



America's Seed Fund powered by the
National Science Foundation
Small Business Innovation Research (SBIR)/
Small Business Technology Transfer (STTR) program
seedfund.nsf.gov

SOLICITATION TOPICS & SUBTOPICS

America's Seed Fund powered by NSF encourages proposals in all areas of science and engineering. An exact fit into one of these topics or subtopics is not required.

For proposals due in 2019

For 40 years, America's Seed Fund powered by NSF has helped startups and small businesses transform their ideas into marketable products and services. We focus on high-risk, high-impact technologies — those that show promise but whose success hasn't yet been validated — and each year, we award \$200 million in funding to entrepreneurs across the country. Our goals are to foster innovation and help create businesses and jobs in the United States. We are a congressionally mandated program — Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR).

Technology Topic Areas

- Advanced Manufacturing (M)
- Advanced Materials (AM)
- Artificial Intelligence (AI)
- Biological Technologies (BT)
- Biomedical Technologies (BM)
- Chemical Technologies (CT)
- Digital Health (DH)
- Distributed Ledger (DL)
- Educational Technologies and Applications (EA)
- Energy and Power Systems (EP)
- Environmental Technologies (ET)
- Information Technologies (IT)
- Instrumentation and Hardware Systems (IH)
- Internet of Things (I)
- Medical Devices (MD)
- Nanotechnology (N)
- Other Topics (OT)
- Photonics (PH)
- Quantum Information Technologies (QT)
- Robotics (R)
- Semiconductors (S)
- Sensors (SE)
- Space (SP)
- Wireless Technologies (W)

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Advanced Manufacturing (M)

The Advanced Manufacturing topic aims to support emerging innovations in manufacturing with the potential to stimulate the nation's manufacturing sector by improving its efficiency, competitiveness, and sustainability. Proposed technology should be environmentally friendly, compatible with human health, and driven by technological advancements aiming to create positive and enduring social impact. Examples include, but are not limited to, innovative technologies for the processing of a variety of single-component and multi-component materials, biological and bio-inspired materials, flexible electronics, ceramics, polymers, metals, alloys, and novel composites using a variety of advanced manufacturing processes.

M1. Additive Manufacturing Components and Systems

M2. Bio-Inspired Manufacturing

M3. Cybermanufacturing

M4. Human-Centric Industrial Technologies

M5. Manufacturing Technologies

M6. Modeling and Simulation

M7. Personalized Manufacturing / Maker Manufacturing / Maker to Manufacturer

M8. Sustainable Manufacturing Technology

M9. Transportation Technologies

M10. Other Manufacturing Technologies

Advanced Materials (AM)

The Advanced Materials topic addresses the development of new and improved materials for a wide variety of commercial and industrial applications. Proposals may focus on the creation of innovative material systems and/or on critical fabrication, processing, or manufacturing challenges involved in the successful commercialization of materials. A wide variety of applications areas will be considered as part of this topic.

AM1. Coatings and Surface Modifications

AM2. Materials for Sustainability

AM3. Metals and Ceramics

AM4. Multiferroics and Specialized Functional Materials

AM5. Structural and Infrastructural Materials

AM6. Other Advanced Materials Technologies

Artificial Intelligence (AI)

This topic focuses on innovations in the field of artificial intelligence (AI), which refers to intelligence exhibited by machines or software. AI is not a specific technology or technical method — it is instead a field of study aimed at achieving machine-based intelligence. Current AI technologies are targeted at specific problem sets. Artificial general intelligence — machines that can reason like humans — remains a more elusive long-term goal.

AI has the potential to be enormously societally disruptive, and the consequences of its introduction must be carefully considered. Proposers are encouraged to discuss possible negative effects of the proposed technology and how these may be avoided or mitigated.

AI proposals may be submitted either to a broad technical subtopic or under the primary application space, examples of which are listed below.

