

ANNUAL REPORT 2021-22

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Northeastern University
College of Engineering



With 215 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 University

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 comprehensive undergraduate and graduate programs lead to degrees through the doctorate in nine colleges and schools across our global system of campuses. Learning is personalized and experiential, with a curriculum that emphasizes the intersection of data, technology, and human literacies—uniquely preparing graduates for lives of fulfillment and accomplishment.

Our research enterprise, with an R1 Carnegie classification, is solutions-oriented and spans the world. Our faculty scholars work in teams that cross not just disciplines, but also sectors—aligned around 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,

A newly elected Member of the National Academy of Engineering. A \$36 million DHS Center of Excellence to protect public spaces. A \$10 million NSF INCLUDES award for Engineering-PLUS, a center to increase BIPOC and women in engineering. And a climate modeling and analytics lab spinout acquired by a leading public company. These are just a few of the many accomplishments of the College of Engineering at Northeastern University during the 2021-2022 academic year.

Our research enterprise continues to grow, reaching \$92.5 million in external research awards in FY2022, up 80% from 2016. Our faculty are conducting interdisciplinary research to address global challenges, from improving healthcare, environmental health, and security to shaping the future of wireless communications, and more. Our faculty have also been recognized for innovations and contributions to their engineering fields. In just the past year, they received eight young investigator awards, and four professional society fellow appointments, among many other prestigious honors.

With our focus on experience-powered, interdisciplinary, and global education, our student enrollment has increased year over year, including our master's degree programs, which rose 48% as compared to 2016. We continue to expand our academic offerings and research capabilities across Northeastern's global university network. Our academic offerings are now available at eight campus locations in three countries and growing. Our newest locations include Arlington, Virginia; London, England; and Vancouver, Canada.

We are proud that Northeastern was once again ranked No. 1 in internships/co-ops by *U.S. News and World Report*. We were also recognized by NASFA: Association of International Educators for the 2022 Senator Paul Simon Award for Campus Internationalization for our global co-op program.

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

Sincerely,

Gregory Abowd, D.Phil.

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



Quick Facts **COLLEGE OF ENGINEERING**

FIVE-YEAR PERFORMANCE 2016 TO 2021

Enrollment, Outcomes, and Programs	Experiential Learning	Transformational Research
TOTAL ENROLLMENT (Fall 2021) 8,542 54% Graduate 46% Undergraduate Enrollment Growth (2016 to 2021) 48% MS 31% PhD 11% BS	931 Graduate Co-op Hires (2022)	215 TENURED/TENURE-TRACK Faculty 20 new in AY2022-23, including 50% jointly appointed
40% New first-year undergraduate students are women up from 33% in 2016	2,897 Total Co-op Hires (2022)	116 YOUNG INVESTIGATOR Awards Including 64 NSF CAREER Awards, and 18 DOD Young Investigator Awards
2,118 Graduate Degree Conferrals up 129% vs. 2016	2,200 Co-op Employer Partners (2020-2022)	4 NSF CAREER Awards in AY2022 in addition to the 7 awarded in AY2021
103 degrees, minors, and graduate certificates	Full-time Job Offer from Co-op Employer (Class of 2021) 55% undergraduate 46% graduate	102 Professional Society Fellowships
OVER 475 PlusOne accelerated master's degree pathways, including those interdisciplinary with other Northeastern colleges, and for engineering and non-engineering enrolled undergraduates	Global Experiences 813 Students (2022) up 36% vs. 2018	158 Patents 2016 to Aug. 2022
5 Engineering Departments	52 Countries (2022)	\$92.5M External Research Awards (2022) up 80% vs. FY2016
Academic Programs on 8 Campuses and Online Boston, MA Arlington, VA London, UK Portland, ME	Seattle, WA Silicon Valley, CA Toronto, CANADA Vancouver, CANADA	Development and Alumni \$76M Gifts (FY2018-2022)
		54,042 Alumni

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

CIBC Center for Integrative Biomedical Computing; a National Institutes of Health university collaborative Research Center producing open-source software tools

CRECE Center for Research on Early Childhood Exposure and Development; a U.S. Environmental Protection Agency and National Institute of Environmental Health Sciences multi-project, multi-institution Research 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

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

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

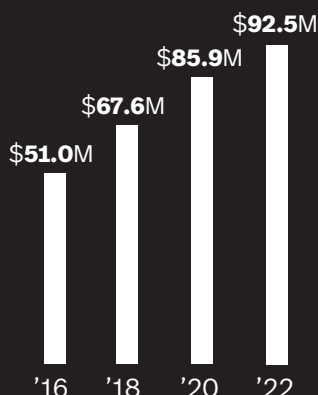
SPIRAL Center for Signal Processing, Imaging, Reasoning, and Learning; a federation of collaborating research laboratories

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



External Research Awards

Up 80% vs. FY2016



Department Research Areas

Bioengineering

Biomechanics, Biotransport, and MechanoBiology
Systems, Synthetic, and Computational
Bioengineering
Imaging, Instrumentation, and Signal Processing
Molecular, Cell, and Tissue Engineering

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 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 Manufacturing
Materials for the Future
Mechanics
Networks and Complex Systems
Resilient and Sustainable Service Systems
Robotics & Control Systems

Jerome F. Hajjar Elected Member of the National Academy of Engineering

Jerome Hajjar, CDM Smith Professor and Chair of the Department of Civil and Environmental Engineering, has been elected a Member of the National Academy of Engineering (NAE). Election to NAE is considered the highest professional distinction accorded to an engineer. Hajjar was recognized for his distinguished contributions to engineering for “development of design criteria and models for stability and seismic design of innovative steel and composite structures.”



Photo by Alyssa Stone



Under Hajjar's leadership, the power to innovate has enabled unprecedented accomplishments in the Department of Civil and Environmental Engineering, which are reflective of the future of the fast-evolving field."

Gregory D. Abowd
Dean of the College of Engineering
Northeastern University

Through experimental testing, computational simulation, and the development of design concepts and criteria, Hajjar has made significant contributions to the development of innovative steel and composite steel/concrete structures. He has developed new resilient and sustainable structural systems, strength and stability design provisions for steel and composite structures, and nonlinear analysis formulations for structural stability and seismic design of steel and composite structures.

Hajjar's work on structural stability began in the 1990s. Structural stability is the theory behind how structures withstand extreme loads without collapsing. His research contributed to new approaches for structural design for stability that are currently embedded in design specifications for steel and composite structures used throughout the U.S. and internationally. His more recent research on structural systems led to a new structural concept for resilience: All energy from an extreme event is focused into replaceable energy-dissipating components of a structure rather than the structure absorbing the energy through permanent damage of its primary structural members like beams, columns, and braces. He has also been advancing the concept of design for deconstruction, where structural systems can be taken apart at the end of the useful life of the structure and the components reused in other structures to reduce waste and the amount of energy needed for recycling. Throughout his career, Hajjar has been researching seismic behavior and design of steel and composite structures. Years of studying fundamentals related to the behavior of these structures, and seeing how they performed in extreme events, led to him rethinking their design to achieve sustainability and resilience goals for earthquakes, hurricanes, and other extreme loads, and underpins his most recent work on developing new and innovative systems.

Academy membership 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."

"With the election to the NAE comes the opportunity and responsibility to serve the nation through participation in the National Academies workshops and reports on engineering issues of importance related to national security, energy, education of future engineers, resilience of urban infrastructure, and sustainability," says Gregory D. Abowd, dean of the College of Engineering at Northeastern University.

Giving back through the work of the NAE is something Hajjar is looking forward to. "I am grateful for all the many collaborations and wonderful students I've had throughout my career, without whom my work would not have been possible," he says. "I am especially grateful for the partnerships I've had with practitioners, industry, and academics from around the world, as well as the opportunity Northeastern has provided to innovate and collaborate."

Abowd adds, "Under Hajjar's leadership, the power to innovate has enabled unprecedented accomplishments in the Department of Civil and Environmental Engineering, which are reflective of the future of the fast-evolving field."

\$36 Million SENTRY DHS Center of Excellence to Protect Soft Targets



After an eight-month competition among the nation's biggest universities, Northeastern, led by **Michael Silevitch**, Robert D. Black Distinguished Professor of electrical and computer engineering, has been awarded \$36 million over 10 years to lead a new Department of Homeland Security (DHS) multi-institutional Center of Excellence, SENTRY (Soft target Engineering to Neutralize the Threat Reality). SENTRY will develop a Virtual Sentry Framework that provides just-in-time information to key decision makers to protect civilian soft targets such as transit stations and schools, and crowded spaces such as stadiums from covert threats.

The multi-institutional DHS Center of Excellence will create a Virtual Sentry Framework that provides just-in-time information to key decision makers to protect civilian soft targets such as transit stations and schools, and crowded spaces such as stadiums from covert threats.

The technology is focused solely on safeguarding civilian targets, but is similar to how the Pentagon sends information to team leaders to defend against a threat. The Virtual Sentry Framework will integrate elements such as crowd-scanning sensors mounted atop light poles, video feeds, cell phone traffic, aerial drone footage, and social media posts. That information will be sent to someone in charge—a school principal, for example—to decide what to do next.

Eleven universities will be working on the project. In addition to Northeastern, they are: Rutgers, Boston University, Tufts University, the University of Southern California, SUNY Buffalo, the University of Puerto Rico-Mayaguez, the University of Rhode Island, University of Florida, Rensselaer Polytechnic Institute, and Notre Dame.

Companies such as integrated systems providers Raytheon Technologies and Leidos will be part of

an industrial advisory board for SENTRY. Corporate business partners on the program could ultimately sell the technology to schools and churches, Silevitch says. But during the 10-year development stage it will be prototyped in a number of venues at no cost.

The system will be versatile enough to monitor soft targets of varying shapes and sizes, a strategic shift from older technologies that treated each target as a unique stand-alone location. "There's such a wide variety of soft targets out there that if you try to focus on just one class, say schools, then that leaves out a whole set of other classes such as subway stations," Silevitch says.

SENTRY should also handle various classes of threats as well, from a lone active shooter to a multi-pronged attack from a foreign power, he adds.

Key to Northeastern's winning strategy was creating a multidisciplinary research program driven by the long-range goal of effectively protecting the vast array of soft targets.

"The four basic research thrusts were conceived at the outset to be part of an integrated whole, feeding off one another to solve these challenging problems," says College of Engineering Distinguished Professor **Carey Rappaport**, electrical and computer engineering, and deputy director of SENTRY.

The program is part of DHS's university-based network of Centers of Excellence. There are 10 centers nationally, each with a specific security focus. SENTRY will be funded through the department's Office of University Programs.

