

# Destination SPACE , Inc.

## STEM Challenges and Lessons Learned in Response to the COVID Pandemic

Dr. L DeWayne Cecil  
Founder and Director, Destination SPACE Inc.

### Nesbitt Discovery Academy Students:

Hunter Milo Miller, 12th grade

Isabella L. Field, 12th grade

Eve T. Currens, 12th grade

Elisa S. Randazzo, 12th grade

Tyler Gleydura, 11th grade

Duncan Clark Horvath, 12th grade

Natasha D. Luchinina, 12th grade



A satellite view of Earth from space, showing a curved horizon with a thin blue atmosphere. The ground below is a patchwork of green and brown, with white clouds scattered across the surface. A small, dark, rectangular satellite is visible in orbit above the horizon line.

# Activities Before COVID - 19

# Destination SPACE Programs

## ☆ In person programs

- Balloon launches (tethered and untethered)
- Sensor/data analytics practice etc.

## ☆ Satellite week

- Jiggy Bots and Cricket Sats

## ☆ ThinSat

- Extreme Low Earth Orbit
- Measure VOC levels in atmosphere

## ☆ CubeSat

- Deep Space CubeSat
- Take various space -weather data

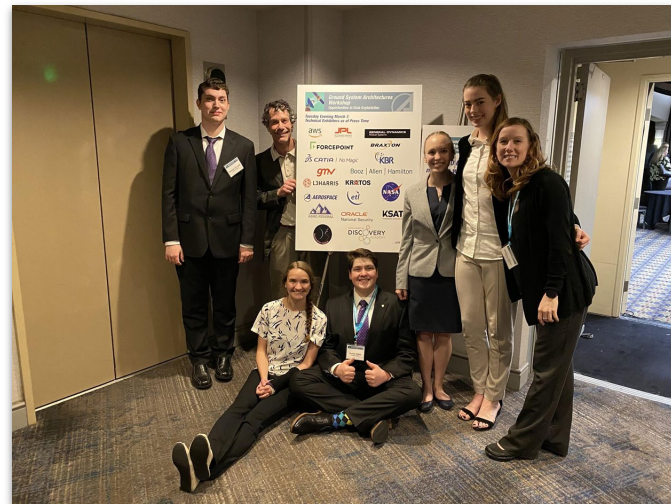




# Presentations and Events

## ★ GSAW 2018, 2019, & 2020

- Our work in learning data analysis is
- Preparations for CubeSat launch
- Learning the workings of Ground systems and operations
- Connected with many prominent aerospace corporations



A wide-angle photograph of Earth from space, showing the curvature of the planet and the thin blue atmosphere. The surface below is a mix of dark blue oceans and brownish-green landmasses with visible cloud patterns.

# Adapting to Remote - Based Instruction

# Virtual Conferences

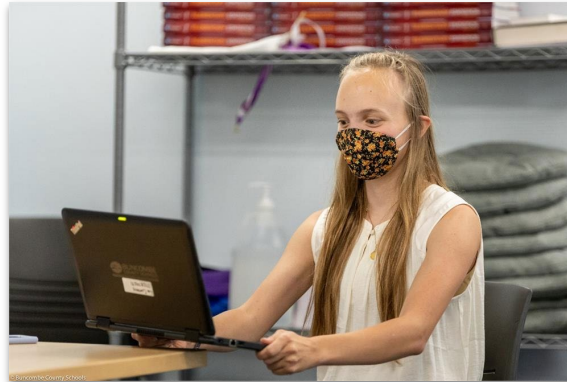
## WRPSA Over the Moon Conference

- ☆ Virtual conference for Western North Carolina STEM teachers
- ☆ Prepared pre -recorded presentation



## Bridging the Gap Conference

- ☆ Virtual conference for STEM teachers across North Carolina
- ☆ Prepared powerpoint and presented live



# Virtual Conferences

## Challenges

- ☆ Low attendance
- ☆ Maintaining engagement
- ☆ Technical difficulties
- ☆ Lack of preparation



## Lessons Learned

- ☆ Flexibility
  - Adapting our programs to unique circumstances
- ☆ Perseverance
  - Working through trial and error
  - Remaining patient through difficulties and delays
- ☆ Reaching a wider audience using technology



