



Team 24: ElevateXY

Bi-Weekly Update 4

Team members list: Colby Beaman, Emmanuel Palma,
Alyssa Rocco

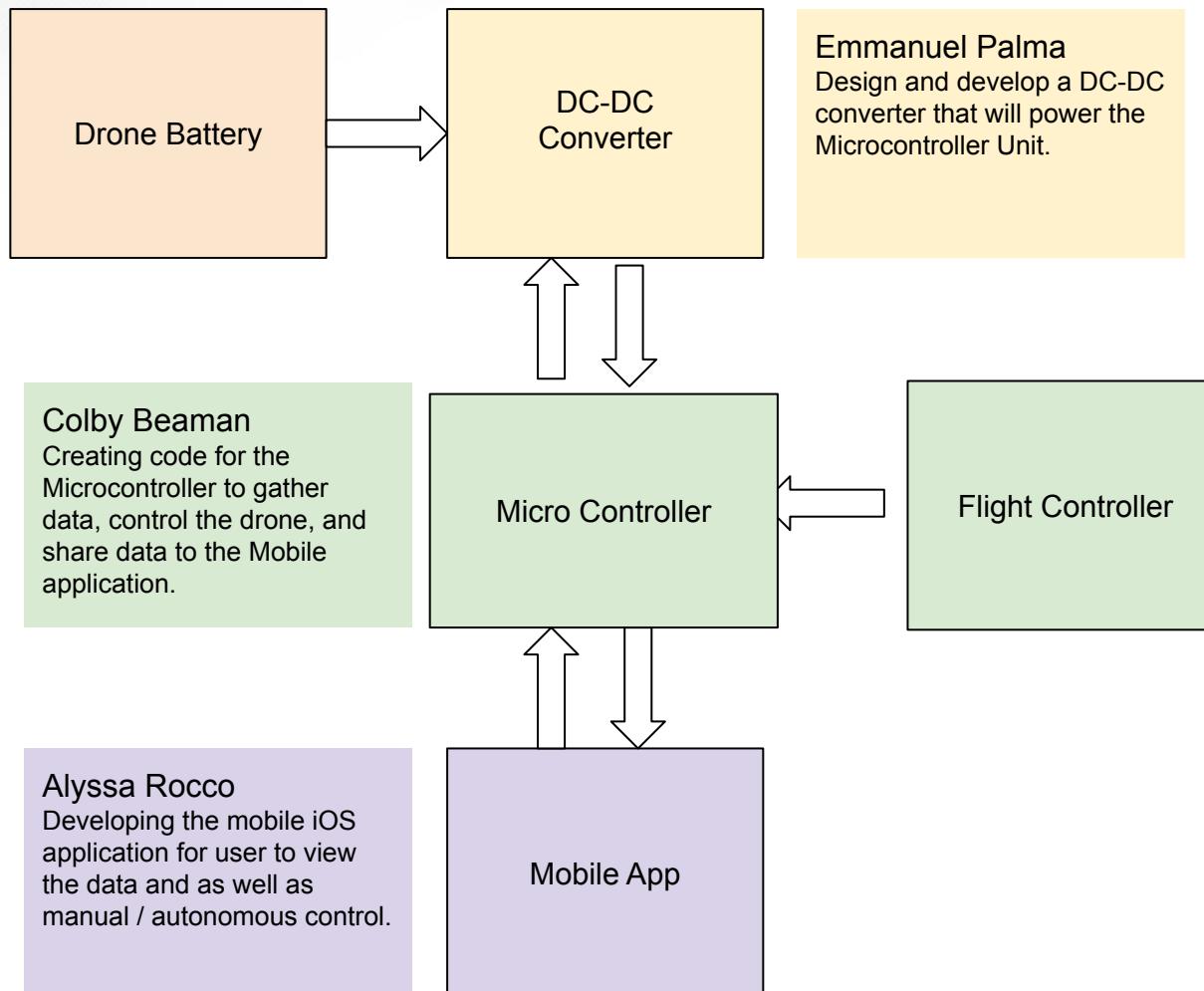
Sponsor: Md Hadiur Rahman Khan
TA: Md Hadiur Rahman Khan