Northeastern's multidisciplinary expertise significantly helped in winning the federal contract. For example, properly designing a school space, architecturally, to make it difficult for a threat to penetrate a soft target, involved interactions between architecture experts at the university's College of Arts, Media and Design. "That was a very important element of our strategy," says Silevitch.

"It is an honor and a major responsibility to lead the SENTRY effort to help protect our nation against incipient soft target attacks," he adds.

\$7.5M DoD MURI Award to Advance Synthetic Biology

University Distinguished Professor **Eduardo Sontag**, electrical and computer engineering, and bioengineering, and collaborators received a \$7.5 million award for “Rules of Composition in Synthetic Biology Across Scales of Complexity: Theory and Tools.” The grant is funded by the Air Force Office of Scientific Research under the Multidisciplinary University Research Initiative (MURI) program. Collaborators include Massachusetts Institute of Technology and California Institute of Technology.

Synthetic biology aims to program biology for applications, such as biosensing, smart probiotics, and regenerative medicine. A major challenge to engineering synthetic biological circuits that behave as intended is the compositional context: Networks are not “plug and play” because behaviors of individual components change when other components are present. This forces a designer to re-optimize each component when other parts are added. The result is that circuits are designed in a monolithic fashion through brute-force parameter search, a lengthy process that is neither scalable, nor generalizable, and often leads to poor outcomes. Overcoming these challenges requires a rigorous, modular, and systematic design framework that explicitly accounts for the context-dependence of biomolecular processes and undesired interactions, which one tends to neglect in the design phase.

The goal of the new grant is to impact synthetic biology by changing the way one describes, characterizes, and designs genetic modules, through tools that will enable the systematic and scalable design of increasingly complex biomolecular decision-making systems. The core of the project will establish theoretical foundations and tools, grounded on the mathematics of dynamical systems, which will enable the compositional design of synthetic biology circuits while accounting for context. A control-theoretic framework will be developed for the composition of biomolecular processes to capture unintended connectivity due to the sharing of cellular resources in gene expression as well as a hierarchical design methodology. The theory will be validated through bacterial, mammalian, and cell-free testbeds to be developed by the experimentalists on the team.



risQ Climate Modeling and Analytics Startup Acquired by Intercontinental Exchange

risQ, a climate modeling and analytics startup, was spun out from research in Professor Auroop Ganguly's Sustainability and Data Sciences Lab. It was acquired in December 2021 by Intercontinental Exchange—one of the largest operators of electronic marketplaces.

Predicting where and when the next extreme weather event will hit, and what the financial toll will be, is pretty much a guessing game for insurance companies and other firms that deal with risk. The rare December 2021 Colorado wildfires, for example, that occurred when snow was on the ground, destroyed nearly 1,000 houses and damaged hundreds more. Homeowners began contacting their insurance companies for assistance. While insurance companies are in the business of hedging bets against the unexpected, how do they model for something as unpredictable as Mother Nature?

This is the business of the growing catastrophe modeling market that serves the insurance sector. “Counterintuitively, the insurance ecosystem is not helping society absorb the majority of the economic impacts of climate change, which is putting most of the burden on communities and low-income populations,” says alumnus **Evan Kodra**, interdisciplinary engineering PhD’14.



That is what prompted him, along with Professor **Auroop Ganguly**, civil and environmental engineering, and another alum **Colin Sullivan**, E'14, computer engineering, to found risQ (pronounced “risk”), a climate modeling and analytics company, in 2016. The three helmed the company—Kodra as chief executive officer; Ganguly as chief scientific adviser; and Sullivan as chief operating officer—until Intercontinental Exchange (ICE) acquired the startup in December 2021. ICE is one of the largest operators of electronic marketplaces.

The Boston-based risQ was spun out of Ganguly’s Sustainability and Data Sciences Lab, and over its lifetime received \$1.65 million in National Science Foundation Small Business Innovation Research grant funding. A landmark NSF Expeditions in Computing grant had also been critical in years past, funding much of the SDS Lab’s research that led to the founding team’s idea underpinning risQ.

The company initially targeted the insurance market but pivoted to cities and communities, where the burden of climate change is driving an early wave of small-town bankruptcies, social inequality, and alarm bells in the financial markets.

risQ’s growth came fast. The company went from one customer in the early days to more than 20 customers at the time of the acquisition—mostly financial institutions that invest in real estate-backed securities and the municipal debt issued by U.S. cities to fund water and sewer systems, schools, transit projects, and day-to-day critical services.

“Most people aren’t really aware of the municipal debt market and how it dictates so much of our built environment and socioeconomic structure. Bonds are like the credit cards of cities,” Kodra says. “We think this market will soon evolve into the primary vehicle for financing climate action in the U.S. because it’s in the best interest of not only cities but also their investors.”

Virginia Beach, a city exposed to increasing flood risk with a shoreline nearly 40 miles long, is one of the first major examples. In 2021, its residents voted to borrow more than \$500 million in municipal bonds to invest in climate resilience.

risQ began a similar project recently with another city looking to improve stormwater runoff management as sea levels rise and flooding intensifies. “Our role is to do the economic and social cost-benefit analyses related to proposed climate infrastructure investments,” says Kodra.

In speaking of risQ’s acquisition, Ganguly adds “To the best of my knowledge, this is the first successful ‘exit’ of a startup company focused on climate and cities.” Intercontinental Exchange and risQ first began working together in January 2020 with the launch of ICE Climate Risk, which lets investors in the U.S. municipal bond and real estate markets incorporate climate risk into project and investment decisions.

Next followed risQ’s Social Impact Scores, allowing users to quantify and invest in social causes through the municipal bond and real estate markets. With the sale of risQ a done deal, Ganguly and his lab mates are already pondering the next societal issue to tackle.

“Critical infrastructure resilience? Urban sustainability? Yes, we bring the power of America’s and the world’s entrepreneurial spirit to solve grand societal challenges of the day,” he says.



With the acquisition of risQ, Evan Kodra, PhD'14, interdisciplinary engineering, is now senior director of climate and ESG at Intercontinental Exchange. He also generously created a fellowship for future student researchers in the Sustainability and Data Sciences Lab in memory of an SDS lab student.

S-POWER: A Successful Model Toward Equalizing Opportunities for Underrepresented Students

The term “transfer shock” describes what happens when students enter a competitive institution without being given the tools to succeed there. For some students, it’s about making the academic leap from a less challenging institution or community college. For others, it’s about navigating university life alone, with few college-educated family members or role models to show them the way.

The S-POWER program was funded in 2016 by an NSF S-STEM award. In May 2022, 16 students in the program graduated, leaving Northeastern for prestigious graduate programs or careers at leading companies. More than 140 more are still successfully on the road to degrees in engineering fields and the program has a retention rate well over 90%. S-POWER has been institutionalized at Northeastern and stands as a blueprint for other programs.



The Northeastern University S-POWER program was recognized with a Facilitator Award at the 2022 STEM for All Video Showcase funded by the National Science Foundation.

In 2016, a team from Northeastern University’s College of Engineering was awarded a \$5 million National Science Foundation S-STEM grant. Known as S-POWER (Student Pathways Opening World Energy Resources), the five-year grant provided financial aid as well as academic and mentoring opportunities for students who could benefit from extra preparation for the university environment. It was largely designed for—though not limited to—students entering Northeastern from community colleges and Historically Black Colleges and Universities (HBCUs). In May 2022, 16 of them graduated, leaving Northeastern for prestigious graduate programs or careers at companies including Apple, Facebook, General Motors, and Lockheed Martin. More than 140 more are still successfully on the road to degrees in engineering fields through S-POWER. The retention rate, organizers report, is outstanding—over 90%.

Moreover, the program is on its way to meeting one of its other goals: setting a blueprint for other programs in the same mold. While organizers stress that S-POWER is just one piece of a larger effort—one attempt among the many needed to equalize opportunities for underrepresented students—it has emerged as a powerful one. The program has now been institutionalized at Northeastern—that is, provided with university funding to continue its work beyond the NSF grant period. “For all intents and purposes, it’s even gone beyond what we initially intended,” says **Richard Harris**, associate dean of diversity, equity, and inclusion in the College of Engineering.

“Working with the S-POWER students, particularly at the graduate level, has provided the team with much insight into the unique social, research, and experiential challenges that these students face in pursuing an MS degree,” says **Marilyn Minus**, professor and chair of mechanical and industrial engineering. “This grant has allowed the team to examine and develop multiple pathways to support the students, beyond the S-POWER scholarship, throughout their time here at NU toward successful completion of their degrees. We can now share these best practices with our partner institutions.”

The purpose of S-POWER is two-fold: addressing the low persistence rate of underrepresented minority students in competitive STEM programs, while supplying diverse and qualified talent to meet the needs of the U.S. energy sector and other STEM-based industries. Building on the work of previous diversity and inclusion efforts dating back to at least 2010, S-POWER was designed around partnerships with select community colleges—Mass Bay, Middlesex, and Northern Essex community colleges, all in Massachusetts—as well as HBCUs—Clark Atlanta University and Hampton University. Crucially, the program doesn’t only begin when students reach the Northeastern campus. It’s been carried out in concert with the “sending institutions”—the colleges where the students started out—so each student can be prepared with key courses and guidance before entering Northeastern. Some students attend Northeastern’s Summer Bridge program for extra academic preparation before their first semester at their new university.

Candidates for the S-POWER program include not only underrepresented minorities but also first-generation college students and those with any socioeconomic disadvantage. What all those groups sometimes lack, upon entering competitive universities, is “social capital”—the support and academic experience that



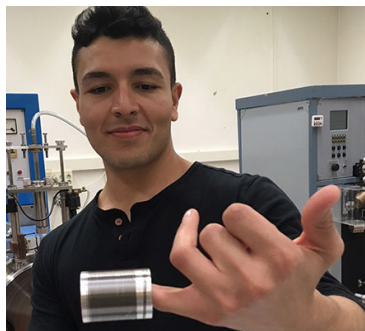
Leadership Team

Left to right: Bradley Lehman, professor of electrical and computer engineering; Marilyn Minus, professor and chair of mechanical and industrial engineering; Claire Duggan, executive director of the Center for STEM Education; Richard Harris, associate dean of diversity, equity, and inclusion; and (not shown) Rachelle Reisberg, assistant dean, engineering enrollment and retention; and Luis Frias, associate director of diversity programs

Photo by Matthew Modono

students from wealthier, more educated social circles might take for granted. From a financial aid standpoint, S-POWER allocated up to \$30,000 per student. Beyond that—depending on each student’s background—the program has stepped in to offer everything from academic tutoring and one-on-one advising to assistance with housing and family dynamics. For **Rachelle Reisberg**, assistant dean of undergraduate engineering enrollment and retention, the value of the program is epitomized by one S-POWER student who came to Northeastern with very few educational or socioeconomic advantages, yet ultimately graduated with a 3.5 GPA. “It’s the kind of success story that I think would not have been possible at a lot of institutions,” says Reisberg. “Without the mentoring, without that coaching and encouragement, she would’ve been lost from the get-go. And now she’s blazing trails. We’re so proud of her.”

