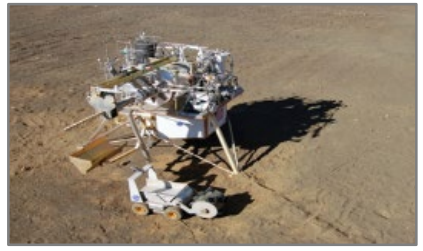
NASA Early-Stage Innovations & Partnerships

Advancing Racial Equity and Support for Underserved Communities in NASA Programs, Grants, Contracts and Grants RFI - Public Meeting, July 13, 2021

Moderators: Karen James and Ashley McQueen, NASA STMD
Presenters:
Prasun Desai – Deputy Associate Administrator, STMD
Jenn Gustetic – Director, Early Stage Innovations and Partnerships, STMD
Gynelle Steele – Deputy Program Executive, SBIR/STTR Program, STMD

Technology Drives the Space Economy



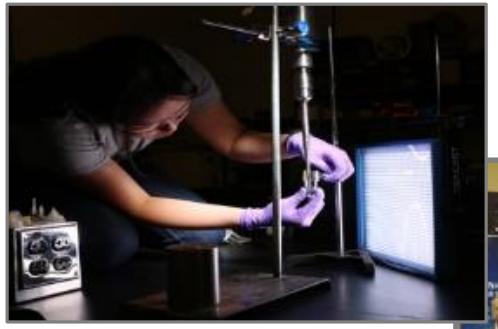
Space Technology develops critical technologies to enable:

- A sustainable Lunar surface presence,
- The future goal of sending humans to Mars, and
- Crosscutting and transformative technologies to enable future exploration, science, and commercial missions.

We accomplish this mission by:

- Funding critical technology gaps
- Keeping NASA's space technology pipeline growing with emerging, innovative technologies that promise to drive the future of exploration, science, and commercialization.

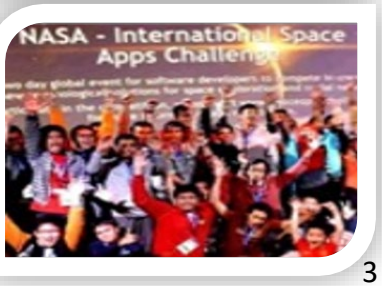
- ✓ Spark Innovation
- ✓ Engage The Brightest Minds
- ✓ Enable Exploration and Discovery
- ✓ Embrace Competition and Public-Private Partnerships
- ✓ Invest in America



Early Stage Innovation and Partnerships (ESIP) Portfolio

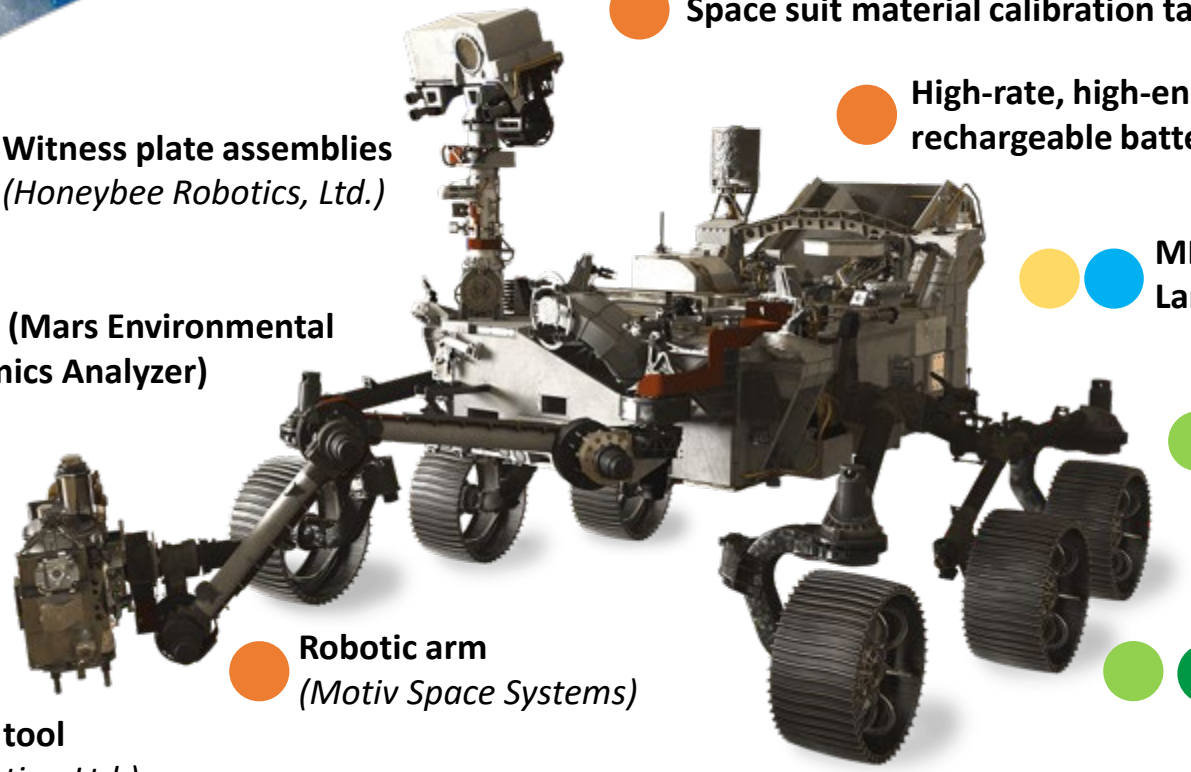
The ESIP Portfolio advances 700+ ambitious projects annually across TRLs and communities to address NASA mission needs and seed future disruptive aerospace capabilities.

