ANNUAL REPORT 2023-24

Northeastern University

Mechanical and Industrial Engineering

Northeastern University
College of Engineering

With over 240 tenured/tenure-track faculty and 20 multidisciplinary research centers and institutes with funding by eight federal agencies, the College of Engineering is a leader in experiential education and interdisciplinary research focused on discovering solutions to global challenges to benefit society. Northeastern's global university system–with engineering programs on campuses across the U.S. and in multiple countries–provides flexible academic offerings, innovative partnerships, and the ability to scale ideas, talent, and solutions.

About Northeastern

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

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

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

NORTHEASTERN

We are a leader in experiential education and interdisciplinary research, focused on innovating for global impact.

DEAR COLLEAGUES, FRIENDS, AND STUDENTS,

At Northeastern University (NU), the Department of Mechanical and Industrial Engineering (MIE) is committed to nurturing our students for professional and technical excellence, advancing the frontiers of engineering through groundbreaking research, engaging in service activities that benefit our department, university, and the profession, and instilling in ourselves and our students the values of ethical behavior, professional responsibility, and careers that contribute to the betterment of society.

As we face critical challenges in the coming decade, including climate change, processing of big data, supply chains, urban transformation, sustainable manufacturing, healthcare optimization, and renewable energy sources, our department stands at the forefront. In line with our commitment to cutting-edge research, we have established 12 dynamic research themes to facilitate collaborative discussions to drive innovation and shape our future research. Research themes range from Biomechanics, Biofluids, and Mechanobiology; Data Analytics, AI, and Operations Research; to Intelligent and Additive Manufacturing; Robotics and Control Systems; and Human-Machine Systems.

Our distinguished faculty members are at the heart of these endeavors, engaging in broad, trans- and inter-disciplinary work. Our department boasts 63 tenured/tenure-track faculty, among whom a remarkable 34% have received prestigious Young Faculty Awards, and an impressive 27% have been honored with CAREER awards from the National Science Foundation. In addition, we are proud to have 23 dedicated and equally accomplished teaching faculty in MIE who contribute significantly to our educational excellence and mission.

As of Fall 2023, our department has grown to accommodate an impressive student body of 3,706 individuals, making us the largest disciplinary academic department in the College of Engineering at Northeastern. To cater to our students' diverse career aspirations, our offerings include 24 graduate MS, PhD, and certificate programs, as well as undergraduate majors in Mechanical Engineering (ME) and Industrial Engineering (IE). Additionally, we offer combined majors such as IE and Business Administration, IE and Computer Science; ME and Design, ME and History, ME and Physics, ME and Bioengineering, and ME and Computer Science. Furthermore, we have expanded our reach across Northeastern's global university network, now offering programs in both Seattle and Vancouver. In Seattle, we have also introduced a new undergraduate summer aerospace program to enrich our students' educational experiences.

Our department thrives with a vibrant community of student groups, including Aerospace NU, BajaSAE, Electric Racing at NU, INFORMS (Institute for Operations Research and the Management Sciences), IISE (Institute of Industrial and Systems Engineers, NU Student Chapter), ASME (American Society of Mechanical Engineers, NU Student Chapter), NUToys, the ESS (Energy Systems Society), and DAESO (Data Analytics Engineering Student Organization) among others. To support and nurture our students' growth, we host key events such as cooperative education (co-op) mixers and job fairs, ME and IE Student Townhalls, and we have recently established the PhD Council to address the specific needs of our doctoral candidates.

This annual report is a testament to the exceptional academic and professional achievements of our faculty and students during the 2023-2024 academic year. We look forward to continuing our journey of excellence and innovation, shaping the future of engineering, and preparing our students to meet the challenges of our ever-evolving world.

Thank you for your continued support and dedication to the Department of Mechanical and Industrial Engineering at Northeastern.

Sincerely,

Yingzi Lin, PhD
Professor and Interim Department Chair
Mechanical and Industrial Engineering
yi.lin@northeastern.edu

For more details, visit our website at MIE.NORTHEASTERN.EDU.

