

# ANNUAL REPORT 2022-23

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**Northeastern University**  
**College of Engineering**



With over 230 tenured/tenure-track faculty and 18 multidisciplinary research centers and institutes with funding by eight federal agencies, the College of Engineering is a leader in experiential education and interdisciplinary research focused on discovering solutions to global challenges to benefit society. Northeastern's global university system—with engineering programs on campuses across the U.S. and in multiple countries—provides flexible academic offerings, innovative partnerships, and the ability to scale ideas, talent, and solutions.

### **About Northeastern**

Founded in 1898, Northeastern is a global research university and the recognized leader in experiential lifelong learning. Our approach of integrating real-world experience with education, research, and innovation empowers our students, faculty, alumni, and partners to create worldwide impact.

Northeastern's personalized, experiential undergraduate and graduate programs lead to degrees through the doctorate in 10 colleges and schools across our 13 campuses worldwide. Learning emphasizes the intersection of data, technology, and human literacies, uniquely preparing graduates for careers of the future and lives of fulfillment and accomplishment.

Our research enterprise, with an R1 Carnegie classification, is solutions oriented and spans the world. Our faculty scholars and students work in teams that cross not just disciplines, but also sectors—aligned around solving today's highly interconnected global challenges and focused on transformative impact for humankind.



**We are a leader in experiential education  
and interdisciplinary research, focused  
on Engineering for Society**

**DEAR COLLEAGUES, FRIENDS, AND STUDENTS,**

Our College of Engineering at Northeastern University is always on the rise! From a newly elected member of the National Academy of Engineering for the second year in a row to achieving well over \$100 million in annual external research awards, we are proud to highlight our many accomplishments.

Our research enterprise reached \$118 million in external research awards in FY2023, up 101% from FY2017. This year, our PROTECT multi-institutional research center, which focuses on environmental health in Puerto Rico, received a \$35 million renewal from the National Institutes of Health for a national ECHO (Environmental Influences on Child Health Outcomes) study. We are also leading Northeastern's first National Research Traineeship, an interdisciplinary \$3 million highly competitive award from the National Science Foundation for research on the effects of digital platforms, while increasing opportunity for underrepresented graduate students. This builds upon our recent federally funded center awards, including a \$36 million DHS Center of Excellence to protect public spaces, and NSF INCLUDES Engineering-PLUS—a \$10 million center to increase BIPOC and women in engineering.

Our faculty have also been recognized for their innovation and contributions to their engineering fields. During the 2023 academic year, our faculty received two lifetime achievement awards, 11 professional society fellowships, and nine early-career award grants.

With our focus on experiential, interdisciplinary, and global education, demand for and selectivity of our degree offerings have increased; master's enrollment rose 75% in fall 2022 vs. 2017, and our undergraduate first-year acceptance rate was 10% vs. 37% for the same period. To meet this growth and offer unique experiential, global opportunities for students, we continue to expand our academic offerings and research capabilities across Northeastern's global university system; we have academic programs at nine campuses in three countries and growing.

We are proud that Northeastern was once again ranked No. 1 in internships/co-ops by U.S. News and World Report (USNWR). We are also thrilled that our College of Engineering undergraduate ranking rose to 37 (up from 50 last year), and our graduate ranking increased to 32 in the USNWR 2024 editions.

I invite you to explore this Annual Report and contact us for ideas for collaboration and more information.

Sincerely,

**Gregory D. Abowd, D.Phil.**

Dean, College of Engineering  
Northeastern University  
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**COE.NORTHEASTERN.EDU**



Photo by Bella Martinez



# Quick Facts **COLLEGE OF ENGINEERING**

Five-Year Performance 2017 to 2022, unless otherwise indicated

Enrollment, Outcomes, and Programs	Experiential Learning	Innovative Research
<b>TOTAL ENROLLMENT</b> (Fall 2022) <b>10,046</b> 62% Graduate 38% Undergraduate  <b>Enrollment Growth</b> (2017 to 2022) <b>75% MS</b> 29% PhD	<b>3,333</b> <b>Total Co-op Hires</b> (AY2023) 58% undergraduate 42% graduate	<b>238</b> <b>TENURED/ TENURE-TRACK</b> Faculty 27 new in AY2023-24, including 44% women or URM, and 41% jointly appointed
<b>53%</b> of first-year undergraduates are women up from 34% in Fall 2017 <b>19%</b> of first-year undergraduates are underrepresented minorities up from 12% in Fall 2017	<b>3,057</b> <b>Co-op Employer Partners</b> (AY2021-2023)	<b>117</b> <b>Faculty Hires</b> since AY2016
<b>10.2%</b> <b>First-Year Acceptance Rate</b> , from 12,727 apps (Fall 2022) vs. 36.9%, from 8,680 apps (2017) <b>4.4</b> <b>GPA (Fall 2022)</b> vs. 4.3 (Fall 2017)	<b>Full-time Job Offer from Co-op Employer</b> (Class of 2022) 54% undergraduate 52% master's	<b>142</b> <b>YOUNG INVESTIGATOR</b> Awards Including 72 NSF CAREER Awards, and 26 DOD Young Investigator Awards
<b>1,783</b> Graduate Degree Conferrals (Class of 2022) up <b>61%</b> vs. 2017	<b>International Experiences</b>	<b>102</b> <b>Professional Society Fellowships</b>
<b>Students employed or in graduate school within nine months after graduation</b> (Class of 2022) 96% undergraduate 94% graduate	<b>622</b> <b>Students</b>   <b>40</b> <b>Countries</b> (AY2023)	<b>154</b> <b>Patents</b> 2017 to Aug. 2023
<b>5</b> <b>Engineering Departments</b>	<b>Academic Programs on 9 Campuses, 3 Countries, and Online</b> Boston, MA Arlington, VA London, UK Oakland, CA Portland, ME Seattle, WA Silicon Valley, CA Toronto, CANADA Vancouver, CANADA	<b>\$118M</b> <b>External Research Awards</b> (2023) up <b>101%</b> vs. FY2017
<b>106</b> <b>degrees, minors, and graduate certificates</b>	<b>Development and Alumni</b>	<b>\$75M</b> <b>Gifts</b> (FY2019-2023)
<b>OVER 475</b> PlusOne accelerated master's degree pathways, including those interdisciplinary with other Northeastern colleges, and for engineering and non-engineering enrolled undergraduates	<b>56,389</b> <b>Alumni</b>	



# 18 Multidisciplinary Research Centers and Institutes

## FUNDING BY EIGHT FEDERAL AGENCIES

**ALERT** Awareness and Localization of Explosives-Related Threats; an emeritus multi-university Department of Homeland Security Center of Excellence

**BTIC** Beyond Traffic Innovation Center; designated by the U.S. Department of Transportation, BTIC leads interdisciplinary research on transportation challenges of the next three decades for the Northeast region

**CHEST** Center for Hardware and Embedded Systems Security and Trust; a multi-university National Science Foundation Research Center, part of the Industry-University Cooperative Research Centers Program

**CHN** Center for High-rate Nanomanufacturing; a multi-institution National Science Foundation Nanoscale Science and Engineering Center

**CURENT** Center for Ultra-wide-area Resilient Electric Energy Transmission Networks; a National Science Foundation and Department of Energy multi-university Engineering Research Center

**GLOBAL RESILIENCE INSTITUTE** Northeastern University institute, focuses on practical and innovative tools, applications, and skills that strengthen the resilience of individuals, communities, infrastructure, systems, networks, and societies.

**GORDON-CenSSIS** Bernard M. Gordon Center for Subsurface Sensing and Imaging Systems; a National Science Foundation graduated multi-university Engineering Research Center

**HSyE** Healthcare Systems Engineering Institute; a Department of Health and Human Services Center through the CMMI program; a university-level institute focused on healthcare improvement

**IIA** Institute of Information Assurance; a National Security Agency/Department of Homeland Security Center of Academic Excellence

**INSTITUTE FOR CHEMICAL IMAGING OF LIVING SYSTEMS** An interdisciplinary Northeastern University institute focused on creating technologies to view chemical processes in the brain and body in real time

**INSTITUTE FOR EXPERIENTIAL ROBOTICS** An interdisciplinary, Northeastern University institute focused on designing machines that adapt to people in real time for a more collaborative human-robot experience

**INSTITUTE FOR THE WIRELESS INTERNET OF THINGS** An interdisciplinary, Northeastern University institute focused on advancing wireless technologies for next-generation networked systems

**INSTITUTE OF MECHANOBIOLOGY** Northeastern University institute, investigates the role of force and mechanics in biological systems, from the molecular level to the whole body

**NORTHEASTERN SMART CENTER** A Northeastern College of Engineering research center aimed at conceiving and piloting disruptive technological innovation in smart devices and systems to make everyday life safer, easier and more efficient

**PROTECT** A National Institute of Environmental Health Sciences' Superfund Research Center; one of the largest mother-child cohorts in the U.S. focused on environmental health and engineering

**SENTRY** Soft-target Engineering to Neutralize the Threat Reality; Department of Homeland Security Center of Excellence addressing the challenges of protecting soft targets and crowded places

**SPIRAL** Center for Signal Processing, Imaging, Reasoning, and Learning; a federation of collaborating research laboratories

**TANMS** Center for Translational Applications of Nanoscale Multiferroic Systems; a National Science Foundation university collaborative Research Center



## Department Research Areas

### Bioengineering

Biomechanics, Biotransport, and MechanoBiology  
Biomedical Devices and Bioimaging  
Molecular, Cell, and Tissue Engineering  
Systems, Synthetic, and Computational Bioengineering

### Chemical Engineering

Biomolecular and Biomedical Systems  
Complex and Computational Systems  
Energy and Sustainability  
Engineering, Education, and Pedagogy  
Materials and Nanotechnology

### Civil and Environmental Engineering

Civil Infrastructure Security  
Environmental Health  
Sustainable Research Engineering

### Electrical and Computer Engineering

Communications, Control, and Signal Processing  
Computer Networks and Security  
Computer Systems and Software  
Computer Vision, Machine Learning, and Algorithms  
Electromagnetics and Optics  
Microsystems, Materials, and Devices  
Power Electronics, Systems, and Controls  
Robotics

### Mechanical and Industrial Engineering

Biomechanics, Biofluids, and Mechanobiology  
Complex Fluids, Multiphase, and Multiscale Matter  
Data Analytics, AI, and Operations Research  
Energy Systems, Sustainability, and Environmental Protection  
Engineering Education  
Human-Technology Integration  
Intelligent and Additive Manufacturing  
Materials for the Future  
Mechanics  
Networks and Complex Systems  
Resilient and Sustainable Service Systems  
Robotics and Control Systems

# Ali Abur Elected a Member of the National Academy of Engineering

**Ali Abur**, professor of electrical and computer engineering, has been elected a Member of the National Academy of Engineering (NAE). Election to the NAE is considered the highest professional distinction accorded to an engineer. Abur was recognized for his contributions to power system state estimation and power engineering education.

Abur says, “Being appointed to the National Academy of Engineering is the pinnacle of engineering. It is very rewarding to see your lifelong work being recognized by your peers.”

