



EXPLORE SPACE TECH

TECHNOLOGY DRIVES EXPLORATION

Space Technology Industry-Government-University Roundtable (STIGUR)

Mr. James Reuter | Associate Administrator, Space Technology Mission Directorate | December 3, 2021

SPACE TECHNOLOGY PORTFOLIO

EARLY STAGE INNOVATION AND PARTNERSHIPS

- Early Stage Innovation
 - Space Tech Research Grants
 - Center Innovation Fund
 - Early Career Initiative
 - Prizes, Challenges & Crowdsourcing
 - NASA Innovation Advanced Concepts
- Technology Transfer

SBIR/STTR PROGRAMS

- Small Business Innovation Research
- Small Business Technology Transfer

TECHNOLOGY MATURATION

- Game Changing Development
- Lunar Surface Innovation Initiative

TECHNOLOGY DEMONSTRATION

- Technology Demonstration Missions
- Small Spacecraft Technology
- Flight Opportunities

Technology Drives Exploration

LOW

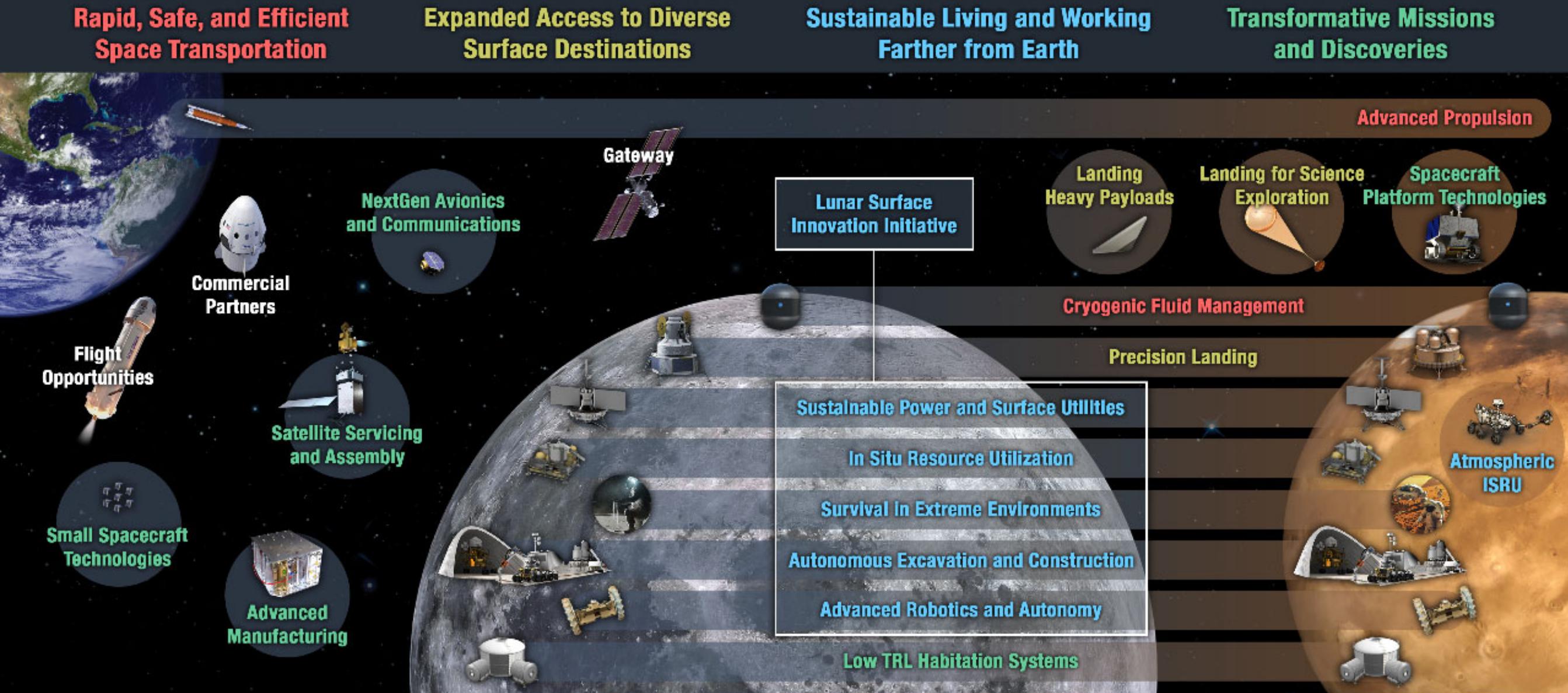
MID
Technology Readiness Level

HIGH

Strategic Technology Framework

Lead	Thrusts	Outcomes	Primary Capabilities
Ensuring American global leadership in Space Technology <ul style="list-style-type: none"> Advance US space technology innovation and competitiveness in a global context Encourage technology driven economic growth with an emphasis on the expanding space economy Inspire and develop a diverse and powerful US aerospace technology community 	 Go Rapid, Safe, and Efficient Space Transportation	<ul style="list-style-type: none"> Develop nuclear technologies enabling fast in-space transits. Develop cryogenic storage, transport, and fluid management technologies for surface and in-space applications. Develop advanced propulsion technologies that enable future science/exploration missions. 	<ul style="list-style-type: none"> Nuclear Systems Cryogenic Fluid Management Advanced Propulsion
	 Land Expanded Access to Diverse Surface Destinations	<ul style="list-style-type: none"> Enable Lunar/Mars global access with ~20t payloads to support human missions. Enable science missions entering/transiting planetary atmospheres and landing on planetary bodies. Develop technologies to land payloads within 50 meters accuracy and avoid landing hazards. 	<ul style="list-style-type: none"> Entry, Descent, Landing, & Precision Landing
