Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

Team 24: ElevateXY
Bi-Weekly Update 3

Team members list:Colby Beaman, Emmanuel Palma, Alyssa Rocco
Sponsor: Md Hadiur Rahman Khan
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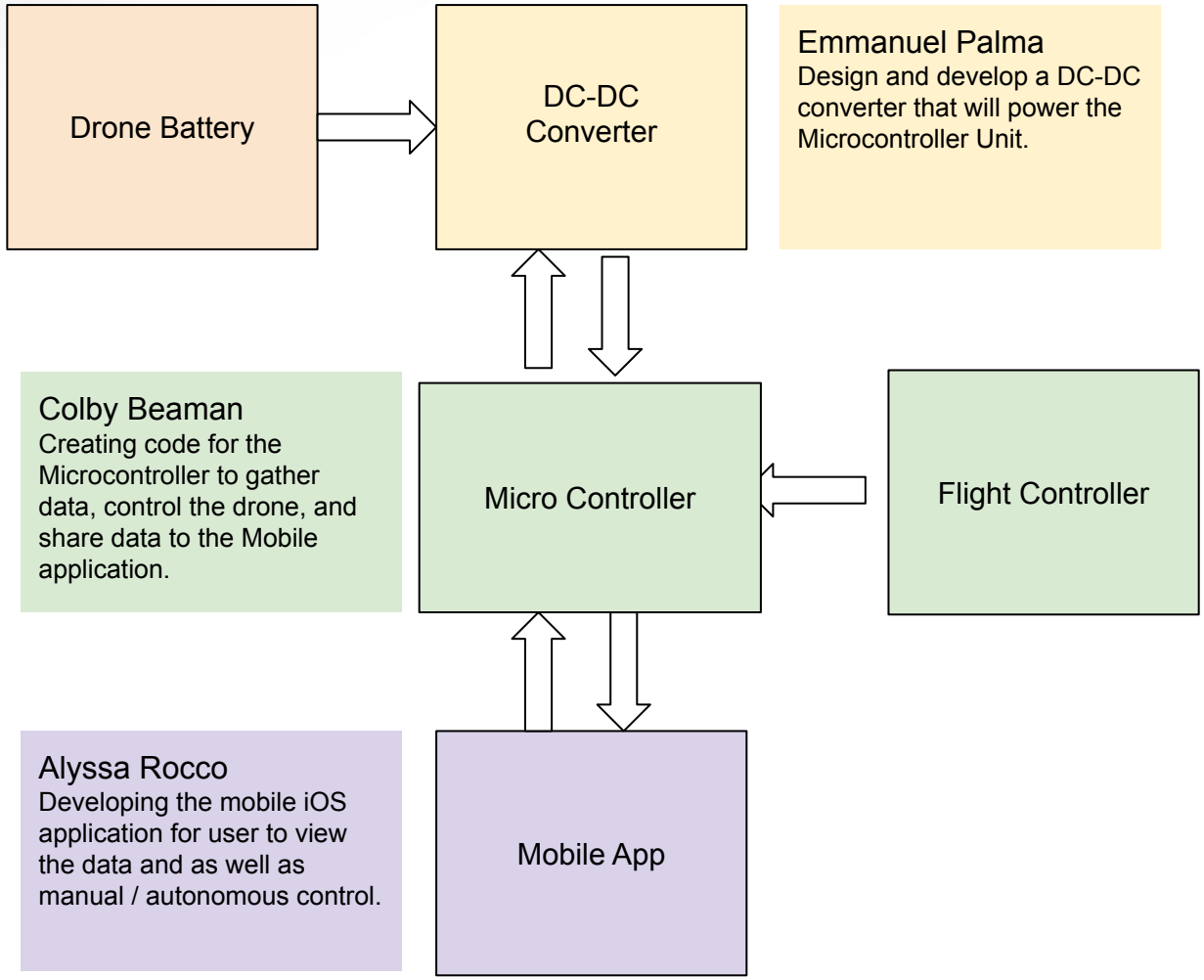
Project Summary

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



Project Timeline

Subsystem Designs and Testing (to be completed by 9/11)	Integration of MCU Subsystem with Converter Subsystem (completed 9/2)	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)