AI1. AI-Optimized Hardware (e.g., electronic chips)

AI2. Business Intelligence

AI3. Computer Vision, Image and Video Processing

AI4. Decision Management and Optimization (e.g., enterprise platforms, finance)

AI5. eCommerce

AI6. Human-Computer Interaction

AI7. Industrial Systems, including Robotics

AI8. Language-Based Technologies (e.g., natural language processing, natural language generation, speech recognition, text analytics)

AI9. Machine Learning Algorithms and Platforms

AI10. Medical Diagnostics

AI11. Sales, Advertising, and Marketing

AI12. Security, Cybersecurity, and Authentication

AI13. Smart Agriculture

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AI14. Vehicle-Based Systems

AI15. Virtual Agents and Assistants

AI16. Other AI Technologies

Biological Technologies (BT)

The Biological Technologies topic covers a wide range of technology areas to advance engineering and science innovation across the biological spectrum. Biological technologies have disrupted decades-old chemical, agricultural, and medical products and services producing a new bioeconomy. Potential breakthroughs in this space are on course to make major socioeconomic contributions to the economy by boosting productivity in industrial and agricultural processes, improving human health, and making advances toward environmental sustainability.

Proposed projects should be focused on using or modifying living organisms, systems, or biological processes to develop novel technologies to produce biochemicals, medical products, and agricultural products. They may involve bioengineering to improve function in molecules, cells, and tissues in humans, plants, animals, and microbes. NSF also encourages proposals for enabling technologies, such as new tools for genomics, proteomics, and drug discovery, the development of instruments for biological applications, computational and bioinformatic tools, and new manufacturing technologies for cells, tissues, organs and biologics.

BT1. Animal Biotechnology

BT2. Bioinstruments

BT3. Biosensors

BT4. Cell and Biologics Manufacturing

BT5. Cell and Tissue Engineering

BT6. Computational Biology and Bioinformatics

BT7. Drug Discovery Platforms

BT8. Fermentation Technologies

BT9. Food and Food Safety Biotechnology

BT10. Life Science Research Tools

BT11. Plant Biotechnology

BT12. Synthetic Biology and Metabolic Engineering

BT13. Other Biological Technologies

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Biomedical Technologies (BM)

The Biomedical Technologies topic aims to support the early-stage development of novel products, processes, or services that will enable the delivery of high-quality, economically-efficient healthcare.

Subtopics are not aimed at supporting or conducting clinical trials, clinical efficacy or safety studies, the development pre-clinical or clinical-stage drug candidates or medical devices, or work performed primarily for regulatory purposes. Limited studies with human subjects may be acceptable to the extent that they are performed in support of feasibility, proof-of-concept studies of early-stage technologies. **Proposals that request support for clinical studies will be deemed non-compliant with the SBIR/STTR solicitations and may be returned without review.**

BM1. Diagnostic Assays and Platforms

BM2. Drug Delivery

BM3. Materials for Biomedical Applications

BM4. Medical Imaging Technologies

BM5. Noninvasive Imaging of Brain Function

BM6. Pharmaceutical Manufacturing

BM7. Other Biomedical Technologies

Chemical Technologies (CT)

The Chemical Technologies topic covers a wide range of technology areas of current and emerging commercial significance pertaining to the broad chemical industry, energy, power generation, and related industrial sectors. Sensing, data, and advanced analytics technologies relevant to these fields are also appropriate for this topic area. Beyond improvement on technical specifications, it is important to also clearly identify the competitive landscape of what is currently possible, and why the proposed innovation will have an impact commercially and/or from a societal benefit standpoint.

CT1. Catalytic Products and Processes

CT2. Chemical Processes and Products

CT3. Data Technologies, Sensing and Analytics for Chemicals, and/or Energy

CT4. Energy Technologies

CT5. Hydrocarbons, Petrochemicals and Natural Resources

CT6. Power Generation and Infrastructure

CT7. Other Chemical Technologies

Digital Health (DH)

The Digital Health topic aims to support the early-stage development of novel devices, components, systems, algorithms, networks, applications, or services that will enable the transformation of healthcare from reactive, hospital-centered, and indemnity-based to proactive, person-centered, preventive, and cost-efficient. **Subtopics are not aimed at supporting clinical trials, the clinical validation of information technologies, or medical devices or studies performed primarily for regulatory purposes.** Limited studies with human subjects may be acceptable to the extent that they are performed in support of feasibility, proof-of-concept studies of early-stage technologies. **Proposals that request support for clinical studies will be deemed non-compliant with the SBIR/STTR solicitations and may be returned without review.**

DH1. Business Models for User-Centered Healthcare

DH2. Data to Decisions

DH3. Digital Health Information Infrastructure

DH4. Empowering Individuals and Communities

DH5. Interoperability of Health Record Systems, Medical Sensors, Devices, and Robotics

