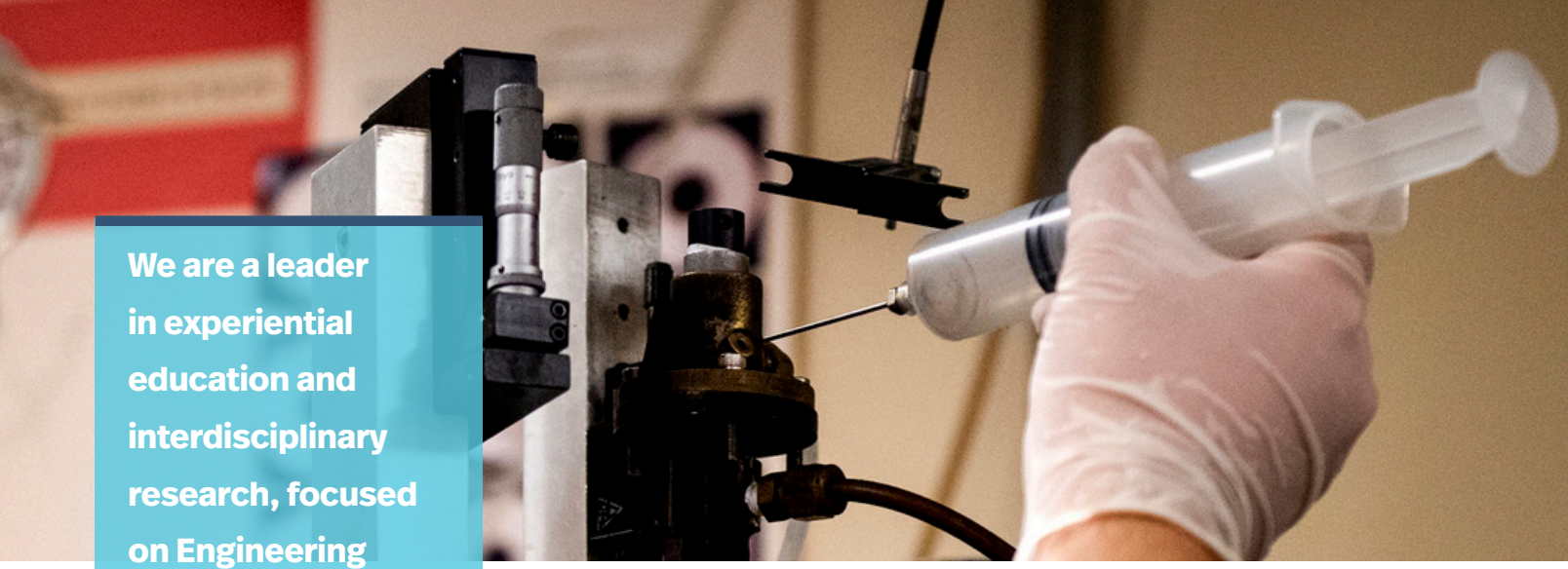
Northeastern University
College of Engineering

2019 | 2020

SCHOLARSHIP REPORT

MECHANICAL AND INDUSTRIAL ENGINEERING



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

DEAR COLLEAGUES, FRIENDS, AND STUDENTS,

As we navigate through an unprecedented time, we are reminded in engineering of the many opportunities and challenges that need to be addressed and realized. At Northeastern University, the Department of Mechanical and Industrial Engineering (MIE) is educating our students to address complex problems, advance the science and practice of engineering, engage in service activities, and promote ethical behavior, all to enhance the well-being of society. Our faculty are also recognized global leaders in their fields, and the department continues to leverage these strengths to address societal needs through engineering in an evolving and complicated world.

Addressing engineering challenges, such as climate change, data science, rethinking/reshaping cities, sustainable manufacturing, improving infrastructure, refining health and well-being, and identifying new energy resources, in the coming decade is profoundly important. To this end, the MIE department has identified key collaborative research areas, including Healthcare Systems, Energy Systems, Resilient Systems, Smart and Sustainable Manufacturing, Impact Mechanics, Multifunctional Composites, Multi-phase Structured Matter, and Biomechanics and Soft matter. Our department is comprised of over 70 tenured/tenure-track and teaching faculty, where more than 30 percent of the MIE tenured/tenure-track faculty have received prestigious Young Investigator Awards. This speaks to the quality of our faculty and research. Our department is also home to two major research centers, the Center for Healthcare Systems Engineering Institute and the Center for High-Rate Nanomanufacturing.

Faculty research efforts are broad, interdisciplinary, and current. Some of these research areas include the transformation and modernization of manufacturing to remain competitive globally, development of modeling tools for healthcare to help hospitals produce projections and consider possible shortage scenarios, origami-inspired engineering, prevention of opioid addiction, combating human trafficking, and the development of robots able to learn and adaptively execute autonomous behaviors.

This past academic year the MIE department has also seen continual growth in our program offerings, with the addition of a combined BS degree in Mechanical Engineering and Design as well as MS programs in Human Factors and Robotics-ME. These new programs bring together our disciplinary concentrations of mechanics, mechatronics, and industrial engineering. MIE is the largest disciplinary department within Northeastern's College of Engineering, with a total student enrollment of over 3,000 in fall of 2019. These new programs and degrees join our over 20 MIE programs at the BS, MS, and PhD levels.

This annual scholarship report details the exceptional academic and professional accomplishments of our faculty and students for the 2019-2020 academic year.

FOR THE LATEST HIGHLIGHTS, PLEASE VISIT US AT MIE.NORTHEASTERN.EDU.

Sincerely,

Marilyn Minus
Professor and
Department Chair
Mechanical and
Industrial Engineering
m.minus@northeastern.edu

QUICK FACTS MECHANICAL AND INDUSTRIAL ENGINEERING

55

TENURED/ TENURE-TRACK Faculty

25

Professional Society Fellowships

1657

Graduate Students Enrolled

2

Federally Funded Research Centers

NSF/DHHS Healthcare Systems Engineering Institute

NSF Center for High-rate Nanomanufacturing

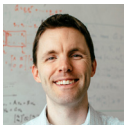
21

Young Investigator Awards, including **16** National Science Foundation CAREER Awards

National Academy Member
Vinod Sahney, University Distinguished Professor

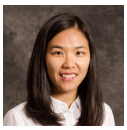
RECENT HIRES

Ruobing Bai
PhD, Harvard University



Laurent Lessard
PhD, Stanford University

Hongwei Sun
PhD, Institute of Engineering Thermophysics, Chinese Academy of Sciences



Xiaoyu Tang
PhD, Princeton University

COLLEGE OF ENGINEERING

With **189** 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, with a focus on discovering solutions to global challenges to benefit society.

5 **Engineering Departments**

95 **YOUNG INVESTIGATOR** Awards

Including **50** NSF CAREER Awards, and **18** DOD Young Investigator Awards

1038 **Graduate Students** Placed on Co-op (2019-20)

TOTAL ENROLLMENT (2019)

8460

53% Graduate
47% Undergraduate

Enrollment Growth
(2014 to 2019)

115% MS
36% PhD
24% BS

NSF CAREER Award for Nanoscale Radiative Heat Transfer Research to Address Global Energy Challenges

Yi Zheng, associate professor of mechanical and industrial engineering

ASSOCIATE PROFESSOR YI ZHENG, mechanical and industrial engineering, is examining some of the world's biggest problems—such as climate change and dependency on fossil fuels—and finding solutions in the world's smallest materials. His research focuses on nanomaterials, which generally range in size from 1 to 100 nanometers (a nanometer is one billionth of a meter).

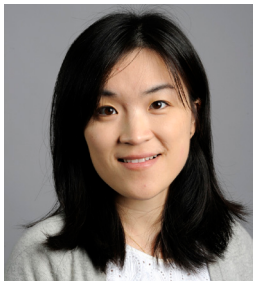
Recently, Zheng has been awarded a $500K prestigious CAREER Award from the National Science Foundation to create new fundamental knowledge about nanoscale radiative heat transfer, which is needed to solve pressing problems in energy harnessing, conversion, and cooling. The project aims to design nanomaterials that can be integrated into solar cells to increase their effectiveness and make solar energy a more appealing and viable prospect against other forms of power. In addition, it will explore radiative cooling, a process by which energy from the sun is harnessed to lower temperatures.

While the general public is aware of the sun's ability to generate heat, it's not yet a mainstream idea that it can also be used to cool things down. "When people talk about cooling, all they know is water-based cooling, where you have water circulating to reduce temperatures," says Zheng. "But this radiative cooling material I'm working on could replace traditional air conditioning units."

Traditional ACs use an immense amount of electricity to provide their users with cooler temperatures—and using electricity causes greenhouse gases to enter the atmosphere. By contrast, the radiative cooling technology Zheng is working on cools things down without using nearly as much energy, reducing the carbon footprint of temperature regulation.

Zheng knows that solving global energy difficulties needs to be a collaborative effort. "What I'm doing is just a small piece of the puzzle," he says. To that end, his project also intends to foster young people's interest in the potential of nanomaterials, paving the way for future engineers to work toward solving these problems. "I want to show the public how cool nanomaterials are, especially high school students," Zheng says. "I want to bring them into nanoengineering, where they can come up with their own solutions to these problems."

