Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

Team 24: ElevateXY
Bi-Weekly Update 2

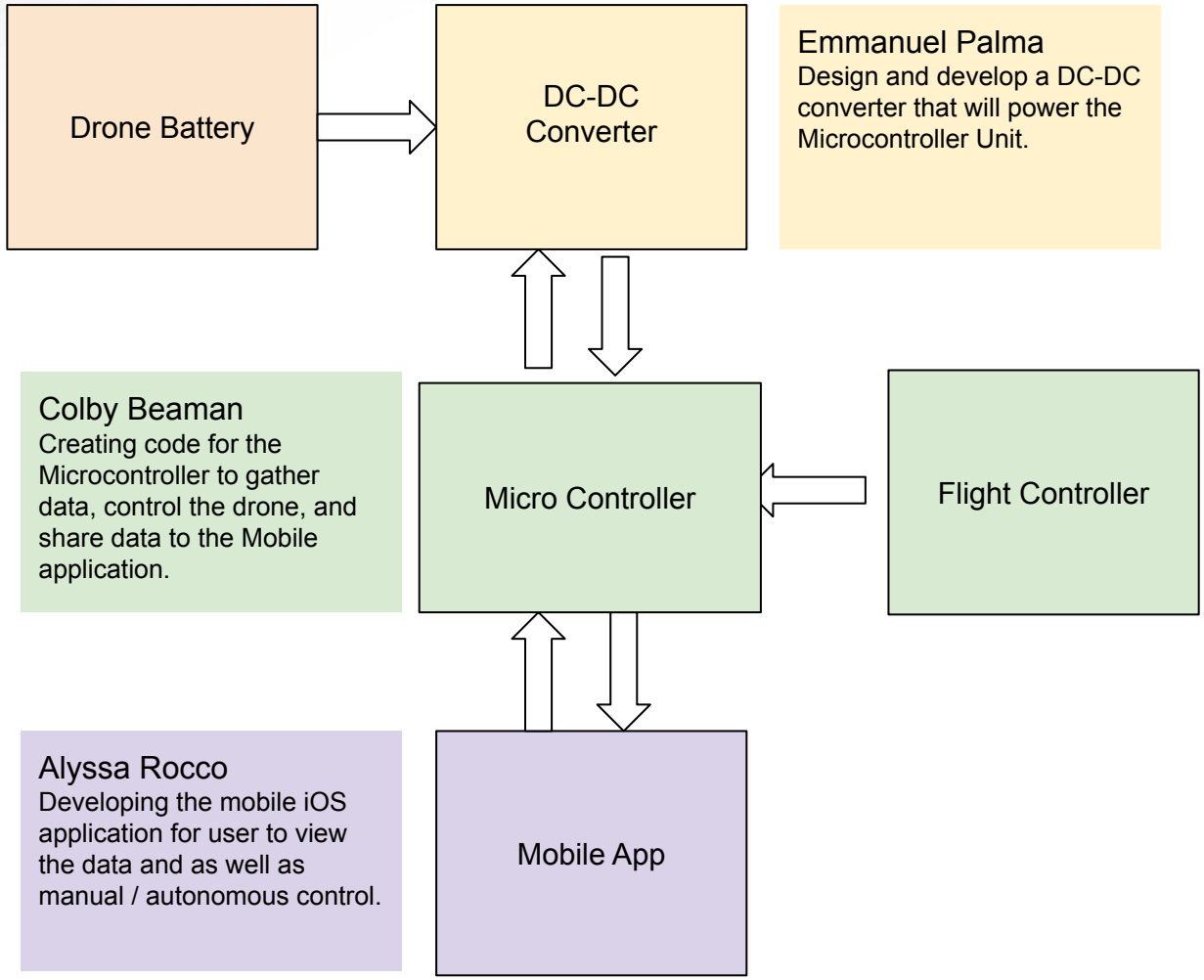
Team members list:Colby Beaman, Emmanuel Palma, Alyssa Rocco
Sponsor: Md Hadiur Rahman Khan
TA:Md Hadiur Rahman Khan