Project Summary

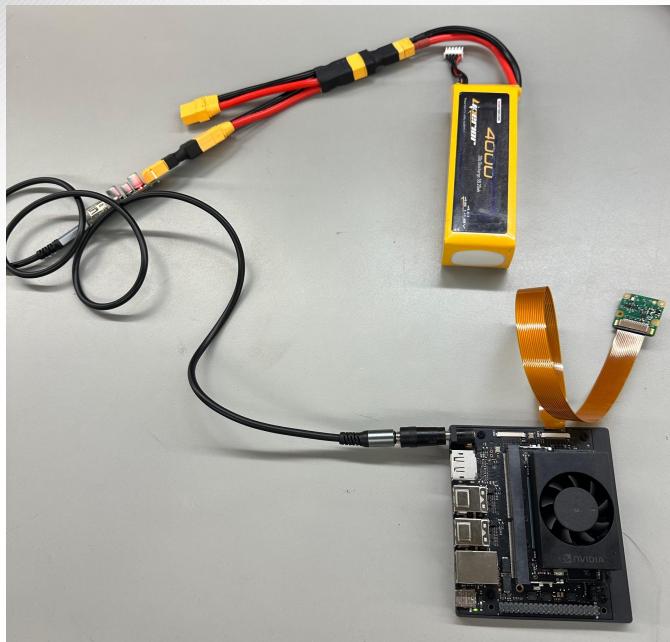
Problem statement: Despite the growing adoption of drones in the delivery, surveillance, and agriculture sectors, existing solutions suffer from inefficient power management and limited autonomous navigation capabilities.

Solution proposal: Offer a DC-DC Converter meant for increasing efficiency along with flight time. In tandem with an iOS application offering real-time power consumption analytics, battery health monitoring, and dual-control functionality.

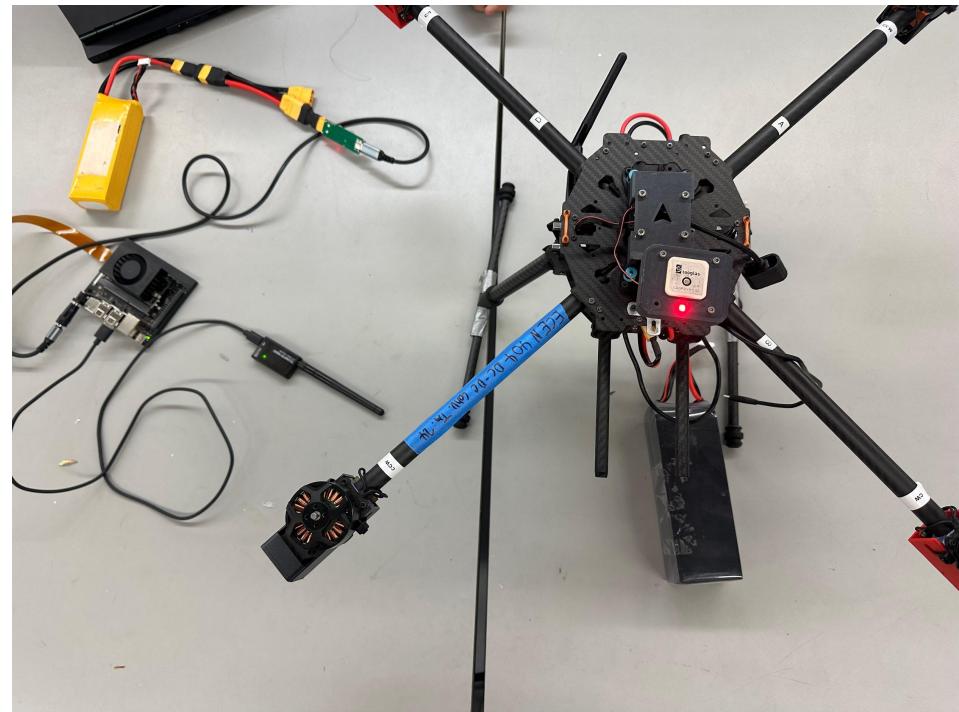
Project/Subsystem Overview



Integrated System Diagram



Jetson Nano Powering on by Converter



Jetson Remote Connecting to Drone

Project Timeline

Subsystem Designs and Testing (to be completed by 9/11)	Integration of MCU Subsystem with Converter Subsystem (completed 10/18)	Integration of MCU Subsystem with Application Subsystem (to be completed by 10/9)	Final Integration and First Flight Test (to complete by 10/15)	System Test (to complete by 11/2)	Validation (to complete by 11/26)	Demo and Report (to complete by 12/5)
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Microcontroller Subsystem

