



Quadcopter Drone/Flight Controller

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Introduction

- We were tasked with creating a new flight controller to replace the existing **CC3D flight controller** on the **Xcite/DYS 320 Quadcopter**.
- We collaborated on this project with an **EE team**.

Purpose

- To implement modern features on the **CC3D flight controller** board, because it lacks functionality that other flight controllers typically have today.
- To provide more documentation on Betaflight repositories currently available.

Goals

Primary Objectives

- Create flight controller board that controls DYS 320 Quadcopter drone using Betaflight

Secondary Objectives (Flex Goals)

- Create an app that can control the drone and receive sensor data.



Design

- Creating the schematic
- PCB layout: printing and soldering
- Betaflight Configuration
- App: React-Native front-end
- App: HTTP back-end

Implementation

- Four key phases:
 - PCB Design
 - Peripheral Testing
 - Betaflight Configuration
 - App Development
- From there the signal flow was laid out and the schematics for each portion of the board were designed.
- After schematics, the PCB was then laid out, printed, and soldered.
- Testing was done as each portion of the board was soldered
- Then development was done on Betaflight/App

Testing

- Peripheral drivers (BMP, MPU, LIS2, ADC)
- Betaflight firmware (STM32F405 hex file & config)
- Drone flight
- HTTP mock server

Results

Functional:

- Flight Controller uses Sensors to improve flight stability and hover
- GPS functionality has been tested providing accurate GPS location
- Battery Protection Circuitry
- App Communication to mock drone

Not Functional:

- No support for "Altitude Hold" in Betaflight

Future Work:

- Continued development of the app
- Fix minor bugs that occurred such as when the board loses power, it also loses Betaflight and peripherals
- Continued support for LED strip, beep to signal pilot on critical statuses – i.e.: low battery, GPS signal loss, and other failsafe protocols.
- Verify sensor fusion between IMU and the magnetometer

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