EE CprE 491 – Fall 2019
MicroCART Senior Design Team
Weekly Report 3

Oct 6th - Oct. 13th

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

This past week our main focus has been developing the second drone platform. We prioritized this goal, because it is difficult to develop / modify code without a platform to test on. We worked on some minor things for software development as well.

Past Week Accomplishments

- Crazyflie setup -Shubham
    - Crazyflie:
        - Set up a development environment on the computer.
        - Flashed the Crazyflie using the CF-client-library. More Info
        - Flashed the Crazyradio to the latest firmware. More Info
        - Successfully flown Crazyflie using a PS3 controller
    - Updated weekly reports and technical documents on the website.
- 2nd drone construction
    - Evan/Jacob/Joe
    - ESC soldered on
    - Zybo board straight pin connectors soldered on
    - Breakout board components soldered on
    - Landing gear connected
- Did latency tests on flashed wifi chips
    - Evan, Kynara, Joe
    - Reflashed Wifi Chips
    - Powered them on in breadboard
    - Pinged their host ip to get response time from wifi chip to external computer
    - Determined average response time to be 0.05 milliseconds, so these chips are performing acceptably.
- Implemented UI elements
    - Kynara
    - Implemented UI elements to view the error in the x, y and z coordinates of the drone.

    - Implemented UI elements to change the Kp, Ki and Kd using a slider.
- Drone Current Draw test
    - Aaron/Evan
    - Tested current output of drone
    - Graphed out current and control relationship
    - Calculated safe threshold using the formula on page 3 of this guide

Pending Issues

- Outdated computers: CO3050-12
- Figuring out networking configuration for multiple drones
- Multiple broken Crazyflie motherboards
    - Missing shoulder support pins
    - Broken buttons
        - Suggestion: Maybe ask ETG to fix
- Ground Station has major issues with compiling
    - Checked multiple commits around the fix recommended by James, and none of them seem to build.
    - This is causing issues with the development of the QT project for the groundstation
    - To fix this, we will have to work with Jame and figure out a functional version of the QT project.
- Actionable items for the control systems
- The current test indicated that the batteries should be fine, but they have died in the past. Not sure where to proceed from here.

Individual Contributions

Team Member	Contribution	Week 3 Hours	Total Hours
Evan Blo1ugh	Added things to Bill of materials to assemble drone. Attached landing gears to new drone frame. Soldered ESC wires to new drone frame. Helped with max current draw at battery port. Found components for shield board. Tested latency from wifi chips.	13	32
Kynara Fernandes	Latency test for the wifi chips. Implemented UI elements as discussed with Matt.	8	27.5
Joe Gamble	Soldered on ESCs, soldered parts on to breakout board, built up wire harness	11	26
Jacob Brown	Finished soldering I/O shield header pins and Zybo-board connectors	6	16
Aaron Szeto	Performed current draw tests. Looked into the Litho Battery burnout issue. Ran Simulink flight sim on own laptop and modified the flight path.	7	19
Shubham Sharma	Set up a development environment for the crazyflie. Flashed the firmware to the most up-to-date version. Mapped PS3 controls to the CF-client. Ran simulations for flying multiple drones at ones (Crazyswarm).	15	27

Plans for Coming Week

- Set up Crazyflie to work with a transmitter controller for more accurate flying. (Might not be possible as seen here)
- Demo a Crazyflie to fly autonomously / Assisted mode.
- Set up the Crazyswarm development environment.
- Optional: Sync OptiTrack controls to the Crazyflie.
- Finish mounting the shield board components
- Pair another controller to another RC reciever
- Finish making connectors from shield board to sensors
- Decide networking interface
- Program the Zybo board
- Configure Camera system for multiple drones
- Finish Drone Assembly and test functionality
- Figure out UI issue where GCS will not build using Qt
- Set up the simulink quad with the groundstation GUI

Summary of Weekly Advisor Meeting:

At this meeting we discussed pending development tasks for each person. We identified that we were having some communication faults. We met as a group to fix these issues. We outlined tasks in line with each development lead like embedded software and hardware, but we decided it would facilitate progress to focus on working in groups more. Working in groups and increasing documentation will hopefully reduce our communication issues. At this meeting we planned to run latency tests on the new wifi chips, make a crazy fly navigate with an RC controller, finish soldering on shield board components, take a current draw from the battery port, and finish a bill of materials for the drone. We accomplished most of these goals this week.