

ELC 496 Design Review #4



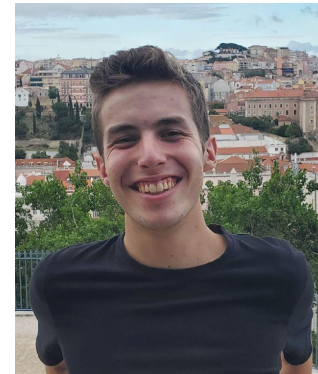
Spring Semester 2023

Advisor: Dr. Deese

Team Members



Sean Burtnett



Mike Bond



Jack Delvecchio



Darion Parks

Agenda

- Project Overview
 - Schedule
 - 2nd Semester Plans
- Project Plan
 - Troubleshooting Drone Stability
 - 2nd Semester Hardware
 - 2nd Semester Software
 - Open AIs
- Project Management
 - Updated Budget
 - Updated Hours
- Summary

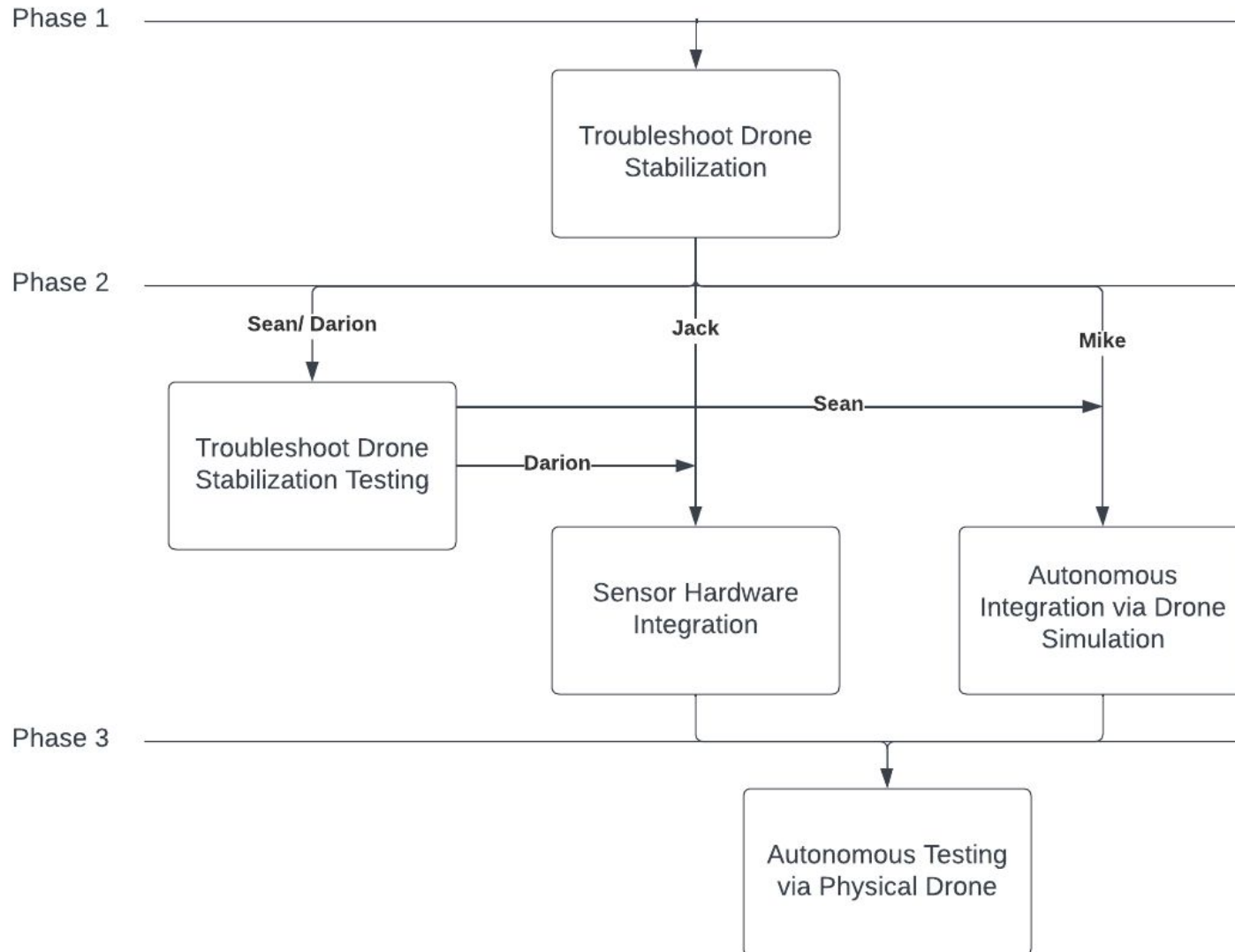
Part 1

Project Overview

Schedule

Task	TASK TITLE	Job	PCT OF TASK DONE	Phase 1: Stability Testing + Sensor Design					Phase 2: System Integration					Phase 3: Testing/ Evaluation			
				1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Stability Testing	Group	33%														
2	Update Website	Jack	0%														
3	Select/Order Parts	Sean	0%														
4	Sensor Assembly	Jack Darion	0%														
5	Coding Autonomous Flight	Mike	0%														
6	Ultrasonic Sensor Integration	Mike Sean	0%														
7	Thermal Sensor Integration	Darion Jack	0%														
8	Documentation	Group	15%														

