



## **2022/23 CubeSat Flight Experiments Workshops**

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.

# 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 Flight Experiments workshop



Maine teacher flying CubeSats on ZeroG



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



# 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

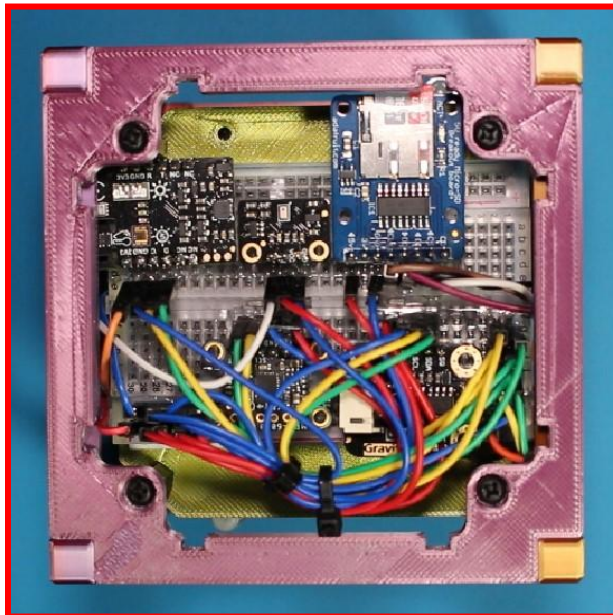


# CubeSat Experiments

## Atmosphere & Radiation Investigator

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

- Arduino Uno
- Radiation
- Temperature
- Humidity
- Pressure
- Altitude
- Ambient Light
- UV Light
- Accelerometer
- Gyroscope
- Microphone
- RTC
- MicroSD
- 3.7V 2500mah Li-Po Battery
- PowerBoost Charger

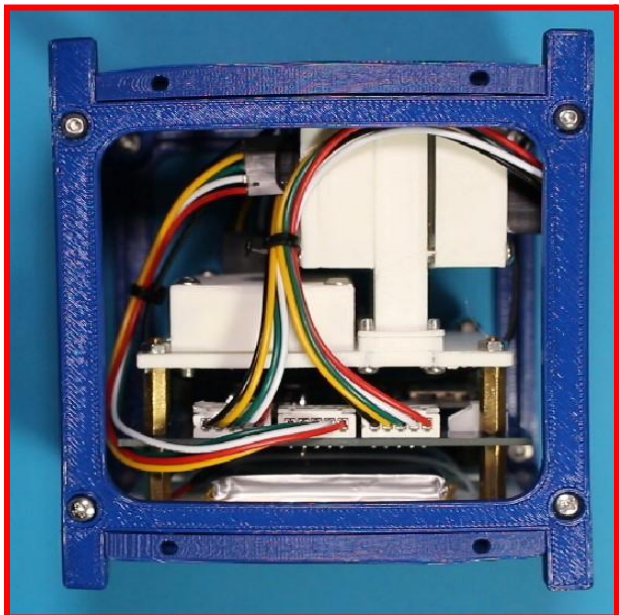
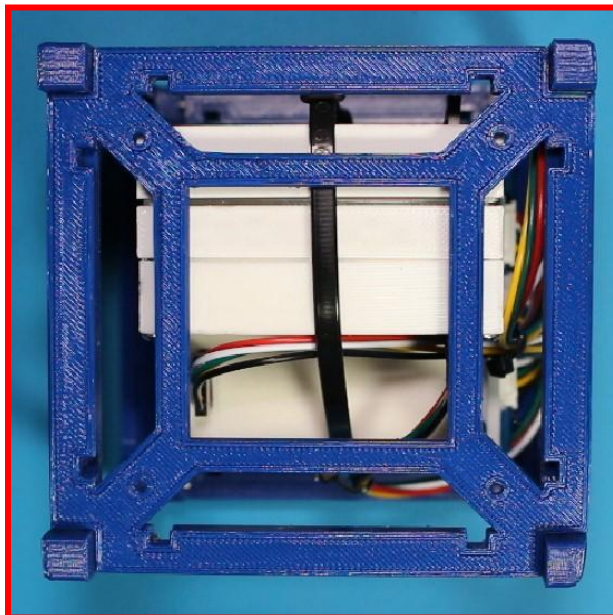