NSF CAREER Award to Use AI in Advanced Manufacturing Processes



Xiaoning "Sarah" Jin, assistant professor of mechanical and industrial engineering

TODAY'S ADVANCED MANUFACTURING TECHNOLOGY demands greater efficiency, reliability, and precision. That's where Mechanical and Industrial Engineering Assistant Professor Xiaoning "Sarah" Jin believes her research can play a critical role. A recent recipient of a five-year, $500K National Science Foundation (NSF) CAREER Award for "Unifying Sensing, Machine Perception and Control for High-Precision Micromanufacturing," Jin's goal is to develop an artificial intelligence and machine learning-assisted technology framework for high precision, advanced manufacturing processes.

With a focus on emerging products—biosensors, micro/nano-scale electronics, batteries and flexible electronics, for example—Jin's solution is to leverage data to understand process dynamic behavior and performance in real time. This information, in turn, will improve the precision and effectiveness of process controls to meet product quality targets and make products faster, with higher throughput and minimal defects.

"Our goal is to use the abundant sensor data from complex manufacturing equipment and processes to make reasonable inferences and reveal what's going on," she explains. "We are trying to reveal the hidden behavior existing in high throughput, high speed processes of micro-scale device fabrication to maintain high reliability and mitigate defect rates. If there are tiny defects or errors at the beginning of a process, and you don't have enough visibility into the process to make a timely correction, you will see a higher defect rate, which can generate significant waste in materials and energy. If we can use all available information to infer what's happening, we can then provide proactive, adaptive action."

The power of Big Data

Jin's innovative approach goes beyond traditional model-based control and design using the power of sensing technologies and advanced data analytics to enable real-time decision-making for meaningful action. "Using a more data-driven approach with engineering knowledge provides us an avenue of mass production for more precise, more reliable products with more complexity and less waste, and a significant improvement in efficiency," she says.

Under the NSF award, Jin will experimentally demonstrate and validate the framework and methods on two micromanufacturing processes—ion mill etching and roll-to-roll printing—to show the real-world impact of her research. "I want to develop a general methodology and algorithms to apply to a broader range of manufacturing processes," she says.

Jin's research is also coupled with STEM education and outreach activities aimed at building interest in next-generation "smart manufacturing" technologies among students at all levels and broadening the diversity of the STEM workforce. "My goal is to grow the program," she says. "I want to help the current workforce adapt to new technology and support the education and training of future manufacturing scientists and engineers to better prepare them."

Shefelbine Hopes Fulbright Award Creates Opportunities Beyond Her Research

REFRESH, REJUVENATE, AND develop new collaborations. Those goals are just the tip of the iceberg for Professor Sandra Shefelbine, mechanical and industrial engineering, jointly appointed in bioengineering, who was recently awarded a Fulbright Futures Scholarship to study skeletal mechanobiology at the University of Melbourne from January to August 2021.

Shefelbine wants to explore how mechanical forces influence bone development, in particular with elite athletes. Specifically, single sport youth athletes can develop hip issues. Basketball, ice hockey, and soccer players can sometimes have their femur bone form differently.

"As an engineer, this is fascinating," Shefelbine said. "What about how those sports impact how the bone grows? This condition forms during adolescence but can affect performance at the professional level. Nobody knows what is causing it, but if we can learn that, we can then prevent it."

Called femoroacetabular impingement (FAI), the condition occurs when the shape of the hip joint changes. Participation in adolescent sports can potentially affect how bones are shaped as a young athlete is growing.

It's important to study how mechanics affect bones as they grow, Shefelbine explained. From there, different forms of therapy can be developed to help prevent FAI from happening.

Shefelbine is currenting studying FAI in elite youth athletes and has characterized "hip motion during sports practice, analyzing changes in proximal femoral head morphology using medical imaging, and measuring balance of hip musculature."

Sandra Shefelbine, Professor, Mechanical and Industrial Engineering; joint faculty, Bioengineering

At the University of Melbourne, Shefelbine said she will be working in mechanical engineering and biomedical engineering.

First, Shefelbine will focus on more whole body questions, looking at how people move. Along with Marcus Pandy, a Professor of Mechanical and Biomedical Engineering at the University of Melbourne, Shefelbine will utilize his data set on people measured in a full body motion capture lab.

The Fulbright research will also integrate research on injuries that sprinters often sustain in their hamstrings. Cameron Nurse, who recently received his Master's in bioengineering, was a varsity sprinter during his undergrad at Boston University. Nurse sustained multiple hamstring injuries and was curious as to why.

"We measured mechanics during sprinting and found interesting lopsidedness," Shefelbine said. "We want to know: are they having injuries because they are lopsided or vice versa? We will probe that with a computational model. We want to understand, if you run a certain way, what implications does that have for your muscles?"

Additionally, Shefelbine said she will be working with Kathryn Stok, another professor at the University of Melbourne. Stok's research focused on cartilage. Seeing how the mechanics of cartilage change in arthritis, for example, can help in understanding what can lead to a joint getting to that level, Shefelbine said.

While the Fulbright research could lead to improvements with athletic training and even prevent future injury, Shefelbine added that she loves how the Fulbright scholarship also involves being an ambassador for your country.

"At this time, our country needs good ambassadors," Shefelbine said. "Through academic exchanges like this, we can show that our country is more than what is seen on the news. The focus is not just on how many papers you're going to publish with your research. You're a representative of the United States."

FACULTY BY RESEARCH AREAS

Biomechanics & Soft Matters – Solids and Fluids

Rouzbeh Amini
Andrew Gouldstone
Carlos Hidrovo
Safa Jamali
Yaning Li
Yingzi Lin
Carol Livermore
Jose Martinez Lorenzo
Sinan Müftü
Hamid Nayeb-Hashemi
Sandra Shefelbine
Mohammad E. Taslim
Kai-Tak Wan
John "Peter" Whitney

Energy Systems

Muhammad Noor E Alam
Ahmed Busnaina
Yung Joon Jung
Yiannis Levendis
Yongmin Liu
Carol Livermore
Hameed Metghalchi
Mohammad E. Taslim
Wei Xie
Yi Zheng
Hongli "Julie" Zhu

Healthcare Systems

Muhammad Noor E Alam
James Benneyan
Chun-An Chou
Jacqueline Griffin
Babak Heydari
Sagar Kamarthi
Yingzi Lin
Kayse Lee Maass
Vinod Sahney
Rifat Sipahi
Wei Xie

Impact Mechanics

Michael Allshouse
Andrew Gouldstone
Carlos Hidrovo
Yaning Li
Yang "Emily" Liu
Carol Livermore
Craig Maloney
Jose Martinez Lorenzo
Sinan Müftü
Hamid Nayeb-Hashemi
Sandra Shefelbine
Kai-Tak Wan
John "Peter" Whitney
Ibrahim Zeid

Mechatronics and Systems – Control, Robotics, & Human Machines

Babak Heydari
Laurent Lessard
Yingzi Lin
Jose Martinez Lorenzo Rifat Sipahi
John "Peter" Whitney

Multifunctional Composites

Teiichi Ando
Ahmed Busnaina
Randall Erb
Andrew Gouldstone
Jacqueline Isaacs
Yung Joon Jung
Yaning Li
Yongmin Liu
Marilyn Minus
Sandra Shefelbine
Moneesh Upmanyu
Yi Zheng
Hongli "Julie" Zhu

Multi-phase Structured Matter

Michael Allshouse
Teiichi Ando
Randall Erb
Carlos Hidrovo
Safa Jamali
Yung Joon Jung
Yaning Li
Yang "Emily" Liu
Yongmin Liu
Carol Livermore
Craig Maloney
Hongwei Sun
Mohammad E. Taslim
Moneesh Upmanyu
Kai-Tak Wan
Yi Zheng

Resilient Systems

Muhammad Noor E Alam
James Bean
Mehdi Behroozi
James Benneyan
Ozlem Ergun
Nasser Fard
Jacqueline Griffin
Surendra M. Gupta
Babak Heydari
Jacqueline Isaacs
Xiaoning "Sarah" Jin
Sagar Kamarthi
Yingzi Lin
Kayse Lee Maass
Emanuel Melachrinoudis
Vinod Sahney
Hao Sun
Wei Xie

Smart and Sustainable Manufacturing

Muhammad Noor E Alam
Ahmed Busnaina
Randall Erb
Jacqueline Isaacs
Yung Joon Jung
Yongmin Liu
Carol Livermore
Marilyn Minus
Mohsen Moghaddam
Moneesh Upmanyu
Wei Xie
Yi Zheng
Hongli "Julie" Zhu

Faculty Honors and Awards

Selected Highlights

Assistant Professor of Mechanical and Industrial Engineering **Hongli Zhu's** research in solid state batteries was featured on the cover of *Advanced Materials* and her research on aqueous flow batteries was featured on the cover of *Advanced Functional Materials*. She was also awarded a **$1 million grant from the Department of Energy's Advanced Manufacturing Office** to work on "Enabling Advanced Electrode Architecture through Printing Technique." It is one of 55 projects nationwide awarded by the DOE to support innovative advanced manufacturing research and development.

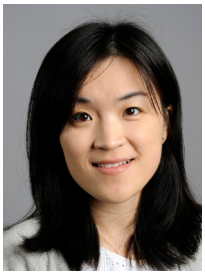
William Lincoln Smith and University Distinguished Professor **Ahmed Busnaina**, mechanical and industrial engineering, has received the **2020 William T. Ennor Manufacturing Technology Award** from the American Society of Mechanical Engineers "for the development of a scalable directed assembly-based nanoscale technology to print bio and chemical sensors, power electronics, and light emitting diodes using inorganic or organic materials on flexible or rigid substrates."

