

## sdmay19-20: MicroCart (Microprocessor Controlled Aerial Robotics Team)

Week 7 Report

October 1 - October 7

Client/Advisor: Dr. Phillip Jones

### Team Members

James Talbert — *Hardware*

Sarah Koch — *Controls*

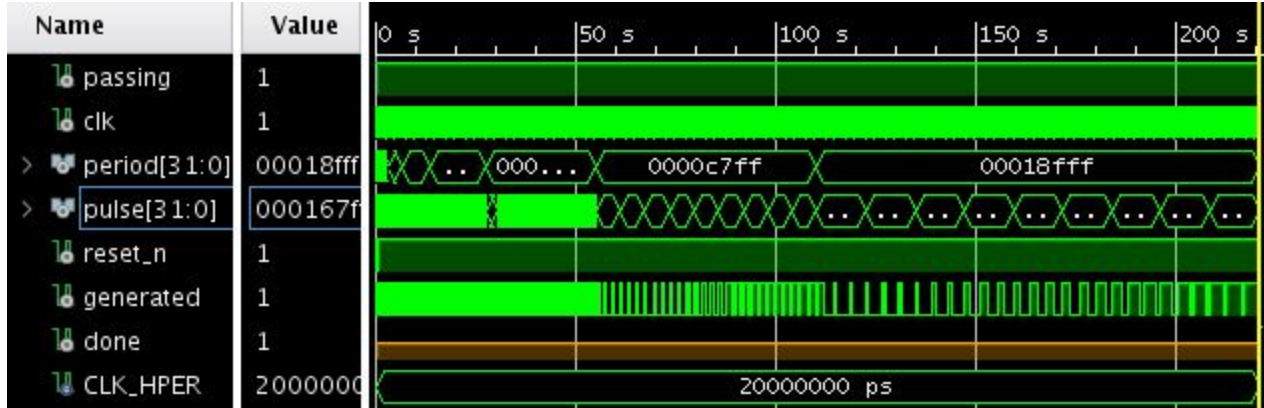
Anthony Bertucci — *Ground Station*

Nina Moriguchi — *Quad Simulation*

Tina Li — *Quad Software*

### Summary of Progress this Report

- Continuous Integration Server Updates - James
  - Worked with ETG to document the CI server setup. The information for getting into the server and mounting the required remote folder is now available to team members.
  - Configured the run machine to be able to run hardware simulation tests with vivado. This now includes the central portion of both custom IP blocks
  - Developed simulation tests for the PWM generator IP block
    - Nested duty cycle and frequency loops
    - Exposed an off-by-one error in the pulse width (inconsistent behavior with the period input)



- Sensor Debugging - Quad Software - Tina
  - Explored options about adding debugging features to quad software - sending sensor data in real time, using MATLAB to graph the data in real time
  - Looked for a way to compare controls output in theory (as calculated by matlab scripts) to actual controls output (add control output to logging)
  - Looked at coverage of continuous integration tests, to explore where there's no test coverage
- Flight Data UI backend - Tony
  - Started to program the backend portion of the new UI feature in c++ in the mainwindow.cpp file
- Controls Implementation - Sarah
  - Continued analysing LQR controller Matlab files
  - Researched theory behind weighing matrices and began evaluation of current weighing matrix files on Git
  - Began work on documentation for how to use controls Matlab files and test the LQR controller using Matlab
- Nina

## Pending Issues

- Tina - need Dane Larson to tell me where the output file is. Need to figure out if we can use MATLAB graphing code I found online
- Tony - need to figure out specifically which partitions of flight data for graphical representation are the most useful for those using MicroCART as a research tool.
- James & Sarah - There is nothing in particular blocking progress at the moment, it just takes time to get things done.

