

Arizona NASA Space Grant Consortium

Annual Statewide Student Research Symposium

Casa Grande Union High School

ASCEND HIGH ALTITUDE BALLOON PROJECT

April 2023



Project Team

Project Manager: Jonathan Lawson

Science Principal Investigator: Valia Kaliozakis

Payload Designer: Elias Razo

Control System/Software: Neal Allado

Electronic Systems Assembly: Ella Barth, Amaya Fisher

Fabrication/Assembly: Angel Gonzalez, Melody Limon, Elijah Ramirez

Data Analysis: Jacob Ross



Mission Statement

Our mission is to design and construct a payload capable of measuring ozone levels, having two experiments that involve particle capture in the stratosphere using aerogel, and examining the growth of *E. coli* in correlation with gamma radiation levels.

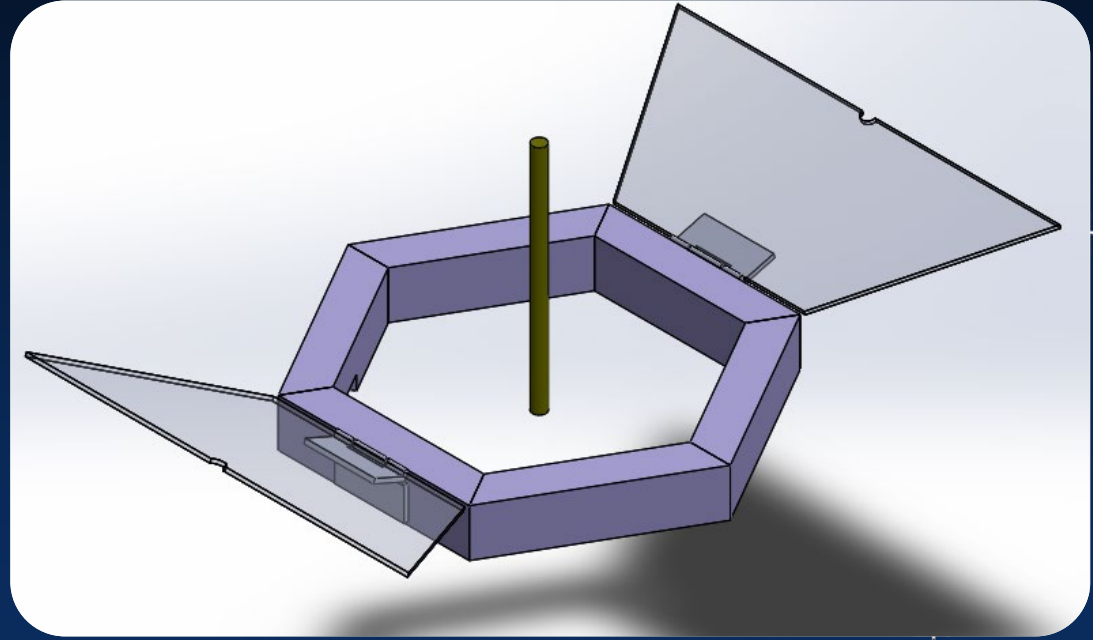
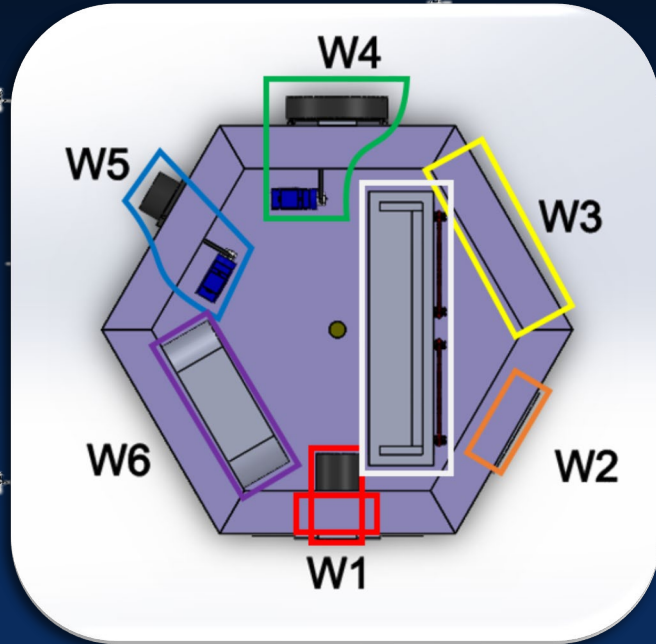
The background is a dark blue gradient with abstract, wavy shapes in a lighter blue and grey. Scattered throughout are various celestial bodies: a blue and white Earth-like planet, a grey and white Saturn-like planet with rings, a grey and white Jupiter-like planet with bands, and several smaller grey and white planets. There are also numerous small white and blue dots representing stars or distant galaxies.

