

# Engineering Portfolio

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# Freshman Year Engineering Project

## Fever Fido

**Mission Objective:** Provide an easy way for people to take their temperature in hospital settings by using a non invasive and approachable device.

- Touchless thermometer in nose
- LEDs in nose that light up depending on measured temperature
- LCD screen at top of head to show exact temperature
- Powered wheels on legs allowing for it to be controlled through laptop



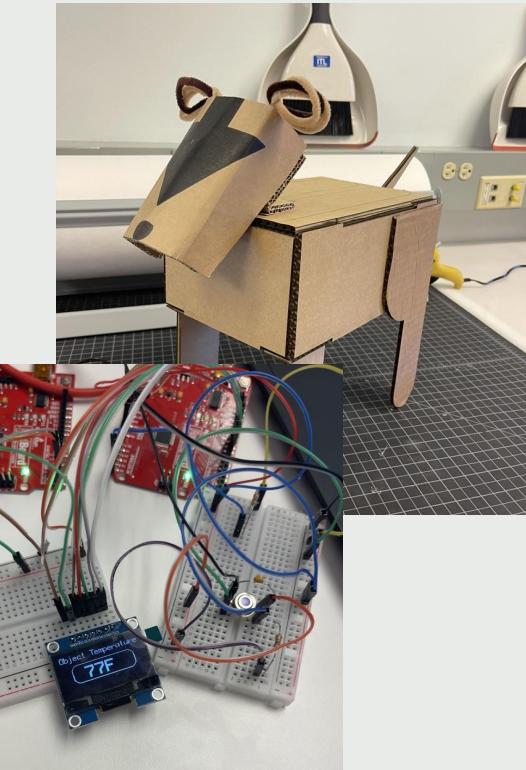
# Freshman Year Engineering Project

## Contributions

- Wiring for thermometer, LEDs, and computer
- Arduino code for temperature reading
- Laser cutting for body components

## Skills Learned

- Prototyping
- Circuit design
- Arduino IDE and simple software
- Human factors design