Colby Beaman

Accomplishments since last update 30 hours of effort	Ongoing progress/problems and plans until the next presentation
New Drone registered with FAA / TAMU database Integrated YOLO model on Jetson Nano (91.4% on CPU needs to be on GPU)	Find Pilot for all Necessary Testing Ongoing Remote Protocol (Manual/Autonomous) with App subsystem

Microcontroller Subsystem

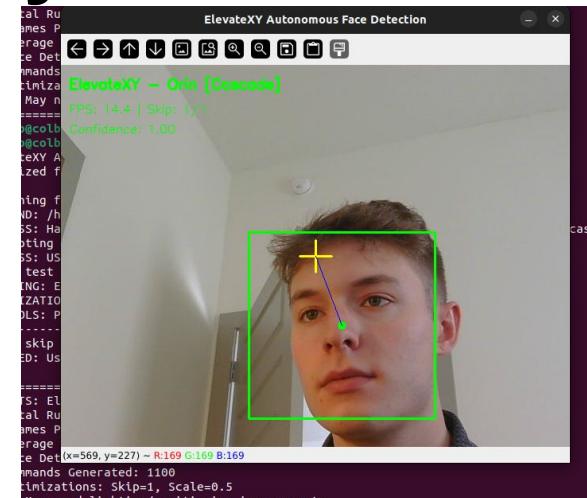
Colby Beaman

Currently Functioning

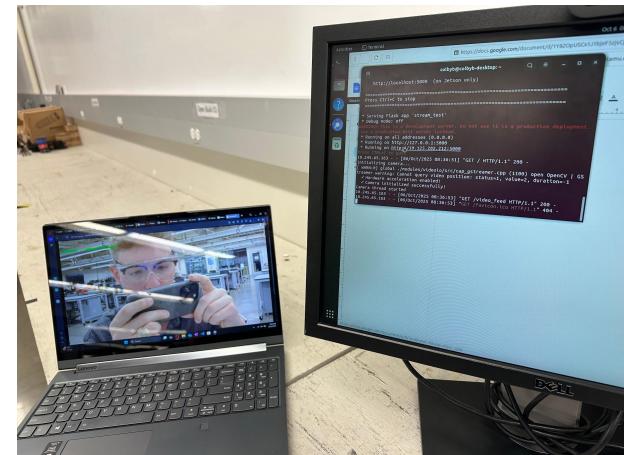
- Object Detection Model
- Manual Controls

Currently in Progress / Development

- Parallelizing all commands to function with App
- Updating Battery Analytics (measuring incorrect Voltage / Percentage)



Optimized Detection Tracking / Camera Streaming



DC Converter

Emmanuel Palma

Accomplishments since last update 30 hrs of effort	Ongoing progress/problems and plans until the next presentation
Adapted to new MCU Jetson Orin Nano which can power it on We have 2 converters for backup and reassurance	Ongoing data gathering such as efficiency, voltage drop. etc Display graphs as well as validated results when we perform our test flight