Photo by Ruby Wallau

Quick Facts **MECHANICAL AND INDUSTRIAL ENGINEERING**

63 **TENURED/ TENURE-TRACK** Faculty

28 **Young Investigator** Awards, including ▶ **17** **National Science Foundation** CAREER Awards

34% of tenured/tenure-track faculty have received Young Investigator Awards

25 **Graduate Academic Programs** MS, PhD, Certificates in Boston, Seattle, and Vancouver, Canada

3,706 **Total Student Enrollment** (Fall 2023)

2,175 **Master's Students**

Up **51**% vs. 2018

30 **Professional** Society Fellowships

16 **Undergraduate Academic Programs** BS and Minors

160 **Doctoral Students**

$39M **External Research Awards** (2022-2024)

2 **Federally Funded** Research Centers

- NSF/DHHS Healthcare Systems Engineering Institute
- NSF Center for High-rate Nanomanufacturing

Electrochemical Society and Toyota Research Institute Young Investigator Fellowship

Juner Zhu
Assistant Professor

Quick Facts **COLLEGE OF ENGINEERING**

With **246** tenured/tenure-track faculty and **20** multidisciplinary research centers and institutes with funding by eight federal agencies, the college is a leader in experiential education and interdisciplinary research focused on discovering solutions to global challenges to benefit society.

5 **Engineering Departments**

142 **YOUNG INVESTIGATOR** Awards

Including **73** NSF CAREER Awards, and **24** DOD Young Investigator Awards

110 **Professional Society Fellowships**

3,274 **Total Co-op Hires** (AY2024)

2,420 **Co-op Employer Partners** (AY2022-2024)

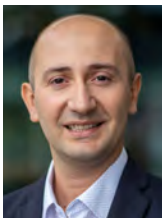
TOTAL ENROLLMENT (Fall 2023)

10,481 65% Graduate
35% Undergraduate

Graduate Enrollment Growth

up **63**% vs. 2018

New Tenured Faculty



Alp Akcay *Associate Professor*

PhD: Carnegie Mellon University, 2013
Previously: Associate Professor, Eindhoven University of Technology
Scholarship focus: Simulation-based optimization, digital twins, data analytics, predictive maintenance, semiconductor manufacturing and supply chains

Tugce Martagan *Associate Professor*

PhD: University of Wisconsin-Madison, 2015
Previously: Associate Professor, Eindhoven University of Technology
Scholarship focus: Stochastic modeling and optimization, Markov decision processes, and game theory with applications in the (bio)pharmaceutical industry

Faculty by Research Theme

Biomechanics, Biofluids, and Mechanobiology

Rouzbeh Amini
Cynthia Hajal
Hyeon Yu Kim
Sandra Shefelbine
Hongwei Sun
Kai-tak Wan

Complex Fluids, Multiphase, and Multiscale Matter

Sara Hashmi
Carlos Hidrovo
Safa Jamali
Francis Loth
Hameed Metghalchi
Ozan Ozdemir
Hongwei Sun
Xiaoyu Tang
Mohammad Taslim
Moneesh Upmanyu
Kai-tak Wan

Data Analytics, AI, and Operations Research

Muhammad Noor E. Alam
James Benneyan
Nasser Fard
Jacqueline Griffin
Babak Heydari
Sagar Kamarthi
Emanuel Melachrinoudis
Shahin Shahrampour
Xubo Yue

Energy Systems, Sustainability, and Environmental Protection

Muhammad Noor E. Alam
Jack Lesko
Yiannis Levendis
Laura Lewis
Hameed Metghalchi
Xiaoyu Tang
Mohammad Taslim
Yi Zheng
Hongli "Julie" Zhu
Juner Zhu

Engineering Education

Ibrahim Zeid

Human-Technology Integration

Megan Hofmann
Michael Kane
Yingzi Lin
Tucker Marion
Jose Martinez Lorenzo
Rifat Sipahi
Sze Zheng Yong

Intelligent and Additive Manufacturing

Muhammad Noor E. Alam
Ahmed Busnaina
Randall Erb
Xiaoning "Sarah" Jin
Sagar Kamarthi
Jeffrey Ian Lipton
Sinan Müftü
Ozan Ozdemir
Xiaoyu Tang
Xubo Yue
Hongli "Julie" Zhu

Materials for the Future

Ruobing Bai
Ahmed Busnaina
Randall Erb
Andrew Gouldstone
Safa Jamali
Yung Joon Jung
Jack Lesko
Laura Lewis
Jeffrey Ian Lipton
Yongmin Liu
Peter Schindler
Moneesh Upmanyu
Yoseob Yoon
Yi Zheng
Hongli "Julie" Zhu

Mechanics

Rouzbeh Amini
Ruobing Bai
Andrew Gouldstone
Jack Lesko
Yaning Li
Carol Livermore
Craig Maloney
Sinan Müftü
Hamid Nayeb-Hashemi
Juner Zhu

Networks and Complex Systems

Ozlem Ergun
Babak Heydari
Laurent Lessard
Tong Ma
Kayse Lee Maass
Jose Martinez Lorenzo
Shahin Shahrampour
Wei Xie
Yasin Yazicioglu
Sze Zheng Yong