Reshaping Life Goals



Juan Mesa, S-POWER graduate in mechanical engineering, now pursuing PhD in Robotics.

When students reflect on their time in S-POWER at Northeastern, one common thread is that it broadened their horizons, reshaping the life goals they’d grown up with before entering the program. One student, **Juan Mesa**, pursued a mechanical engineering degree with the simple goal of helping in his father’s auto repair business, but found a much more expansive field with countless applications. He ultimately pursued a research experience in Spain and entered a PhD program with a focus on robotics.

S-POWER showed me that If you give people the resources to succeed—the resources someone else might have grown up with—they can do just as well.”

Maddy Weaver, E’22
Electrical and Computer Engineering



Maddy Weaver (center), S-POWER graduate in electrical and computer engineering, is now pursuing a master’s at Carnegie Mellon University.

Another student, 2022 graduate **Madeleine Weaver**, once planned on becoming a waitress or pastry chef. After transferring to Northeastern from Mass Bay Community College through the S-POWER program, she completed a degree in electrical and computer engineering—at one point working in an augmented reality lab at the University of Southern California. Now, she is at Carnegie Mellon for her master’s, pursuing a career as an animatronics engineer.

“S-POWER showed me that if you give people the resources to succeed—the resources someone else might have grown up with—they can do just as well,” says Weaver.



Summer Bridge Program Institutionalized and University-wide

Northeastern's Summer Bridge Program, established in 2002 and originating in the College of Engineering, gathers first-year students who come from historically underrepresented populations and helps them prepare for their next four years at Northeastern. In 2015, the College of Engineering institutionalized the program in the college. The College of Science joined the program in 2016. In 2021, qualifying students from all colleges could participate in the Summer Bridge Program online. In 2022, about 260 students from across the university gathered on campus to participate in the weeklong program.

Emerging Leader Abie Award

Kris Dorsey, associate professor of electrical and computer engineering, jointly appointed in Bouve College of Health Sciences, is a 2022 Emerging Leader Abie Award winner from AnitaB.org. In honor of Denice Denton, the first female dean of an engineering school at a major U.S. research university, the Emerging Leader Award is given to a junior, non-tenured faculty member for high quality research and significant impact on diversity.



Northeastern University Impact Award



Richard Harris, associate dean of diversity, equity, and inclusion in the College of Engineering, was honored as the inaugural recipient of the Northeastern University Impact Award. The Impact Award is bestowed upon a faculty or staff member who has implemented meaningful initiatives in an exemplary manner, ultimately helping to improve the quality of connections between students, faculty, alumni, or parents to Northeastern.

New Prestigious PhD Fellowships for Women in STEM from Henry Luce Foundation

See story on page 14.

NSF \$10M Engineering PLUS – Partnerships Launching Underrepresented Students



In 2021, Northeastern received a \$10 million grant from the National Science Foundation for Engineering PLUS (Partnerships Launching Underrepresented Students) to build a system and a network to dramatically increase engineering degrees among women and BIPOC (Black, Indigenous, and other People of Color) nationally by the year 2026. It is the only center funded by NSF INCLUDES with a focus on engineering.

The vision of the Engineering PLUS Alliance is to achieve transformative, systemic, and sustainable change with a goal to increase the annual number of engineering degrees among underrepresented groups to 100,000 among undergraduates and 30,000 among graduate students. Currently, the BIPOC community accounts for just 18 percent of engineering graduates and 34 percent of the population as a whole, while women account for 23 percent of the graduates and 51 percent of the total population.

The Alliance will work in cooperation with existing organizations such as the NSF Louis Stokes Alliance for Minority Participation (LSAMP), the National GEM Consortium, and the National Action Council for Minorities in Engineering (NACME), and others.

It will create a regional structure that is both sustainable and can be replicated across the nation. To ensure this regional concept takes hold, the Alliance established a Peer Leadership Training Academy to prepare 450 academics, administrators, and industry leaders to become change agents among universities, high schools, community colleges, and businesses in the region.

Northeastern leads include **Karl Reid** (PI), senior vice provost and chief inclusion officer, **Michael Silevitch**, Robert D. Black College of Engineering (COE) distinguished professor, **Claire Duggan**, executive director, Center for STEM Education, COE, and **Richard Harris**, associate dean of diversity, equity, and inclusion, COE.

Visit engplusalliance.northeastern.edu

Expanding the Global Network

The College of Engineering continues to add new academic offerings to meet evolving industry requirements and provide students with flexible options to pursue their career goals. More academic programs have also continued to be offered at campuses across Northeastern's growing global network. Several master's degrees and some graduate certificates are now available at campus locations, including Arlington, Virginia; Portland, Maine; Seattle, Washington; Silicon Valley in California; and in Toronto and Vancouver, Canada.

Additionally, research capabilities are expanding beyond Boston. Currently, the Institute for Experiential AI and the Institute for the Wireless Internet of Things, as well as digital engineering (specifically computational medicine) have research efforts in Portland, Maine, while the Arlington, Virginia campus will enable closer research collaborations with government and industry partners.

Newest Academic Programs

UNDERGRADUATE PROGRAM

BS in Mechanical Engineering and Bioengineering

GRADUATE PROGRAMS

MS in Information Systems-Bridge

MS in Internet of Things

MS in Pharmaceutical Engineering

MS in Product Development

MS in Wireless and Network Engineering

Certificate in Climate and Engineering

Certificate in Sustainability Engineering

NEWEST GRADUATE PROGRAMS AT GLOBAL NETWORK CAMPUSES

Arlington, Virginia

MS in Software Engineering Systems

Certificate in Blockchain and Smart Contracts Engineering

Certificate in Software Engineering Systems

Portland, Maine

MS in Bioengineering, with concentration in systems, synthetic, and computational bioengineering (focus in computational medicine)

MS in Electrical and Computer Engineering, with concentration in network and security

Seattle, Washington

MS in Data Architecture and Management

Vancouver, Canada

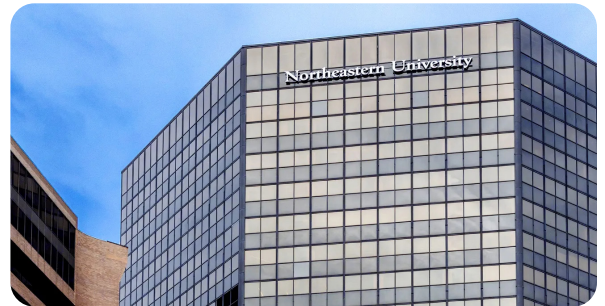
MS in Data Analytics Engineering



An eight-week residency at the Seattle campus, which includes dozens of industry site visits, is a core part of a new aerospace minor in the College of Engineering.



Nitin Sunda, ME'21, cyber physical systems, credits the skills that he learned in class at the Silicon Valley campus with him landing a co-op at tech company Nokia. Upon graduating he had two full-time job offers from Nokia and Amazon.



Northeastern's campus in Arlington, Virginia, the latest addition to its expanding global university system, will give the university a foothold in the Washington, D.C., area, one of the fastest growing regions in the U.S. Located in the Rosslyn neighborhood, the campus welcomed its first cohort of graduate students virtually in fall 2022, with plans to open for in-person instruction in spring 2023. The initial focus of the campus will be on security, resiliency, and technology. When the campus fully opens in the spring, there will be a floor dedicated to research and a floor dedicated to learning, with opportunities for collaboration between the two. At the heart of the Arlington campus is the co-mingling of the public and private sectors through partnerships with government entities, industry leaders and the community.

New NU Bound Program



In Fall 2022, the first cohort of first-year engineering students started a one-year experience at the Northeastern University-London campus. Northeastern is the first U.S.-based institution of higher learning to be granted "university title" by England's higher education regulator.

New Prestigious PhD Fellowships for Women in STEM from Henry Luce Foundation

Northeastern University is honored to be the recipient of a Henry Luce Foundation award from the **Clare Boothe Luce Program for Women in STEM** to support fellowships for women pursuing a PhD in mechanical engineering, electrical engineering, computer engineering or physics.

Since its first grants in 1989, the Clare Boothe Luce Program for Women in STEM has become the single most significant source of private support for women in science, mathematics, and engineering in higher education in the United States. Clare Boothe Luce, the widow of Henry R. Luce, was a playwright, journalist, U.S. Ambassador to Italy, and the first woman elected to Congress from Connecticut. In her bequest establishing this program, she sought “to encourage women to enter, study, graduate, and teach” in science, mathematics, and engineering.

Each fellowship recipient will be admitted with five years of funding—a combination of Clare Boothe Luce Program funds and institutional resources. They will also receive a stipend for annual living expenses, a full tuition scholarship, health insurance, student fees, and professional development funds.

In addition to pursuing research, selected fellows will have access to Northeastern’s faculty and facilities, and a series of professional development activities offered through the university’s PhD Network. The fellows will receive funding flexibility to support interdisciplinary research, and an opportunity to receive personalized mentoring and joining the LEADERS program, a leadership and experiential learning program for PhD students.

Global Co-op Program Recognized by NASFA

Northeastern University was selected by NASFA: Association of International Educators for the **2022 Senator Paul Simon Award for Campus Internationalization**. One of five higher education institutions to be recognized within two categories, Northeastern received the Senator Paul Simon Spotlight Award for its global cooperative education program. The award recognizes a specific program or initiative that contributes to internationalization on campus.

Named after the late Senator Paul Simon of Illinois, the NAFSA Simon Awards recognize outstanding innovation and accomplishment in campus internationalization, defined by NAFSA as a conscious effort to integrate and infuse international, intercultural, and global dimensions into the ethos and outcomes of their students’ education.



You get a nice perspective on the rest of the world. That’s really important in my opinion. My advice to other students is take advantage of the global opportunities at Northeastern.”

Isabelle Brandicourt, E’23, Electrical Engineering
Research Co-op in Antarctica

PhD Student Spotlights



Yasmeen Farra, PhD'22

BIOENGINEERING

Advised by Chiara Bellini, Associate Professor of Bioengineering

Originally from Austin, Texas, **Yasmeen Farra** began her PhD at Northeastern in 2017 after graduating from Trinity University with a bachelor's degree in engineering science. Her research focuses on vascular mechanics—specifically, how chronic disease associated with e-cigarette “vaping” or cigarette smoking influences the structural integrity and functional health of large arteries.