## **Bismuth & Barium Radiation Shielding Experiment**

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

***GeigerSat2 built by Camren Mumme***

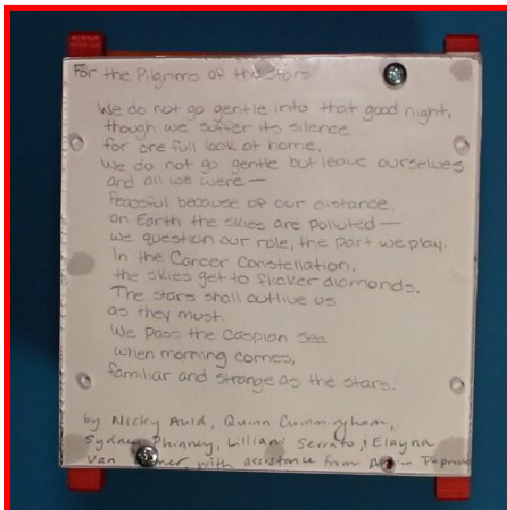
- Arduino Nano Every
- Temperature
- Pressure
- Radiation - Control
- Radiation - Bismuth
- Radiation - Barium
- RTC
- MicroSD
- 3.7V 2500mah Li-Po Battery
- Powerboost Charger



## Magnetic Field Observer

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

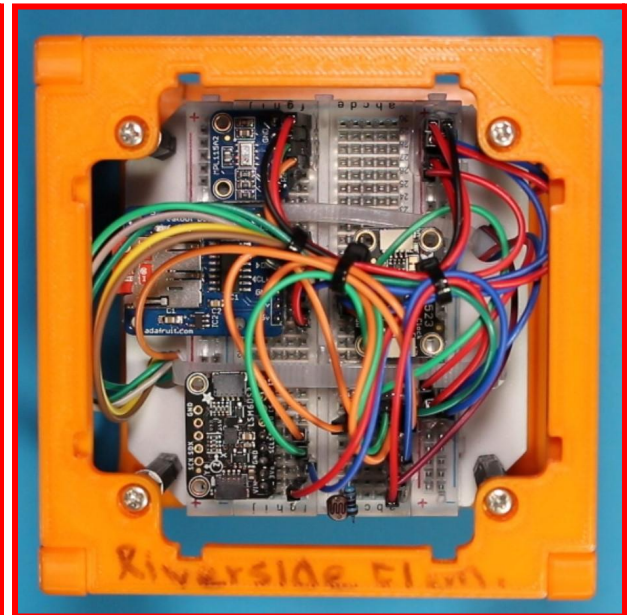
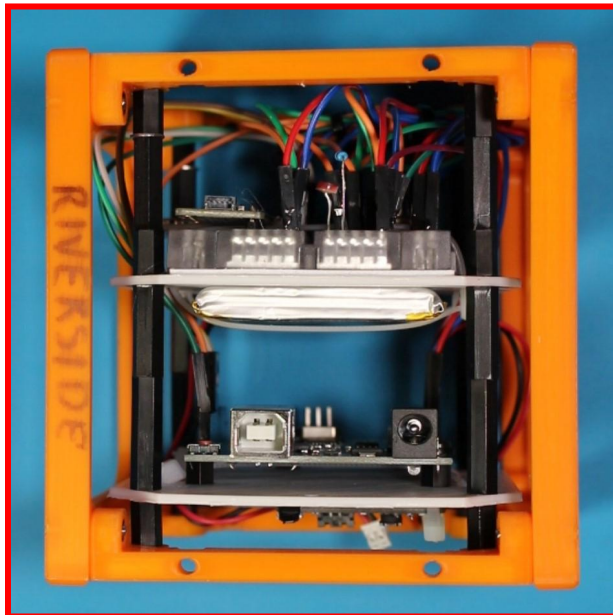
- MaxIQ ESP32
- Magnetic Field Sensor
- 2 x Temperature
- Humidity
- Pressure
- Accelerometer
- Gyroscope
- RTC
- MicroSD
- 3.7V Li-Po Battery



## Workshop CubeSat Trial

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

- Generic Uno
- Temperature
- Pressure
- Ambient Light
- Accelerometer
- Gyroscope
- RTC
- MicroSD
- 3.7V 2500mah Li-Po Battery
- Powerboost Charger

