LEVERAGING PRIZE AUTHORITY TO ADDRESS CRITICAL NASA TECHNOLOGY NEEDS

John Kelly
Program Manager, NASA's Flight Opportunities Program

EXPLORE SPACE TECH

THROUGH SUBORBITAL FLIGHT

The Flight Opportunities program rapidly demonstrates promising technologies for space exploration, discovery, and the expansion of space commerce through suborbital testing with industry flight providers.

Photo Credit: Blue Origin

FLIGHT OPPORTUNITIES MECHANISMS

NASA TECHFLIGHTS

Includes topic areas that address agency and mission goals; up to $750K to purchase flights on suborbital or hosted orbital platforms directly from any eligible U.S. commercial flight provider

NASA TechLeap PRIZE

Challenges addressing specific NASA technology needs; previous awards have been up to $650K to build payloads, plus access to a suborbital flight test

NASA TECHRISE STUDENT CHALLENGE

Competition to inspire the next generation of space researchers; offers hands-on insight into the design and test process used by NASA-supported researchers

FLIGHTS OF OPPORTUNITY

Through collaborative internal and external relationships, the program takes advantage of opportunities to flight test valuable space technologies

Autonomous Observation Challenge No.1:

Small spacecraft tech to autonomously detect, locate, track, and collect data on transient terrestrial events or maintain line of sight communication with an object on the lunar surface

Nighttime Precision Landing Challenge No. 1

Sensing systems that can detect terrain hazards and process the data in real time to facilitate safe landing of a spacecraft in the dark

NASA TECHRISE STUDENT CHALLENGE

The NASA TechRise Student Challenge leverages suborbital flight platforms to offer hands-on insight into the design and test process used by NASA-supported researchers.

Students from **grades 6-12** receive a **$1,500 stipend** and an assigned spot on a **high-altitude balloon flight**

The 57 student teams selected in the 2021-2022 challenge represented 37 U.S. states and territories

Photo credits: Roberto Clemente Middle School

Credit: Washington Liberty High School

NASA TECHLEAP PRIZE

To support future missions and reduce risk, the NASA TechLeap Prize seeks to rapidly identify and develop technologies of significant interest through a series of challenges. Winners receive cash prizes during the payload build phase as well as an opportunity for a suborbital flight test with a commercial flight provider.

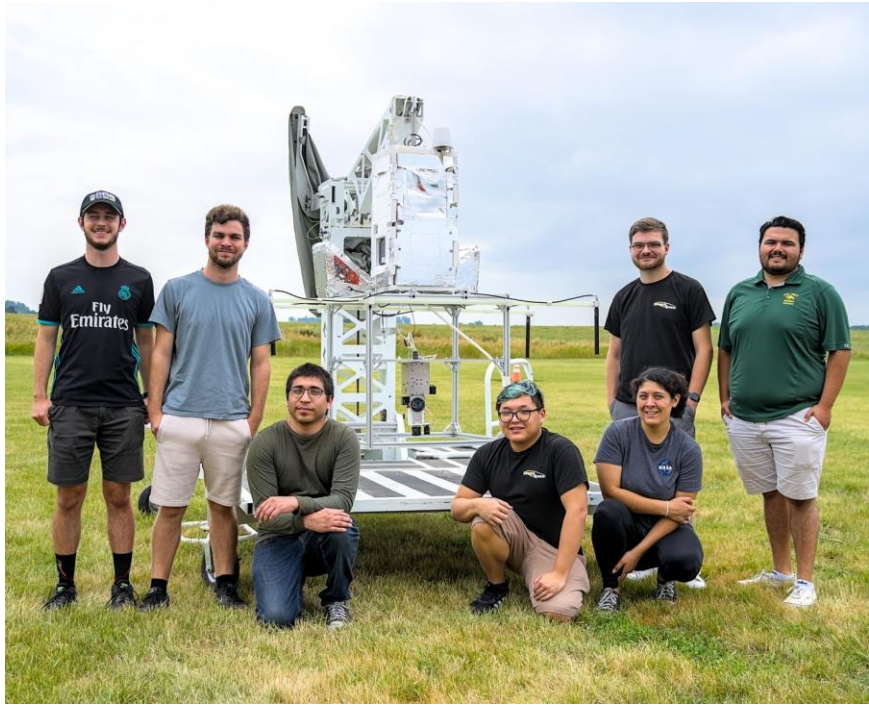
Objective: Decrease time from selection to flight and increase diversity of technology developers addressing NASA gaps

