

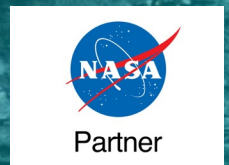


NASA STEM Pathway Activities –  
Consortium for Education

# PROGRESS REPORT

JUNE 1, 2021 – MAY 31, 2022

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Cooperative Agreement 80NSSC17M0021



# RESILIENCE & INGENUITY

nasaostem.okstate.edu

During Year 5 (2021-2022), the NASA STEM Pathway Activities – Consortium for Education (NSPACE) team continued to adapt hybrid models of work, professional learning, and activity delivery before the opportunity to return to on-site events for the first time since the COVID-19 global pandemic. This year has brought new opportunities, capabilities, and team members while we have continued to serve and broaden Artemis Generation participation in NASA STEM engagement activities.

As the team transitioned from fully remote to a hybrid work structure, we emphasized resilience, adaptability, ingenuity, and collaboration with colleagues and mirrored these skills with activity participants. In Spring 2022, the HISD activity team started working with teachers on school campuses again, NASA SUITS wrapped up its first onsite test week in three

years, and NCAS held three on-site activities at NASA centers Summer 2022.

Each activity within the NSPACE portfolio has evolved throughout the year. Next Gen STEM piloted a new activity, NASA SPARX. The full NSPACE team helped develop and implement the first two SPARX sessions. NCAS is innovating to best suit the needs of community college students. We designed and developed the *NASA Career Simulation*, expanding our NCAS On Campus activity to additional sites. We have piloted Mursion, a virtual reality simulation experience, and telepresence robots with one activity, hoping to expand to additional activities. Internally, our administrative team continued to lead professional development through the *NSPACE Summit: Choose Your Own Professional Development Adventure* online community of practice, focusing on creativity,

innovation, and communication. We also welcomed six new team members to assist with MIRO, NASA SPARX, Space Grant, and NCAS.

In this report please enjoy the amazing work the NSPACE team accomplished with our partners: the 13-campus Texas A&M University system, 4-H, the Center for Sovereign Nations, Langston University, Northern Oklahoma College, and Technology for Learning Consortium.



**Dr. Stansberry**  
Professor, Learning, Design, and Technology  
PI, NASA STEM Pathway Activities – Consortium for Education (NSPACE)  
Founder, Emerging Technologies and Creativity Research Lab



## NASA'S OFFICE OF STEM ENGAGEMENT Focus Areas

**Create unique opportunities** for students to contribute to NASA's work.

**Build a diverse future STEM workforce** by engaging students in authentic learning experiences.

**Strengthen public understanding** by enabling powerful connections to NASA's mission and work.



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NSPACE activities fall under one of two categories — **STEM Collaborations**: Activities in collaboration with partners, including school districts, State of Texas, and Houston Livestock Show & Rodeo; or **STEM Operations**: Activities funded through NASA Headquarters by Minority University Research and Education Projects (MUREP), Next Gen STEM (NGS) and the National Space Grant College and Fellowship Project (Space Grant).

### STEM Collaborations

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# NSPACE

At a Glance

# Virtual CONNECTIONS

**68,000+**  
Participants reached from  
50 states and territories.

**12**  
NASA Office of STEM  
Engagement activities  
implemented.

**2**

Team awards from  
NASA:

**1** JSC Director's Innovation  
Group Achievement Award  
for **ERO Champions**.

**2** Space Flight Awareness  
Team Award for **Next Gen  
STEM Commercial Crew**.



**5**

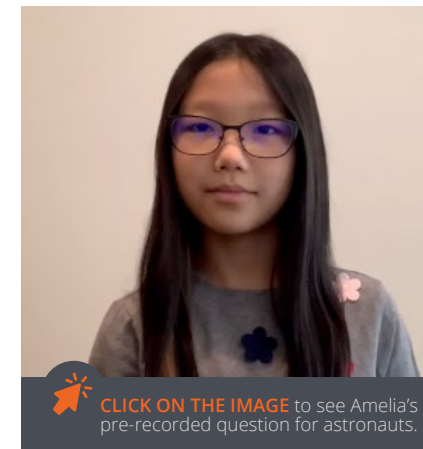
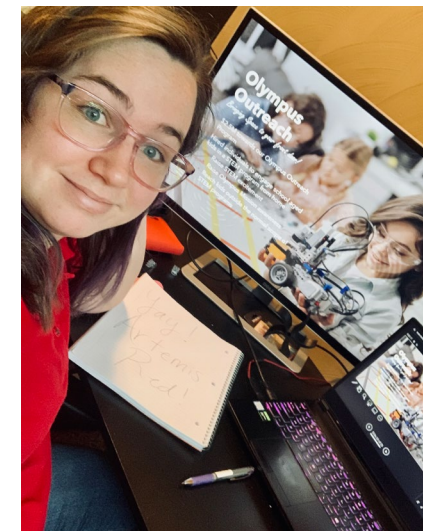
Team members recently  
received **master's and  
doctorate degrees**.

**6**

NASA centers host  
NSPACE employees  
at them (**Armstrong,  
HQ, Johnson, Langley,  
Marshall, and Stennis**).

**6**

New team  
members, including  
**2 new positions**.



CLICK ON THE IMAGE to see Amelia's pre-recorded question for astronauts.

For the majority of year five, the NSPACE team worked remotely with their activities' participants. Even now as we transition to again providing on-site experiences, our team is combining what we built and accomplished over the past two years to create hybrid programs that extend our reach.

Prior to the pandemic NCAS consisted of a five-week online course and a week-long center onsite. During the pandemic the NCAS team pivoted to virtual onsite experiences. NCAS designed and developed one experience implemented by personnel at the NASA centers (NCAS Virtual) and one led by NASA-trained community college faculty at the NCAS partner campuses (NASA Career Simulation). Each activity focuses on Artemis mission to return to the moon and is comprised of the same elements of the successful physical on-sites.

The summer 2021 HISD teacher externship shifted to a virtual experience to allow teacher immersion in NASA work through virtual tours, trainings, and workshops. NASA instructional coaches provided virtual support including lesson planning, in-class modeling, and unique access to NASA subject matter experts joining class online.

In-flight Education Downlinks continued virtual events with pre-recorded questions from students allowing access for schools who previously lacked the facilities or technology access required to host a live downlink.

**3**

New tools were  
utilized by NSPACE  
to enhance virtual  
connections.

**1** **Communique**

A NASA virtual event  
platform, **Communique**,  
to create innovative and  
engaging culminating  
events.

**2** **STEM Gateway**

NASA's new registration  
management system,  
centralized all activities'  
information and application  
processes.

**3** **Mursion**

The NCAS team developed  
two Mursion scenarios  
where students practice  
handling difficult situations  
in simulated interactions.

"I love being able to encourage community college students to reach for their dreams of working at NASA or in the STEM industry. Many of these students are capable but lack role models or the self-confidence to apply for a NASA internship or continue their STEM education. Watching students develop greater self-confidence and grow to believe in themselves is rewarding beyond my expectations of working on a NASA activity."

Lisa Mitchell, NCAS Team Member



# High School Aerospace Scholars HAS

[nasa.gov/has](https://nasa.gov/has)



## NASA Strategy for STEM Engagement Alignment

The HAS online course connects over 800 students representing all demographic areas of Texas with content from all NASA mission directorates. Over 500 students in 54 diverse teams are invited to the summer virtual experience. Students engage with NASA subject matter experts during both the online course and summer experience. The summer virtual experience connects students to NASA internships, NASA robotics and engineering experts, and college programs promoting STEM careers.