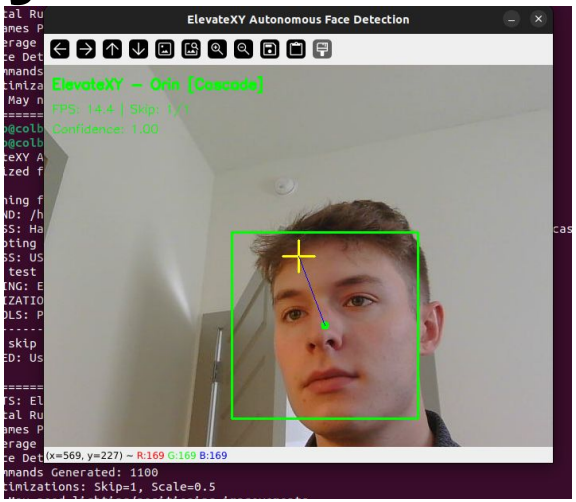
Microcontroller Subsystem

Colby Beaman

Accomplishments since last update 15 hours of effort	Ongoing progress/problems and plans until the next presentation
Part 107 License Exam Passed App Subsystem receives data and camera connection	Register drone with FAA Complete Insurance Form for Flight Testing Ongoing Remote Protocol (Manual/Autonomous) with App subsystem

Microcontroller Subsystem

Colby Beaman



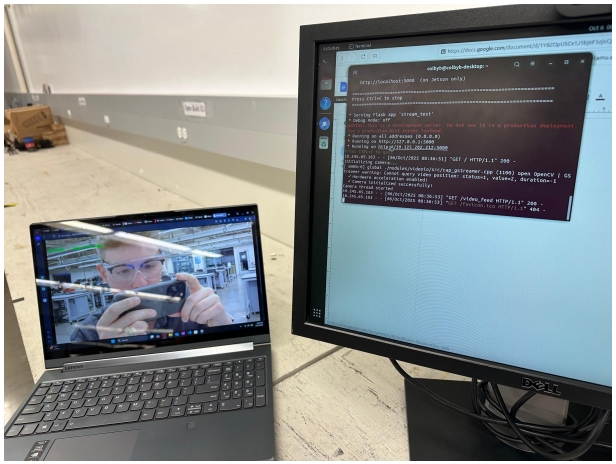
Currently Functioning

- Object Detection Model
- Manual Control
- Remote Camera / Data Streaming with App Connection

Currently in Progress / Development

- Further Optimization / Parallelization
- Sending commands to and from App Subsystem

Optimized Detection Tracking / Camera Streaming



DC Converter

Emmanuel Palma

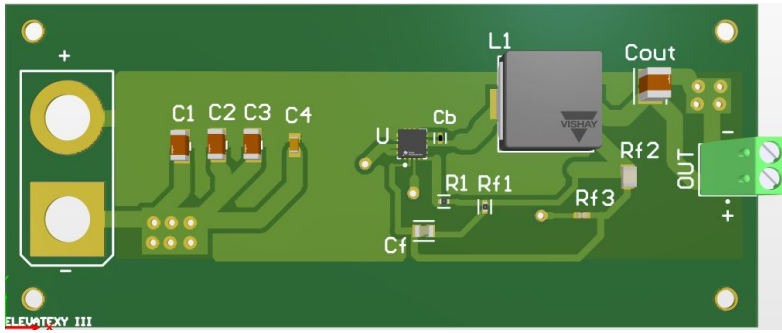
Accomplishments since last update 13 hrs of effort	Ongoing progress/problems and plans until the next presentation
Finalized assembling PCB Converter	Began debugging PCB Change in microcontroller resulted in a new redesign

DC Converter

Emmanuel Palma

New updates to the PCB:

- Will undergo redesign due to new microcontroller
- Needs an output of 9-20V/ 2A instead of a 5V/4A
- During redesign I will find a power supply to power microcontroller