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



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 10/2)	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 7 hrs of effort	Ongoing progress/problems and plans until the next presentation
Manual Protocol works along with Remote Control Completed battery data function in preparation for integration with App Subsystem	By next Presentation will have Part 107 License Autonomous Version Continued Integration with Application Subsystem

Microcontroller Subsystem

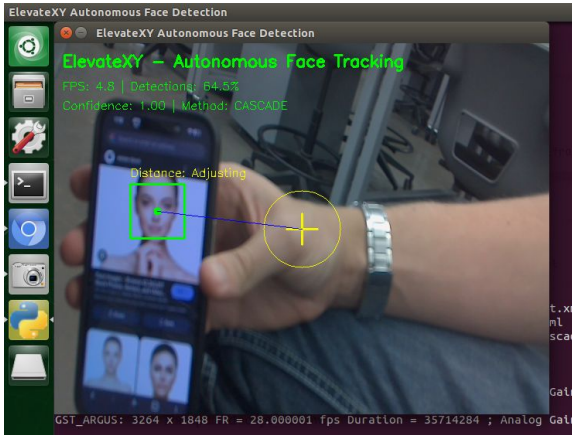
Colby Beaman

Currently Functioning

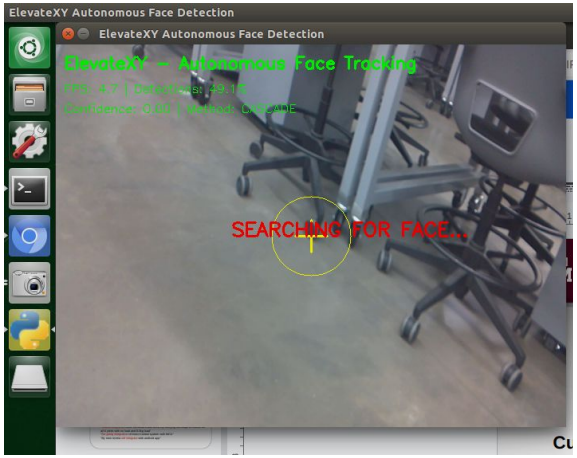
- Manual Control Protocol
- Battery Data can be Extracted / Viewed
- Buck Converter can properly power MCU

Currently in Progress / Development

- Computer Vision Model
- Remote Connection with App Subsystem



Sample Facial Detection Tracking



Current Manual Protocol Screengrab

```
colbyb@colbyb-desktop:~$ python3 clean_battery_monitor.py
ElevateXY Battery Monitor
Safety checks enabled, live data verification included
Connecting to /dev/ttyUSB0 @ 57600 baud...
Connected! Enabling proper safety settings...
CRITICAL:autopilot:PreArm: Hardware safety switch
CRITICAL:autopilot:PreArm: Battery 1 below minimum arming voltage
Safety setting: ARMING_CHECK = 1
Safety setting: GPS_TYPE = 1
ERROR:dronekit:timeout setting parameter EKF_CHECK to 1.000000
Safety setting: EKF_CHECK = 1
Safety setting: FS_CRASH_CHECK = 1
ERROR:dronekit:timeout setting parameter LAND_DETECTOR to 1.000000
Safety setting: LAND_DETECTOR = 1
Safety setting: BATT_MONITOR = 4
Safety checks re-enabled. Ready for monitoring.

============================================================
ELEVATEXY Program Version 2.0
============================================================
Controls:
  W/A/S/D   - Movement
  Q/E       - Up/Down
  R         - Arm/Disarm
  B         - Show battery status
  V         - Verify live data
  ESC       - Exit
============================================================
Starting initial data verification...

Verifying live data updates...
Collecting samples for 10 seconds...
Sample  1: V=23.393 A=0.0 %=99
Sample  2: V=23.382 A=0.0 %=99
Sample  3: V=23.414 A=0.0 %=99
Sample  4: V=23.391 A=0.0 %=99
Sample  5: V=23.413 A=0.0 %=99
Sample  6: V=23.413 A=0.0 %=99
Sample  7: V=23.407 A=0.0 %=99
Sample  8: V=23.401 A=0.0 %=99
Sample  9: V=23.431 A=0.0 %=99
Sample 10: V=23.411 A=0.0 %=99
Sample 11: V=23.43 A=0.0 %=99
Sample 12: V=23.41 A=0.0 %=99
Sample 13: V=23.419 A=0.0 %=99
Sample 14: V=23.351 A=0.0 %=99
bSample 15: V=23.378 A=0.0 %=99
Sample 16: V=23.413 A=0.0 %=99
Sample 17: V=23.391 A=0.0 %=99
Sample 18: V=23.389 A=0.0 %=99
Sample 19: V=23.408 A=0.0 %=99
Sample 20: V=23.382 A=0.0 %=99

Data Analysis:
------------------------------------------------
Voltage: 23.351V to 23.431V (range: 0.080V)
OK: Voltage is changing
```