Texas High School Aerospace Scholars is an authentic STEM learning experience for Texas high school juniors to engage with NASA's missions and become the next generation of explorers. HAS is a year-long commitment for participants, starting in the fall with a four-month online learning experience related to space exploration, Earth science, technology, and aeronautics. Students passing the online learning experience receive an invitation to Moonshot, a five-day gamified virtual summer experience mentored by NASA scientists and engineers. During the summer experience, students work in teams to plan an Artemis-themed mission to the Moon and Mars.

## Forward to the Moon

HAS will connect more students to NASA scientists and engineers who are directly involved with Artemis missions during the online course and Moonshot experience.

Moonshot includes nine different missions with specific design challenges based on parts of NASA's Artemis planned sequential exploration of and sustainability on the Moon in preparation for a Mars mission.



**844** Students participated in the HAS online course.



**26%**  
From Title 1 schools.



**14%**  
From rural schools.



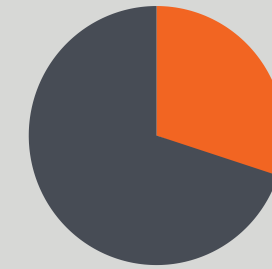
**60%**  
Invited to HAS Moonshot virtual experience.



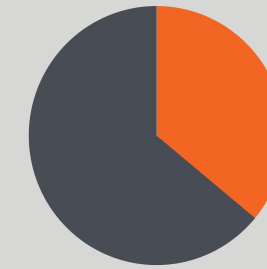
**40%**  
Female participants.



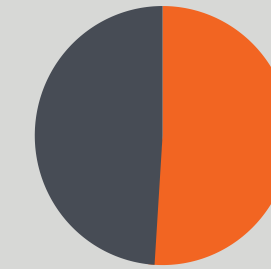
**31%**  
Hispanic/Latino(a) participants.



**30%**  
Of Texas rural high schools have participated in HAS since 2017.



**36%**  
Of Texas Title 1 high schools have participated in HAS since 2017.



**51%**  
Of Texas high schools from Houston Livestock Show & Rodeo counties have participated in HAS since 2017.

An article highlighting the innovative design of HAS' virtual gamified experience, Moonshot, was published in the *International Journal of Designs for Learning*, Volume 12, Issue 1.



CLICK ON THE IMAGE to read *View of Moonshot: Redesigning NASA's High School Aerospace Scholars Experience at Johnson Space Center for Online Delivery* (iu.edu)

## Success Story: IKER AGUIRRE



CLICK ON THE IMAGE to watch a video message from Iker Aguirre.

In the Summer of 2021, former HAS student Iker Aguirre served as an intern at NASA's Johnson Space Center in Houston, where he applied his experience from the HAS activities to the work he completed. His interest in NASA took on new meaning based on him seeing firsthand how the goals of the agency help positively impact humanity. Iker is currently a student at The University of Michigan, majoring in aerospace engineering and designing a nitrogen evaporator for the university's rocket club. Iker reflected on his HAS experience, "The knowledge and experience I learned through HAS, and my subsequent internship at the Johnson Space Center, have been invaluable assets for me here at U of M."



# Houston Independent School District Aerospace Academies

# HISD



## NASA Strategy for STEM Engagement Alignment

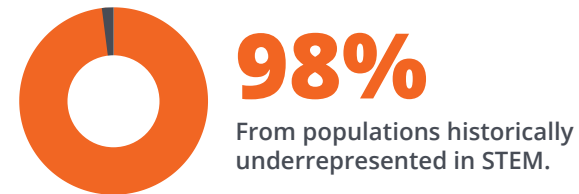
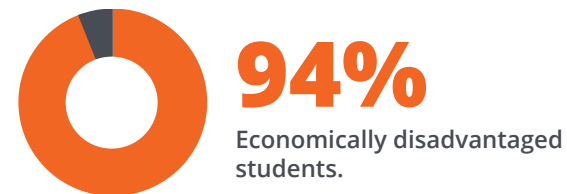
NASA instructional coaches help teachers create structured and widely-accessible, experiential learning opportunities for students on campus to engage with NASA's work in exploration and discovery.

NASA instructional coaches develop and deploy a continuum of STEM experiences partnering with teachers to facilitate authentic learning opportunities to cultivate student interest in pursuing STEM careers and foster interest in aerospace fields. Students at Milby High School, Washington High School, and Deady Middle School participate in the Growing Beyond Earth project, which helps NASA scientists study plant growth on Earth and in space.

The HISD schools served through this partnership are primarily from underrepresented and underserved communities.



The Houston Independent School District Aerospace Academies activity supports five schools in HISD which received grants from the U.S. Department of Education to become STEM magnet schools involving programs focusing on aerospace engineering. The HISD Aerospace Academies activity provides content, resources, and instructional coaching to aid educators in training the Artemis Generation of space explorers.



**91**

Teachers received direct support using the Instructional Coaching model including lesson planning, in-class modeling, and access to NASA subject matter expert.



**96**

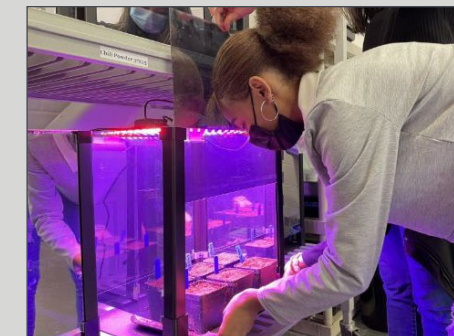
NASA mission-focused 5E lessons developed and integrated into classrooms ranging from K-Physics.



**4,000+**

Students served at five campuses in the 7th largest school district in the nation.

Middle and high school students participated in **monthly lunchtime STEM challenges.**



## Forward to the Moon

Hosting the third HISD teacher externship this summer at NASA's Johnson Space Center in Houston. Educators will participate in tours, hands on STEM activities, and professional development.

HISD Aerospace Academy students will participate in a weeklong STEM summer bridge. Students in Kindergarten through grade 12 engage in fun STEM activities integrating NASA curriculum.

## Success Story: FAMILY AFFAIR

Participating in NASA programs has become a family affair at Deady Aerospace Academy. During a coffee with the principal, parents were engaged in some of the NASA lessons their students are experiencing on campus. Parents of seventh grade student Maritza Alaniz shared their oldest son was also exposed to NASA robotics during his time at Deady. He was invited to participate in a co-op at NASA working on computer programming for the space shuttle during his high school years.

Eighth grader Jazlyn Ramirez is also continuing a NASA legacy. Her older brother Julian participated in the NASA WEAR Challenge and was invited to the 2020 Astronaut Candidate Graduation. Julian is featured in Astronaut Jonny Kim's Artemis team member video. Julian is continuing his aerospace studies at Milby High School, one of the five HISD Aerospace Academies.





# Micro-g Neutral Buoyancy Experiment Design Teams

# Micro-g NExT

[stem.nasa.gov/artemis](https://stem.nasa.gov/artemis)



## NASA Strategy for STEM Engagement Alignment

Now in its eighth year, Micro-g NExT is one of NASA's Artemis Student Challenges offering a unique engineering design opportunity for a diverse set of undergraduate students from junior colleges, community colleges, colleges, and universities across the nation. Micro-g NExT challenges students to design innovative solutions to real-world problems as they work alongside a NASA mentor to design mission ready hardware that meets a specific relevant mission need. For 2022, Micro-g NExT offers three Artemis-focused concept design challenges, two created by the Extravehicular Activity tools office out of NASA's Johnson Space Center in Houston and one developed by NASA's Jet Propulsion Laboratory in Southern California.

