to have working build on separate machine. This was due to lack of ability to work during the week (due to other responsibilities). This will be solved next week.

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## Plans for Upcoming Reporting Period

- **James**
    - Calibrate on-board quad sensors
    - Merge hardware development into master (functionality is currently equivalent minus the calibrations).
    - Update the user handoff
        - Modifications to both ground station and quad software
        - Will likely extend into the following week.
- **Sarah**
    - Continue work on creating new controller testing procedures
        - Run this by team members and Dr Jones once a 1st draft is completed
    - Continue implementation of the LQR controller, utilizing the matrix library
- **Tony**
    - Get stable build running for next week
    - Begin testing backend code for grabbing real time flight data

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## Individual Contributions

| Team Member | Contribution | Weekly Hours | Total Hours |
|---|---|---|---|
| James Talbert | • Made/tested necessary adaptations for the PCB | 8 | 124 |
| Sarah Koch | • Worked on creation of a testing plan for new controllers | 5 | 101 |
| Anthony Bertucci | • Worked on getting a new build working for the project | 2 | 90 |

**Gitlab Activity Summary**

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Action: pushed to, Fri Feb 15 2019
Author: James Talbert
Title: I think everything is working with the PCB, needs calibration though
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Action: commented on, Thu Feb 14 2019
Author: James Talbert
Title: Transition current hardware platform to Vivado,  Type: Note
Comment: I need to re-orient the IMU to software.
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Action: commented on, Mon Feb 11 2019
Author: James Talbert
Title: Transition current hardware platform to Vivado,  Type: Note
Comment: Thus far, the PCB is working. For some reason, the I2C controller is reading a NACK from the IMU when the line is clearly pulled low on an oscilloscope. The line does return high for a little bit after when the IMU releases it. Everything on the scope looks like a valid transaction, and the IMU correctly ACKs its address, and not other addresses. I have not yet verified the clock speed (thought about it after I left the lab).

So, I got it working by forcing a full system reset in XSDK. I am evaluating how this applies to SD-card boots.

It looks like things work fine with the SD card.

- [x] Power Working (5V to Zybo from battery via regulator)
- [x] Motor Control Working (PWM)
- [x] IMU Working
  - Looks like an I2C controller config issue (I don't know why we haven't seen it before).
  - I'm going to try reverting to the MPU-9150 to see if that made a difference (I don't think it's supposed to).
- [ ] WiFi Working
  - [x] UART to/from WiFi Working, I can't test the actual WiFi right now.
- [x] LIDAR working
- [x] Optical Flow Working
  - I don't have a great way to evaluate the accuracy of the sensing, but the

communication with it is working.
 - [x] RC Receiver Working (order might be reversed)
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