DC Converter

Emmanuel Palma

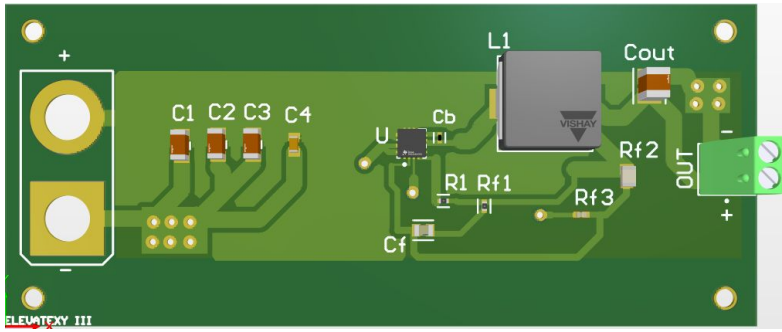
Accomplishments since last update 10 hrs of effort	Ongoing progress/problems and plans until the next presentation
Modified the Buck converter to connect to a 6s LiPo battery for integration	Begin assembling/soldering components to the PCB by next presentation will give an update on test results and integration outcome

DC Converter

Emmanuel Palma

New updates to the PCB:

- PCB board arrived 9/18
- Mounting holes to attach to the drone
- XT90 bullet connector input will be wired by 12 AWG
- plug output to power Jetson nano at 20W (5V=4A)