Abur has worked for decades on ways to improve the reliability and efficiency of electric power transmission systems. Over the course of his career, these systems have become steadily more diverse, sophisticated, and complex, posing continuous challenges to power system operators. High-profile system failures that led to widespread blackouts in the northeast during the 1970s inspired Abur’s early efforts to improve power network monitoring techniques. He innovated the use of measurements to estimate the states of systems, as well as methods for detecting and correcting errors in those measurements and improving real-time network modeling. His research using phasor measurement technology in the 1990s helped pave the way for development of fast and robust state estimators using wide-area synchronized measurements and resulted in improvements in system reliability.

More recently, he has worked closely with the independent system operator ISO New England on methods (for which he received a patent) to detect and remove errors, many of which had previously gone unnoticed, in their vastly complex network model databases. Effective, practical solutions such as these have helped improve an industry that our entire society depends on every minute of every day.

Abur came to Northeastern in 2005, joining the Department of Electrical and Computer Engineering as a professor and serving as department chair until 2013. Throughout his research career he has completed close to 50 projects sponsored by federal and state

agencies, as well as the energy industry. His service to the profession has included serving as Associate Editor for *IEEE Transactions on Power Systems* and *IEEE Power Engineering Society Letters*, as well as chairing IEEE’s PES Awards Subcommittee and PES IEEE Fellows Subcommittee. He currently serves as co-chair of the IEEE PES Working Group on Power System State Estimation Algorithms.

Abur was also instrumental in launching the CURENT (Center for Ultra-Wide Area Resilient Electric Energy Transmission Networks) Engineering Research Center, originally funded by the National Science Foundation and Department of Energy, now graduated and self-sustaining. He continues to serve as the Northeastern campus director of this multi-university engineering research center, the first in the area of smart power transmission and home to both hardware and software testbeds.

Among Abur’s awards and recognitions are the IEEE Power & Energy Society Outstanding Power Engineering Educator Award and IEEE PES Boston Chapter Outstanding Engineering Award, both in 2014. He was elected a Fellow of the IEEE in 2003, and an American Electric Power Faculty Fellow, Texas A&M University, that same year. Decades of speaking engagements at industry and academic gatherings throughout the United States and internationally are a testament to Abur’s impact in the power transmission field.

Membership in the NAE honors those who have made outstanding contributions to “engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature” and to “the pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education.”

Abur says, “I am humbled by the honor and grateful for the recognition of my work. Earning trust is paramount for me—being honest, meticulous, and reliable in one’s work is what makes it valuable and useful to others.”



“

*Being appointed to the National Academy of Engineering is the pinnacle of engineering. It is very rewarding to see your lifelong work being recognized by your peers.”*

**ALI ABUR**

Professor of Electrical  
and Computer Engineering





# Jerome Hajjar Honored with Lynn S. Beedle Award from Structural Stability Research Council

**Jerome F. Hajjar**, CDM Smith Professor and Chair of the Department of Civil and Environmental Engineering, has received the 2024 Lynn S. Beedle Award for his lifetime achievement from the Structural Stability Research Council (SSRC) and has been appointed president of the Structural Engineering Institute (SEI)—the largest institute under the umbrella of the American Society of Civil Engineers. In 2022, Hajjar was elected a member of the National Academy of Engineering.

The SSRC Lynn S. Beedle Award was established to honor the late Lynn S. Beedle, who was “an international authority on stability and the development of code criteria for steel and composite structures,” the council’s website says.

The award is given to thought leaders who “have carried out world-class research in the field of structural stability and have also made outstanding and decisive contributions to establish SSRC as [a] world-leading structural stability organization,” Daniel Linzell, chair of the council, wrote to Hajjar.

Additionally, beginning October 1, 2023, Hajjar became president of SEI, which has more than 30,000 members and works to improve “every aspect of the structural engineering profession.”

“Some of the initiatives that SEI is doing and I’ll be a champion of during my term are issues related to sustainability, resilience, and equity,” Hajjar says. “I’d like to encourage all structural engineers to make these three topics premier design objectives guiding all of their designs.”

The SEI and the American Society of Civil Engineers also play an important role in shaping public policy and setting national structural engineering standards, Hajjar says. The institute—one of nine that make up the American Society of Civil Engineers—is intimately involved with the production and dissemination of structural engineering knowledge, producing specialized publications, organizing conferences, and other events, and overseeing technical groups focused on advancing the field’s expertise.

Critical to setting industry standards, Hajjar says the broader engineering society “puts out several standards that get adopted by state legislatures into the state building codes, with ASCE-7 being one of the most critical among them.”

Hajjar’s academic contributions to the field have often focused on structural stability, or how buildings, bridges and other structures can cope with extreme loads. After receiving his PhD in structural engineering from Cornell University, he worked as an engineer for the global architectural firm Skidmore, Owings & Merrill, where he studied the designs of some of the world’s most iconic buildings. He has increasingly focused on how the profession can better address the evolving threat of climate change. Among other contributions, Hajjar has championed the concept of “design for deconstruction,” which focuses on how structures can be taken apart—their components recycled—at the end of their useful life.

As president of SEI, Hajjar hopes to usher in “solutions that dramatically reduce the amount of energy we use in building ... structures, the amount of waste we generate, the amount of greenhouse gas we create.”



# Gregory D. Abowd Receives ACM SIGCHI Lifetime Research Award

**Gregory D. Abowd**, dean of the College of Engineering and professor of electrical and computer engineering, received the Association for Computing Machinery (ACM) Special Interest Group on Computer-Human Interaction (SIGCHI) Lifetime Research Award. The award is presented to individuals for outstanding contributions to the study of human-computer interaction. It recognizes the very best, most fundamental, and influential research contributions, and is awarded for a lifetime of innovation and leadership.

Abowd is a world leader in the invention and application of ubiquitous computing technologies. His work has defined the field over the past three decades, and his intellectual contributions have shaped two major themes in ubiquitous computing: context-aware computing and automated capture and access of live experiences. He has shown how a variety of application areas—the classroom, the home, autism, and healthcare—benefit from innovations in mobile and ubiquitous technologies. Two particularly trailblazing projects, Classroom 2000 and the Aware Home, demonstrated “living laboratories” to advance technological advancements as well as understanding the impact when those technologies are woven into everyday life. His research has resulted in public-domain software toolkits and commercial solutions in the home and health sectors. As the parent of two sons on the autism spectrum, Abowd initiated a research program in technologies to support this neurodiverse population, resulting in several commercial products. In the process, he started a non-profit, the Atlanta Autism Consortium, that connects stakeholder communities across research, clinical practice, education, and families, and he was recognized by the State of Georgia for his efforts in establishing that organization.



*Dean Abowd is one of the world's top scholars in ubiquitous computing, software engineering, and technologies for autism. This lifetime achievement award from SIGCHI is a spectacular recognition of the impact of his work."*

**DAVID MADIGAN**

Northeastern Provost and  
Senior Vice President for Academic Affairs

Abowd's leadership to the research community cemented ubiquitous computing as a core topic in HCI research. He hosted UbiComp 2001 in Atlanta, rebranding and establishing it as the premier forum in the area. He served on the founding editorial board for *IEEE Pervasive Computing Magazine* and was the co-founding Editor-in-Chief of *Foundations and Trends in HCI*. In the mid 2010's, he created the *Proceedings of the ACM in Interaction, Mobile, Wearable, and Ubiquitous Technologies (IMWUT)*, serving as the Founding Editor-in-Chief.

Abowd has been recognized by ACM as a Fellow, a member of the SIGCHI Academy, recipient of the SIGCHI Social Impact Award, and the ACM Eugene Lawler Humanitarian Award. After 26 years at Georgia Tech, Abowd became Dean of the College of Engineering at Northeastern University in 2021. He received his master's and doctorate degrees from the University of Oxford, where he attended as a Rhodes Scholar.

View a video recording of Dean Gregory Abowd's SIGCHI Lifetime Research Award acceptance lecture.



# ‘Game-changing’ Alzheimer’s Research of Bioengineering Professor Is Major Beneficiary of \$50M Grant

A new research institute launched by **Nikolai Slavov**, associate professor of bioengineering, is the principal beneficiary of a \$50 million grant from two investors, Schmidt Futures and Citadel founder and CEO Ken Griffin, that aim to support big breakthroughs in science. The institute, Parallel Squared Technology Institute (PTI), intends to use new techniques to significantly ramp up single-cell protein analysis of Alzheimer’s disease, which researchers suspect is caused by a buildup of abnormal proteins in and around brain cells. The work the institute is undertaking is built on technology Slavov developed at Northeastern. This technology platform will increase the scale of protein analysis by as much as a thousand-fold, which will significantly decrease the cost of Alzheimer’s research, Slavov says.

“It’s going to make this kind of analysis much more accessible, much more powerful,” he says, calling it a “Manhattan Project” for the poorly understood brain disorder that afflicts more than 55 million worldwide.

Often protein pathologies and disorders are studied by sequencing RNA, because that is the tool most readily available, Slavov says. “It’s a bit like looking for keys under the lamp post, because that is where the light is, rather than where we are going to find things.

We are trying to make a very powerful lamp post that can shine a light where people have not yet explored, where we think there is a lot to discover,” he says.

Schmidt Futures is a philanthropic initiative of former Google CEO Eric Schmidt and Wendy Schmidt, while Griffin is founder and CEO of the multinational hedge fund Citadel. Together, they announced this week a \$50 million commitment to Convergent Research, which will distribute the funds to PTI and to EvE Bio.

A press release from Schmidt Futures calls PTI and EvE Bio the type of focused research organizations (FROs) that accelerate major breakthroughs to meet challenges associated with human health and climate change.

PTI, which Slavov co-founded with his former PhD students **Aleksandra Petelski** and **Harrison Specht**, expects to grow to 40 to 50 scientists within the first five years with a state-of-the-art research lab. While PTI will operate as an independent not-for-profit research organization, it will be led by Slavov who plans to develop experiential learning programs with the university, including co-op positions for Northeastern students.

Slavov credits the Allen Frontiers Group for supporting his use of mass spectrometry to scale up single-cell protein analysis. Proteins are the workhorses of the



## Expanding the Global Network

The College of Engineering continues to add academic offerings to meet evolving industry requirements and provide students with flexible options to pursue career goals. Academic programs have also been expanded to campuses across Northeastern's growing global network. With Northeastern's Global Scholar's program, undergraduate first-year students start Northeastern with a one-year experience at the London, England or Oakland, California campuses. Students pursuing a minor in aerospace engineering participate in the Summer in Seattle program. In the past year, several additional master's degrees were offered at campuses beyond Boston in the U.S. and Canada. In total, engineering academic programs are offered at nine campuses in three countries and online. Notably, engineering research facilities in addition to Boston include Burlington and Nahant, Massachusetts; Portland, Maine; and Arlington, Virginia, with more expansion planned. Northeastern's global university system provides flexible academic offerings, innovative partnerships, and the ability to scale ideas, talent, and solutions.

