



## **CubeSat Flight Experiments Workshops January 2024 Update**

### **[Registration now open for Summer 2024 Workshops in New Mexico](#)**

The primary purpose of our CubeSat Flight Experiments workshops are to provide teachers with real spaceflight activities and equipment they can use in their classrooms. With the training and resources from these workshops, teachers will be able to work with their students to build flight-ready CubeSats and experiments that can be flown on multiple launch platforms.

Attendees are taught engineering concepts of project development phases, milestones, deliverables, and quality gates within the context of flight opportunities. They also involve participants in authentic iterative engineering.

Our programs don't stop at the end of the workshop. We continue to provide support to teachers and students as they build and troubleshoot their CubeSat experiments. We then fly those CubeSats aboard various flight platforms including Blue Origin's New Shepard, Firefly Aerospace's Alpha rockets, the Perlan II stratospheric glider, high altitude balloons, and more.

These workshops strengthen the understanding of science, technology, engineering, Art, and Math (STEAM) studies and careers through guided work in spaceflight experiments and engineering. They introduce affordable, easy-to-use flight experiment equipment and flight opportunities to educators across the US. Through our programs, we enable whole communities to participate in authentic, hands-on exploration in STEAM tied to actual spaceflight missions.

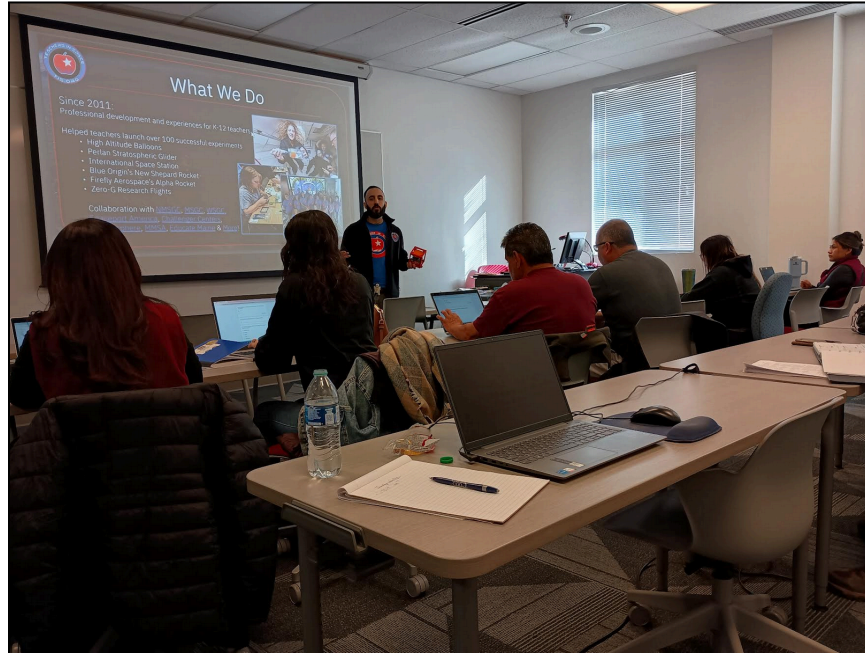
While our workshops are specifically for K-12 teachers, whole communities are being impacted. Teachers take what they learn from TIS and apply it in their classrooms and afterschool programs. Students are given the opportunity to build working CubeSat experiments, and we've found that teachers often include students' siblings, parents, and other family members. Parents have mentioned how these CubeSat experiments become part of everyday life and discussed outside of the classroom, even at the dinner table.

Not only do these workshops impact teachers, students, and their communities; but also the entire space industry. This program is intended to develop the pipeline from schools to aerospace and commercial space sector jobs. When students get engineering experiences at a young age, it may spark an interest in pursuing careers in needed roles to further human space exploration.

# January 2024 CubeSat Workshop

Las Cruces, New Mexico

We were joined by both new and familiar teachers for another 2-Day introduction to CubeSat Flight Experiments workshop. Some of these teachers sent us student-made experiments that were flown on Perlan and built into the CubeSats that we flew on Blue Origin's New Shepard rocket.



