National Aeronautics and Space Administration

SmallSat Technology Development Opportunities: The Small Business Innovation Research (SBIR) Program and University Smallsat Technology Partnerships (USTP)

SmallSat Conference | 2023

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Small Spacecraft Technology (SST) program

Program Systems Engineer

SmallSat Technology Development Opportunities

Key to success is NASA's ability to leverage from and develop new technologies with industry and academia

There are many ways to partner with NASA for SmallSat technology developments!

SBIR·STTR America's Seed Fund

Target: U.S. Small Businesses (+ Research Institutions for STTR)

Leverage small business knowledge and technology development to deliver innovation that contributes to NASA's missions, provides societal benefit, and grows the US economy

University SmallSat Technology Partnerships

Target: U.S. Universities and Colleges

Advance novel technologies for SmallSats useful to NASA and industry, leveraging unique talents and fresh perspectives from the university community. Focus on TRL 3-5

Other Agency Initiatives

Other Agency initiatives may have SmallSat related scope depending on the year. For example, **Announcement of Collaboration Opportunity (ACO)** and **Tipping Points.** S3VI opportunities tracking page: https://www.nasa.gov/smallsat-institute/nasa-smallsat-opportunities

SBIR / STTR Elements to Consider

SBIR
Small Business Innovation Research

Target: Small Businesses

Solicitation Timeframe: Phase 1 typically January-March

Included Small Spacecraft-specific sutopics in 2023 (see next slide)

STTR
Small Business Technology Transfer

Target: Small Businesses partnered with Research Institutions

Solicitation Timeframe: Phase 1 typically January-March

No Small Spacecraft-specific sutopics in 2023

Target: Small Businesses, increased focus on commercialization

Solicitation Timeframe: August 01-September 21, 2023

No Small Spacecraft-specific topics in 2023, but 2 possibly of interest:

- Closing Capability Gaps to Accelerate In-Space Production Applications in LEO
- Commercial Development of Active Debris Remediation (ADR) Services and Orbital Debris Tracking Services

Learning about NASA's Needs: SBIR Focus Areas

2023 SBIR Focus Areas (FA)	
FA 1: In-Space Propulsion Technologies	**FA 12:** Entry, Descent and Landing Systems
FA 2: Power Energy and Storage	**FA 13:** Information Technologies for Science Data
FA 3: Autonomous Systems for Space Exploration	**FA 15:** Materials, Materials Research, Structures, and Assembly
FA 4: Robotic Systems for Space Exploration	**FA 16:** Ground and Launch Processing
FA 5: Communications and Navigation	**FA 17:** Thermal Management Systems
FA 6: Life Support and Habitation Systems	**FA 18:** Air Vehicle Technology
FA 7: Human Research and Health Maintenance	**FA 19:** Integrated Flight Systems
FA 8: In-Situ Resource Utilization	**FA 20:** Airspace Operations and Safety
FA 9: Sensors, Detectors and Instruments	**FA 21: Small Spacecraft Technologies**
FA 10: Advanced Telescope Technologies	**FA 22:** Low Earth Orbit Platform Utilization and Microgravity Research
FA 11: Spacecraft and Platform Subsystems	**FA 24:** Dust Mitigation and Extreme Lunar Environment Mitigation Technologies

NASA's research subtopics are organized by "Focus Areas" that group interests and related technologies.

- Identify the Area(s) closest to your innovation/idea
- **NASA has a dedicated *Small Spacecraft Technologies* SBIR Focus Area with small spacecraft-specific subtopics!**

<u>Small Spacecraft-specific subtopics</u>:

- Z8.02: Communications and Navigation for Distributed Small Spacecraft Beyond Low Earth Orbit (LEO)
- Z8.09: Small Spacecraft Transfer Stage Development
- Z8.13: Space Debris Prevention for Small Spacecraft

SBIR / STTR Program Structure

Up to $1 million for Phase I and II and nearly $3 million or more for Post Phase II opportunities!

Phase II-E example:

- NASA Flight Opportunities (FO) is interested in investing in suborbital flight testing of select SBIR/STTR technologies to help mature them
- FO investment matched by SBIR/STTR Program

NASA SBIR/STTR PHASES

PHASE I
Idea Generation
$150,000
SBIR 6 months
STTR 13 months

PHASE II
Prototype Development
$850,000
24 months

PHASE III
Infusion/ Commercialization
Non-SBIR Funding

I-CORPS

TABA

POST PHASE II OPPORTUNITIES

PHASE II – E/X
Reqs matching funding
up to $375,000
6 to 12 months

PHASE II SEQUENTIAL
Occasional opportunity (not routine)
Varying award amount
24 months+