### Newest Academic Programs

#### UNDERGRADUATE PROGRAM

BS in Chemical Engineering and Data Science  
Minor in Environmental Engineering  
Minor in Global Perspectives in Engineering

#### GRADUATE PROGRAMS

MS in Climate Science and Engineering  
Online modality of MS in Information Systems  
Online modality of Data Analytics Engineering

#### NEWEST GRADUATE PROGRAMS AT GLOBAL NETWORK CAMPUSES

##### *Arlington, Virginia*

MS in Information Systems  
MS in Information Systems-Bridge

##### *Oakland, California*

MS in Information Systems  
MS in Information Systems-Bridge

##### *Seattle, Washington*

MS in Electrical and Computer Engineering

##### *Toronto, Canada*

MS in Cyber-Physical Systems

##### *Vancouver, Canada*

MS in Information Systems

“

*We are trying to make a very powerful lamp post that can shine a light where people have not yet explored, where we think there is a lot to discover.”*

**Nikolai Slavov**

Associate Professor of Bioengineering, and Founder and Director of Parallel Squared Technology Institute

cell, serving as “catalysts for virtually every biochemical reaction that occurs in living things,” according to the journal *Nature*. Ramping up the pace of proteomics, the large-scale study of proteins, is expected to yield solutions to problems of drug resistance, help pinpoint biomechanisms associated with the genetic propensity for diseases, and enhance immune cells to target diseased cells.

“We will be in a position to understand mechanisms for disease much more accurately and discover new and fundamental biological principles of how a cell functions,” according to Slavov, who with Bogdan Budnik won the 2022 Human Proteome Organization's award for discovery in proteomic sciences.

Researchers at PTI expect to soon receive cadaver tissue samples from Massachusetts General Hospital to analyze for Alzheimer's disease. Slavov says he expects the scale of protein analysis to be increased tenfold in the next two years and up to a thousand-fold in five years.

“Instead of costing millions of dollars to a project, it will cost thousands,” Slavov says.

# Awarded Northeastern's First Highly Competitive NSF National Research Traineeship Award

*Multidisciplinary research  
on effects of digital platforms  
while increasing opportunity  
for underrepresented  
graduate students*

Photo by Alyssa Stone





Northeastern is poised to contribute a significant body of research toward a greater understanding of the sweeping effects digital platforms such as Uber, Airbnb, and Venmo are having on society, while also training an underrepresented generation of students to solve problems across disciplines.

**Ozlem Ergun**, distinguished professor of mechanical and industrial engineering, was awarded a \$3 million grant from the National Science Foundation for the NSF's highly prestigious "national research traineeship" (NRT) program. The NRT provides support to students in "research-based master's and doctoral degree programs" who are working in "high priority interdisciplinary or convergent research areas."

The funds will support 28 PhD "traineeships" at Northeastern over the course of five years with the goal of helping students develop the "skills, knowledge and competencies" relevant to their respective careers, while also producing targeted research addressing real-world problems.

The award will also enable Northeastern to partner with Hampton University, an HBCU, and the University of Houston, a Hispanic-Serving Institution, to support student trainees across all three universities, and develop an engineering graduate degree program at the latter.

The award is the result of several years of collaboration among a large interdisciplinary team, including faculty from the College of Engineering, D'Amore McKim School of Business, Khoury College of Computer Sciences, the School of Law, Department of Economics and the School of Public Policy and Urban Affairs.

"The interdisciplinarity of this initiative will expand critically important analysis of the social justice implications of rapidly changing platforms," says Jennie Stephens, dean's professor of sustainability science & policy, who is helping to oversee the effort. "And by diversifying who is trained to be involved in the development and regulation of evolving platforms, this research training program is positioned to have big societal impact."

*It is critical that the developers of new platform technologies no longer simply be trained as engineers and computer scientists, and that policy makers and regulators must understand the ecosystems around digital platforms.*

Landing an NRT award—considered by academics to be the gold standard for training grants—is a first for Northeastern. "They're highly competitive and very hard to get," says Ergun. She adds that program administrators hope that the associated training offered at the University of Houston and Hampton University would produce prospective students capable of pursuing postdoctoral work at any of the three universities.

"The NRT program addresses workforce development, emphasizing broad participation and institutional capacity building needs in graduate education," the foundation's website states. "The program encourages proposals that involve strategic collaborations with the private sector, non-governmental organizations, government agencies, national laboratories, field stations, teaching and learning centers, informal science centers, and academic partners."

"The focus of this proposal is to create a training program that addresses the needs of these digital platforms ultimately leading to profitability and competitiveness, and to better understand the changes these platforms are imposing on the society—be it in public services, the delivery of social services, resource allocation, even the future of work," Ergun adds.

Academic interest in the app-based platforms varies across disciplines. Ergun says she hopes the NRT funding will spur more collaboration between the social sciences and the STEM fields, where polarization on the topic is evident.

"While digital platforms have democratized provision and access to services and products with low entry and transaction costs, the larger impact on society is not fully understood," Northeastern's proposal reads. "It is critical that the developers of new platform technologies no longer simply be trained as engineers and computer scientists, and that policy makers and regulators must understand the ecosystems around digital platforms."

## \$1M NSF Award to Expand Bridge to Doctorate STARS Program

**Sara Wadia-Fascetti**, vice provost of the PhD Network and professor of civil and environmental engineering, **Jacqueline Isaacs**, vice provost for faculty affairs and professor of mechanical and industrial engineering, **Randall Hughes**, affiliated faculty in civil and environmental engineering, and **Richard Harris**, associate dean for diversity, equity and inclusion, were awarded a \$1 million National Science Foundation grant to expand Northeastern's Louis Stokes Alliances for Minority Participation (LSAMP) Bridge to the Doctorate Strategic Advancement of Rising Scholars (STARS) Fellowship Pathway.



## Partnership with National Grid's Clean Energy Careers Academy

The College of Engineering at Northeastern was one of just three Boston-area universities to be selected as a partner of National Grid's Clean Energy Careers Academy for college engineering students. As part of the academy, National Grid mentors and others engage students about the energy and utilities field, provide professional development opportunities, and create connections that can lead to future internships, co-ops, and full-time employment within National Grid. In addition, Northeastern is a recipient of National Grid's new Clean Energy Scholars Scholarship. The scholarship is for qualifying engineering students from historically underrepresented and marginalized communities. The partnership adds to Northeastern's extensive collection of programs to support students while helping to create a pipeline of diverse talent in the clean energy field.

## Scholarship for Promising Graduate Students from Ghana

**Subodh Chanrai**, a member of Northeastern's Board of Trustees, and his brothers in the family business, Chanrai Summit Group, believe education opens the door to opportunity. In that spirit, the family established the Chanrai Family Graduate Scholarship to provide educational opportunities to young Ghanaians. The first recipient of the scholarship is **Kelvin Amakye**, who will be pursuing a master's degree in bioengineering at Northeastern. At the University of Ghana, the country's foremost institution of higher learning, Amakye was honored as one of the outstanding students in his class by the dean of the School of Engineering Sciences. The provost of the College of Basic and Applied Sciences recognized Amakye as one of the very best students of the entire college in the final year of his studies as a result of his hard work, sheer merit, and continued grit. Amakye says that there is this mindset that bioengineers or biomedical engineers in Ghana are incapable of coming out with their own innovations with respect to medical devices and bioimaging devices. He hopes that after his graduate studies at Northeastern and some co-ops or internships with American companies he will be able to return to Ghana and change this harmful mindset by contributing to the local design of medical devices. Amakye also wants to establish a foundation in the future that would contribute to innovations in bioengineering and medical equipment in Ghana.



Northeastern parent and trustee Subodh Chanrai (second from the left), group executive chairman of the Chanrai Summit Group, presents a scholarship to Kelvin Amakye (third from the left) at the Global Leadership Summit in March 2023 at the Kempinski Hotel in Accra, Ghana. Photo by Alyssa Stone/Northeastern University



# PhD Student Spotlights



## Jason Derks, PhD'22

### BIOENGINEERING

Advised by Nikolai Slavov, Associate Professor of Bioengineering

**Jason Derks** began pursuing his PhD in 2017, eager to lead a synthetic biology project with the skills he developed as a research technician in the years prior. He found an early mentor in Joseph Ayers, affiliated faculty, bioengineering, who generously gave Derks freedom to develop a research project to engineer a strain of baker's yeast for real-time chemical sensing; the proposed research and preliminary results were presented as a poster at Northeastern's RISE:2019 research expo.

Two years into the program, Derks' research took a different direction as he joined the laboratory of Associate Professor Nikolai Slavov, bioengineering, who served as his primary advisor and mentor for the remainder of his PhD. In the Slavov laboratory, Derks' research focused on developing new methods for high-throughput proteomics and using them for quantifying the proteomes of single nuclei from macrophage cells responding to bacterial antigens. The aim of this project was to study protein translocation with submolecular resolution and understand its contributions to the innate immune response of macrophages.

To quantify proteins, Derks used liquid chromatography mass spectrometry (LC-MS), an approach which, though powerful, limited the number of samples he could analyze. Thus, his first project on the Slavov team focused on increasing the throughput of LC-MS analysis by multiplexing samples as proposed by Slavov. This side project became Derks' primary dissertation research, and developed into a technology he would call "plexDIA," which he published in *Nature Biotechnology* in 2022. Since then, he has authored a perspective in the *Journal of Proteome Research* about plexDIA and presented his work at the American Society for Mass Spectrometry.

Derks has since continued his work as a postdoctoral researcher, using plexDIA to analyze the proteomes of single nuclei at high throughput to investigate heterogeneity of protein translocalization, and looks forward to applying high-throughput proteomics in industry.



## Caterina Bartomeu

### Garcia, PhD'22

### CHEMICAL ENGINEERING

Advised by Rebecca Willits, Professor and Chair, Department of Chemical Engineering

Originally from Spain, **Caterina Bartomeu Garcia** earned her bachelor's degree in chemical engineering from the Universitat Autònoma de Barcelona, and master's degree in nanoscience materials and processes at Universitat Rovira i Virgili. In 2017, she began pursuing a PhD in chemical engineering at Northeastern.

Bartomeu Garcia's research focused on the development of novel drug delivery systems for the treatment of brain infections such as bacterial meningitis. A significant challenge for current brain disease treatments is the poor permeability of drugs through the blood-brain barrier (BBB). Her research aimed to develop and characterize a pH-sensitive liposomal drug delivery system with a cell-penetrating peptide to both increase the encapsulated drug's permeability and improve its stability in presence of a bacterial infection. In vitro studies showed great bactericidal properties against two of the main bacteria that cause meningitis, with no cytotoxic effect against two of the main cells that form the BBB. Promising permeability results were obtained with a 2D infection BBB model, suggesting that these liposomal systems represent a potential alternative to the use of antibiotics alone.

Bartomeu Garcia has one publication in the *International Journal of Nanomedicine*. She has collaborated on many other projects focused on material science, such as the surface modification of ceramics and stainless-steel surgical materials to improve their biocompatibility, reduce their degradation and prevent bacteria adhesion and proliferation. These collaborations during her PhD resulted in five peer-review publications. She has also presented her research in multiple conferences, including the Society for Biomaterials annual meeting in Seattle (2019), TechConnect World Innovation Conference in Boston (2019), and the American Institute for Chemical Engineering annual meeting in Boston (2020). She was an invited speaker in the Frontiers in Nanomedicine & Drug Delivery meeting in London (2019). In 2022, Northeastern University awarded her the Dissertation Completion Fellowship.

Bartomeu Garcia is currently working as a scientist at Repertoire Immune Medicines in Cambridge, Massachusetts. She continues to work with drug delivery systems, now focused on the delivery of novel mRNA technologies for the treatment of autoimmune diseases such as diabetes type 1 and multiple sclerosis.