DH6. Other Digital Health Technologies

Distributed Ledger (DL)

The Distributed Ledger topic area covers a wide range of technology areas of current and emerging commercial significance and impact spanning all areas of distributed ledger including blockchains, Directed Acyclic Graphs (DAGs), and related capabilities (cryptography, smart contracts, etc.). Applications of these technologies and approaches across any range of industries and commercial uses are appropriate for this topic area. It is important that the proposed project involve novel, distinctive approaches and/or disruptive innovations that enable high potential impact and competitive advantage in its field of use. These subtopic areas are meant to serve as examples of what entrepreneurs may propose in this space; all distributed ledger proposals with technical innovation and significant commercial potential are welcome, regardless of the specific area of focus of the project.

DL1: Autonomous Systems and Economies

DL2: Blockchain, DAGs, and Next Gen Protocols

DL3: Convergence with Big Data, and AI

DL4: Convergence with IoT, Crowdsourcing and Crowdsensing

DL5: Cryptography and Security

DL6: Decentralized Applications (dApps); Smart Contracts

DL7: Distributed Consensus; Fault Tolerance Mechanisms

DL8: Distributed Ledger in Edge and Cloud Computing

DL9: Distributed Ledger Interoperability

DL10: Distributed Ledger in Network Architecture and Management

DL11: Financial Technologies

DL12: Human-to-Technology Interface

DL13: Scalability Solutions

DL14: Trusted Identity; Identity Management

DL15: Other Distributed Ledger Technologies

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Educational Technologies and Applications (EA)

NSF welcomes proposals that present creative, ground-breaking, and commercially sustainable innovations in the field of education, where such innovations offer the potential for substantial positive impact on society and the world. The subtopics below provide vital (but incomplete) examples of possible educational applications. Submitted proposals should provide detailed descriptions of how the proposed application will work and provide examples of how users would interact with the application, how learning will be assessed, and how accessible and affordable the application will be. Applicants are encouraged to apply under a subtopic where the strongest case for the project's technical innovation can be made.

EA1. Capacity Building, Education, and Training for the Emerging Fourth Sector Ecosystem

EA2. Collaborative and Game-Based Education

EA3. Computer Science, Computer Engineering, and Information Technology Education

EA4. Entrepreneurial, Informal and Maker Education

EA5. Global, Distance, and Higher Education

EA6. Language Applications

EA7. Learning Assessments

EA8. Middle School and High School Education

EA9. Pre-K and Primary Education

EA10. Social and Behavioral Education

EA11. Other Education-Related Technologies

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Energy and Power Systems (EP)

Proposals are solicited in the areas of electronic systems for portable energy sources for mobile technologies and off-grid type applications, including new energy sources. Proposals in the areas of power management systems for energy scavenging/harvesting and compact energy conversion systems, conversion from renewable resources, interface devices between batteries and super-capacitors as well as smart power demand-response management systems are welcome. Proposals with ideas on nature-inspired processes for sustainable energy solutions and carbon storage, reducing the carbon and resource intensity of hydrocarbon extraction, energy conversion, and its uses are sought. Proposals involving energy storage from the scale of wearable devices to power plant, and energy conversion are encouraged. Proposals that address innovations in new technologies that support smart infrastructures (such as materials, sensors, devices, and control systems) to ensure efficient and sustainable energy transmission, distribution, monitoring, and management for micro grids, integration of diverse energy sources, and self-healing networks are sought. Innovations in the areas of novel voltage conversion, micro-inverters and DC-DC voltage converters, and compact high-voltage, high-power systems are welcome. Proposals covering new energy sources for portable and mobile devices, smart power demand-response management systems, inverters, motors, and generators for higher efficiency, smaller size and power factor corrections are encouraged.

EP1. Energy Harvesting and Storage

EP2. Infrastructure and Smart Grids

EP3. Other Energy and Power Systems Technologies

Environmental Technologies (ET)

Environmental Technologies cover a range of innovations that bring the promise of high commercial impact and/or societal benefit for the environment. The topic covers a wide range of technology areas of current and emerging commercial significance pertaining to the technologies and materials that improve environmental and or environmental health outcomes. Sensing, data, and advanced analytics technologies relevant to these fields are also appropriate. If the proposed technology or approach solves a problem without a current solution or underserved area, this should be highlighted.

