EE CprE 491 – Fall 2019
MicroCART Senior Design Team
Weekly Report 5
Oct 21st - Oct. 28th
Faculty Advisors: Phillip Jones, Matt Cauwels, James Talbert

Team Members:
Evan Blough -- Technical Team Lead, Embedded Software Lead
Kynara Fernandes -- Ground Control Station Lead
Aaron Szeto -- Controls Lead
Joe Gamble -- Embedded Hardware Lead
Shubham Sharma -- Crazy Fly Implementation Lead, Website Manager
Jacob Brown -- Physical Hardware Lead

Summary for Progress this Week

We ran into a lot of obstacles this week. Some of them were resolved, but many of them are still pending issues the impede development progress. We demonstrated the drone functionality and furthered our development on the second drone. We continued to research the matlab tools and document the GCS and quad assembly process.

Past Week Accomplishments
- Demonstrated drone to isu alums - Evan, Jacob
- Paired DXi6 to RC receiver on quad - Evan
- Took measurements of flight tiles to be used for creating flight scripts more easily. The measurement table is in the Appendix - Evan
- Flashed embedded software and hardware on master branch onto SD and tested it on drone - Evan, James
- Data Analysis Tool successful returns number data and GUI file return graphs from test file- Aaron
- Component diagrams for Ground Station - Kynara

Pending Issues
- Dx6 Controller seems to be stuck in low voltage mode. I took a video of the issue.
- "co3050-12" is stuck in a boot loop the exact error message is listed in the appendix. This will impede embedded hardware,software, and crazyflie development, so this issue needs to get fixed ASAP. We sent an email to ETG about this issue.
- "co3050-microcart" still has sudo issue. We communicated with ETG. We will have someone check with ETG to ensure progress. We need this to fix the Matlab simulation issue.
- The control software on the drone has a bug. This bug is that if the quad is not connected to the GCS and the autonomous channel is switched on, manual input will still have control. I want to disable this feature because it seems like a safety hazard.

- Data Analysis Tool code not working when trying to plot data. Issue with plot parameters being returned as 1 instead of actual parameters
- Data Analysis guide is slightly outdated, appears to be from an older version of the code.
- Significant variance between setpoints and actual achieved location. I am not sure what is causing this, so we might have to try calibrating cameras and drone PID gain values

Individual Contributions

Team Member	Contribution	Week 3 Hours	Total Hours
Evan Blough	I practiced demoing the drone. I demonstrated the drone to some ISU alumni with Jacob. I had to pair the Dx6i to the drone rc receiver because the DX6 broke the day before the demo. I took measurements of each carpet tile in the flight area using the ground station. I thought these measurements would be useful for creating flight scripts. I worked with James on friday to load the SD card with software and hardware using Xilinx and Vivado.	10	53
Kynara Fernandes	Researched GCS communication and began to make diagrams	7	45.5
Joe Gamble	Helped Shubham fix some non-functional crazy flies. Had an interview with a company	4	35
Jacob Brown	Demonstrated drone to faculty and worked on assembling drone	5	26
Aaron Szeto	Got data analysis tool to return number data from test file. Got GUI file to work with test file. Worked on debugging data analysis plotting issue	8	32
Shubham Sharma	Added more documentation for Crazyflies. Added backup zip file, in case the submodules are discontinued. Making progress to modify the backend to work with Crazyflies. Added reports to the website.	6	43

Plans for Coming Week
- Finish Attaching shield board cables to second drone platform
- Test new Zybo board
- Create new trackable object for second drone
- Finish Inventory
- Finish Documentation for drone assembly
- Change functionality of autonomous mode without GCS connection
- Set up a secondary computer with a functional Ground Station for crazyflie.
- Set up VRPN communication with the crazyflie
- Update data analysis guide, continue debugging data analysis tool

Summary of Weekly Advisor Meeting:

We talked about a lot of upcoming tasks we have to work on. We talked about continuing work on the current draw. There were also obstacles to our progress. The GCS had a sudo issue, and Dr. Jones recommended reaching out to ETG. Dr. Jones recommended increasing our documentation on the drone assembly, GCS, and Matlab tools. We talked about making demo scripts for the drone and the possible existence of a matlab tool to generate drone setpoints. Buying organizational containers was a topic that was brought up. We talked about reorganizing the git repo to move the visualization tool closer to the root folder of the repo.

Appendix:

- Coordinate measurements for flight area

I read the position of every tile on the floor. This will help people write demo scripts for specific patterns. - Evan								
		Floor Layout	GCS					
			1	2	3	4	5	
			6	7	8	9	10	
			11	12	13	14	15	
			16	17	18	19	20	
			21	22	23	24	25	
			26	27	28	29	30	
I measured all the coordinates because the matt is slightly off centered so sometimes it makes the patterns look off if you just put in random set points								

			Coordinates Index	X	Y			
			1	-1.12	1			
			2	-1.11	0.54			
			3	-1.08	0.09			
			4	-1.07	-0.37			
			5	-1.04	-0.82			
			6	-0.68	1.011			
			7	-0.63	0.57			
			8	-0.624	0.104			
			9	-0.599	-0.362			
			10	-0.592	-0.789			
			11	-0.205	1.017			
			12	-0.2011	0.566			
			13	-0.17	0.11			
			14	-0.161	-0.354			
			15	-0.13	-0.799			
			16	0.236	1.05			
			17	0.274	0.621			
			18	0.296	0.156			
			19	0.312	-0.305			
			20	0.33	-0.76			
			21	0.713	1.052			
			22	0.731	0.633			
			23	0.744	0.167			
			24	0.77	-0.286			
			25	0.788	-0.729			
			26	1.15	1.08			
			27	1.18	0.653			
			28	1.2	0.192			
			29	1.22	-0.278			
			30	1.23	-0.7109			

- New documentation for Crazyflie!