# PhD Student Spotlights



## **Sarah Sanchez, PhD'23**

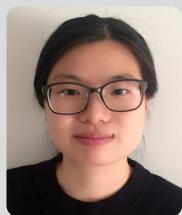
**CIVIL AND ENVIRONMENTAL ENGINEERING**

Advised by Matthew Eckelman,  
Associate Professor of Civil and  
Environmental Engineering

**Sarah Sanchez** earned her bachelor's, master's, and doctoral degrees from Northeastern's Department of Civil and Environmental Engineering. As an undergraduate, she studied sustainable cities and systems, designing the environmental infrastructure for a brand-new city of 200,000 in China as a capstone project. As a member of the inaugural class of Northeastern's MS in engineering and public policy program, she focused her research on sustainability in healthcare, leading a study evaluating reusable versus disposable medical supplies and devices that was published in the peer-reviewed journal *Resources Conservation and Recycling*.

Sanchez was awarded the Strategic Advancement of Rising Scholars (STARS) Fellowship funded by the National Science Foundation to continue her research and graduate training through a PhD in civil and environmental engineering. Her main dissertation work lay in building methods and models for lifecycle environmental assessment in direct collaboration with communities of "care professionals," from medical doctors to art conservators. Sanchez's work led to numerous published case studies, exhibits, databases, and a website visited and used by tens of thousands of art conservators around the world. Many of the environmental concerns among care professionals involve chemicals and pollution, and Sanchez also conducted research at community scales on the sources and distribution of hazardous air pollutants in Massachusetts.

In addition to her academic work, Sanchez served on and eventually led the CEE department's Graduate Student Council that advises the department and organizes trainings and events. She has dedicated her academic career to understanding the environmental and health impacts that care communities cause, not from a distance, but deeply embedded within those communities of practice. Sanchez embodies Northeastern's mission of impact-driven research, working to put knowledge into the hands of care professionals and create tools to help them "green" their practices.



## **Yu Yin, PhD'23**

**COMPUTER ENGINEERING**

Advised by Yun Raymond Fu, COE  
Distinguished Professor of Electrical and  
Computer Engineering, and Khoury College  
of Computer Sciences

After completing a bachelor's degree from the School of Electronic Engineering at the Wuhan University of Technology and a master's degree in electrical and computer engineering at Northeastern University, **Yu Yin** began a PhD in computer engineering at Northeastern in 2019. Yin's research interests broadly include visual synthesis and understanding, multi-modality fusion, and transfer learning. She is devoted to developing machine learning frameworks and synthetic data generators to make computer vision and AI systems more accurate, affordable, and scalable. Her primary focus during her doctoral studies was synthetic data generators, which provide a reliable and controllable source for training machine learning models while reducing the reliance on real-world data collection. Her dissertation mainly investigates the potential for understanding human behavior by recreating it using image synthesis.

Yin's technical contributions have led to more than two dozen peer-reviewed papers on leading AI and data mining conferences, such as the IEEE Conference on Computer Vision and Pattern Recognition, AAAI Annual Conference, ACM International Multimedia Conference, SIAM International Conference on Data Mining, IEEE International Conference on Data Mining, and top IEEE transaction journals, such as *IEEE Transactions on Image Processing* and *IEEE Transactions on Multimedia*. In recognition of her research contributions, Yin received the National Science Foundation I-Corps grant in 2022 and the Northeastern University Dissertation Completion Fellowship in 2023. She also worked at Microsoft and Zillow as a research intern.

Throughout her academic journey, Yin has actively contributed to the academic community. She served as a teaching instructor for a data visualization course at Northeastern, chaired workshops on image recognition and analysis at several prominent conferences, and served as a reviewer and program committee member for multiple prestigious journals and conferences.

Upon completing her PhD, Yin commenced her role as an assistant professor of computer and data sciences at Case Western Reserve University's School of Engineering in the fall of 2023.





## **Razan Al Lawati, PhD'23**

### **INDUSTRIAL ENGINEERING**

Advised by Md Noor E Alam,  
Associate Professor of Mechanical  
and Industrial Engineering

Originally from Muscat, Oman, **Razan Al Lawati's** passion for problem-solving led her to complete an MS in interdisciplinary engineering at Purdue University and a second MS in operations research at Northeastern. She then pursued her PhD in industrial engineering at Northeastern under the supervision of Associate Professor Md Noor E Alam researching in the Decision Analytics Lab.

Al Lawati's current research focuses on using stochastic optimization in various ways to develop decision-making tools for systems that deal with uncertainty. In her work, she developed a novel framework in which decisions are updated as new information becomes available and studied the use of decomposition techniques to make large problems computationally tractable.

Al Lawati's entrepreneurial drive led her to found a solar consulting firm in Oman. Through this venture, she conducted feasibility studies and designed solar energy systems. She has also worked in enhanced oil recovery, where she researched and introduced new water treatment technologies. During this time, Al Lawati observed the difficulties associated with decision-making in the face of uncertainty with variable resource generators, prompting her to apply her PhD research to the renewable energy field. Her research findings have been applied to short-term market solutions for individual farms and long-term national, system-level solutions. Her in-depth understanding of the subject has enabled her to effectively mentor undergraduate students, facilitate workshops, and provide valuable assistance in manuscript editing and grant proposals. Al Lawati's research contributions in this field have been published in the *Journal of Applied Energy*.

Following graduation, Al Lawati plans to continue publishing papers related to her research to aid regulators, policymakers, and market designers in developing evidence-based decisions. She will also be collaborating with multidisciplinary teams on process improvement projects to bring life-changing impact to healthcare systems in the Middle East.



## **Xiaoyu (Criss) Zhang, PhD'23**

### **MECHANICAL ENGINEERING**

Advised by Laura Lewis, Distinguished  
University and Cabot Professor of Chemical  
Engineering and Mechanical Engineering

**Xiaoyu (Criss) Zhang** completed his PhD in mechanical engineering working with the Nanomagnetism research lab, focusing on experimental research to understand and tailor magnetofunctional materials. These materials are essential to modern society by allowing wireless interconversions between different types of energy to functionalize a variety of advanced technologies in automotive, aerospace, energy, and biomedical fields. Zhang's research applies novel materials processing approaches to alter local atomic environments and structures at scales from Ångstrom-level to microscale to tailor magnetofunctionality.

During his time at Northeastern, Zhang contributed to 14 peer-reviewed journal publications, including nine published contributions, with three as first-author, and five manuscripts in preparation. He has delivered 20 presentations at various national and international conferences. In 2022, he received the Department of Mechanical and Industrial Engineering's Ferretti & Yamamura Award for Excellence in Research. In addition, Zhang worked closely with six mechanical engineering professors on two core undergraduate courses, providing instructional guidance to over 1,000 undergraduate and graduate students in the department. His dedication to teaching earned him the Ferretti & Yamamura Award for Excellence in Teaching in 2019.

Zhang has a strong interest in international scientific collaboration and has been actively involved in the global magnetics community by participating in, volunteering, and hosting multiple professional events. In 2021, he led a successful \$10,000 seed-funding effort sponsored by the IEEE Magnetism Society, the premier global organization for magnetism professionals. As a "PI-in-training," this opportunity allowed him to collaborate with other PhD students from Ames National Laboratory and the Instituto de Ciencia de Materiales de Madrid in developing a more efficient processing pathway for advanced magnetic materials. In 2020 and 2021, he was one of the six organizers who represented North and South America in the inaugural Around-the-Clock Around-the-Globe Magnetism Conference. In 2022, he became the first student chair of a young scientists networking event at the annual Magnetism and Magnetic Materials Conference in Minneapolis.

After receiving his doctorate, Zhang is continuing research on magnetofunctional materials as a post-doctoral associate at Northeastern.

# Faculty Fellows

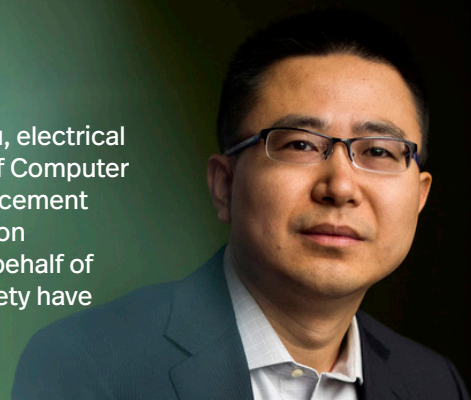
## AIMBE Fellows

Associate Professor **Aileen Huang-Saad** and Professor **Guohao Dai**, bioengineering, were named Fellows of the American Institute for Medical and Biological Engineering (AIMBE). Huang-Saad was elected “for outstanding contributions to the development of BME entrepreneurship education microenvironments and studying their impact on the engagement of diverse populations.” Dai was elected “for contributions in vascular mechanobiology and 3D bioprinting vascular networks for tissue engineering, regenerative medicine applications.”



## AAAS Fellow

College of Engineering Distinguished Professor **Yun Raymond Fu**, electrical and computer engineering, jointly appointed in Khoury College of Computer Sciences, was elected as an American Association for the Advancement of Science Fellow in the Information, Computing & Communication section. Election as a Fellow honors members whose efforts on behalf of the advancement of science or its applications in service to society have distinguished them among their peers and colleagues.



## ACM and AAAS Fellow

Professor **Kevin Fu**, electrical and computer engineering, jointly appointed in the Khoury College of Computer Sciences, was named a Fellow of the Association for Computing Machinery for contributions to computer security, and especially to the secure engineering of medical devices. He was also named an American Association for the Advancement of Science Fellow in the Information, Computing & Communication section. Additionally, Fu received the Association for the Advancement of Medical Instrumentation & MedCrypt Cybersecurity Visionary Award for his groundbreaking research that demonstrated that implantable devices like pacemakers can be vulnerable to hackers and his efforts to mitigate these risks. He was also appointed to the White House President’s Council of Advisors on Science and Technology (PCAST) Working Group.



## NAI Fellow

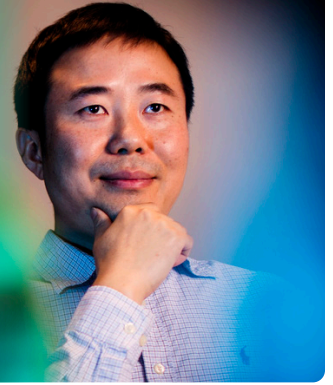
University Distinguished and William Lincoln Smith Professor **Vincent Harris**, electrical and computer engineering, has been named a Fellow of the National Academy of Inventors (NAI). The NAI Fellows program highlights academic inventors who have demonstrated a spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on the quality of life, economic development, and the welfare of society. Election as an NAI Fellow is the highest professional distinction awarded to academic inventors.





## Fellow of Optica and SPIE

Associate Professor **Yongmin Liu**, mechanical and industrial engineering, and electrical and computer engineering, was elected a Fellow Member of Optica for significant contributions to the fundamental and application of nanophotonics—plasmonics and photonic metamaterials in particular. He was also selected as a Fellow of the International Society for Optics and Photonics (SPIE). SPIE Fellows are members of distinction who have made significant scientific and technical contributions in the multidisciplinary fields of optics, photonics, and imaging.