DESIGN

Fall Semester Enclosure (Post Recovery)



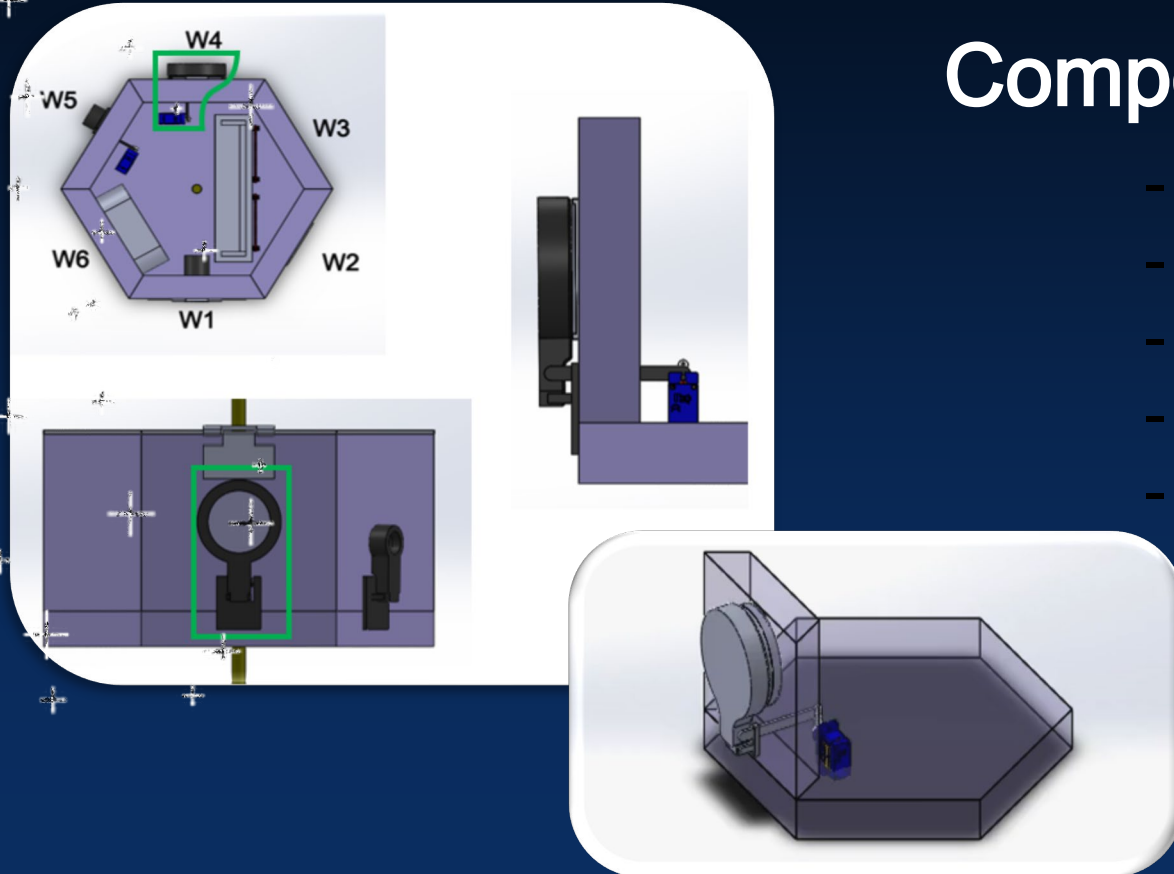
Spring Semester Enclosure Design



Petri Dish Mechanism

Components:

- Petri Dish Holder
- Hinge
- Connecting rod
- Servo
- Petri Dish



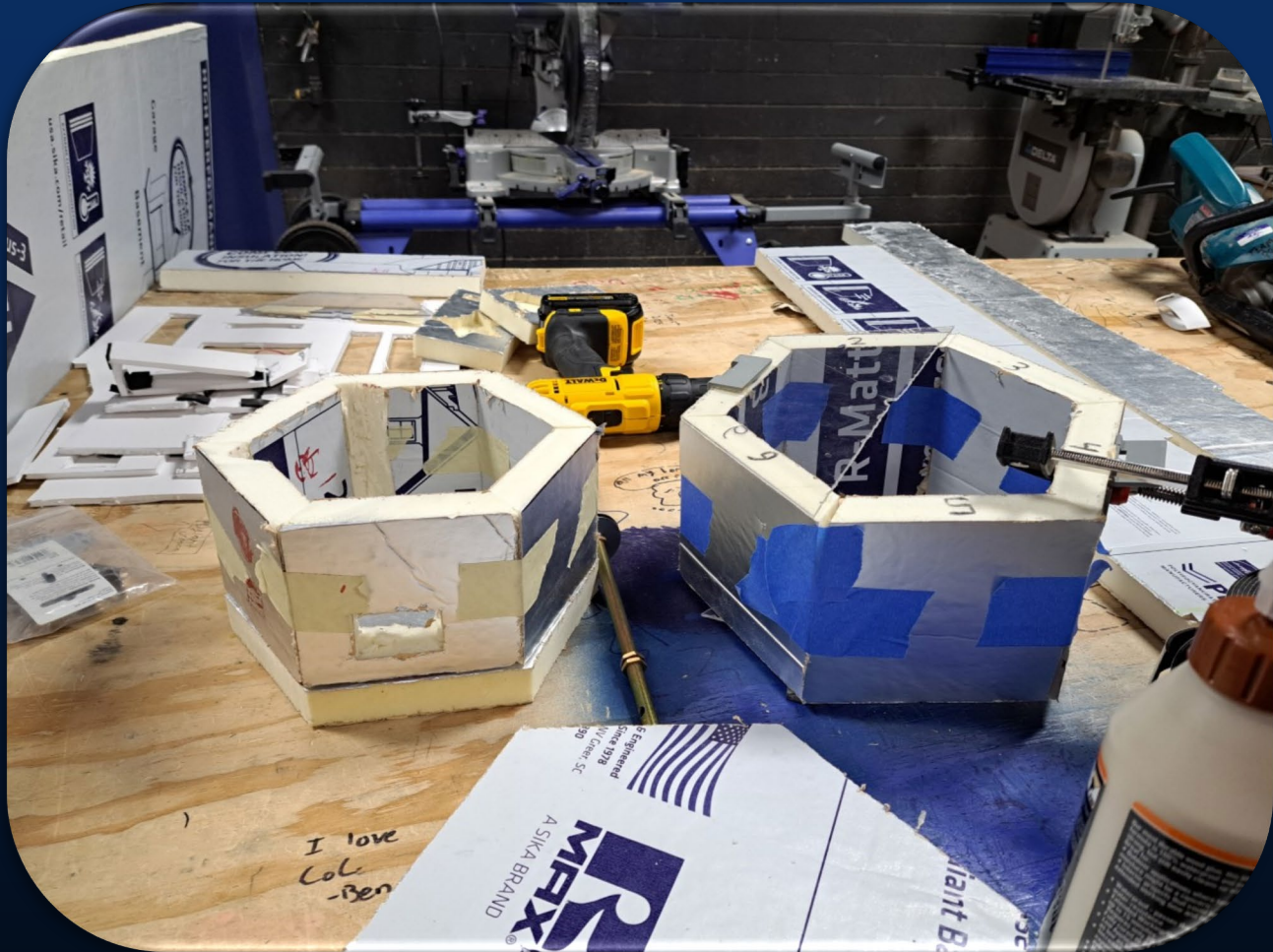
Fabrication

The background is a dark blue gradient with abstract, wavy shapes in a lighter blue and grey. Scattered throughout are various celestial bodies: a ringed planet (Saturn), a blue and white Earth-like planet, a grey planet with a ring, a grey planet with a ring, a grey planet with a ring, and several small white and blue dots representing stars.

