Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

Team 24: ElevateXY
Bi-Weekly Update 1

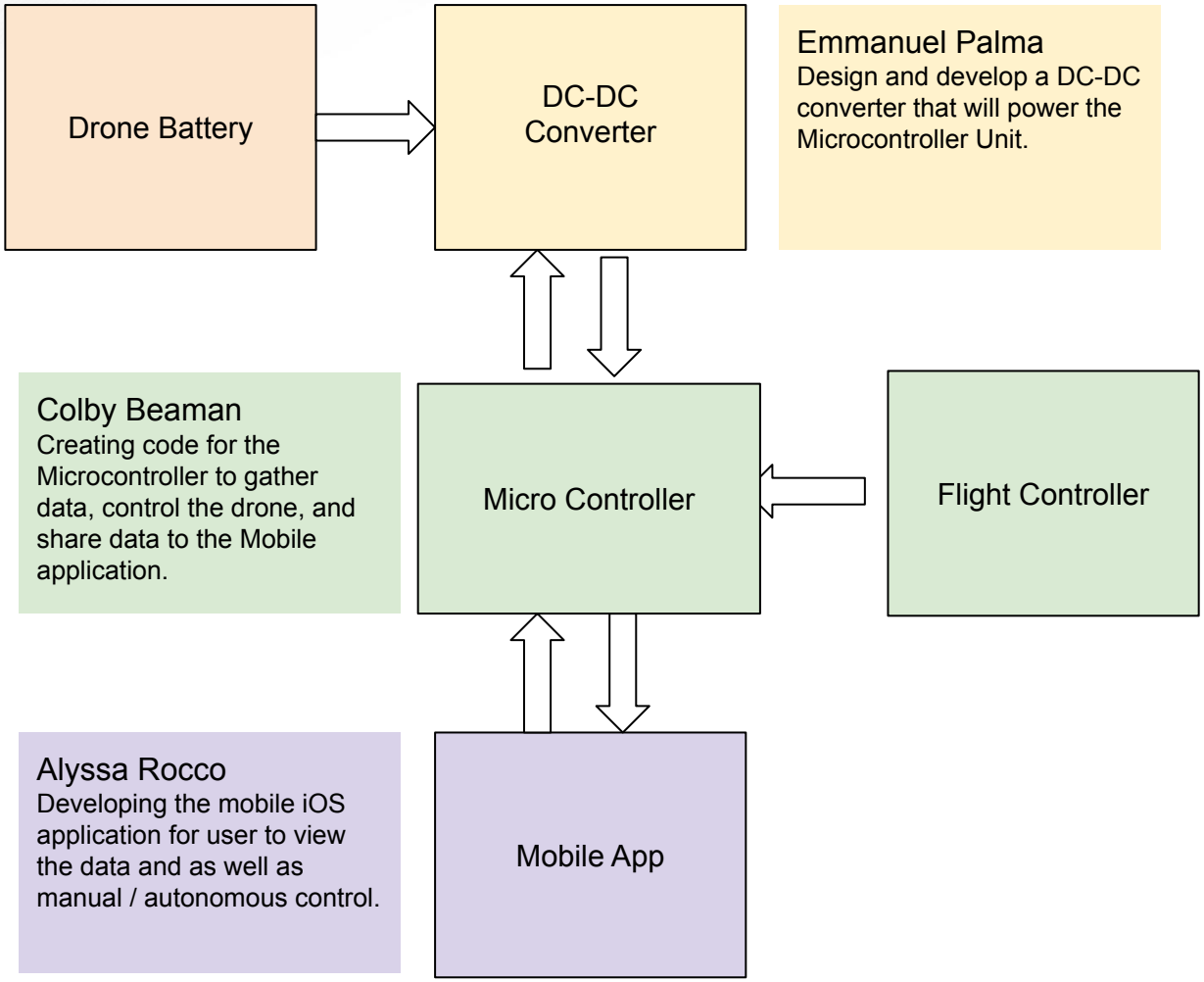
Team members list:Colby Beaman, Emmanuel Palma, Alyssa Rocco
Sponsor: N/A
TA:Md Hadiur Rahman Khan