# Blue Origin NS-24 New Shepard Payload Flight

Van Horn, Texas

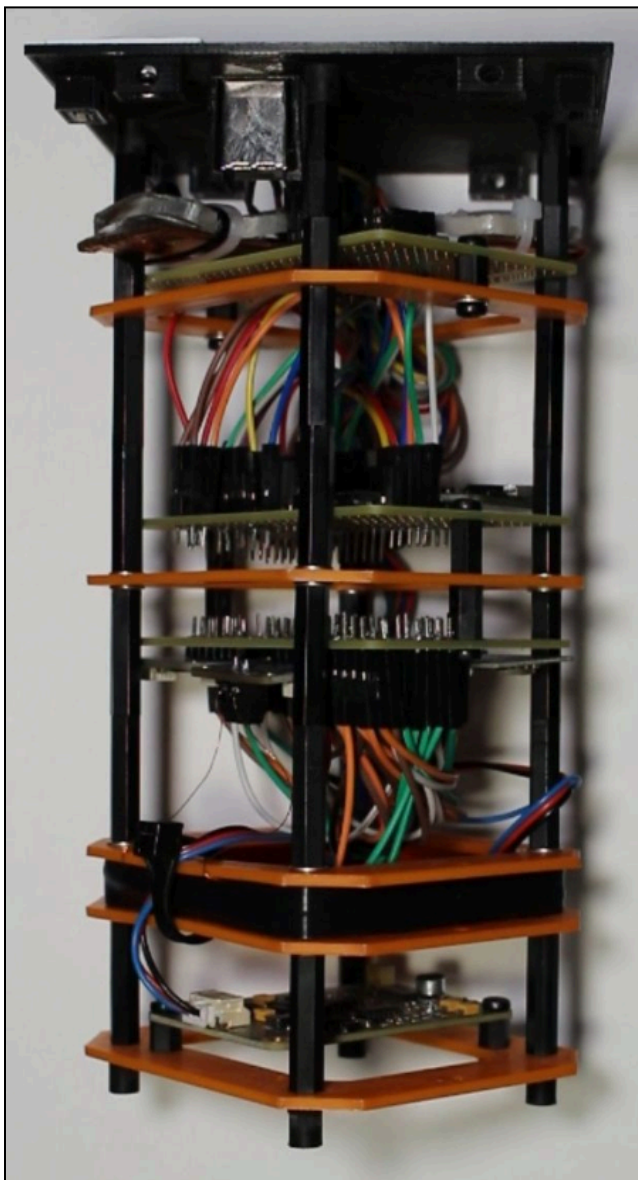
(2) 2U CubeSats

[Click Here for New Shepard Flight Details from Blue Origin](#)

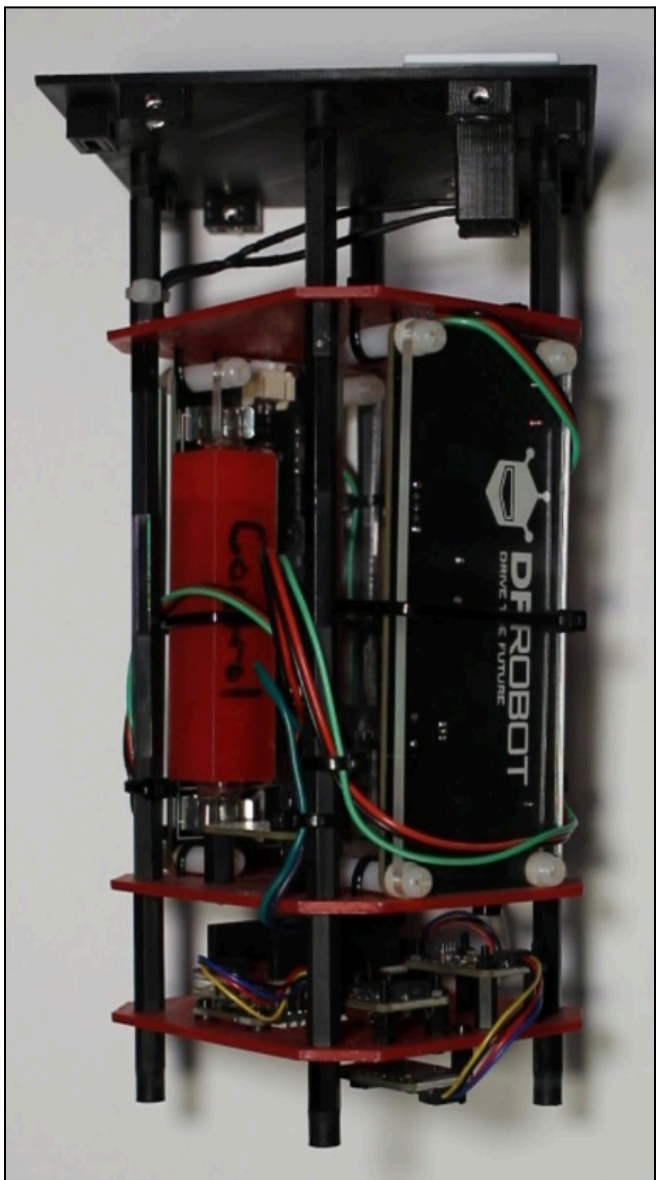
[Click Here for B02U1 CubeSat Details & Flight Data](#)