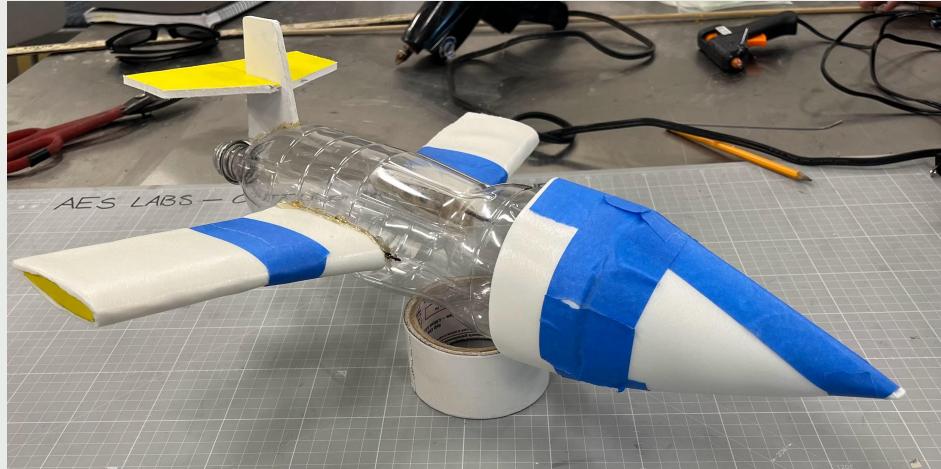


# Sophomore Year Engineering Project

## Boost-Glide Water Rocket

**Mission Objective:** Develop a small boost glide rocket that can travel 120 meters in the horizontal direction.

- 1.25L bottle
- Foam/balsa wings
- Trimmable horizontal stabilizer



# Sophomore Year Engineering Project

## Contributions

- Wing design and fabrication
- CAD design
- Nose cone
- Thrust testing



# Sophomore Year Engineering Project

## Results

Left: 27.16 meter boost

Right: 33.70 meter glide

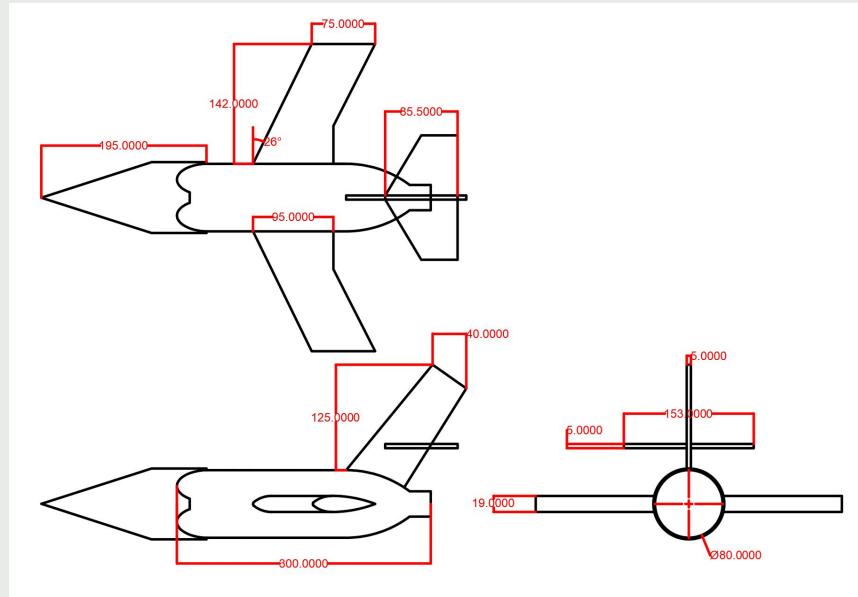
One of the best groups for  
combined boost + glide  
performance!



# Sophomore Year Engineering Project

## Skills Learned

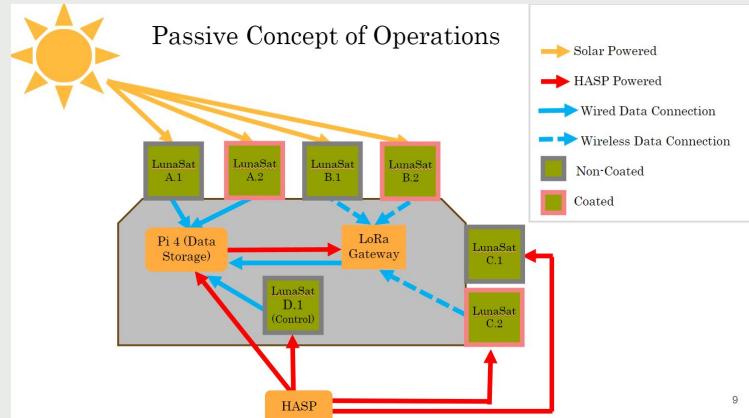
- CAD software (primarily AutoCAD + solidworks)
- Prototyping
- More laser cutting experience
- 3d printing
- PDR presentation
- Testing
- Aerodynamic and structural design



# High Altitude Student Payload (HASP)

## Mission Objective:

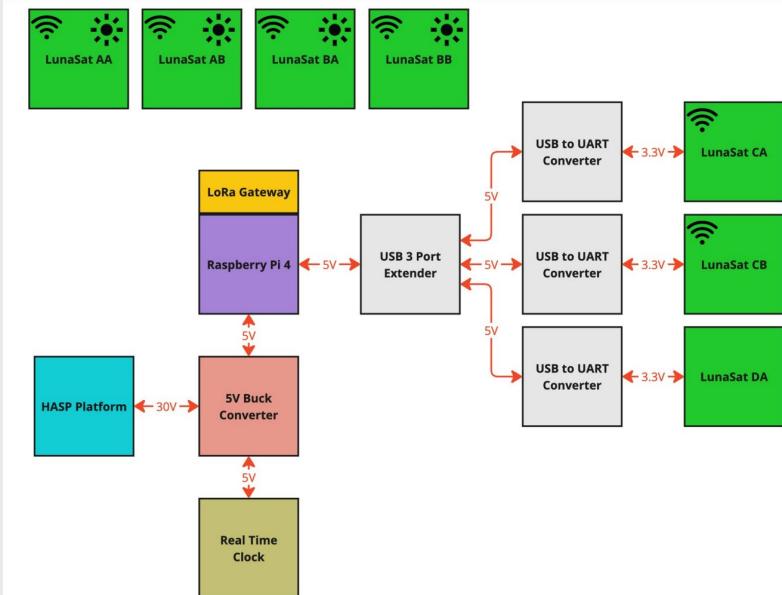
Develop a payload for NASA Colorado Space Grant that can fly on the HASP platform, testing LunaSats in a space-like environment. Payload needs to interface with platform connections for data and power, allowing for it to be monitored throughout the mission.