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



Project Timeline

Complete In Progress Behind

Subsystem	Research	Design	Simulation	Ready for Integration
MCU Subsystem	Complete	Complete	In Progress	Behind
Converter Subsystem	Complete	Complete	Complete	In Progress
Application Subsystem	Complete	Complete	Complete	In Progress

Microcontroller Subsystem

Colby Beaman

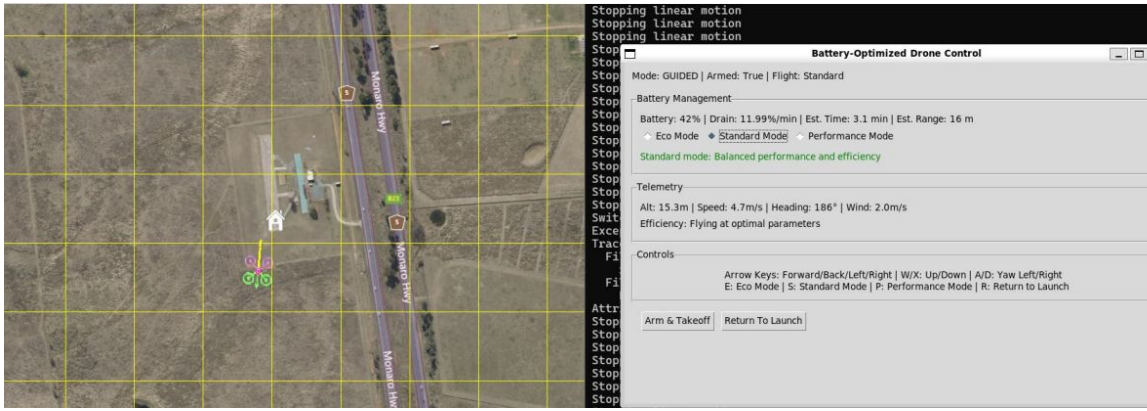
Accomplishments since 403 4 hrs of effort	Ongoing progress/problems and plans until the next presentation
Object Detection Simulation with Benchmark Data	Study for Part 107 Test Provide Battery Analytics / Location Data for Application Execute motor startup protocol

Microcontroller Subsystem

Colby Beaman

Currently Functioning

- Manual Control Protocol
- Object Detection on Simulation Video (YOLO Model)



Manual Simulation Screenshot

Currently in Progress / Development

- Full Implementation of Manual / Autonomous Modes on MCU
- Extracting Crucial Data for Application
- Motor Control

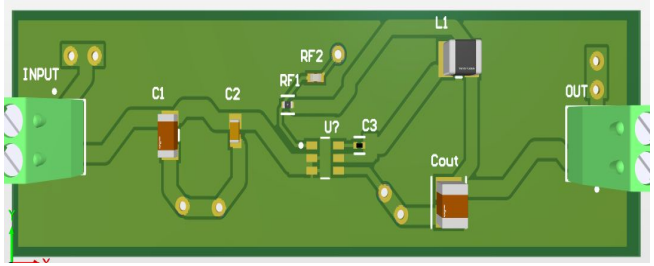
DC Converter

Emmanuel Palma

Accomplishments since 403 5 hrs of effort	Ongoing progress/problems and plans until the next presentation
Developed a Buck Converter that runs at an efficiency of 90% of outputting 5V for 10 consecutive minutes.	Modify PCB and adapt to integration, change the input outlet to be powered by a 6s LiPo battery

DC Converter

Emmanuel Palma



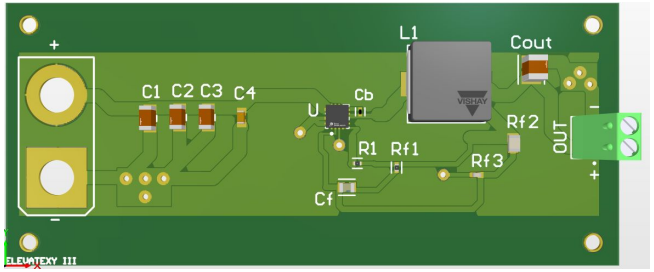
Current Buck Converter

Issues with current PCB:

- Unable to output a constant 4 Amps
  - Jetson Nano needs 5V=4A

New additions to the PCB:

- Increasing the trace width to 70 mil
- Vias for heat dissipation
- Mounting holes to attach to the drone
- XT90 bullet connector input



New Buck Converter

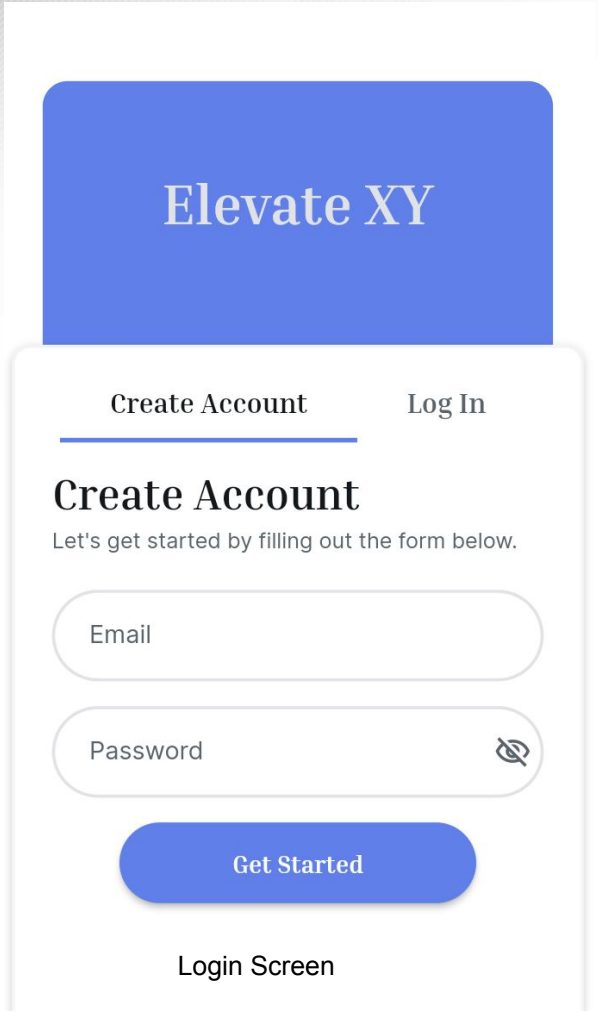
Mobile Application

Alyssa Rocco

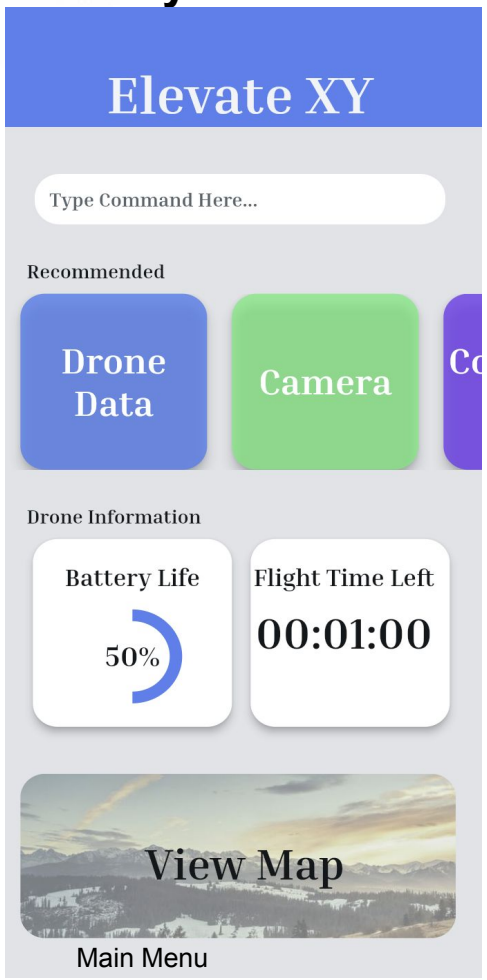
Accomplishments since 403 5 hrs of effort	Ongoing progress/problems and plans until the next presentation
Developed the front end of the app and have been able to test the “Real Time” Drone Data.	Creating a bluetooth connection in order for the app to connect to the Jetson Nano Begin testing the app to send commands to the Jetson Nano