ET1. Agricultural and Food Technologies

ET2. Data Technologies, Sensing, and Analytics for the Environment

ET3. Environmental Health and Green Chemistry

ET4. Environmental Security and Defense

ET5. Resource Efficiency and Renewable Resources

ET6. Technologies for Extreme Environments

ET7. Water Treatment

ET8. Other Environmental Technologies

Information Technologies (IT)

This topic encourages the submission of proposals that present ground-breaking innovations in the generation, analysis, use, transmission, or protection of information, where such innovations offer the potential for substantial commercial returns and positive societal impact. The subtopics below provide specific examples of technologies and applications, although given the enormous range and diversity in the field of IT these examples are inevitably incomplete.

IT1. Big Data and Advanced Analytics

IT2. Cloud Computing and High-Performance Computing

IT3. Cloud-based IT Services

IT4. Cybersecurity, Authentication, and Privacy

IT5. Cybersecurity for the Internet of Things

Note: This subtopic is focused on cybersecurity innovations pertaining to IoT. Hardware innovations related to IoT should be submitted to the Internet of Things (I) topic.

IT6. Human-Computer Interaction, Virtual Reality, and Augmented Reality

IT7. Image and Video

Note: Image- and video-based innovations that rely on the use of artificial intelligence should be submitted under the AI3 subtopic.

IT8. Mobile Computing and Internet of Things

Note: This subtopic includes IT-based innovations pertaining to IoT devices. Hardware innovations related to IoT should be submitted to the Internet of Things (I) topic.

IT9. Networking Technology

Note: This subtopic includes IT-based innovations pertaining to IoT networking technology. Hardware innovations related to IoT should be submitted to the Internet of Things (I) topic.

IT10. Social Media and Collaborative Networking

IT11. Software

Note: This subtopic focuses on IT innovations that are embodied in software and provide important new or enhanced capabilities that will usually be generalized, rather than directed to a specific use case. Examples of such capabilities include (but are not limited to): enhanced computational speed or efficiency; new or improved functionality; improved or extended performance; increased ease of use and accessibility. The range of possible innovations under this subtopic is too broad to describe here. Past examples of significant software innovations cover a wide range of technical approaches and resulting new capabilities, and they include (but

are obviously not limited to): object-oriented programming; the GUI; HTTP; HTML; TCP/IP; SQL; internet search engine(s); the spreadsheet; word processing; MapReduce; virtualization.

IT12. Other Information Technologies

Instrumentation and Hardware Systems (IH)

The Instrumentation and Hardware Systems topic addresses the research and development of new and improved instrumentation and related systems for a wide variety of commercial and industrial applications. Proposals in this topic may deal with new instruments for use in scientific, industrial, engineering, or manufacturing environments, among others. Types of instruments that will be considered include systems and tools designed for the purposes of detection, manipulation, characterization, measurement, processing, control, and/or monitoring. A wide variety of applications areas will be considered as part of this topic.

IH1. Instrumentation or Hardware Systems for Imaging

IH2. Instrumentation or Hardware Systems for Characterization

IH3. Instrumentation or Hardware Systems for Detection, Actuation, Control, and Manipulation

IH4. Other Instrumentation or Hardware Systems Technologies

Internet of Things (I)

The Internet of Things (IoT) is a rapidly evolving field that involves the interconnection and interaction of smart objects (objects or devices with embedded sensors, onboard data processing capability, and a means of communication) to provide automated services that would otherwise not be possible. IoT is not a single technology, but rather involves the convergence of sensor, actuator, information, and communication technologies. Emerging IoT implementations will use smaller and more energy-efficient embedded sensor technologies, more sophisticated actuators, enhanced communications, and advanced data analytics to collect and aggregate information and enable intelligent systems that understand context, track and manage complex interactions, and anticipate requirements. Market verticals that are potentially impacted by innovations in this area include connected cities and homes, smart transportation, smart agriculture, industrial IoT, and retail IoT. Proposals are encouraged that address key challenges across the full range of IoT applications involving hardware devices and sensors. Advances focusing on software, cybersecurity, and computing technologies should apply under one of the Information Technologies (IT) subtopics.

