Senior Design May22, 43

MicroCART Senior Design Team

Week 9 and 10 Report

November 17 - November 30

Faculty Advisor : Philip Jones

Members:

Brandon Cortez - Team Lead, Test Station Sub-team

Reid Schneyer - Test Station Lead, Test Station Sub-team

Colton Glick - Git Wrangler, Firmware Sub-team

Ellissa Peterson - Tech Lead

Ryan Hunt - Firmware Sub-team Lead

Carter Irlmeier - Web Master

Zachary Eisele - Firmware/Groundstation Sub-team

Summary of Progress this Week

It was discovered that the Crazyflie firmware can be built normally from within the Microcart repo (contrary to last report). Moving forward all crazyflie firmware modifications will be developed within the Microcart repository as originally planned.

The firmware team has been able to create a new module within the Crazyflie firmware that is the "student" controller. This controller will be what the students of the lab will write in order to stabilize the Crazyflie. Creating this module involved learning about the building scripts that Crazyflie uses and adding out new dependency to the firmware. Some troubleshooting was required.

Corrected the Gitlab CI/CD for the Crazyflie firmware. It was discovered that the Crazyflie firmware can be built normally from within the Microcart repo (contrary to last report) so long as the entire repo is mounted in the docker container so the build scripts have access to the git data. Some additional work was needed to ensure the submodules required to build the firmware are cloned correctly during the job execution. Gitlab now builds the firmware and runs unit tests with each commit to the repo. Current the unit tests are displaying a warning about duplicate parameters. This was introduced with the new student controller. However other

controllers in the system use the same parameter names. So it seems to be an issue with selecting the controller, somehow two are running at the same time?

The full end to end system of the microCART ground station, cf adapter, crazyflie ground station, and crazyflie is now being run and is working as intended. There is still work to be done with this, however. In order to be able to use each function of the MicroCART ground station with the crazyflie, callbacks need to be updated in the adapter itself. Some of these callbacks are already working, but some of the more important ones still need some work.

Past Week Accomplishments

- Created a new "student" controller in the Crazyflie firmware, this will be what the students modify to interact with the system. Currently a copy of the existing cascading PID controller. Will be modified in the future to be a template for students to create their own control logic. Compiles successfully and runs on crazyflie - Colton, Ryan

- Got gitlab CI CD working properly - Colton

- Unit tests working correctly. Currently displaying a warning about duplicate parameters in the system, related to copy of PID controller - Colton

- Updated gitlab runner ([link to gitlab issue](#)) on MicroCART build server from version 9.5.1 (2017) to the latest 14.5.0, this fixed an issue where not all the CI/CD output being displayed correctly - Colton

- Finished up the final design document for 491 - Brandon

- Became familiar with how to get information from Crazyflie sensors - Ryan

- Uninterrupted communication from microcart ground station to cf adapter to crazyflie ground station to crazyflie - Zach

- Settled on an IR implementation for the physical aspect of the drone and got real-time data tracking working with the Tracking Tools application using the OptiTrack system - Carter

Pending Issues

- Work on faculty presentation on December 8 - All members

- setvbuf is giving problems in the cf_adapter, commenting it out worked and the adapter is working as intended, meaning the code may have been redundant in the first place. However, it would be nice to know why it was failing. - Zach

- ~~Trying to get CI CD working on Gitlab, having issues running the docker container crazyflie provides as a build environment~~ <mark>Fixed</mark> working correctly now - Colton

- Update documentation In readme and wiki - Colton

- No longer need temp_crazyflie_repo (https://git.ece.iastate.edu/danc/temp-crazyflie-repo), but don't have permission to delete it. Jones needs to delete it, settings > general > advanced > delete. I created this repo while trouble shooting.

  MicroCART_Crazyflie_Firmware repo can also be deleted (https://git.ece.iastate.edu/danc/MicroCART_Crazyflie_Firmware), this was a pre-existing repo that was blank and unused, currently only has a copy of the stock Crazyflie firmware and will not be used - Colton

- Continue to troubleshoot why data streaming is not working on my Ubuntu machine - Carter

Individual Contributions

Team Member	Contributions	Weekly Hours	Total Hours
Brandon Cortez	- Finished up the 491 final design document	10	46
Reid Schneyer	-Worked on 491 design doc and presentation	6	41
Colton Glick	- Gitlab CI/CD working - Gitlab runner update - Student controller	7 + 7	51
Ellissa Peterson	Fixing ground station GUI makefile	4	32
Ryan Hunt	-student controller -found way to get crazyflie sensor information	6	40
Carter Irlmeier	- Set up a Tracking Tools application, calibrated the OptiTrack camera system, marked the center point, and set up a rigid body using the IR markers (after finally settling on a physical IR implementation that works) to display real-time information from the drone including the X, Y, Z, coordinates and the Yaw, Roll, and Pitch - Discovered how to record this data and play	12	42

	it back as well as output it to a CSV file - Downloaded a multitude of programs on my Ubuntu machine and configured them in an attempt to data stream the real-time information over for use (mostly CrazySwarm) which seems to be close to being successful - can communicate with the drone and can run the mock demonstration as well as starting the program without any thrown errors but no rigid body shows up - trying connections with the ethernet switch soon - Recorded a demo video, and uploaded more information the website in an attempt to finish it up by Thursday night		
Zachary Eisele	-Ground station and adapter work	9 + 9	60

Comments and Extended Discussion

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Plans for coming Week

- Convert student controller to an easy to understand template - Colton, Ryan

- Start writing modules for that template to calculate PID values - Ryan

- Work on bluetooth communication between crazyflie ground station and Crazyflie - Colton, Zach

- Work on updating callbacks in cf_adapter

- Finish up the presentation for the 491 faculty panel demo - Brandon

- Try to solve Tracking Tools data streaming problems using the ethernet switch, finalize website, post demos to YouTube - Carter

Summary of Weekly Advisor Meeting