## IEEE Fellow

Distinguished University and Cabot Professor **Laura Lewis**, chemical engineering, and mechanical and industrial engineering, was elevated to an IEEE Fellow for contributions to the design of magneto-functional materials. This distinction is reserved for select IEEE members whose extraordinary accomplishments in any of the IEEE fields of interest are deemed fitting of this prestigious grade elevation and is awarded to less than 0.1% of voting members annually.



## AIAA Associate Fellow

College of Engineering Distinguished Professor **Yiannis Levendis**, mechanical and industrial engineering, was selected as an American Institute of Aeronautics and Astronautics (AIAA) Associate Fellow for his technical contributions to fuel combustion physics, chemistry, and diagnostics, and for educating engineering students in the fields of gas turbine combustion and air pollution. Associate Fellows are individuals who have accomplished or directed important engineering or scientific work, have done original work of outstanding merit, or who have otherwise made outstanding contributions to the arts, sciences, or technology of aeronautics or astronautics.



## IISE Fellow

Professor Emeritus **Emanuel Melachrinoudis**, mechanical and industrial engineering, was named a Fellow of the Institute of Industrial and Systems Engineers (IISE). The Fellow award is the highest classification of membership in IISE and is in recognition of outstanding leaders of the profession that have made significant, nationally recognized contributions to industrial engineering.



## INFORMS Fellow

**Ozlem Ergun**, College of Engineering distinguished professor, mechanical and industrial engineering, was elected a Fellow of the Institute for Operations Research and the Management Sciences (INFORMS). This honor is reserved for few select members. In 2023, only twelve members were elected Fellows.



# Faculty Early-Career Award Grants

## **NSF CAREER Award for Examining Flow of Polymer Gels in Confined Spaces**

Polymer gels are all around us in both natural and industrial settings, including gelatin, toothpaste, 3D printing materials—even human blood. Awarded a \$550,000 CAREER Award from the National Science Foundation, **Sara Hashmi**, assistant professor of chemical engineering, is conducting research to better understand the fundamental science of how crosslinked polymers flow through small channels to prevent or reverse clogging in various applications such as blood flow through a vessel. By creating mathematical models to better understand the physical processes of these flow patterns, Hashmi's research can extend into a range of applications, from pharmaceutical and biomedical to industrial.



## **\$1.96M NIH Early Stage Investigator R35 MIRA Award for the Battle Against Antibiotic Resistance**

As traditional antibiotics lose their effectiveness, many deadly diseases have become more difficult to treat. This is why **Elizabeth Libby**, assistant professor of bioengineering, received a five-year, \$1.96 million Early Stage Investigator R35 MIRA (Maximizing Investigator's Research Award) grant from the National Institutes of Health. Libby's research is focused on how bacteria develop resistance at the cellular level—knowledge that will be crucial to the development of more effective antibiotics. To do this, she is exploring the Hanks-type serine/threonine kinases and phosphatases signaling systems, which determine and regulate cell growth and behavior and are a key contributor to the failure of antibiotic treatment in major diseases.



## **Office of Naval Research Young Investigator Program Award for Polymorphic Wireless Computing for Ultra-Wideband 6G Spectrum Dominance**

**Francisco Restuccia**, assistant professor of electrical and computer engineering, received an Office of Naval Research Young Investigator Program Award focused on finding the right tradeoff between communication needs and the computational capabilities of wireless devices. He is using advanced concepts in neural network design to enable real-time and autonomous modification of wireless communication networks based on user and device needs by researching novel techniques that will seamlessly adapt not only the underlying algorithmic structure, but also the hardware and software components of 6G wireless devices, while operating at several gigahertz of bandwidth.



## **Air Force Office of Scientific Research Young Investigator Program Award to Establish Theoretical Foundations of Next-Generation Dynamic Data-Driven Wireless Systems**

To ensure that wireless networks function accurately and reliably, even if they become congested or compromised, **Francisco Restuccia**, assistant professor of electrical and computer engineering, is exploring new ways to enable complex real-time wireless transmissions within a cyber-physical system. With a Young Investigator Program Award from the Air Force Office of Scientific Research, his research is optimizing the cyber portion of these networks mathematically by creating multiple logical networks on shared physical infrastructure and applying application-level semantic optimization to the problem.



## NSF CAREER Award to Improve Flood Hazard Assessments

With a \$718,000 CAREER Award from the National Science Foundation, **Samuel Muñoz**, associate professor of marine and environmental sciences, jointly appointed in civil and environmental engineering, aims to enhance understanding of rivers and their behavior by combining systematic, long-term observations with hydraulic model simulations to create more accurate flood hazard assessments. The insights developed will help generate high-quality paleoflood estimates, along with workflows and toolsets that could transform our ability to reconstruct prehistoric floods on lowland river systems.



## NIH Trailblazer Award for Engineering Smarter Gut Metabolites to Affect Human Health

With a \$628,000 Trailblazer Award for New and Early Stage Investigators from the National Institutes of Health's National Institute of Biomedical Imaging and Bioengineering, **Benjamin Woolston**, assistant professor of chemical engineering, is leading interdisciplinary work to look for ways to use human gut microbes as potential therapies against disease. The research aims to learn what factors exist in the complex gut that engineers need to consider to develop microbes that can react intelligently to the environment in the gut microbiome. Woolston and his team are concentrating on microbially produced hydrogen sulfide (H<sub>2</sub>S), which has been linked to health issues such as ulcerative colitis and Crohn's disease.



## NSF CAREER Award to Enhance the Security of Machine-Learning Hardware Accelerators

Assistant Professor **Xiaolin Xu**, electrical and computer engineering, received a \$600,000 National Science Foundation CAREER Award to generate new security components and metrics to evaluate the security of products built on Field Programmable Gate Array-based Machine Learning (FPGA-ML) accelerators, especially in critical domains like aerospace, defense, and autonomous driving. In many cases, hardware can be used to increase the speed and efficiency of machine learning, but along with this solution comes inherent security risks. Xu seeks to mitigate the security risks by systematically investigating the threats and defenses of FPGA-ML acceleration systems so performance can increase without compromising safety.



## Office of Naval Research Young Investigator Program Award for Autonomous Naval Ships

**Sze Zheng Yong**, associate professor of mechanical and industrial engineering, was awarded a \$750,000 Office of Naval Research Young Investigator Program Award to develop algorithms for non-verbal communication between unmanned, autonomous Naval ships. He is creating the complex algorithms needed for autonomous robots and Naval ships to design "information-bearing motions" for enhanced nonverbal communication. The research is to make it possible for unmanned ships to function autonomously as teams and adapt to the unexpected when there is no central command.



## Office of Naval Research Young Investigator Program Award to Develop a Novel Terahertz System-on-a-Chip

Assistant Professor **Xufeng Zhang**, electrical and computer engineering, received an Office of Naval Research Young Investigator Program Award to develop a novel terahertz (THz) system-on-a-chip (SOC). The SOC takes advantage of recent advancements in silicon photonics, superconducting devices, and terahertz (THz) instrumentation. With its comprehensive on-chip signal processing capabilities, including THz generation, routing, manipulation, and detection, it will address current challenges of THz systems and enable the frequency band to be suitable for a broad range of practical applications, including quantum networks and wireless communication for 6G and 7G networks.



# Faculty Early-Career Award Honors

Photo by Adam Glanzman

## Blavatnik National Award for Young Scientists Finalist

Professor **Kaushik Chowdhury**, electrical and computer engineering, was selected as a finalist for the 2023 Blavatnik National Awards for Young Scientists in Physical Sciences and Engineering for addressing the global need of telecommunications spectrum scarcity, as well as for improving connectivity by designing next-generation wireless systems and machine learning-based network operations. This prestigious award is the largest unrestricted prize for early career scientists and honors outstanding young scientists and engineers under the age of 42.



## ASME Y.C. Fung Early Career Award

Associate Professor **Jessica Oakes**, bioengineering, was selected as the Y.C. Fung Early Career Award Medalist for outstanding work in respiratory mechanics that has significantly advanced the understanding of asthma, smoking, and inhalable drug delivery, and for strong advocacy in diversity, equity, and inclusion efforts. The award was established to recognize young investigators who are committed to pursuing research in the field of bioengineering and have demonstrated significant potential to make substantial contributions to the bioengineering field.



Photo by Ruby Wallau



## IEEE Wireless Communications Technical Committee Outstanding Young Researcher Award

Professor **Josep Jornet**, electrical and computer engineering, received the IEEE Wireless Communications Technical Committee (WTC) Outstanding Young Researcher Award for his pioneering contributions to the field of terahertz communications. The award recognizes active members of the WTC within the IEEE Communications Society who have been involved significantly with research related to the area of wireless communications and who have completed their PhD within the past 10 years.



## Cellular and Molecular Bioengineering Rising Star Award

Assistant Professor **Sara Rouhanifard**, bioengineering, was selected to receive a 2023 Cellular and Molecular Bioengineering Rising Star Award for her outstanding impact on the field of cellular and molecular bioengineering.



## American Society of Thermal and Fluids Engineers Early Career Researcher Award

Associate Professor **Yi Zheng**, mechanical and industrial engineering, was awarded the inaugural American Society of Thermal and Fluids Engineers Early Career Researcher Award for his significant contributions to the field of thermal and fluids engineering.





# Faculty Honors

## IFAC Award on Non-Linear Control Systems

University Distinguished Professor **Eduardo Sontag**, electrical and computer engineering, and bioengineering, received the International Federation of Automatic Control (IFAC) Technical Committee Award on Non-Linear Control Systems, which is described as the “highest distinction on nonlinear control systems research.” Given every three years, the award recognizes individuals who have made outstanding technical contributions in the nonlinear control area and supplied remarkable service to IFAC.

Photo by Adam Glanman

## ASCE Thomas A. Lenox ExCEED Leadership Award

The American Society of Civil Engineers (ASCE) has awarded W. Samuel Easterling, James L. and Katherine S. Melsa Dean of Engineering at Iowa State University, and **Jerome F. Hajjar**, CDM Smith Professor and Chair in the Department of Civil and Environmental Engineering at Northeastern University, the 2023 Thomas A. Lenox Excellence in Civil Engineering Education (ExCEED) Leadership Award for extraordinary leadership in civil engineering education.





## NAI Senior Member

Srinivas Tadigadapa, professor and chair of electrical and computer engineering, was selected as a National Academy of Inventors (NAI) Senior Member. NAI Senior Members are active faculty, scientists, and administrators from NAI Member Institutions who have demonstrated remarkable innovation-producing technologies that have brought or aspire to have a real impact on society's welfare.



## ACS Rubber Division's Bioelastomer Award

University Distinguished Professor **Art Coury**, chemical engineering, is the recipient of the American Chemical Society's Rubber Division Bioelastomer Award, which honors significant contributions to the advancement of biomaterials in the field of rubber science and technology. Recipients are those who have made an outstanding contribution to the understanding or utilization of biomaterials, including naturally derived elastomeric polymers and protein-based bioelastomers.