CCRPP
Reqs matching funding
$500,000 to $2,500,000
24 months

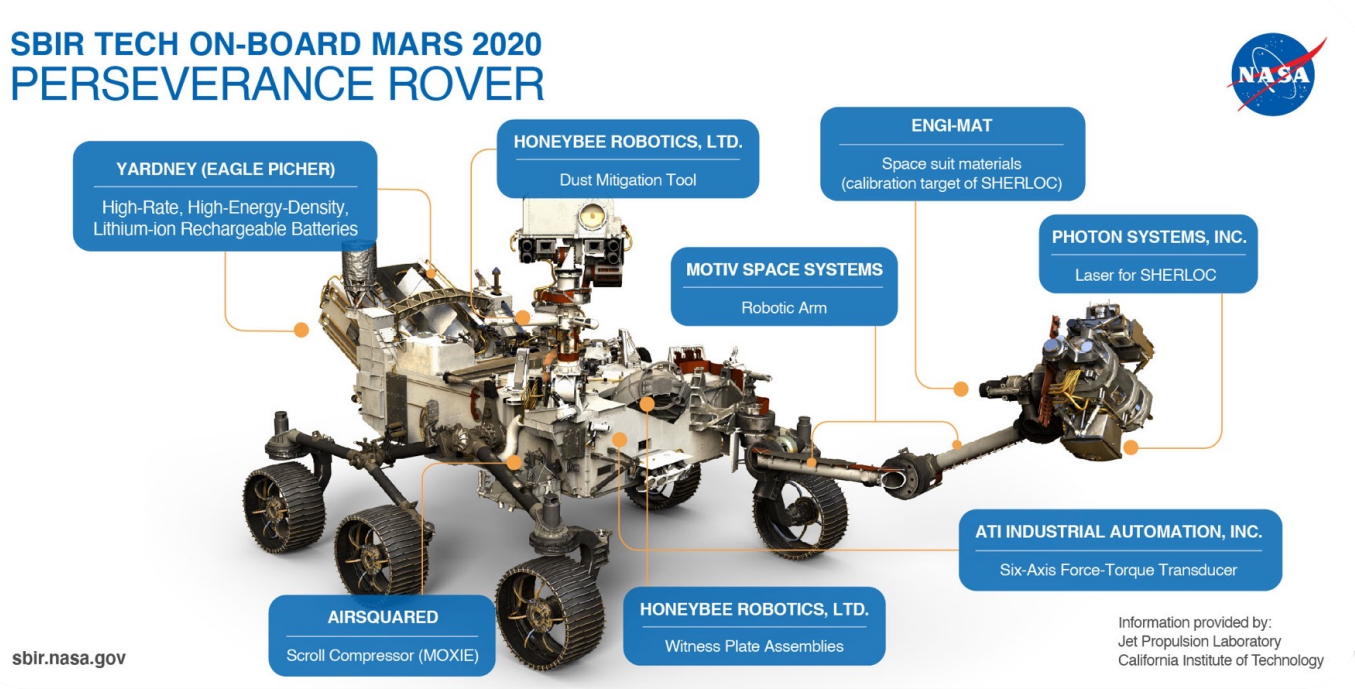
I-CORPS

22-002

Phase II-S example:

- NASA Small Spacecraft Technology (SST) was a participating program in 2020, 2021, 2022, 2023
- Specific topics, competed
- Up to $4M awards, over 24 months

SBIR/STTR Success Stories



NASA's SBIR and STTR programs have awarded **more than $3.75 billion** to research-intensive American small businesses.

Engineers and scientists from more than 3,100 Firms in all 50 States, DC, and Puerto Rico have participated across the two programs.

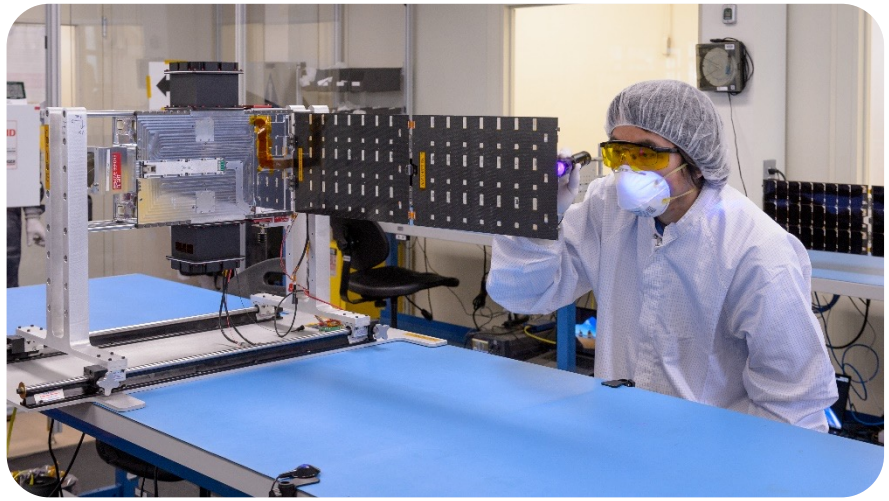
Approximately 15,000 total awards have been made to-date.

