MicroCart (Microprocessor Controlled Aerial Robotics Team)
sdmay19-20

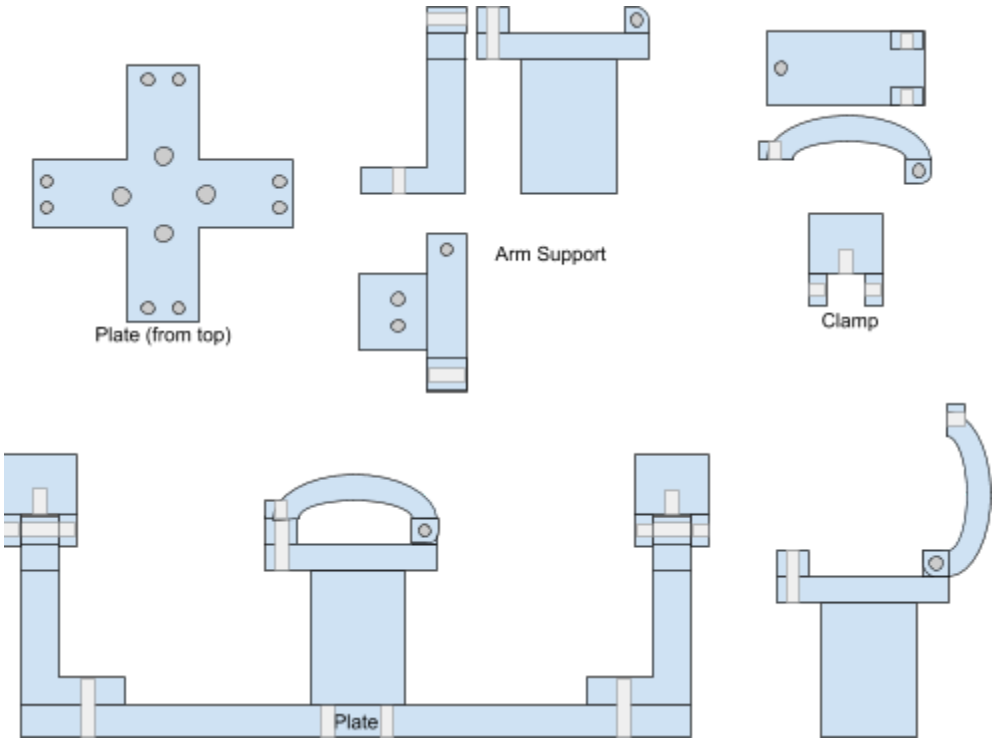
March 11 — March 24
Client/Advisor: Dr. Phillip Jones

Team Members

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

Summary of Progress this Report

- **James**
  - Assisted with the design of a quadcopter mount for safe testing of new control algorithms
  - Tested manual flight mode with the MPU-9250 IMU
- **Sarah**
  - Assisted Prof Umesh and grad students with operating and navigating the Simulink simulator
  - Altered the controller testing procedure to include an option for manual mode testing
  - Worked with James on creating a new quadcopter mount for controller testing
- **Tony**
  - Continued working on getting quad_app portion of Real Time data logging feature functional



Concept design for quadcopter mount

Pending Issues

- **James**
  - The quad is qualitatively less stable using the MPU-9250. It's hard to quantify, but it is harder to control.
- **Sarah**
  - Awaiting the fabrication of a quadcopter mount for yaw testing
- **Tony**
  - LAN issue with continuous hangups has not been resolved and will need to be fixed before autonomous flights can be tested

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Plans for Upcoming Reporting Period

- **James**
  - Continue design of quad yaw-test mount
  - Quantify the performance difference between the MPU9250 and the MPU9150
- **Sarah**
  - Begin testing functionality and compare quad performance to the logged Simulink simulator PWM data
- **Tony**
  - Continue working on quad_app side of RT data logging feature
  - Reach out to past team members regarding possible issues with LAN

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
James Talbert	● MPU-9250 basic flight testing ● Quad yaw control test mount	6	145
Sarah Koch	● Assisted controls researchers with usage of the Simulink simulator ● Added manual mode option to controller testing procedure	6	111
Anthony Bertucci	● Fixed logic issues with quad_app that would have prevented meaningful data from being transferred	4	110

Gitlab Activity Summary

Action: pushed to, Mon Mar 11 2019
Author: bertucci
Title: The work continues. Fixing issues with RT data on quad side
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Action: pushed to, Mon Mar 04 2019
Author: bertucci
Title: beginning to make necessary fixes to Tina's addition to allow build...

Action: pushed to, Sat Feb 23 2019
Author: bertucci
Title: Adding necessary changes to backend to populate data log
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Action: pushed to, Sat Feb 23 2019
Author: bertucci
Title: Merging quad send_rt_data branch with real-time data transfer gui b...

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.

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 cofig 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)
