

## **sdmay18-17 MicroCART (Microprocessor Controlled Aerial Robotics Team)**

Week 23 Report

Reporting Period: 4/2/2018 - 4/9/2018

### **Team Members**

Blake Pries -- Communications Lead

Dane Larson -- Ground Station Lead

Matthew Kelly -- Documentation Lead and Webmaster

Tyler Imboden -- Quad Software Lead

Jakub Hladik -- Test Lead

Kyle Trost -- Team Lead

Peter Thedens -- Repository Lead

Austin Rohlfing -- Controls Lead

### **Summary of Progress this Report**

Generals Tasks for entire team:

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Quad Software - Tyler and Kyle:

Summary for progress this report:

- Continued working to get vivado build flying on quads
- New quad seems to be in working order after changing out ESCs that came with motors for previous generation of ESCs. The newer ESCs incorporate "active braking" which is incompatible with our control model.
- Suspect the new quad works but unsure due to

Pending Issues:

- Front-right motor is not being sent correct values
  - RC Controller values are fine
  - PWM we are sending that kotorbis about 10-15% lower for some reason on both quads

- So this clearly is a QuadSW problem
- Vivado build is broken due to trying to change the floating point unit to hard

Plans for upcoming reporting period:

- Get vivado build fling on both quads
  - Or at very least modify old build to test new quad fully
  - Going to try and grab an old quad sw build from hit and go through changes again(while keeping vivado hardware)

Controls - Austin and Blake:

Summary for progress this report:

- Finished linearization of A matrix; B nearly done
- Checked linearization work with MATLAB, automated results agree with hand-derived
- Created LQR model with linearized state-space matrices

Pending Issues:

- Use of BYU controls model seems insufficient for precise control
- Matt (Rich)'s state-space matrix disagrees with both hand-derived and MATLAB-generated copies
- Matt's thesis does not give values for half his LQR state weighting matrix (There's a sentence where they should be, but are suspiciously missing)

Plans for upcoming reporting period:

- Find LQR weighting values to create (decent?) model
- Run simulation with newly created LQR model
- Run simulation with LQR created for modern parameters
  - (Control model creation now automated; no new math needed)
- Have the manual assist mode committed so can be reviewed.

Testing - Peter and Jakub:

Summary for progress this report:

- Merged Makefile explanation markdown (Peter)
- Brainstormed how to interface matlab script with ground station (Peter)
- Worked on moving GUI & DataAnalysisTool pdfs to markdown (Peter)
- Continued work on controls in the simulator (Jake)

## Pending Issues:

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## Plans for upcoming reporting period:

- Finalize how to launch Matlab from ground station to run desired script (Peter)
- Continue work on moving pdfs to markdown (Peter)

## Ground Station - Matt and Dane:

## Summary for progress this report:

- Finished script to setup simple wifiap (Dane)
- Some work on dhcpd done and added to scripts (Dane)
- Removed symlinks from merge branch, generated in adapters makefile, added documentation to explain this (Dane)
- Started work on GUI (Matt)
- Finished Wifi Client and an additional server Arduino implementation, ready to test latency (Matt)
- Finished Ground Station Debug defines to remove commented code (Matt)

## Pending Issues:

- May have to work on our own testing scripts
- Still waiting on response from Eric regarding their scripts used for testing latency.

## Plans for upcoming reporting period:

- Test wifiap script on lab machine (Dane)
- Finish dhcpd work, add to setup script, test on lab machine (Dane)
- Test latency and merge wifiap branch (Dane and Matt)
- GUI updates (Matt and Dane)

Name	Role	Contribution	Hours worked	Total
Peter Thedens	Repository Lead	Moving GUI & DataAnalysisTool pdfs to markdown	7	118

Austin Rohlfing	Controls Lead	Model linearization and control design	13	159
Kyle Trost	Team Lead	Helped with new quad Vivado build	15	197
Matt Kelly	Documentation Lead	Helped with new quad and worked on Wifi Client	16	203
Dane Larson	Ground Station Lead	Simple wifiap, Working on dhcp, corrected merge issues	7	141
Jakub Hladik	Test Lead	Continued work on controls in simulator	6	129
Tyler Imboden	Quad Software Lead	Worked on new quad	16	166
Blake Pries	Communications Lead		0	93