	 Live Sustainable Living and Working Farther from Earth	<ul style="list-style-type: none"> Develop exploration technologies and enable a vibrant space economy with supporting utilities and commodities <ul style="list-style-type: none"> Sustainable power sources and other surface utilities to enable continuous lunar and Mars surface operations. Scalable ISRU production/utilization capabilities including sustainable commodities on the lunar & Mars surface. Technologies that enable surviving the extreme lunar and Mars environments. Autonomous excavation, construction & outfitting capabilities targeting landing pads/structures/habitable buildings utilizing in situ resources. Enable long duration human exploration missions with Advanced Habitation System technologies. [Low TRL STMD; Mid-High TRL SOMD/ESDMD] 	<ul style="list-style-type: none"> Advanced Power In-Situ Resource Utilization Advanced Thermal Advanced Materials, Structures, & Construction Advanced Habitation Systems
	 Explore Transformative Missions and Discoveries	<ul style="list-style-type: none"> Develop next generation high performance computing, communications, and navigation. Develop advanced robotics and spacecraft autonomy technologies to enable and augment science/exploration missions. Develop technologies supporting emerging space industries including: Satellite Servicing & Assembly, In Space/Surface Manufacturing, and Small Spacecraft technologies. Develop vehicle platform technologies supporting new discoveries. Develop technologies for science instrumentation supporting new discoveries. [Low TRL STMD/Mid-High TRL SMD. SMD funds mission specific instrumentation (TRL 1-9)] Develop transformative technologies that enable future NASA or commercial missions and discoveries 	<ul style="list-style-type: none"> Advanced Avionics Systems Advanced Communications & Navigation Advanced Robotics Autonomous Systems Satellite Servicing & Assembly Advanced Manufacturing Small Spacecraft Rendezvous, Proximity Operations & Capture Sensor & Instrumentation

Ensuring American Global Leadership in Space Technology



Technology Drives Exploration

Space Technology Research Grants Program



NASA Space Technology Graduate Research Opportunities (NSTGRO)