Resilient and Sustainable Service Systems

Muhammad Noor E. Alam
James Benneyan
Ozlem Ergun
Jacqueline Griffin
Surendra M. Gupta
Kayse Lee Maass

Robotics and Control Systems

Yingzi Lin
Jeffrey Ian Lipton
Tong Ma
Shahin Shahrampour
Max Shepherd
Rifat Sipahi
Seungmoon Song
John "Peter" Whitney
Yasin Yazicioglu
Sze Zheng Yong

Faculty Honors and Awards

SELECTED HIGHLIGHTS

Photo by Ruby Wallau

ASME Fellow

Yi Zheng, associate professor of mechanical and industrial engineering, was selected as a Fellow of the American Society of Mechanical Engineering (ASME) for his exceptional engineering achievements and contributions to the engineering profession, particularly in the research field of micro/nanoscale heat transfer for sustainable energy harvesting, conversion, and storage.

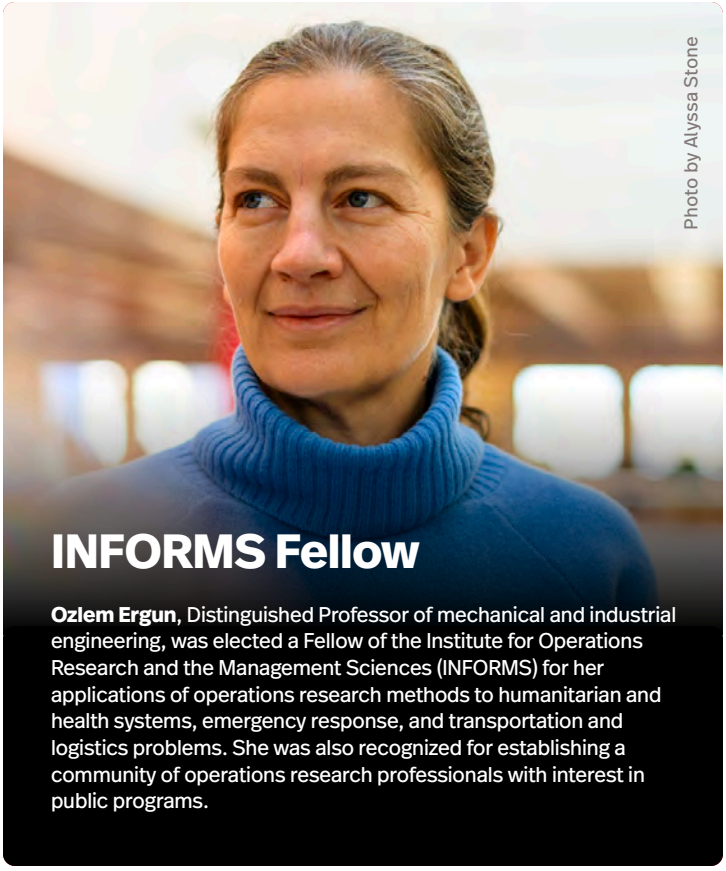


Photo by Alyssa Stone

INFORMS Fellow

Ozlem Ergun, Distinguished Professor of mechanical and industrial engineering, was elected a Fellow of the Institute for Operations Research and the Management Sciences (INFORMS) for her applications of operations research methods to humanitarian and health systems, emergency response, and transportation and logistics problems. She was also recognized for establishing a community of operations research professionals with interest in public programs.