NASA Innovative Advanced Concepts (NIAC)	Nurtures **visionary ideas** that could transform future NASA missions with the creation of breakthroughs, while engaging America's innovators and entrepreneurs as partners in the journey.
Space Tech Research Grants (STRG)	Challenges the spectrum of **academic researchers** to examine the theoretical feasibility of ideas and approaches that are critical to making science, space travel, and exploration more effective, affordable, and sustainable.
Center Innovation Fund / Early Career Initiative (CIF/ECI)	Stimulate and encourage creativity and innovation within the **NASA Centers and Early Career leaders** in addressing the technology needs of NASA and the nation.
Prizes, Challenges & Crowdsourcing (PCC)	Makes opportunities available for **public participation** in NASA research and technology solutions to support NASA missions and inspire new national aerospace capabilities.
Small Business Innovation Research (SBIR)/ Small Business Technology Transfer (STTR) Program	Engages **small businesses, research institutions, and entrepreneurs** in R&D of innovative technologies that meet NASA needs and have the potential for commercialization.
Technology Transfer (T2)	Ensures that innovations developed for exploration and discovery are broadly available to the public, maximizing the benefit to the Nation, and enabling **spinoffs**.



Innovation Drives Technology….

Technology Drives Exploration



- **Laser for SHERLOC** *(Photon Systems, Inc.)*
- **Space suit material calibration target for SHERLOC** *(ENGI-MAT)*
- **High-rate, high-energy-density, lithium-ion rechargeable batteries** *(Yardney/Eagle Picher)*
- **Witness plate assemblies** *(Honeybee Robotics, Ltd.)*
- **MEDLI2 (Mars Entry, Descent and Landing Instrumentation 2)**
- **MEDA (Mars Environmental Dynamics Analyzer)**
- **TRN (Terrain Relative Navigation)**
- **Six-axis force-torque transducer** *(ATI Industrial Automation, Inc.)*
- **Robotic arm** *(Motiv Space Systems)*
- **Lander Vision System** *(JPL)*
- **Dust mitigation tool** *(Honeybee Robotics, Ltd.)*
- **MOXIE (Mars Oxygen In-Situ Resource Utilization Experiment)**
- ***Scroll compressor*** *(Airsquared)*
- **Synthesizing Flight Software (FSW) Discrete Controllers from Formal Specifications** *(JPL)*

These Mars Rover technologies are also useful here on Earth for everything from safer autonomous vehicles to helper robots in hospitals. To learn more, visit spinoff.nasa.gov.