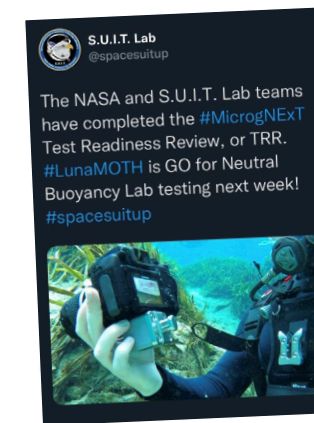
Micro-g NExT is an authentic, mission-driven NASA STEM experience. This collaboration between NASA's Exploration Systems Development Mission Directorate and Office of STEM Engagement integrates undergraduate students into the technology and hardware development paths of NASA missions in support of human space exploration. Undergraduate students gain an overall experience including hands-on engineering design, test operations, public outreach, and an opportunity to develop innovative technologies contributing to the NASA's Artemis missions. The end-to-end real-world engineering design process encompassed by the Micro-g NExT experience prepares the Artemis Generation for the return to the Moon and a future career in the STEM workforce.

**34%**  
Of participants are female (a 6% increase from last year).

**54%**  
Of participants represented underrepresented learners.

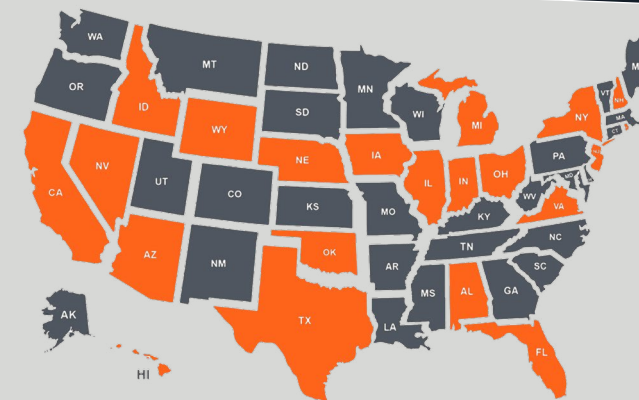


Current Micro-g NExT participants shared their advice for future Micro-g NExT participants during a virtual roundtable discussion.



**21**  
States represented by participating colleges.

**17%**  
Increase in state representation compared to last year.

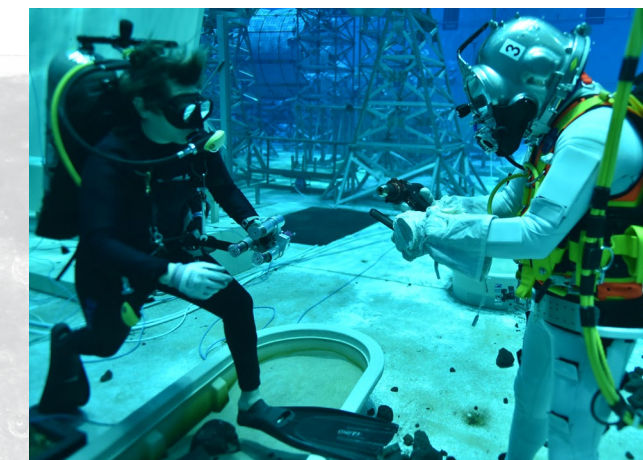


## Forward to the Moon

Nineteen student teams will travel to Houston to test their prototypes in NASA's Neutral Buoyancy Lab and receive feedback from NASA engineers and NBL test divers.

Micro-g NExT will host a "Where are they now?" exploration panel in June featuring students from the 2018 Lone Star College-CyFair team who designed the zip-tie cutter used on a spacewalk during repairs of the Alpha Magnetic Spectrometer on the International Space Station.

Continuing to use all lunar EVA based challenges as Micro-g NExT students design and build hardware which will potentially be used on the Artemis III mission.



## Success Story: LONE STAR COLLEGE-CYFAIR



Lone Star College-CyFair's CRATER team received a U.S. Patent (US Patent No US 11,219,995 B1) for the dust-tolerant pivot device they designed in the 2020 Micro-g NExT Challenge. They developed the design with support of Texas Space Grant Consortia as they concurrently participated in the Texas Space Grant Consortium Design Challenge during their Micro-g NExT experience. The students are listed as inventors on what is the first patent at Lone Star College System based on student work.



## Success Story: KELLY DEREES

Former participant Kelly DeRees is now employed as a NASA engineer and the lead subject matter expert for two of our three challenges.



# NASA Spacesuit User Interface Technologies for Students

# NASA SUITS

[stem.nasa.gov/artemis](https://stem.nasa.gov/artemis)



## NASA Strategy for STEM Engagement Alignment

NASA SUITS crowd sources augmented reality display software solutions by engaging students in authentic learning experiences as teams solve challenges put forth by NASA engineers designing the next generation spacesuit. Students participating in NASA SUITS see their design work implemented in the same planetary analog environments NASA uses to test all aspects of future crewed surface operations. SUITS participants use the same four Ts as the EVA office: tools, techniques, technologies, and training. SUITS includes an outreach component to the challenge, attracting non-STEM majors to contribute to NASA's missions.

The NASA Spacesuit User Interface Technologies for Students design challenge engages undergraduate and graduate student teams to design and create spacesuit information displays in augmented reality environments. The NASA SUITS challenge requirements support NASA's Artemis missions through research and development of human autonomy for future spacewalks on the Moon and Mars. Teams receive invitations to test and evaluate prototypes with engineers while using mission-unique facilities and assets at NASA's Johnson Space Center in Houston.

**10%**

Increase in number of teams testing onsite.

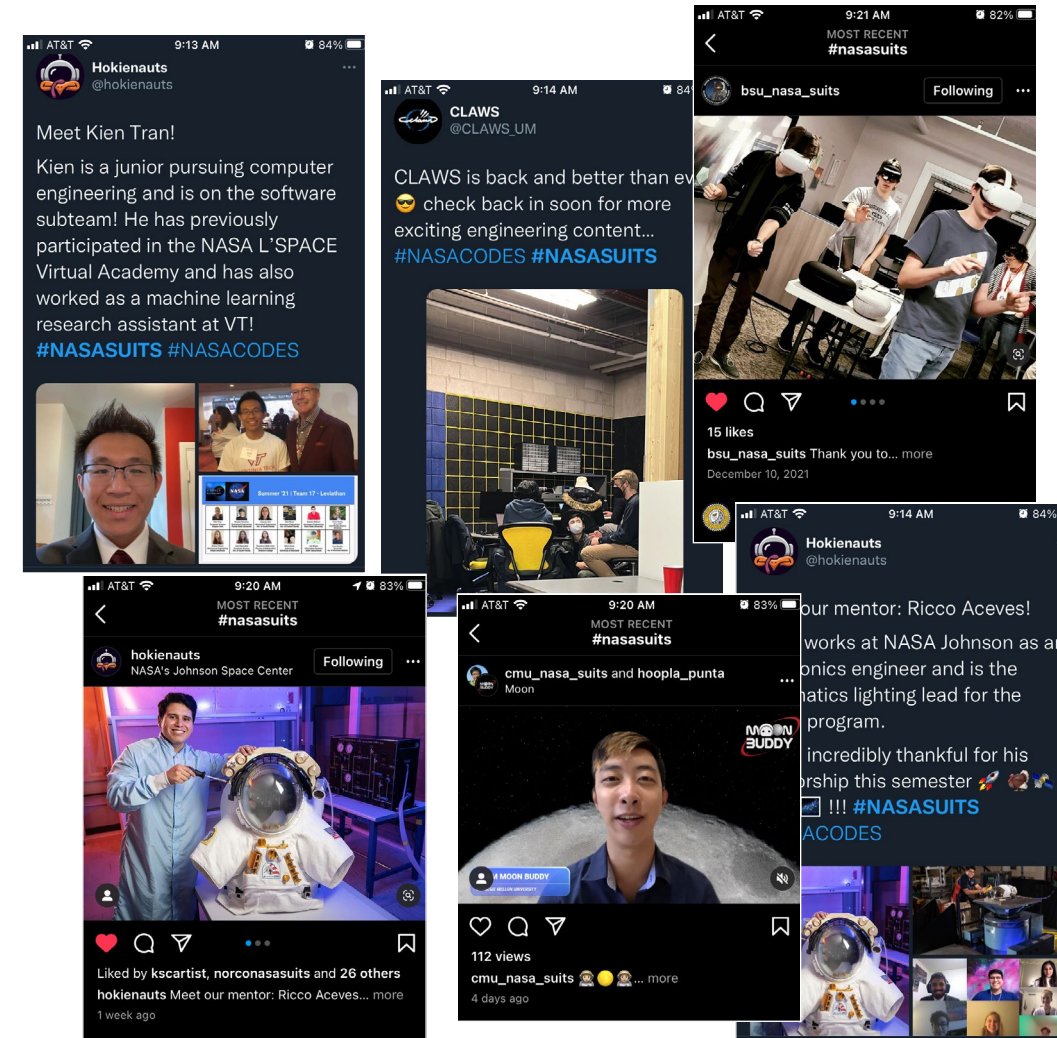
**60%**

Increase in the average number of students per each team.

