

Appendix C: SBIR/STTR and the Space Technology Roadmaps

Research and technology topics/subtopics for the SBIR Program are identified annually by Mission Directorates and Center Programs. The Directorates identify high priority research and technology needs for respective programs and projects. Research and technology topics for the STTR Program are aligned with needs associated with the research interest and core competencies across NASA Centers. Both programs support a broad range of technologies defined by a list of topics and subtopics that vary in content within each annual solicitation.

The following table relates these SBIR/STTR topics and subtopics to the Technology Area Breakdown Structure (TABS) in the Space Technology Roadmaps (STR). The table is organized by the OCT Technology Area level one (first column) and level 2 (third column), with the related SBIR Select subtopic description (fourth column) and subtopics ID (fifth column) listed as well. The Aeronautics area is included for completeness, though this is beyond the scope of the STR.

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA01	1.0.0 Launch Propulsion Systems	1.2.0 Liquid Rocket Propulsion Systems	Detailed Multiphysics Propulsion Modeling & Simulation Through Coordinated Massively Parallel Frameworks	T1.02
			1.3.0 Air Breathing Propulsion Systems	Propulsion Efficiency - Turbomachinery Technology for Reduced Fuel Burn
		1.5.0 Unconventional/Other Propulsion Systems	Terrestrial and Planetary Balloons	S3.06
Affordable Nano/Micro Launch Propulsion Stages	T1.01			
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA02	2.0.0 In-Space Propulsion Technologies	2.1.0 Chemical Propulsion	Low Emissions/Clean Power - Combustion Technology/Emissions Measurement Techniques	A1.03
			LOX/Methane In-Space Propulsion	H2.01
			Cryogenic Fluid Management for In-Space Transportation	H2.04
		2.2.0 Non-Chemical Propulsion	Nuclear Thermal Propulsion (NTP)	H2.02
			High Power Electric Propulsion	H2.03
			Propulsion Systems for Robotic Science Missions	S3.02
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA03	3.0.0 Space Power and Energy Storage	3.1.0 Power Generation	Thermal Energy Conversion	H8.01
			Advanced Photovoltaic Systems	H8.03
			Power Generation and Conversion	S3.01
			Self-Powered, Ultra-Miniature Devices	T3.02
			Power Systems for Hybrid Electric Propulsion	T15.01

		3.2.0 Energy Storage	Advanced Next Generation Batteries	H8.04
		3.3.0 Power Management and Distribution	High Power/Voltage Electronics	Z1.01
		3.4.0 Cross Cutting Technology	Solid Oxide Fuel Cells and Electrolyzers	H8.02
			Power Electronics and Management, and Energy Storage	S3.03
			Energy Transformation and Multifunctional Power Dissemination	T3.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA04	4.0.0 Robotics, Telerobotics and Autonomous Systems	4.1.0 Sensing & Perception	Wireless Technology	Z6.01
		4.2.0 Mobility	Robotic Systems - Mobility, Manipulation, and Human-System Interaction	H6.01
			Extreme Environments Technology	S4.04
		4.3.0 Manipulation	Robotic Mobility, Manipulation and Sampling	S4.02
			Regolith Resources Robotics - R ³	T4.02
		4.4.0 Human-Systems Integration	Augmented Reality	Z5.01
		4.5.0 Autonomy	Unmanned Aircraft Systems Technology	A2.02
			Requirements Management for Spacecraft Autonomy and Space Mission Automation	H6.02
			Command, Data Handling, and Electronics	S3.09
			Spacecraft Autonomy and Space Mission Automation for Consumables	H6.03
			Integrating ISHM with Flight Avionics Architectures for Cyber-Physical Space Systems	H6.04
			Contamination Control and Planetary Protection	S4.05
			Fault Management Technologies	S5.05
			Dynamic Servoelastic (DSE) Network Control, Modeling and Optimization	T4.01
			Coordination and Control of Swarms of Space Vehicles	T4.03
			Information Technologies for Intelligent and Adaptive Space Robotics	T11.01
		4.6.0 Autonomous Rendezvous and Docking	Spacecraft Technology for Sample Return Missions	S4.03

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA05	5.0.0 Communication and Navigation	5.1.0 Optical Comm. And Navigation	Long Range Optical Telecommunications	H9.01
			Slow and Fast Light	S3.08
		5.2.0 Radio Frequency Communications	Autonomous Ka-band Spacecraft Terminals	T5.01
		5.4.0 Position, Navigation, and Timing	Flight Dynamics and Navigation Systems	H9.03
			Aeronautical Communications, Navigation, Surveillance and Information (CNSI) Systems for UAS	T15.02
5.5.0 Integrated Technologies	Advanced Space Communication Systems	H9.02		
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA06	6.0.0 Human Health, Life Support and Habitation Systems	6.1.0 Environmental Control Life Support & Habitation Systems	Environmental Control and Life Support for Spacecraft and Habitats	H3.02
			International Space Station (ISS) Utilization	H14.01
			Sustainability in Space	T6.03
			Closed-Loop Living System for Deep-Space ECLSS with Immediate Applications for a Sustainable Planet	T6.04
		6.2.0 Extravehicular Activity Systems	Dust Tolerant, High Pressure Oxygen Quick Disconnect for Advanced Spacesuit and Airlock Applications	H4.01
			Trace Contaminant Control for Advanced Spacesuit Applications	H4.02
			EVA Space Suit Power, Avionics, and Software Systems	H4.03
			Space Suit Environmental Protection Garment Materials and Technologies	T6.01
		6.3.0 Human Health and Performance	Task Analysis Visualization and Data Management Tool	H12.01
			Passive Vital Sign Monitoring	H12.02
			Novel Imaging Technologies for Space Medicine	H12.03
		6.5.0 Radiation	Radiation Shielding Technologies - Transport Codes	H11.01
			Space Radiation Storms: Monitoring, Forecasting and Impact Analysis	T6.02