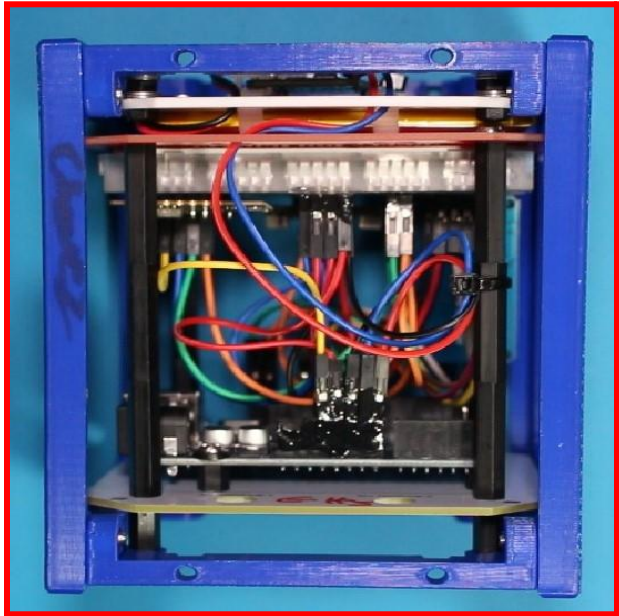




## **Environmental Explorer**

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

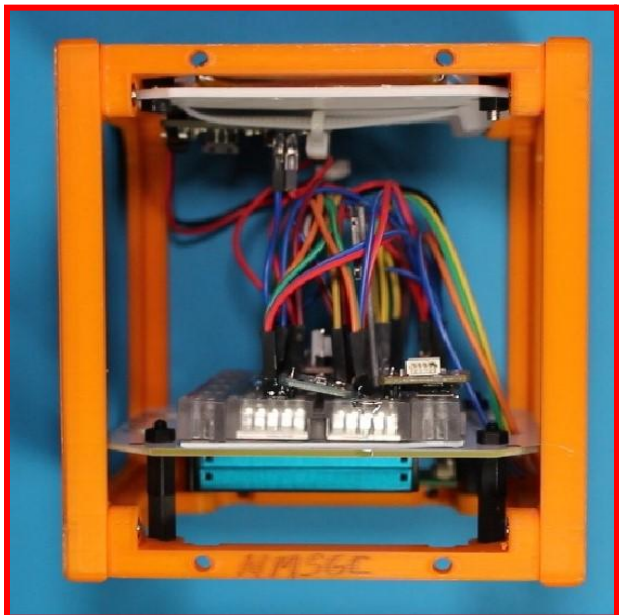
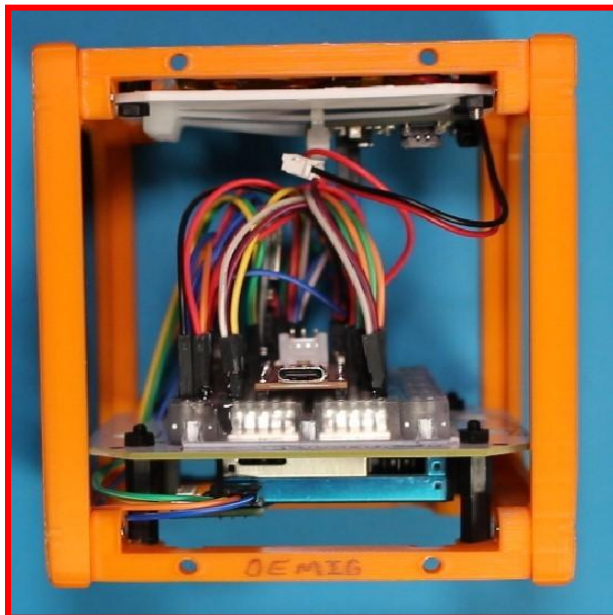
- Generic Uno
- Temperature
- Humidity
- Pressure
- Altitude
- Ambient Light
- UV Light
- RTC
- MicroSD
- 3.7V 2500mah Li-Po Battery
- Powerboost Charger