DC Converter

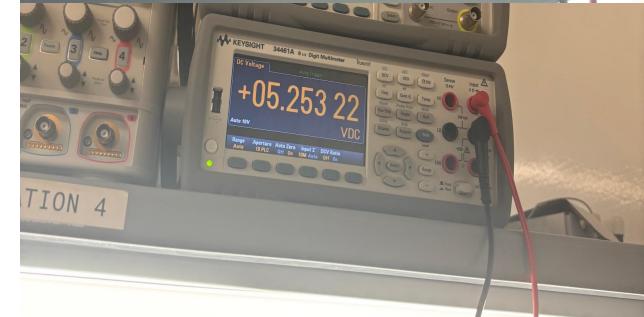
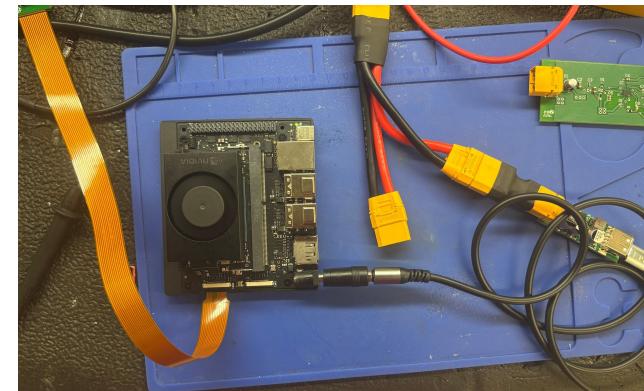
Emmanuel Palma

Currently functioning

- 1 of 2 converters powering Jetson Orin Nano, powered by usbc to 5x2.5mm jack for a 20V/2.3A power supply.

Working on / in progress

- Validating/ measuring and recording data for report
- Finalize debugging remaining built converter



Mobile Application

Alyssa Rocco

Accomplishments since last update 30 hrs of effort	Ongoing progress/problems and plans until the next presentation
Testing the camera quality on the app and MCU	Fixing the frontend and adding more features that would make the app more user friendly Testing on an iOS device (Apple Developer + TestFlight)



Mobile Application

Alyssa Rocco

ElevateXY

Create Account Log In

Create Account

Let's get started by filling out the form below.

Email X

Password !

Confirm Password !

Get Started

ElevateXY

Drone Connect

Enter Command Here

Recommendations

Drone Data Camera C

Drone Information

Battery Life 50%

Flight Time 00:01:00

View Map

← Drone Data

ReadData

Voltage: [1234.56 V]

Current: [1234.560 A]

Altitude: [1234.6 m]

Speed: [1234.56 m/s]

Heading: [1235 degrees]

Wind: [1235 mph]