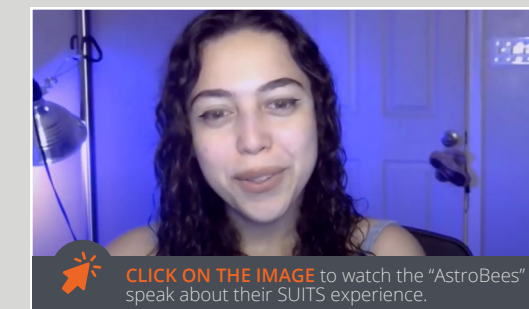
## Forward to the Moon

Students will design outside-the-box options for next generation lunar navigation with requirements developed by NASA engineers.

NASA SUITS will test student designs in the same lunar analog environments engineers at NASA's Johnson Space Center use.



The University of Baltimore NASA SUITS team, the "AstroBees", was invited to share their research and experiences during a special video event hosted by the Baltimore Museum of Industry.



CLICK ON THE IMAGE to watch the "AstroBees" speak about their SUITS experience.

## Success Story: MITHIL ADSUL

Mithil Adsul is a second-year participant in NASA SUITS challenge through his team at Virginia Tech. He was born in Nashik, India, immigrated to the U.S., and grew up in Manassas, Virginia which allowed for repeated visits to the nearby Smithsonian Air and Space Museum inspiring him to pursue the dream of working at NASA. He is studying electrical engineering with a focus on space systems and is the leader of his NASA SUITS team. Adsul shared, "Participating in SUITS fits my career goals and interests as it has given me the opportunity to lead, manage, and work with a multidisciplinary team of students in a space mission-type project. It has also enabled me to learn from and speak with NASA professionals, further fueling my dream."



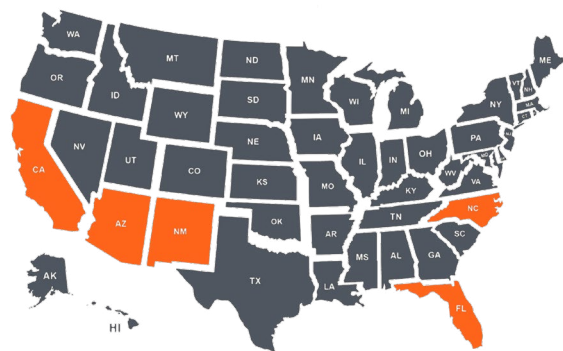
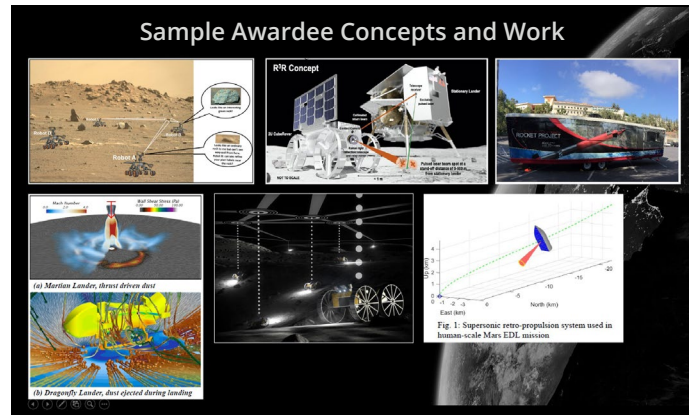
Adsul completed several industry internships including Final Frontier Design working on their EVA 1.0 suit and with Made in Space. Adsul said, "My participation in SUITS has been the topic of conversation for internship interviews where I was able to emphasize the teamwork, time management, and engineering skills I developed and applied through the challenge."



# Minority University Research and Education Project

# MUREP

[nasa.gov/stem/murep](https://nasa.gov/stem/murep)



Minority University Research and Education Project (MUREP) offers competitive grants/cooperative agreements to Minority Serving Institutions (MSIs) to:

- Recruit and retain underrepresented and underserved students into STEM fields, including women and girls, and persons with disabilities;
- Provide specific STEM knowledge, skills and abilities to underrepresented and underserved students through NASA unique research, internships, scholarships, and fellowships at NASA field centers;
- Assist faculty and students in research pertinent to NASA missions; and
- Provide opportunities for minority institutions to improve the quality of their faculty preparation programs and thereby improve the quality and diversity of future STEM leaders.

The primary purpose of M-STAR (MUREP Space Technology Artemis Research) Grant is to strengthen and develop the research capacity and infrastructure of U.S. MSIs in areas of strategic importance and value to NASA's mission and national priorities. MSIs in areas of strategic importance and value to NASA's mission and national priorities. The main goals are to promote literacy in STEM and to enhance the capability of institutions to participate in NASA's Space Technology Mission Directorate opportunities.

MSI Engagement is tasked with creating relationships with MSIs and underrepresented students to assist them in participating in NASA MUREP activities.

# Office of STEM Engagement

# OSTEM

[stem.nasa.gov](https://stem.nasa.gov)

7

Enterprise-level workshops facilitated.

200

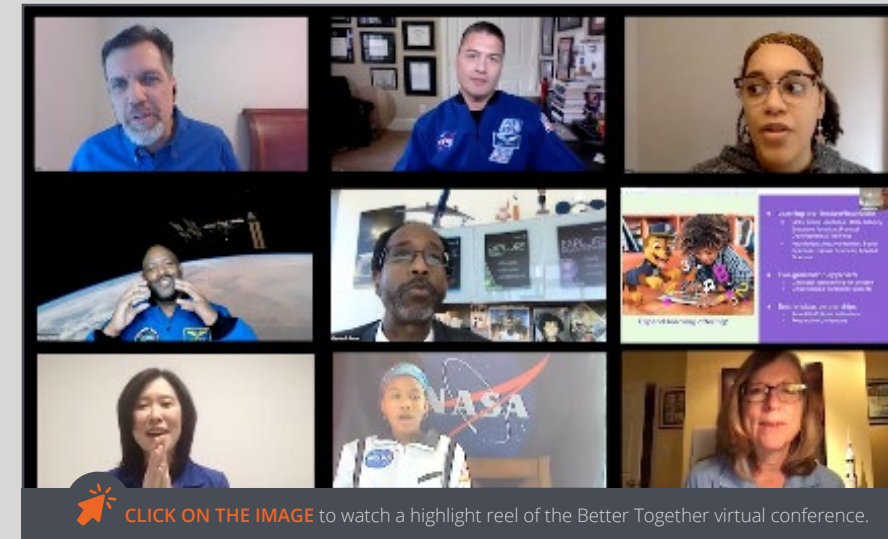
NASA employees joined "We Are NASA STEM" team within minutes of launch.

486

Booth visits during OSTEM's first virtual Technical Interchange Meeting.

6

Consultant cohorts formed of Pathways and OSTEM internship personnel spanning NASA HQ and all 10 centers.