I1. IoT Communications

I2. IoT Energy and Power Systems

I3. IoT Integrated Systems

I4. IoT Sensors and Actuators

I5. Other IoT Technologies

Medical Devices (MD)

The Medical Devices topic aims to support the early-stage development of novel products, processes, or services that will enable the delivery of high-quality, economically-efficient healthcare in the United States and globally. The medical devices topic is not aimed at supporting or conducting clinical trials, clinical efficacy or safety studies, the development of pre-clinical or clinical-stage drug candidates or medical devices, or work performed primarily for regulatory purposes. Limited studies with human subjects may be acceptable to the extent that they are performed in support of feasibility, proof-of-concept studies of early-stage technologies. **Proposals that request support for clinical studies will be deemed non-compliant with the SBIR/STTR solicitations and may be returned without review.**

MD1. Medical Devices

Nanotechnology (N)

The Nanotechnology topic addresses the creation and manipulation of functional materials, devices, and systems with novel properties and functions that are achieved through the control of matter at a submicroscopic scale (from a fraction of nanometer to about 100 nanometers). This includes, but is not limited to, innovative hierarchical nanostructures, nanolayered structures, nanowires, nanotubes, quantum dots, nanoparticles, nanofibers, and other nanomaterials and biomaterials and their composite structures. Proposals focusing on global technological challenges through development of innovative nanotechnologies are especially encouraged.

N1. Nanomanufacturing

N2. Nanomaterials

N3. Nanotechnology Solutions to Global Grand Challenges

N4. Other Nanotechnology Technologies

Other Topics (OT)

The Other Topics area is intended to be a home to any proposed project that does not seem to fit into one of the other technology topic areas, but still meets the NSF SBIR/STTR goals of supporting research and development of innovative, risky, unproven technology, with commercial viability and the potential to benefit society.

OT1. Other Topics

Photonics (PH)

The Photonics topic addresses the research and development of new materials, devices, components, and systems that have the potential for revolutionary change in the optics and photonics industries. Photonic technologies can include anything generally operating in or using photons in the electromagnetic spectrum from gamma rays down to long radio waves. Examples include photovoltaics, lasers, various light emitting diode technologies (LED, OLED, QLED), radiation detectors, and novel communications technologies.

PH1. Advanced Metrology and Sensors

PH2. Advanced Optical Components and Systems

PH3. Communications, Information, and Data Storage

PH4. Energy

PH5. Lighting and Displays

PH6. Other Photonics Technologies

Quantum Information Technologies (QT)

This topic focuses on innovations in information and communications technologies that rely fundamentally on quantum mechanical properties and interactions. Typically, such innovations will involve the generation, detection, or manipulation of quantum states to provide faster, more efficient or more secure information processing and communications. Proposals may include innovations at the component, sub-system, or system level that result in substantial and usable improvements in the generation, transmission, detection, storage, or processing of information, or the security and privacy of information. Proposed innovations must offer the potential for robustness, reliability, scalability, and operation at temperatures that are practical within the constraints of the intended application. Innovations at the component and sub-system level should aim for compactness and energy efficiency, consistent with the requirements of the application.

Examples of technology innovation in the quantum computing subtopic could include qubit generation and detection; development of computational models (quantum circuits, etc.); error correction; algorithms; software; hardware sub-systems and systems; and NISQ computers. Examples of technology innovation in the quantum communications subtopic could include components such as sources, memories, repeaters, detectors; hardware sub-systems and systems; networks; cryptography; and key distribution. Proposals may be submitted under one of the following broad subtopics:

QT1. Quantum Communications

QT2. Quantum Computing

QT3. Quantum Sensing and Metrology

QT4. Quantum Simulation

QT5. Other Quantum Information Technologies

Robotics (R)

Proposals addressing robot intelligence and experiential learning, particularly those in the areas of high-performance processors/hardware to provide situational awareness, and improved artificial intelligence, are welcome. Innovations in voice, obstacle and image recognition, emotional response, and hand-eye coordination are encouraged. We encourage proposals describing projects that borrow features from other animal nervous systems and include biologists, neuroscientists, and/or psychologists on their team to exploit new knowledge in the study of the brain and behavior. NSF also seeks proposals that address next-generation automation, the flexible and rapid reconfiguration of assembly lines allowing mass customization, the use of advanced control, scheduling, modularization, and decentralization with agile, mobile robotic systems that can enable the cost-effective manufacture of small lot-size products, and on-demand parts manufacturing. Proposals to support the physical and educational needs of individuals with disabilities (e.g., vision, hearing, cognitive, motor related) are sought. Robotic applications in healthcare, smart drones and drone networks are appropriate. Medical devices that provide new capabilities to doctors including surgery; robotic exoskeletons to enhance human strength; personal robots with an emphasis on human-centered end use and interaction, personal caregiving and increased autonomy; and robots of augmentation are welcome.