Recognizing her potential as a scientist, the National Science Foundation awarded Farra a prestigious Graduate Research Fellowship in 2019. During her doctoral studies, she worked on several projects and presented her work at numerous conferences in a wide range of topics, from tobacco research to magnetic resonance imaging, aerosol medicine, and biomechanics. Her efforts culminated in five first-author publications: three already published, one under review, and one currently in submission. As a result, she received the APSelect Award from the American Physiological Society for distinction in scholarship in the June 2021 issue of the *American Journal of Physiology-Heart and Circulatory Physiology* for the article “Structural and Functional Remodeling of the Female Apoe^{-/-} Mouse Aorta Due to Chronic Cigarette Smoke Exposure.” She was also selected as a finalist for the highly competitive student paper competition at the SB3C conference and received the 2022 College of Engineering Outstanding Graduate Student Award for her research contributions over the past five years.

Farra was elected to the Bioengineering Graduate Student Council where she served for several years. She has also devoted considerable effort to improving science communication as a fellow of the College of Engineering Communications Lab for nearly three years. She coached peer-to-peer sessions to help students with scientific writing and organized training sessions on how best to present scientific content.

Following graduation, Farra will be taking her passion for scientific research to her new role as a scientist at Senda Biosciences, a biotech startup in Cambridge, Massachusetts. She will work on the translational biology team to help bring life-changing treatments to patients by harnessing Senda's platform for fully programmable medicines.



Sadia Khan, PhD'22

CIVIL AND ENVIRONMENTAL ENGINEERING

Advised by R. Edward Beighley, Professor of Civil and Environmental Engineering

Originally from Dhaka, Bangladesh, **Sadia Khan** graduated from Bangladesh University of Engineering & Technology with a bachelor's degree in civil engineering and served as a lecturer at the University of Asia Pacific in Dhaka. She joined the PhD program at Northeastern in 2017.

Under the guidance of Professor Edward Beighley, civil and environmental engineering, and Assistant Professor Amy Muller, civil and environmental engineering, jointly appointed in marine and environmental sciences, Khan performed research focused on characterizing nutrient export variability from urban stormwater and developing novel diversion and treatment strategies to minimize treatment costs and maximize phosphorus removal. Leveraging this research theme, Khan took part in two collaborative research projects that included both policy and engineering stakeholders: the first with the City of Cambridge, Massachusetts and Stantec, and the second with the Boston Water and Sewer Commission and Kleinfelder.

Khan's focus on data-driven solutions for managing urban stormwater will ultimately improve challenges associated with eutrophication in freshwater systems such as the Charles River in Boston. During her doctoral studies, she published in *Science of The Total Environment* and presented her findings at five conferences. From connections made through her research, Khan joined Kleinfelder as a water resources engineer in the summer of 2022, and is continuing her efforts on improving our water resources.

PhD Student Spotlights



Md Mahmudul Hasan, PhD'22

INDUSTRIAL ENGINEERING

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

As a PhD student of the Decision Analytics Lab at Northeastern, **Md Mahmudul Hasan** conducted data-driven research to address complex challenges in public health, contributing to healthcare decision-making, policy, and management. From a methodological standpoint, he leveraged management and data science techniques, particularly AI/machine learning, statistical modeling, and operations research techniques.

Hasan was also a member of Northeastern's Center for Health Policy and Healthcare Research. He collaborated on several interdisciplinary research projects, partly funded by the CDC in partnership with the Massachusetts Department of Public Health and Northeastern's Global Resilience Institute. The research addressed critical issues such as the opioid overdose epidemic. Hasan's research also focused on developing an intelligent multi-criteria decision-making framework for resilient supplier selection in logistics 4.0.

He presented his research at prestigious conferences and produced 13 publications. He received the John and Katharine Cipolla Merit Award-PhD from the Department of Mechanical and Industrial Engineering and the Outstanding Graduate Research Award from the College of Engineering. In addition to being an active and prolific researcher, Hasan mentored undergraduate and master's students, leading them in their projects and thesis activities and helping them participate in scholarly publications.

After defending his dissertation, Hasan worked as an Oak Ridge Institute for Science and Education postdoctoral fellow of drug safety and artificial intelligence methods in the U.S. Food and Drug Administration's Center for Drug Evaluation and Research. In this position, he utilized AI and natural language processing techniques to investigate how the interactions between opioids and other FDA-approved drugs cause adverse health events in the human population.

Hasan began a tenure-track faculty position at the University of Florida in July of 2022. He is jointly appointed between the Department of Information Systems and Operations Management at the university's College of Business and the Department of Pharmaceutical Outcomes and Policy at the College of Pharmacy.



Seyedeh Mahsa Sadeghian, PhD'22

MECHANICAL ENGINEERING

Advised by Sandra Shefelbine,
Professor of Mechanical and Industrial
Engineering, and Bioengineering

Mahsa Sadeghian completed her master's degree and PhD conducting research in the Multiscale Mechanics and Musculoskeletal Mechanobiology Lab at Northeastern. Her master's thesis used computational modeling to explore the mechanics of growing bone, focusing on stresses in the growth plate, a thin layer of cartilage responsible for growing bone length.

In her doctoral research she expanded on this work, incorporating mechanobiology, the tissue response to mechanical loading. As bone grows, it changes shape and material properties due to ossification. These biological processes are influenced by the mechanical environment of the tissue. By modeling the effect of loading conditions on growth and ossification, Sadeghian explored pathologies of the hip, particularly the proximal femur. She modeled femoroacetabular impingement, a hip condition that forms in elite adolescent athletes and leads to arthritis. Her work helped to uncover possible causes of the abnormal bone growth. She also modeled hip dysplasia, the condition in which the femur develops outside of the acetabular socket, and the effects of harness treatment.

Sadeghian published two papers and has two more in preparation. She was also a teaching assistant for the Mechanics of Materials Lab, changing the labs each year so that students had more hands-on experiences. In 2019, she completely redesigned the labs to include even more hands-on demonstrations and new equipment, and revised them yet again as take-home lab kits to accommodate the pandemic.

Her dedication to teaching earned her numerous awards, including the Alfred J. Ferretti Excellence in Teaching Award and the John and Katharine Cipolla Merit Award from the Department of Mechanical and Industrial Engineering, as well as the College of Engineering Outstanding Graduate Teaching Award. Sadeghian hopes to apply her modeling skills to orthopedic device design in the future.



Pranali J. Buch, PhD'22

CHEMICAL ENGINEERING

Advised by Edgar Goluch,
Associate Professor of Chemical
Engineering

Originally from India, **Pranali Buch** joined the PhD program at Northeastern in the fall of 2017. Prior to graduate school, she worked for bluebird bio in their lentiviral vector process and analytics group as a scientist, and subsequently as a consultant. Her research interest lies in solving drug delivery challenges and developing delivery systems for biological applications.

Buch conceptualized and designed her own doctoral project that was aimed at developing lipid nanoparticles with a poly-(ethylene glycol) (PEG) alternative polymer. Since PEG does not have excellent stealth properties, and anti-PEG antibodies are increasing in the general population, having an alternative polymer with superior stealth properties is beneficial. She demonstrated the functionality of this system in bacterial biofilm infection models. During the process, she published two literature review articles and a results manuscript that is currently in the review process. She also mentored four undergraduate students during her graduate studies and helped them secure Northeastern research awards. In addition, she authored the technical sections of R03 and R21 National Science Foundation grants, and SBIR Phase I grant applications for various projects.

Buch presented her work multiple times at the American Institute of Chemical Engineers and presided over the biomedical sensors oral presentation session at Pittcon in 2019. She has received several recognitions, including the Kanojia Fellowship, a Graduate Thesis Research Grant, Best Teaching Assistant Award, Best Student Seminar Presentation Award, and a Dissertation Completion Fellowship. After graduation, she started working as a drug delivery consultant for a biotech venture in the Boston area.



Tirthak Patel, PhD'22

COMPUTER ENGINEERING

Advised by Devesh Tiwari,
Associate Professor of Electrical and
Computer Engineering

After earning his bachelor's degree in electrical engineering with honors from the University of Toronto, **Tirthak Patel** joined Northeastern to pursue his PhD. Patel's research addresses the challenge of error-prone program executions on quantum computers and provides robust solutions to improve their reliability. While the field of quantum computing is rapidly advancing, relatively high noise on near-term quantum computers remains a fundamental roadblock, prohibiting wider adoption. Due to the high noise levels, program executions on near-term quantum computers produce erroneous program outputs. Programmers largely lack the tools to estimate the correct output of these noisy program executions.

Patel's research has focused on designing cross-layer system software for extracting meaningful output from erroneous program executions on quantum computers. In particular, he led the effort to benchmark and analyze the performance of different quantum algorithms on quantum computers. Patel leveraged the insights gained from this measurement-based experimental effort to inform the design of his novel software tools and methods.

He has published more than 35 rigorously peer-reviewed research papers. Patel also interned at Berkeley Lab, served on conference committees, reviewed journal papers, served as a teaching assistant, and delivered lectures about quantum computing at Northeastern.

In recognition of his research contributions, Patel received the Natural Sciences and Engineering Research Council of Canada Alexander Graham Bell Canada Graduate Scholarship, the Northeastern University College of Engineering Outstanding Graduate Research Award, the ACM-IEEE Computer Science George Michael Memorial High Performance Computing Fellowship, and the Northeastern University Outstanding Graduate Student Award in Research.

Following graduation, Patel will join Rice University's School of Engineering in the fall of 2023 as an assistant professor of computer science.

Faculty Fellows, Young Investigator Awards, and Honors

Photo by Alyssa Stone

National Academy of Engineering Member

CDM Smith Professor and Chair of the Department of Civil and Environmental Engineering **Jerome F. Hajjar** was elected a Member of the National Academy of Engineering for his development of design criteria and models for stability and seismic design of innovative steel and composite structures. Election to the NAE is among the highest professional distinctions accorded to an engineer. See page 4.



ACM Fellow

College of Engineering Distinguished Professor **David Kaeli**, electrical and computer engineering, was selected as an Association for Computing Machinery (ACM) Fellow for his contributions to computer architecture and compilers. The ACM Fellows program recognizes the top 1% of ACM Members for their outstanding accomplishments in computing and information technology and/or outstanding service to ACM and the larger computing community.