CLICK ON THE IMAGE to watch a highlight reel of the Better Together virtual conference.

In 2021, the **NASA STEM Better Together conference series** brought together the Office of STEM Engagement's partners to focus on student, stakeholder, and mission success.

Participants included:

- 121 EPSCoR Researchers
- 14 MIRO Researchers
- 17 Non-Researcher/Unknown
- 16 NASA Planning Team Members
- 40 NASA Researchers

In 2022, we continued our support of the Better Together conference through planning, lessons learned, and preparing booths, posters, and discussion groups.



# MUREP Institutional Research Opportunity

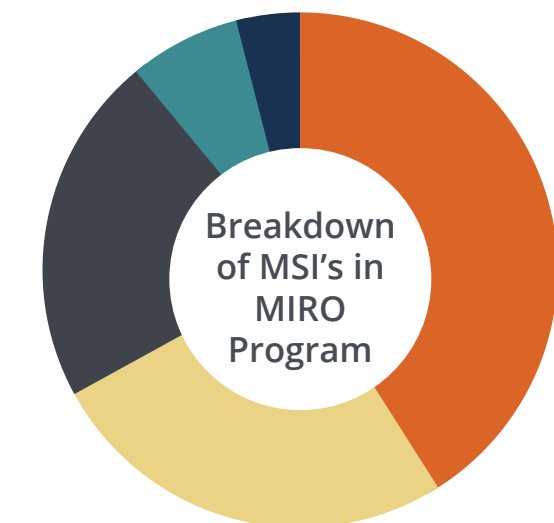
# MIRO

[www.nasa.gov/stem/murep/miro](http://www.nasa.gov/stem/murep/miro)



### NASA Strategy for STEM Engagement Alignment

The MIRO activity continues to demonstrate progress in building research capacity at minority serving institutions. NASA STEM-related academics and research promoted through the MIRO-funded projects have allowed the awardees to establish viable partnerships, conduct research in alignment with NASA priorities, and offer experiential opportunities for diverse student groups.



MUREP Institutional Research Opportunity was established to strengthen and develop the research capacity and infrastructure of Minority Serving Institutions (MSIs) in areas of strategic importance and value to NASA's mission and national priorities. Overall, MIRO awards aim to promote STEM literacy and to enhance and sustain the capability of institutions to perform NASA-related research and education, which directly supports NASA's four mission directorates—Aeronautics Research, Human Exploration and Space Operations, Science and Space Technology. MIRO awardees supported NASA's Artemis program by focusing on strategic capabilities in propulsion, robotic landers, lunar surface operations, small spacecraft technologies, crew exploration and rescue vehicles, space suit enhancement, life support technologies, and battery development to enable safe high density energy storage.

**41%** Hispanic Serving Institutions (HSI)

**26%** Historically Black Colleges and Universities (HBCU)

**22%** Asian American and Native American Pacific Islander (AANAPISI)

**7%** Tribal Colleges and Universities (TCU)

**4%** Alaska Native and Native Hawaiian (ANNH)



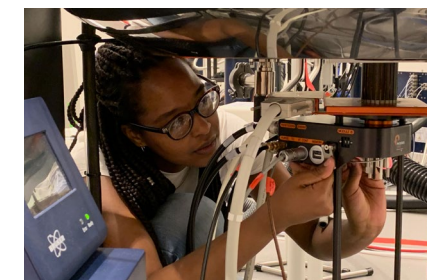
**8,703**

Student participants  
(a **12% increase** from last year).



**328**

Activities this year  
(a **30% increase** from last year).



**66**

NASA internships across  
**9 centers** funded by MIRO awardees.

**78%**

Of MIRO student awards granted to underrepresented students based on gender, disability status, race and/or ethnicity.

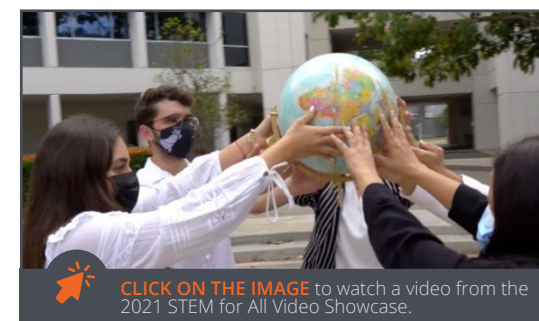


**41%**

Of MIRO student awards received by female students.



Universities shift courses, workshops, training to virtual environment.



[CLICK ON THE IMAGE](#) to watch a video from the 2021 STEM for All Video Showcase.



**124** new proposals received funding.

### Success Story: KE'LA KIMBLE



[CLICK ON THE IMAGE](#) to learn more about how MIRO programs empower student success.

“My colleagues and I were doing top tier research almost solely on our own. This made successful experiments much more fulfilling and gave us a chance to grow through the obstacles and failures. The support I received from the MIRO program has indeed set me up for a life of fulfillment in STEM.”

Ke'La Kimble, former MIRO program student at Xavier University of Louisiana



# MUREP Innovation and Tech Transfer Idea Competition

# MITTIC

<http://go.nasa.gov/NASAMITTIC>



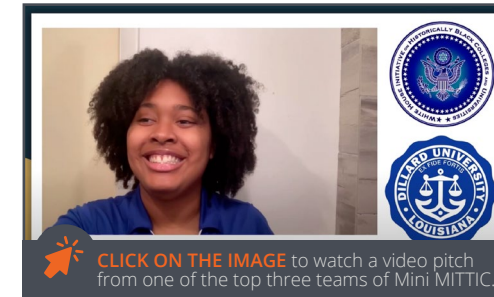
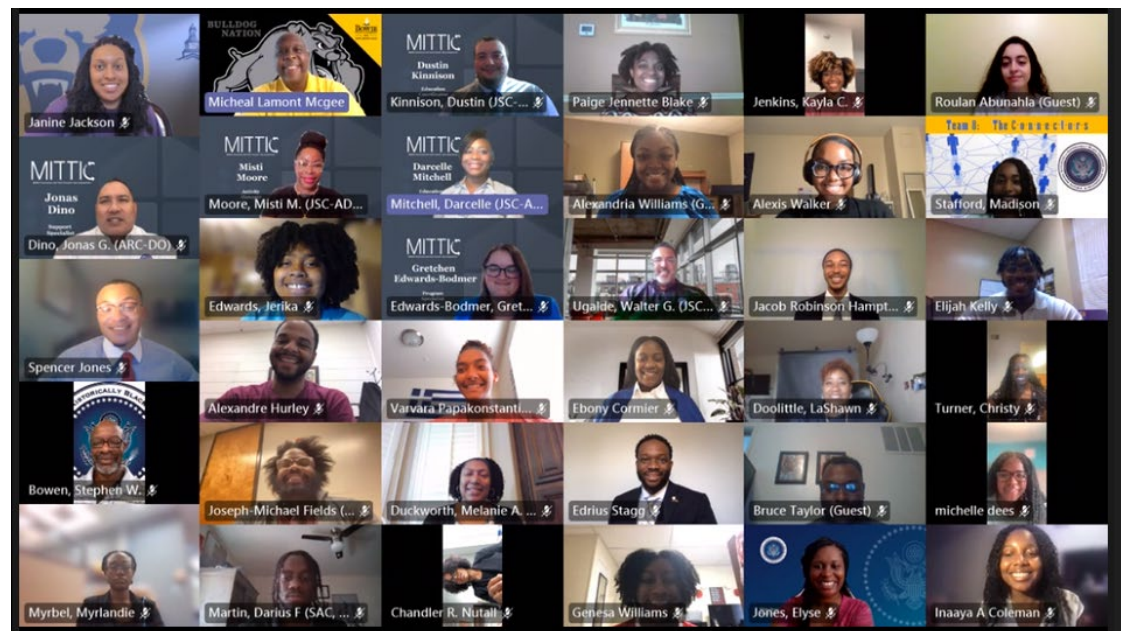
## NASA Strategy for STEM Engagement Alignment

MITTIC increases the diversity of the NASA pipeline by engaging specifically with MSIs to expose them to NASA missions, technology, and opportunities. Students, as well as institution representatives, are presented with unique opportunities to engage with NASA subject matter experts within the fields of STEM and business to learn about NASA's mission and develop their entrepreneurial skills as they further NASA's reach and the Artemis Generation.