# Wireless Communications

## \$13M U.S. Army Grant for Wireless Research

The Kostas Research Institute (KRI) at Northeastern University has been awarded \$13 million by the U.S. Army Research Laboratory for foundational research into Cognitive Distributed Sensing in Congested Radio Frequency Environments. This contract will fund the first year of a planned four-year research program anticipated to be funded up to \$47.4 million. Led by KRI, the program is a collaboration among five universities—Northeastern University, Northern Arizona University, University of Houston, University of Massachusetts-Amherst, and University of North Texas. **Deniz Erdogan**, professor of electrical and computer engineering and chief technology officer for KRI, is the principal investigator of research activities at Northeastern.



Photo by Brooks Canada



Photo by Matthew Modono

## First CHIPS and Science Act's Research Grant for Open, Interoperable Wireless Networks

Northeastern's Institute for the Wireless Internet of Things, led by William Lincoln Smith Professor **Tommaso Melodia**, electrical and computer engineering, received the first research grant from the CHIPS and Science Act's Wireless Innovation Fund of the National Telecommunications and Information Administration, which is part of the Commerce Department. The award will be used to test approaches to building open and interoperable next-generation wireless networks. The CHIPS and Science Act provides \$1.5 billion over the next decade to support the development of open and interoperable wireless networks.

## Developing Secure Next-Generation Cellular Networks

Assistant Professor **Francesco Restuccia**, electrical and computer engineering, and William Lincoln Smith Professor **Tommaso Melodia**, electrical and computer engineering, and Associate Professor **Alina Oprea** of Northeastern's Khoury College of Computer Sciences, were awarded a \$900,000 National Science Foundation grant for "Resilient-by-Design Data-Driven NextG Open Radio Access Networks." The project studies security threats to machine learning algorithms used to achieve real-time resource optimization across space, time, frequency, and devices. It also develops solutions to protect them, focusing on the Open Radio Access Networks (Open RAN) architecture.

## New DoD Open6G Industry-University Cooperative Research Center

The technical effort of the Department of Defense's new Open6G industry-university cooperative research center is housed at Northeastern as part of the Institute for the Wireless Internet of Things led by electrical and computer engineering faculty. Open6G focuses on future open, programmable, and disaggregated 6G systems.





## **\$1.3M NSF Award for Hydrophone Array System for Real-Time Oceanic Acoustic Monitoring**

Professor **Purnima Ratilal-Makris**, electrical and computer engineering, was awarded a \$1.28 million National Science Foundation grant for “Large-Aperture 160-Element Coherent Hydrophone Array System Upgrades and Operational Readiness Testing for Real-Time Continental-Shelf Scale Ocean Acoustic Monitoring.” The system provides a transformative approach for sensing vast areas of the ocean, enabling ocean discoveries to be made while at sea, with real-time feedback that allows the data collection procedure to be adapted and optimized on-the-fly. Ratilal-Makris was also one of eighteen members selected for the newly formed Ocean Research Advisory Panel (ORAP), who will serve as advisors to the White House Office of Science and Technology Policy (OSTP) and the interagency Ocean Policy Committee (OPC).





# Cybersecurity

## \$1.4M NSF Award to Advance Worldwide Navigation Security with Distributed AI



Associate Professor **Pau Closas** and Assistant Research Professor **Tales Imbiriba**, electrical and computer engineering, in collaboration with Tampere University and the University of Vaasa in Finland, was awarded a \$1.4 million National Science Foundation award for “Distributed AI for Enhanced Security in Satellite-aided Wireless Navigation (RESILIENT).” The project will develop tools for interference management in geolocation applications such as Global Navigation Satellite Systems.

Photo by Matthew Madoono



## \$1.2M NSF Award to Enable Data Privacy with GPU-Accelerated Encryption

College of Engineering Distinguished Professor **David Kaeli**, electrical and computer engineering, in collaboration with Boston University, was awarded a \$1.2 million National Science Foundation grant for “Architecting GPUs for Practical Homomorphic Encryption-based Computing.” Fully Homomorphic Encryption (FHE) currently provides strong data privacy guarantees for cloud computing because it enables operations on encrypted data; but processing encrypted data using FHE takes multiple orders of magnitude longer than processing unencrypted data. The project will explore the use of graphics processing units (GPUs) to accelerate FHE-based computing in the cloud.

## \$1.2M NSF Award to Secure Scientific Cyberinfrastructures



Assistant Professor **Xiaolin Xu**, electrical and computer engineering, is leading a \$1.2 million National Science Foundation grant, in collaboration with Professor **Miriam Leeser**, electrical and computer engineering, and the University of Massachusetts, for “CAREFREE: Cloud Infrastructure Resilience of the Future for Testbeds, accelerators and networks.” The goal of the research project is to secure scientific cyberinfrastructures, in the form of next-generation cloud systems, that include network-attached accelerators.

## \$1.2M NSF Award to Increase AI Security with Privacy-Preserving Machine Learning as a Service

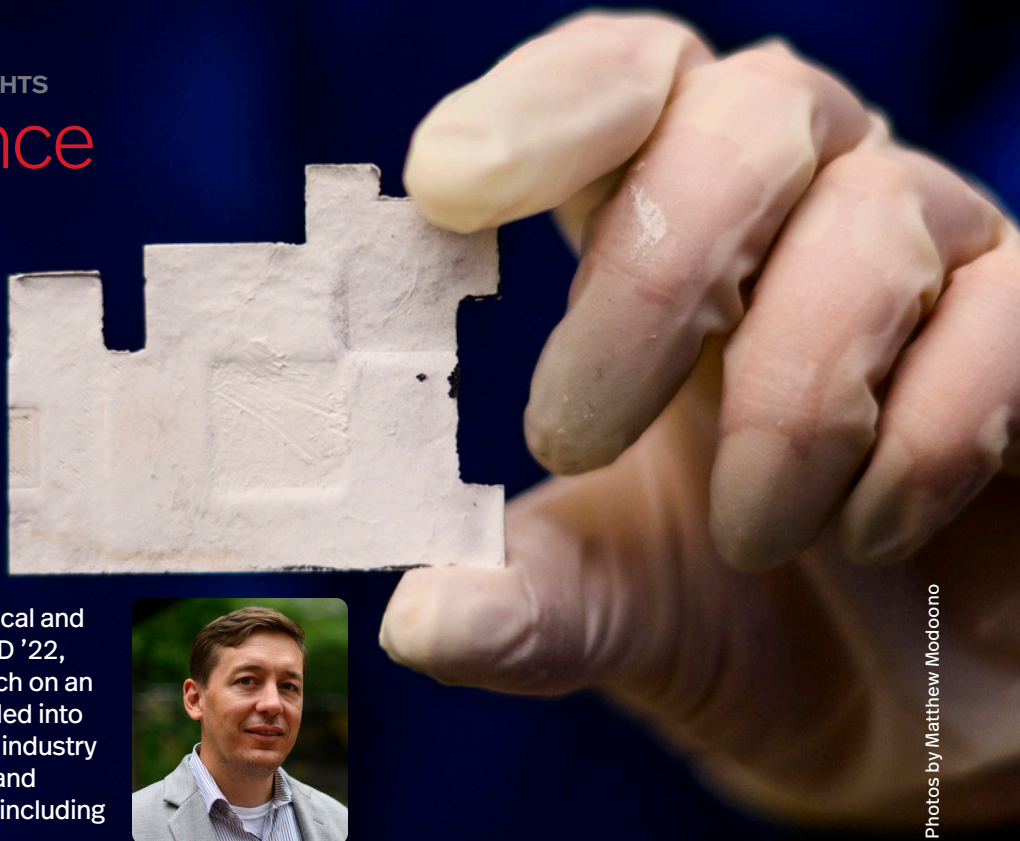
Assistant Professor **Xiaolin Xu**, electrical and computer engineering, in collaboration with faculty from Lehigh University and the University of Connecticut, was awarded a \$1.2 million grant from the National Science Foundation for “Accelerating Privacy-Preserving Machine Learning as a Service: From Algorithm to Hardware.” The project aims to accelerate machine learning as a service by developing efficient, scalable, and encryption-conscious computing paradigms.



# Materials Science

## Discovery of All-Ceramic Could Transform Design of Heat-Emitting Electronics

Associate Professor **Randall Erb**, mechanical and industrial engineering, and **Jason Bice**, PhD '22, mechanical engineering, published research on an all-ceramic that can be compression-molded into complex parts in *Advanced Materials*. The industry breakthrough could transform the design and construction of heat-emitting electronics, including cellphones and other radio components.



Photos by Matthew Modono



Photo by Matthew Modono

## Out-of-Plane Printed Electronics on Flexible Substrates

Professor **Ravinder Dahiya**, electrical and computer engineering, published "Out-of-Plane Electronics on Flexible Substrates using Inorganic Nanowires Grown on High Aspect Ratio Printed Gold Micropillars" in *Advanced Materials*. The paper describes a new method of creating nanowire-based electronics that are more efficient in their manufacture and performance than current methods allow, potentially enabling more sensitive sensors or efficient energy harvesters.

## Seven Patents Issued for Technology Used in New DuPont Product

Associate Professor **Steve Lustig**, chemical engineering, was a major contributor to a new product by DuPont called Kevlar® EXO™, a novel, ultra-high-performance copolymer that offers added strength and resilience. Through this collaborative research, Lustig has been issued seven patents for his technology. DuPont created the original version of Kevlar®—a strong, heat-resistant, and lightweight synthetic fiber used in everything from bulletproof vests to boat sails—in 1965. With this new iteration, they sought to harness Lustig's expertise in the design and manipulation of molecular and materials chemistry and structure to create a fiber that was even stronger and lighter and with improved anti-ballistic capabilities.



# Healthcare

## \$3.8M NIH Award to Study Cardiovascular and Respiratory Effects of E-cigarettes and Cigarettes

Associate professors of bioengineering **Chiara Bellini** and **Jessica Oakes** received a \$3.8 million National Institutes of Health grant for “Cardiopulmonary Outcomes of Dual Cigarette and E-cigarette Use in Animal Models of Chronic Exposure.” The project will provide scientific evidence in support of data-driven e-cigarette regulation under The Family Smoking Prevention and Tobacco Control Act, specifically concerning the health risks of dual combustible and electronic cigarette use.

Photo by Adam Glanzman

## \$2.1M NIH Award to Understand the Molecular Mechanisms Underlying Alzheimer’s Disease

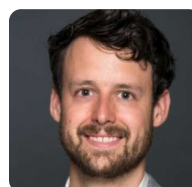


**Lee Makowski**, professor and chair of the Department of Bioengineering, in collaboration with Massachusetts General Hospital, received a \$2.1 million National Institutes of Health grant for “Fibrillar Polymorphs in Human Brain Tissue.” His research group will use x-ray scanning microscopy to observe changes in the molecular structure of amyloid plaques and neurofibrillary tangles during disease with the goal of better understanding the molecular mechanisms underlying the disease, which should provide clues to aid in the design of therapeutics to slow or halt disease progression.

## \$3.4M NIH Grant to Discover RNA Modification Sites Using Pseudouridine Modified mRNA



Assistant Professor **Sara Rouhanifard**, bioengineering, was awarded a \$3.4 million National Institutes of Health R01 grant for “Synthetic mRNA Control Set for Nanopore-Based Pseudouridine Modification Profiling in Human Transcriptomes.” The research has the potential to vastly increase insight into the epitranscriptome—changes in chemical modifications of RNA that can affect gene expression within cells—which could help identify new therapeutic targets and lead to new classes of drugs.



