ADVANCING AI RESEARCH AND WORKFORCE

Advances in AI research over the last several decades have enabled breakthroughs across nearly every sector of society, from understanding the cosmos to advancing healthcare delivery to improving our transportation systems to enhancing manufacturing. The National Science Foundation is the leading federal funder of fundamental research in AI, including foundational and translational research, advanced and scalable computing resources that power AI innovations, and education and workforce development for America’s AI researchers and practitioners.

AI IS CORE TO “10 BIG IDEAS”

Advances in AI are core to many of NSF’s 10 Big Ideas, a framework that NSF announced in 2016 for pushing forward the frontiers of U.S. research and innovation. Key among these are Harnessing the Data Revolution (HDR) and Future of Work at the Human-Technology Frontier (FW-HTF).

- **Harnessing the Data Revolution** engages NSF’s research community in the pursuit of fundamental research in data science and engineering; the development of a cohesive, federated, national-scale approach to research data infrastructure; and the development of a 21st century data-capable workforce. Learn about active funding opportunities.

- **Future of Work at the Human-Technology Frontier** is building an understanding of how constantly evolving technologies are actively shaping the lives of workers and how people in turn can shape those technologies, especially in the world of work. This Big Idea is bringing together a range of NSF research communities to conduct fundamental scientific research on the interaction of humans, society and technology that will help shape the future of work to increase opportunities for workers and productivity for the American economy.

TAKING AI TO THE NEXT LEVEL

NSF supports fundamental research in AI. Our ability to bring together numerous fields of scientific inquiry -- including computer and information science and engineering, cognitive science and psychology, economics and game theory, engineering and control theory, ethics, linguistics, mathematics, philosophy -- uniquely positions the agency to lead the nation in expanding the frontiers of AI.

NSF is providing several funding opportunities with special emphasis on AI.

- The National Artificial Intelligence Research Institutes program will provide more than $120 million in fiscal year 2020 to fund planning grants and begin funding up to six multidisciplinary, multi-institutional research institutes that will create national nexus points for universities, federal agencies, industry and nonprofits to advance AI research and workforce development. NSF anticipates providing another $80 million for additional research institutes that will begin in Fiscal Year 2021.

- **AI and Society, supported jointly with the Partnership on AI**, supports EArly-concept Grants for Exploratory Research (EAGERs) to understand the social challenges arising from AI technology and to enable scientific contributions to overcome them. Increases in the scale and diversity of AI system deployments necessitate a better understanding of AI in the open world, including unforeseen circumstances and social impacts, and approaches to AI that consider such circumstances and impacts from the start.

- **NSF Program on Fairness in Artificial Intelligence in Collaboration with Amazon** is a joint partnership to support research focused on fairness in AI, with the goal of contributing to trustworthy AI systems that are readily accepted and deployed to tackle grand challenges facing society. Specific topics of interest include, but are not limited to, transparency, explainability, accountability, potential adverse biases and effects, mitigation strategies, validation of fairness, and considerations of inclusivity.
• **Real-Time Machine Learning (RTML)** is a joint effort of NSF and the Defense Advanced Research Projects Agency (DARPA) to explore high-performance, energy-efficient hardware and machine learning architectures that can learn from a continuous stream of new data in real time. Both agencies have issued calls for proposals focused on RTML and will offer collaboration opportunities to awardees throughout the duration of their projects. Overall, this partnership will contribute significantly to the foundation for next-generation co-design of RTML algorithms and hardware.

• **Fairness, Ethics, Accountability, and Transparency (FEAT)** contributes to discovery in research and practice related to fairness, ethics, accountability and transparency in computer and information science and engineering, including AI.

### INVESTING IN THE NEXT GENERATION

NSF’s investments in AI research and infrastructure are accompanied by investments in education and workforce development. NSF is funding research and development that is building the necessary foundations for implementing rigorous and engaging computer science education at all levels: preK-12, colleges/universities and continuing education programs.

• **Computer Science for All: Researcher Practitioner Partnerships (CSforAll: RPP)** aims to provide all U.S. students the opportunity to participate in computer science and computational thinking education in their schools at the preK-12 levels. NSF focuses on researcher-practitioner partnerships that foster the research and development needed to bring computer science and computational thinking to all schools.

• **Improving Undergraduate STEM Education: Computing in Undergraduate Education (IUSE: CUE)** supports teams of Institutions of Higher Education (IHEs) in re-envisioning the role of computing in interdisciplinary collaboration within their institutions. In addition, NSF is encouraging partnering IHEs to use this opportunity to integrate the study of ethics into their curricula, both within core computer science courses and across the relevant interdisciplinary application areas.

• **Graduate Research Fellowships (GRF)** recognize and support outstanding graduate students in NSF-supported STEM disciplines, including AI and data science, who are pursuing research-based master’s and doctoral degrees at accredited U.S. institutions.

• **NSF Research Traineeship (NRT)** is designed to encourage the development and implementation of bold, new, and potentially transformative models for STEM graduate education training. NRT is dedicated to effective training of STEM graduate students in high-priority interdisciplinary or convergent research areas, including Harnessing the Data Revolution and Future of Work at the Human-Technology Frontier.

### NSF LEADERSHIP IN AI

NSF leadership plays an important role in driving and coordinating AI research and development across federal agencies through the [National Science and Technology Council (NSTC)](https://www.nsf.gov/about/nstc/), a Cabinet-level council that serves as the principal means for the President to coordinate science and technology policies across the executive branch. NSF co-chairs the NSTC AI Select Committee, Machine Learning and AI Subcommittee, and AI Research and Development Interagency Working Group, all of which serve to coordinate research, education, and research infrastructure investments. As part of these efforts, NSF joined other federal agency partners in announcing the release of an update to the [National Artificial Intelligence Research and Development Strategic Plan](https://www.nsf.gov/about/nstc/) on June 21, 2019.