[Click Here for B02U2 CubeSat Details & Flight Data](#)

## B02U1



## B02U2



# Summer 2023 Perlan Flight Campaign

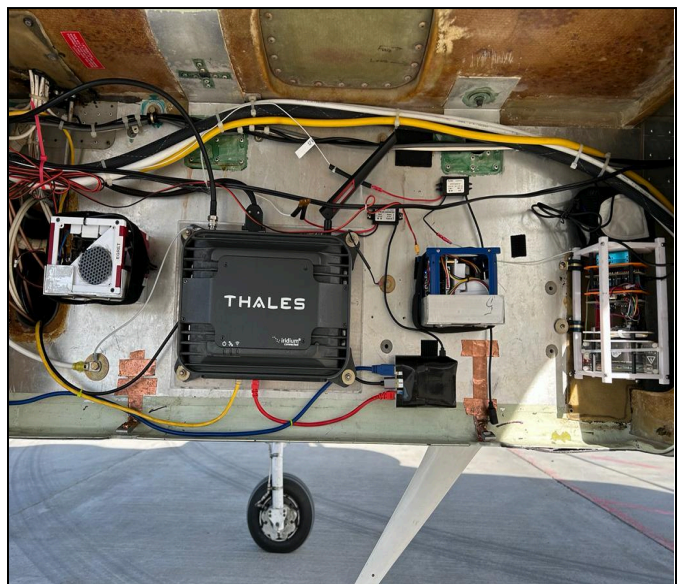
El Calafate, Argentina

(8) 1U CubeSats & (1) 2U CubeSat

[Click Here for Perlan's blog documenting the campaign](#)



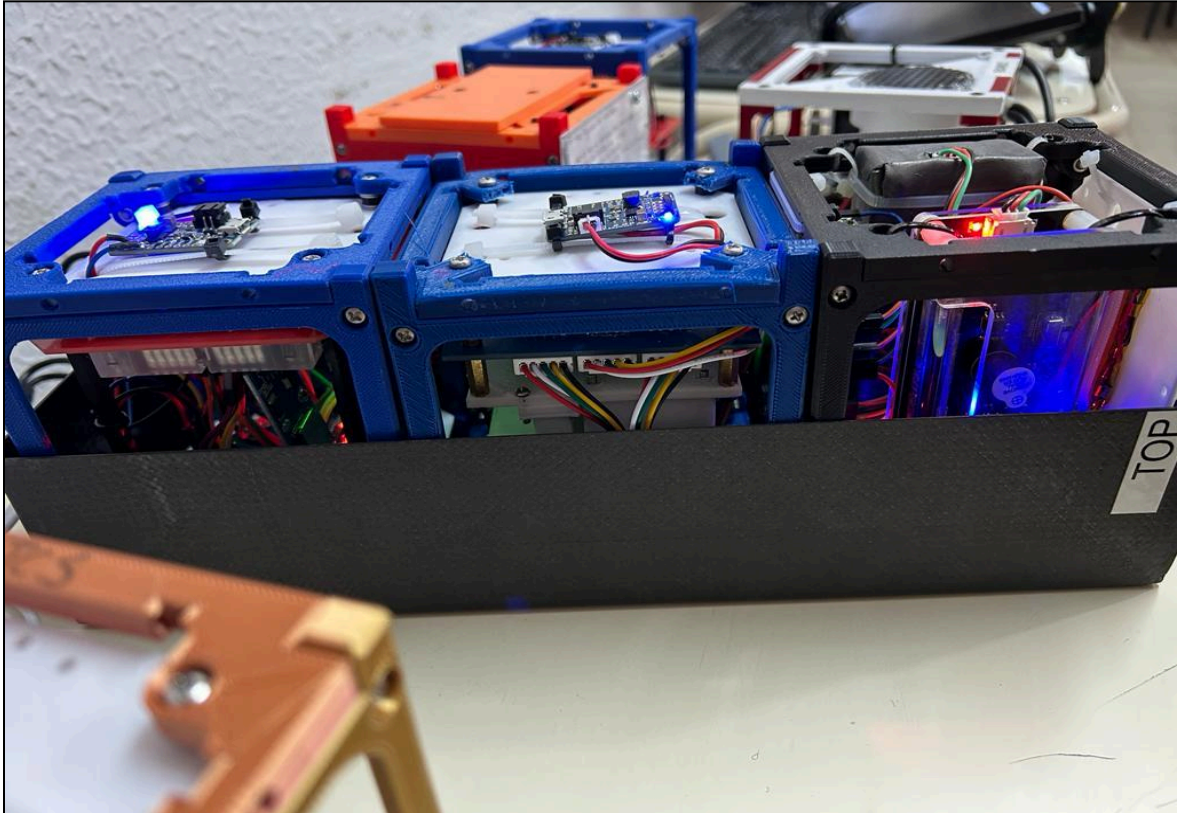
**CubeSat payloads and the Egrett tow plane just prior to loading.**