# High Altitude Student Payload (HASP)

## Contributions

- Initially science subteam lead
  - Designed entire experiment
  - Multiple testing blocks for redundancy
  - Different independent variables for each block
- Transitioned to avionics team lead as design progressed
  - Designed and tested power and data circuits
  - Integrated all avionics components into payload housing
  - Soldered, crimped, and built all connections/interfaces



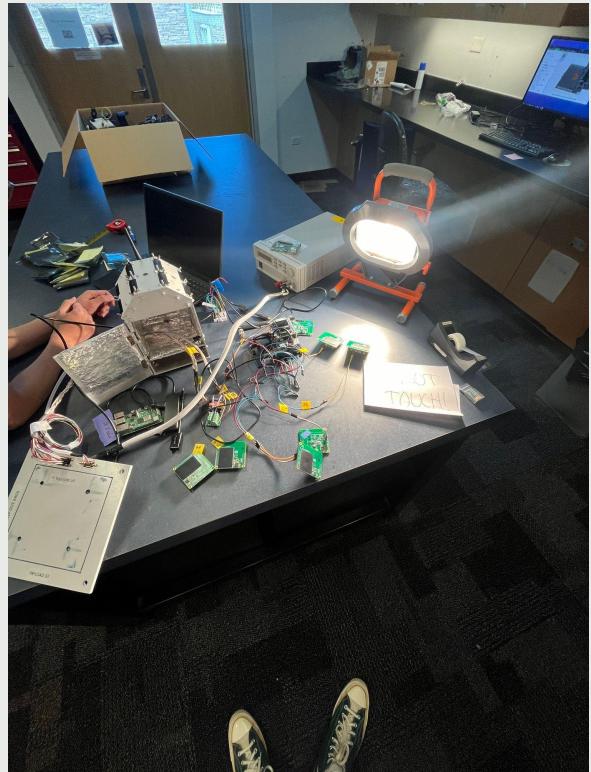
# High Altitude Student Payload (HASP)

## TVAC Testing

- Attended TVAC testing at the Columbia Scientific Balloon Facility to be certified for flight

## Ground Station Monitoring

- During flight, I monitored and recorded downlink during flight. I also sent commands to the payload when needed



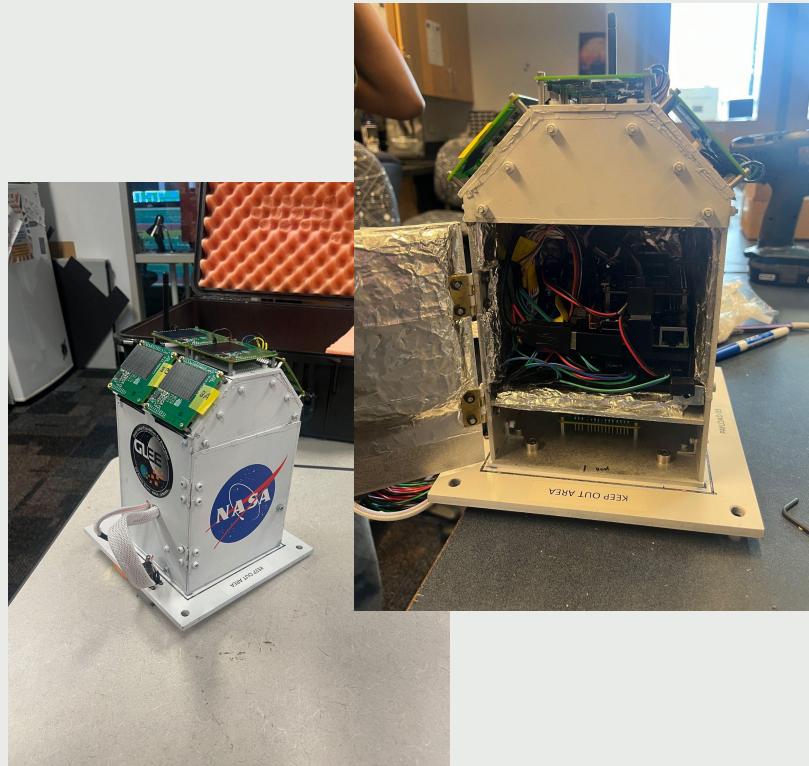
# High Altitude Student Payload (HASP)