## Atmospheric Air Quality Examiner

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

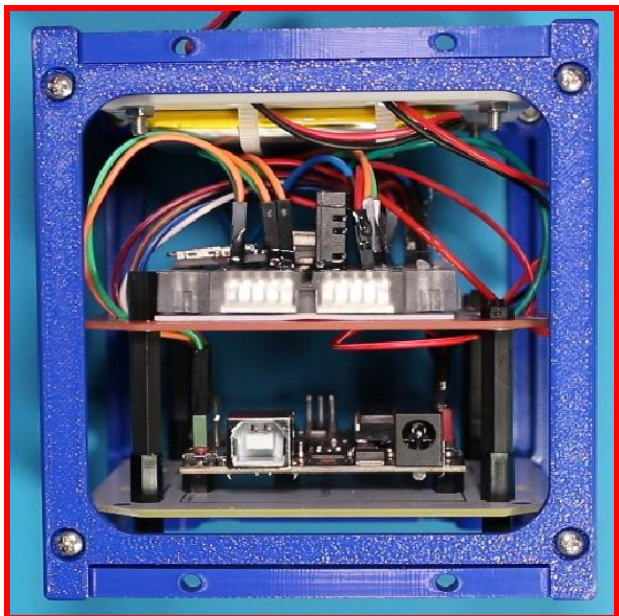
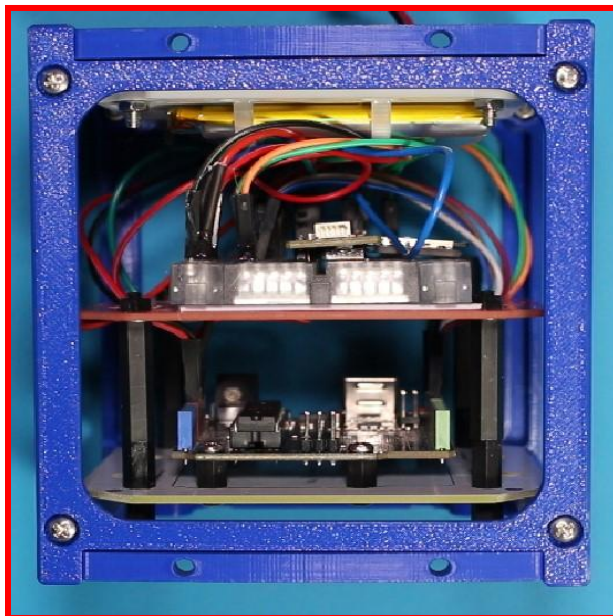
- Seed Studio Nano
- Temperature
- Pressure
- Ambient Light
- Air Quality (PM 1, PM 2.5, PM 10)
- RTC
- MicroSD
- 3.7V 2500mah Li-Po Battery
- Powerboost Charger



## Temperature & Humidity Analyzer

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

- DFRobot Uno
- Temperature
- Humidity
- RTC
- MicroSD
- 3.7V 2500mah Li-Po Battery
- Powerboost Charger

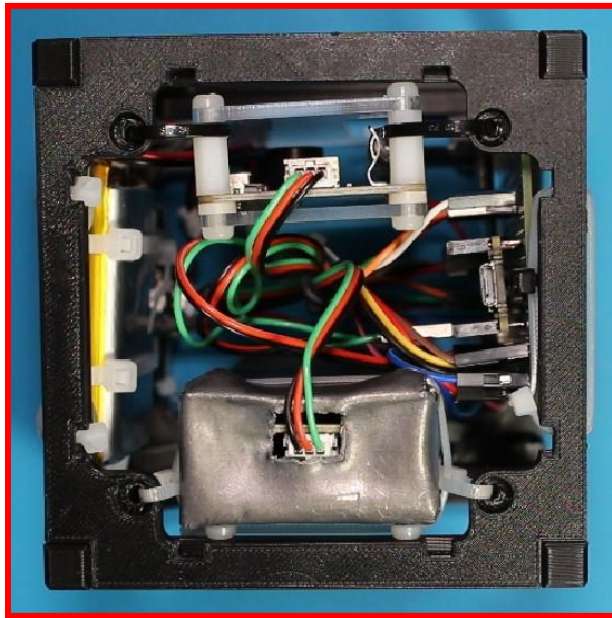


## **Lead Radiation Shielding Experiment**

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

### **Video**

- Arduino Nano Every
- 2 x Radiation (Control & Lead)
- RTC
- MicroSD
- 3.7V 2500mah Li-Po Battery
- Powerboost Charger



## **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
- Radiation
- Noise Level
- Air Quality (PM 1, PM 2.5, PM 10)
- 3.7V 2500mah Li-Po Battery
- Powerboost Charger