Autonomous Observation Challenge No.1

- Collaboration with Small Spacecraft Technology program
- Flight tests for the 3 winners on Aerostar (formerly Raven) high-altitude balloons completed in July and August 2022; reflights planned for 2023

Nighttime Precision Landing Challenge No. 1

- Challenge sought low-SWaP-C sensing systems to detect terrain hazards in the low light conditions, particularly on the lunar surface
- 3 winners selected June 2022; flight tests on lunar surface test field in Mojave ~Spring 2023



Credit: Aerostar

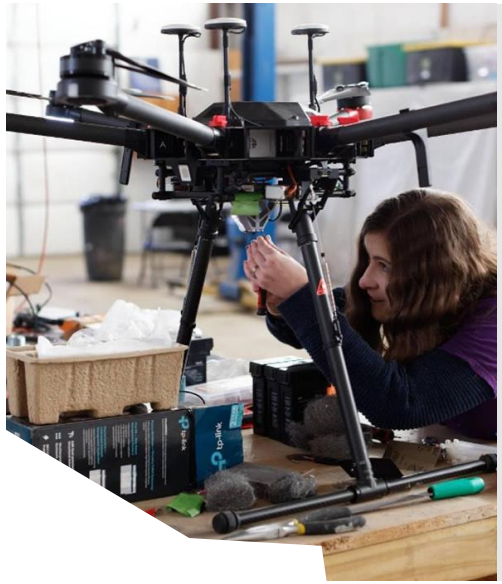
NASA TECHLEAP PRIZE FLIGHTS

Bronco Space Lab at Cal Poly

Bronco Ember wildfire detection system

Combines a short-wave infrared camera with artificial intelligence for potentially faster, more accurate aerial detection of nascent wildfires

Flew July 8, 2022 with Aerostar

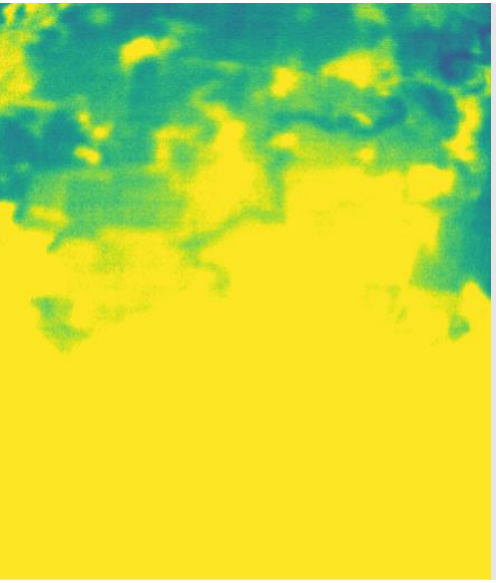


Orion Labs

Quantum Earth OBServatory

4U payload designed to demonstrate how onboard data processing and quantum machine learning can result in reduced downlink requirements