College of
Engineering
Faculty have

102

**Professional
Society
Fellowships**

IEEE Fellow and Lifetime Achievement Award

Professor **Hanumant Singh**, electrical and computer engineering, jointly appointed in mechanical and industrial engineering, has been elevated to an IEEE Fellow for his development of localization and mapping techniques and autonomous systems for marine and polar applications. IEEE Fellow is the highest grade of membership and is recognized by the technical community as a prestigious honor and an important career achievement. Singh also received the Lifetime Achievement Award from the IEEE Oceanic Engineering Society for his work on autonomous underwater vehicles.



Photo by Matthew Modono

Elected Member of Academia Europaea

Professor **Yun Raymond Fu**, electrical and computer engineering, jointly appointed in Khoury College of Computer Sciences, was elected a Member of Academia Europaea (The Academy of Europe). Membership is for individuals that have demonstrated “sustained academic excellence” and is by invitation only by existing MAE and judged during a peer-review selection process.



Photo by Matthew Madoono

Fellow of SPIE

Associate Professor **Charles DiMarzio**, electrical and computer engineering, was selected by the International Society for Optics and Photonics (SPIE) as a Fellow for his significant scientific and technical contributions in the multidisciplinary fields of optics, photonics, and imaging. SPIE Fellows are honored for their technical achievement and for their service to the general optics community and to SPIE in particular.



Photo by Matthew Madoono

IISE Fellow

Professor **Sagar Kamarathi**, mechanical and industrial engineering, was selected for the Institute of Industrial and Systems Engineers (IISE) Fellow Award. It 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.



Photo by Matthew Madoono

Faculty Young Investigator Awards

NSF CAREER Award for Drug Delivery Biomaterials

Associate Professor **Ambika Bajpayee**, bioengineering, was awarded a \$630K CAREER grant from the National Science Foundation for “Developing Electrically Charged Biomaterials for Targeted Drug Delivery to Negatively Charged Complex Tissue Environments.” Her research will investigate how to improve drug delivery in tissues within the human body that are not receptive to systemic or local drug delivery methods due to their high negative charge density and lack of blood vessels by using charge interactions.



NSF CAREER Award for Early Detection of Autism

Assistant Professor **Sarah Ostadabbas**, electrical and computer engineering, was awarded a \$600K CAREER grant from the National Science Foundation for “Learning Visual Representations of Motor Function in Infants as Prodromal Signs for Autism.” She will develop a targeted, AI-guided infant motor function monitoring and assessment system that can discover the relationship between certain infant behavior and future diagnoses of autism.



NSF CAREER Award to Use Ultra-low Power Analog Computing Circuits to Develop Machine Learning Hardware for Biomedical Devices

Assistant Professor **Aatmesh Shrivastava**, electrical and computer engineering, received a \$500K National Science Foundation CAREER award for “An Ultra-low Power Analog Computing Hardware Design Framework for Machine Learning Inference in Edge Biomedical Devices.” He is developing ultra-low power machine learning system-on-chip hardware with inference capability for wearable and implantable biomedical applications. Using analog rather than digital computing, the chip will be 5 to 10 times smaller (millimeters vs. centimeter in size) and use 5 to 50 times less power.



NSF CAREER Award for More Reliable Quantum Computing

Associate Professor **Devesh Tiwari**, electrical and computer engineering, was awarded a \$560K CAREER grant from the National Science Foundation for “Qurious: Methods for Making Erroneous Near-term Quantum Computers More Usable.” The project will investigate how to make the next generation of computing machines—quantum computers—more effective, as well as train technologists to use them. If successful, quantum computers can be used to solve computationally challenging problems of societal importance.



College of
Engineering
Faculty have

116 **YOUNG
INVESTIGATOR** ▶
Awards

Including **64** NSF
CAREER Awards,
and **18** DOD YIAs

Outstanding New Environmental Scientist (ONES) Award to Study Impact of Wildfire Smoke on Human Health

Assistant Professor **Jessica Oakes** and Associate Professor **Chiara Bellini**, bioengineering, were awarded a \$3.4 million National Institute of Environmental Health Sciences Outstanding New Environmental Scientist (ONES) grant for “Cardiopulmonary Risk Assessment from Smoke Exposure at the Wildland Urban Interface.” The research will study the impact of burning vegetation as well as the health risks associated with the combustion of common household materials. The ultimate goal of the study is to make policy recommendations on issues such as evacuations and the types of materials that should be avoided in new construction in the Wildland Urban Interface (WUI).



NIH Trailblazer Award for Mathematical Modeling of Microbial Communities

Assistant Professor **Mahdi Imani**, electrical and computer engineering, received a \$590K National Institutes of Health (NIH) Trailblazer R21 Award for new and early-stage investigators from the National Institute of Biomedical Imaging and Bioengineering (NIBIB) for “Bayesian Dynamical Modeling of Microbial Communities.” He will develop highly scalable and efficient mathematical models and tools that will allow researchers to gain a deeper understanding of the fundamental biology of microbial communities and their system-level interactions.



Army Research Office Young Investigator Award for Colloidal Crystals

Safa Jamali, assistant professor, mechanical and industrial engineering (MIE), was awarded a grant from the Army Research Office Young Investigator Program for research on the synthetic creation of colloidal structures for new materials. Collaborators include **Randall Erb**, associate professor, MIE, and North Carolina State University. The project seeks to understand how particles behave under flow to form colloidal structures more easily using divergent-convergent flow geometries and different frequencies, amplitudes, and applied deformations.



\$1.96M NIH MIRA Award to Improve the Effectiveness of Drug Delivery with ‘Organ on a Chip’

The National Institutes of Health recognized Assistant Professor **Ryan Koppes**, chemical engineering, with a \$1.96 million R35 MIRA (Maximizing Investigator’s Research Award) Early-Stage Investigator grant, titled “Engineering Multifaceted 3D Human Organ Platforms for Toxicity Testing,” to improve the effectiveness of drug delivery. Koppes will develop new 3D benchtop models of the human cardiovascular system from engineered tissue, which can be used for various analysis and testing purposes without relying on human or animal subjects.



Faculty Honors

SELECTED HIGHLIGHTS

Charter Member of IEEE Computer Society Distinguished Contributors

Professor **Miriam Leeser**, electrical and computer engineering, was recognized as a charter member of the IEEE Computer Society Distinguished Contributor Program. The program was introduced in 2021 to showcase the immense combined technical expertise and innovation power of its membership while recognizing volunteer commitment.

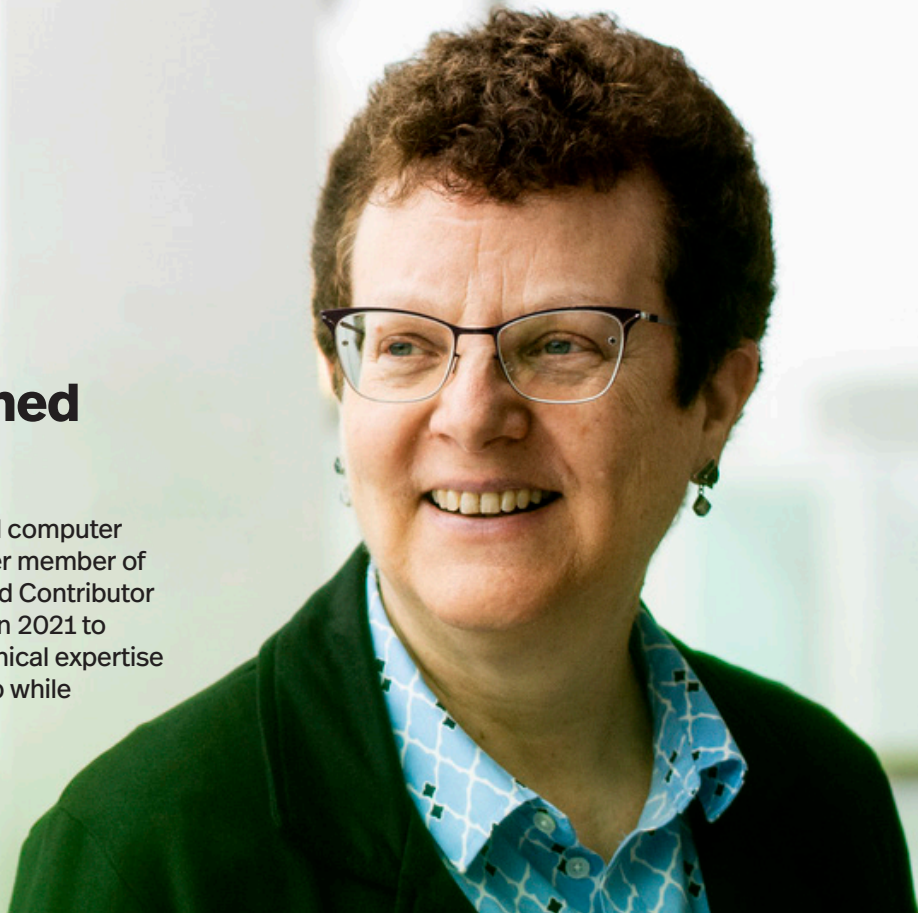


Photo by Ruby Wallau

U.S. Fulbright Scholar

Associate Professor **Carlos Hidrovo**, mechanical and industrial engineering, was selected as a Fulbright U.S. Scholar for 2022-2023 and will conduct research in Australia. U.S. Fulbright awards are prestigious and competitive fellowships that provide unique opportunities for scholars to teach and conduct research abroad. He will be mainly researching the implementation of two techniques: surface acoustic waves (SAWs) at the Royal Melbourne Institute of Technology and micro magnetofluidics at Griffith University in Queensland, for controlling the generation of liquid droplets in gas-liquid droplet microfluidics.



2022 Richard E. Bellman Control Heritage Award

University Distinguished Professor **Eduardo Sontag**, electrical and computer engineering, jointly appointed in bioengineering, received the 2022 Richard E. Bellman Control Heritage Award—the highest recognition in control theory and engineering in the United States. He was honored “for pioneering contributions to stability analysis and nonlinear control, and for advancing the control theoretic foundations of systems biology.”



SPIE Senior Member

Associate Professor **Yongmin Liu**, mechanical and industrial engineering, jointly appointed in electrical and computer engineering, was selected as a senior member of the International Society for Optics and Photonics (SPIE). SPIE Senior Members are members of distinction honored for their professional experience, their active involvement with the optics community and SPIE, and/or significant performance that sets them apart from their peers.