## Results

- Successful flight in September 2024
- Payload remained functional throughout entire flight
- Electrical system survived delivery, flight, impact, and return

## Skills Learned

- Circuit design and testing
- Prototyping
- Data systems
- Design reviews
- Full product development cycle
- Team leadership

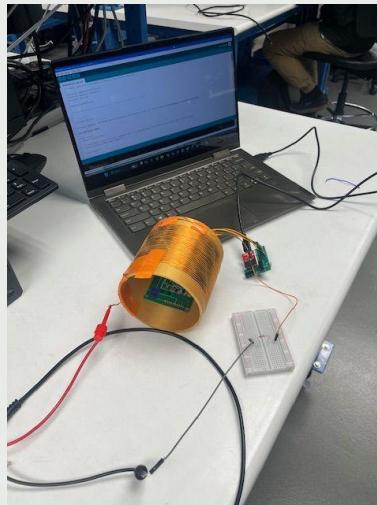


# GLEE Science Lead

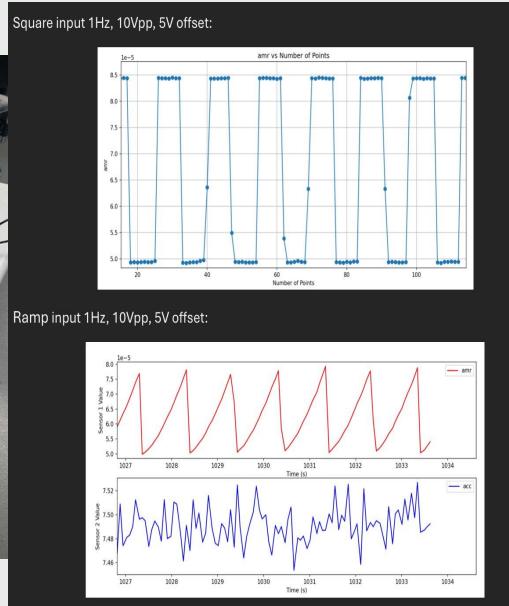
As the GLEE (Great Lunar Expedition for Everyone) science team lead, I am in charge of testing the LunaSat technology as it develops. I manage work allocation for 4 team employees and set goals for the team.

## Skills Learned

- Team leadership
- Writing test plans
- Effective communication
- Quality control
- Documentation
- Data processing