New Buck Converter

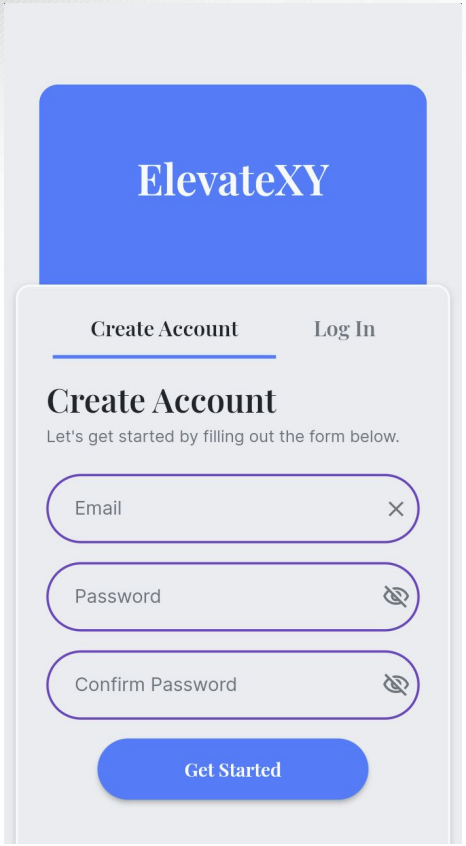
Mobile Application

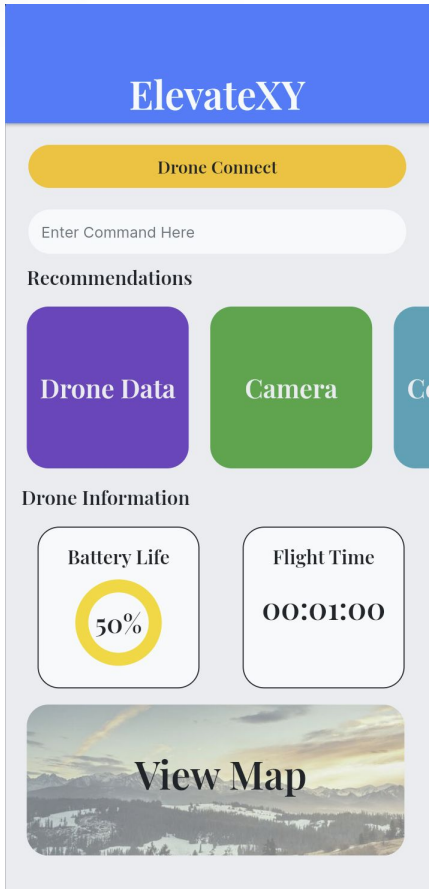
Alyssa Rocco

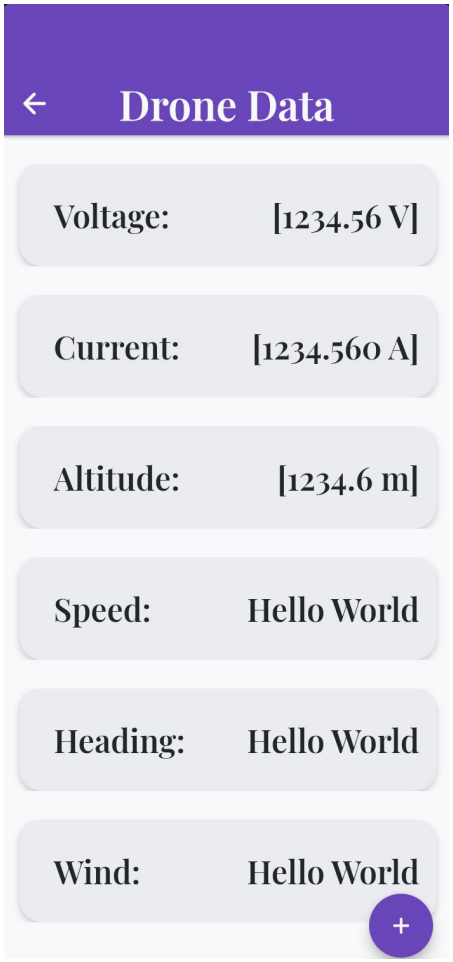
Accomplishments since last update 10 hrs of effort	Ongoing progress/problems and plans until the next presentation
Created the Wifi Connection to integrate the app to the Jetson Nano	Testing the app to send commands to the Jetson Nano Testing the Jetson Nano connection to send data to the app

