National Aeronautics and Space Administration

2021-2023 Competition Overview

July 2022

NASA's Flight Opportunities Program Space Technology Mission Directorate (STMD)

Mission: **Rapidly demonstrate promising technologies** for space exploration, discovery, and the expansion of space commerce through **suborbital testing with commercial flight providers**

Credits (above, right): Blue Origin, UP Aerospace

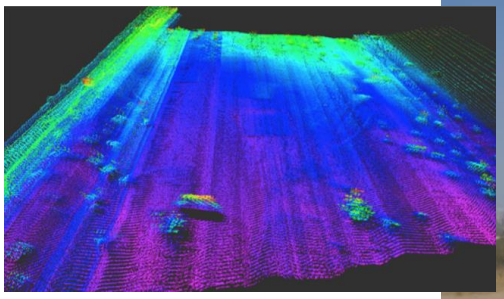
STMD Flight Opportunities Program

Credit: Carthage College

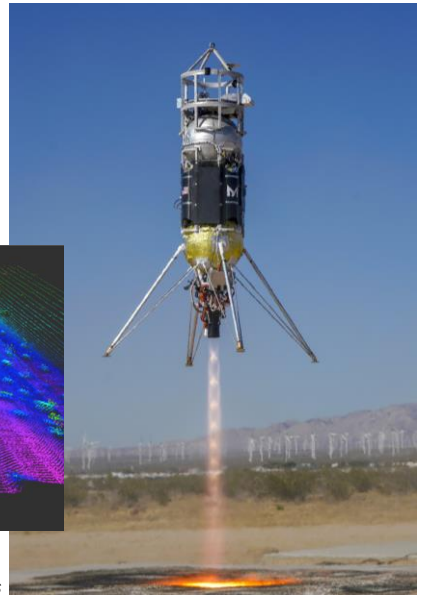
Credit: Airborne Systems North America

Credit: NASA/Virgin Galactic

Credit: Steve Boxall/ZERO-G



Credit: Near Space Corporation



Credit: Masten Space/Matt Kuhns

STMD Flight Opportunities Program

Since 2011*, Flight Opportunities has…

- Supported **254** successful fights
- **348** technologies in the portfolio
- Enabled **870** tests of payloads

*As of June 30, 2022

NASA TechRise Student Challenge

- Goal: To inspire students by means of real-world drivers, challenges & opportunities
- New STEM interdisciplinary effort to engage 6-12 grade students (U.S. public, private and charter schools)
- Opportunity to build their own experiment and fly it to space or on a high-altitude balloon

Credit: Blue Origin

TechRise Student Challenge web site:
https://www.futureengineers.org/NasaTechRise

NASA TechRise Student Challenge

- 1st challenge launched in 2021 (ongoing); working with *Future Engineers*
- **2nd challenge expected to launch in August 2022**
- Experiential hands-on opportunity to build a 4x4x8 in. experiment of their own design
- Immersion into computers, microprocessors, electronics, science, math, etc.
- Test their idea on a suborbital flight opportunity
  - High-Altitude Balloon: 4-hour flight duration at 70,000 ft altitude
  - Rocket-Powered Vehicle: 3-4 min. microgravity at ~70 miles altitude

