



NASA
TECHRISE
STUDENT CHALLENGE



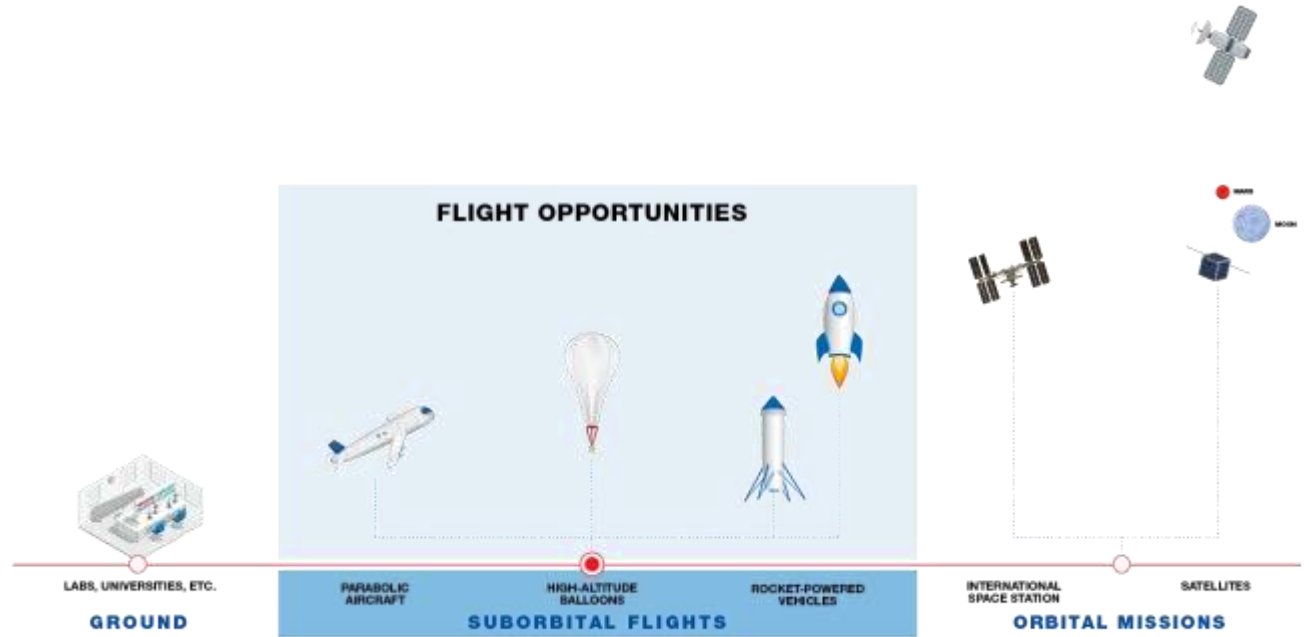
**2021-2023
Competition Overview**

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



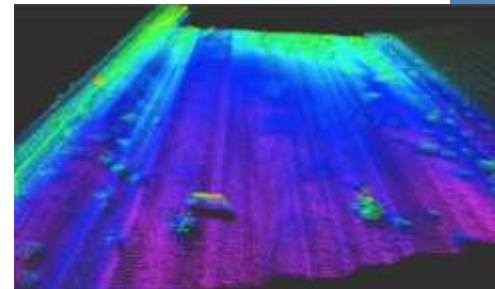
Credit: Airborne Systems North America



Credit: NASA/Virgin Galactic



Credit: Steve Boxall/ZERO-G



Credit: Masten Space/Matt Kuhns



Credit: Near Space Corporation



STMD Flight Opportunities Program

Since 2011*, Flight Opportunities has...

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



*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



Saxe Middle School
New Canaan, CT



Louisville Male High School
Louisville, KY



Credit: Blue Origin

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



NASA TechRise Student Challenge

- 1st challenge started in 2021 (ongoing); working with *Future Engineers*
- **2nd challenge will start August 10th, 2022**
- Experiential hands-on opportunity to build a 2U (4x4x8 in.) experiment of their own design
- Students participate in groups of 4 or more (plus educator lead)
- Immersion into computers, microprocessors, electronics, science, math, etc.
- Conceptualize, build, test their idea & record their data 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
- Experiment payloads are returned to students after their flight
- **No previous experience necessary to participate!**