CIF | STRG | SBIR/STTR | GCD | TDM | Flight Opportunities

Space Technology Research Grants Program

Engage Academia: *tap into spectrum of academic researchers, from graduate students to senior faculty members, to examine the theoretical feasibility of ideas and approaches that are critical to making science, space travel, and exploration more effective, affordable, and sustainable.*

NASA Space Technology Graduate Research Opportunities (NSTGRO)

Early Career Faculty (ECF)

Early Stage Innovations (ESI)

Lunar Surface Technology Research (LuSTR) Opportunities

Space Technology Research Institutes (STRI)

TA01
Launch Propulsion
27 Awards

TA02
In-Space Propulsion
80 Awards

TA03
Space Power & Energy Storage
44 Awards

TA04
Robotics & Autonomous Systems
121 Awards

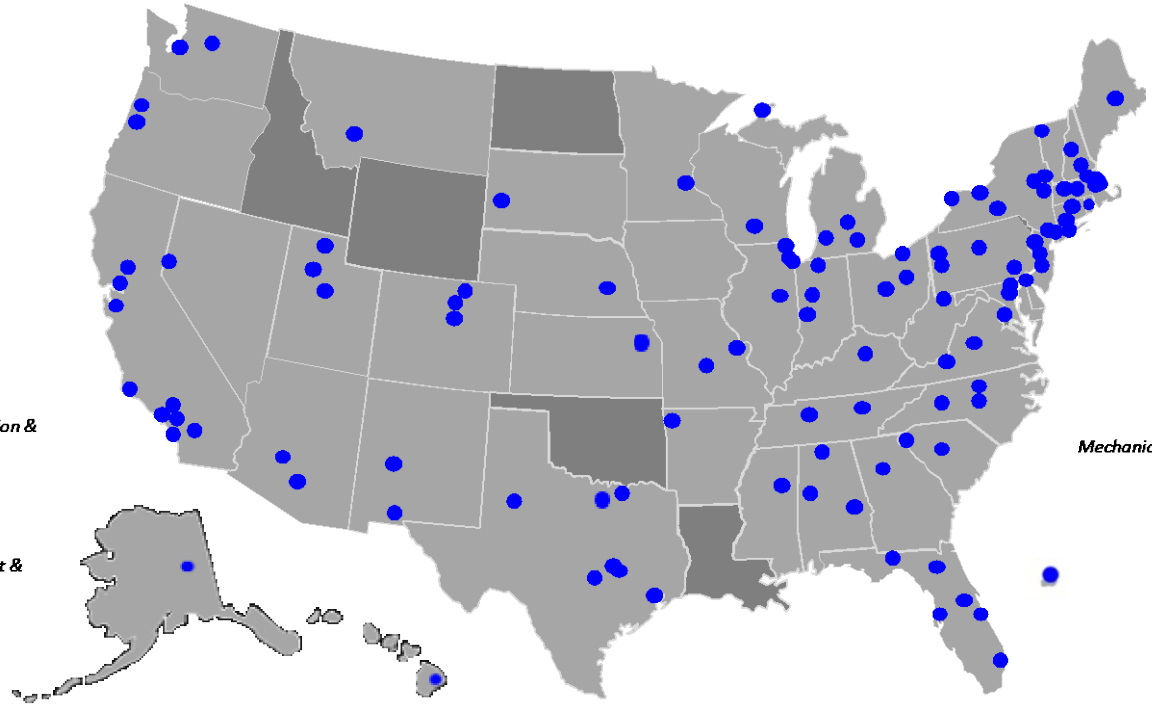
TA05
Communications, Navigation & Orbital Debris Tracking
87 Awards