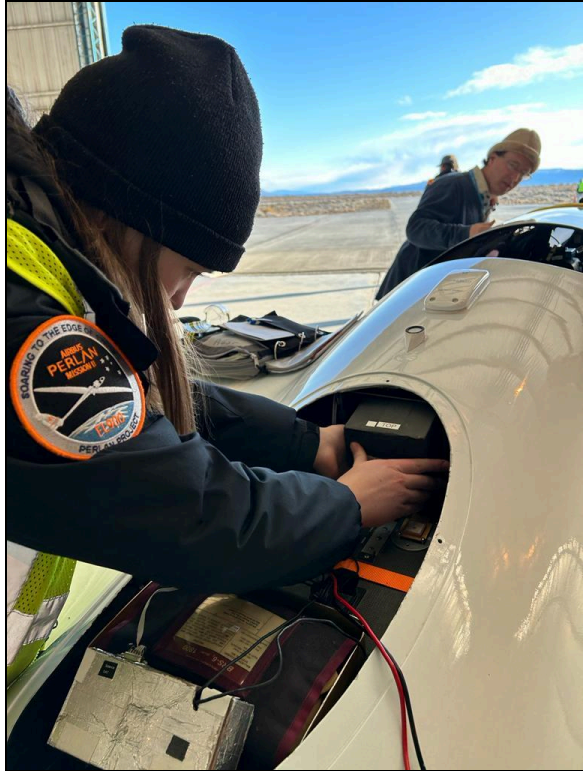
**CubeSats integrated into the Egrett's various scientific payload bays**



**Senior Perlan Project intern, Elisa Vasenden, prepares the CubeSats for flight**



**CubeSats in the Perlan payload container**



**Loading the CubeSats into Perlan's science bay**



**Perlan pilots climbing into the cockpit and crew doing final preflight preparations**





**Final checklists before tow out of the Perlan glider**



**Tow out of the Perlan Glider**



**Launching a weather balloon prior to flight**



**Launch!**



**CapCom monitoring the flight**



**After flight inspection. From L-R: Jim Payne (Chief Pilot), Morgan Sandercock, Tim Gardiner (both Perlan pilots), & Elisa Vasenden (Senior Perlan Project Intern)**