To broaden participation and allow more room for a diverse group of students to participate, MITTIC removed the requirement for a team member to complete L'SPACE.

MITTIC provides an engaging virtual experience through live conversations with subject matter experts and a unique experience through the Space Tank competition. Teams are also able to attend a multitude of tours ranging from recorded tours to live virtual tours with NASA and industry subject matter experts.

Minority University Research & Education Program (MUREP) Innovation & Technology Transfer Idea Competition is a virtual NASA intellectual property spinoff challenge to develop new ideas from within the Artemis Generation for commercialization and entrepreneurship through the delivery of a concept paper and a "Space Tank" lightning pitch competition for student teams enrolled at Minority Serving Institutions (MSIs). The winning team presents their concept to NASA and various tech companies in Silicon Valley while also qualifying for NASA internships and earning funds up to \$15,000 for their institution.



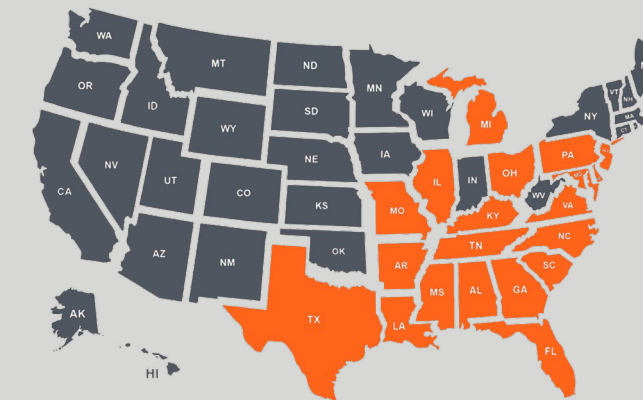
Mini MITTIC with the White House Initiative on Historically Black Colleges and Universities' Scholar Recognition Program represented 54 HBCUs from across the nation.



Mini-MITTIC HBCU Scholars

**21**  
HBCU locations and scholar home states.

**23%**  
Increase in letters of intent from 2020.



## Forward to the Moon

MITTIC looks forward to the iteration of Mini MITTIC 2022 as the concluding event will include a subject matter expert session as part of the Master Class professional development sessions.

The NASA Intellectual property which fuels Artemis to the Moon is being used by MITTIC participants to build a brighter future on Earth.

In an effort to broaden participation and eliminate barriers, at least one team member receiving a L'SPACE certification is now an optional prerequisite rather than a requirement for MITTIC teams.



## Success Story: EL CAMINO COLLEGE



CLICK ON THE IMAGE to learn more about the team of students from El Camino College.

At the beginning of 2021, a group of six undergraduate engineering students from El Camino College received a \$5,000 grant for their NASA-tech-based startup from the MUREP Innovation & Tech Transfer Idea Competition (MITTIC). Following their success with the MITTIC challenge, the students were selected to participate in a pilot accelerator to mature their idea and develop business skills to balance their STEM experience. "As a group, we didn't have a lot of business experience. The coaching we received helped us understand the mechanics of entrepreneurship and taught us how to structure our approach to prioritize creating value for our customers," said Moises Santander.



# NASA Community College Aerospace Scholars NCAS

[go.nasa.gov/ncas](https://go.nasa.gov/ncas)



## NASA Strategy for STEM Engagement Alignment

NCAS funded 15.5 NASA internships in summer and fall of 2021 and plans to fund an additional 10 in the summer of 2022 to NCAS alumni. Since 2014, informal tracking shows nearly 250 internships awarded to NCAS alumni. Through internships, NCAS alumni contribute to NASA's missions and programs.

NCAS helps build a diverse STEM workforce by engaging with Minority Serving Institutions (MSI) to foster relationships and encourage underrepresented students to pursue a STEM career. Last year 80% of NCAS participants hailed from MSIs.

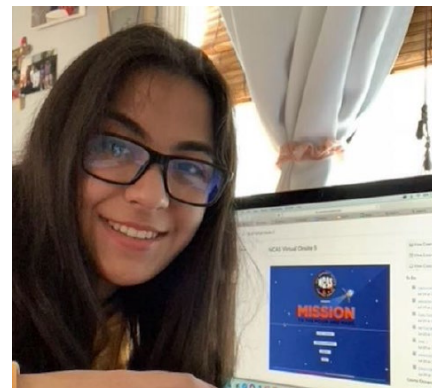
NCAS uses a proven model to inspire students to continue to a four-year institution pursuing a STEM degree.

NASA Community College Aerospace Scholars builds a diverse future STEM workforce by engaging two-year-degree-seeking students in authentic learning experiences. Scholars get a closer look at NASA's unique missions and research and learn how to develop their talents, interests, and passion to become future STEM professionals.



### MISSION 1: DISCOVER

Scholars discover NASA's research and missions through a guided online experience during a five-week self-paced online course where scholars learn about NASA missions and research.



### MISSION 2: ENGAGE

Scholars who successfully complete Mission 1 may receive an invitation to participate in the engineering design experience with a team of like-minded peers.



### MISSION 3: EXPLORE

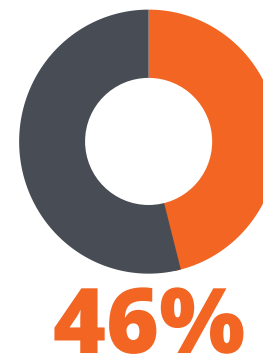
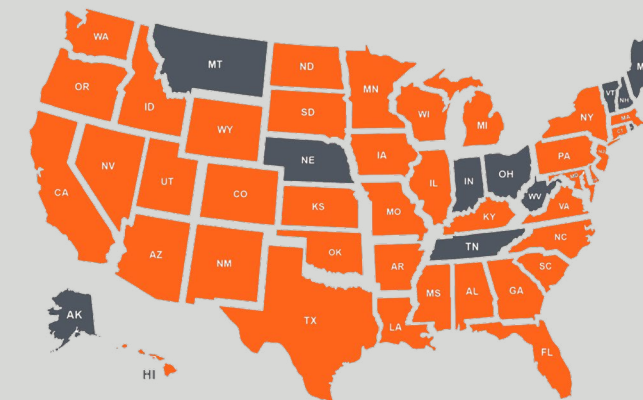
Scholars contribute to NASA's missions by developing possible solutions to current NASA challenges onsite at a NASA center. Scholars engage in authentic job shadowing and gain exposure to university campuses.



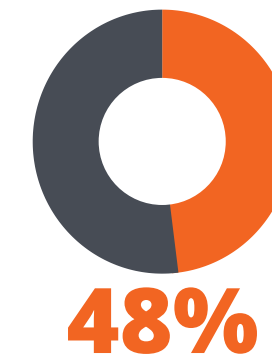
## Mission 1: Discover – NCAS Online

**1,203**  
Students participated.

**252**  
Schools represented from  
38 states and Puerto Rico.



Female representation of students invited to Mission 2: Engage.



Students who identified as an underrepresented minority participated in Mission 2: Engage.

## Success Story: SYDNEY BURKS

Sydney Burks, a sophomore at Hinds Community College and NCAS alumna, was recently honored by the White House Initiative on Historically Black College and Universities (HBCU).