TA06
Human Health, Life Support & Habitation
61 Awards

TA07
Human Exploration Destination Systems
38 Awards

300+ active awards **116 Universities**

45 States **1 Territory** (PR)



TA08
Science Instruments, Observatories and Sensor Systems
96 Awards

TA09
Entry, Descent & Landing
90 Awards

TA10
Nanotechnology
42 Awards

TA11
Modeling, Simulation, IT & Processing
38 Awards

TA12
Materials, Structures, Mechanical Systems & Manufacturing
104 Awards

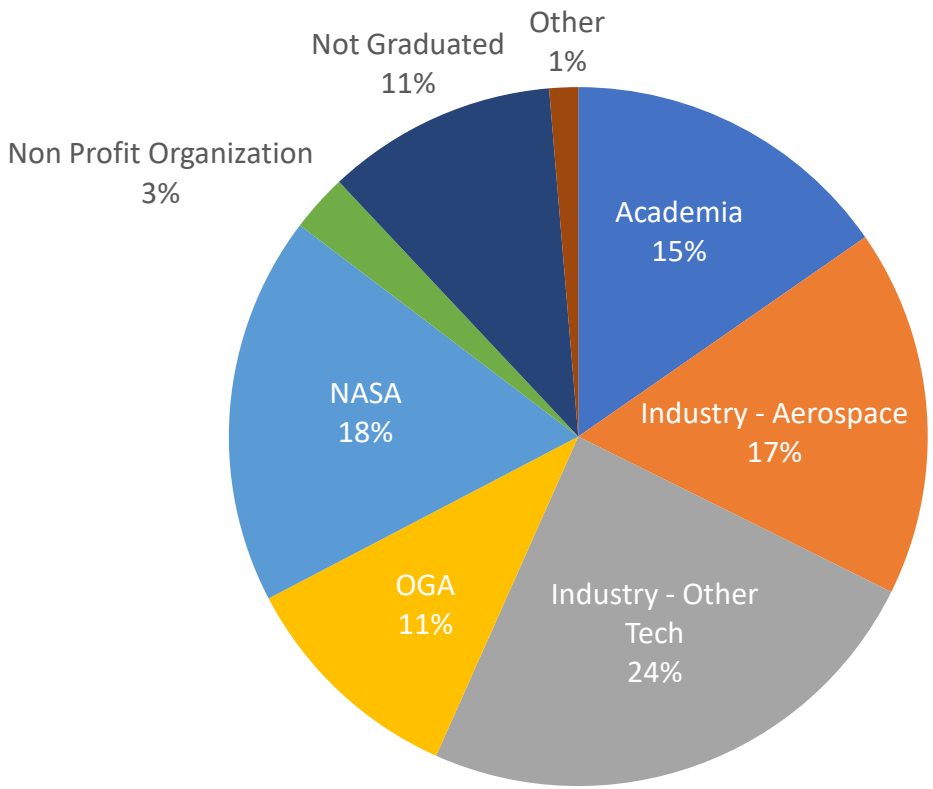
TA13
Ground & Launch Systems
1 Awards

TA14
Thermal Management
33 Awards

STRG accelerates the development of groundbreaking high-risk/high-payoff low TRL space technologies

Post-NSTGRO Employment

Post graduation, NSTRF & NSTGRO researchers contribute their expertise across a wide variety of organizations in industry, government, and academia.



Over 300 graduate students have completed their NSTRF/NSTGRO research and begun their careers

INDUSTRY

BOEING
ASRC FEDERAL
Google
x∞ analytical space
SCALED COMPOSITES
Ford
SPACEX
NORTHROP GRUMMAN
Ball
Raytheon
KINETX AEROSPACE
LOCKHEED MARTIN
BLUE ORIGIN

GOVERNMENT LABS

APL
LINCOLN LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Sandia National Laboratories
NATIONAL INSTITUTE OF AEROSPACE
AEROSPACE
NASA
DRAPER
NIST
&cnrs

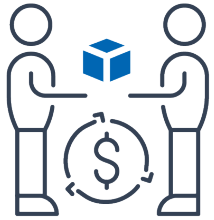
ACADEMIA

University of Dayton
Fort Lewis College
SPACE INSTITUTE
CHARLESTON SOUTHERN UNIVERSITY
UW
WASHINGTON STATE UNIVERSITY
ILLINOIS
Stanford University