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA07	7.0.0 Human Exploration Destination Systems	7.1.0 In-Situ Resource Utilization	In situ Resource Utilization - Production of Feedstock for Manufacturing and Construction	H1.01
		7.6.0 Cross-Cutting Systems	Synthetic/Engineering Biology for NASA Applications	T7.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA08	8.0.0 Science Instruments, Observatories & Sensor Systems	8.1.0 Science Instruments	In Situ Sensors and Sensor Systems for Lunar and Planetary Science	S1.06
			8.2.0 Observations	Airborne Measurement Systems
		Surface & Sub-surface Measurement Systems		S1.08
		Cryogenic Systems for Sensors and Detectors		S1.09
		Proximity Glare Suppression for Astronomical Coronagraphy		S2.01
		Precision Deployable Optical Structures and Metrology		S2.02
		Technologies for Planetary Compositional Analysis and Mapping		T8.01
		8.2.0 Observations	Advanced Optical Systems and Fabrication/Testing/Control Technologies for EUV/Optical and IR Telescope	S2.03
			X-Ray Mirror Systems Technology, Coating Technology for X-Ray-UV-OIR, and Free-Form Optics	S2.04
			Guidance, Navigation and Control	S3.05
		8.3.0 Sensor Systems	Environmental Monitoring	H3.01
			Lidar Remote Sensing Technologies	S1.01
			Microwave Technologies for Remote Sensing	S1.02
			Sensor and Detector Technology for Visible, IR, Far IR and Submillimeter	S1.03
			Detector Technologies for UV, X-Ray, Gamma-Ray and Cosmic-Ray Instruments	S1.04
Particles and Field Sensors and Instrument Enabling Technologies	S1.05			
Unmanned Aircraft and Sounding Rocket Technologies	S3.04			
Photonic Integrated Circuits	T8.02			

			Detection technologies for extant or extinct life for use on robotic missions	T8.03
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA09	9.0.0 Entry, Descent and Landing Systems	9.1.0 Aeroassist & Entry	Ablative Thermal Protection Systems Technologies	H7.01
			Diagnostic Tools for High Velocity Testing and Analysis	H7.02
		9.3.0 Landing	Navigation and Hazard Avoidance Sensor Technologies	T9.01
		9.4.0 Vehicle Systems Technology	Planetary Entry, Descent and Landing and Small Body Proximity Operation Technology	S4.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA11	11.0.0 Modeling, Simulation, Information Technology and Processing	11.1.0 Computing	Technologies for Large-Scale Numerical Simulation	S5.01
		11.2.0 Modeling	Structural Efficiency - Aeroelasticity and Aeroservoelastic Control	A1.01
			Quiet Performance - Propulsion Noise Reduction Technology	A1.02
			Physics-Based Computational Tools - Stability and Control/High Lift Design Tools	A1.05
			Enabling NASA Science through Large-Scale Data Processing and Analysis	S5.03
		11.4.0 Information Processing	Integrated Science Mission Modeling	S5.04
			Earth Science Applied Research and Decision Support	S5.02
			Distributed Spacecraft Missions (DSM) Technology Framework	T11.02
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA12	12.0.0 Materials, Structures, Mechanical Systems and Manufacturing	12.1.0 Materials	Multifunctional Materials and Structures: Integrated Structural Health Monitoring for Long Duration Habitats	H5.03
			NDE Sensors	H13.02
			Advanced Metallic Materials and Processes Innovation	Z3.01
			Technologies to Enable Novel Composite Repair Methods	T12.02
			Increasing Predictability of Softgoods Material Behavior for Inflatable Space Structures	T12.03
		12.2.0 Structures	Large Deployable Structures for Smallsats	H5.01

			Extreme Temperature Structures	H5.02
			In-Space Structural Assembly	H5.04
			Advanced Structural Health Monitoring	T12.01
		12.4.0 Manufacturing	Joining for Large-Scale Polymer Matrix Composite (PMC) Structures	Z4.01
			Experimental and Analytical Technologies for Additive Manufacturing	T12.04
		12.5.0 Cross-Cutting	Flight Test and Measurements Technologies	A2.01
			NDE Simulation and Analysis	H13.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA13	13.0.0 Ground and Launch Systems Processing	13.3.0 Technologies to Increase Reliability and Mission Availability	Improved Test and Launch Operations via Interface Design	H10.01
			Advanced Propulsion Systems Ground Test Technology	H10.02
			Embedded Intelligent Sensor Systems	T13.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA14	14.0.0 Thermal Management Systems	14.2.0 Thermal Control Systems	Thermal Control Systems	S3.07
			Active Thermal Control Systems for Space Exploration	Z2.01