Success of Undergraduate Participants in NASA's Artemis Student Challenge <u>Micro-g Neutral Buoyancy</u> <u>Experiment Design Teams (Micro-g NExT)</u>

This challenge offers students an experience to develop real solutions, for real NASA missions, in real time test operations in the Neutral Buoyancy Laboratory (NBL) and gain real engineering design experience!







ARTEMIS STUDENT CHALLENGES



Join an Artemis Student Challenge!



Human Exploration Rover Challenge

Create a human-powered vehicle designed to traverse a simulated surface and perform mission tasks of another world

Micro-g NExT Design, build and test a tool or device to address a current space exploration challenge

Spacesuit User Interface Technologies for Students

Design and create spacesuit information displays within an augmented reality environment

First Nations Launch

Build and launch K-class high-powered rockets

Big Idea Challenge

Design lunar payloads that demonstrate technology systems needed for exploration and science

Student Launch

Design, build and test a high-powered rocket with a scientific payload that supports research for the Space Launch System

Lunabotics

Build a robot to simulate an off-world lunar mining mission







A PEAK INTO THE MICRO-G NEXT CHALLENGE

https://youtu.be/DuRtGUBewK4



Participation from 2015-2021









"...It's a great chance for the students to deal with the multitude of aspects of designing devices and really get their hands-on hardware." -David Coan, EVA Engineering and Operations Specialist

What is Micro-g NExT?

- <u>CHALLENGE</u> Students design, build and test a tool or device that addresses a current, authentic space exploration goal.
- <u>EXPERIENCE</u> This activity includes hands-on engineering design, test operations, and public outreach.
- EXPOSURE Students work with all types of NASA professionals, from education coordinators and engineers, to professional NBL divers. They are exposed to the simulated microgravity environment of NASA's unique testing facilities and more.
- <u>CONNECTS</u> Micro-g NExT provides a unique opportunity to contribute to NASA's mission, and the 2022 challenges focus on aspects of the Artemis program's goal of returning humans to the Moon and prepare for human missions to Mars.



"Micro-g NExT will really push your limits and allow you to grow in your field" - Micro-g NExT Participant





NASA mission-driven challenges

University students design, build, and test unique mission-enabling solutions

Test operations conducted in simulated microgravity environment of NASA unique testing facility – Neutral Buoyancy Laboratory (NBL)

Year-long authentic experience prepares future STEM workforce

The Benefits







Artemis Challenge Series

Challenge 1: Lunar Surface EVA Operations: EVA Sample Size Location Calibration Marker Challenge 2: Lunar Surface EVA Operations: EVA Sample Bag & Dispenser Challenge 3: Lunar Surface EVA Operations: Lunar Reusable Surface Anchoring Device





"Through this experience students were able not only to do great work but gain the confidence in themselves to do that work." - *Micro-g NExT Faculty Advisor*







FROM MICRO-G NEXT CHALLENGE TO THE INTERNATIONAL SPACE STATION

https://youtu.be/I8Y3aHM1mc8



Student Mission Contributions

+2







NEEMO: Astronaut Reid Wiseman used the core sample device designed and built by Los Medanos College.



Today's spacewalkers are using a tool to cut and retain zip ties that was developed by STEM students. Learn more about the zip-tie cutter here: go.nasa.gov/204M31e

Follow



Zip-tie Cutter Tool Clip from NASA TV





Spacewalk preparation: Astronaut Chris Cassidy tested the EVA Zip Tie Cutter designed and built by Lone Star College, Cy Fair. It easily cut and retained zip ties during a simulated AMS repair run.

"This tool is money."-Astronaut Chris Cassidy

ISS EVA: Astronaut Luca Parmitano used the EVA zip tie cutter during the repair of the Alpha Magnetic Spectrometer outside the International Space Station.





Astronaut NBL training: **Astronauts Shane** Kimbrough and Jeanette Epps tested the Sharp Edge **Detection and Removal** Device designed and built by Clemson University.

"It did work. That's the cool thing. I can detect easily that there's a burr." – Astronaut Jeanette Epps





Each prospective team member must meet all the following requirements:

•Enrolled as an undergraduate student enrolled in an accredited U.S. institution of higher learning (junior college, community college, college, university) at the time the proposal is submitted. •16 or older before arrival in Houston.

•U.S. citizen or legal permanent resident.

Additionally, each team must meet all the following requirements:

Supervising faculty member from an accredited U.S. institution of higher learning.
All primary team members must attend the orientation, preliminary design review, test readiness review, and prototype test week events.

Primary team members may only participate with one team in the same challenge.Teams may not have more than two former Micro-g NExT team members per team.

Other Considerations:

•Teams can consist of multiple institutions collaborating in the same challenge.

•Team make-up should include an interdisciplinary aspect of any academic study area.

•Teams may receive support from university students of any level, faculty members, professional consultants etc., however only primary team members may participant in test week activities at NASA's Johnson Space Center.

If prototype testing is onsite only three primary team members will be allowed to travel to Johnson.One proposal per team.

Microgravity University (nasa.gov)







Current NASA Employees speak on the impact of Artemis Student Challenges

https://youtu.be/VP5RgtCPLss



NExT Steps



- Info Sessions
- Dates and Times
- September 8, 2021 6 7 p.m. CDT
- September 16, 2021 6 7 p.m. CDT
- September 21, 2021 6 7 p.m. CDT
- October 8, 2021 6 7 p.m. CDT

- Proposal Submission
- Due October 28th
- 1. Technical Section
 - a. Abstract
 - b. Design Description
 - c. Operations Plan
 - d. Safety
 - e. Technical References
- 2. Outreach
- 3. Administrative Section
 - a. Mentor Request
 - b. Institutional Letter of Endorsement
 - c. Statement of Supervising Faculty
 - d. Statement of Rights of Use
 - e. Funding and Budget Statement
 - f. Parental Consent Forms

- Prototype Test Weeks
- Dates and Times
- Test Readiness Reviews May 30 June 3
- Prototype Testing Event June 5 June 11



QUESTION and ANSWER



Join an Artemis Student Challenge!









2021 Micro-g NExT Prototype Testing Engagement Events



EVENTS: Welcome Kick-Off, Live NBL Tour, Micro-g NExT Exploration Panel, Virtual Poster Sessions



Welcome and Kick-Off with Ken Bowersox, Deputy Associate Administrator for HEO and Former Astronaut



Live NBL Tour with NBL Engineer James Shaw





Micro-g NExT Exploration Panel about Artemis and the ISS











2021 Micro-g NExT Prototype Testing Event Summary





15 undergraduate teams directed lunar EVA simulations in the NBL <u>from remote</u> <u>locations across the nation</u>. This was the <u>second operation of this kind</u> in the NBL! Lunar EVA Prototype Testing