R1. Human Assistive Technologies and Bio-related Robotics

R2. Human-Machine Interfaces and Control/Architecture

R3. Robotic Applications

R4. Robotics in Agile Manufacturing, and Co-Robots

R5. Other Robotics Technologies

Semiconductors (S)

The Semiconductors topic addresses the research and development of new designs, materials, devices, and manufacturing systems that have the potential for impactful change in the semiconductor industry.

S1. Electronic Devices

S2. Electronic Materials

S3. Integrated Circuit Design

S4. Micro-electronics Packaging, Thermal Management, and Systems Integration

S5. Processing and Metrology Technology

S6. Other Semiconductor Technologies

Sensors (SE)

Recent technological advancements in materials science and bioengineered systems have made inexpensive, powerful, and ubiquitous sensing a reality. Examples range from truly smart airframes and self-evaluating buildings and infrastructure for natural hazard mitigation to large-scale weather forecasting, self-organizing energy systems, and smart devices that self-assemble into networks leading to the first electronic nervous system that connects the internet back to the physical world. Proposals are sought in new sensing modalities, self-powered and energy efficient sensors, sensors for extreme environments, sensor fabrication techniques such as 3D printing and self-assembly, sensor signal read out, conditioning, and processing, and biodegradable sensors. For sensor systems and algorithms, tomographic processing, 3D array, autonomous sensing, sensor fusion, extreme environment materials sensing, and remote sensing parametric inversion are of interest.

SE1. Sensors

Space (SP)

The Space topic will seek revolutionary technologies to be deployed outside Earth's atmosphere to enhance the commercial use of space. Technologies could include innovations that provide cheaper, safer, and more frequent products and solutions to commercial space customers. This topic particularly seeks to support growth-oriented small businesses who have not previously received significant SBIR/STTR funding and are seeking to contribute to economic growth by developing innovative systems and services supporting the overall emerging space economy.

Proposals should be addressing real capability gaps or enabling technologies for the space industry, anchored with a solid understanding of the challenges of working in space, including launch, mass and volume restrictions, radiation and thermal environment, communications and latency, power and energy, etc. NSF encourages proposals with revolutionary satellite and vehicle hardware or systems innovations involving propulsion systems, navigation systems, and energy collection and power generation systems unique to space environments, in-space manufacturing systems and services; Earth imaging and sensing; planetary (other than Earth) physical surveying, mapping, and prospecting services; extraction and processes of water and volatiles (not on Earth); and analytic services based on data collected extensively from space-based systems, either alone or in combination with terrestrial systems.

SP1. Extra-terrestrial Resource Extraction

SP2. Geological and Geoclimatic Science Data Products and Services

SP3. Ground Launch Sites and Satellite Operations

SP4. In-space Manufacturing

SP5. Navigation and Positioning Services

SP6. On-Orbit Services

SP7. Remote Sensing Services

SP8. Space Transportation and Access

SP9. Spacecraft Development and Manufacturing

SP10. Telecommunications Services

SP11. Other Space-Related Technologies

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Wireless Technologies (W)

Proposals of interest involve next-generation wireless communication technologies requiring systems with high data rates, low cost, and that support a wide variety of applications and services, while maintaining full mobility, minimum latency, and long battery life. Devices and subsystems that increase data throughput rates via cell density, increased spectrum, multiple input, multiple output (MIMO), massive MIMO, and new “antenna” concepts. NSF welcomes proposals involving modulation and demodulation techniques for signal generation and reception through spectral efficiency, noise immunity, jamming immunity, and power efficiency; radio frequency (RF) pollution: device and circuit; processing algorithms/3D spatial control; high efficiency devices such as micro-TWT, smart dust, and inductive couplers. NSF seeks proposals in the areas of spectrum-related research and development activities that improve the efficiency by which the radio spectrum is used, and the ability of all members of the public to access spectrum-related services. Mobile and automotive radar, smart solar panels, on-panel DC-AC converters, and self-testing and self-networking devices are also of interest.

W1. Wireless Devices and Components

W2. Wireless Systems

W3. Other Wireless Technologies