$33.1 MILLION
NSF Funding at Vanderbilt in FY 2020

31
Active NSF CAREER Awards in FY 2020

10
New NSF CAREER Awards in FY 2020

NSF I-Corps Program at Vanderbilt

The National Science Foundation (NSF) Innovation-Corps (I-Corps) program prepares scientists and engineers to extend their focus beyond the university and accelerates the economic and societal benefits of NSF-funded research projects that are ready to move toward commercialization. To date, the Vanderbilt I-Corps site has supported more than 170 teams of researchers and aspiring entrepreneurs in identifying product opportunities for their ideas; 46 percent of the teams have been led by women.

Participants have worked on a wide range of projects, including a radioisotope power system that converts the heat from recycled nuclear waste into electricity, a blockchain-enabled fintech product that allows refugees to safely access their money when fleeing persecution, a virtual try-on technology for the fashion industry, and an advanced cybersecurity solution that protects against ransomware attacks.

The participants have won at SXSW, been accepted into Techstars (a program that provides entrepreneurs with financial, human, and intellectual capital to fuel the success of their businesses), been selected for the Forbes Top 30 under 30, hired their first employees, and licensed their technologies to strategic partners. Since fall 2017, more than 18 teams of Vanderbilt students and faculty have been accepted into the national I-Corps program, each receiving a $50,000 grant to explore the commercial potential of their research. Eight of these teams were led by underrepresented minority founders.

These grantees gain skills in entrepreneurship through training in customer discovery and product market fit with guidance from established entrepreneurs. Eleven teams have received highly competitive SBIR (Small Business Innovation Research) or STTR (Small Business Technology Transfer) grants. Teams from the Wond’ry, Vanderbilt University’s Innovation Center and home of the Vanderbilt I-Corps site program, have raised over $47 million in funding from grants and venture capital.

Recent CAREER Awards at Vanderbilt

NSF’s Faculty Early Career Development (CAREER) Program offers the foundation’s most prestigious awards in support of early-career faculty who exemplify the role of teacher-scholars through outstanding research, excellent education, and the integration of education and research within the context of their organizations.

- An assistant professor of civil and environmental engineering has received a CAREER award to improve critical infrastructure risk management and transform policy-making to ensure the resilience and sustainability of communities under short- and long-term risks and provide opportunities for learning lessons across cities. The project combines integrated research, education, and outreach on two cities with very different profiles—fast-growing Nashville, which is turning to community-focused and smart solutions, and Colombo in Sri Lanka, which faces two monsoon seasons each year that affect thousands of people.

- An assistant professor of chemical and biomolecular engineering has received a CAREER award to support his research on membrane technology which focuses on atomically-thin two-dimensional materials that allow subatomic particles (e.g., protons) to selectively pass through the membrane while blocking even small gas atoms such as helium. The ability to separate protons from other atoms and molecules will enable disruptive innovations in energy generation and conversion, chemical processing and separations, electronics, and environmental protection.
• An assistant professor of physics has received a CAREER award to further his search for the particles that make up dark matter and are responsible for dark matter interactions. Based on observations of gravitational effects and the behavior of stars, scientists know that dark matter exists and that it accounts for roughly 27 percent of the universe’s energy density. So far, however, no one has been able to figure out what particles make up dark matter, let alone capture or measure them. He also plans to use the award to create research and mentoring opportunities for students in the Fisk-Vanderbilt Master’s-to-PhD Bridge Program and intends to start a summer particle physics academy for local high school students from underrepresented groups.

NSF Convergence Accelerator Program

The new NSF Convergence Accelerator program seeks to test new models for innovation in government, industry, and academia. NSF’s convergent approach is designed to speed basic research toward impactful problem solving by bringing together scientists from different fields, business practitioners, and non-profit leaders to holistically understand problems and craft solutions. As part of the program, NSF has awarded a highly competitive Phase II $5 million grant to Vanderbilt University that greatly expands a School of Engineering-led project for creating novel AI technology and tools and platforms that train and support individuals with autism spectrum disorder in the workplace. The significant federal investment follows a successful $1 million, nine-month Phase I pilot grant to the same team that forged partnerships with employers and other stakeholders and produced viable prototypes through immersive, human-centric design.