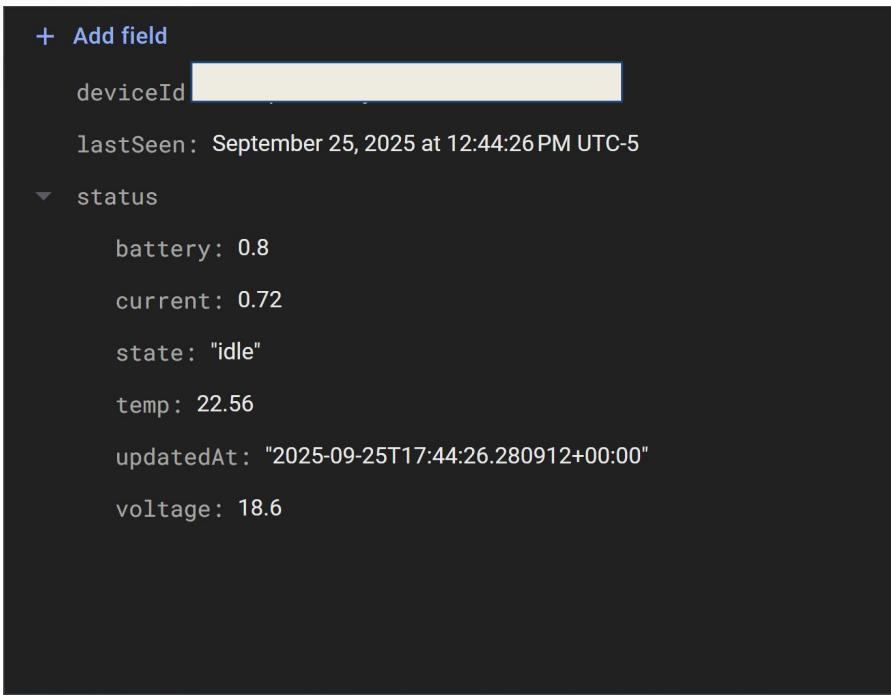
+

← Camera

! Video Player misconfigured

Pictures

Mobile Application

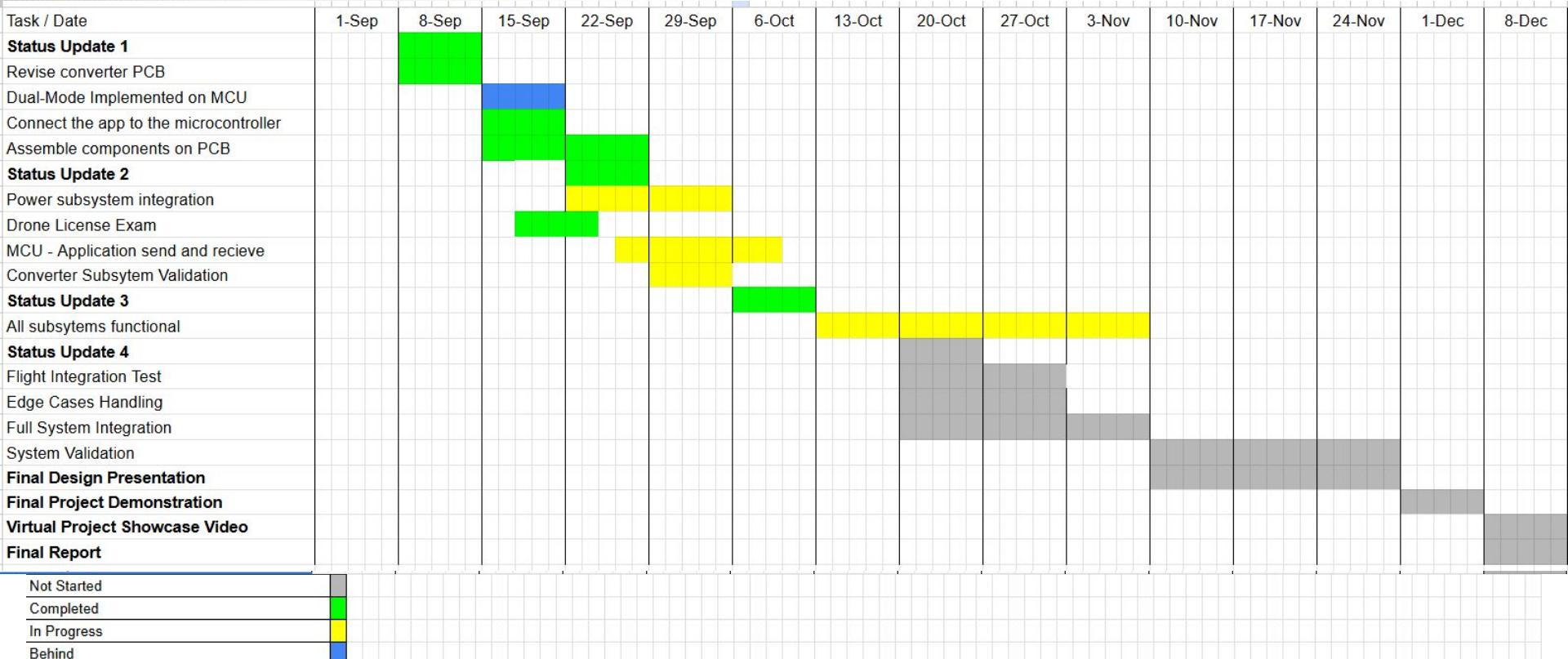


A screenshot of a mobile application interface. At the top, there is a header with a '+' icon and the text 'Add field'. Below this, there is a text input field with the placeholder 'deviceId'. Underneath the input field, there is a list of device status data:

- lastSeen: September 25, 2025 at 12:44:26 PM UTC-5
- status
 - battery: 0.8
 - current: 0.72
 - state: "idle"
 - temp: 22.56
- updatedAt: "2025-09-25T17:44:26.280912+00:00"
- voltage: 18.6

- Firebase is able to save the data and send it to the App
- Camera uses an HTTP stream from a backend that goes to the app
 - 1-2 second lag from camera to app