**Sometimes the weather did not allow for flights**

# CubeSat Flight Experiments

## Atmosphere & Radiation Investigator

*Karin Paquin - St. John's Catholic School - Brunswick, ME*

Microcontroller: Arduino Uno

Radiation

Temperature

Humidity

Pressure

Altitude

Ambient Light

UV Light

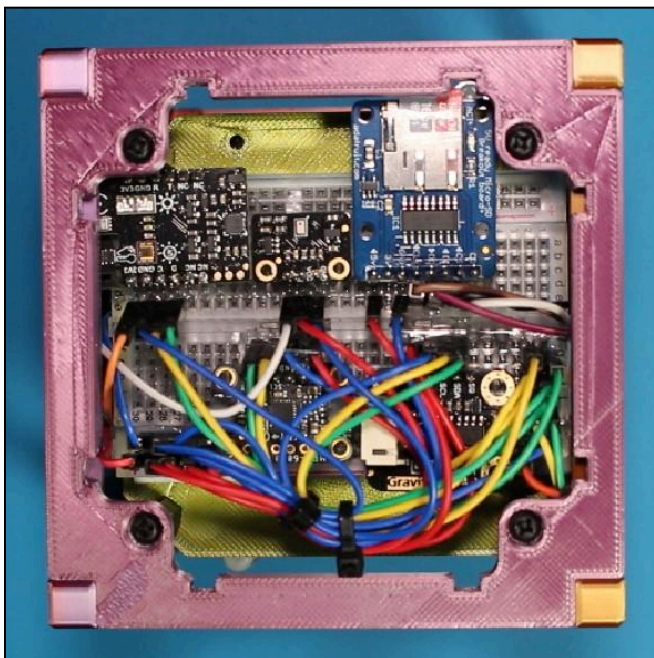
Accelerometer

Gyroscope

Microphone

RTC

MicroSD



# **Bismuth & Barium Radiation Shielding Experiment**

***Rhonda Stevens - Sipayik Elementary School - Pleasant Point, ME***

***GeigerSat2 built by Camren Mumme***

Microcontroller: Arduino Nano Every

Temperature

Pressure

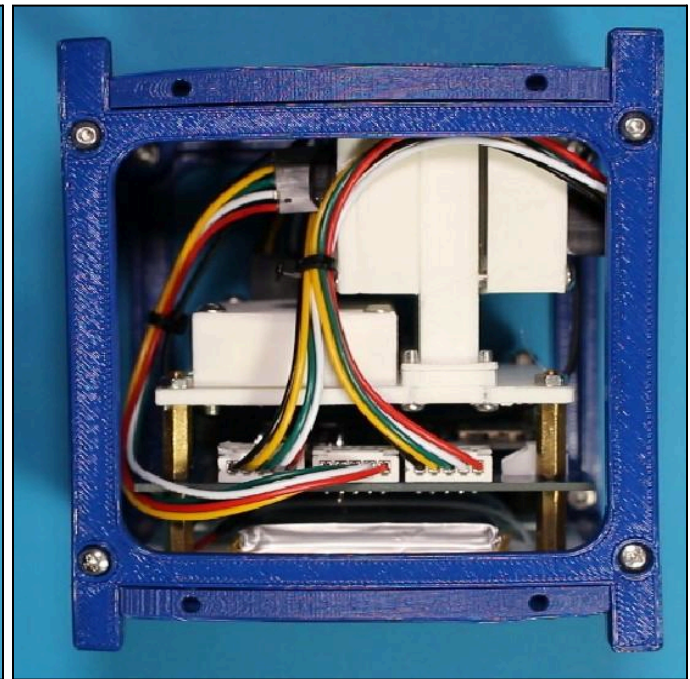
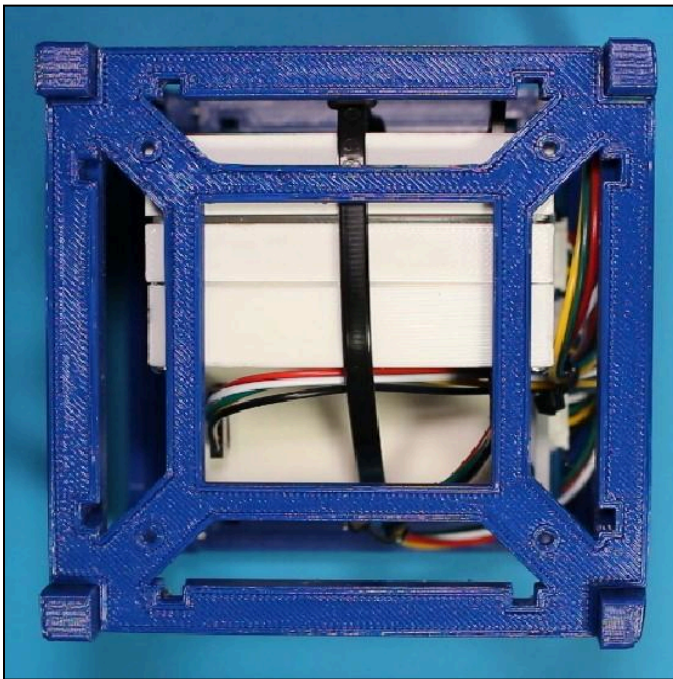
Radiation - Control