Buck Converter

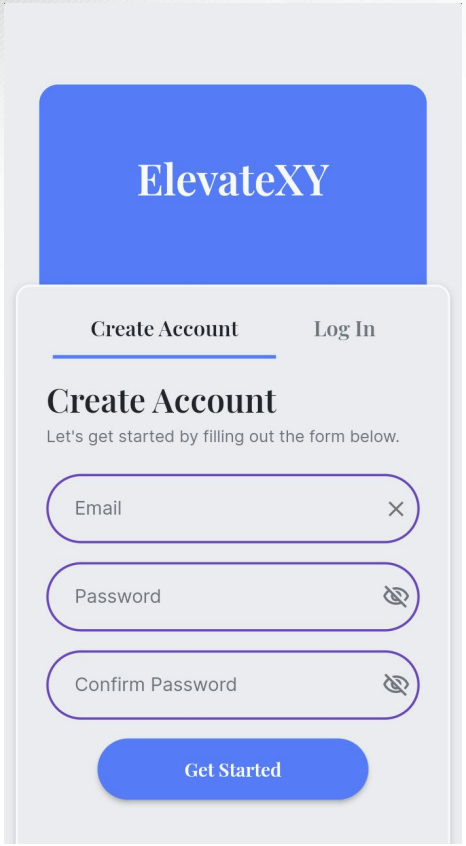
Mobile Application

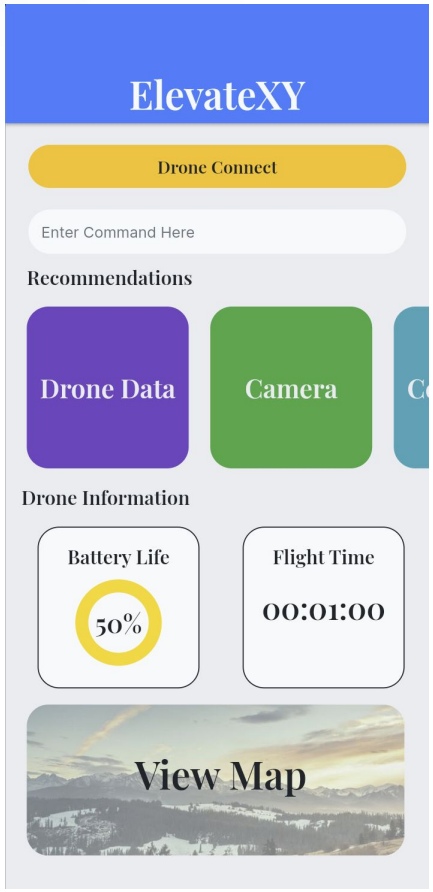
Alyssa Rocco

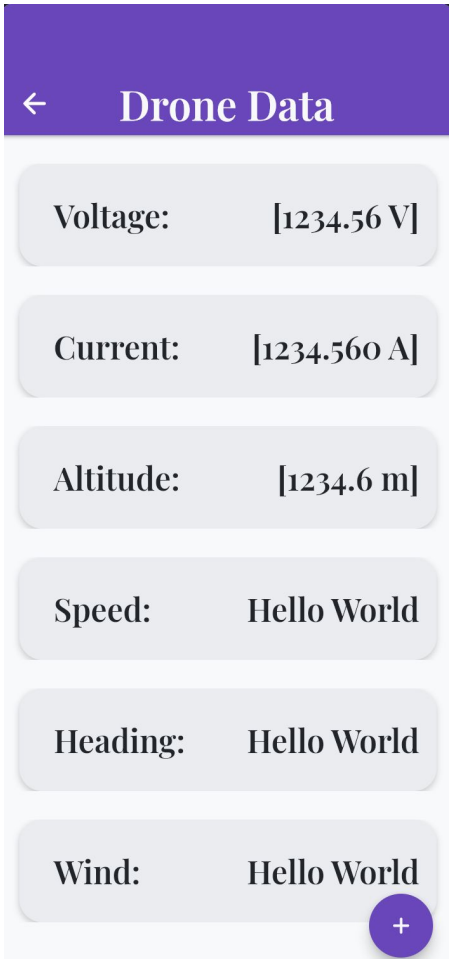
Accomplishments since last update 12 hrs of effort	Ongoing progress/problems and plans until the next presentation
The app is able to send and receive commands and data from the MCU	Testing the camera quality on the app Continue integrating the commands and Computer Vision Model