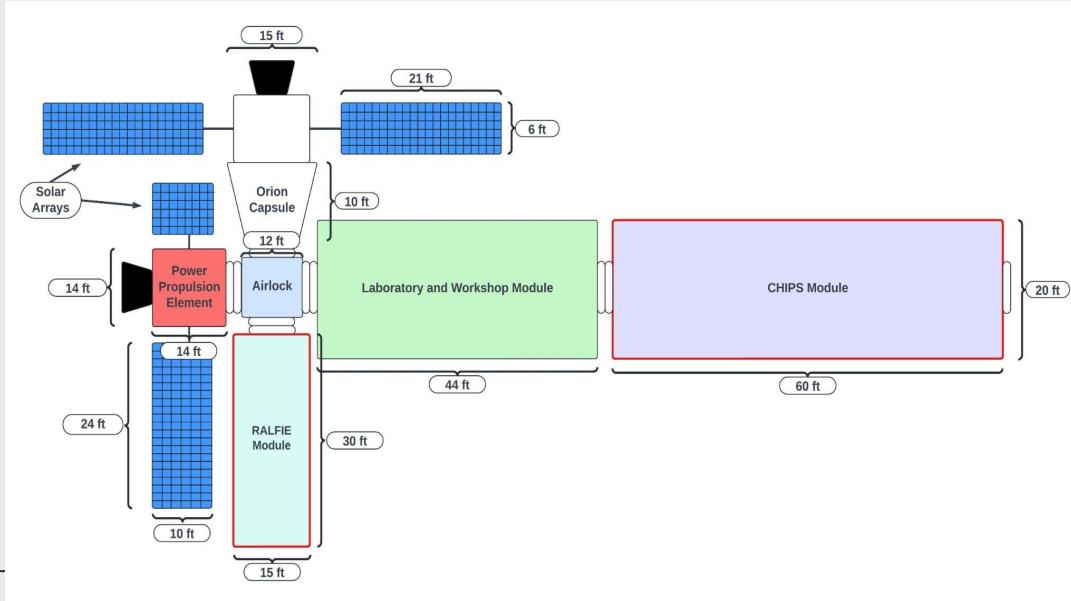
Magnetic Field Testing and Outputs



# Human Spaceflight Project

For my Human Spaceflight final project, taught by former astronaut Jim Voss, I was tasked with designing the habitation module for 4 astronauts on a trip to Mars. I needed to determine everything that was required to sustain the astronauts on their round trip, ensuring that they were happy and healthy.

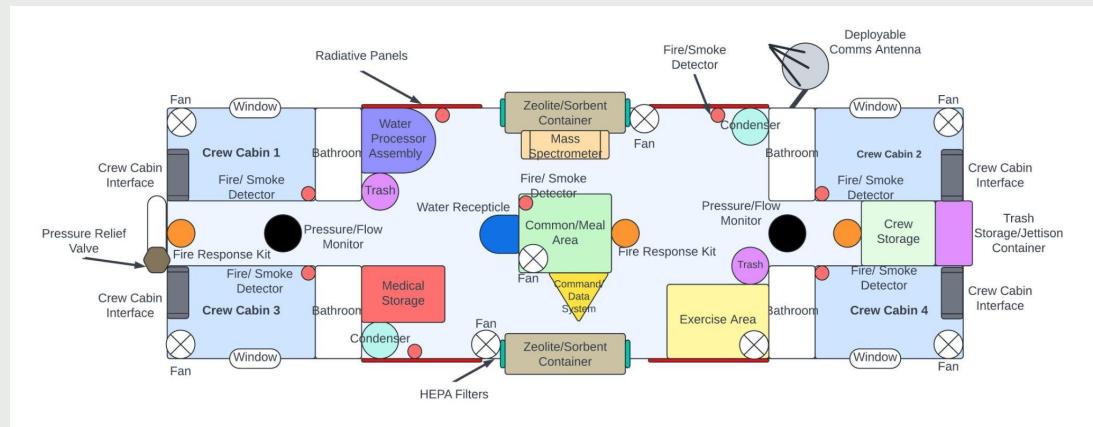
[Full Project Report Here](#)



# Human Spaceflight Project

## Lessons Learned

- Environmental Control and Life Support system design
- Mission design
- Human factors design
- Bioastronautics