$4M Army Research Lab Award for Large-Format Metal Additive Manufacturing

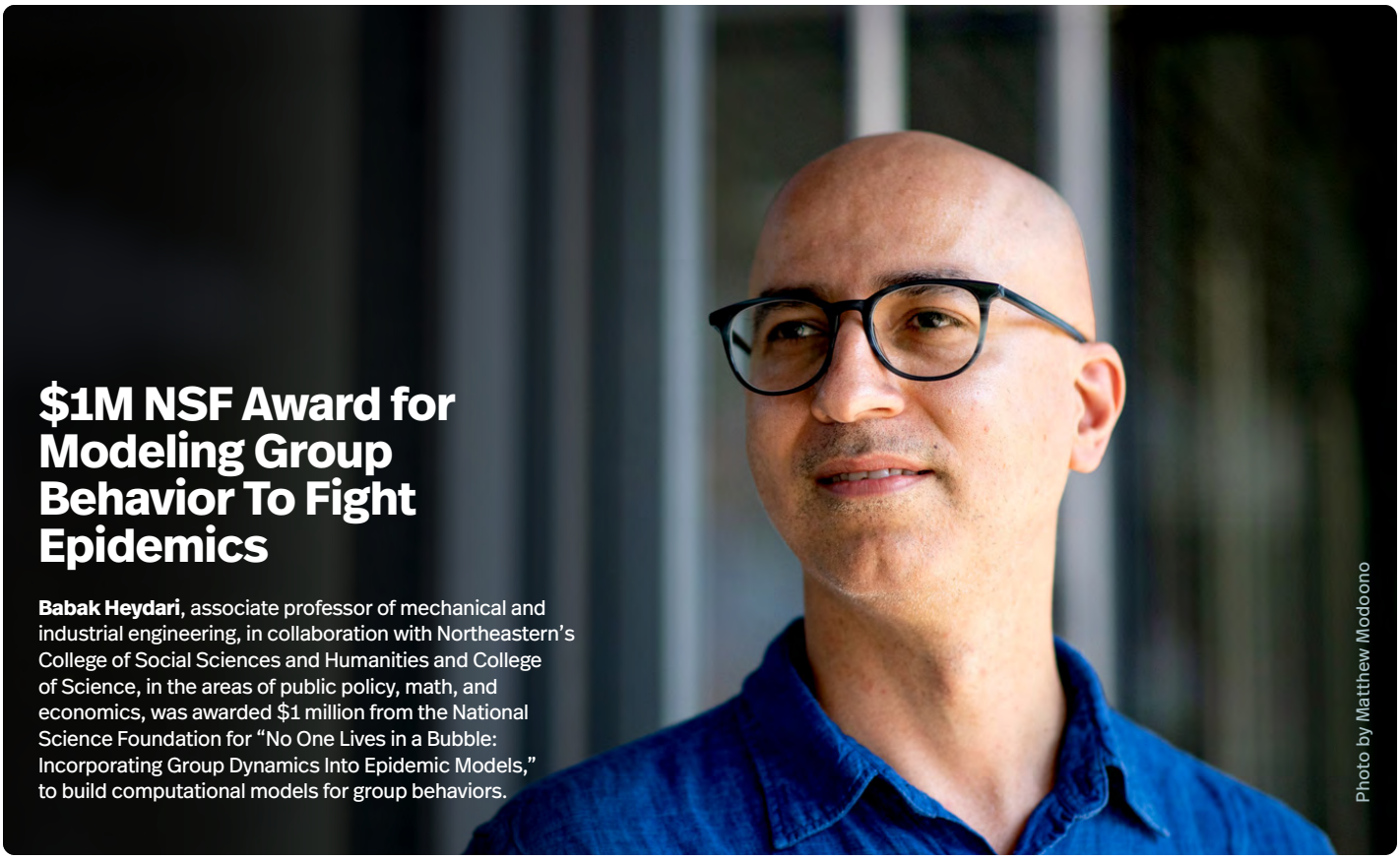
Sinan Müftü, Distinguished Professor of mechanical and industrial engineering (MIE), and **Ozan Özdemir**, MIE assistant professor, are leading a team that was awarded a $4.38 million grant from the Army Research Laboratory to advance wire-arc direct energy deposition for large-format metal additive manufacturing.

$1.5M Army Research Lab Award for Cold Spray Additive Manufacturing

Sinan Müftü, Distinguished Professor of mechanical and industrial engineering (MIE), and **Ozan Özdemir**, MIE assistant professor, were awarded $1.5 million by the Army Research Laboratory for research focusing on Cold Spray Additive Manufacturing and developing innovative initiatives in cybersecurity and enhancement of mechanical robustness in parts and coatings related to this manufacturing process.

$1M Air Force Award To Harness Solar and Thermal Energy for Spacecrafts

Yi Zheng, associate professor of mechanical and industrial engineering, in collaboration with Faraday Technology, Inc., received a $1 million research grant from the U.S. Air Force for "Concentric Ultra-Dark Solar-Thermal Absorber and Metasurface Thermal Emitter for Thermophotovoltaic Power Conversion." He is creating materials for satellites, spacecrafts, and space vehicles to enable them to absorb heat sources and convert them to reusable energy at power generation capacity that meets the U.S. Air Force's needs.



$1M NSF Award for Modeling Group Behavior To Fight Epidemics

Babak Heydari, associate professor of mechanical and industrial engineering, in collaboration with Northeastern's College of Social Sciences and Humanities and College of Science, in the areas of public policy, math, and economics, was awarded $1 million from the National Science Foundation for "No One Lives in a Bubble: Incorporating Group Dynamics Into Epidemic Models," to build computational models for group behaviors.