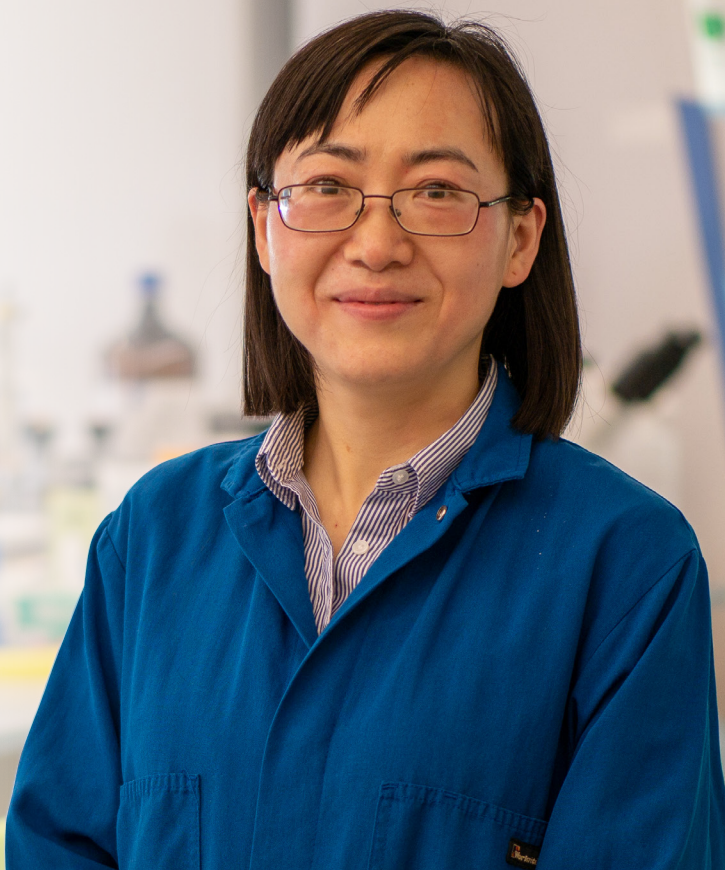
## Exoskeletal Boot Improves Balance

Assistant Professor **Max Shepherd**, mechanical and industrial engineering, jointly appointed in physical therapy, movement, and rehabilitation sciences, published “Exoskeletons Need to React Faster than Physiological Responses to Improve Standing Balance” in *Science Robotics*—the research was featured on the front cover. His team developed a wearable ankle exoskeleton suit, *ExoBoot*, that can generate artificially fast torque before the onset of the user’s physiological reaction, improving standing balance by 9 percent.



## NIIMBL Award for mRNA Vaccine Potency Assessment and Prediction

Assistant Professor **Wei Xie**, mechanical and industrial engineering, received an \$851,000 award from the National Institute for Innovation in Manufacturing Biopharmaceuticals for “Advanced FISH Assay and Mechanism Hybrid Surrogate to Improve mRNA Vaccine Potency Assessment and Prediction.” By swiftly assessing multivalent mRNA vaccines, Xie aims to improve the prediction of their potency and provide a quick quality screening technology.



## \$1.2M NSF Award to Understand Cell-Fate Transitions for Tumor Development



**Herbert Levine**, University Distinguished Professor, jointly appointed in physics and bioengineering, is collaborating with Brown University and MD Anderson Cancer Center to lead a \$1.2 million National Science Foundation grant for determining the “Regulation of Cellular Stemness during the Epithelial-Mesenchymal Transition.” State-of-the-art single-cell measurement technology will be used together with advanced mathematical modeling frameworks to understand how cells choose specific fates and to quantitatively unravel the genetic and epigenetic dynamics that lead these cells along their trajectories.

## \$2M NIH Award for Single-Molecule Protein Sequencer

Professor **Meni Wanunu**, physics and bioengineering, received a \$2 million R01 grant from the NIH/National Human Genome Research Institute for “Asymmetric Single-Chain MspA Nanopores for Electroosmotic Stretching and Sequencing Proteins.” Protein identification and single-molecule protein sequencing could revolutionize the understanding of health by providing a picture of the molecular state of the cell at the level of its most functional molecules.

## \$3M NIH Award to Help Transform Treatment for Pancreatic Cancer

University Distinguished Professor **Mansoor Amiji**, pharmaceutical sciences and chemical engineering, in collaboration with University of California-Davis and drug developer TargaGenix, is working on the final stages of a new therapeutic model that could transform treatment for pancreatic cancer and potentially save thousands of lives every year. Amiji is leading a \$3 million, five-year National Institutes of Health grant to work on mouse efficacy and safety trials at Northeastern for the next three years.



## Nonspherical Ultrasound Microbubbles for Drug Delivery

Assistant Professor **Tao Sun**, bioengineering, published research on “Nonspherical Ultrasound Microbubbles” in *Proceedings of the National Academy of Sciences*. Spherical microbubbles (MB) are widely used for ultrasound imaging and ultrasound-mediated drug delivery. Sun’s research shows that it is possible to generate nonspherical MB. Nonspherical MB outperformed spherical MB in temporarily permeabilizing the blood-brain barrier, opening new avenues for drug delivery.

# AI, Computing, and Data Modeling

Photo by Ruby Wallau

## \$4M DARPA Award for Ultra-Small, Fast, High-Resolution Infrared Sensors



**Matteo Rinaldi**, professor of electrical and computer engineering (ECE) and director of the Northeastern SMART research center, is leading a \$4 million Defense Advanced Research Projects Agency (DARPA) grant under the DARPA Optomechanical Thermal Imaging (OpTIm) program. The project focuses on the development of Nano-opto-mechanical Piezoelectric Resonant Infrared-sensitive Metamaterials for Quantum-Limited Photodetection. Collaborators include **Cristian Cassella**, associate professor of ECE, **Yongmin Liu**, associate professor of mechanical and industrial engineering, jointly appointed in ECE, **Benjamin Davaji**, assistant professor of ECE, **Zhenyun Qian**, associate research professor of ECE, and **Siddhartha Ghosh**, assistant professor of ECE.



## Developing Intelligent Tutoring Systems for Advanced Manufacturing

Assistant Professor **Mohsen Moghaddam**, mechanical and industrial engineering, is

leading a \$850,000 National Science Foundation grant for “Accelerating Skill Acquisition in Complex Psychomotor Tasks via an Intelligent Extended Reality Tutoring System.” The project builds upon the ongoing research at the intersection of AI and augmented, virtual, and mixed reality. It aims to foster learning and adaptability in educational and workplace settings across a range of industries, including manufacturing, healthcare, construction, and defense, among others. Northeastern University co-PIs include Kemi Jona, assistant vice chancellor for digital innovation and enterprise learning; Casper Hartevelde, associate professor of game design and associate dean of the College of Arts, Media, and Design (CAMD); and Mehmet Kosa, CAMD postdoctoral research associate.

## The Dependencies Between El Niño and River Flow

Research conducted by Professor **Jennifer Dy**, electrical and computer engineering, and College of Engineering Distinguished Professor **Auroop Ganguly**, civil and environmental engineering, on “Explainable Deep Learning for Insights in El Niño and River Flows” was published in *Nature*.

## Optical Metasurfaces Research

Research of Associate Professor **Yongmin Liu**, mechanical and industrial engineering, and electrical and computer engineering, on “Breaking the Limitation of Polarization Multiplexing in Optical Metasurfaces with Engineered Noise” was published in *Science*. The research details a new method of increasing the capacity of optical information systems to develop high-capacity optical displays, information encryption, and data storage.



## Study of the Effect of Micro-Level Social Interaction Parameters on Pandemic Policy Success

The research of Associate Professor **Babak Heydari**, mechanical and industrial engineering, on “Micro-level Social Structures and the Success of COVID-19 National Policies” was published in the *Nature Computational Science* journal. The study shows that the micro-level structure of person-to-person interactions can be an important explanatory factor in the success of COVID-19 policy.



# Environmental Health and Sustainability

## First-Ever Global Survey of Earth's Surface Water



Professor **Ed Beighley**, civil and environmental engineering, served as a principal investigator on the Surface Water and Ocean Topography (SWOT) satellite science team and was one of two U.S. SWOT applications scientists. The satellite launched in December 2022, and for the first time simultaneously measures elevations and extents of the Earth's surface waters at high resolution. Beighley is currently a member of the SWOT applications team and is funded by NASA's Jet Propulsion Laboratory and the Consortium of Universities for the Advancement of Hydrologic Science, Inc., working on new methods for integrating SWOT measurements into flood hazard applications for the global insurance industry and developing visualizations of the SWOT mission data.

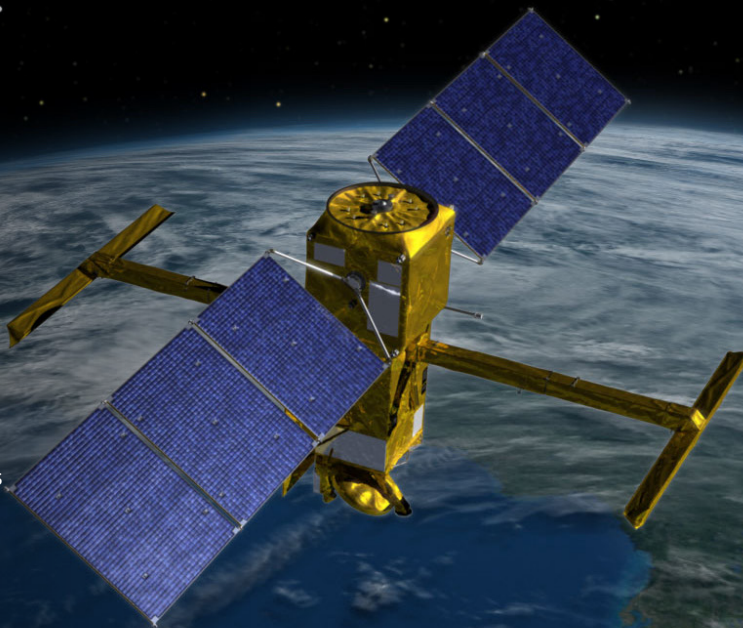


Photo by NASA Jet Propulsion Lab

## DoE Award to Train Next-Generation of Grid-Interactive Efficient Building Operators



**Michael Kane**, assistant professor of civil and environmental engineering, received a \$750,000 award from the U.S. Department of Energy to develop a training program for vocational technology high schools and community colleges that improves entry-level building operators' literacy in grid-interactive efficient buildings. Kane is joined on the project by partners from the Northwest Energy Efficiency Council (NEEC), the Washington State University (WSU) Integrated Design+Construction Lab (ID+CL), and Boston Public Schools.

## \$3M DOE Award to Build a Carbon Negative Future with Steel and Cross Laminated Timber

With a \$3.1 million award from the Department of Energy's Advanced Research Projects Agency - Energy, **Jerome Hajjar**, CDM Smith professor and chair of civil and environmental engineering, will lead a multi-institution team of researchers developing a new carbon sequestration technique using cross-laminated timber composite floor systems in bolted steel construction for building structures. The new structural method aims to decrease the use of steel while increasing the use of carbon-storing timber and design for deconstruction methods.