NASA SBIR/STTR Program

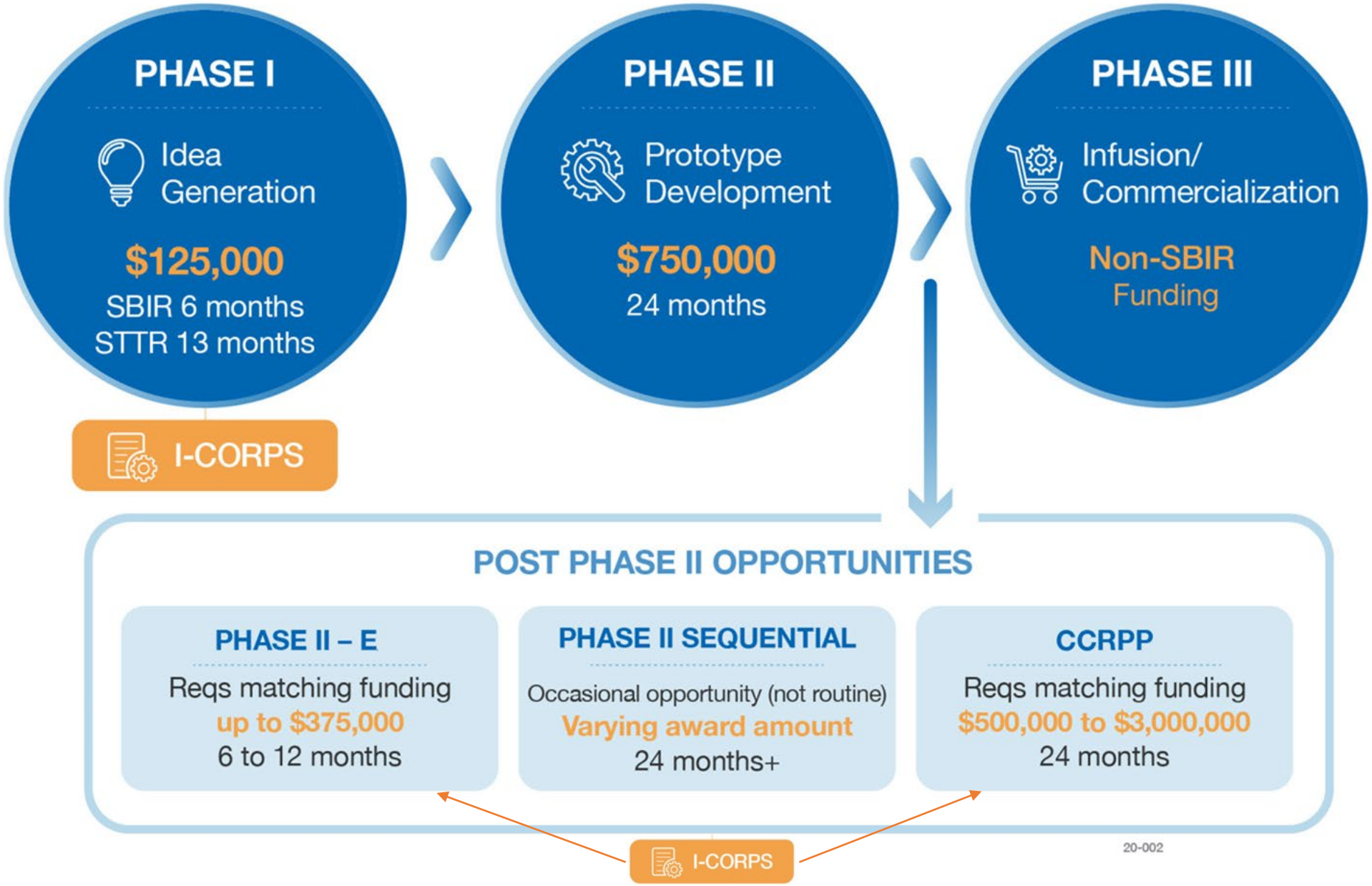
As a program under STMD, the NASA SBIR/STTR program funds the research, development, and demonstration of innovative technologies that fulfill NASA needs.

NASA's SBIR/STTR Program has **awarded more than $3.75 billion** to research-intensive American small businesses



Engineers and scientists from **more than 12,000** small businesses in all 50 States, DC and Puerto Rico have participated

SBIR/STTR Program Phases



Astronaut Jessica Meir is using the BFF at the International Space Station.
Photo courtesy of Techshot

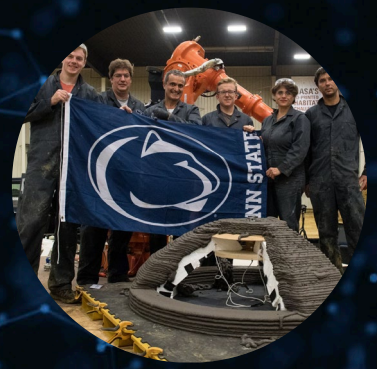
3-D Bioprinter Overcomes Gravity by Printing Living Tissues in Space