- **No previous experience necessary to participate!**

TechRise Student Challenge web site:
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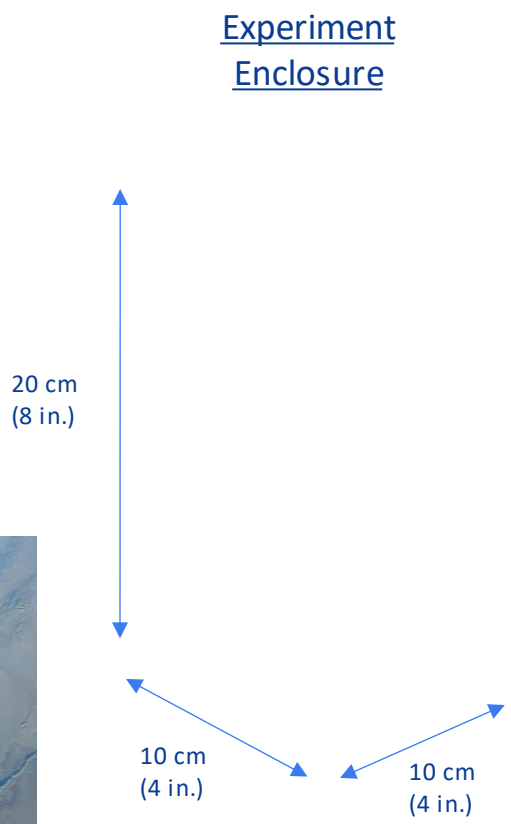
NASA TechRise Student Challenge

- Student Team Awards Include:
  1. Cash prize ($1500)
  2. Flight hardware (2U experiment enclosure)
  3. A suborbital flight opportunity (balloon or rocket)

Credit: Raven Aerostar

Credit: UP Aerospace



NASA TechRise Student Challenge

- Student Teams Support & Tools
  - Online vehicle simulators
  - Detailed step-by-step video tutorials (basic electronics, hardware/software, coding)
  - Sample code (Arduino & CircuitPython)
  - Detailed design guidelines
  - Ready access to TechRise resources
  - Dedicated engineering support team (weekly meetings throughout challenge)

Online Vehicle Simulators

Credits: Future Engineers

NASA TechRise Student Challenge

- Multiple virtual student and educator-focused events:
  - Educator Workshops (x3)
  - Q&A Webinar
  - Virtual Field Trip
  - Winners' Announcement Event
  - NASA Meet-and-Greet
  - Winners' Showcase

NASA TechRise Student Challenge

- How to participate?
  1. Create a student team (4 or more students and **1 educator mentor**)
  2. Develop an experiment idea
  3. Decide what flight type is needed to test their experiment (balloon vs. rocket)
  4. Write a brief plan
     - What is your experiment idea?
     - Why would this experiment be important?
     - How would you build this experiment?
     - Basic timeline

- Flexible experiment requirements to stimulate student creativity & teamwork
  - Science and/or technology-focused experiment
  - Include the use of microcontrollers/SBCs
  - Work in teams

NASA TechRise Student Challenge

- Multi-step competition
  - Aug. – Nov. 2021: Proposal submission window
  - December 2021: Proposal selections
  - Jan. 2021 – Oct. 2022: Payload buildup 
  - Summer 2023: Suborbital flights (tentative)

NASA TechRise Student Challenge

Selection Process

- Evaluation Criteria

Originality of the Flight Experiment Idea	25 pts
Impact on Education and/or Society	25 pts
Build Plan & Compliance with Design Guidelines	25 pts
Timeline Feasibility	25 pts
Awarded if School is Title 1 Eligible	5 pts

- Judging Process
  - US & territories divided into 20 regions
  - Large panel of judges (NASA, academia & industry)

TechRise Regions

NASA TechRise Student Challenge

57 Student Teams Selected:

20 Student Experiments

High Altitude Balloon

Raven Aerostar
(4-hour flight; 70,000 ft altitude)

24 Student Payloads

Rocket-Powered Vehicle

Blue Origin
(~3 min. microgravity conditions, ~62 miles alt.)