Photo by Matthew Modoono

$1.5M NSF Award To Develop New Photonic Materials

Professor **Yongmin Liu**, mechanical and industrial engineering, jointly appointed in electrical and computer engineering (ECE), and ECE Assistant Professor **Sunil Mittal**, in collaboration with the Georgia Institute of Technology and Purdue University, are leading a $1.5 million National Science Foundation DMREF grant for "Accelerating the Design and Development of Engineered Photonic Materials Based on a Data-Driven Deep Learning Approach." This project uses advanced artificial intelligence techniques to develop new artificial photonic materials that can be engineered to have prescribed properties and surpass naturally occurring materials.

Designing Exoskeletons To Be More Versatile and Accessible

Max Shepherd, assistant professor of Bouvé Health Sciences, jointly appointed in mechanical and industrial engineering, and in collaboration with the Georgia Institute of Technology, was awarded an $800,000 National Science Foundation grant for "Towards Task-Agnostic and Device-Agnostic Ankle Exoskeleton Control for Mobility Enhancement." The goal is to make exoskeletons capable of assisting with all possible tasks of daily living, increasing their utility and accessibility for a broader range of people.

NASA Glenn Fellow

Yi Zheng, associate professor of mechanical and industrial engineering, was selected as a NASA Glenn Fellow. He collaborated on a NASA project about the highly efficient Battery Thermal Management System during the summer of 2024.

Faculty Honors and Awards

SELECTED HIGHLIGHTS

ECS Toyota Young Investigator Fellowship To Develop More Sustainable EV Batteries

Juner Zhu, assistant professor, mechanical and industrial engineering, received an Electrochemical Society (ECS) Toyota Young Investigator Fellowship, one of only three individuals this year to receive the award. He is developing technology to monitor and identify the health of individual batteries in an electric vehicle (EV) through a mechano-electrochemical approach that would use sensors to gather data on a battery's physical changes. The data would then be analyzed using machine learning techniques to determine a battery's condition, patterns of deterioration, or other problems. This information can bring efficiencies or even reduce some of the more labor-intensive and potentially unsafe processes involving EV batteries–the handling, transporting, recycling, and disposing phases.

Photo by Bella Martinez

The World's First Sub-THz Satellite Network Platform

Josep Jornet, professor of electrical and computer engineering (ECE), and interim ECE department chair; **Andrew Gouldstone**, professor of mechanical and industrial engineering; **Tommaso Melodia**, ECE William Lincoln Smith Professor; and **Ken Duffy**, ECE professor, jointly appointed in the College of Science; and in collaboration with the Morehead State University Space Science Center, were awarded $750,000 from the National Science Foundation for "Development Towards a Community Research Platform for sub-THz Satellite Communication Networks." The project explores the development of the world's first community research platform for sub-terahertz satellite communication networks.

Advancing Ultra-Fast Sound Technology

Yoseob Yoon, assistant professor of mechanical and industrial engineering, published "Terahertz Phonon Engineering With van der Waals Heterostructures" in *Nature*. He discovered a way to create atomically thin transducers that could one day enable quantum computing at room temperature.

Developing Tools for Interactive Smart Knitted Textiles

Megan Hofmann, assistant professor of Khoury College of Computer Sciences, jointly appointed in mechanical and industrial engineering, was awarded $550,000 from the National Science Foundation for "Tools for Programming and Designing Interactive Machine-Knitted Smart Textiles." She will investigate the user-experience needs of garment designers and hand-knitters for machine-knitting software to help them create complex smart textiles, which, for example, could include clothing with embedded health sensors.

Exploring the Potential of Frictional Mechanical Metamaterials

Yaning Li, associate professor of mechanical and industrial engineering, was awarded $531,056 from the National Science Foundation to explore a new category of mechanical metamaterials, titled "Frictional Mechanical Metamaterial," which is composed of separated but interacting components that dissipate energy through internal friction between components as they engage with each other. The research will create new knowledge in fundamental mechanics, and also technical revolutions to leverage the fast advancements of mechanical metamaterials, additive manufacturing, and material science.

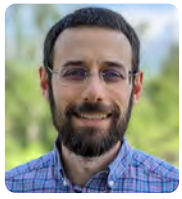
AI's Potential in Stem Cell Manufacturing

The research of **Wei Xie**, assistant professor of mechanical and industrial engineering, on how AI can be used for the large-scale manufacturing of pluripotent stem cells, which have great promise for new cell treatments and regenerative medicine, was published in two papers, "Metabolic Regulatory Network Kinetic Modeling With Multiple Isotopic Tracers for iPSCs" in *Biotechnology and Bioengineering* and "Stochastic Biological System-of-Systems Modelling for iPSC Culture" in *Communications Biology*.