Construction Materials

1. EPS Rigid Foam Board Insulation, 1”thick
2. LEXAN General Purpose 3/ 16 in. thick polycarbonate non-UV coated sheet
3. 3D printed parts
4. Gorilla Wood Glue
5. Gorilla Duct Tape





I love
Col
-Ben

Engineered
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1990

MRX
ASIKA BRAND

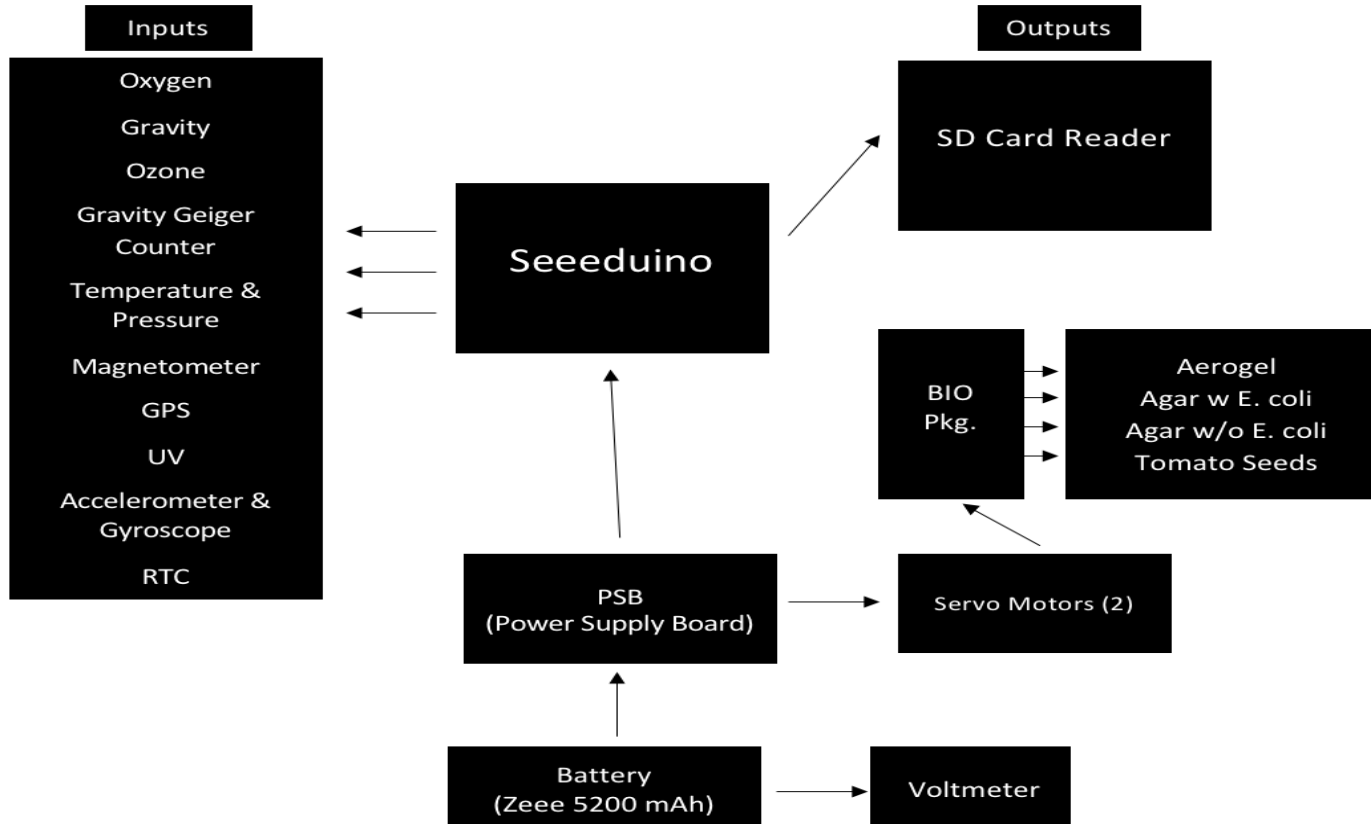
R-Mat

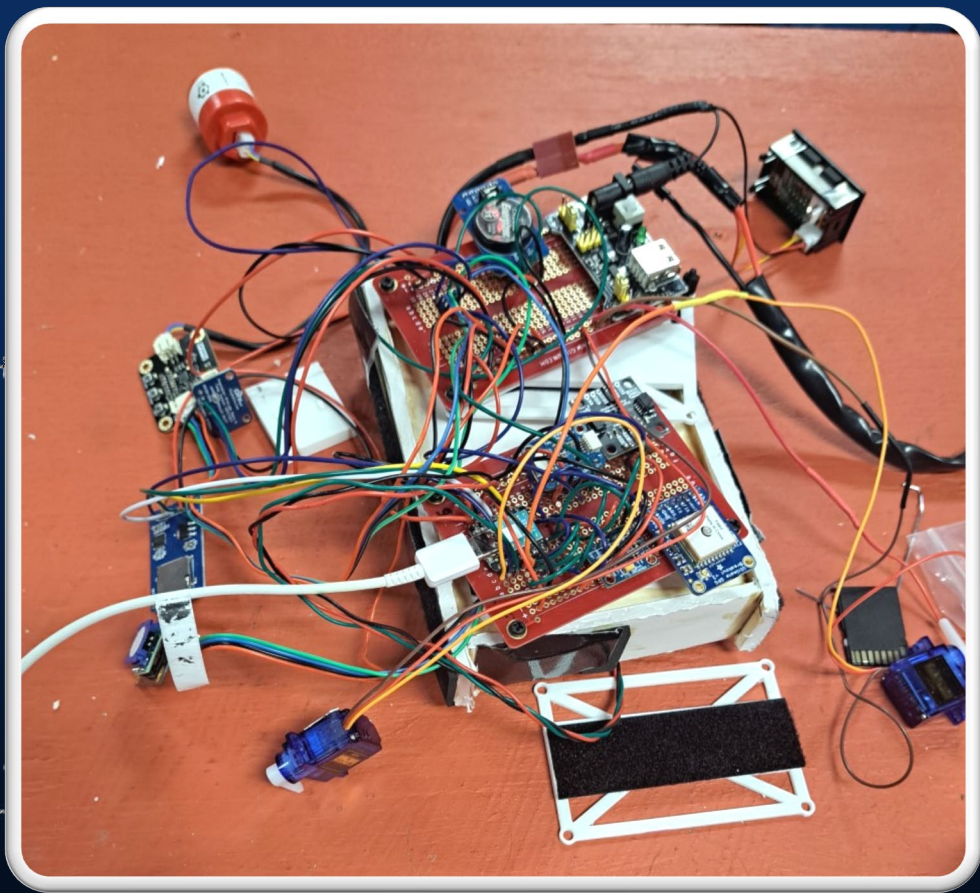
Paint B

The background is a dark blue gradient with abstract, wavy shapes in a lighter blue and grey. Scattered throughout are various celestial bodies: a blue and white Earth-like planet, a grey planet with a ring (Saturn), a grey planet with horizontal bands (Jupiter), and several smaller grey planets and white stars. The text "Electrical Systems" is centered in a white, serif font.

Electrical Systems

Electrical Block Diagram





RTC ds3231



BMP390



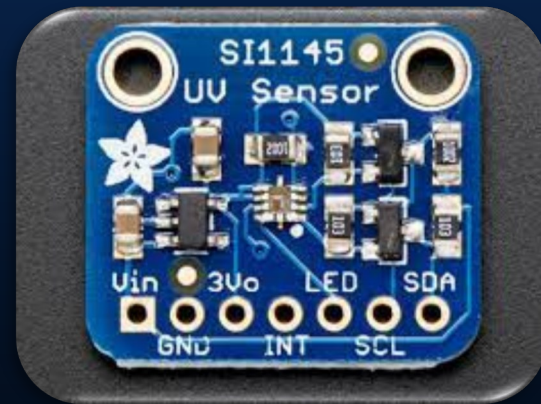
MPU6050



Seeeduino Xiao



SI1145



The background is a dark blue gradient with abstract, organic shapes in a lighter blue and grey. Scattered throughout are various celestial bodies: a blue and white Earth-like planet, a grey and white Saturn-like planet with a ring, a grey and white Jupiter-like planet with bands, and several smaller grey and white planets. Small white and blue dots represent stars or distant galaxies.