## Appointed Co-Director of Global Resilience Institute

College of Engineering Distinguished Professor **Auroop Ganguly**, civil and environmental engineering, has been selected as co-director of Northeastern's Global Resilience Institute (GRI), which is committed to developing and deploying practical and innovative tools, applications, and skills that strengthen the resilience of individuals, communities, infrastructure, systems, networks, and societies.

## Leading Research Impact Engine

**Yang Zhang**, professor and distinguished fellow and associate chair for research, civil and environmental engineering, is leading Northeastern's multidisciplinary research Impact Engine, "Healthier Air and People: Intelligent Solutions to Urban Pollution for Equity and Resilience (iSUPER)." It will pair low-cost, adaptable sensing technologies with novel pollution prediction models to accurately identify hyperlocal pollution hot spots in real time.



Learn more about our accomplished faculty



# Student Successes

## SELECTED HIGHLIGHTS

### Barry Goldwater Scholarship

**Siddharth Simon**, E'24, computer engineering and computer science, is a pre-med student driven to use computer software and data engineering to make an impact in medicine by improving access to care as well as patient outcomes. He was awarded a 2023 Barry Goldwater Scholarship, one of the nation's most prestigious merit-based awards for undergraduate students planning to pursue research careers in natural sciences, engineering, and mathematics.



Photo by Alyssa Stone

## National Science Foundation Graduate Research Fellowship Program Award Recipients



The NSF GRFP recognizes and supports outstanding graduate students who have demonstrated the potential to be high-achieving scientists and engineers early in their careers. Several Northeastern University engineering students received the award in 2023.



**Adel Attari**, E'19  
chemical engineering



**Gillian Audia**, E'23  
chemical engineering  
and biochemistry



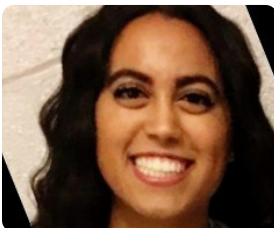
**Rebecca Chinn**, E'18  
chemical engineering



**Caroline Ghio**, E'21  
chemical engineering



**Ashley Herrick**, PhD'25  
bioengineering



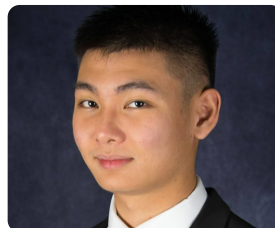
**Nora Khalil**, PhD'25  
chemical engineering



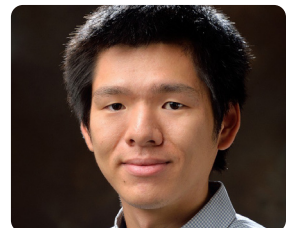
**Bjorn Kieruff**, E'22  
mechanical engineering



**David McMullin**, E'20  
chemical engineering



**Michael Shen**, E'23  
computer engineering



**Jonathan Tan**, E'23  
electrical engineering





## First Place at NASA BIG Idea Competition

A Northeastern student team, advised by Assistant Professor **Alireza Ramezani**, electrical and computer engineering, won the prestigious Artemis Award, the top honor at NASA's 2022 Breakthrough, Innovative, and Game-changing (BIG) Idea Challenge for their COBRA: Crater Observing Bio-inspired Rolling Articulatior. Their snake-inspired robot sidwinds and tumbles, which will expand NASA's lunar and Martian exploration toolkits.

## National Defense Science and Engineering Graduate Research Fellowship

PhD student **Jack Guida**, electrical engineering, advised by Assistant Professor **Siddharta Ghosh**, electrical and computer engineering, was awarded a National Defense Science and Engineering Graduate Research Fellowship. He is researching microscale acoustics and integrated photonics as part of the Northeastern SMART research center.



## Graduate Education for Minorities PhD Engineering Fellowships

**Eric Cardoza**, E'23, mechanical engineering, **Melanie Edmund**, E'23, industrial engineering, and **Benoni Vainqueur**, E'23, computer engineering and computer science, received the Graduate Education for Minorities (GEM) PhD Engineering Fellowship, which offers students opportunities and access to dozens of the top engineering and science firms and universities in the nation.

## Knight-Hennessey Fellowship



**Conor Messer**, E'19, bioengineering, won a Knight-Hennessey Scholars fellowship. An associate computational biologist at the Broad Institute, Messner will pursue a master's degree at Stanford University, participating in programming that prepares him to lead in academia, industry, government, nonprofits, and the community.

## Udall Undergraduate Scholarship Honorable Mention

**Benjamin Lanava**, E'24, environmental engineering, received a Udall Undergraduate Scholarship Honorable Mention. Lanava hopes to find sustainable and affordable solutions for carbon sequestration and providing communities around the world with access to safe, clean drinking water. The Udall Foundation recognizes aspiring sophomores and juniors who advance environmental issues, native health care, and tribal public policy.



# Student Successes

## SELECTED HIGHLIGHTS



### Robotics Team Wins \$1 Million in Global Competition

Team Northeastern won \$1 million in third place at the ANA Avatar XPrize robotics global competition. The competition is aimed at developing human-operated robotic “avatar” systems that can complete tasks and replicate a person’s senses, actions, and presence to a remote location in real time. The student team is advised by Professor **Taskin Padir**, electrical and computer engineering, and director of the Institute for Experiential Robotics, and Assistant Professor **Peter Whitney**, mechanical and industrial engineering.

### Sears B. Condit Award for Outstanding Scholastic Achievement

**Zachary Hoglund**, E’24, bioengineering and biochemistry, won the Sears B. Condit Award, which provides scholarships for outstanding scholastic achievement. Hoglund is co-president of student organization Innovators for Global Health and served as a neurology research co-op in the Hyman Research Lab at Harvard Medical School.



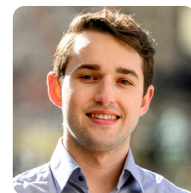
### Donald F. & Mildred Topp Othmer Scholarship Award

**Taryn Sparacino**, E’22, chemical engineering, is the recipient of the 2021-2022 Donald F. & Mildred Topp Othmer Scholarship Award, which is awarded to 15 AIChE student members annually

for their outstanding academic achievement and involvement in student chapter activities.

### Schwarzman Scholarship and One of BostInno’s 25 Under 25

**Alex Marley**, E’22, electrical engineering, was awarded the highly selective Schwarzman Scholarship and named one of BostInno’s 25 Under 25. BostInno’s annual list recognizes company founders, nonprofit leaders, stand-out employees and students under the age of 25 who are already leaders in the Boston startup community. The Schwarzman Scholarship supports up to 200 Scholars annually from the U.S., China, and around the world for a one-year master’s in global affairs at Beijing’s Tsinghua University.





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## ACM SIGHPC Computational and Data Science Fellowship

**Ana Veroneze Solórzano**, PhD '26, computer engineering, won a prestigious Association for Computing Machinery Special Interest Group on High Performance Computing (SIGHPC) Computational and Data Science Fellowship. This competitive international fellowship is given to early-career graduate students who demonstrate excellence in both academic achievement and community leadership.



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## Future Leader in Chemical Engineering

**Ke (Chloe) Wen**, E'22, chemical engineering and biochemistry, was selected for the Future Leaders in Chemical Engineering Symposium 2022, organized by North Carolina State University. Wen was invited to present the research she conducted on engineering mechanically tunable gelatin-based hydrogels to study glycocalyx expression in human endothelial cells.



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## Structural Engineers Association of Mass. Scholarship

**Baiyu Chen**, PhD, civil and environmental engineering, was awarded the Structural Engineers Association of Massachusetts (SEAMASS) scholarship. Chen, who is advised

by CDM Smith Professor and Department Chair **Jerome Hajjar**, demonstrated exceptional passion and commitment to the field. Chen is developing innovative connection and design equations for steel-CLT hybrid structures. Additionally, she is working on conducting a Life Cycle Analysis of framing plan options, aiming to contribute to sustainable practices in the construction industry.

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## Best Paper Award at IEEE IFCS-EFTF

**Nicolas Casilli**, E'21, MS'21, PhD'26, electrical engineering, who is advised by Associate Professor **Cristian Cassella**, received the Best Paper award at the IEEE International Frequency Control Symposium and the European Frequency and Time Forum (IEEE IFCS-EFTF 2023) for his paper "An Ising Tag with a LiNbO<sub>3</sub> Resonator for Temperature Threshold Sensing."



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## Best Master's Thesis Award at EuroSim Conference



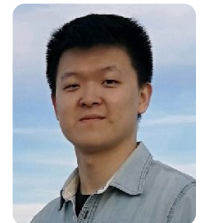
**Sahil Belsare**, MS'21, industrial engineering, received the Best Master's Thesis Award at the EuroSim Conference in Amsterdam for his innovative thesis on adaptive job shop scheduling using deep reinforcement learning. Belsare used a deep reinforcement learning approach to solve a stochastic flexible job scheduling problem,

which was innovative at that time. He was advised by Associate Teaching Professor **Mohammad Dehghani**, mechanical and industrial engineering.

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## ASME Design Engineering Division Best Paper Award

**Haonan Fan**, PhD'24, mechanical engineering, received the 2023 Best Paper Award of the American Society of Mechanical Engineering Design Engineering Division for "DC Motor Velocity Control with Integral Retarded Controller Under Unintentional Delay" at the 2023 ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference.



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## PhD Student's Research on Impact of Insect Decline Published in Nature Climate Change

A paper led by **Kate Duffy**, PhD '21, civil and environmental engineering, and published in *Nature Climate Change*, uses data science to show that, in addition to rising temperatures, fluctuations in temperature will increase the risk of insect extinction in the decades ahead. Insect population collapse could devastate the food chain and sanitation, which depends on insects for cross-pollination and waste disposal.

# View Annual Reports of our Five Engineering Departments



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[mie.northeastern.edu/faculty/annual-reports](http://mie.northeastern.edu/faculty/annual-reports)







## New EXP Facility for Research and Teaching

EXP is Northeastern University's new eight-story, 357,000-square-foot facility that will further the horizons of science, engineering, teaching, and creating. Opened in fall 2023, it offers eight floors of occupiable space, including a top-floor executive area; a floor primarily dedicated to computational research, or research that uses computing systems to apply mathematical models for solving problems; four floors of teaching and academic research labs; 15,000 square feet of makerspace throughout the building; a cafe and "Ideation" space overlooking a ground-floor robotics area, and much more. The following College of Engineering-led research institutes and centers are located in EXP, including the Institute for the Wireless Internet of Things, Institute for Experiential Robotics, and Northeastern SMART.

*Photos by Matthew Madoono/Northeastern University*





## Letter from the Dean

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## Quick Facts

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## Faculty Honors & Research

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## ABOUT THE COVER

In the pharmaceutical industry, each drug needs a unique formulation to allow the body to dissolve and absorb it, but there isn't an easy way to develop a formula for each case. **Rebecca Carrier**, professor and associate chair for research, chemical engineering, has made finding a solution her life's work. She studies interactions between materials and biological systems, with a current focus on the intestinal environment and drug delivery, as well as



retinal and gut epithelial repair. She is the principal investigator at the Advanced Drug Delivery Research Lab at Northeastern. Scan the QR code to read the full article.

Photo by Matthew Modoono, Northeastern University