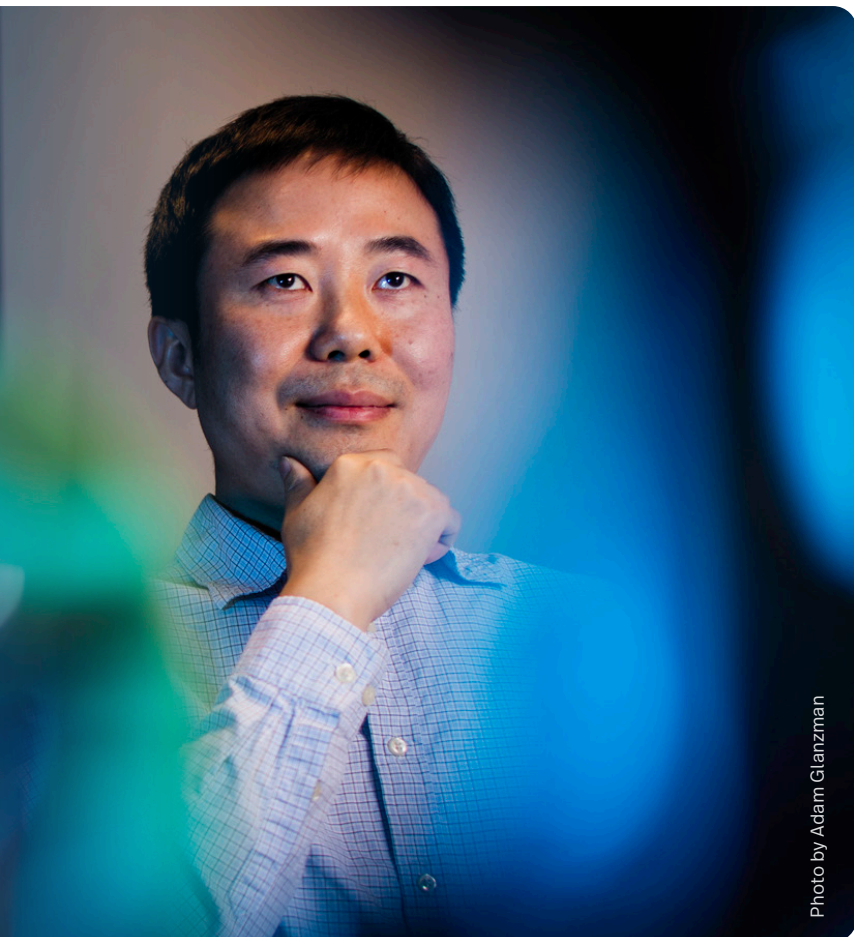


Photo by Adam Glanzman

Faculty Honors

SELECTED HIGHLIGHTS

Early Achievement Award and IEEE Distinguished Lecturer

Associate Professor **Josep Jornet**, electrical and computer engineering, received the 2022 IEEE Radio Communications Committee (RCC) Early Achievement Award and was selected as an IEEE Communications Society (ComSoc) Distinguished Lecturer for 2022 and 2023.



Photo by Matthew Madoono

ASEE 2021 Ralph Coats Roe Award

Yiannis Levendis, College of Engineering Distinguished Professor, mechanical and industrial engineering, received the American Society of Engineering Education (ASEE) 2021 Ralph Coats Roe Award, which “recognizes an engineering educator who is an outstanding teacher and has made a notable contribution to the profession.”



Photo by Ruby Wallau

Latrobe Prize from the American Institute of Architects College of Fellows

Assistant Professor **Amy Mueller**, civil and environmental engineering (CEE), jointly appointed in marine and environmental sciences, and Affiliated CEE Faculty **Michelle Laboy**, along with an interdisciplinary Northeastern team won the Latrobe Prize from the American Institute of Architects College of Fellows for their project Common SENSES (Standards for ENacting Sensor networks for an Equitable Society). SENSES is a new process for development that incorporates localized information about how a project will transform its surroundings, taken from a system of sensors and revising the role of community input in development projects.



Photo by Matthew Madoono

IEEE AESS Harry Rowe Mimno Award

Associate Professor **Pau Closas**, electrical and computer engineering, received the Harry Rowe Mimno Award from the IEEE Aerospace and Electronic Systems Society (AESS) for his paper "State Estimation Methods in Navigation: Overview and Application."



First Northeastern University Amazon Scholar

Taskin Padir, associate professor, electrical and computer engineering, and director of the Institute for Experiential Robotics, is Northeastern University's first Amazon Scholar. The Amazon Scholar program partners with university professors from around the world with Amazon talent to work on large-scale and high-impact projects in the professor's field of expertise. Padir will find innovative ways, through robotics, to improve last-mile delivery for Amazon's drivers.

Photo by Matthew Madoono



Wireless Communications

\$3M Award to Improve 5G and 6G Wireless Networks

Associate Professor **Dimitrios Koutsonikolas**, electrical and computer engineering, is leading a \$2 million award from the National Science Foundation and an additional \$1 million contribution from Northeastern University. The three-year grant supports the development of an open, programmable research platform called X-Mili, which will serve as a testbed for millimeter-wave transmitters and receivers. The innovative platform is the first to enable modeling and testing of both the hardware and software components of future wireless networks, which will drive system-level innovation. Co-investigators on the project include electrical and computer engineering professors **Stefano Basagni**, **Josep Jornet**, and **Tommaso Melodia**.



\$1M NSF Award to Create Resilient, Energy Efficient, and Secure IoT Networks

Associate Professor **Marvin Onabajo**, Professor **Yunsi Fei**, Assistant Professor **Aatmesh Shrivastava**, and Assistant Professor **Francesco Restuccia**, electrical and computer engineering, were awarded \$1 million from the National Science Foundation for “RINGS: Internet of Things Resilience through Spectrum-Agile Circuits, Learning-Based Communications and Thermal Hardware Security.” They will create spectrum-agile IoT networks with low-power adaptive radio frequency (RF) circuits at the sensor nodes, and with coordinated optimization and enhanced security at the edge device.



Self-Powered Sensorial ‘Skin’ the Future of Motion and Gesture Recognition



Groundbreaking research on flexible photodetectors with computational powers by Associate Professor **Canek Fuentes-Hernandez**, electrical and computer engineering, and Dean of the College of Engineering **Gregory D. Abowd**, has been published in the *Nature journal npj Flexible Electronics*. The paper, titled “Flexible Computational Photodetectors for Self-Powered Activity Sensing,” describes a new approach to achieve motion and gesture recognition using arrays of thin and flexible organic photodetectors distributed in space.



Making 6G Possible: Time Sharing Method Demonstrated for First Time in Terahertz Band

Electrical and computer engineering faculty and researchers at Northeastern's Institute for the Wireless Internet of Things have successfully tested a method that could allow telecommunication providers to move beyond 5G and into higher bandwidths. The research paper, titled "Dynamic Spectrum Sharing between Active and Passive Users Above 100 GHz" was published in *Nature Communications Engineering* and co-authored by Associate Professor **Josep Jornet**, Principal Research Scientist **Michele Polese**, William Lincoln Smith Professor **Tommaso Melodia**, Assistant Professor **Francesco Restuccia**, and Associate Research Scientist **Viduneth Ariyaratna**.



Healthcare

\$2M NASA Grant to Build Long Lasting Neurovascular Model

Associate Professor **Guohao Dai**, bioengineering, and Associate Professor **Abigail Koppes** and Assistant Professor **Ryan Koppes**, both of chemical engineering, received a \$2 million grant from NASA, titled “Bioengineer Long-lasting 3D Neurovascular Microphysiological System to Model Chronic Inflammation-mediated Neurodegeneration.” They are developing a long-lasting 3D neurovascular model, which would be valuable to evaluate the impact of chronic stressors on the brain, such as drugs, environmental toxins, bacterial/viral infection, inflammation in neurodegeneration, as well as microgravity and radiation in long-term space flight.



Photo by Matthew Modono

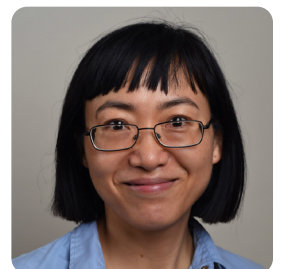
\$2.7M National Cancer Institute Award to Help Unlock the Mystery of How Cancer Spreads

Professor **Mark Niedre**, bioengineering, and Associate Professor **Chiara Bellini**, bioengineering, received a \$2.7 million grant, titled “Continuous, Non-Invasive Optical Monitoring of Circulating Tumor Cell-Mediated Metastasis in Awake Mice,” from the National Cancer Institute. The project will develop a wearable device to detect tumor cells that enter the bloodstream, and study why and how they dislodge, and how they behave in the bloodstream, as well as devise ways to prevent them from metastasizing. Since the key to treating cancer is early detection, the research could have life-saving implications. Collaborators include Dana Farber Cancer Institute, Dartmouth College, and the Hospital for Sick Children in Canada.



\$2M NIIMBL Award for Stem Cell Research

Assistant Professor **Wei Xie**, mechanical and industrial engineering, received a \$2 million award from NIIMBL, the National Institute for Innovation in Manufacturing Biopharmaceuticals, for “Advanced Bioprocessing Sensor and Analytical Technologies for Induced Pluripotent Stem Cell Culture Online Monitoring and Automation.” To accelerate intensified, reliable, and scalable iPSC production in bioreactors, the project will refine sensor technology to detect spatial heterogeneity and support large-scale cell processing, as well as improve interpretable AI and machine-learning algorithms for bioprocessing control and automation.



Pioneering Single Cell Proteomics Research

Associate Professor and Allen Distinguished Investigator **Nikolai Slavov**, bioengineering, pioneered technologies, called Single Cell Proteomics by Mass Spectrometry, for quantifying thousands of proteins across many single cells. The technology offers a cheaper and faster technique that enables researchers to analyze a much larger number of single cells and gain much more accurate data. The new field was described in the November 2021 **cover article of C&EN**, titled “Individual Cell’s Proteins Vary. Single-Cell Proteomics Can Now Show How.”

As interest in single-cell proteomics grew fast, adoption was delayed by technical challenges in performing highly specialized analysis. The Slavov laboratory developed accessible methods that could be broadly adopted based on detailed protocols published by the group. A paper title, “Multiplexed Single-Cell Proteomics Using SCoPE2” was published in the October 29, 2021 issue of **Nature Protocols**. A paper titled “Increasing the Throughput of Sensitive Proteomics by plexDIA” was also published in the July 14, 2022, issue of **Nature Biotechnology**.



Photo by Ruby Wallau

Environmental Health

Mathematical Model to Predict Human Mobility During Disasters

Associate Professor **Qi Ryan Wang**, in collaboration with researchers from RPI and Columbia University, published the paper “A Spatiotemporal Decay Model of Human Mobility when Facing Large-scale Crises” in the prestigious *Proceedings of the National Academy of Sciences*.