Radiation - Bismuth

Radiation - Barium

RTC

MicroSD



# Magnetic Field Observer

**Jim Lenke - Machias Memorial High School - Machias, ME**

Microcontroller: MaxIQ ESP32

Magnetic Field Sensor

2 x Temperature

Humidity

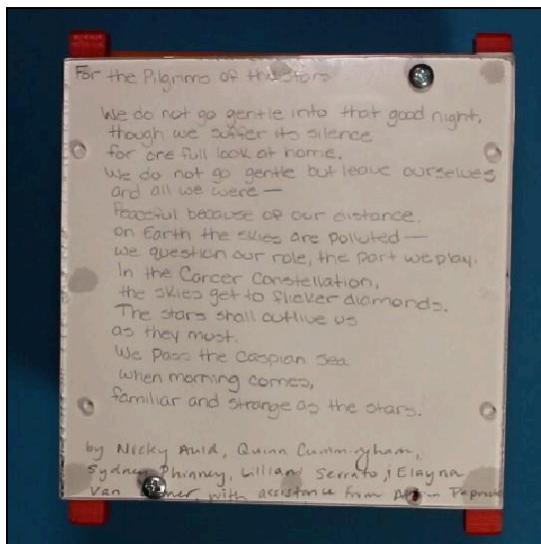
Pressure

Accelerometer

Gyroscope

RTC

MicroSD



## Workshop CubeSat Trial

*Arcelia Rios - Riverside Elementary School - Sunland, NM*

Microcontroller: Generic Uno

Temperature

Pressure

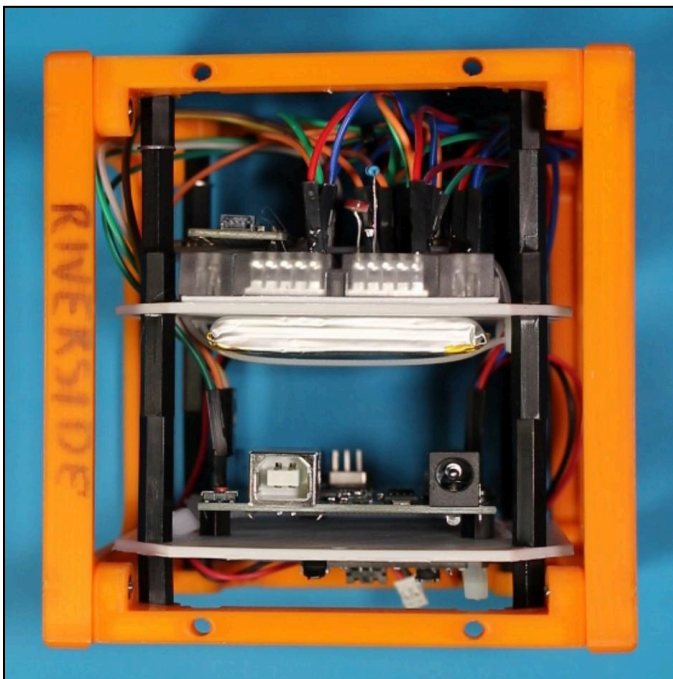
Ambient Light

Accelerometer

Gyroscope

RTC

MicroSD





# **Environmental Explorer**

***Gary Chavez - Gadsden High School - Anthony, NM***

Microcontroller: Generic Uno

Temperature

Humidity

Pressure

Altitude

Ambient Light

UV Light

RTC

MicroSD



## Atmospheric Air Quality Examiner

*Paulo Oemig - NMSGC - New Mexico State University - Las Cruces, NM*

Microcontroller: Seeed Studio Nano

Temperature

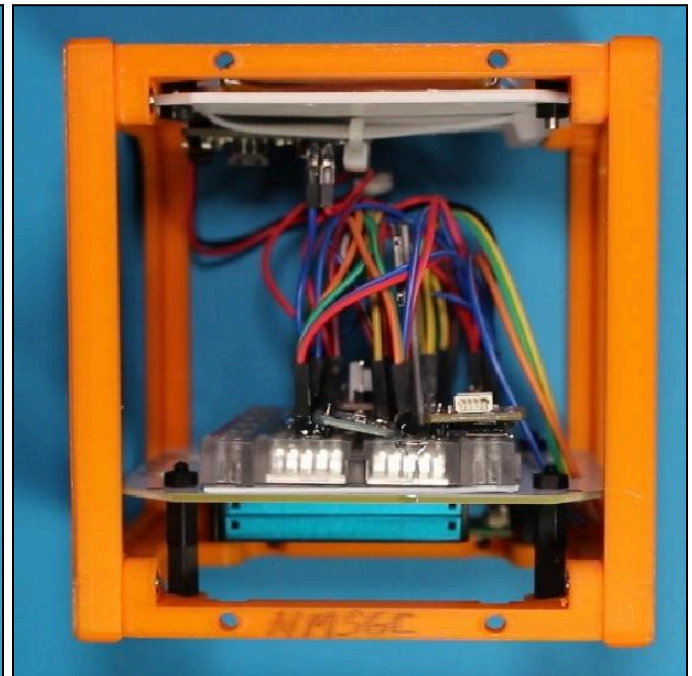
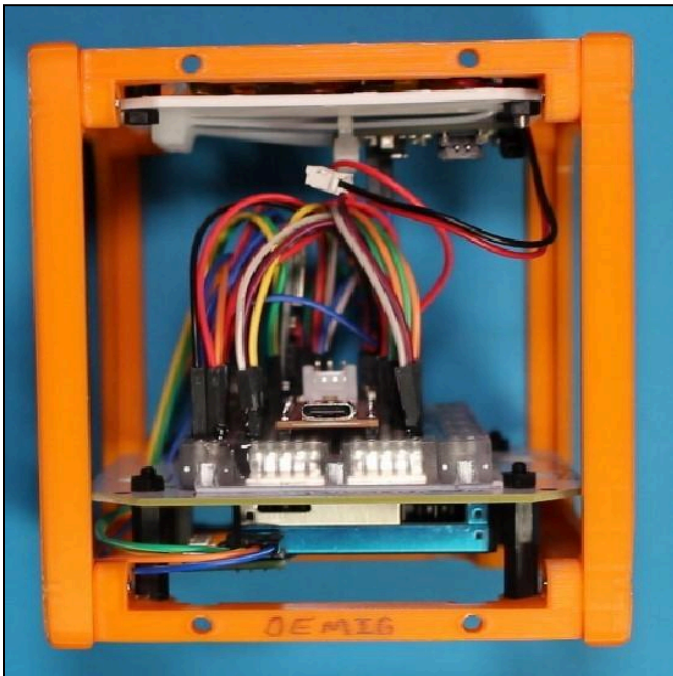
Pressure

Ambient Light

Air Quality (PM 1, PM 2.5, PM 10)