236 active awards

Solicitation anticipated September 2022



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

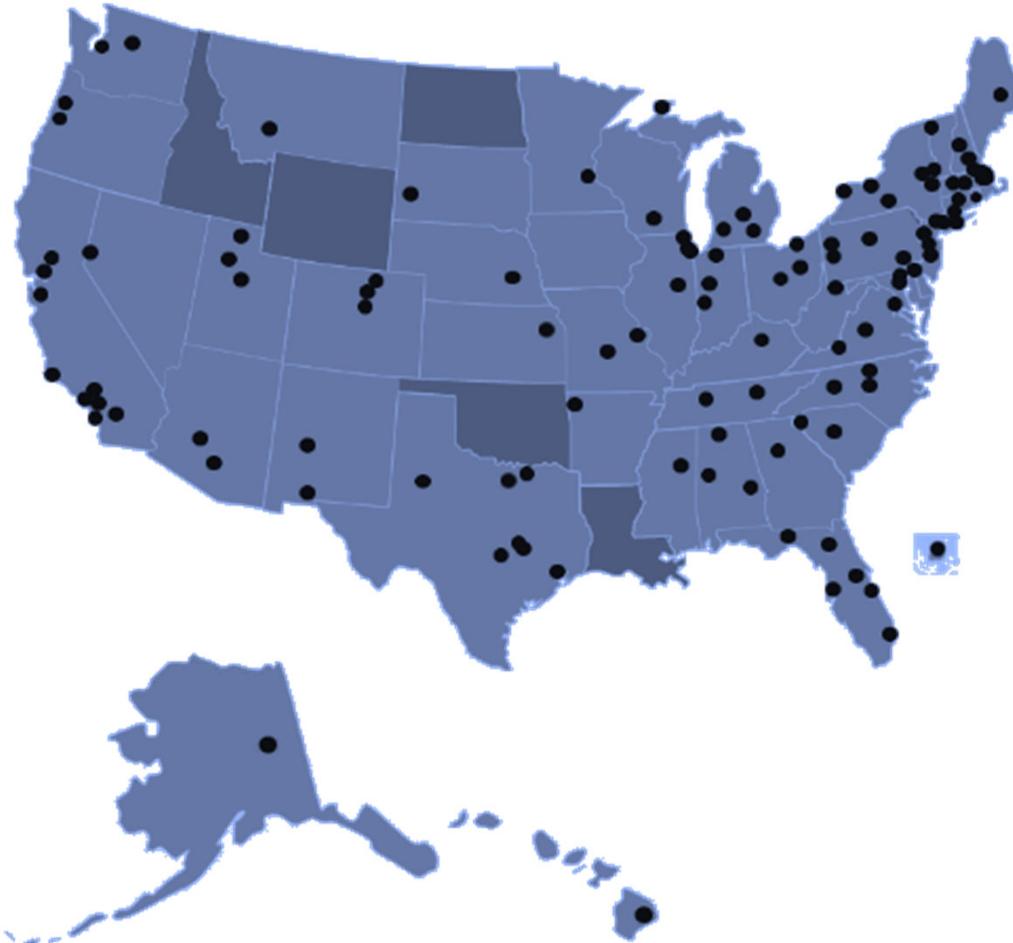


TA07
Human Exploration Destination Systems
38 Awards

Early Career Faculty (ECF)

46 active awards

Solicitation anticipated February 2022



Early Stage Innovations (ESI)

51 active awards

Solicitation anticipated April/May 2022

Lunar Surface Technology Research (LuSTR) Opportunities

6 active awards

Solicitation anticipated July 2022

Space Technology Research Institutes (STRI)

6 active awards

Solicitation anticipated May/June 2022

TA08
Science Instruments, Observatories and Sensor Systems
96 Awards



TA09
Entry, Descent & Landing
90 Awards



TA10
Nanotechnology
42 Awards



TA11
Modeling, Simulation, IT & Processing
41 Awards



TA12
Materials, Structures, Mechanical Systems & Manufacturing
106 Awards



TA13
Ground & Launch Systems
1 Award



TA14
Thermal Management
34 Awards



868 awards

345 active awards

45 states

1 territory (PR)

116 Universities

NASA SBIR/STTR Program



PRE-PHASE I

Activities to engage underserved and underrepresented communities

Phase I solicitation release expected in early CY 2022

PHASE I



Idea Generation

\$150,000

SBIR 6 months
STTR 13 months



PHASE II



Prototype Development

\$1,000,000

24 months
(Planned)

PHASE III



Infusion/ Commercialization

**Non-SBIR
Funding**

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

21-002

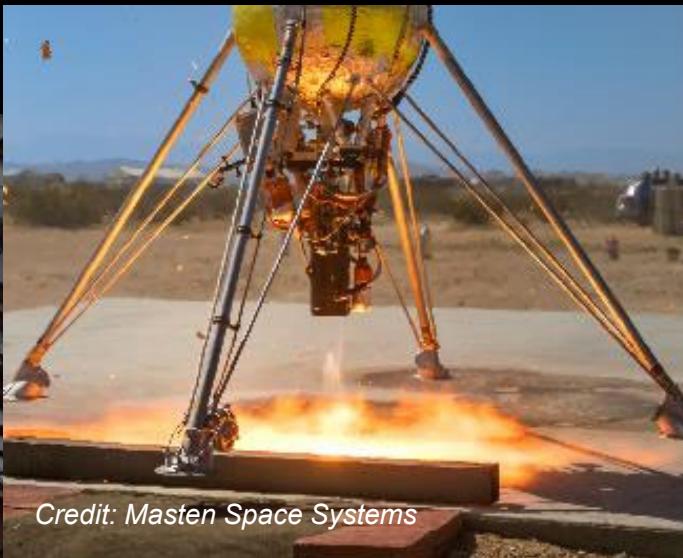
Post Phase II is 25% of awards budget

Flight Opportunities



Since 2011*

- 230 successful flights
- 778 payload tests
- 336 total technologies in portfolio



