Senior Design May 24, 32

MicroCART Senior Design Team

Week 24 Report

March 8 - March 22, 2024

Faculty Advisor: Philip Jones

Members:

Justin Kenny - Scribe
Steve Frana - Technical Lead
Trevor Friedl - Project Manager
Travis Massner - UI/UX Designer
Clayton Kramper - Technical Lead
Will Maahs -Team Organization Lead

Links

- Shared Google Drive Folder
- Tentative Project Gantt Chart
- Crazyflie Status

Summary of Progress this Week

We cloned the Microcart repository onto the Pi and modified the cflib_adapter to use the built-in python mmap commands to write to shared memory using a simple “pipe-style” example discussed at last week's meeting. We also wrote a simple shared memory application on the FreeRTOS side that is able to read from the memory location. The current setup allows python to place bytes into the shared memory space, wait for FreeRTOS to read it, then write to it again.

We are in the process of eliminating the need for submodules inside of the repo as requested, and we are testing that removing these does not break anything during the initial build process for each implementation. So far this seems to work specifically for the big quad deck, but still needs to be tested for the regular crazyflie firmware. A good way to test this might be by running through MP4 with the changes made to the submodules to ensure everything is still working. We are making note of the submodules in the repository in the case that the firmware package needs an upgrade in the future.

I continued working on looking into whether the timeout value in the commander header file was causing the drone to timeout after the specified 2 seconds. In order to change the firmware I had to first copy over the lab part 2 files from a previous iteration. I then adjusted the 2000 ms value to 4000 to see if I would notice a difference in the time when I did a ./CLI command, however, I didn't notice any difference in the time-to-timeout. I tried other values such as 8000 and 1000 but I didn't notice any

difference. I then started working on connecting to the drone via USB to view the drones system output, however I ran into some troubles and wasn't able to figure out how to view the output.

We are in the process of commenting out hardware specific code in the crazyflie_firmware in order to cross compile it for FreeRTOS on the RasPi. I was able to chat with Grant about some commits on the repo that I saw from last year and he said he had started working on changing the firmware code but he had not tested any of it yet. It is a little bit of a slow process because the firmware code is pretty complex and I have relatively little experience with firmware code.

Pending Issues

- Add documentation for PycroCart
- Unsure of the difficulty of porting drone firmware FreeRTOS.
- Crazyflie Radio seems to be disconnecting from the crazyflie somewhat frequently
- Plotting Packet (future)

Individual Contributions

Member	**Contributions**	**Weekly Hours**	**Total Hours**
Justin Kenny	• Wrote Python shared memory handler class • Wrote FreeRTOS shared memory reading functions. • Debugged network connectivity issues with the Pi.	8	150
Steve Frana	• Attempting to setup AMP script to start FreeRTOS application on startup • Midterm Peer Review for SD class	5	133
Clayton Kramper	• Kept working through firmware • Midterm Peer Review	4	116
Travis Massner	• Re-ran tests on the crazyflie radios and drones to check whether the etg fixed the issues • Continued methods for testing changing timeout value	6	106

	• Trying to connect drone to computer via USB to access console output		
Will Maahs	• Kept working through firmware and commenting out hardware specific code • Talked to Grant about last year's team's progress on firmware. Got some good resources • Midterm Peer Review	4	130
Trevor Friedl	• Ran through tests with the changes made to the FlyPi submodules, planning on pushing these changes to dev soon • Created wiki page for uncommon issues found throughout MicroCART, added submodules issue and error preventing VirtualBox from running • Edited midterm review video and posted onto website/MicroCART YouTube	5	113

Comments and Extended Discussion

- Any guidance with the modifying the crazyflie_firmware code
- 488 starts MP-4 next week, what should we do as a team both in and out of the class to help?

Plans for coming Week

- Cross-compile crazyflie firmware and get it to run on the Pi without crashing.
- Write startup script to run baremetal programs on the Pi without manual starting them through uboot.
- Complete more advanced ring buffer style shared memory program.
- Finish PycroCart documentation on the Wiki of the Git Repo
- Film a video on how to use both of the PycroCart GUIs
- Film a video fully explaining the current state of PycroCart
    - Suggestions for future teams
    - Motivations
    - Things to not do
- Post KiCAD tutorial to MicroCART YouTube
- Plotting Packet -Potentially
- Get FlyPi flying back in the air *without* the use of the test stand