13 Student Payloads

Rocket-Powered Vehicle

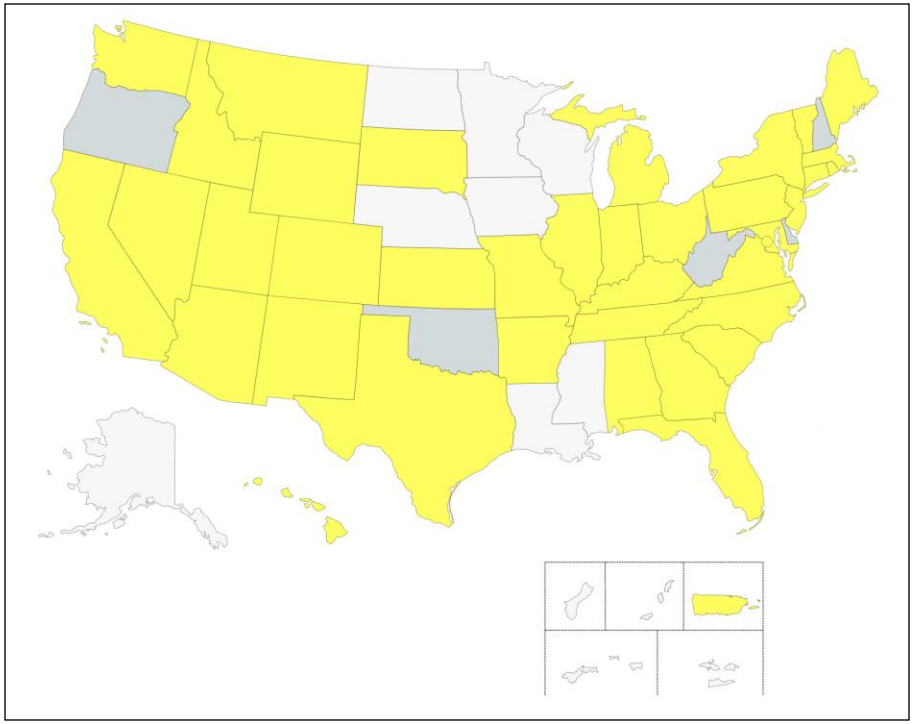
UP Aerospace
(~4 min. microgravity conditions, ~75 miles alt)

NASA TechRise Student Challenge

TechRise Student Challenge (2021-2023):

- Total of **57 student proposals** selected
- 37 US states/territories represented
- 600+ students directly participating
- 61% are Title I eligible
- Flights planned for early/mid-2023