2nd Semester Plans



Part 2

Project Plan

Troubleshooting Drone Stability

Current Issues We're Facing

- RX/TX working with the motors
- Adjusting parameters in Mission Planner
 - Changing Servo Output Signal
 - Tree Parameters
 - PPM Encoder vs. PWM

Troubleshooting Drone Stability

Plan Going Forward

- Hard deadline of February 23rd set
 - If we can't get the drone flying with the RX/TX we will move on to focusing on end goal of our autonomous application by working in parallel

2nd Semester Hardware

- Ultrasonic sensors and thermal sensors will be attached to the drone
 - 6 ultrasonic sensors
 - 1 thermal sensor
- Ultrasonic sensors placed on all 4 sides of drone and 1 on top/ 1 on bottom
- Thermal sensor placed on the bottom facing frontwards

3D Printing

- 6 cages to hold the sensors in place will be needed
- 4 of the cages will be similar, they will fit between the legs of the drone to hold sensors



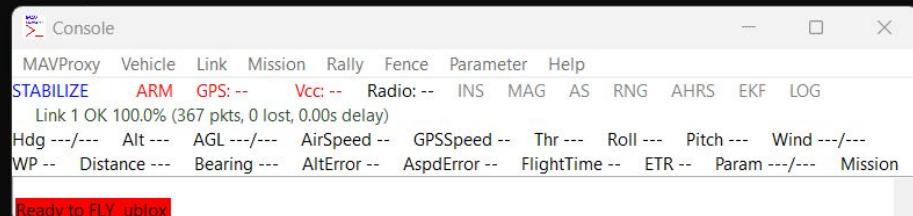
- Cages will be created using 3D printing
- Final sketches are being worked on and will be implemented during phase 2

Drone Simulation

- Dronekit-SITL (Software in the loop) allows for simulated drone models
- This can be set up to work with Mission Planner and test Python Scripts

```
C:\Users\Owner>dronekit-sitl copter --home=40.26,-74.79,0,0
os: win, apm: copter, release: stable
Downloading SITL from http://dronekit-assets.s3.amazonaws.com/sitl/copter/sitl-win-copter-3.3.tar.gz
Download Complete.
Payload Extracted.
Ready to boot.
Execute: C:\Users\Owner\.dronekit\sitl\copter-3.3\apm.exe --home=40.26,-74.79,0,0 --model=quad -I 0
SITL-0> Started model quad at 40.26,-74.79,0,0 at speed 1.0
SITL-0.stderr> bind port 5760 for 0
Starting sketch 'ArduCopter'
Serial port 0 on TCP port 5760
Starting SITL input
Waiting for connection ....
bind port 5762 for 2
Serial port 2 on TCP port 5762
bind port 5763 for 3
Serial port 3 on TCP port 5763
```

```
C:\Users\Owner>mavproxy.exe --master tcp:127.0.0.1:5760 --sitl 127.0.0.1:5501 --out 127.0.0.1:14550 --out 127.0.0.1:14551
1
Connect tcp:127.0.0.1:5760 source_system=255
Loaded module console
Running script (C:\Users\Owner\AppData\Local\.mavproxy\mavinit.scr)
Loaded module help
Unknown command 'graph timespan 30'
Log Directory:
Telemetry log: mav.tlog
Waiting for heartbeat from tcp:127.0.0.1:5760
Detected vehicle 1:1 on link 0
STABILIZE> |
```



Drone Simulation

- Simulated Drone acts as a model to allow for the development of Python scripts
- The Simulated Drone uses GPS and doesn't have the sensors we will use
 - Scripts will be adapted for our drone



Open AIs

- Drone Stabilization
- Update Website
- Order Sensors and parts

TCF Demonstration Plans

Main Goals

1. Achieving motor control/air stability
2. Semi-autonomous movement

Stretch Goals

1. Thermal sensor sending data while drone is in flight
2. Full-autonomous mission capability with proximity sensor integration