For more information:

- Website: www.sbir.nasa.gov
- Newsletter, Webinars, and program announcements: sbir.nasa.gov/info
- Solicitations: https://sbir.nasa.gov/solicitations
- Success Stories: https://sbir.nasa.gov/success-stories

University Smallsat Technology Partnerships (USTP)

University SmallSat Technology Partnerships



NASA's Starling mission includes USTP-developed technologies

Scope:

- 2-year PI-led cooperative agreements between U.S. university team and a NASA center to develop specific technologies for small spacecraft
- $225k / year for University ($445k total)
- + 0.5 FTE/year + $30,000 for NASA partner (includes JPL)
- Starting Technology Readiness Level (TRL): 3-5, with an expected increase in TRL of +2
- Possibility for funded extensions for Technology Demonstrations (suborbital to orbital)

2023 Technology Topics:

- Topic 1: Earth- and Global Navigation Satellite System-Independent Position Navigation and Timing for Small Spacecraft
- Topic 2: Edge Computing and Machine-Learning Architectures, Software, Platforms, and Devices for Small Spacecraft
- Topic 3: High Specific Power Systems and Thermal Control for Small Spacecraft

Solicitation Timeframe: April 25 2023–July 18 2023, 2-step process (closed)

- NASA benefits from rapid, innovative academic processes yielding new technologies
- Universities gain experience and recognition through hands-on NASA collaborations

USTP Success Stories

Investments:

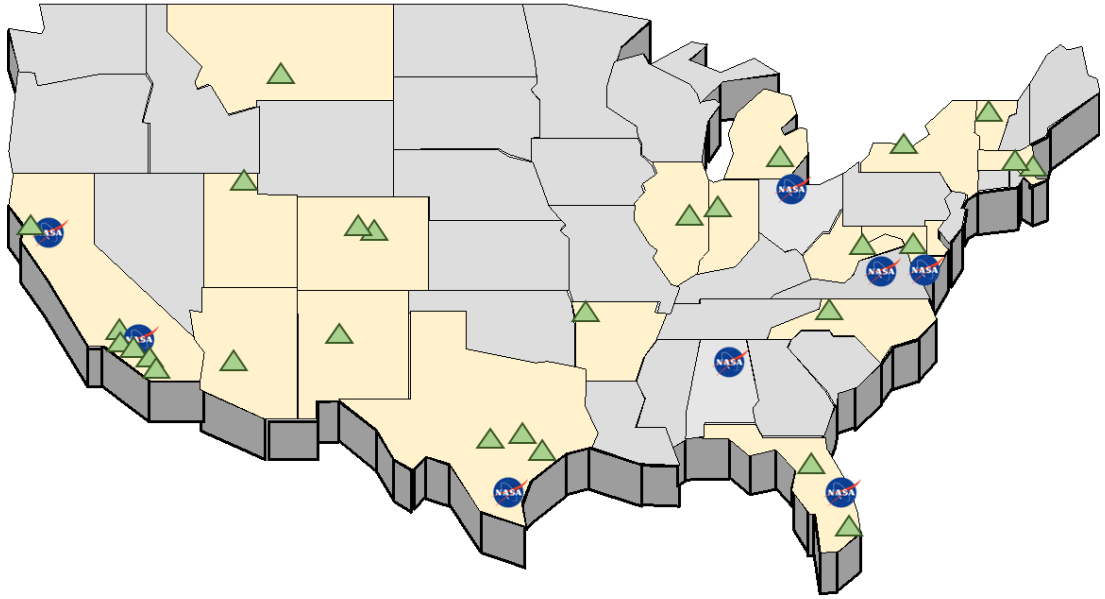
- Over $26,468,000 awarded
- 46 partnerships in 5 cohort years
  (2013, 2015, 2016, 2018, 2019)
- 28 universities in 19 states
- 8 of 10 NASA centers partnered

Results:

- 22 flight demonstrations performed/planned
- 1 Intersatellite Network Planning/ Routing tool software open-sourced
- Numerous New Technology Reports / Patents
- 30+ conference presentations
- 50+ papers published
- 100+ students involved
- Many technology readiness levels (TRL) raised

28 Universities in 19 States

8 NASA Centers



For more information:

- Website:
  https://www.nasa.gov/directorates/spacetech/small_spacecraft/smallsat-technology-partnership-initiative
- S3VI newsletter:
  https://lp.constantcontactpages.com/su/hkvyjHq/S3VISubscription

Contact us and let's innovate together!

Meet us at:

NASA STMD booth

Booth 77, Taggart Student Center, Juniper Lounger