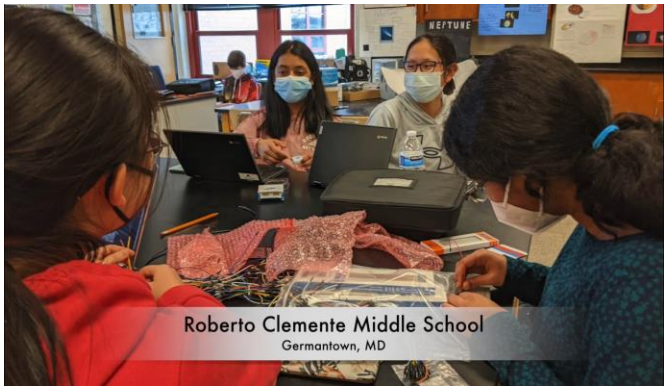
Represented States/Territories

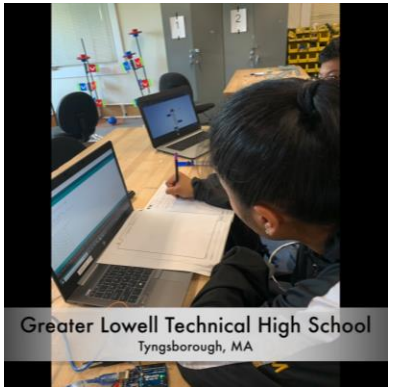


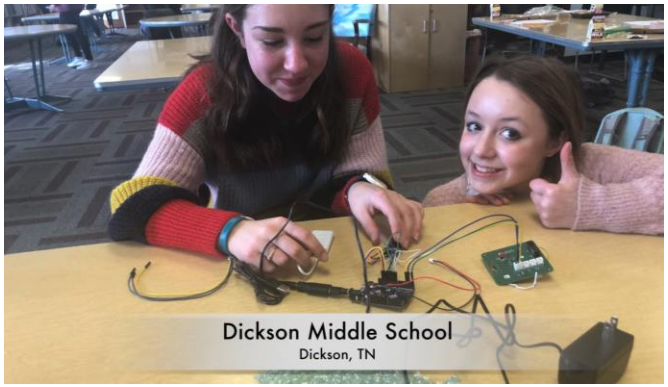
NASA TechRise Student Challenge

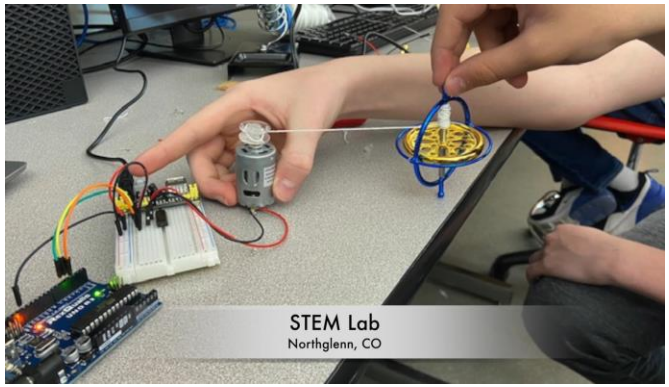
- Wide range of student project topics
  - Microgravity
  - Physics & capillary flow
  - Space agriculture
  - Space radiation
  - Space exploration
  - Human health
  - Solar panel deployment
  - Lunar regolith behavior
  - High-altitude effects
  - **Remote Sensing** & earth observation
  - Air quality & greenhouse gases
  - Climate Change

NASA TechRise Student Challenge

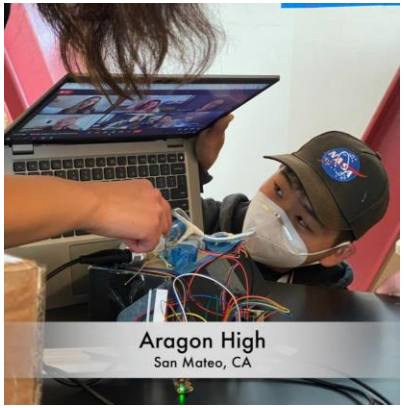


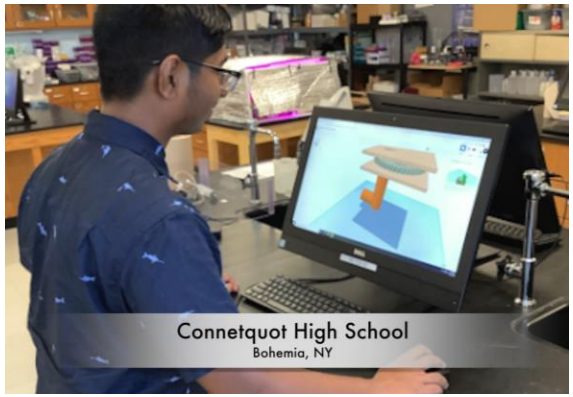






NASA TechRise Student Challenge





2022-2023 NASA TechRise Student Challenge

- **August 2022** - Preparing to launch a **new *TechRise Student Challenge***
- Some exciting highlights
  - 2nd iteration of this exciting initiative
  - Science & Technology focus with use of microcontrollers & electronics
  - Retain main characteristics & structure of first challenge
  - Estimating up to 60 student team winners
  - Planned to take place during 2022-2023 academic year
  - Flight tests planned for Summer 2023

- **No previous experience necessary to participate!**

NASA TechRise Student Challenge

- Multiple virtual student and educator-focused events:
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  - Q&A Webinar
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2022-2023 NASA TechRise Student Challenge

Want more info & real-time updates?

https://www.futureengineers.org/NasaTechRise