Sydney was one of 86 students selected as a HBCU scholar, where she will serve as an ambassador for her school. Additionally, all the HBCU scholars participated in the Mini Minority University Research and Education Project (MUREP) Innovation Tech Transfer Idea Competition (MITTIC). "MITTIC gives students a glimpse into NASA's Technology Transfer Program and provides them a unique opportunity to explore their entrepreneurial interests using NASA's technology portfolio," stated Torry Johnson, MUREP Project Manager.

After attending NCAS and MITTIC, Sydney said "My participation in both NCAS and Mini-MITTIC have afforded me the opportunities to work with fellow minority students with diverse STEM majors and to see firsthand how these different STEM areas complement each other."



# Next Gen STEM: EARTH

[nasa.gov/stemonstation](https://nasa.gov/stemonstation)



## NASA Strategy for STEM Engagement Alignment

Earth includes a portfolio of activities developed on evidence-based best practices aligned with NASA's Office of STEM Engagement strategic goals. Many of the opportunities, including In-flight Education Downlinks, attract a diverse group of students to STEM by connecting students across the nation to NASA's mission and work aboard the International Space Station. The Student Payload Opportunity with Citizen Science (SPOCS) challenge provided students a robust authentic learning experience in payload development, integration, and flight as each team worked diligently to advance research in the areas of bacteria resistance and sustainability. STEMonstrations videos offer students and educators around the world the opportunity to view popular K-12 STEM topics demonstrated in a microgravity environment, sparking interest in the possibilities of low-Earth orbit.

Representing K-12 education opportunities extending from the International Space Station to climate science, Earth connects students and educators to NASA's Office of STEM Engagement using station and Earth Science resources to inspire, engage, and educate a diverse group of students and educators. Formerly known as STEM on Station, Earth continues to provide a comprehensive website of resources, In-flight Education Downlinks, lessons taught from station, space station payload opportunities, and hands-on STEM activities both in low-Earth orbit and on the ground using high-profile partnerships to amplify NASA's missions and unique assets.



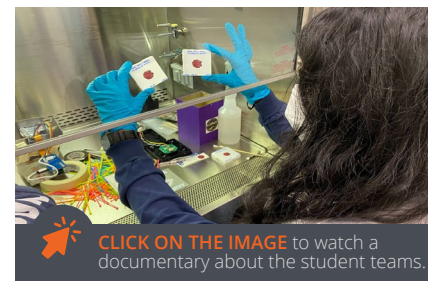
**28**

In-flight Education Downlinks in 18 states (plus District of Columbia, Bulgaria, and the United Kingdom).



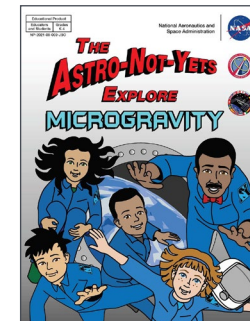
**6**

New STEMonstrations added to the collection bring the total number of STEMonstrations to 21.



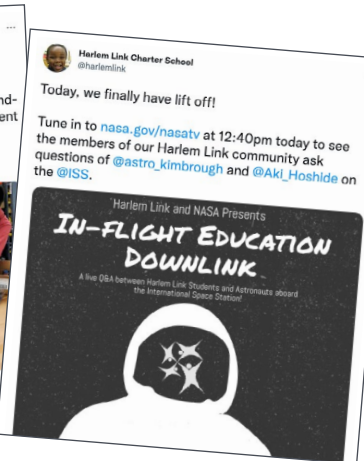
**2**

Student teams launched payloads to the International Space Station through SPOCS.



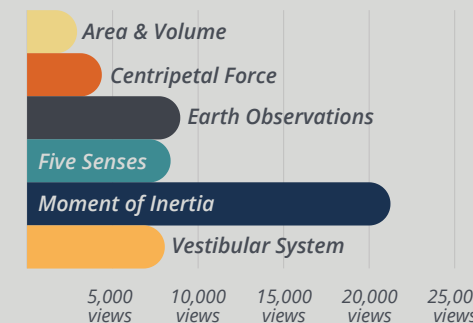
New Astro-Not-Yets storybook titled "The Astro-Not-Yets Explore Microgravity" released to the public.

CLICK ON THE IMAGE to download a PDF of the latest Astro-Not-Yet book.



STEMonstrations video views on YouTube increased by over

**41%**



STEM on Station website views increased by approximately

**500,000**



## Forward to the Moon

The Earth team in collaboration with Microsoft Hacking STEM, Texas Instruments, and the USDA Forest Service is creating activities and resources to celebrate Artemis Moon Trees, a living commemoration of trees grown from seeds flown aboard Apollo 14. The new generation of seeds will fly aboard Artemis I, then be delivered into the hands of students and educators across the country to engage the Artemis Generation in citizen science for the benefit of humanity here on Earth.

Earth is proud to launch the fourth installment in the Astro-Not-Yet series: "Astro-Not-Yets Explore Moon Trees." Mr. Armstrong's class returns to learn the history of Moon Trees, explore ways to measure plant growth, and learn about the vital role trees play in our delicate ecosystems here on Earth.



"This [downlink] was the exact medicine our school needed to help us heal from two years of interruption and chaos from the pandemic. It gave us a true sense of purpose in learning once again.

Our staff and our community all pulled together as one to learn and enjoy the day as astronaut Kayla Barron reached down from the station and touched our lives. We cannot say enough on how great she was in being very personal with our students as she answered their questions.

We look forward to further learning about the station and the Artemis Program as once again our country leads the world in the exploration of space.

The Faculty, Staff, and Administration of North Decatur Elementary School (Greensburg, IN)



# Next Gen STEM: NASA Sparking Participation in Authentic Real-World Experiences

# NASA SPARX



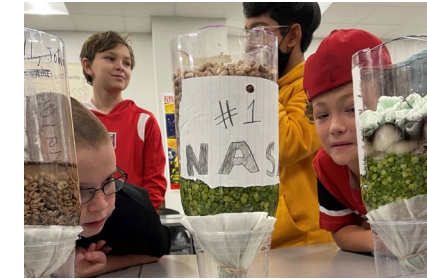
## NASA Strategy for STEM Engagement Alignment

The competition levels of NASA SPARX provide opportunities for student teams from diverse backgrounds to contribute to NASA's work. NASA SPARX engages students in authentic learning experiences, such as engineering design challenges, and connects participants with NASA people through experiences such as the culminating events with subject matter experts. During the Moon Level 2 Astronaut Candidate activity, participants designed and built models of a lunar habitat. In the Earth Level 2 Earth Scientist activity, participants gathered data as part of the Global Learning and Observation to Benefit the Environment (GLOBE) program to support NASA Earth scientists. NASA SPARX uses evidence-based education practices to connect participants to NASA with a traditional education event. During the pilot, NASA partnered with educational organizations to reach underrepresented communities. The partners included Aviation Youth Mentoring Program, Broward Education Foundation, Consumer Energy Education Foundation, Liftoff Alumni Association, Pennsylvania Statewide Afterschool/Youth Development Network, and Rio Grande Valley Science Association.

The NASA Sparking Participation and Real-World Experiences in STEM Challenges and Competitions pilot is an opportunity for pre-college youth and educators to engage with NASA's missions. NASA SPARX uses evidence-based education practices to connect NASA with a traditional education event and broaden student participation, especially in underrepresented communities. Using NASA-based themes and educational resources, participants learn about NASA and STEM while creating projects to showcase their learning. Participants select the level of complexity and rigor they wish to enter based on their capabilities and interests.