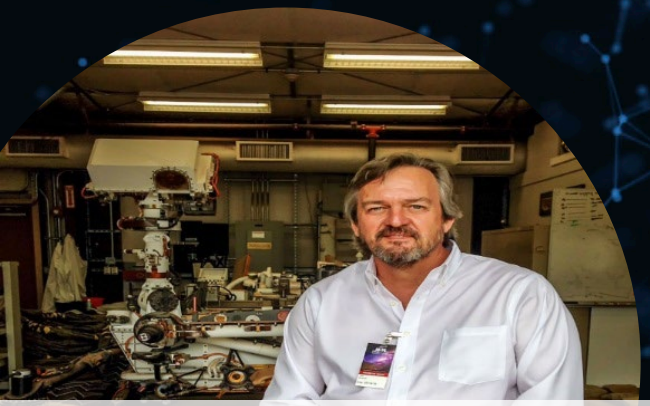
POST-AWARD SUCCESS:
More than $5 million external investment attributed to BFF, including $2.5 million from ISS Program

SNAPSHOT:
Techshot, Inc., based in Greensville, IN, is the first U.S. company to 3-D print organic products on the International Space Station (ISS). The company's BioFabrication Facility (BFF), developed in collaboration with nScrypt, Inc., prints in space to overcome the effects of gravity on Earth, which cause 3-D printed tissues to disform under their own weight. Techshot's BFF was launched to the ISS supported by the NASA SBIR/STTR program in 2019. The company has since worked with NASA and other customers, valuing BFF's external investments at more than $5 million, including $2.5 million from the ISS Program.

"Our company has been able to provide jobs in a rural area in a non-space state, and we really tie that back to the SBIR program.

– Richard Boling VP of Corporate Advancement, Techshot





Prizes and challenges: approaching innovation differently

Complements other NASA approaches to solve technological problems, with a unique set of strengths:

- Targets solutions, not proposals; awards performance
- Increases number and diversity of participants addressing a problem

These opportunities can be accessed by the public on the NASA Solve website: ***www.nasa.gov/solve***

SOLVE

Startup NASA

The Startup NASA initiative offers startup companies a license with no up-front costs for commercial use of our patented technologies, we're letting companies hold onto their cash while securing the intellectual property needed to carve

99 new companies have formed since program launched in October 2015, with 12 startup licenses so far in FY21.

Geneto

PETRA POWER

Gaia Elements

Tellus

EDRONES

JETOPTERA™

SpaceBooster LLC

NASA iTech
2017 CYCLE 2
SEMIFINALIST

AirFlare

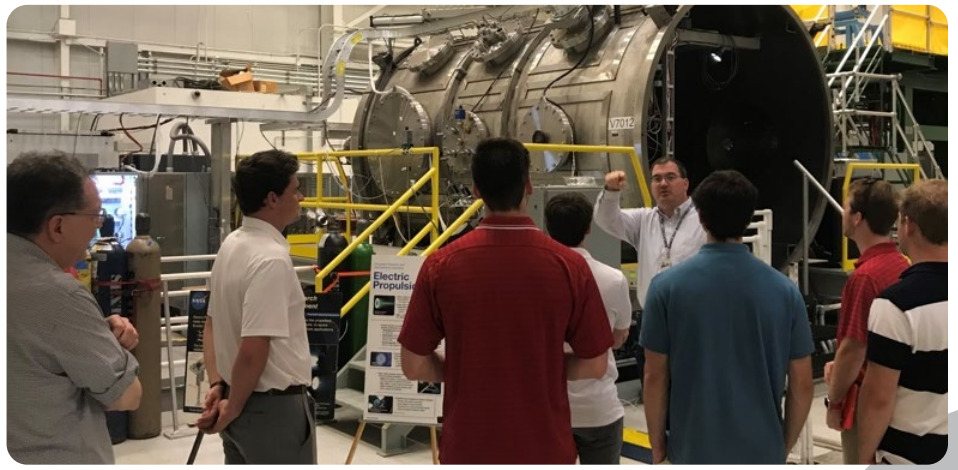
Dig.y.S L™

PROFESSIONAL TECHNICAL SERVICES

NASA Technology Transfer University (T2U)