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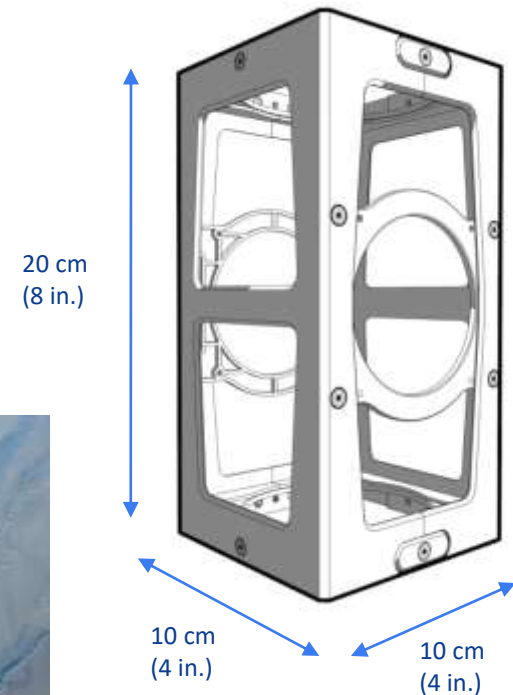
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NASA TechRise Student Challenge

- Student Team Awards Include:
 1. Cash prize (\$1500)
 2. Flight hardware (2U experiment enclosure)
 3. A suborbital flight opportunity (balloon or rocket)
- Dedicated engineering support team (weekly meetings throughout challenge)

Experiment
Enclosure



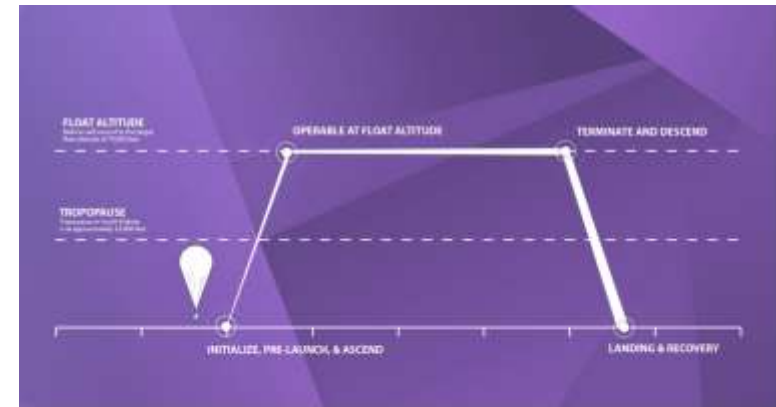
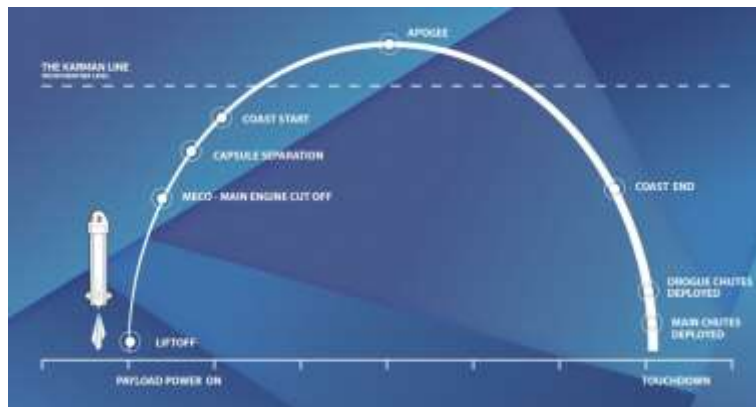
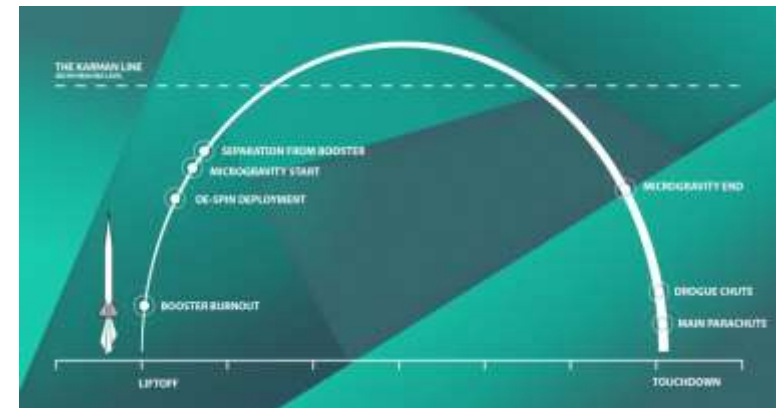
Credit: UP Aerospace



