Engineering at NSF

DAWN TILBURY, NSF ASSISTANT DIRECTOR FOR ENGINEERING

ASEE ENGINEERING DEANS INSTITUTE, NEW DEANS ORIENTATION

FEB. 3, 2020
NSF champions research and education across all fields of science and engineering.
93% funds research, education and related activities

$8.3B FY 2020 enacted

48,000 proposals evaluated

2,000 NSF-funded institutions

12,000 awards funded

386,000 people NSF supported

$1.2B STEM education

$100M to seed public/private partnerships

236 NSF-funded Nobel Prize winners

Numbers shown are estimates based on FY 2018 activities.
NSF Budget

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<th>FY 2017</th>
<th>FY 2018</th>
<th>FY 2019</th>
<th>FY 2020</th>
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Research Protection

NSF values
- Openness
- Transparency
- Merit-based competition

Importance of disclosure
NSF’s 10 Big Ideas | 6 Research Ideas

- Windows on the Universe: The Era of Multi-messenger Astrophysics
- The Future of Work at the Human-Technology Frontier
- Navigating the New Arctic
- Harnessing the Data Revolution
- The Quantum Leap: Leading the Next Quantum Revolution
- Understanding the Rules of Life: Predicting Phenotype
NSF’s 10 Big Ideas | 4 Enabling Ideas

Growing Convergence Research at NSF

NSF 2026: Seeding Innovation

NSF INCLUDES: Enhancing STEM through Diversity and Inclusion

Mid-scale Research Infrastructure
“No Deadlines” for ENG core proposals

Unsolicited proposals to all core programs in four ENG divisions (CBET, CMMI, ECCS, and EEC) are accepted any time

- Declined proposals face a 1-year moratorium before resubmission

New flexibility to carefully craft proposals for significant contributions
National AI Research Institutes

Planning grant proposals in any areas of relevant foundational and use-inspired research

Institutes proposals in a theme:
- Trustworthy AI
- Foundations of Machine Learning
- AI-Driven Innovation in Agriculture and the Food
- AI-Augmented Learning
- AI for Accelerating Molecular Synthesis and Man
- AI for Discovery in Physics

President’s AI strategy: https://www.whitehouse.gov/ai/

NSF 20-029
Dear Colleague Letter: Research Opportunities for the Directorate for Engineering in Artificial Intelligence

December 16, 2019
Dear Colleagues:

Recent advances in artificial intelligence (AI) and its emerging uses in various knowledge and technology fields have been enabled by accelerating advances in fields such as deep learning, computer vision and natural language processing, in parallel with increased computing power and availability of large data sets. Such advances, combined with the development of new logic algorithms and hardware suitable for AI, are expected to generate profound commercial and societal impacts in areas ranging from autonomous vehicles to manufacturing, robotics, agriculture, construction, building management and vehicle safety, highlighting the convergence of engineering and data sciences.

Synergy between research frontiers in AI and the projects sponsored by the Directorate for Engineering have the potential to stimulate further transformative progress and continued advancement in engineering processes and systems, addressing issues of national importance with potential for economic impact and quality-of-life improvements. The National Artificial Intelligence Research and Development Strategic Plan (National Science and Technology Council, June 2019) provides a framework for the visioning activities and strategic objectives of investments in AI research in the United States.

This Dear Colleague Letter (DCL) highlights existing programs and other potential opportunities for ENG researchers to participate in the submission of proposals and supplemental funding requests for AI projects:

- ENG core research, education and innovation programs (described in https://www.nsf.gov/director_index.jsp?org=ENG)
- ENG centers and networks
- Collaborative projects with other directorates and agencies
- Conferences and workshops
- Start-ups and small businesses focused on commercializing AI-enabled devices, systems and platforms
- AI dedicated programs, including the National Artificial Intelligence Research Institutes program (described in NSF 20-503; with FAQs in NSF 20-021). There are two tracks described in this program: A Planning Grant Track (deadline January 30, 2020) and an Institute Track (January 28, 2020) that has six specific thematic areas. Four of the Institutes Tracks may be of special interest to ENG researchers working in the fields of: Foundations of Machine Learning; AI-Driven Innovation in Agriculture and the Food System; AI-Augmented Learning; AI for Accelerating Molecular Synthesis and Manufacturing.

POINTS OF CONTACT

The activities described in this DCL constitute neither a special competition nor a new program. Interested PIs should contact the cognizant.
Sustainable Urban Systems

27 workshops and conferences in summer 2019 to explore concepts for advancing sustainable urban systems research networks

- Small to mega cities
- Topics: food, resilience, infrastructure, automation, education, and others
- Regions: Great Lakes, Southeast, arid regions, and others

https://www.nsf.gov/ere/ereweb/urbansystems/
Mid-scale Research Opportunities

Addressing Systems Challenges through Engineering Teams (ASCENT)

Environmental Convergence Opportunities in Chemical, Bioengineering, Environmental, and Transport Systems (ECO-CBET)

Leading Engineering for America's Prosperity, Health, and Infrastructure (LEAP HI)

Resilient urban infrastructure that integrates the natural and built environments

*Image courtesy Northwestern University*
Non-Academic Research Internships for Graduate Students (INTERN) Supplements

Advances NSF-funded basic research through collaborations with industry, small businesses and national labs

- ~450 graduate students during FY 2017-2019
Visioning

To speak with a unified voice on bold and high-impact fundamental research priorities that will
◦ advance the state of current engineering endeavors, and
◦ enable rapid and efficient responses to emerging opportunities and/or national needs

July 2019: Visioning Summit
NSF Lineage: Basic research to commercialization

Org: FlexDex
PI: Shorya Awtar

Org: FlexDex
PI: Shorya Awtar

PI: Shorya Awtar
EL: David Hiemstra
Mentor: Francis Criqui
Open ENG Positions

CBET
- Disability and Rehabilitation Engineering (DARE)
- Engineering of Biomedical Systems

CMMI
- Engineering for Civil Infrastructure
- Manufacturing Systems Design

ECCS
- Communications, Circuits and Sensing Systems
- Energy, Power, Control, and Networks

EEC
- Engineering Research Centers

http://nsf.gov/careers
Thank you