Through T2U, we are connecting student entrepreneurs with NASA-proven technology

- Student entrepreneurs build case studies with NASA's patent portfolio while learning about commercialization and licensing opportunities.
- Currently, there are 24 active T2U agreements.
- In FY21 T2U will target 3 new T2U partnerships in FY21, with special emphasis on states that do not currently have T2U activity, creating approximately 20 new T2U activities.



Alabama STEM MBA program visit to NASA MSFC.

Diversity, Equity, and Inclusion through ESIP

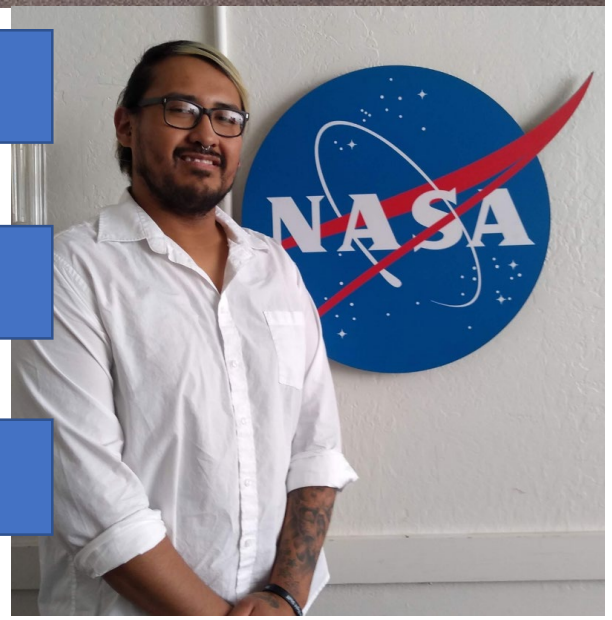
- Early Stage Innovation and Partnerships will place additional emphasis on increasing participation by underserved communities, as well as individuals from those communities. Some existing activities include:
  - **The SBIR/STTR program The SBIR/STTR program** has launched a cooperative agreement with MSI STEM Research and Development Consortium (MSRDC) to increase the participation of HBCUs and MSIs in our programs. The cooperative agreement will develop opportunities for HBCUs and MSIs to understand the various technologies needed for NASAs missions and help to encourage collaborations with small businesses so to compete in the STTR program.
  - **MUREP Small Business Technology Transfer (M-STTR)** utilizes planning grants to incentivize partnerships between MSIs and Small Businesses, enhancing the potential and preparing teams to participate in the annual SBIR/STTR solicitation.
  - **MUREP Innovation & Tech Transfer Idea Competition (MITTIC)** is a higher education spinoff challenge established to develop new ideas for commercialization by seeking concept papers from multi-disciplinary student teams enrolled at MSIs.
  - Collaborated with OSBP, OSTEM, and Science Mission Directorate (SMD) in an annual "**Technology Infusion Road Tour**" to reach HBCUs and MSIs and share information about how to participate in NASA research opportunities.