Faking a medical record in order to mitigate privacy risks

With support from NSF, a group of Vanderbilt University computer scientists are using generative adversarial networks (GANs), or machine learning frameworks, to generate over 1 million de-identified electronic health records (EHRs) of patients that don’t actually exist. Currently, unrestricted use on a wide scale of EHRs for biomedical or health services research is precluded by patient privacy considerations. “Fake” EHRs simulated in this way could ultimately help speed discovery. Evaluated against earlier learning models, the team’s medical GAN more closely mimics real-world data while providing training-set patients a similar level of protection from prospective privacy attacks.

New discovery shows infection of the lungs can be caused by hybrid fungi

NSF is supporting a team of scientists in Vanderbilt’s College of Arts and Science who have discovered the first known instance of a hybrid fungal species causing aspergillosis, an ensemble of different types of lung infections that often impacts immune-compromised people. This new discovery will set the stage for future research on innovative identification, treatment, and management strategies for these lung diseases. To combat infections, understanding how fungi respond to antifungal drugs is essential. Examining how the fungus grows in infection-relevant conditions is the first step to helping patients impacted by these types of infections.

Neurodiversity Inspired Science & Engineering Graduate Trainee Fellowship Program

Sponsored by an NSF Research Traineeship grant, Vanderbilt’s Neurodiversity Inspired Science & Engineering (NISE) program takes a novel approach to the training of engineers and scientists engaged in advancing the future of work at the human technology frontier (FW-HTF). NISE engages students across STEM disciplines in all stages of the development, deployment, and commercialization of FW-HTF approaches and devices that support neurodiverse individuals and/or that are inspired by their abilities. The traineeship anticipates providing a unique and comprehensive training opportunity for 150 students, including 50 funded trainees from computer science, mechanical engineering, data science, psychology, organizational science, and neuroscience. The NISE program builds on the unique strengths of the Vanderbilt School of Engineering’s Frist Center for Autism & Innovation and the Vanderbilt Graduate School.

For more information, please contact Vanderbilt’s Office of Federal Relations:
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FY 2020
Graduate Research Fellowships

Twenty-two Vanderbilt graduate students won NSF graduate research fellowships in FY 2020, bringing the total number of fellows at Vanderbilt to 71. The fellowships provide three years of support and are aimed at aiding individuals who have demonstrated notable potential early in their research careers and in increasing the diversity of the science and engineering workforce.

Training diverse students in STEM

Vanderbilt University is committed to increasing the number of underrepresented minority students completing STEM degrees. Partnered with HBCUs and funded by NSF, Vanderbilt is working to improve the demographic representation of STEM fields.

- Tennessee State University and Vanderbilt are leading an expansion of the Tennessee Louis Stokes Alliance for Minority Participation, an NSF-funded collaborative effort by 10 Tennessee colleges and universities to improve the retention of underrepresented minority students in STEM fields statewide.

- The Fisk-Vanderbilt Master’s-to-PhD Bridge Program provides students a stepping stone from their master’s degree at Fisk University to a Ph.D. at Vanderbilt. As of Fall 2018, the program has produced 29 Ph.D. graduates in physics, astronomy, and materials science. Every student has acquired STEM-related employment prior to graduation. This program could serve as the vehicle for systemic change to reduce inequities in STEM and stress the importance of not losing students in the educational system.

INCLUDES Program

Vanderbilt received one of NSF’s inaugural INCLUDES (Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science) awards. That award supported a pilot program to find innovative ways to improve the success of students with disabilities in STEM disciplines.

Additionally, a Peabody College researcher is among an alliance of researchers funded through INCLUDES who are forging pathways to STEM careers for people who are or were incarcerated. The project’s mission is to make educational programming for STEM careers and college study commonplace, accessible, and rigorous in U.S. prisons and reentry programs.

Research Experience for Undergraduates

The Vanderbilt Institute of Nanoscale Science and Engineering (VINSE) has hosted an NSF-funded Research Experience for Undergraduates site program on campus since 2011. VINSE REU attracts undergraduates from across the country to Vanderbilt and provides valuable supplementary enrichment and social activities to the participating students. In its 10 years of operation, VINSE REU has provided opportunities to 101 students who have gone on to win national awards, including 19 NSF graduate research fellowships. There was no event this past summer due to COVID-19 restrictions.

Training for teachers

Researchers at Vanderbilt Peabody College, in partnership with Fisk University, established a Robert Noyce Teacher Scholarship Program. Noyce scholarships, funded by NSF, are designed to recruit and prepare high-quality STEM teachers for high-need school districts.

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