Mechanical and Industrial Engineering Professors **Sagar Kamarthi**, Interim Dean **Jacqueline Isaacs**, Assistant Professors **Xiaoning Jin**, **Mohsen Moghaddam**, and Assistant Vice Chancellor for Digital Innovation and Enterprise Learning Kemi Jona were awarded a **$2 million National Science Foundation grant** for the Integrative Manufacturing and Production Engineering Education Leveraging Data Science program to develop free online courses to help people working in manufacturing modernize and retool their skills.

Professor **Surendra M. Gupta**, mechanical and industrial engineering, was awarded the 2019 **IEOM Society International Distinguished Professor Award** in "recognition and appreciation of his dedication in teaching, learning and mentoring, and achievements in the field of industrial engineering and operations management."

Professor **Sandra Shefelbine**, mechanical and industrial engineering, jointly appointed in bioengineering, was awarded a **Fulbright Futures Scholarship** to study skeletal mechanobiology at the University of Melbourne. See page 4. She was also named a **Fellow** of the American Institute for Medical and Biological Engineering (AIMBE) in recognition of "her distinguished and continuing achievements in medical and biological engineering." Additionally, Shefelbine, in collaboration with the College of Science, was awarded a $650K **National Science Foundation grant** for "Manipulating Fluid Flow in Mechanoadaptation of Bone."

Yiannis Levendis, College of Engineering Distinguished Professor, mechanical and industrial engineering, was recently elected as a **Fellow** to the National Academy of Inventors, an honor reserved for individuals whose inventions "have made a tangible impact on quality of life, economic development, and the welfare of society."



Assistant Professor **Xiaoning "Sarah" Jin**, mechanical and industrial engineering, was awarded a $500K National Science Foundation **CAREER Award** for "Unifying Sensing, Machine Perception and Control for High-precision Micromanufacturing." See page 3.

Associate Professor **Yi Zheng**, mechanical and industrial engineering, recently received a $355K **Soleeva Energy Innovation Award** from industry partner Soleeva Energy to develop a functional interfacial structure for solar-driven water desalination and purification. He also received a $500K **CAREER Award** from the National Science Foundation to create fundamental knowledge about nanoscale radiative heat transfer, which is needed to solve problems in energy harnessing, conversion, and cooling. See page 3.

Assistant Professor **Kayse Maass** is **PI of a $574K grant from the National Science Foundation** (NSF) for "ISN2: Coordinated Interdiction for Disruption of Labor Trafficking in the Agricultural Sector." The award, in collaboration with Northeastern's D'Amore-McKim School of Business and College of Social Sciences and Humanities, will advance national health, welfare, and prosperity by furthering an understanding of effective operational methods to combat labor trafficking within the U.S. agricultural sector. Maass is also c**o-PI of a $535K NSF grant**, titled, "ISN2: Disrupting Human Trafficking via Needs Matching and Capacity Expansion." The interdisciplinary award is in collaboration with Worcester Polytechnic Institute (lead) and John Jay College of Criminal Justice and will study the efficient allocation of resources over time to disrupt human trafficking networks.

Professor **Ozlem Ergun**, mechanical and industrial engineering, and Assistant Professor Michael Kane, civil and environmental engineering, are co-PIs of a **$1.2 million National Science Foundation grant**, along with Northeastern's School of Law (lead), and College of Social Sciences and Humanities, as well as Boston College for creating an "Understanding the Algorithmic Workplace: A Multi-Method Study for Comprehensive Optimization of Platforms." The project will develop new evidence and understanding about the behavior and interactions of workers, business organizations, and government institutions that are involved in the "algorithmic workplace" or "gig economy".

COVID-19 Research Highlights

Professor **Ozlem Ergun**, mechanical and industrial engineering, and her team, in collaboration with the Commonwealth of Massachusetts Executive Office of Elder Affairs, has created a matching optimization algorithm and an online portal called COVID-19 Long Term Care Facility Staffing Team. The portal coordinates the intake of job applicants' information and matches it automatically to an ever-changing list of facility staffing needs. Ergun also received an **National Science Foundation RAPID grant** for this work.

Associate Professor **Jacqueline Griffin**, mechanical and industrial engineering (MIE), College of Engineering Distinguished Professor **David Kaeli**, electrical and computer engineering, MIE Professor **Ozlem Ergun**, and affiliate faculty Stacy Marsella and Casper Harteveld were awarded a $100K **National Science Foundation RAPID grant** for "Rapid Monitoring and Assessment of Critical Pharmaceutical Supply Chains." Partnering with Massachusetts General Hospital and software company OrbitalRx, the researchers are working to actively understand drug shortage management, particularly in response to COVID-19.

James Benneyan, Professor and Director of Northeastern's Healthcare Systems Engineering Institute (HSyE), mechanical and industrial engineering, **developed a modeling tool** working in partnership with Dr. Michael Rosenblatt, chief medical officer at the Lahey Hospital and Medical Center, and other hospitals associated with HSyE to help hospitals prepare for surges in COVID-19 cases.

Associate Professor **Babak Heydari**, mechanical and industrial engineering, in collaboration with William Paterson University, is analyzing COVID-19 data to **assess effectiveness of social distancing policies**.

View all department news.

Distinguished University and Cabot Professor **Laura Lewis**, chemical engineering, jointly appointed in mechanical and industrial engineering, was awarded a $200K **National Science Foundation RAPID grant** for "Lattice-Defective Copper Oxides as a Biocidal Tool for COVID-19 and Beyond." The research addresses a need for new types of surface treatments that exhibit antipathogenic "contact-kill" capabilities to protect public health and welfare.

Student Honors and Awards
Selected Highlights

PhD student **Chang Liu**, mechanical engineering, was awarded **first place** in the ASME Noise Control and Acoustics Division student paper competition for the paper "Preliminary Results of Microwave – Induced Thermoacoustics Imaging in Geological Media," which was presented at the 2019 International Mechanical Engineering Congress & Exposition.

Data Analytics Engineering student **Aparna V. Alavilli**, MS'20, was awarded Northeastern's **Outstanding Graduate Student Award for Experiential Learning** for showing an extraordinary capacity to integrate academics and professional work and establishing herself as an emerging leader in their field. She received a full-time job offer from New Balance as a data scientist.

PhD candidate **Adel W. Fadhel**, mechanical and industrial engineering (MIE), and MIE Professor Surendra M. Gupta's paper titled "Carbon Emissions and Energy Balance in the Design of a Sustainable Food Waste Network Model" won the **Best Track Paper Award** in Waste Management at the International Conference on Industrial Engineering and Operations Management.

PhD Student Spotlight

Rozhin Doroudi, PhD

Industrial Engineering
Advised by Ozlem Ergun,
Professor of Mechanical and Industrial Engineering

While pursuing her PhD in Industrial Engineering, Rozhin Doroudi leveraged artificial intelligence techniques to understand behavior of human decision makers in a pharmaceutical supply chain and how these behaviors drive drug shortages. She modeled a pharmaceutical supply chain with boundedly rational artificial decision makers capable of reasoning about the motivations and behaviors of others. Such realistic models of human behavior enable studying the effects of trust dynamics in disrupted supply chains. She also focused on another important aspect of pharmaceutical supply chains as part of healthcare systems: equity. She demonstrated how coordination between supply chain decision makers can result in a more equitable system. In her last chapter, Doroudi used Deep Reinforcement Learning to suggest inventory replenishment policies for health centers.

During her PhD, Doroudi published two first-author papers and was co-author of another paper. She also presented her research at prestigious conferences. She received the Yaman Yener Memorial Graduate Scholarship from Northeastern University College of Engineering in 2019. Doroudi was president of INFORMS (Institute for Operations Research and the Management Sciences) student chapter for a year and half. During this time the student chapter won INFORMS 2017 cum laude best student chapter award and Doroudi won the Judith Liebman Award for leading the student chapter. She was also awarded the Alfred J. Ferretti Excellence in Leadership Award in Spring of 2020.

During her graduate program, Doroudi worked as a data scientist intern at Liberty Mutual Insurance for two summers. After receiving her PhD, she joined Liberty Mutual Insurance as a data scientist.