Photo by Matthew Madoono

\$1.5M NSF Award for Realtime Air Quality Monitoring and Intervention

Associate Professor **Qi Ryan Wang**, civil and environmental engineering (CEE), is leading a \$1.5 million National Science Foundation grant, in collaboration with Associate Professor **Yanzhi Wang**, electrical and computer engineering, Assistant Professor **Amy Mueller**, CEE and marine and environmental sciences, Associate Professor **Brooke Foucault Welles**, Northeastern’s College of Arts, Media and Design, and Louisiana State University, to work on “Toxic-Free Footprints to Improve Community Health against Respiratory Hazards.” They will study how human mobility (the pathway people take through the city each day) affects exposure to airborne toxins as well as how dangerous exposure levels can be more effectively communicated.



Invitation of the United Nations Environmental Programme

Professor **Auroop Ganguly**, civil and environmental engineering, has been invited to join the United Nations Environmental Effects Assessment Panel review for the 2022 quadrennial assessment report on the environmental effects of stratospheric ozone depletion.



Photo by Matthew Madoono

Robotics

\$3M NIH MERIT Award to Understand Human Dexterity and Inform Robotic Object Manipulation Research

University Distinguished Professor **Dagmar Sternad**, biology, electrical and computer engineering, and physics, and core faculty in the Institute for Experiential Robotics, has been awarded a \$3 million MERIT Award from the National Institutes of Health to investigate human sensorimotor control of dynamically complex objects. The research will take a control-theoretic and dynamical systems approach to understand human dexterity and the insights gained will be used to improve assessment of severity in stroke patients and inform research on robotic manipulation of deformable objects. Dr. David Lin from Massachusetts General Hospital is a collaborator on the project.



\$2.1M DOE Award for Greenhouse Gas Sensor Technology on Drones

Professor **Matteo Rinaldi**, electrical and computer engineering, who is also director of the Northeastern SMART Center, received a \$2.1 million award from the Department of Energy Advanced Research Projects Agency-Energy (ARPA-E) for “High-Performance and Miniaturized Greenhouse Gas Sensor for Drone-based Remote Sensing.” He will develop a palm-sized sensor that can be affixed to drones to scan acres of land faster, cheaper, more accurately, and with less power using pioneering zero power smart sensor technology, allowing farmers to detect harmful nitrous oxide emissions on their land. Nitrous oxide is a key ingredient in agricultural fertilizer and harmful to the environment.



\$1M NSF Award for Designing An Autonomous, Bat-inspired Aerial Robot

Assistant Professor **Alireza Ramezani**, electrical and computer engineering, in collaboration with Northeastern’s Khoury College of Computer Sciences, and the University of California-Berkeley, is leading a \$1 million National Science Foundation grant for “Design, Flight Control, and Autonomous Navigation of Bioinspired Morphing Micro Aerial Vehicles for Operation in Confined Spaces.” The project will create aerial, bat-inspired robots (drones) that can operate and navigate autonomously in extremely confined spaces, meeting an increased demand for fast, continuous environmental surveillance in city sewers.

Materials Science

\$2.1M DOE Grant for Novel Magnetic Materials to Address Supply Chains Issues and Enable Green Technology

Distinguished University and Cabot Professor **Laura Lewis**, chemical engineering, and mechanical and industrial engineering, has been awarded a \$2.1 million grant from the Department of Energy (DOE) to discover Nature's rules for creation of competitive magnetic materials comprised of non-critical elements. The research is focused on developing new types of strong, permanent magnets that allow the wireless transmission of energy and are used in everything from wind turbines to electric vehicles to cell phones and computers. Collaborators include the University of Delaware, Northeastern University Physics department, and University of Warwick, UK.



Photo by Matthew Modoano

First Silicon Nanowires that Operate as an Ultrawide-bandgap Semiconductor

The research of mechanical and industrial engineering professors **Yung Joon Jung** and **Moneesh Upmanyu** on "Catalyst-free Synthesis of sub 5nm Silicon Nanowire Arrays with Massive Lattice Contraction and Wide-Band Gap" has been published in *Nature Communications*. The researchers developed silicon nanowires that operate as an ultrawide-bandgap (UWBG) semiconductor—a first in the world of silicon, potentially revolutionizing the integration of etched silicon nanowires into UWBG device applications.

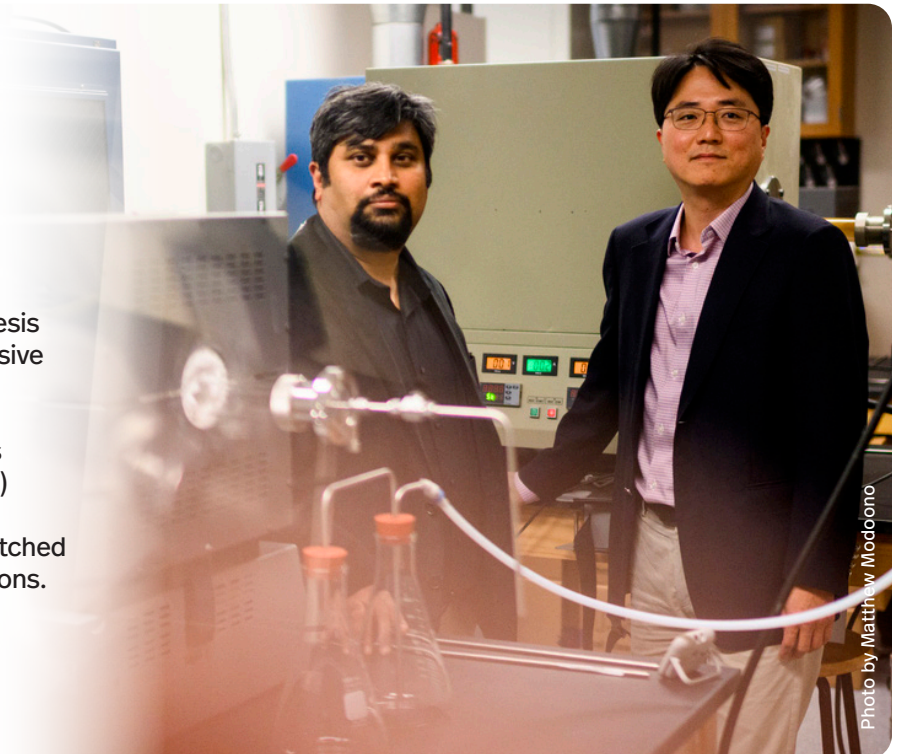


Photo by Matthew Modoano

Computing and Data Modeling

\$15M NSF Award for Superconductor Research Powers Faster Computing

Associate Professor **Yanzhi Wang**, electrical and computer engineering, is part of a multi-university team, called DISCoVER (Design & Integration of Superconductive Computation for Ventures beyond Exascale Realization) Expedition, awarded a \$15 million six-year grant from the National Science Foundation's Expeditions in Computing program. Wang, who is a Thrust Leader of the project, and collaborators are exploring the use of novel superconductor electronics as a viable next step in computing technology. Superconductor electronics can deliver ultra-high performance and energy efficiency at scale, resulting in better, faster computing systems suitable for general use.

Photo by Ruby Wallau

\$1M NSF Award for Data-Driven Model for Pandemic Preparedness

Assistant Professor **Milad Siami** and Dennis Picard Trustee Professor **Mario Sznaier**, electrical and computer engineering, in collaboration with NYU Tandon School of Engineering, received a \$1.1 million National Science Foundation grant, titled "Modeling and Control of Non-Passive Networks with Distributed Time-Delays: Application in Epidemic Control." They are developing a comprehensive framework for data-driven control of large-scale networks where time delays and the corresponding complex behavior play a substantial role such as with the COVID-19 pandemic. To enhance pandemic preparedness, it is imperative to generate accurate network models of our connected society and disease spread.



New Quantum Bit Platform Points to new Direction for Low-Cost, Large-Scale Quantum Computers



A paper, titled "Single Electrons on Solid Neon as a Solid-State Qubit Platform," published in the journal **Nature** by Assistant Professor **Xufeng Zhang**, electrical and computer engineering, who had a key contribution in the quantum microwave measurements, and researchers at Argonne National Lab and other collaborative institutions, demonstrates a fundamentally new quantum bit (qubit) platform.

Learn more
about our
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Student Successes

SELECTED HIGHLIGHTS



Students for the **Exploration and Development of Space student group**, advised by Assistant Professor **Alireza Ramezani**, electrical and computer engineering, was one of seven university teams selected as finalists in the 2022 NASA's BIG Idea Challenge. The team's project, titled "COBRA: Crater Observing Bio-inspired Rolling Articulator," is a snake-like design for their robot to allow it to traverse the extreme terrains on the moon's surface.

ACM-IEEE CS George Michael Memorial HPC Fellowship

Tirthak Patel, PhD'22, computer engineering, was selected as a recipient of the 2021 ACM-IEEE CS George Michael Memorial HPC Fellowship, for his contributions toward making current error-prone quantum computing systems more usable and helping high performance computing (HPC) programmers solve computationally challenging problems.



'Student of the Year' by ASEE, Co-op and Experiential Division



Ruthie Nelson, E'21, mechanical engineering, was selected as one of the Students of the Year by the American Society of Engineering Education, Cooperative and Experiential Education Division, which honors not only her strengths as an engineer, but her attitude and willingness as a student learning from her different co-op experiences.



Published Research and Honored for Community Service and Leadership

Bioengineering alumna **Kritika Singh**, E'20, who was selected as a Rhodes Scholar and National Institutes of Health Oxford-Cambridge (NIH OxCam) Scholar, has had her research, which she began before she graduated, on "Bright and stable luminescent probes for target engagement profiling in live cells" featured on the cover of **Nature Chemical Biology**. Singh was also awarded the 2021 Leadership Award and Building a Better Community Through Service Award, which is used to recognize OxCam Scholars' exceptional leadership and service, not only to the Scholars Program but also to the greater community.

Best Student Paper Award at IEEE EFTF/IFCS 2022

Xuanyi Zhao, PhD'23, electrical engineering, advised by Assistant Professor Cristian Cassella, electrical and computer engineering, won the Best Student Paper Award at the 2022 Joint Conference of the European Frequency and Time Forum & the IEEE International Frequency Control Symposium (IEEE EFTF/IFCS 2022) in Paris for his paper on "Improving Thermal Linearity and Quality Factor of AIscN Contour Mode Resonators Using Acoustic Metamaterials Based Lateral Anchors."





Northeastern Electric Racing Team Places Second in Competition

The **Northeastern Electric Racing team** placed second in the all-electric vehicle category at the 2022 Formula Hybrid+Electric Competition, their first in-person competition after having spent the past 5 years building their first-ever vehicle and competing virtually the past two years. Northeastern Electric Racing is a student organization that designs and builds an all-electric formula-style race car to compete against other universities from around the world. They also won the inaugural Scrutineer's Award in Honor of Suzanne Royce for being the most prepared team and having the best engineering documentation.