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?
 - Basic elements that would make up your 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)

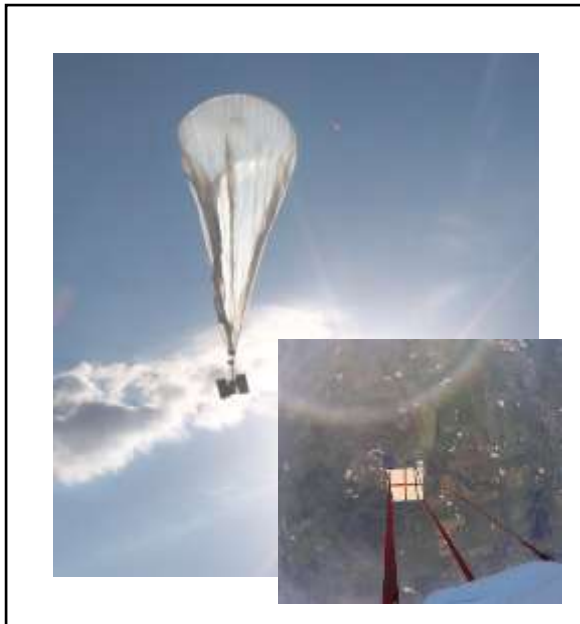


NASA TechRise Student Challenge

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)



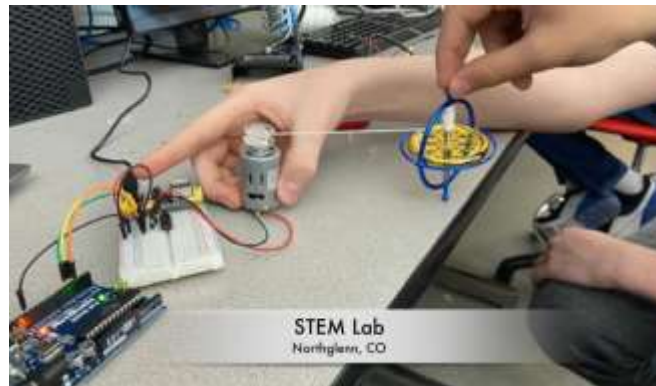
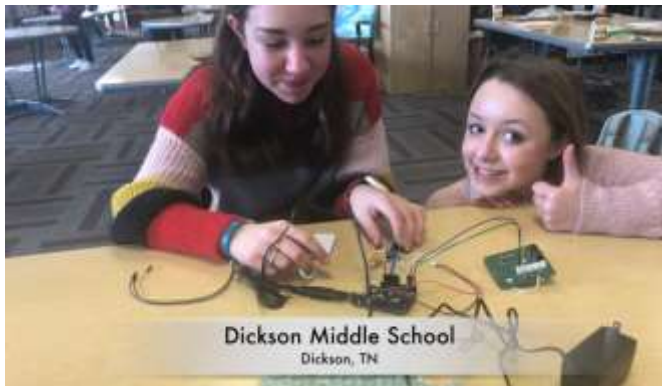
NASA TechRise Student Challenge

- 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

More examples in NASA TechRise web site:
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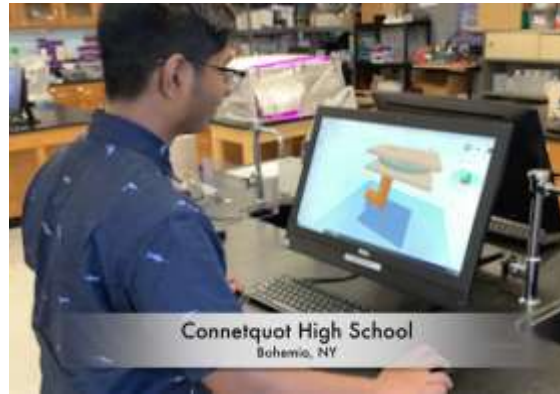


NASA TechRise Student Challenge





NASA TechRise Student Challenge





2022-2023 NASA TechRise Student Challenge

- **August 10, 2022** – Launching 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 experience necessary to participate!**





NASA TechRise Student Challenge

- Multiple virtual student and educator-focused events:
 - Educator Workshop
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2022-2023 NASA TechRise Student Challenge

Apply to the 2022-2023 challenge!

Want more info & real-time updates?

<https://www.futureengineers.org/NasaTechRise>