Photo by Matthew Modoono

DOE Academic Center for Reliability and Resilience of Offshore Wind

Andrew Myers, professor of civil and environmental engineering (CEE); **Nathan Post**, associate research professor of CEE and mechanical and industrial engineering; and **Jerome F. Hajjar**, University Distinguished and CDM Smith Professor and Chair of the CEE department, in collaboration with the University of Massachusetts Amherst and a consortium of 40 partners, were selected to join a first-of-its-kind $11.9 million Department of Energy research center, the Academic Center for Reliability and Resilience of Offshore Wind (ARROW). Dedicated to accelerate reliable and equitable offshore wind energy deployment across the nation, ARROW will focus on workforce development, targeted research, and partnerships and strategies to embed equity in offshore wind development.



Named to ASEE-NE Leadership

Kai-tak Wan, professor of mechanical and industrial engineering, was named American Society for Engineering Education Northeast section chair for 2024-2026.

Advancing All-Solid-State Lithium Metal Batteries

Hongli Zhu, associate professor of mechanical and industrial engineering, received a $770,000 grant from the Department of Energy Office of Science for "Uncovering the Mechano-Electro-Chemo Mechanism of Fresh Li in Sulfide-Based, All-Solid-State Batteries Through Operando Studies." The goal of this research is to contribute to the advancement of all-solid-state lithium (Li) metal batteries by addressing key challenges and understanding the behavior of Li metal.

Discovery To Revolutionize Thermal Management

After pioneering thermoforming technical ceramic matrix composites, **Randall Erb**, professor of mechanical and industrial engineering, and Jason Hoffman-Bice, PhD'22, mechanical engineering, created Fourier LLC, a spinout company to commercialize their groundbreaking innovation in thermal management known as thermoforming technical ceramic matrix composites. Their materials and manufacturing technology is capable of creating large deformations in fully sintered ceramic pre-formed sheets that can be applied to an array of potential applications ranging from high-powered printed circuit boards to RF devices and medical devices.

Learn more about our accomplished faculty

Student Successes

SELECTED HIGHLIGHTS

2024 National Science Foundation Graduate Research Fellowship Program Award Recipients

Mechanical engineering students **Nathan Carmichael**, PhD'28, **Jonathan Gray**, E'16, and **Kathryn Lee**, PhD'28, were recipients of the prestigious 2024 National Science Foundation Graduate Research Fellowship, which recognizes and supports outstanding graduate students who have demonstrated the potential to be high-achieving scientists and engineers early in their careers.

Nathan Carmichael, PhD'28

Jonathan Gray, E'16

Kathryn Lee, PhD'28

Third Place Win at Walt Disney Parks & Resorts Industrial Engineering Case Competition

Daunte Pean, E'25, **Lucas Kirma**, E'25, and **Karim Kane**, E'25, industrial engineering, won third place at Disney's national Industrial Engineering Case Competition. The team took on the role as outside consultants for the city of Dallas and gave their recommendation on what form of entertainment should be built.

Capstone Design Teams Recognized at IISE Conference

Two industrial engineering student capstone teams were recognized at the Institute of Industrial and Systems Engineers conference in Montreal. The Parachute Quality Assurance Modernization capstone project (top photo below) received the Capstone Day Judges Award, and the US Open Tennis Championships Electronic Officiating Quality Control project (bottom photo) won fourth place in the Capstone Senior Design Project Service Systems category. Both capstone teams were advised by **Beverly Kris Jaeger-Helton**, teaching professor of mechanical and industrial engineering (pictured below with each winning team).

Engineering Management Team Wins International Competition

An **MS in engineering management student team** secured third place in the "Virtual Best Case Analysis Competition" and second place in the "Live Best Case Presentation Competition" in the 2023 17th Annual International Engineering Management Student Case Competition organized by the American Society for Engineering Management.

IISE UPS Scholarship for Female Students

Mia Ferrante, E'25, industrial engineering, was chosen by the Institute of Industrial and Systems Engineers (IISE) Scholarship Trustees Committee as the winner of the UPS Scholarship for Female Students for her scholastic achievement, leadership, and dedication to the ISE profession.

Entrepreneurship: Women Who Empower Awards

Mukki Gill, E'25, mechanical engineering and history, placed second in the Powering a Healthy Tomorrow Award at Northeastern's Women Who Empower Innovator Awards for her work on ZOR, a noninvasive and portable medical device that predicts epileptic seizures through breath analysis. She also received an honorable mention in the undergraduate category. **Nicole Guadagno**, E'25, mechanical engineering, received an honorable mention in the undergraduate category for her work on Remetra, a wearable medical device that measures autoimmune inflammatory markers through sweat and transmits the data to a mobile platform for tracking and analysis. Additionally, **Fatema Janahi**, E'22, computer engineering, and MS'22, engineering management, received an honorable mention in the graduate alumnae category for her work on Palm, a value-driven shopping platform that empowers women to express their identities through cultural fashion.