Fulbright-Canada Globalink Mitacs Award

Aditi Purandare, E'23, electrical and computer engineering, received the Fulbright-Canada Globalink Mitacs Award. The scholarship enables American students to work on research projects for 12 weeks at different institutions in Canada. Purandare was matched with a project at the University of Toronto studying financial planning and portfolio optimization through data analytics and artificial intelligence.



Selected as Future Leader in Chemical Engineering

Lauren Gerbereux, E'21, chemical engineering, was selected for the 2021 Future Leaders in Chemical Engineering Symposium organized by North Carolina State University. This highly selective research symposium recognizes the finest undergraduate researchers in chemical engineering in the United States. Students are chosen based on academic achievement, research contributions, and apparent potential.

ASCE 2022 New Faces in Civil Engineering

Civil engineering alumna **Annahid Dastgheib-Beheshti**, E'15, was named one of the American Society of Civil Engineer's 2022 New Faces in Civil Engineering-Professional. She is one of only 10 nationwide selected in 2022. Dastgheib-Beheshti is the current President of the Northeastern University Civil Engineering Alumni Organization and is a senior civil engineer at Arup in Boston.



PETRA Best Student Paper Award



Kyle Lockwood, PhD'24, electrical and computer engineering, and co-authors received the Best Student Paper Award at PETRA 2022 (Corfu, Greece), with their paper titled "Leveraging Submovements for Prediction and Trajectory Planning for Human-Robot Handover."

Best Poster at ACM CF22

Nicolas Agostini, PhD'23, computer engineering, advised by College of Engineering Distinguished Professor David Kaeli, electrical and computer engineering, won the Best Poster Award at the 19th ACM International Conference on Computing Frontiers (CF22) for his poster on "SODA-OPT: an MLIR-based Flow for Co-design and High-level Synthesis."

Student Successes

SELECTED HIGHLIGHTS



Women Who Empower 2022 Innovator Award

Bioengineering alumna **Samantha Johnson**, E'21, ME'21, was the first place winner of Northeastern's Women Who Empower 2022 Innovator Awards in the Young Alumnae category. The recognition comes with a \$22,000 award, which she will use to continue development of a robotic arm that can sign in American Sign Language for the DeafBlind community. She founded a company, Tatum Robotics, with funding from the Canadian National Institute for the Blind. The effort began as her thesis project with support from her advisor, Associate Professor **Chiara Bellini**, bioengineering, and other faculty including Assistant Professor **Mona Minkara**, bioengineering, Associate Professor **Taskin Padir**, electrical and computer engineering, who is also director of the Institute for Experiential Robotics at Northeastern, and Assistant Professor **Jon Matthis**, biology. Tatum Robotics has formed collaborations with the Perkins School for the Blind, National Technical Institute for the Deaf, and Helen Keller National Center.

INFORMS Receives Student Chapter Award

The **Northeastern University INFORMS student group** has been selected as a winner of the 2021 INFORMS Student Chapter Annual Award at the Magna cum laude level for the third year in a row.

2022 Hodgkinson Award



Hannah Boyce, E'22, chemical engineering, was named a winner of the Harold D. Hodgkinson Achievement Award for 2022, one of the highest honors a senior can receive. While at Northeastern, Boyce did three co-ops, the last one at ETH Zurich in Switzerland conducting research in extracellular vesicles, a new field of drug delivery. She was also president of Northeastern's chapter of the AIChE. She is now pursuing her PhD in chemical engineering at Massachusetts Institute of Technology.

Barry Goldwater Scholarship

Giona Kleinberg, E'23, bioengineering and biochemistry, received the Barry Goldwater Scholarship, one of the nation's most prestigious, merit-based awards for undergraduate students who plan to pursue research careers in natural sciences, engineering, and mathematics. Kleinberg's research has varied from studying the effects of thyroid hormones on behavior to analyzing the mechanisms that allow large salamander-like animals, called axolotl, to regrow organs.



2022 Outstanding Graduate Student Award in Research

Li Jiao, PhD'22, chemical engineering, and **Tirthak Patel**, PhD'22, computer engineering, received 2022 Outstanding Graduate Student Awards in Research for showing an exceptional ability to conduct high-level research and make contributions to the scholarly literature in their respective fields.

ACM TODAES Rookie Author of the Year Award

Shijin Duan, PhD'25, computer engineering, advised by Assistant Professor **Xiaolin Xu**, is the recipient of the prestigious ACM Transactions on Design Automation of Electronic Systems (TODAES) Rookie Author of the Year (RAY) Award, for their paper, titled "FPGAPRO: A Defense Framework Against Crosstalk-Induced Secret Leakage in FPGA."

Robotics Team Advances to Finals of Global Competition

Northeastern's Robots team, advised by Assistant Professor **Peter Whitney**, mechanical and industrial engineering, advanced to the finals of the global Avatar XPrize competition, which aims to create an avatar system that can transport human presence to a remote location in real-time. They were one of 37 clubs out of 150 around the world to advance to the semifinal stage. As finalists they were one of 15 teams selected. The team built a mobile robot using a combination of originally designed hardware and re-engineered off-the-shelf robotic systems. The finalist teams equally shared a milestone prize purse of \$2 million and competed again in Fall 2022.

International Wastewater Design Competition Winner

A **civil and environmental engineering Capstone team** placed second (out of 23 schools from four countries) in the Wastewater Category of the student design competition at the Water Environment Competition at WEFTEC 2021 in Chicago. The project outlined the preliminary design and modeling of a Water Resource Recovery Facility completed for an anonymous Vermont-based creamery.



2022 Outstanding Graduate Student Award in Teaching

Caroline McCormick, PhD'24, bioengineering, received the 2022 Outstanding Graduate Student Award in Teaching for her exceptional ability to communicate ideas and concepts in the classroom and a talent for inspiring students.

National Science Foundation Graduate Research Fellowship Program Award Recipients

The NSF GRFP program 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 students and alumni received the award in 2022.

Katherine Bassett, interdisciplinary, PhD'25

Trinity Cookis, chemical engineering and biochemistry, E'20

Beth DiBiase, chemical engineering and biochemistry, E'21

Austin Lin, electrical engineering and physics, E'20

Jeffrey Marchioni, bioengineering, E'20

Owen Porth, chemical engineering and biochemistry, E'20



Selected for DOE 2023 Build Challenge

Northeastern's Solar Decathlon team's project was a winner of the Department of Energy's Solar Decathlon Build Challenge. The team was selected to proceed in the 2023 Build Challenge, a distinction that comes with \$50,000 in funding. The team was led by students **Aasav Harania**, MS in energy systems, and **Ted Walinskis**, BS in chemical engineering and MS in engineering and public policy. The team is advised by Assistant Professor **Michael Kane**, civil and environmental engineering.

Student Spotlight

Northeastern's First Churchill Scholar

Photo by Ruby Wallau

Cameron Young, E'22, chemical engineering and biochemistry, has an impressive resume in the field of biomedical research.

As a researcher at prestigious hospitals, and a coauthor of 10 medical-related papers, Young's accomplishments throughout his time at Northeastern earned him the Churchill Scholarship, an award granted to outstanding American students to attend England's Cambridge University. He is the first Northeastern student to receive this scholarship. Young began a one-year master's degree in medical science at the British university in fall 2022.

While at Northeastern, Young completed a co-op at Boston Children's Hospital where he studied a rare condition, Multisystem Inflammatory Syndrome in Children, that almost exclusively affects kids. The condition causes vital organs to become inflamed after exposure to COVID-19. He also worked in cancer research at Mass General Brigham, where he helped develop a device that prevents radiation from reaching healthy tissue during cancer therapy.

As a Churchill Scholar, Young is working with Cancer Research UK, the world's largest independent cancer-research charity. He is analyzing the genetics of a large pool of breast-cancer patients in order to study and catalog different ways that the disease manifests.

Upon completion of his master's at Cambridge, Young plans to attend medical school. Though he's not entirely certain yet what field of medicine he wants to work in, Young thinks he would like to study cancer in children.

"I love working with kids," says Young. "It's so rewarding watching kids recover, and from a medical perspective, kids are more interesting. They're more resilient than adults, and the ways that diseases present themselves are more complex in children."

"Cancer is fascinating because it's such a diverse field," he says. "It's hard to treat and understand, and I'm looking forward to tackling more of these challenges in oncology at Cancer Research UK."

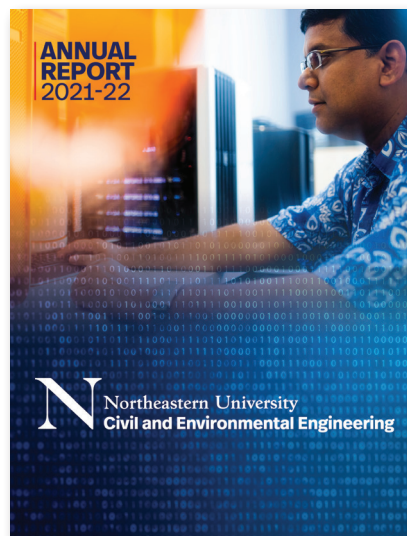
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New EXP Research Center

EXP, Northeastern University's new dynamic eight-story center for science, engineering, and computational research, is on track to open in Fall 2023. Rising alongside the complementary 220,000 square foot, six-story Interdisciplinary Science and Engineering Complex, the new 357,000 square foot, eight-floor facility will create opportunities to further the horizons of science, engineering, teaching, and creating. Many of EXP's floors are divided into four neighborhoods, enabling specializations for teaching, maker spaces, biology, chemistry, dry labs, and other computational disciplines. Those quadrants are lined with soft spaces—kitchenettes, meeting rooms, and lounges—where collaboration can take place.

Photo by Matthew Modoono/Northeastern University

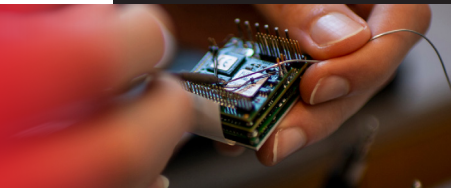
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ABOUT THE COVER

Debra Auguste, professor of chemical engineering, is currently working on a new targeted approach to treating triple-negative breast cancer—a form of the disease more prevalent in younger women, with a higher rate of mortality among African American women. By using ultra-deformable liposomes (UDLs), drugs intended to combat the cancer can be applied to the source with more accuracy, increasing their effectiveness. The UDLs can be deformed in a manner that allows them to permeate small pathways to the cancer that would otherwise be impossible to reach.



See full story via the QR code.

*Photo by Matthew Modoono,
Northeastern University*