RTC

MicroSD



# Temperature & Humidity Analyzer

*Leah Coffman - Turner Elementary - Kansas City, KS*

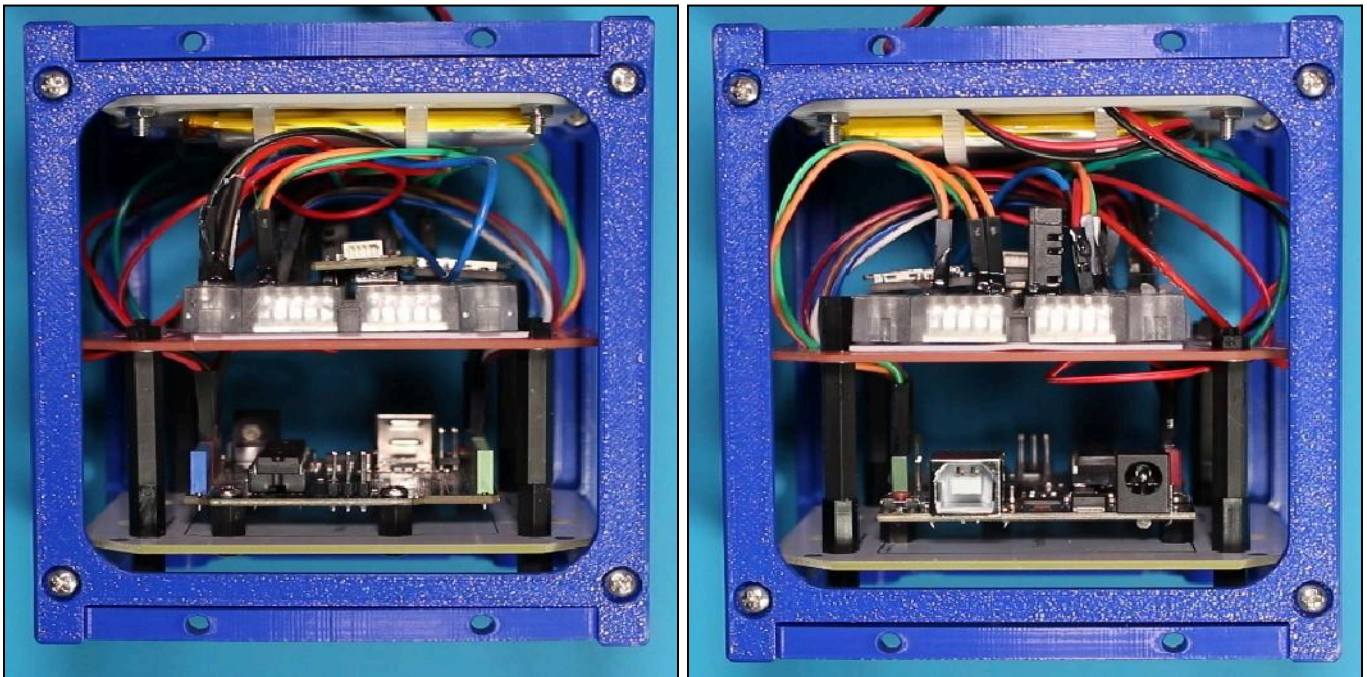
Microcontroller: DFRobot Uno

Temperature

Humidity

RTC

MicroSD



# **Lead Radiation Shielding Experiment**

***Stephanie Banning - Holy Cross Catholic School - Hutchinson, KS***

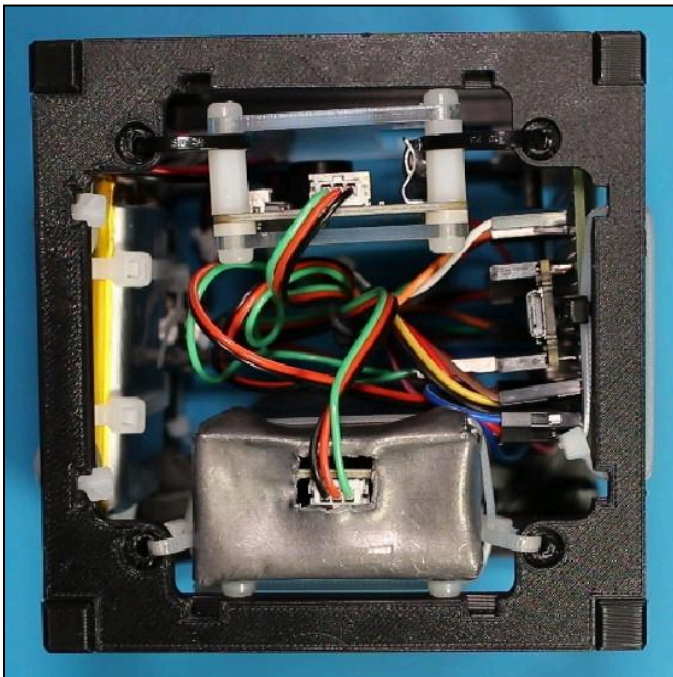
## **Video**

Microcontroller: Arduino Nano Every

2 x Radiation (Control & Lead)

RTC

MicroSD



# **Teachers in Space 2U Experimental Control Platform**

*Noah Luogameno - Teachers in Space - New York, NY*

Arduino Nano Every

Temperature

Humidity

Pressure

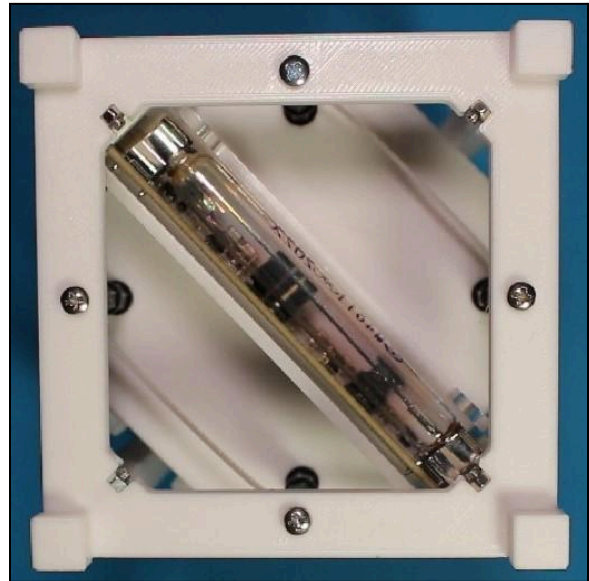
Altitude

Ambient Light

UV Light

Noise Level

Air Quality (PM 1, PM 2.5, PM 10)



# 2022/23 Intro to CubeSats Workshops

## New Mexico

**New Mexico teachers at 2022 TIS workshop**



**NM Students, teachers, and their CubeSats**



**NM teachers conduct a balloon mission**



**students integrate CubeSats onto drone**



# Kansas

**Kansas K-12 teachers attend the 2022 Teachers in Space Flight Experiments workshop**



**Workshop participants at the Cosmosphere KS Students building CubeSat flown on Perlan**



# Maine

Maine teachers at the workshop



Maine teacher flying CubeSats on ZeroG



Maine students and teachers with the CubeSat they built to be flown aboard Perlan glider

