

# Senior Design May 24, 32

## MicroCART Senior Design Team

### Week 23 Report

*March 1 - March 8, 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 wrote a short baremetal program to write to physical memory addresses, and then we confirmed those addresses were being written with devmem. We also looked at the processor data sheets to determine the best location for shared memory on each Raspberry pi. We began writing a more complex shared memory application for both baremetal and linux using mmap.

The FlyPi is idle at the final step of its operation. I fixed a few rough issues with some of the builds by fixing the git submodule paths within the developer branch and was able to get the FlyPi scanned and connected properly onto the PycroCART GUI. Now whenever we send packets the CLI will register that packet events are being sent, but the motors do not begin to thrust. Logging on the GUI shows the roll/pitch/yaw reading live and even updates the motor logging despite there being no thrust. Might need to work on combating this issue as a team. We got the motors working last night...

I ran a full test of every crazyflie drone and radio to check whether they appeared to be usable for the MP4 lab. I tested each drones ability to power on, whether the drone was able to be flashed by doing a "make cloud", whether the GUI would open consistently and wouldn't crash, and finally whether the drone responded to setting a thrust value in the GUI. For each radio, I just tested whether it was able to communicate with a healthy drone by connecting them to the computer, running the GUI, and setting a thrust value in the GUI.

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.

## 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
- Shared memory: pipe-style or buffer-style?
- Plotting Packet (future)

## Individual Contributions

Member	Contributions	Weekly Hours	Total Hours
Justin Kenny	<ul style="list-style-type: none"> <li>● Looked through documentation to find an open memory address.</li> <li>● Wrote baremetal program to write to a specific memory location.</li> <li>● Began writing linux shared memory handler using mmap.</li> </ul>	11	142
Steve Frana	<ul style="list-style-type: none"> <li>● Looked into reworking library interrupts for shared memory</li> <li>● Began exploring various ways this problem has been tackled in the past</li> <li>● Helped Justin</li> </ul>	7	128
Clayton Kramper	<ul style="list-style-type: none"> <li>● Worked on getting the FlyPi to fly</li> <li>● Got responses from sensors to plot</li> <li>● Got motors to spin. In theory flight is possible</li> </ul>	4	112

	<ul style="list-style-type: none"> <li>● Need to charge big batteries</li> </ul>		
Travis Massner	<ul style="list-style-type: none"> <li>● Ran tests on all of the crazyflie drones and radios to check health and usability</li> <li>● Tested changing timeout value with Lab Part 2 firmware</li> <li>● Worked on connecting crazyflie drone to computer via USB to check output for testing timeout</li> </ul>	7	100
Will Maahs	<ul style="list-style-type: none"> <li>● Started going through firmware and commenting out hardware specific code</li> <li>● Helped Trevor get the FlyPi connected and running on the tested</li> <li>● Got the (old) shared memory application running on the raspi 3. (to test documentation)</li> </ul>	11	126
Trevor Friedl	<ul style="list-style-type: none"> <li>● Continued working on FlyPi <ul style="list-style-type: none"> <li>○ Seeking out connectivity issues with the GUI, is getting information from the drone and “sending” packets but is not updating motor states</li> </ul> </li> <li>● Fixing issue with git submodule dependencies for main branches</li> </ul>	8	108

## Comments and Extended Discussion

### Plans for coming Week

- Fly the FlyPi - **High Priority**
- Find the status of all CrazyFlies and radios - **High Priority**
- Write a new shared memory program for baremetal/linux that uses mmap.
- Write a shared memory reader program on the baremetal side.
- 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