PhD Student Spotlight

Jessica Faust, PhD'20

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

Early in her academic journey as a community college student, Jessica Faust was selected for the National Science Foundation's (NSF) Research Experiences for Undergraduates (REU) in summer of 2010, working as a research assistant in mechanical design at Northeastern's College of Engineering Center for High-Rate Nanomanufacturing. She worked on several projects in the George J. Kostas Nanoscale Technology and Manufacturing Research Center clean room. She also participated as an REU the following summer at Northeastern as a research assistant in biomedical optics in the Heterogeneous Materials Multi-scale Mechanics Laboratory in the Mechanical and Industrial Engineering (MIE) department. This time at Northeastern deepened her love for research and resulted in a peer-reviewed publication. In 2011, Faust transferred from her community college to Worcester Polytechnic Institute (WPI) to continue her undergraduate education, and while there, returned to work as a research assistant at Northeastern on a collaborative project with the Macromolecular Innovations in Nano-materials Utilizing Systems Laboratory (MINUS Lab) and the Directed Assembly of Particles and Suspensions Laboratory (DAPS Lab), from 2014-2016. Within these two years, Faust performed a significant amount of research that led her mentors, Professor Minus and Associate Professor Erb, to write an NSF proposal (that was funded) and encouraged Faust to pursue her PhD. Upon graduation from WPI in 2016, Faust applied for, based on her research at Northeastern, and ultimately received, a prestigious NSF Graduate Research Fellowship and began pursuing her PhD in Mechanical Engineering at Northeastern in the DAPS Lab. Her doctoral research focused on fundamental breakthroughs in interphase assembly within mechanical and thermal composite materials, one of the most important and complicated topics of study in composite materials such as designing materials for bone graft applications. She also worked at the frontier of RF and telecommunications materials. Her recent dissertation examined three different composite systems, two of which are focused on improving the strength of mechanical properties and the third on thermal properties. Her thermal composite study aims to create an electrical insulating thermally conductive composite that has very high thermal conductivity but will not short circuit the circuit board. Her PhD research resulted in a patent in 2019, titled, "Methods for Creating Thermally Conductive Boron Nitride Films and Coatings on Composite Surfaces," as well as more than 12 conference presentations. In 2020, Faust was recognized for her exceptional ability to conduct high-level research and make contributions to the scholarly literature in her field with Northeastern's Outstanding Graduate Student Award for Research. Other notable achievements include being named to Northeastern's Huntington 100, and receiving the Ferretti Academic Excellence Award (2018), the John and Katharine Cipolla Early Student Career Award (2019), and the Akira Yamamura Mechanical and Industrial Engineering Department Award for Research (2020). Faust also engaged in STEM outreach. She mentored students in Northeastern's Young Scholars Program, including international students through the Science Without Borders program. In total, Faust has mentored 11 students—high school and undergrads—while at Northeastern. She is currently a post-doctoral researcher at Northeastern in the MIE department.

SEE RECENT PHD GRADUATE DISSERTATION SUMMARIES ON PAGE 38.

Muhammad Noor E Alam

Assistant Professor, Mechanical and Industrial Engineering

PhD, University of Alberta, 2013
coe.northeastern.edu/people/alam-md-noor-e

Scholarship focus: applied operations research, healthcare, supply chain, large scale optimization and big data analytics

Honors and awards: 1st Place Winners: 2019 Association for Public Policy Analysis and Management (APPAM) Fall Research Conference, Denver, CO, USA; Analytics Best Track Paper Award, 2016 IEOM Detroit Conference; Postdoctoral Fellowship, Natural Sciences and Engineering Research Council of Canada; Izaak Walton Killam Memorial Scholarship

SELECTED PUBLICATIONS

M.S. Morshed, Md. Noor-E-Alam
Accelerated Affine Scaling Algorithms for Linear Pro-Gramming Problems, Computers & Operations Research, 114, 2020, 104807

M.S. Morshed, Md. Saiful Islam, Md. Noor-E-Alam
Accelerated Sampling Kacz-marz Motzkin Algorithm for Linear Feasibility Problem, Journal of Global Optimization, 77, 2020, 361-382

R. Paulsen, A.S. Modestino, Md. Mahmudul Hasan, Md. Noor-E-Alam, L. Young, G. Young
Patterns of Buprenorphine/Naloxone Prescribing: An Analysis of Claims Data from Massachusetts, The American Journal of Drug and Alcohol Abuse, 46(2), 2019, 216-223

Md. Saiful Islam, M.S. Morshed, G. Young, Md. Noor-E-Alam
Robust Policy Evaluation from Large-Scale Observational Studies, PLoS One, 14(10), 2019, e0223360

D.Jiang, T. Ibn Faiz, Md. Mahmudul Hasa, Md. Noor-E-Alam
A Possibility Distribution Based Multi-Criteria Decision Algorithm for Resilient Supplier Selection Problems, Journal of Multi-Criteria Decision Analysis, 2019, 1-21

Md. Mahmudul Hasan, D. Jiang, A.M.M. Sharif Ullah, Md. Noor-E-Alam
Resilient Supplier Selection in Logistics 4.0 With Heterogeneous Information, Expert Systems With Applications, 139, 2019, 112799

Michael Allshouse

Assistant Professor, Mechanical and Industrial Engineering

PhD, Massachusetts Institute of Technology, 2013
coe.northeastern.edu/people/allshouse-michael

Scholarship focus: nonlinear dynamics, geophysical fluid dynamics, computational fluid mechanics, disaster response, experimental fluids

SELECTED PUBLICATIONS

M.R. Allshouse, H.L. Swinney
Dependence of Internal Wave Bolus Transport on Pycnocline Thickness, Geophysical Research Letters, 2020, e2020GL086952

G. Salvador-Vieira, M.R. Allshouse
Internal Wave Boluses in a Continuously Stratified, Journal of Fluid Mechanics, 885, 2020, A35

M. Filippi, M. Budisic, M.R. Allshouse, S. Atis, J-L. Thiffeault, T. Peacock
Using Braids to Quantify Interface Growth and Coherence in a Rotor-Oscillator Flow, Physical Review Fluids, 5, 2020, 054504

A. Taqieddin, M.R. Allshouse, A.N. Alshawabkeh
Editors' Choice–Critical Review–Mathematical Formulations of Electrochemically Gas-Evolving Systems, Journal of The Electrochemical Society, 165, 2018, E694-E711

F.M. Lee, M.R. Allshouse, H.L. Swinney, P.J. Morrison
Internal Wave Energy Flux from Density Perturbations in Nonlinear Stratifications, Journal of Fluid Mechanics, 856, 2018, 898-920

M.R. Allhouse, et al.
Impact of Windage on Ocean Surface Lagrangian Coherent Structures, Environmental Fluid Mechanics, 17(3), 2017, 473-483

M.R. Allshouse, F.M. Lee, P.J. Morrison, H.L. Swinney
Internal Wave Pressure, Velocity, and Energy Flux from Density Perturbations, Physical Review Fluids, 1(1), 2016, 014301

M.R. Allshouse, T. Peacock
Lagrangian Based Methods for Coherent Structure Detection, Chaos, 25, 2015, 097617

SELECTED RESEARCH PROJECTS

Analyzing Vertical Ocean Transport with Lagrangian Coherent Structures
Principal Investigator, Office of Naval Research

Rouzbeh Amini

Associate Professor, Mechanical and Industrial Engineering; Associate Professor, Bioengineering

PhD, University of Minnesota, Minneapolis, 2010
coe.northeastern.edu/people/amini-rouzbeh

Scholarship focus: biomechanics, mechanobiology, biotransport

SELECTED PUBLICATIONS

S.D. Salinas, M.M. Clark, R. Amini
The Effects of– 80° C Short-Term Storage on the Mechanical Response of Tricuspid Valve Leaflets, Journal of Biomechanics, 98, 2020, 109462

V.S. Thomas, V. Lai, R. Amini
A Computational Multi-Scale Approach to Investigate Mechanically-Induced Changes in Tricuspid Valve Anterior Leaflet Microstructure, Acta Biomaterialia, 94, 2019, 524-535

K. Amini Khoiy, K.T. Asgarian, F. Loth, R. Amini
Dilation of Tricuspid Valve Annulus Immediately After Rupture of Chordae Tendineae in Ex-Vivo Porcine Hearts, PLOS One, 13(11), 2018, e0206744

A.D. Pant, P. Gogte, V. Pathak-Ray, S.K. Dorairaj, R. Amini
Increased Iris Stiffness in Patients with a History of Angle-Closure Glaucoma: An Image-Based Inverse Modeling Analysis, Investigative Ophthalmology & Visual Science, 59(10), 2018, 4134-4142

S.H. Pahlavian, J. Oshinski, X. Zhong, F. Loth, R. Amini
Regional Quantification of Brain Tissue Strain Using Displacement-Encoding with Stimulated Echoes Magnetic Resonance Imaging, Journal of Biomechanical Engineering, 140(8), 2018

SELECTED RESEARCH PROJECTS

In-vivo Assessment of Human Iris Mechanical Properties
Principal Investigator, BrightFocus Foundation

Multi-scale Assessment of Biomechanical Alterations in Tricuspid Valves Following Pregnancy
Principal Investigator, National Science Foundation

Teiichi Ando

Professor, Mechanical and Industrial Engineering

PhD, Colorado School of Mines, 1982
coe.northeastern.edu/people/ando-teiichi

Scholarship focus: rapid solidification processing, droplet-based materials processing, powder metallurgy, material processing by severe plastic deformation, processing-structure-property relationships in materials

Honors and awards: Fellow, American Society of Materials International; Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

W.C, Evans, X. Dan, A. Houshmand, S. Muftu, T. Ando
Microstructural Characterization of 6061 Aluminum Splat Deposited on T6 3061 Aluminum Substrate, Metallurgical and Materials Transactions A, 50A (8), 2019, 3937-3948

T. Ando, A. Houshmand
Dislocation Climb Rate at Very High Vacancy Concentrations, Materialia, 8, 2019, 100472

Z. Huang, K. Date, K. Tatsugawa, T. Ando
Characterization of Al Skeletal Structures Fabricated by Ultrasonic Powder Consolidation, Metallurgical and Materials Transactions A, 49A, 2018, 6173-6183

Y. Li, Y. Hamada, K. Otobe, T. Ando
A Method to Predict the Thickness of Poor-Bonded Material along Spray and Spray-Layer Boundaries in Cold Spray Deposition, J. Thermal Spray Technology, 26(3), 2017, 350-359

S. Onell, T. Ando
Application of a Simple Sub-Regular Solution Model to the Computation of Phase Boundaries and Free-Dendritic Growth in the Ag-Cu System, Acta Mater, 113, 2016, 109-115