Mobile Application

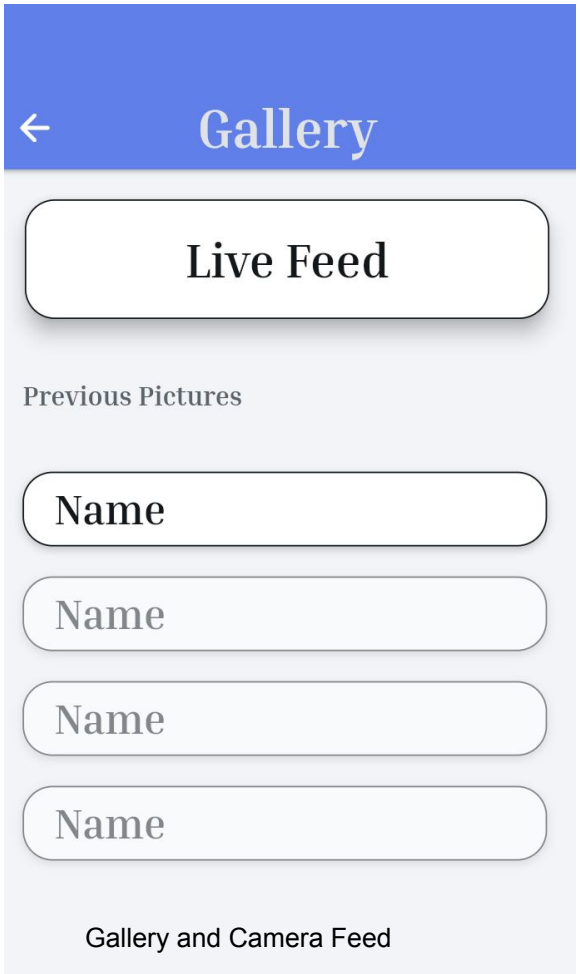
Alyssa Rocco



Login Screen



Main Menu



Gallery and Camera Feed

Parts Ordering Status

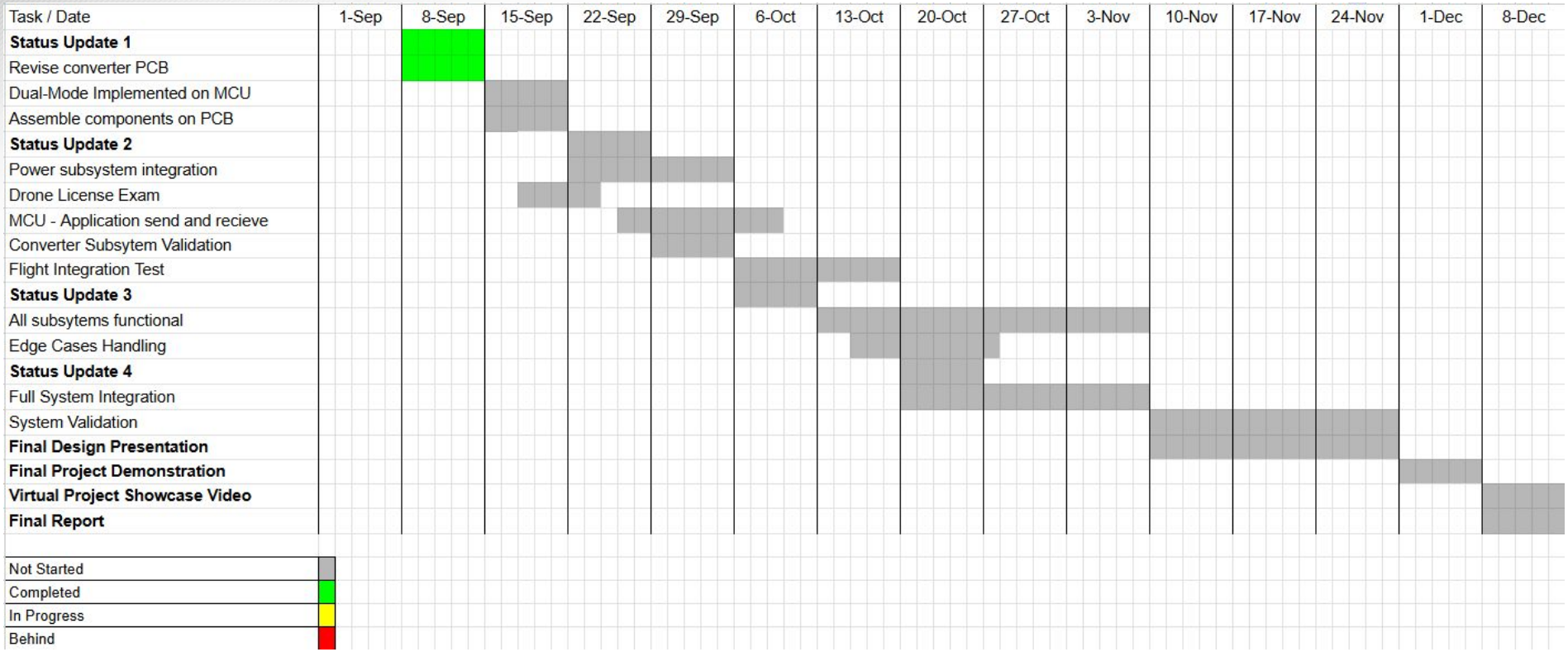
Parts ordered:

