

Senior Design May 24, 32

MicroCART Senior Design Team

Week 22 Report

February 24 - March 1, 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](#)
- [MP4 Timing Data](#)
- [Microcart Packet Structure](#)

Summary of Progress this Week

We discovered that we are unable to run the shared memory program from the tutorial we found because the Raspberry Pi 3/Zero 2W processors lack GIC functionality, meaning the shared memory library the tutorial is based on can't be run. We will instead write our own shared memory buffers, so our focus for next week will be getting a simple shared memory example running with a simple memory access running on the baremetal side and using mmap on the linux side. We also corrected and completed documentation in the wiki to show how to get the LED blink example running on baremetal.

The FlyPi is still being worked on to get put in the air, but some progress has been made over the past week to do so. Recently, there were a couple of errors stemming from some missing files that were soon realized through a YouTube video explaining the FlyPi, and these happened to take a little while to figure out. Now there seems to be an issue with the big quad not wanting to directly connect to the CrazyRadios. Once we can get this working, then I'll be able to use the PycroCART GUI to start working with the quad once it gets connected. Additionally, the video for the PCB/KiCAD tutorial was also worked on this week and is nearing completion. A breakdown of the video has been provided below in the WSR.

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

Individual Contributions

Member	Contributions	Weekly Hours	Total Hours
Justin Kenny	<ul style="list-style-type: none">● Made a wiki page showing how to compile and run the baremetal LED blink program.● Used picoscope to debug issues with the tutorial's shared memory program.	7	131
Steve Frana	<ul style="list-style-type: none">● Debugged shared memory with picoscope● Checked hardware for register differences between raspberry pi's● Monitiered 2 UARTs on raspberry pi 4	7	121
Clayton Kramper	<ul style="list-style-type: none">● Got swarm demo working● Prepped for scholars day	6	108
Travis Massner	<ul style="list-style-type: none">● Looked for timeout code in the firmware● Worked on testing the timeout firmware changes	6	93
Will Maahs	<ul style="list-style-type: none">● Got swarm demo working● Started trying to boot the FlyPi● Prepped for scholars day	6	111
Trevor Friedl	<ul style="list-style-type: none">● Attended and assisted with Scholar's week demo● Created slides and recorded more modules for FlyPi PCB/KiCAD overview<ul style="list-style-type: none">○ Part 1 - Slide overview○ Part 2 - KiCAD Navigation○ Part 3 - Using KiCAD example w/ FlyPi● Continued working on getting FlyPi up in the	7	100

	air. Found that there were some missing files from Austin's YouTube implementation but was able to get past that. Having some more issues with connecting to the CrazyRadios, which I believe might be an issue with the firmware and just needs reflash		
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Comments and Extended Discussion

Plans for coming Week

- Fly the FlyPi - **High Priority**
- Find the status of all CrazyFlies and radios - **High Priority**
- Write new shared memory program for baremetal/linux that uses mmap.
- Figure out how to use 2 UART ports on baremetal programs, possibly using pigpio.
- 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