Y. Shu, S. Gheybi Hashemabad, T. Ando, Z. Gu
Ultrasonic Powder Consolidation of Sn/In Nanosolder Particles and Their Application for Low Temperature Cu-Cu Joining, Materials and Design, 111, 2016, 631-639

SELECTED RESEARCH PROJECTS

Fabrication of High-Thermal Conductivity, Low Thermal Expansivity Cu-Invar and Cu-Graphite Composites by Ultrasonic Powder Consolidation
Principal Investigator, Hitachi Metals, Ltd

Engineered Materials and Materials Design of Engineered Materials
Co-Principal Investigator, Army Research Laboratory

Ruobing Bai

Assistant Professor, Mechanical and Industrial Engineering
(Joining Janurary 2021)

PhD, Harvard University, 2018
coe.northeastern.edu/people/bai-ruobing

Scholarship focus: solid mechanics and large deformation, soft active materials: hydrogels, liquid crystal elastomers, and biomaterials, fracture and adhesion of materials, multi-physics of materials: mechanics, thermodynamics, chemistry, optics, and electromagnetism, instability of materials

Honors and awards: Best Poster Award, NEW MECH; Haythornthwaite Student Travel Grants, ASME-IMECE; Chun-Tsung Scholar, Peking University

SELECTED PUBLICATIONS

R. Bai, J. Yang, Z. Suo
Fatigue of Hydrogels, European Journal of Mechanics - A/Solids, 74, 2019, 337-370

R. Bai, J. Yang, X.P. Morelle, Z. Suo
Flaw-Insensitive Hydrogels Under Static and Cyclic Loads, Macromolecular Rapid Communications, 2019, 1800883

J. Yang, R. Bai, B. Chen, Z. Suo
Hydrogel Adhesion: A Supramolecular Synergy of Chemistry, Topology, and Mechanics, Advanced Functional Materials, 2019, 1901693

R. Bai, B. Chen, J. Yang, Z. Suo
Tearing a Hydrogel of Complex Rheology, Journal of the Mechanics and Physics of Solids, 125, 2019, 749-761

R. Bai, J. Yang, X.P. Morelle, C. Yang, Z. Suo
Fatigue Fracture of Self-Recovery Hydrogels, ACS Macro Letters, 2018, 312-317

M. Sun, R. Bai, X. Yang, J. Song, Z. Suo, X. He
Hydrogel Interferometry for Ultrasensitive and Highly Selective Chemical Detection, Advanced Materials, 2018, 1804916

J. Yang, R. Bai, Z. Suo
Topological Adhesion of Wet Materials, Advanced Materials, 2018, 1800671

R. Bai, Q. Yang, J. Tang, X.P. Morelle, J. Vlassak, Z. Suo,
Fatigue Fracture of Tough Hydrogels, Extreme Mechanics Letters, 2017, 15, 91-96

James Bean

Senior Advisor to the President; Professor, Mechanical and Industrial Engineering; Professor, D'Amore-McKim School of Business

PhD, Stanford University, 1980
coe.northeastern.edu/people/bean-james

Honors and awards: Fellow, Institute of Operations Research and the Management Sciences; George E. Kimball Medal, Institute of Operations Research and the Management Sciences; 2017 Outstanding Alumnus, Harvey Mudd College

SELECTED PUBLICATIONS

S. Xu, J. Bean
Scheduling Parallel-Machine Batch Operations to Maximize On-Time Delivery Performance, Journal of Scheduling, 2015, 1-18

S. Xu, J. Bean
A Genetic Algorithm for Scheduling Parallel Non-Identical Batch Processing Machines, Proceedings of the IEEE Symposium on Computational Intelligence in Scheduling, 2007, 143–150

Z.Z. Lin, J. Bean, C. White III
A Hybrid Genetic/Optimization Algorithm for Finite Horizon Partially Observed Markov Decision Processes, INFORMS Journal on Computing, 16, 2004, 27-38

J. Ohlmann, J. Bean, S. Henderson
Convergence in Probability of Compressed Annealing, Mathematics of Operations Research, 29, 2004, 837-860

C. Kim, G. Keoleian, D. Grande, J. Bean
Life Cycle Optimization of Automobile Replacement: Model and Application, Environmental Science and Technology, 37, 2003, 5407-5413

Z.Z. Lin, J. Bean, C. White III
Chapter 15: A Genetic Algorithm Heuristic for Finite Horizon Partially Observed Markov Decision Problems, Evolutionary Optimization, Boston, 2002, 371-398

R. Hughes, J. Bean, D. Chaffin
A Method for Classifying Co-Contraction of Lumbar Muscle Activity, Journal of Applied Biomechanics, 17, 2001, 253-258

B. Norman, J. Bean
Scheduling Operations on Parallel Machine Tools, IIE Transactions, 32, 2000, 449-459

Mehdi Behroozi

Assistant Professor, Mechanical and Industrial Engineering

PhD, University of Minnesota, 2016
coe.northeastern.edu/people/behroozi-mehdi

Scholarship focus: geographic resource allocation, logistics, transportation, multimodal transport systems, data visualization, social resilience, and production scheduling; Mathematical programming, data analytics, robust optimization, computational geometry, geometric probability theory, and geospatial analysis

SELECTED PUBLICATIONS

M. Behroozi, J.G. Carlsson
Computational Geometric Approaches to Equitable Districting: A Survey, A chapter in Optimal Districting and Territory Design: Models, Algorithms, and Applications, Springer, 2019

J.G. Carlsson, M. Behroozi, K. Mihic
Wasserstein Distance and the Distributionally Robust TSP, Operations Research, 66(6), 2018, 1603-1624

H. Samarghandi, M. Behroozi
On the Exact Solution of the No-Wait Flow Shop Problem with Due Date, European Journal of Operational Research, 256(2), 2017, 141-159

J. G. Carlsson, M. Behroozi
Worst-Case Demand Distributions in Vehicle Routing, European Journal of Operational Research, 256(2), 2017, 462-472

J.G. Carlsson, M. Behroozi, X. Meng, R. Devulapalli
Household-Level Economies of Scale in Transportation, Operations Research, 64(6), 2016, 1372-1387

J.G. Carlsson, M. Behroozi, X. Li
Geometric Partitioning and Robust Ad-Hoc Network Design, Annals of Operations Research, 238, 2016, 41-68

M. Behroozi
Plant Layout and Location, 6th Edition, Modaresane Sharif, Tehran, Iran, 2015

H. Samarghandi, P. Taabayan, M. Behroozi
Metaheuristics for Fuzzy Dynamic Facility Layout Problem with Unequal Area Constraints and Closeness Ratings, International Journal of Advanced Manufacturing Technology, 67, 2013, 2701-2715

James Benneyan

Director, Healthcare Systems Engineering Institute; Professor, Mechanical and Industrial Engineering

PhD, University of Massachusetts, Amherst, 1997
coe.northeastern.edu/people/benneyan-james

Scholarship focus: healthcare systems engineering, operations research, quality and reliability engineering, statistical quality control, high reliability design, patient safety

Honors and awards: Senior Fellow, Institute for Healthcare Improvement; Fellow, Society for Health Systems; Lifetime Fellow, Healthcare Information and Management Systems Society; Fellow, Institute of Industrial Engineers

SELECTED PUBLICATIONS

R.R. Krishnan, J. Benneyan, S. Sonuc
Optimization of Medical Supply Chains and Forward Store Locations for Recurrent Homecare Patient Demand with Periodic Interruptions, American Journal of Operations Research, 8(3), 2018, 203-220

J. Benneyan, I. Garrahan, I. Ilies, X. Duan
Modeling Approaches, Challenges, and Preliminary Results for the Opioid and Heroin Co-Epidemics, Proceedings Winter Simulation Conference, 2017, 2821-2832

S. Mutlu, J. Benneyan, J. Terrell, V. Jordan, A. Turkcan
A Co-Availability Scheduling Model for Coordinating Multi-Disciplinary Care Teams, International Journal of Production Research, 53(24), 2015, 7226-7237

H. Musdal, B. Shiner, M.E. Ceyhan, B.V. Watts, J.C. Benneyan
In-Person and Video-Based Post-Traumatic Stress Disorder Treatment for Veterans: A Location-Allocation Model, Journal of Military Medicine, 179(2), 2014, 150-156

J.S. Peck, D.J. Nightingale, S.A. Gaehde, J.C. Benneyan
Generalizability of a Simple Approach for Predicting Hospital Admission from an Emergency Department, Academic Emergency Medicine, 20(11), 2013, 1156-1163

SELECTED RESEARCH PROJECTS

Development and Validation of Analytic Spatial-Temporal Models to Help Study and Mitigate the National Opioid-Heroin Co-Epidemic
Principal Investigator, National Science Foundation

Ahmed Busnaina

William Lincoln Smith and University Distinguished Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering; affiliated faculty, Electrical and Computer Engineering

PhD, Oklahoma State University, 1983
coe.northeastern.edu/people/busnaina-ahmed

Scholarship focus: nanomanufacturing; nano and microscale printing of sensors and electronics; nano and micro scale defects in semiconductor manufacturing; high rate nanomanufacturing; power electronics, RF, NEMS devices and nanomaterials based nanoelectronics, flexible and hybrid electronics

Honors and awards: 2020 ASME William T. Ennor Manufacturing Technology Award and Medal, Fellow, National Academy of Inventors; Fulbright Senior Scholar; Life Fellow, American Society of Mechanical Engineers; Fellow, the Adhesion Society; Outstanding Translational Research Award, Institute of Environmental Sciences and Technology's 2013 Willis J. Whitfield Award