## Plans for Upcoming Reporting Period

- Software Quad - Test + Debug support : Tina LI
  - Read through how the logging software works
  - Test the latency of sending sensor data in real time
  - Find where the log file is outputted, explore how MATLAB graphs data in real time
- Quad Hardware Platform - James
  - Build the full system hardware platform in Vivado, allowing for quad software development on the new hardware, which can be modified to have more features or less bugs.
  - Order locking connectors through ETG.
  - Start building datasheets/reference manuals for the custom IP Cores.
- Ground Station - Tony
  - Finish/Continue working on linking backend functionality to new UI feature.
  - Begin testing bandwidth capabilities of UART on quad to determine how much more data can be sent over an operation loop without sacrificing performance.
- Controls & Custom PCB - Sarah
  - Create a visual outline for the controls documentation
  - Continue work on document that explains how to run the LQR controller in Matlab
  - Begin work on a specs sheet for a custom MicroCART PCB
- Nina:

## Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
James Talbert	Configured and documented the GitLab CI run server. Added VHDL testbench for the PWM Generator	9	34
Sarah Koch	Continued validation of current controls Matlab files Worked on controls documentation	4	27
Anthony Bertucci	Continued to program backend functionality for new Flight Data feature in UI	6	28
Nina Moriguchi			[copy from prev]

			+new
Tina Li	Worked on exploring the feasibility of various types of debugging tests that can be added	5	24

## Gitlab Activity Summary

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 Action: pushed to, Sat Oct 06 2018

Author: James Talbert

Title: Update README.md  
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Action: pushed to, Sat Oct 06 2018

Author: James Talbert

Title: Update README.md  
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Action: commented on, Sat Oct 06 2018

Author: James Talbert

Title: Update CI docs to include documentation of the runner VM, Type: Note

Comment: @ninam @bertucci @tinali @skoch Do you see a approve button? I haven't done merge requests in GitLab before. If you do, please take a look at [the CI readme](../blob/patch-1/ci/README.md) and let me know if it makes sense.  
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Action: pushed to, Fri Oct 05 2018

Author: James Talbert

Title: Update .gitignore  
 -----

Action: pushed to, Fri Oct 05 2018

Author: James Talbert

Title: Merge branch '41-Transition-current-hardware-platform-to-Vivado' of...  
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Action: pushed to, Fri Oct 05 2018

Author: James Talbert

Title: Update Creating\_and\_maintaining\_new\_Vivado\_project.md  
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Action: pushed to, Fri Oct 05 2018

Author: James Talbert

Title: Update creating-maintaining-new-project.md  
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Action: pushed to, Fri Oct 05 2018

Author: James Talbert

Title: Add quad tests back in  
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Action: pushed to, Fri Oct 05 2018

Author: James Talbert

Title: Merge branch 'write\_pwm\_hw\_tests' into 39-Transition-current-hardwa...  
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Action: commented on, Fri Oct 05 2018  
Author: James Talbert  
Title: Transition current hardware platform to Vivado, Type: Note  
Comment: The PWM\_Generate kernel module has a testbench that passes.

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Action: pushed to, Fri Oct 05 2018  
Author: James Talbert  
Title: Make the time width consistent (register+1)

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Action: pushed to, Fri Oct 05 2018  
Author: James Talbert  
Title: Fix build-tests make path as well

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Action: pushed to, Fri Oct 05 2018  
Author: James Talbert  
Title: Fix test runner/ci scripting

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Action: pushed to, Fri Oct 05 2018  
Author: James Talbert  
Title: wip: Testbench for pwm\_signal\_out

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Action: pushed to, Thu Oct 04 2018  
Author: James Talbert  
Title: Update README.md to reflect completed setup

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Action: commented on, Thu Oct 04 2018  
Author: James Talbert  
Title: Transition current hardware platform to Vivado, Type: Note  
Comment: Remaining Tasks:  
- [x] Create Simulation Testbench for PWM\_Generate  
- [ ] Create Full System hardware design  
- [ ] Test quad\_app on the hardware platform

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Action: commented on, Thu Oct 04 2018  
Author: James Talbert  
Title: Transition current hardware platform to Vivado, Type: Note  
Comment: I have integrated a PWM recorder test into the CI framework. This required mounting the Xilinx folder on the VM. There is a document in our google drive with the login info (not public for security reasons). Any pull request will now run the HW simulation tests automatically.

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Action: pushed to, Thu Oct 04 2018  
Author: James Talbert  
Title: Testing changes for CI

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Title: Testing changes for CI

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Action: pushed to, Thu Oct 04 2018

Author: James Talbert

Title: Testing changes for CI