📄 **README.md**

Crazyflie

This readme provides details about how to set up and learn more about Bitcare Crazyflie 2.0

Help getting started: Link

First, if submodules were not recursively added through git. Run this command in the root of the repository:

```
git submodule update --init --recursive
```

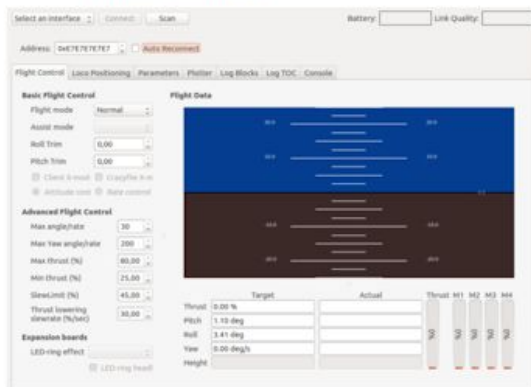Note: If a submodule fails to retrieve data then use `crazyflie/CF_Repos.zip` to get the failed repo.

Basic quick start CF client (Linux):

Installation: CD to directory: "crazyflie-clients-python"

Run:

```
sudo apt-get install python3 python3-pip python3-pyqt5 python3-pyqt5.qtsvg
pip3 install -e .
```

Launch GUI: `python3 bin/cfclient`

More information about the client.

Usage: Use this link with information with CF client usage.

Flashing CF Firmware:

Sometimes the CF firmware gets corrupted, hence would require a firmware flash. To do this you would need the CF client installed and the latest firmware.
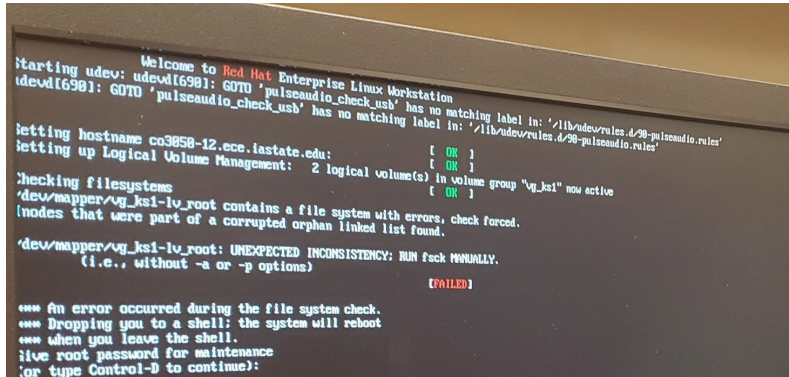
1. Turn the Crazyflie off.
2. Start the Crazyflie in bootloader mode by pressing the power button for 3 seconds. Both the blue LEDs will blink.
3. Go back to the Crazyflie client and click the Connect -> Bootloader menu.
4. Update firmware dialog
5. Click the "Initiate bootloader cold boot" button. After a few seconds the status should read "Connected to bootloader".
6. Click the "Browse" button and go to home/bitcraze/Downloads and select the zip file you downloaded earlier.
7. Click the "Program" button. The progress bar will go from 0% to 100% twice, as the firmware for the two processors is uploaded to the Crazyflie.
8. Click the "Restart in firmware mode" button. The Crazyflie reboots and is now updated.
9. Close the bootloader window.

Crazyflie Python Library:

cflib is an API written in Python that is used to communicate with the Crazyflie and Crazyflie 2.0 quadcopters. It is intended to be used by client software to communicate with and control a Crazyflie quadcopter. For instance the cfclient Crazyflie PC client uses the cflib. More info here.

Note: As of right now, the Python Library is not used much, as this is the GroundStation's functionality.

- The issue with the "co3050-12" computer:


```
                  Welcome to Red Hat Enterprise Linux Workstation
Starting udev: udevd[690]: GOTO 'pulseaudio_check_usb' has no matching label in: '/lib/udev/rules.d/90-pulseaudio.rules'
udevd[690]: GOTO 'pulseaudio_check_usb' has no matching label in: '/lib/udev/rules.d/90-pulseaudio.rules'

Setting hostname co3050-12.ece.iastate.edu:                    [  OK  ]
Setting up Logical Volume Management:    2 logical volume(s) in volume group "vg_ks1" now active
                                                               [  OK  ]
Checking filesystems                                           [  OK  ]
/dev/mapper/vg_ks1-lv_root contains a file system with errors, check forced.
Inodes that were part of a corrupted orphan linked list found.

/dev/mapper/vg_ks1-lv_root: UNEXPECTED INCONSISTENCY; RUN fsck MANUALLY.
        (i.e., without -a or -p options)
                                               [FAILED]

*** An error occurred during the file system check.
*** Dropping you to a shell; the system will reboot
*** when you leave the shell.
Give root password for maintenance
(or type Control-D to continue):
```