**36,000+**  
Student participants.



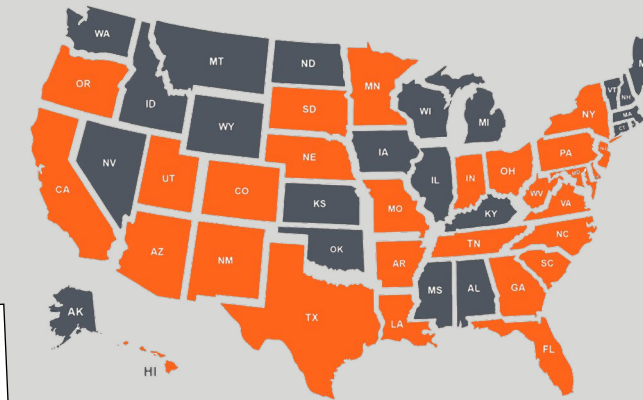
**1,117**  
Formal and informal educator participants.



**49%**  
Of participants were young women.

**29**

States and the District of Columbia were represented.



**66%**  
Of participants are economically disadvantaged.

**70%**  
Of participants identified as Black/African American or Hispanic/LatinX.



NASA SPARX is meeting young people and educators where they are at. This program is a wonderful opportunity for PSAYDN, the other partners, educators, and the young people who will be participating. Just the name NASA inspires folks. NASA SPARX is a wonderful and great opportunity to engage with; this is going to be a lot of fun.

Steven Williams from Pennsylvania Statewide After School Youth Development Network aid



# National Space Grant College and Fellowship Project

# Space Grant

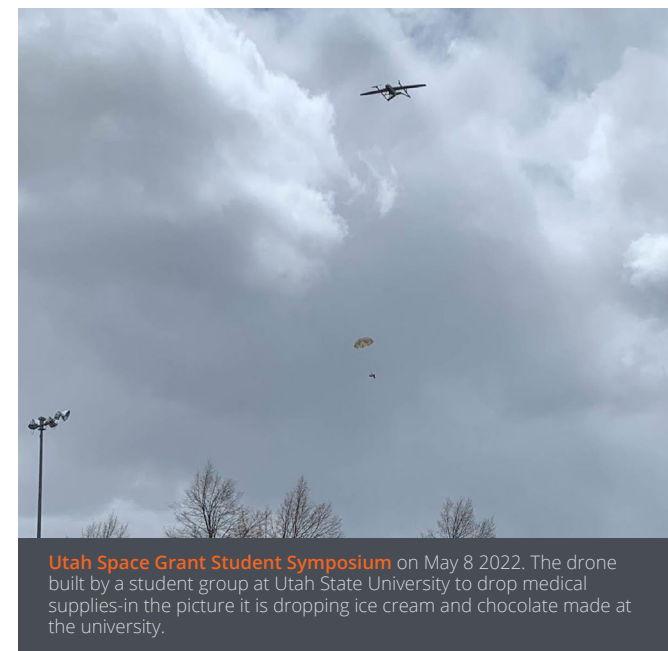
[www.nasa.gov/stem/spacegrant/about](http://www.nasa.gov/stem/spacegrant/about)



## NASA Strategy for STEM Engagement Alignment

Space Grant supports student research, internships, fellowships, and hands on learning activities for college and university students.

Space Grant consortia also provide K-12 outreach in their areas encouraging students to pursue an education in a STEM major while striving to create opportunities for students at MSIs including Historically Black Colleges and Universities, Hispanic Serving Institutions, and Tribal Colleges and Universities.



**Utah Space Grant Student Symposium** on May 8 2022. The drone built by a student group at Utah State University to drop medical supplies-in the picture it is dropping ice cream and chocolate made at the university.

Space Grant is a national network of colleges and universities. These institutions are working to expand opportunities for Americans to understand and participate in NASA's aeronautics and space projects by supporting and enhancing science and engineering education, research and public outreach efforts. The Space Grant national network includes over 850 affiliates from universities, colleges, industry, museums, science centers, and state and local agencies. These affiliates belong to one of 52 consortia in all 50 states, the District of Columbia and the Commonwealth of Puerto Rico.

Space Grant is helping to prepare the Artemis Generation by funding six Artemis Student Challenges. The NSPACE team works with three of the six states chosen to host a challenge.

### Hawaii Space Grant

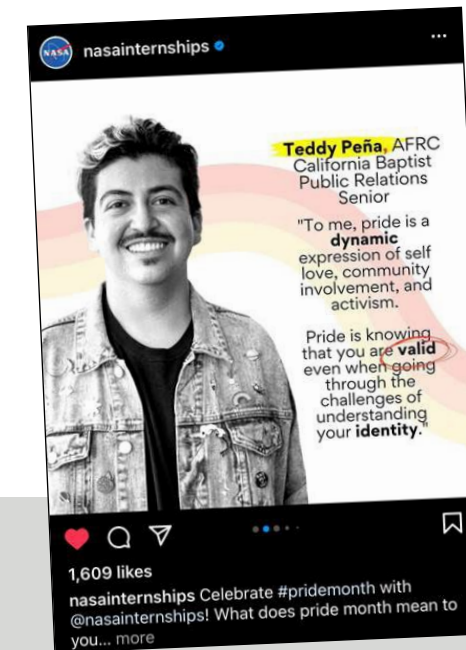
Is helping to fund hands on learning by providing kits for students to make orbital and suborbital CubeSats

### Washington Space Grant

Is sponsoring a Lunar Lava Tube Exploration program, where students will build and operate small rovers which will explore a facsimile lunar lava tube environment.

### California Space Grant

Is supporting a lunar/mars lander skills competition where students will build a lander free flier and navigate it through a 3D obstacle course.

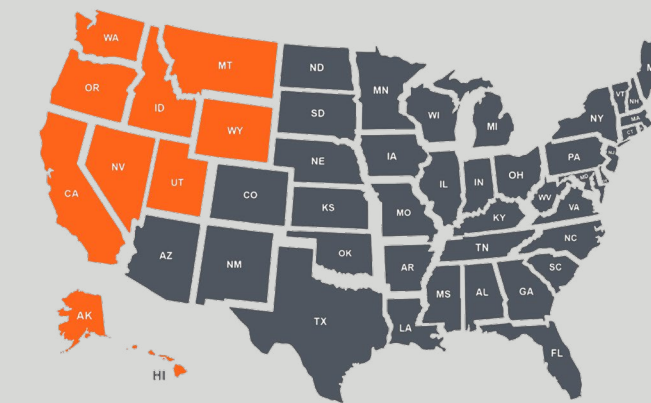


# 828

Students attended one of the 18 webinars featuring resume workshops and NASA subject matter experts.

# 165

Principle Investigators attended webinars to learn about other NASA STEM activities.



# 10

States in the Western Region are represented by NSPACE through the California Regional Office of STEM Engagement.

## Forward to the Moon

Expanding support to include at least five more states by the end of the year.

Partnering with Louisiana and Indiana to provide more student webinars to help develop skills such as resume and proposal writing.

Increasing student reach by partnering with more states to connect students with NASA and helping Space Grant directors access NASA resources to provide meaningful student activities aligned with NASA mission directorates.

## Success Story: REBECCA TUCKER



When working on experimental aircraft, there are some significant legal concerns. The Office of General Council of NASA is not generally what comes to mind when they think about NASA

jobs, but it is vital to keeping the agency running. Rebecca Tucker is learning a lot more about what this entails. Tucker's background is uniquely suited to this particular internship. She is currently a law student at Louis and Clark Law School in Portland, Oregon. Before studying law, Tucker flew helicopters for the Navy. Her experience and education give Tucker a unique perspective on the world of law and aeronautics.

For her internship, Tucker is working with the acting chief council for Armstrong Flight Research Center (Armstrong). During her time at Armstrong, Tucker has reviewed contracts for various projects at Armstrong, including the X-59 project and a project which aims to widen one of the taxiways to accommodate the SOFIA aircraft. The internship allowed Tucker to apply what she learned in law school to real-world cases, which she feels is invaluable for her future career.





**NASA STEM Pathway Activities –  
Consortium for Education**

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