Control System Software Development


```
extFile = SD.open("ext.txt",WRITE_FILE);

if (extFile) {

    extFile.print(now.hour(), DEC);
    extFile.print(':');
    extFile.print(now.minute(), DEC);
    extFile.print(':');
    extFile.print(now.second(), DEC);
    extFile.print(",");

    extFile.print(bmp2.temperature);
    extFile.print(" , ");

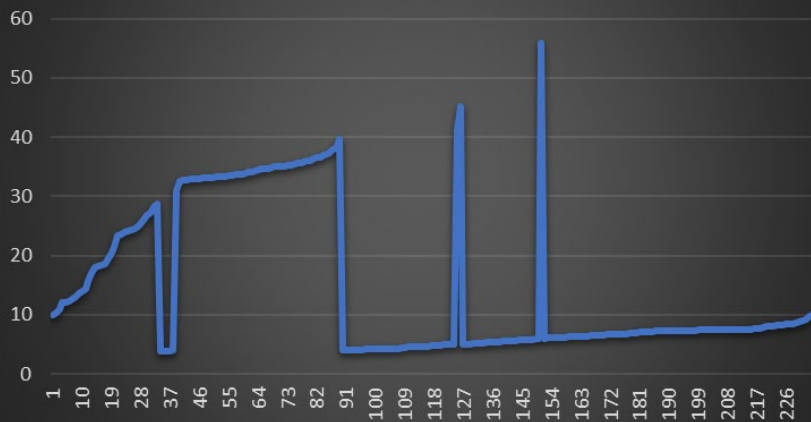
    extFile.print(bmp2.pressure / 100.0);
    extFile.print(" , ");

    extFile.println(bmp2.readAltitude(SEALEVELPRESSURE_HPA));
    extFile.close();
}
```

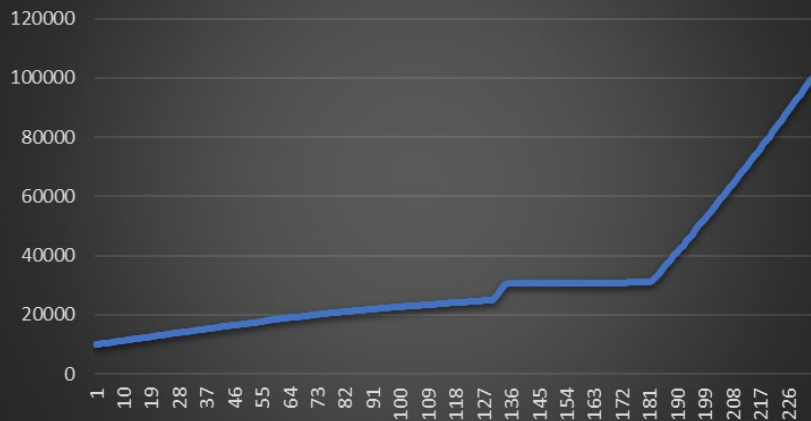
*EXT - Notepad

File	Edit	Format	View	Help
13:22:32	,23.30	,970.87	,359.09	
13:22:38	,23.30	,970.86	,359.08	
13:22:43	,23.29	,970.86	,359.17	
13:22:49	,23.29	,970.85	,359.24	
13:22:55	,23.28	,970.84	,359.29	
13:23:1	,23.28	,970.83	,359.22	
13:23:7	,23.27	,970.84	,359.16	
13:23:13	,23.26	,970.85	,359.16	
13:23:18	,23.25	,970.85	,359.16	
13:23:24	,23.24	,970.85	,359.12	
13:23:30	,23.23	,970.85	,359.25	
13:23:36	,23.23	,970.84	,359.27	
13:23:42	,23.22	,970.84	,359.30	
13:23:48	,23.21	,970.83	,359.22	
13:23:53	,23.20	,970.84	,359.29	
13:23:59	,23.20	,970.83	,359.32	

Humidity (%)