# Kit - Based Virtual Learning

## Destination Rover

Arduino Nano Microcontroller

Solderless Breadboard

5x AA Batteries

Ultrasonic Sensor

2 DC Motors

## Destination Weather Station

Arduino Nano Microcontroller

Solderless Breadboard

5x AA Batteries

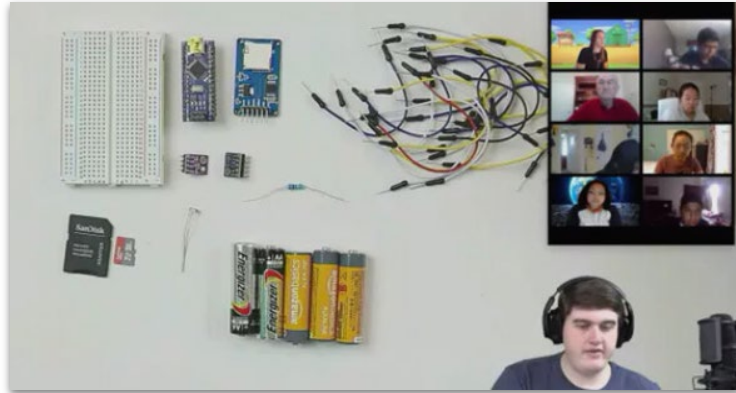
Weather Sensor (Temperature, Humidity,  
Pressure)

Visible Light Intensity

UV Intensity



# Virtual Camps



- ★ Before the COVID pandemic, we had 7 in -person summer camps planned.
- ★ 3 summer camps we held online remotely in 2020
  - West Virginia camp held with NASA IV&V Education Resource Center
  - California Destination Aerospace with Aerospace Corporation
  - Homeschool camp.

A wide-angle satellite photograph of Earth from space. The image shows a vast expanse of the planet's surface, with a mix of dark blue oceans and lighter blue/green landmasses. A thin, bright blue line of the atmosphere is visible at the top. In the upper right quadrant, a small, dark, rectangular satellite is seen in orbit, with a small plume of white smoke or vapor trailing behind it. A black rectangular box is superimposed over the center of the image, containing the text "Going Forward" in white.

**Going Forward**

# Hybrid Camps - Improvements and Plans





# Rocketry

## ☆ Air - Powered Bottle Rocket

- Safe
- Easy
- Open to younger students

## ☆ Model Rocket Kit

- Set Design Kit
- Teaches basics of rocketry
- Better for older students





# Ground Systems

## CricketSat:

- ★ 433MHz transmitter
- ★ Attached to 2x2 timer
- ★ Transmits data to Yagi antenna
- ★ Then interpreted through an SDR using the HDSDR program

## Python Based Data Analysis:

- ★ 3D scatterplot
- ★ Hardcoded
- ★ Requires editing excel file to use



# Current Ground Systems

- ★ Data Analysis Tools Updated:
  - Not hardcoded anymore
  - Will attempt to use unedited excel files
  - 2D&3D scatterplot
- ★ Arduino Based Ground Stations



# Future Ground Systems

- ★ Miles CubeSat
- ★ Upgraded Python Toolset
  - GUI
  - More Graphing Options
  - Machine Learning based anomaly detection



# Student Opportunities in STEM

- ☆ American Society of Mechanical Engineers (ASME)
- ☆ Space camp internships
- ☆ South Carolina Governor's School for Science and Math
- ☆ GSAW 2021
- ☆ Asheville internships
- ☆ Destination SPACE summer internships



# Overall Takeaway

- ★ Seek opportunities within challenges
  - Make the most of opportunities even if/when they are virtual
- ★ Learned new ways to adapt skills which we will continue to use beyond COVID
  - Continue past covid with newly developed technology
- ★ Access in the future to those who cannot attend events in person
  - Expanding access to underrepresented groups in STEM
  - Connecting events globally

# Contact Destination SPACE

A background image showing a view of Earth from space, with a blue horizon and a dark sky. Three small, dark, rectangular objects, likely satellites, are visible in the upper right quadrant of the image, appearing to be in orbit.

[destination-space](https://www.destination-space.org) - [stem.org](https://www.stem.org)

[info@destination-space](mailto:info@destination-space.org) - [stem.org](https://www.stem.org)