MITTIC teams visit Johnson Space Center, 2019

MITTIC
2018 - 2019

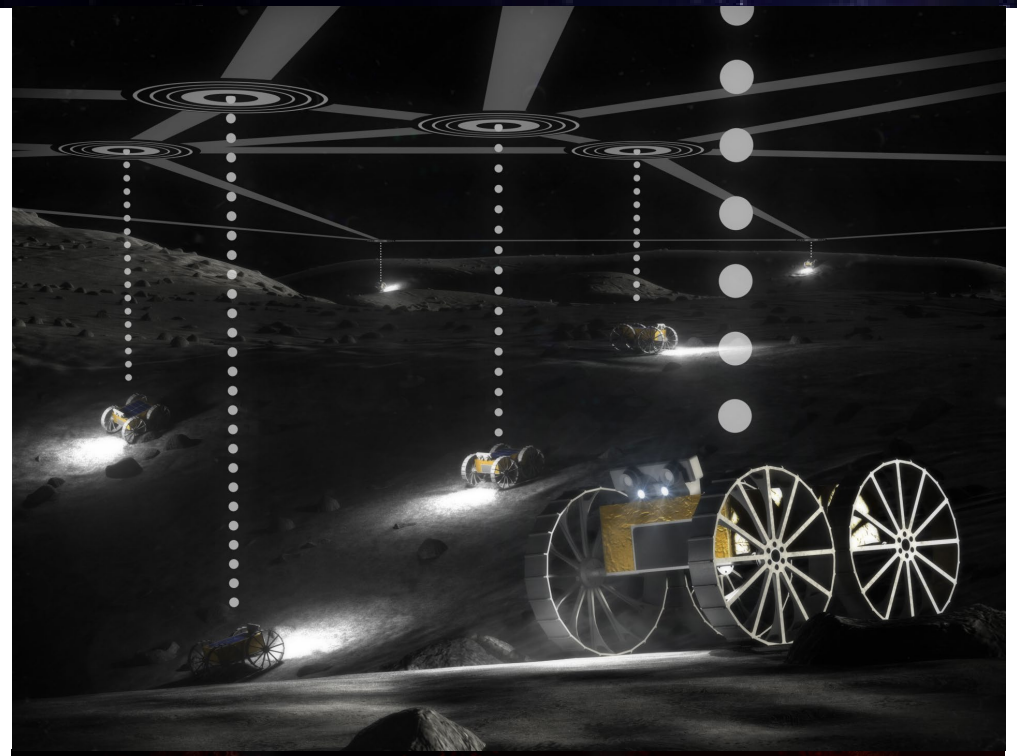
MITTIC SBIR/STTR
Internship 2019

MUREP
Internship 2020



Jonathan Catch the Bear, Sitting Bull College

Diversity, Equity, and Inclusion through Space Technology



Partner with STEM Engagement's Minority University Research and Education Project (MUREP) to engage and support MSIs, including HBCUs, and to reach students from underserved and underrepresented communities.

- **MUREP Space Technology Artemis Research (M-STAR)** aims to strengthen and develop the research capacity and infrastructure at MSIs in alignment with STMD's priorities and to promote MSI participation in STMD opportunities and programs. The 2021 M-STAR grants offer up to $250,000 per year for a two-year performance period to MSIs.

- For the **2022 BIG Idea Challenge**, STMD is working with MUREP as well as Space Grant to increase access and representation through targeted outreach to MSIs, including HBCUs, and pre-proposal resources. With nearly $1M in available funding annually, BIG Idea Challenge offers the most money to student teams of any Artemis Student Challenge.

Additional Informational Site

https://www.msrdconsortium.org/
https://nspires.nasaprs.com/
https://microgravityuniversity.jsc.nasa.gov/nasamittic.cfm
https://nspires.nasaprs.com/
https://bigidea.nianet.org/

NASA Request for Information

We want to hear from you

Please use the chat function to submit your comments

What resources or avenues can NASA expand upon to bring awareness to underrepresented and underserved communities and improve their participation and outcomes, including HBCUs and MSIs? How might NASA expand participation through the following STMD programs:

1. Technology Transfer (~2:30PM): NASA maintains a portfolio of patents with commercial potential and makes them available to the public through our patent license program.
2. Small Business Innovation Research & Small Business Technology Transfer (SBIR/STTR) (~2:37PM): NASA offers devoted research and development funding to small businesses and entrepreneurs through the SBIR/STTR programs, which also offer pathways to directed procurements from NASA.
3. Space Technology Research Grants (STRG) & NASA Innovative Advanced Concepts (NIAC) (~2:44PM): NASA offers a host of research and development grants to universities and other innovators through the Space Technology Research (STRG) and NASA Innovative Advanced Concepts (NIAC) programs, which engage faculty, students and university research teams.
4. Prizes, Challenges and Crowdsourcing (~2:51PM): NASA makes opportunities available for public participation in NASA research and technology solutions to support NASA missions and inspire new national aerospace capabilities through the Prizes, Challenges and Crowdsourcing Program.


NASA
www.nasa.gov/spacetech
hq-feedback-spacetech@mail.nasa.gov