Crew Habitation Module

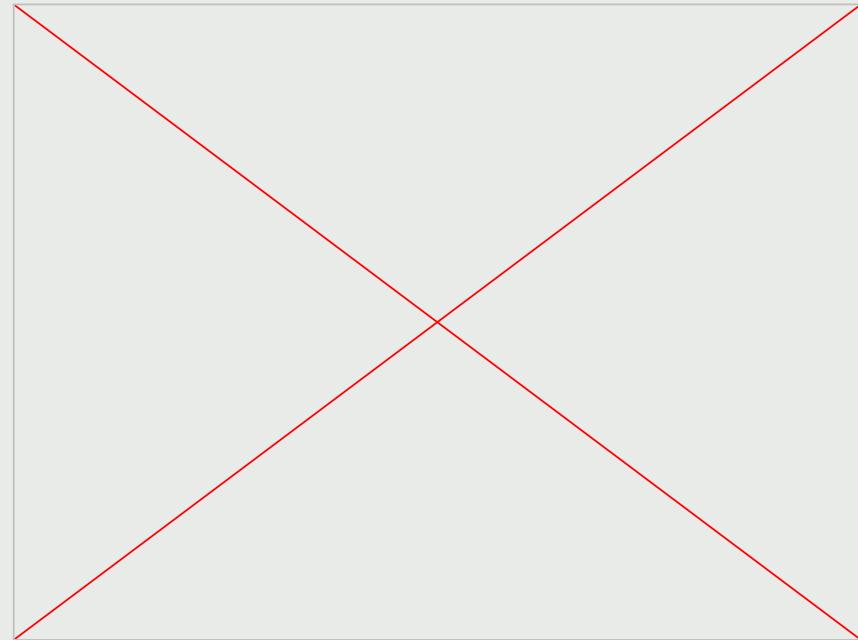
# N Body System Simulation Project

This past summer, to improve my coding skills, I took an astronomy course that was based in Python. For my final project, I built a Python simulation that plotted the orbits of planets with various initial conditions.

## Skills Learned

- Coding in Python
- Data processing
- Python libraries

[Code Here](#)

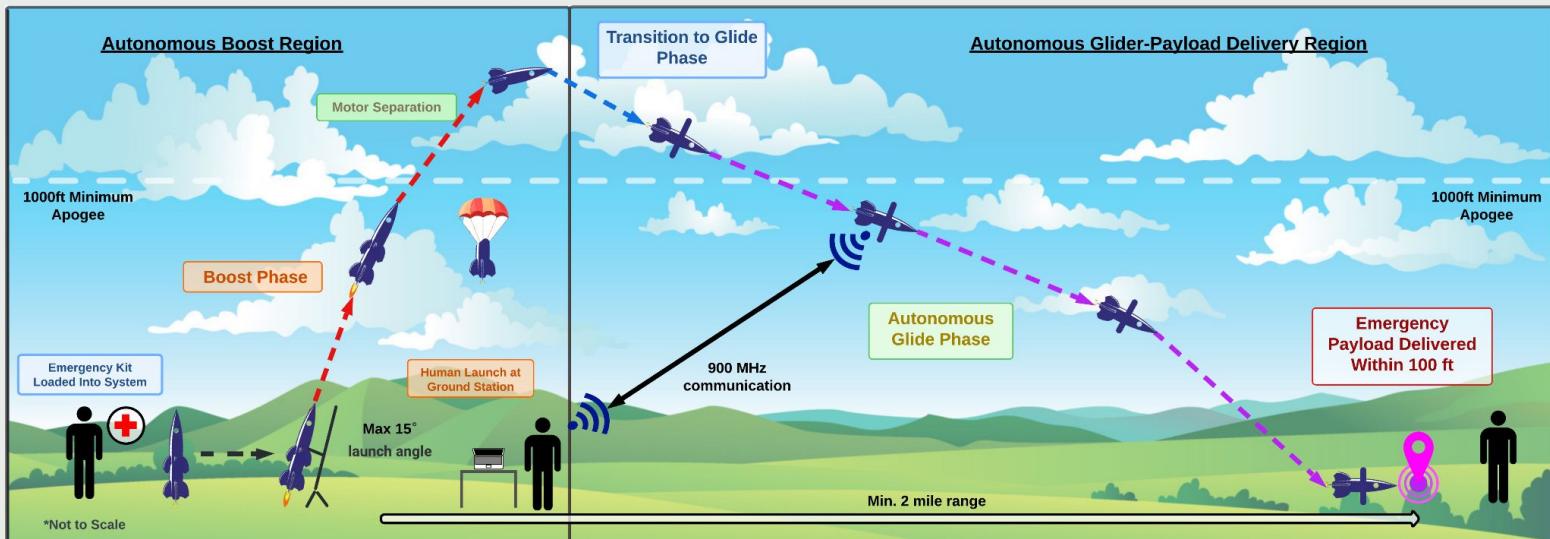


Three Body Simulation

# Senior Project

## Mission Objective:

Accurately deliver an emergency rescue kit via rocket-glider to a stranded individual in a remote, hard-to-reach location. Dedicated to providing survival items in a time sensitive situation.