Mobile Application

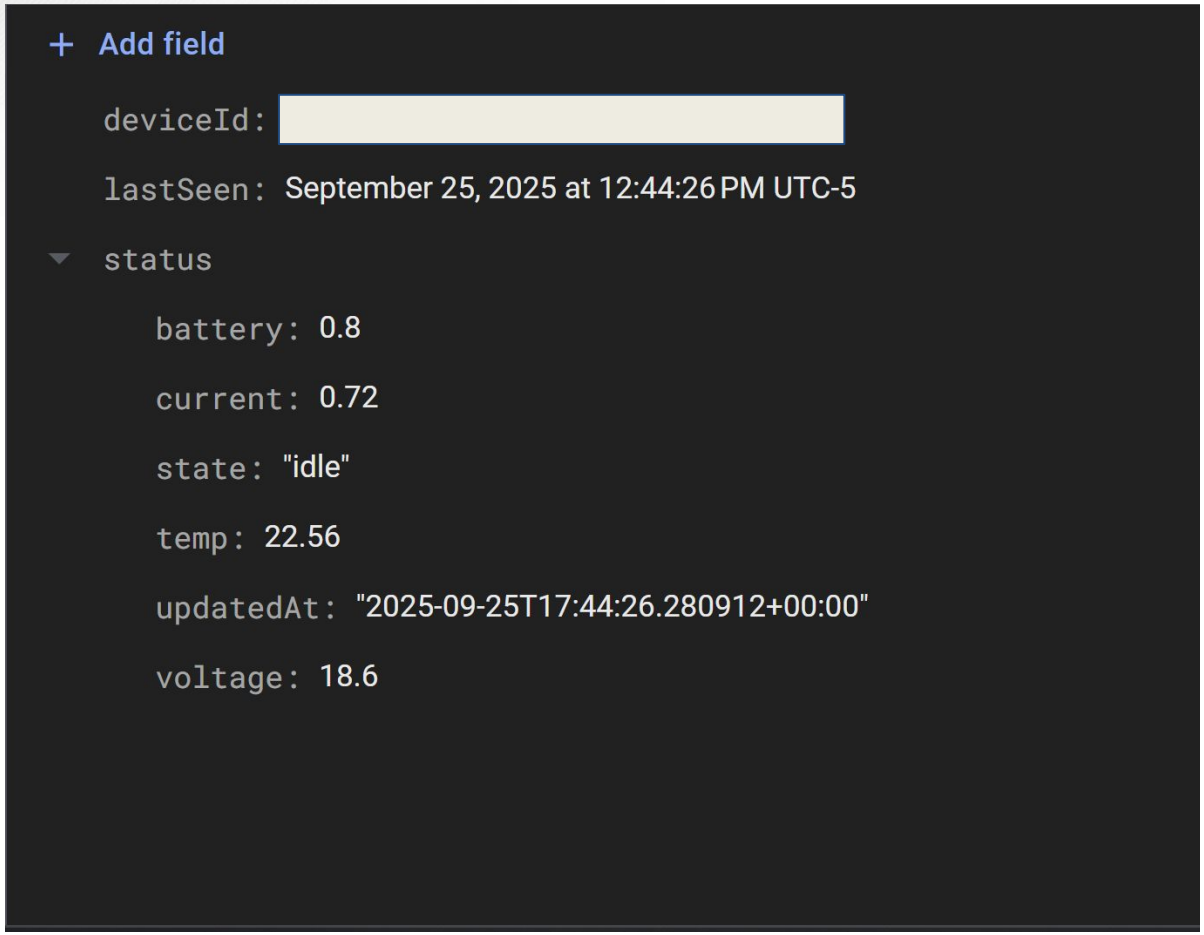
Alyssa Rocco



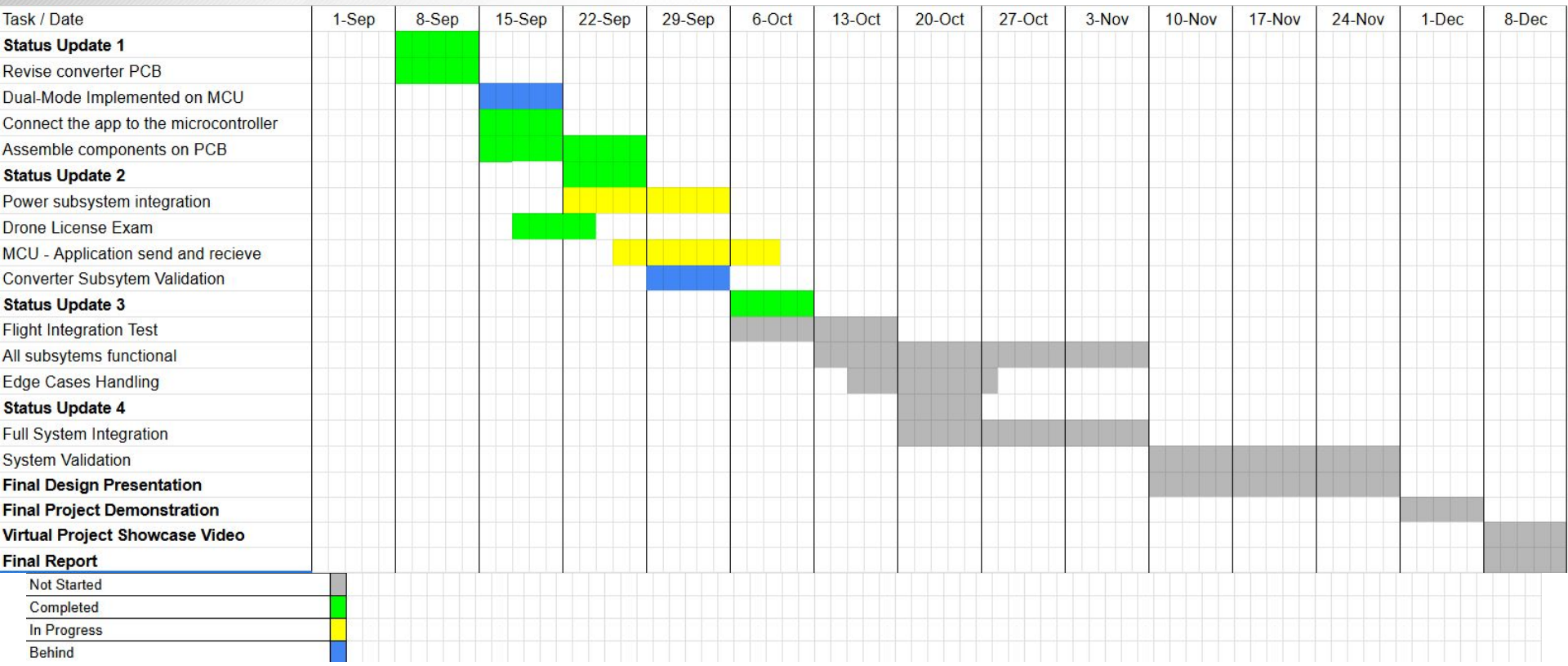




Mobile Application



Execution & Plan



Validation Plan

Test name	Verification Goal	Methodology	Status	Assigned to
Object Detection Model Integration	Model loads with 3 seconds, inference <30ms per frame	Time startup protocol, optimize Model to ensure efficiency	UNTESTED	Colby
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
Pass Part 107 Exam	Pass and Receive Subsquent 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
Person Detection Accuracy	Achieves >85% precision within 5-10 feet	Test single person scenarios, multiple person scenarios, and zero person scenarios	UNTESTED	Colby
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
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
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
Edge Case Handling	No crash: Partial Occulsion, 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
Flight Integration Test	Maintains detection during flight manuevers, no inference with manual controls	Monitor Flight Log, Monitor GPU usage during basic maneuvers (Non-AI), Save video of camera feed	UNTESTED	Colby
Full System Integration	MCU sends data to mobile app, recieves power/flight data, 0 system crashes, no memory leaks	Monitor Network throughput, Monitor CPU and GPU utilization, Monitor various Battery analytics	UNTESTED	Colby
Update Buck Converter	Redesign Buck Converter to be powered by a LiPo 6S battery	Changing the input of the PCB with the dimension of an XT90 bullet connector	VALIDATED	Emmanuel
Integrate Buck Converter	Sucessfuly 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
Test efficiency of new converter	Prove that the converter has remained higly efficient at 90% after integration	Measruing the calculated output power over the energy input of the PCB	UNTESTED	Emmanuel
Simulate flight duration	Converter functioning with high effiency for 10 constant minutes	Using a stopwatch, record a 10 minute lap of the PCB powering the multicontroller	UNTESTED	Emmanuel
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
Connect App to Microcontroller	80% of the data is able to be sent and receieved to the microcontroller	Send signals from the app to see if the MCU will output the correct control selected	UNTESTED	Alyssa
Camera Connection/Quality	Camera quality has been improved and has less than five second delay	Optimize to find the best output	UNTESTED	Alyssa
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
Develop API Calls to send the MCU	All the commands run on the MCU	Monitor output sent from App versus Input received on MCU	UNTESTED	Alyssa
Test all features combined on the app	Able to perform the functions created	Run sucessfully with no bugs/ errors throughout the flight time	UNTESTED	Alyssa

Thank you for your time