SELECTED PUBLICATIONS

S.A. Abbasi, T.H. Kim, S. Somu, H. Wang, Z. Chai, M. Upmanyu, A.A. Busnaina
Fabrication of a Nanoelectromechanical Bistable Switch Using Directed Assembly of SWCNTs, Journal of Physics D: Applied Physics, 53(23), 2020

Z. Chai, A. Korkmaz, C. Yilmaz, A.A. Busnaina
High-Rate Printing of Micro/Nanoscale Patterns Using Interfacial Convective Assembly, Advanced Materials, 2020, 2000747

Z. Chai, H. Jeong, S.A. Abbasi, A.A. Busnaina
Fabrication of Organic Field Effect Transistors using Directed Assembled and Transfer Printed Carbon Nanotube Source/Drain Electrodes, Applied Physics Letters, 114(10), 2019, 103301

Z. Chai, J. Seo, S.A. Abbasi, A. Busnaina
Assembly of Highly Aligned Carbon Nanotubes Using an Electro-Fluidic Assembly Process, ACS Nano, 12(12), 2018, 12315-12323

SELECTED RESEARCH PROJECTS

Advanced Manufacturing Cluster for Smart Sensors and Materials
Principal Investigator, Massachusetts Technology Collaborative

Novel Nanoprinting for Wireless Chemical Gas sensors
Principal Investigator, NASA

Chun-An (Joe) Chou

Assistant Professor, Mechanical and Industrial Engineering

PhD, Rutgers University, 2011
coe.northeastern.edu/people/chou-chun

Scholarship focus: large-scale optimization, data mining, machine learning, healthcare analytics, computational neuroscience, decision support systems, complex systems

Honors and awards: Research Foundation for SUNY Collaboration Fund Award, 2013; Finalist of the INFORMS Data Mining Best Student Paper Award, 2011

SELECTED PUBLICATIONS

C.-A. Chou, Q. Cao, S.-J. Weng, C.-H. Tsai
Mixed-Integer Optimization Approach to Learning Association Rules for Unplanned ICU Transfer, Artificial Intelligence in Medicine, 13, 2020, 101806

W. Bomela, S. Wang, C.-A. Chou, Jr-S. Li
Real-Time Inference and Detection of Disruptive EEG Network for Epileptic Seizures, Nature Scientific Reports, 10, 2020, 8653

S. Qian, S.-C.Yen, E. Folmar, C.-A. Chou
Self-Expressive Subspace Learning to Recognize Motion Dynamics for Chronic Ankle Instability, IISE Transactions on Healthcare Systems Engineer-ing, 10(1), 2020, 60-73

M. Fan, C.-A. Chou
Detecting Abnormal Patterns of Epileptic Seizures Via Temporal Synchronization of EEG Signals, IEEE Transactions on Biomedical Engineering, 66(3), 2019, 601-608

S. Khanmohammadi, C.-A. Chou
Adaptive Seizure Onset Detection Framework Using a Hybrid PCA-CSP Approach, IEEE Journal of Biomedical and Health Informatics, 22(1), 2018, 154-160

F. Miaolin, A.C. Yang, J.-L. Fuh, C.-A. Chou
Topological Pattern Recognition of Severe Alzheimer's Disease Via Regularized Supervised Learning of EEG Complexity, Frontiers in Neuroscience, 12, 2018, 685

SELECTED RESEARCH PROJECTS

Decoding Multi-Modal Physiological Response Patterns for Assessing Post-Stroke Cognitive Impairment in VR-based Driving
Principal Investigator, Tufts CTSI

Data-Driven Method for Recognizing and Learning Dynamical Systems in Computational Neuroscience
Principal Investigator, Burroughs Wellcome Fund CRTG Program

Randall Erb

Associate Professor, Mechanical and Industrial Engineering

PhD, Duke University, 2009
coe.northeastern.edu/people/erb-randall

Scholarship focus: structure/property relationships in composites and ceramics, magnetic manipulation, colloidal physics

SELECTED PUBLICATIONS

A. Gurijala, R.B. Zando, J.L. Faust, J.R. Barber, L. Zhang, R.M. Erb
Castable and Printable Dielectric Composites Exhibiting High Thermal Conductivity via Percolation-Enabled Phonon Transport, Matter, 2(4), 2020, 1015-1024

J.L. Faust, G.A. Winter, M.L. Minus, R.M. Erb
Polypropylene Crystallization at an Alumina Interface Using Single Walled Carbon Nanotubes, Journal of Colloid and Interface Science, 543, 2019, 9-16

L. Li, R.M. Erb, J. Wang, J. Wang, Y.M. Chiang
Fabrication of Low-Tortuosity Ultrahigh-Area-Capacity Battery Electrodes Through Magnetic Alignment of Emulsion-Based Slurries, Advanced Energy Materials, 9(2), 2019, 1802472

R.M. Erb, J.J. Martin, R. Soheilian, C. Pan, J.R. Barber
Actuating Soft Matter with Magnetic Torque, Advanced Functional Materials, 26(22), 2016, 3859-3880

J.S. Sander, R.M. Erb, L. Li, A. Gurijala, Y.-M. Chiang
High-Performance Battery Electrodes via Magnetic Templating, Nature Energy, 1, 2016, 16099

J.J. Martin, B.E. Fiore, R.M. Erb
Designing Bioinspired Composite Reinforcement Architectures Via 3D Magnetic Printing, Nature Communications, 6, 2015, 8641

R.M. Erb, R.L. Libanori, N. Rothfuchs, A.R. Studart
Composites Reinforced in Three Dimensions by Using Low Magnetic Fields, Science, 335, 2012, 199-204

SELECTED RESEARCH PROJECTS

Battery Electrode Technologies
Principal Investigator, Rogers Corporation

Composite and Ceramic Manufacturing Technologies
Principal Investigator, Raytheon Corporation

SBIR - Ultralight Wearable Cooling Systems
Co-Principal Investigator, National Science Foundation

Özlem Ergun

Professor and Associate Chair for Graduate Affairs, Mechanical and Industrial Engineering; affiliated faculty appointment in: Electrical and Computer Engineering, Global Resilience Institute

PhD, Massachusetts Institute of Technology, 2001
coe.northeastern.edu/people/ergun-ozlem

Scholarship focus: design and management of large-scale networks, supply chain design and resilience, collaboration and crowdsourcing in logistics, humanitarian logistics

Honors and awards: National Science Foundation CAREER Award; Winner, EURO/INFORMS 2007 Management Science Strategic Innovation Prize

SELECTED PUBLICATIONS

R. Doroudi, P. Sequeira, S. Marsella, Ö. Ergun, R. Azghandi, D. Kaeli, et al.
Effects Of Trust-Based Decision Making in Disrupted Supply Chains, PLoS ONE 15(2), 2020, e0224761

J. Featherstone, Ö. Ergun, K. Fulton, W. Hopp, P. Keskinocak, B. Koon, A. Lippert, C. Philip, K. Smith, S. Mannan
Strengthening Post-Hurricane Supply Chain Resilience: Observations from Hurricanes Harvey, Irma, and Maria, The National Academies Press, 2020

L. Gui, A. Atasu, Ö. Ergun, B. Toktay
Design Incentives under Collective Extended Producer Responsibility: A Network Perspective, Management Science, 64(11), 2018, 4967-5460

A. Ulusan, Ö. Ergun
Restoration of Services in Disrupted Infrastructure Systems: A Network Science Approach, PLOS ONE, 13(2), 2018, e0192272

SELECTED RESEARCH PROJECTS

Food Aid Quality Review Phase III Program
Principal Investigator, subcontract from Tufts University's USAID grant

Future of Work: Understanding the Algorithmic Workplace: A Multi-Method Study for Comprehensive Optimization of Platforms
Co-Principal Investigator, National Science Foundation

Optimizing Routing for Same Day Delivery Operations with Crowdsourced Drivers
Principal Investigator, Deliv.com

RAPID: Rapid Monitoring and Assessment of Critical Pharmaceutical Supply Chains
Co-Principal Investigator, National Science Foundation

Nasser Fard

Associate Professor, Mechanical and Industrial Engineering

PhD, University of Arizona, 1982
coe.northeastern.edu/people/fard-nasser

Scholarship focus: systems reliability; accelerated life testing in reliability prediction; big data data-driven decision making in spatiotemporal streaming environment; life data (survival data) analysis; robust design of experiments

Honors and awards: American Statistical Association Natrella Scholarship Award; Outstanding Presentation Award from the Reliability and Maintainability Symposium; Associate Editor, IEEE Transactions on Reliability; Associate Editor, International Journal of Reliability, Quality and Safety Engineering; Certified Quality Engineer by American Society for Quality (#11909)

SELECTED PUBLICATIONS

H. Xu, Y. Fang, N. Fard
Optimal Design for Resilient Load-Sharing Systems with Nonidentical Components, Quality and Reliability Engineering International, 2018, 1-17

H. Xu, Y. Fang, N. Fard
Reliability Assessment of Repairable Load-Sharing k-out-of-n: G System with Flowgraph Model, IEEE Xplore, Annual Reliability and Maintainability Symposium (RAMS), 2018

Y. Fang, H. Xu, N. Fard
Time Series Chain Graph for Reliability Covariate Modelling, IEEE Xplore, Annual Reliability and Maintainability Symposium (RAMS), 2018

N. Fard, S. Davis
Statistical Method for Predicting Inpatient Bed Demand, Annual ISSAT International Conference on Reliability and Quality in Design, RQD, 2018

