One Small CubeSat, One Giant Leap: High-Altitude Data Collection With A Custom 2U CubeSat Payload

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Overview: Developed a 2U cubesat with similar sensor array as previous semesters while increasing the efficiency of data collection and using a 360 camera.

Introduction & Project Description

We designed two lightweight payloads (one per semester) for near space research via high-altitude balloons.

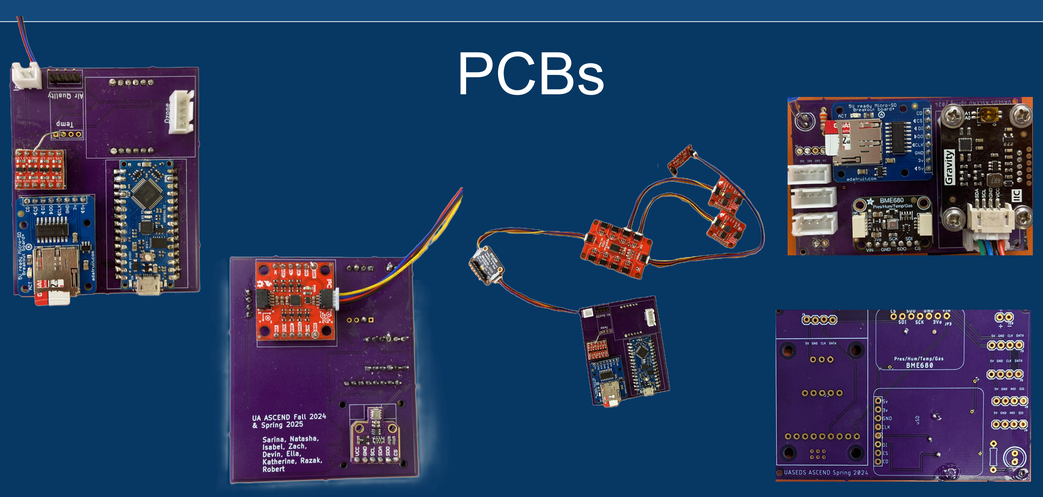
General Data Logging Fall: Pressure, Altitude, Temperature, Humidity, Radiation, Ozone, UV, Accelerometer, Gyroscope, Magnetometer

General Data Logging Spring: Pressure, Altitude, Temperature, Humidity, Accelerometer, Gyroscope, Magnetometer, Visible Light, Infrared Light, and UV-A,B,C

Results

During the fall semester, we were only able to collect data from the BME & IMU sensors, while the cameras were able to get 40 minutes of footage. The Spring 2024 PCB was used due to a defect in the Fall 2024 PCB. The spring semester launch resulted in the SD card being damaged and a loss of all data, while the new 360 camera collected 30 minutes of footage.

PCBs



(Custom schematics using KiCad)

Housing

3D Printed CF PLA

“The Indestructible” (Fall)

“The Brick” (Spring)

Both housings were developed using SolidWorks and printed with 40-25% infil. Lid was secured to body with zip-ties. Spring payload has two drawers with latches securing each.

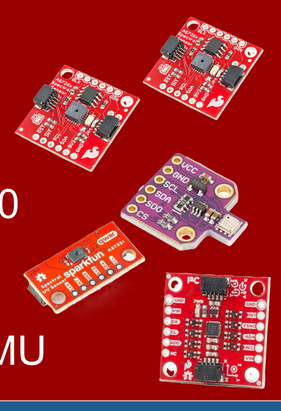
Sensors

Fall:

- Gravity: Ozone
- BME 680
- GUVA
- 9DOF IMU

Spring:

- AS7262
- AS7263
- BME 680
- AS7331
- 9DOF IMU

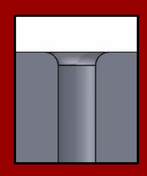


Kevlar Suspension

Shackle

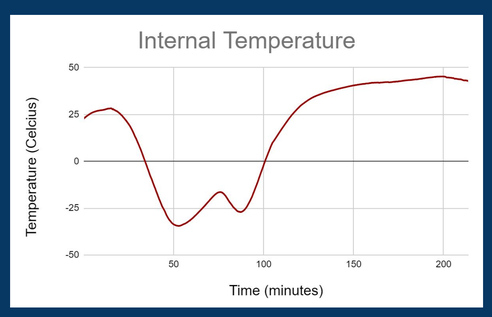
3mm Kevlar Rope

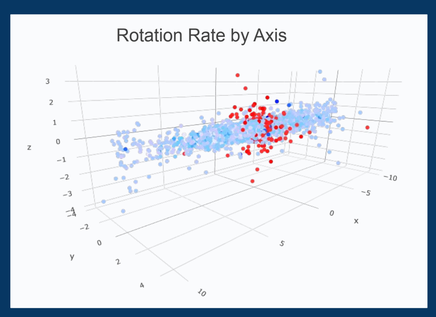
To reduce payload weight and ease internal crowding within the compartments, an external suspension system was designed in place of a through-lamp-rod.



Guideways Through Corners of Structure

Plot of Data





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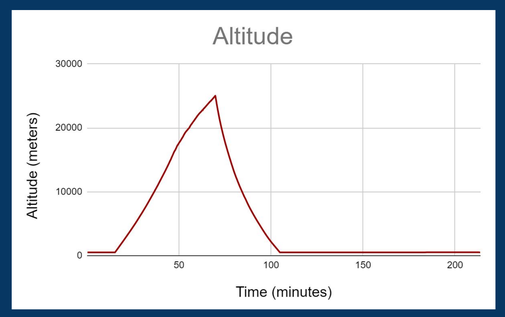

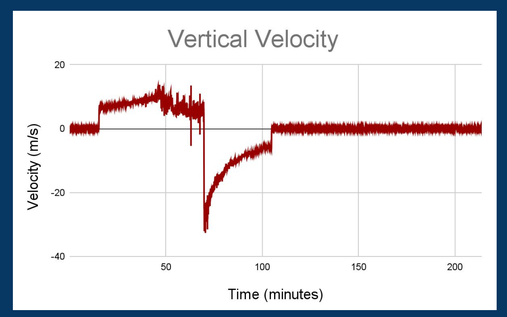

Future Projects: Integration of solar power into battery charging circuitry, improved 360 camera footage.

Scan QR code to see Fall flight footage!

Scan QR code to see Spring flight footage!

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