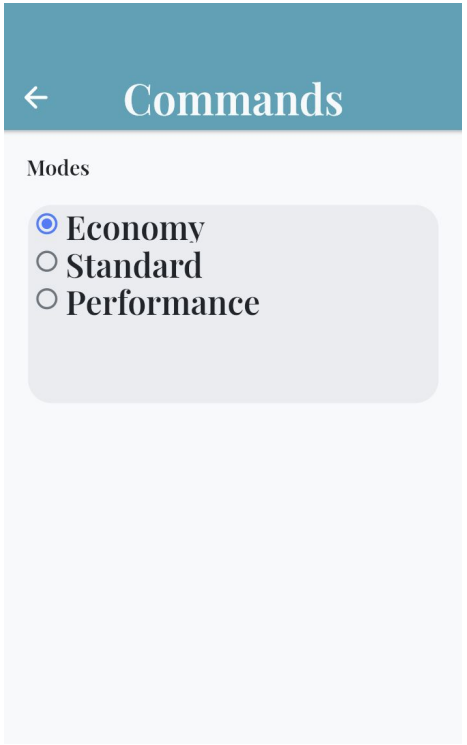
Mobile Application

Alyssa Rocco

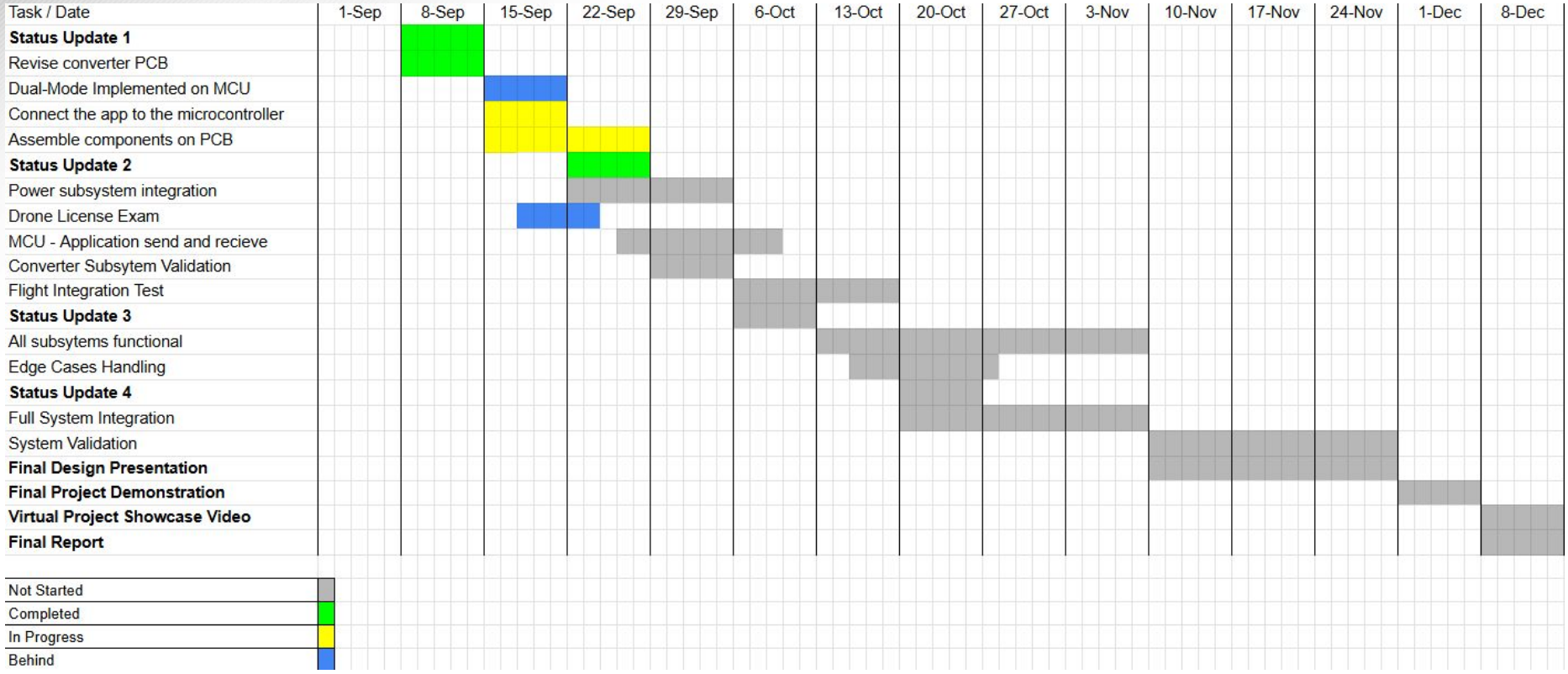








Execution & Plan



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		10/2
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 your time