Flew July 28, 2022 with Aerostar

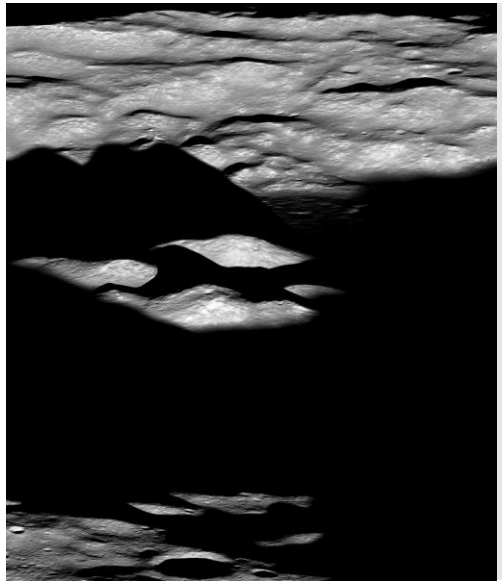


Texas A&M

Satellite system for plume identification

Uses gimbaled cameras to identify and track plumes in real time

Flew August 3, 2022 with Aerostar



Nighttime Precision Landing Challenge No. 1

Aims to identify low-cost sensing systems that can map terrain in the dark from an altitude of 250 meters or higher

3 winners selected in August 2022

Flights expected Summer 2023

Thank you!

Flight opportunities website:
nasa.gov/flightopportunities

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ADVANCING PRECISION LANDING TECHNOLOGIES

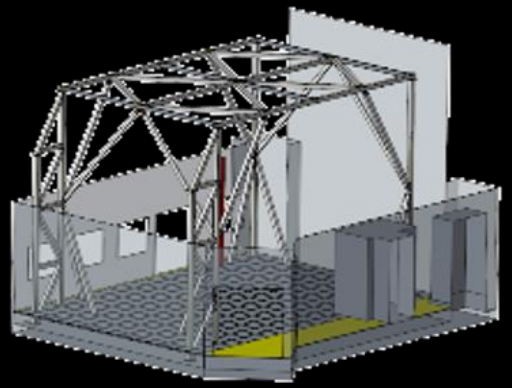
MICHELLE MUNK

STMD Chief Architect (Acting)
EDL System Capability Lead

PRECISION LANDING MATURATION APPROACH

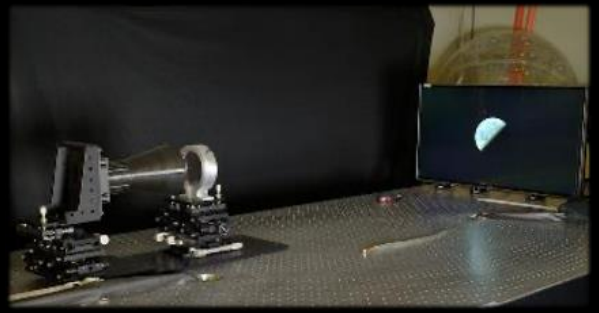
Simulation

HWIL Dynamic Testing



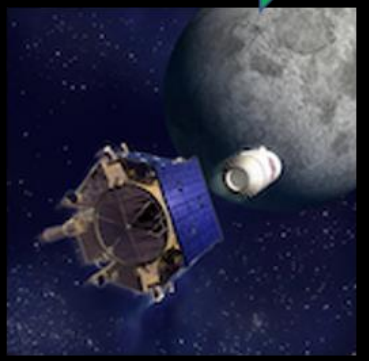
Suborbital Rocket Tests

Concept → Capability



Lab Component Testing

Aerial Vehicle Testing



Space Tech Demo

NIGHTTIME PRECISION LANDING CHALLENGE NO. 1

- Open to researchers from qualified commercial businesses and academic institutions, as well as individual entrepreneurs and other innovators
- Challenge seeks sensing systems that can detect terrain hazards and process the data in real time to help spacecraft land safely in the low light conditions, particularly on the lunar surface
- Addresses NASA's Entry, Descent, and Landing technology thrust

Selections from 15 applications were made June 23, 2022:

- The Bronco Space Club at Cal Poly Pomona
- Falcon ExoDynamics Inc
- University of South Florida Institute of Applied Engineering Inc

Planning for lunar surface test field underway – flight tests in Spring 2023