K. Sadeghzadeh, N. Fard
Analytical Clustering Procedures in Massive Failure Data, IEEE Xplore Annual Reliability and Maintainability Symposium (RAMS), 2017

N. Fard, H. Xu,Y. Fang
Reliability Assessment of Load-Sharing Systems by Flowgraph for Non-Identical Components with Time-Varying Repair Rates, International Conference on Computers and Industrial Engineering, CIE47, 2017

Y. Fang, H. Xu, N. Fard
Neural Network-WPCA Based Method for Multi-Objective Optimal Redundancy Allocation, International Journal of Reliability, Quality and Safety Engineering, 24(5), 2017, 1750024-1–1750024-22

Andrew Gouldstone

Professor and Associate Chair for Experiential Innovation, Mechanical and Industrial Engineering; affiliated faculty, Chemical Engineering; Director, Michael J and Ann Sherman Center for Engineering Entrepreneurship Education

PhD, Massachusetts Institute of Technology, 2001
coe.northeastern.edu/people/gouldstone-andrew

Scholarship focus: biomechanics; material science; engineering mechanics

Honors and awards: College of Engineering Faculty Fellow; National Science Foundation CAREER Award

SELECTED PUBLICATIONS

A. Gouldstone, B.M. Smyser
Comparing Patterns of Quantitative Literacy in Mechanical and Industrial Engineering Capstone Teams, The International Journal of Engineering Education, 35(6), 2019, 1918-1925

C.D. Smallwood, P. Boloori-Zadeh, M.R. Silva, A. Gouldstone
High Oxygen Concentrations Adversely Affect the Performance of Pulmonary Surfactant, Respiratory Care, 62(8), 2017, 1085-1090

N. Zhi, B.K. Jaeger, A. Gouldstone, R. Sipahi, S. Frank
Toward Monitoring Parkinson's Through Analysis of Static Handwriting Samples: A Quantitative Analytical Framework, IEEE Journal Of Biomedical and Health Informatics, 21(2), 2016, 488-495

G. Dwivedi, K. Flynn, M. Resnick, S. Sampath, A. Gouldstone
Bioinspired Hybrid Materials from Spray-Formed Ceramic Templates, Advanced Materials, 27(19), 2015, 3073-3078

M. Qu, A. Gouldstone
On The Role of Bubbles In Metallic Splat Nanopores and Adhesion, Journal of Thermal Spray Technology, 17(4), 2008, 486-494

SELECTED RESEARCH PROJECTS

Fundamentals of Bonding in Kinetic Consolidation Processes
Co-Principal Investigator, National Science Foundation

GARDE: An Interdisciplinary Approach to Accommodate Fine Motor Control Disorders
Co-Principal Investigator, National Science Foundation

Jackie Griffin

Associate Professor and Director, Industrial Engineering and Operations Research, Mechanical and Industrial Engineering

PhD, Georgia Institute of Technology, 2012
coe.northeastern.edu/people/griffin-jacqueline

Scholarship focus: health care resource allocation with multi-objective resource allocation models; modeling resiliency in complex systems; design and management of outpatient health care clinics; simulation: discrete event simulation and systems dynamics; deterministic and stochastic optimization

Honors and awards: Achievement Rewards for College Scientists Foundation; George Fellowship, Health Systems Institute, Georgia Institute of Technology

SELECTED PUBLICATIONS

V. Vahdat, J. Griffin, J.E. Stahl, C. Yang
Analysis of the Effects of EHR Implementation on Timeliness of Care in a Dermatology Clinic: A Simulation Study, Journal of the American Medical Informatics Association, 25(7),2018, 827–832

V. Vahdat, J. Griffin
Decreasing Patient Length of Stay via New Flexible Exam Room Allocation Policies in Ambulatory Care Clinics, Health Care Management Science, 2017, 1-25

V. Vahdat, J. Griffin, S. Burns, R. Azghandi
Proactive Patient Flow Redesign for Integration of Multiple Outpatient Clinics, Proceedings of 2017 Winter Simulation Conference (WSC), 2017, 2893-2904

SELECTED RESEARCH PROJECTS

CRISP Type 1: Multi-Agent Modeling Framework for Mitigating Distributed Disruptions in Critical Supply Chains
Principal Investigator, National Science Foundation

CRISP Type 2: Identification and Control of Uncertain, Highly Interdependent Processes Involving Humans with Applications to Resilient Emergency Health Response
Co-Principal Investigator, National Science Foundation

Design of New Orthopedic Clinics Via Simulation
Principal Investigator, Boston Children's Hospital

Improving Patient Flow in New Musculoskeletal Floor of the 'Brigham Building for the Future'
Principal Investigator, Brigham and Women's Hospital

Patient Flow Simulation Projects in Dermatology and Cardiology Clinics
Principal Investigator, Brigham and Women's Hospital

Surendra M. Gupta

Professor, Mechanical and Industrial Engineering

PhD, Purdue University, 1977
coe.northeastern.edu/people/gupta-surendra

Scholarship focus: green manufacturing; green supply chains; disassembly modeling; remanufacturing; reverse logistics; managing end of life products; environmentally conscious manufacturing; manufacturing sustainability; reverse and closed-loop supply chains; just-in-time (JIT) manufacturing and materials management; operations research: stochastic and simulation modeling

Honors and awards: Søren Buus Outstanding Research Award, College of Engineering; Best Dissertation Advisor National Award: American Society for Engineering Management; Distinguished Professor Award: IEOM Society International; Outstanding IE Professor Award

SELECTED PUBLICATIONS

Y. Kinoshita, T. Yamada, S.M. Gupta
Design of Disassembly-To-Order System for Reused Components and Recycled Materials using Linear Physical Programming, International Journal of Sustainable Manufacturing, 4(2-4), 2020, 121-149

G.M. Duman, E. Kongar, S.M. Gupta
Estimation of Electronic Waste using Optimized Multivariate Grey Models, Waste Management, 96(1), 2019, 241-249

A.D. Joshi, S.M. Gupta
Evaluation of Design Alternatives of End-of-Life Products using Internet of Things, International Journal of Production Economics, 208(1), 2019, 281-293

L. Zhou, S.M.Gupta
Marketing Research and Life Cycle Pricing Strategies for New and Remanufactured Products, Journal of Remanufacturing, 9(1), 2019, 29-50

A.Y. Alqahtani, S.M. Gupta
Warranty and Preventive Maintenance for Remanufactured Products-Modeling and Analysis, CRC Press, 2019, 340 Pages

A.Y. Alqahtani, S.M. Gupta
Warranty Cost Sharing Policies with Preventive Maintenance Strategy for Sensor Embedded Remanufactured Products, International Journal of Industrial and Systems Engineering, 31(3), 2019, 360-394

Babak Heydari

Associate Professor and Co-Program Director for Engineering Management, Mechanical and Industrial Engineering; affiliate faculty, School of Public Policy and Urban Affairs

PhD University of California, Berkeley, 2008
coe.northeastern.edu/people/heydari-babak

Scholarship focus: socio-technical systems, systems engineering and design, social and economic networks, resilience of networked systems, computational social sciences, platform-based systems, sharing economy systems, computational social sciences, game theory, artificial intelligence

Honors and awards: National Science Foundation CAREER Award, Wiley Systems Engineering Journal Best Paper Award, Chair-elect of Council of Engineering Systems Universities (CESUN), Member of the scientific advisory board of Future Resilient Systems (FRS)

SELECTED PUBLICATIONS

A.Ehsanfar, B. Heydari
An Incentive Compatible Scheme for Electricity Cooperatives: Axiomatic Approach, IEEE Transactions on Smart Grids, 9(2), 2018, 1416-1424

D.A. Gianetto, M. Mosleh, B. Heydari
Dynamic Structure of Competition Networks in Affordable Care Act Insurance Market, IEEE Access, 6, 2018, 12700-12709

B. Heydari, M.J. Pennock
Guiding the Behavior of Sociotechnical Systems: The Role of Agent-Based Modeling, Systems Engineering, 21(3), 2018, 210-226

W. Chen, B. Heydari, A.M. Maier, J.H. Panchal
Network-Based Modeling and Analysis in Design, Design Science, 2018, 4

M. Mosleh, B. Heydari
Fair Topologies: Community Structure and Network Hubs Drive Emergence of Fairness Norms, Scientic Reports, 2686(7), 2017

M. Mosleh, K. Dalili, B. Heydari
Distributed or Monolithic? A Computational Architecture Decision Framework, IEEE Systems Journal, 1(12), 2016, 125-136

M. Mosleh, P. Ludlow, B. Heydari
Distributed Resource Management in Systems of Systems: An Architecture Perspective, Systems Engineering, 19(4), 2016, 362-3740

B. Heydari, M. Mosleh, K. Dalili
From Modular to Distributed Open Architectures: A United Decision Framework, Systems Engineering, 19(3), 2016, 252-266

Carlos Hidrovo

Associate Professor, Mechanical and Industrial Engineering

PhD, Massachusetts Institute of Technology, 2001
coe.northeastern.edu/people/hidrovo-chavez-carlos

Scholarship focus: multiscale and multiphase flow and transport phenomena, surface tension interactions in micro/nanoengineered structures, and electrokinetic ion transport in porous media for applications in energy storage, portable biochemical diagnostics, thermal management, and water treatment systems

Honors and awards: National Science Foundation CAREER Award; Defense Advanced Research Projects Agency Young Faculty Award; American Society of Mechanical Engineers Robert T. Knapp Award