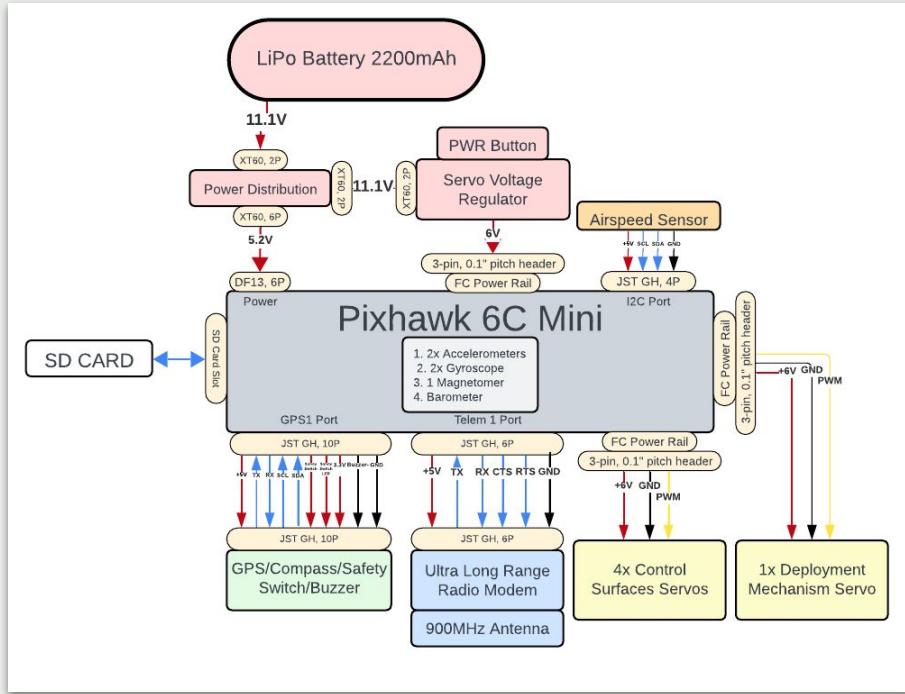


# Senior Project

## Contributions:

- Developing and testing avionics system
- Picking components needed to complete mission
- Mounting and harnessing
- Creating mission profile software for flight computer
- Attending and presenting in design reviews

[Full CDR Slides Here](#)



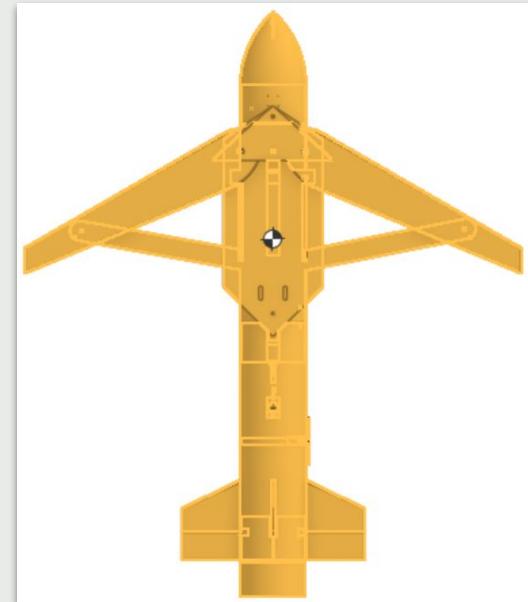
# Senior Project

## Results

- Passed both PDR and CDR presentations in Fall 2024
- Moving forward to manufacture and testing in spring

## Skills Learned

- Effective presentation and communication
- Ardupilot software
- Working on large teams
- Trade studies
- Amateur rocketry



Current CAD Design for Rocket Glider

# GSA Presentation

In September 2024, I presented a poster in the undergraduate research section at the Geological Society of America in Anaheim, California. My poster covered my work at NASA Colorado Space Grant Consortium regarding moonquake detection using a network of accelerometers on the Moon.

At this conference, I improved my networking skills and got to experience the academic side of planetary science for the first time!