Testing Landing Technologies

FY2021 Activity*

Provider	Flights	Payload Tests
High-Altitude Balloons		
AM0CAL	1	1
Near Space Corp.	1	1
Raven Aerostar	4	4
Stratodynamics	3	3
World View		
Parabolic Flights		
Zero Gravity Corp.	14	43
Rocket-Powered Vehicles		
Blue Origin	2	15
Masten Space Systems	4	12
UP Aerospace	1	1
Virgin Galactic	2	4
TOTALS	32	84

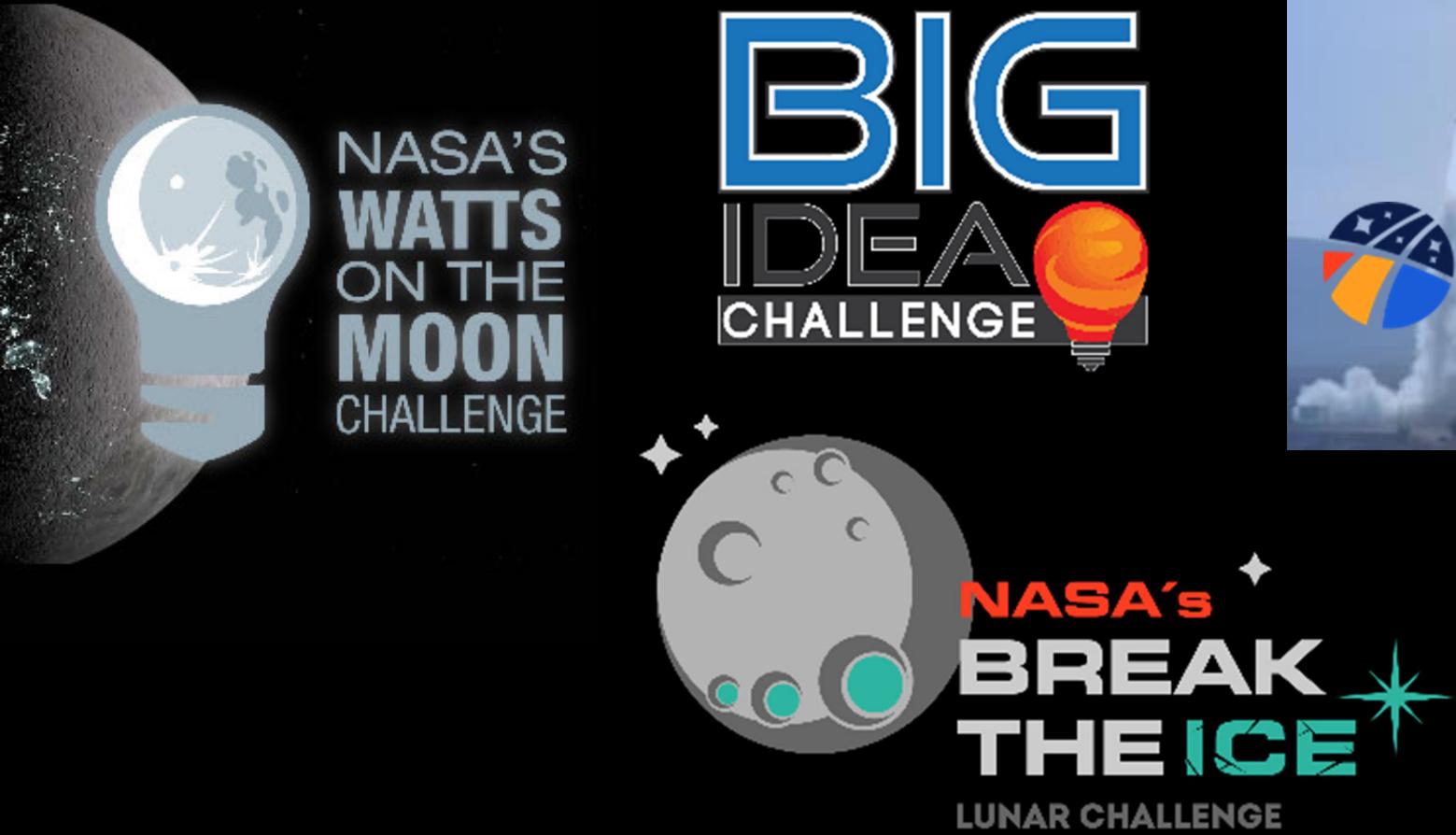
* As of September 30, 2021

Prizes, Challenges, and Crowdsourcing



In fiscal year 2021:

- NASA ran 65+ crowdsourcing projects and competitions
- Prizes totaled more than \$9 million
- Current & future opportunities: nasa.gov/solve





December 5
Launch:
Laser
Communications
Relay
Demonstration

nasa.gov/specials/calliefirst



NASA
TECHRISE
STUDENT CHALLENGE