Mukki Gill, E'25

Nicole Guadagno, E'25

Fatema Janahi, E'22

Pursuing a Career in Renewable Energy on Co-op, in the Lab, and Beyond

CJ Huey, E'24, mechanical engineering, is deeply motivated by important work, and co-op experiences led to a career path in renewable energy.

On co-op at Electric Hydrogen, a renewable energy equipment manufacturer, Huey was a stack engineer. Right from the start, diving into a hands-on environment provided experience working on lab testing and analysis. The data collected was submitted for review and it was the responsibility that came from this environment that Huey found most fulfilling.

"I was in charge of it from the start to finish—the whole process, and I had to present my results," Huey says. "The importance of the work gave me more passion."

In particular, the depth of the experimentation and testing reached a level unmatched by what could be achieved in a typical classroom environment. Huey's role was to run pressure tests for various gaskets on a hydrostatic machine. These tests ensured that hydrogen cells could be pressurized at a high enough PSI to be used for clean energy. This was a process of trial and error as variables such as material and size of the gaskets were changed.

Huey also designed a gantry and laser profiler, which made it significantly easier and less time-consuming to get measurements needed to ensure that the cells were up to Electric Hydrogen's standards. "It was definitely a lot of pressure, but it also gave me creativity and freedom to do it how I thought would be best," Huey says.

Huey's second co-op at Lockheed Martin was design-focused and very different work than at Electric Hydrogen. Taking a different path for the second co-op helped Huey figure out work that was of most interest.

"Lockheed, however, allowed me to solidify my skills in documentation," Huey says. Fully understanding this documentation required a lot of initiative on Huey's part. The material spanned decades and that sometimes meant that coding decisions that were previously made didn't align with current practices. The range of skills Huey had was also greatly expanded due to the programming experience. "I used Visual Studio at my job, and that was the first time that I had ever used it," Huey says. "I had multiple classes since that using Visual Studio, and I didn't have a class teach me that before, so coming in with that prior knowledge was really helpful."

Huey's co-ops also provided a chance to make connections. "At Northeastern, there are opportunities that companies want Northeastern students for, and so you don't have to fight as much to get your resume noticed," Huey says. "I wouldn't have even known about some of these job opportunities had it not been for Northeastern."

On campus, Huey was heavily involved with AerospaceNU, serving as president in past semesters. AerospaceNU gave a chance to work on the kinds of projects provided on co-op. There's also a level of creative freedom. "It's not a competition-based club, and so all the projects worked on are projects that people decide they want to work on," Huey says.

Huey also conducted research in the Thermodynamics and Combustion Lab at Northeastern under Hameed Metghalchi, professor of mechanical and industrial engineering. The bulk of the work was for a paper about synthetic fuels such as produced hydrogen as opposed to natural gas. This proved to be a much cleaner energy source. Huey's involvement with the lab was directly sparked from experience on co-op at Electric Hydrogen.

"I've always been interested in renewable energy, but it wasn't something I was super focused on until I worked there…and so I reached out to Professor Metghalchi because I knew he did research on similar topics," Huey says.

The experience in the lab led Huey down a path toward graduate school. "I'm really interested in renewable energy now, and I'm also interested in aerospace, and so I found a bunch of programs where they're looking at making aviation and rocketry more renewable," Huey says. "I'm hoping to pursue that type of research in grad school."

CJ Huey, E'24 (back row, fourth from the right), with AerospaceNU during a launch.

"At Northeastern, there are opportunities that companies want Northeastern students for, and so you don't have to fight as much to get your resume noticed."

CJ Huey, E'24
Mechanical Engineering

Burcu Ozek, PhD'24

INDUSTRIAL ENGINEERING

Advised by Sagar Kamarthi,
Professor of Mechanical and Industrial Engineering

In 2018, **Burcu Ozek** began pursuing her PhD after receiving a bachelor's degree from Bilkent University in Ankara, Turkey, and working in industry for two years. Her doctoral research focused on developing objective pain assessment methods through machine learning, aiming to accurately quantify uncertainty and preexisting pain conditions. She co-authored six peer-reviewed journal articles, with four as lead author. She also presented her research at the INFORMS conference, as well as at Northeastern's RISE Expo and the Cutting-Edge Connections in PhD Research event.