- Components / updated PCB for the new buck converter
  - Should be scheduled to arrive within the next 5 business days

Parts remained to be ordered:

- Housing unit for the Jetson Nano

Execution & Plan



Validation Plan

Task	Verification Goal	Assigned to	Status	Date Due
Object Detection Model Integration	Model loads within 5 seconds, inferenance <50ms per frame	Colby		9/11
Motor startup Sequence	All motors reach 1500 RPM within 3 seconds	Colby		9/11
Pass Part 107 Exam	Pass and Receive Subsquent Documentation for Licence, followed with blanket form on Flight Request	Colby		9/20
Person Detection Accuracy	>85% precision, <5% false positives, confidence >0.7	Colby		9/15
Real-time Processing	Maintains 30+ FPS, displays bounding boxes, no frame drops over 5 minutes	Colby		9/24
MCU-Mobile App Communication	Person coordinates sent with 100ms, 0% packet Loss over 10 minutes	Colby		10/2
Power Consumption Analysis	<4A peak during detection (within converters 4A limit), <3A average, measured over 30 minutes	Colby		10/8
Edge Case Handling	No crash: 0 persons, 10+ persons, low light condition (<50 lux)	Colby		10/10
Flight Integration Test	Maintains detection during flight manuevers, no inference with manual controls	Colby		10/15
Full System Integration	MCU sends data to mobible app, recieves power/flight data, 0 system crashes, no memory leaks	Colby		10/29
Simulate converter	Produce an efficiency +80%	Emmanuel		9/4
Update Buck Converter	Redesign Buck Converter to be powered by a LiPo 6S battery	Emmanuel		9/8
Integrate Buck Converter	Sucessfuly adapt a XT90 connector input to power the converter which will supply a 5V=4A output	Emmanuel		9/22
Test efficiency of new converter	Prove that the converter has remained higly efficient at 90% after integration	Emmanuel		9/25
Simulate flight duration	Converter functioning with high effiency for 10 constant minutes	Emmanuel		9/29
Real-time Processing	Drone Data is able to update within one second	Alyssa		9/4
Connect App to Microcontroller	80% of the data is able to be sent and receieved to the microcontroller	Alyssa		9/11
Camera Connection/Quality	Camera quality has been improved and has less than five second delay	Alyssa		9/18
AI Components/Commands	Drone is able to understand the commands and execute within five seconds	Alyssa		9/25
Develop API Calls to send the MCU	90% of commands run on the MCU	Alyssa		10/9
Test all features combined on the app	Able to perform 90% of the functions created	Alyssa		10/16

Key	
Completed	
On Schedule/In Progress	
Behind Schedule	

Thank you for time