Execution & Plan



Validation Plan

Paragraph #	Test name	Verification Goal	Methodology	Status	Assigned to
3.2.1.3	Object Detection Model Integration	Model loads with 3 seconds, inference <30ms per frame	Time startup protocol, optimize Model to ensure efficiency	UNTESTED	Colby
3.2.1.3	Motor startup Sequence	All motors arm and reach idle with 3 seconds, no failures (specifically ESC errors / disarms)	Send Arm command and monitor RPM, Check for delayed response	VALIDATED	Colby
3.4	Pass Part 107 Exam	Pass and Receive Subsequent Documentation for Licence, followed with blanket form on Flight Request	Take and pass Part 107 exam, Obtain Remote Pilot Certificate from FAA, Complete TAMUS Flight Authorization	UNTESTED	Colby
3.2.1.2	Person Detection Accuracy	Achieves >85% precision within 5-10 feet	Test single person scenarios, multiple person scenarios, and zero person scenarios	UNTESTED	Colby
3.2.1.2	Real-time Processing	Maintains 20+ FPS, displays bounding boxes, no frame drops over 5 minutes	Implement frame counter and monitor under different scenarios, Verify bounding boxes render correctly	UNTESTED	Colby
3.2.3.1.3	MCU-Mobile App Communication	Supports simultaneous telemetry and command transmission, no packet loss during flight	Implement timestamped messages from MCU to App that also Echo, Count received packets on a 10 minute test	UNTESTED	Colby
3.2.3.1.1	Power Consumption Analysis	Nano operates with 15W power during normal AI inference, <25W peak during inference and telemetry	Monitor Power with Model under various loads, Develop a normal threshold based on Testing to Monitor	UNTESTED	Colby
3.2.4.1	Edge Case Handling	No crash: Partial Occlusion, 10+ persons, low light condition (<50 lux)	Test at night (with FAA approved lights), Use video footage of 10+ people with Model, Test with person behind object	UNTESTED	Colby
3.2.3.1.3	Flight Integration Test	Maintains detection during flight maneuvers, no inference with manual controls	Monitor Flight Log, Monitor GPU usage during basic maneuvers (Non-AI), Save video of camera feed	UNTESTED	Colby
3.2.3.1.3	Full System Integration	MCU sends data to mobile app, receives power/flight data, 0 system crashes, no memory leaks	Monitor Network throughput, Monitor CPU and GPU utilization, Monitor various Battery analytics	UNTESTED	Colby
3.2.2.1	Drone weight	Not exceeding the MTOW for the drone	Aiming to have the converter weight >200 grams as well as charging between 6s or 4s	IN PROGRESS	Emmanuel
3.2.3.1	Update Buck Converter	Redesign Buck Converter to be powered by a LiPo 4S battery	Changing the input of the PCB with the dimension of an XT60 bullet connector	VALIDATED	Emmanuel
3.2.3.1.2	Integrate Buck Converter	Successfully adapt a XT90 connector input to power the converter which will supply a 5V=4A output	Using a multimeter to record the output load of the integrated PCB	IN PROGRESS	Emmanuel
3.2.3.2.2	Test efficiency of new converter	Prove that the converter has remained highly efficient at 80% after integration	Measuring the calculated output power over the energy input of the PCB	IN PROGRESS	Emmanuel
3.2.3.2.2	Simulate flight duration	Converter functioning with high efficiency for 10 constant minutes	Using a stopwatch, record a 10 minute lap of the PCB powering the multicontroller	IN PROGRESS	Emmanuel
3.2.3.2.1	Real-time Processing	Drone Data is able to update within one second	Created a test file that updates and see if the data changes on the app	VALIDATED	Alyssa
3.2.1	Display Data	80% of the data is able to be sent and received to the microcontroller	Send signals from the app to see if the MCU will output the correct control selected	VALIDATED	Alyssa
3.2.3.2.3	Camera Connection/Quality	Camera quality has been improved and has less than five second delay	Optimize to find the best output	IN PROGRESS	Alyssa
3.2.3.2.2	Develop API Calls to send the MCU	All the commands run on the MCU	Monitor output sent from App versus Input received on MCU	IN PROGRESS	Alyssa
3.2.3.2.1	AI Components/Commands	Drone is able to understand the commands and execute within five seconds	Set a time stamp from when the program started until it is connected	UNTESTED	Alyssa
4.1.1	Test all features combined on the app	Able to perform the functions created	Run successfully with no bugs/ errors throughout the flight time	UNTESTED	Alyssa

Thank you for your time