Ozek completed two consecutive internships as a PhD data scientist at Merck through Northeastern's LEADERS program, an experiential learning opportunity that combines leadership and professional skills education with a research project. At Merck, she developed innovative machine learning and knowledge graph frameworks to enhance drug development processes. Her internship experience contributed to her PhD research and addressed real-world challenges, demonstrating her commitment to practical and impactful research.

As the head teaching assistant for the Data Mining in Engineering class for more than three years, Ozek led a team of 30 teaching assistants and guided their efforts to effectively manage classroom dynamics and enhance learning outcomes. She mentored more than 600 students, supporting them through complex coursework and fostering a positive, inclusive, and respectful learning environment.

Her achievements in research, teaching, and leadership have been recognized with prestigious awards from Northeastern at the university and college levels, including induction into the Lux. Veritas. Virtus. society of distinction, the MIE Ferretti and Yamamura Award, a 2023 Outstanding Graduate Teaching Award, a LEADERS Fellowship, and the Yaman Yener Memorial Graduate Scholarship in 2021.

In the next chapter of her career, Ozek will be working at a startup that addresses healthcare challenges by leveraging innovative artificial intelligence innovations to enhance patient care delivery.

Daniel Braconnier, PhD'23

MECHANICAL ENGINEERING

Advised by Randall Erb,
Associate Professor of Mechanical and Industrial Engineering

Daniel Braconnier began his PhD journey in 2019, when he received a Mechanical and Industrial Engineering (MIE) Chair's Fellowship and joined the Directed Assembly of Particles and Suspensions Laboratory. He previously earned a bachelor's degree in mechanical engineering and a master's degree in materials science from Worcester Polytechnic Institute.

As a doctoral student, Braconnier led a project developing long-lasting superhydrophobic coatings, resulting in a paper published by the Royal Society of Chemistry, and additionally presented at the Materials Research Society (MRS) conferences and the American Chemical Society Colloids Symposium. The paper earned a Best Presentation Award at an MRS conference in 2023.

Braconnier's dissertation was on the creation of thermally conductive polymer composites (TCPCs)—a budding material class that combines the processability and electrical resistivity of polymers with the property of high thermal conductivity. He received the College of Engineering's PhD Conference Best Poster Award in 2023.

He developed a patent-pending TCPC that far exceeded current standards for such a material and received the inaugural Student Innovator of the Year Award in 2024 from the Northeastern University chapter of the National Academy of Inventors. Braconnier's invention will allow future electronic devices to be slimmer, lighter, and more efficient. Braconnier has submitted elements of this work for publication to the *Additive Manufacturing Journal* and continues to work towards more publications on this new material.

Throughout his PhD, Braconnier made it a priority to grow as an educator. He mentored nine undergraduate researchers, advised a master's research project, led a seminar for the Building Bridges program for high school students, and voluntarily took on teaching assistant positions. In 2020, Braconnier received the Academic Technology Scholars Award for aiding faculty in the transition from in-person to online courses during the COVID pandemic. In 2021, he was awarded the MIE Teaching Fellowship as the sole instructor for the PhD course, Soft Matter.

He currently holds a postdoctoral associate position as a Digital Learning Laboratory Fellow at the MIT.

Northeastern University
Mechanical and Industrial Engineering

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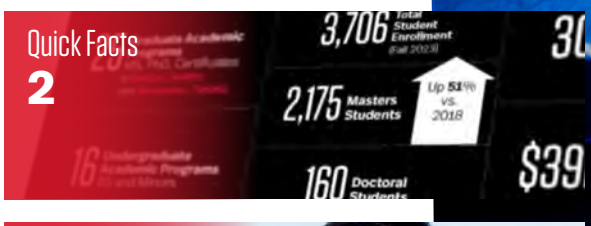

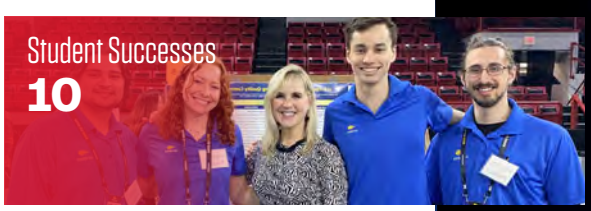

COVER IMAGE

Students **Matthew O'Rourke** and **Rachel Rakushkin** were awarded Mosaic Prototype awards from Northeastern's Center for Entrepreneurship Education for their work developing technologies to reduce the cost of satellite components as part of the Project Horizons student club, which is part of the AerospaceNU club. They are working to send a series of satellites into space as part of NASA's CubeStat Launch Initiative. Scan the QR code to read the full story.

Photo by Matthew Modoono/Northeastern University