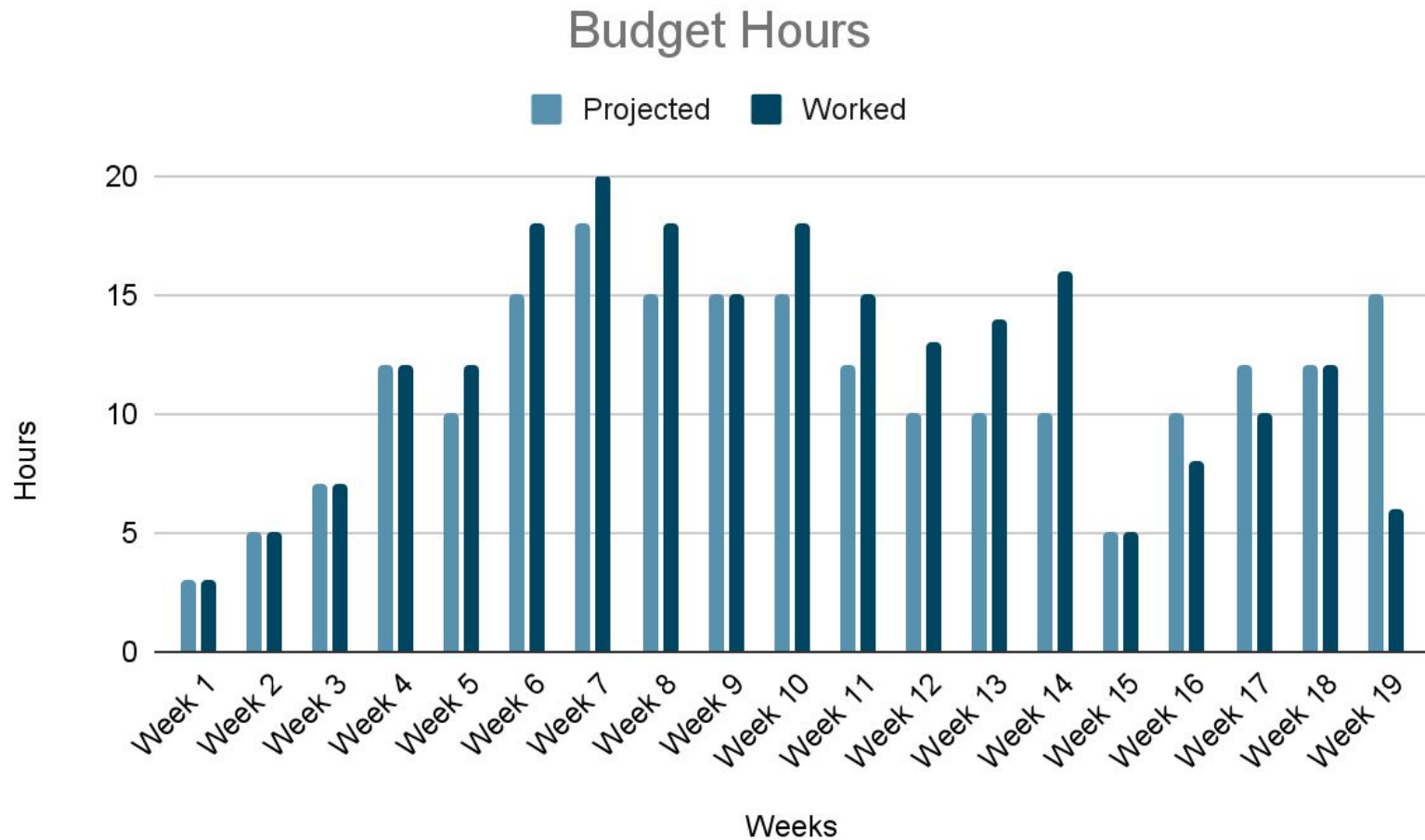
Part 3

Project Management

Budget

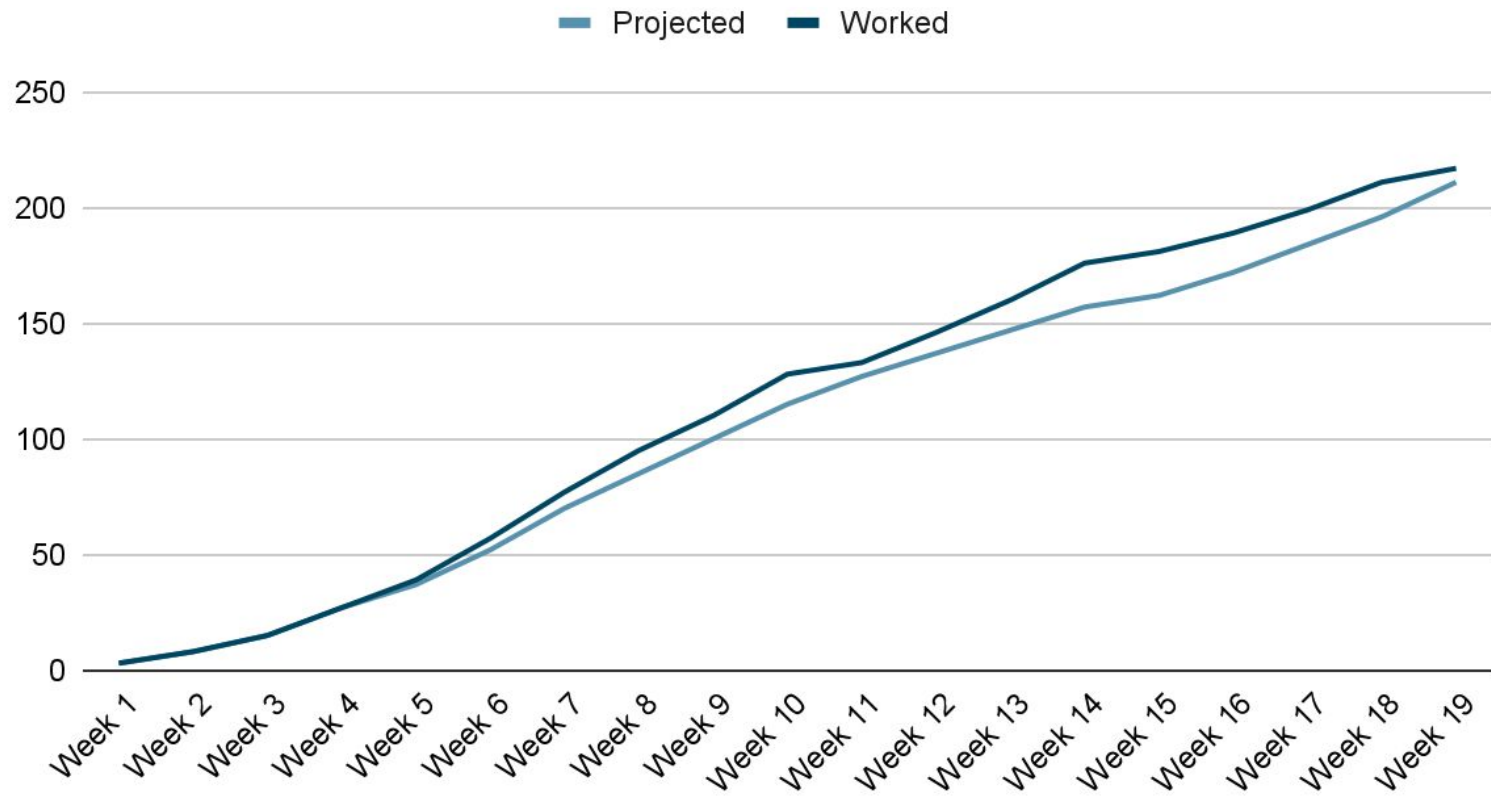
Parts	Cost	Our Price	Actual Price (bought)
Raspberry Pi 4 Model B (4 GB RAM)	\$134.95	\$0.00	\$0
Pixhawk Flight Controller	\$100.00	\$100.00	\$290
Adaptor Cables	\$9.00	\$9.00	\$9
ESCs 4 PACK	\$31.99	\$31.99	\$36
Motors 4 PACK	\$51.79	\$51.79	\$0
Frame	\$23.99	\$23.99	\$21
Props	\$14.49	\$14.49	\$15
Battery	\$25.99	\$25.99	\$38
Battery Connector	\$8.99	\$8.99	\$9
Battery Charger	\$41.99	\$41.99	\$12
Micro SD Card	\$5.99	\$5.99	\$7
Micro SD to USB	\$6.99	\$6.99	\$7
Velcro Straps	\$9.99	\$9.99	\$14
Scotch Mounting Tape	\$13.95	\$13.95	\$9
Zip Tie	\$5	\$0.00	\$5
Vibration rubber + standoffss	\$15	\$15.00	\$15
Telemetry	\$97	\$97	\$0
PPM Encoder	\$18.99	\$18.99	\$0
Vibration Plate	\$8.00	\$8.00	\$0
3.5mm Bannana Plugs (20pck)	\$15.00	\$14.91	\$15
Heat Shrink	\$5.00	\$5.00	\$5
USB-C power	\$15.00	\$15.00	\$15
micro HDMI + cords	\$10.00	\$10.00	\$10
Ultrasonic Sensors x6	\$122	\$122	
Sensor Adaptor Cables	\$10	\$10	
Thermal Sensor	\$150	\$150	
Total	\$951.09	\$811.05	\$532

Weekly Budget Hours



Cumulative Budget Hours

Cumulative Hours Chart



Part 4

Summary

Summary/Conclusion

- Complete stabilization of the drone needs to be completed ASAP
- The group will work in parallel to complete necessary end goals
 - Sensor Hardware
 - Drone Simulation Testing