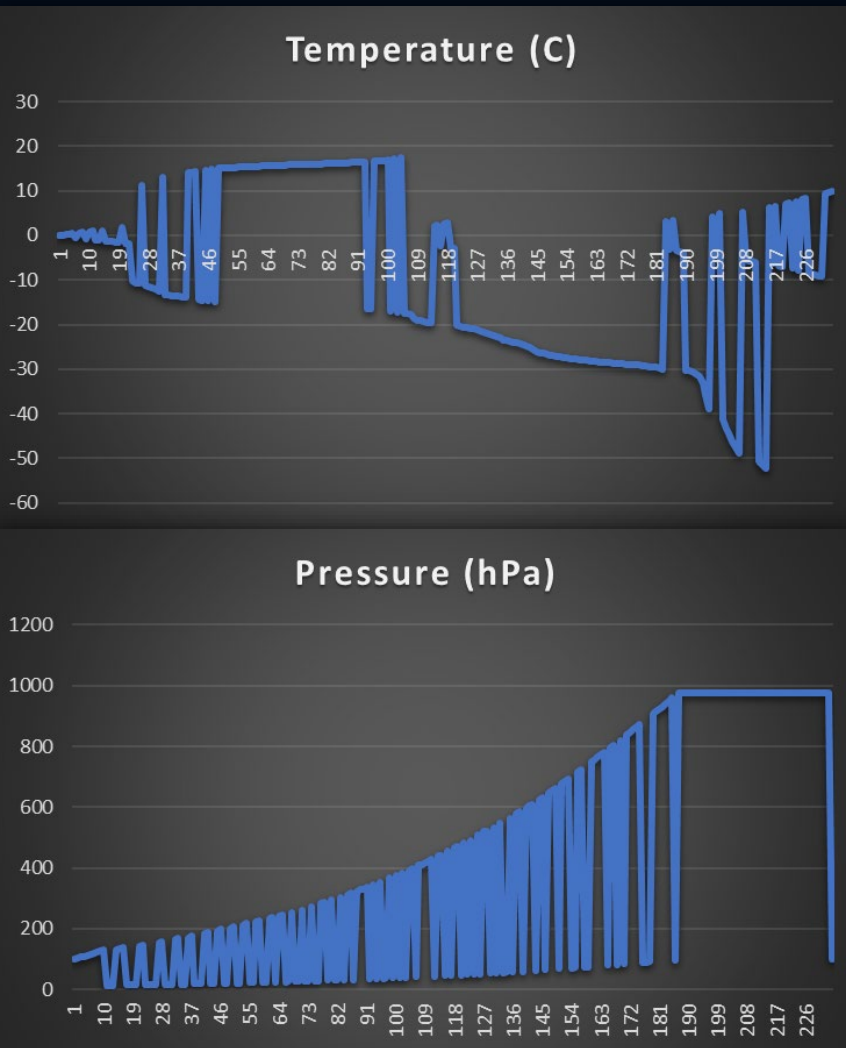


Approximate Altitude (m)



Data From
Fall 2022

Data From Fall 2022





The background is a dark blue gradient with abstract, wavy shapes in a lighter blue and grey. Scattered throughout are various celestial bodies: a ringed planet (Saturn), a planet with horizontal bands (Jupiter), a planet with a blue and white pattern (Earth), and several smaller grey and white spheres. Small white and blue dots represent stars.

Bioscience

Biological Experiments Summary

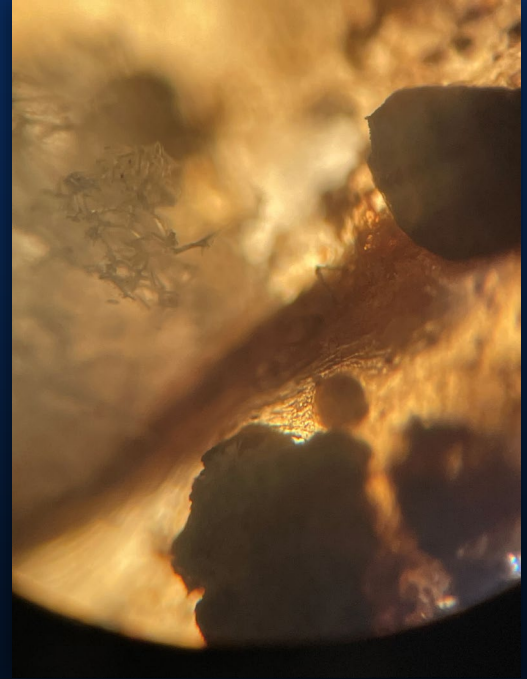
Project 1: Aerogel - Objectives: capture any particles floating in the atmosphere.

Project 2: LB Agar Dish With E. Coli Objectives: Identify if any microorganisms can cultivate and sustain growth in microgravity conditions.

Project 3: Beefsteak Tomato Seeds - Objectives: Identify what genetic effects radiation has on crops.

Project 4: Petri Dish with LB Agar- Objectives: Capture and Identify potential bacteria strains found in the atmosphere.

PostLaunch Results





Acknowledgements

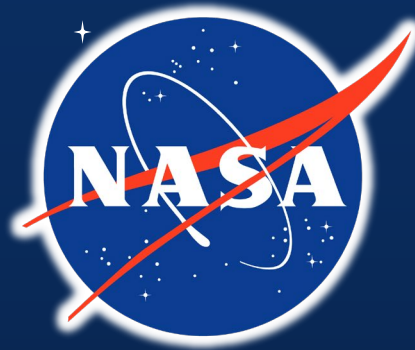
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Thank you