SELECTED PUBLICATIONS

Y. Salamat, C.H. Hidrovo
Significance of the Micropores Electro-Sorption Resistance and Non-Electrostatic Adsorption in Capacitive Deionization Systems, Water Research, 169, 2020, 115286

P. Tirandazi, C.H. Hidrovo
Study of Drag Reduction using Periodic Spanwise Grooves on Incompressible Viscous Laminar Flows, Physical Review Fluids, 5(6), 2020, 064102

P. Tirandazi, C.H. Hidrovo
An Integrated Gas-Liquid Droplet Microfluidic Platform for Digital Sampling and Detection of Airborne Targets, Sensors and Actuators B: Chemical, 267, 2018, 279-293

Y. Salamat, C.H. Hidrovo
A Parametric Study of Multiscale Transport Phenomena and Performance Characteristics of Capacitive Deionization Systems, Desalination, 438(7), 2018, 24-36

P. Tirandazi, C.H. Hidrovo
Liquid In-Gas Droplet Microfluids; Experimental Characterization of Droplet Morphology, Generation Frequency, and Monodispersity in a Flow-Focusing Microfluidic Device, Journal of Micromechanics and Microengineering, 27(7), 2017, 075020-9

SELECTED RESEARCH PROJECTS

Elucidating the True Role of Surface Microtexturing in Friction Reduction and Enhanced Convective Heat Transfer
Principal Investigator, National Science Foundation

Formation and Transport Dynamics of High Speed Gas Liquid Droplet Microfluidics
Principal Investigator, National Science Foundation

Jacqueline Isaacs

Interim Dean of the College of Engineering; Professor, Mechanical and Industrial Engineering; affiliated faculty appointment in: the School of Public Policy and Urban Affairs

PhD, Massachusetts Institute of Technology, 1991
coe.northeastern.edu/people/isaacs-jacqueline

Scholarship focus: economic-environmental assessment of materials processing towards sustainable design and manufacturing, ethical, societal and legal implications of nanomanufacturing, development and assessment of educational games for engineering students and for K-12 outreach activities

Honors and awards: National Science Foundation CAREER Award; ELATE Fellow; College of Engineering Excellence in Mentoring Award; Northeastern University Excellence in Teaching Award; Northeastern University Aspiration Award

SELECTED PUBLICATIONS

M.J. Eckelman, J.A. Isaacs, C.J. Bosso, J. Basl, K. Eggleson
Part 3 Engineering, Chapter 20: "Case Studies of Product Life Cycle Environmental Impacts for Teaching Engineering Ethics, Next-Generation Ethics: Engineering a Better Society, Editor, AE Abbas, Cambridge University Press, 474, 2019, 291-312

A.T. Namin, S. Kamarthi, M.J. Eckelman, J.A. Isaacs
Comparison of U.S. Manufacturing Locations for Solar PVs, Procedia CIRP, 80, 2019, 434-439, Part of Special Issue, 26th CIRP Life Cycle Engineering (LCE) Conference, West Lafayette, IN

S.A. Abbasi, A. Busnaina, J.A. Isaacs
Cumulative Energy Demand for Printing Nanoscale Electronics, Procedia CIRP (80) 2019, 298-303, Part of Special Issue, 26th CIRP Life Cycle Engineering (LCE) Conference, May 7-9, 2019, West Lafayette, IN

A.T. Namin, M.S. Jalali, V. Vahdat, H.S. Bedair, M.I. O'Connor, S. Kamarthi, J.A. Isaacs
The Adoption of New Medical Technologies: The Case of Customized Individually Made Knee Implants, Value of Health, 22(4), 2019, 423-430

SELECTED RESEARCH PROJECTS

Developing Integrative Manufacturing and Production Engineering Curricula That Leverage Data Science
Co- Principal Investigator, National Science Foundation

Safa Jamali

Assistant Professor, Mechanical and Industrial Engineering

PhD, Case Western Reserve University, 2015
coe.northeastern.edu/people/jamali-safa

Scholarship focus: microstructure-macroscopic properties relationship in complex fluids, with emphasis on rheology and physics of soft matter and structured fluids; colloidal suspensions; mesoscale computational science; non-Newtonian fluid mechanics; physics of living systems; hemorheology and hemodynamics

SELECTED PUBLICATIONS

S. Jamali, G.H. McKinley, R.C. Armstrong
Rheology, Microstructure and Heterogeneity in Thixotropic Elasto-Visco-Plastic Fluids, Physical Review Letters, 118, 2017, 048003

A. Boromand, S. Jamali, J. Maia
Structural Fingerprints of Yielding in Short-Ranged Attractive Colloidal Gels, Soft Matter, 13(2), 2017, 458-473

S. Liu, S. Jamali, J.-B. Baek, J. Maria, L. Dai
Solvent Induced Conformational Switching of Polymer Brush Functionalized Graphene Transistors, Macromolecules, 49(19), 2016, 7434-7441

S. Jamali, et al.
A Gaussian-Inspired Auxiliary Thermostat for Non-Equilibrium Dissipative Particle Dynamics Simulations, Computer Physics Communications, 197, 2015, 27-34

S. Jamali, et al.
Generalized Mapping of the Many-Body Dissipative Particle Dynamics Simulation Parameters onto Fluid Compressibility and the Flory-Huggins Theory, Journal of Chemical Physics, 142(16), 2015, 1-11

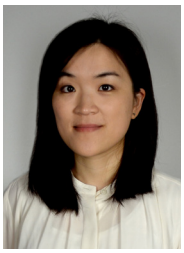
S. Jamali, et al.
Microstructure and Rheology of Soft to Rigid Shear-Thickening Colloidal Suspensions, Journal of Rheology, 59(6), 2015, 1377-1395

S. Khani, S. Jamali, A. Boromand, M. Hore, J. Maia
Polymer-Mediated Nanorod Self-Assembly Predicted by Dissipative Particle Dynamics Simulations, Soft Matter, 11(34), 2015, 6881-6892

S. Jamali, A. Boromand, J. Maia
Viscosity Measurement Techniques in Dissipative Particle Dynamics, Computer Physics Communications, 196, 2015, 149-160

S. Jamali, M. Yamanoi, J. Maia
Bridging the Gap Between Microstructure and Macroscopic Behavior of Monodisperse and Bimodal Colloidal Suspensions, Soft Matter, 9(5), 2013, 1506-1515

Xiaoning Jin



Assistant Professor, Mechanical and Industrial Engineering

PhD, University of Michigan, 2012
coe.northeastern.edu/people/jin-xiaoning

Scholarship focus: developing advanced models for prognostics and health management using physics-based models and data analytics; designing preventive strategies for manufacturing operations

SELECTED PUBLICATIONS

A. He, X. Jin
Failure Detection and Remaining Life Estimation for Ion Mill Etching Process Through Deep-Learning Based Multimodal Data Fusion, Journal of Manufacturing Science and Engineering 141(10), 2019

C. Chou, X. Jin, A. Mueller, S. Ostadabbas
Multimodal Data Fusion-Moving From Domain-Specific Algorithms to Transdomain Understanding for Accelerated Solution Development, IEEE Sensors Letters, 3(1), 2019, 1-4

S.M. Hassani, X. Jin, J. Ni
Physics-Based Gaussian Process for The Health Monitoring for A Rolling Bearing, Acta Astronautica, 154, 2019, 133-139

M. Xu, S.Radhakrishnan, S. Kamarthi, X. Jin
Resiliency of Mutualistic Supplier-Manufacturer Networks, Scientific Reports 9, 2019, 13559

X. Jin, H. Shui, M. Shpitalni
Virtual Sensing and Virtual Metrology for Spatial Error Monitoring of Roll-To-Roll Manufacturing Systems, CIRP Annals-Manufacturing Technology 68(1), 2019, 491-494

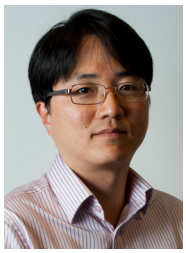
M. Xu, X. Jin, S. Kamarthi, Md. Noor-E-Alam
A Failure-Dependency Modeling and State Discretization Approach for Condition-Based Maintenance Optimization of Multi-Component Systems, Journal of Manufacturing Systems, 47, 2018, 141-152

H. Shui, X. Jin, J. Ni
Twofold Variation Propagation Modeling and Analysis for Roll-To-Roll Manufacturing Systems, IEEE Transactions on Automation Science and Engineering, 16(2), 2018, 599-612

SELECTED RESEARCH PROJECTS

Precision Alignment of Roll-to-Roll Printing Electronics
Principal Investigator, National Science Foundation

Yung Joon Jung



Professor, Mechanical and Industrial Engineering

PhD, Rensselaer Polytechnic Institute, 2003
coe.northeastern.edu/people/jung-yung-joon

Scholarship focus: synthesis of low dimensional nanomaterials and engineering their molecular structures; assembly, transfer and integration of nanomaterials and nanostructured architectures and study properties and underlying fundamental science; nanoelectronics, flexible devices, chemical sensors and energy application

SELECTED PUBLICATIONS

J. Hao, B. Li, H. Jung, S. Hong, Y. Jung, S. Kar
Vapor-Phase-Gating Induced Ultrasensitive Ion Detection in Graphene and Single-Walled Carbon Nanotube Networks, Advanced Materials, 2017, 1606883

S. Hong, T. Lundstrom, R. Ghosh, H. Abdi, J. Hao, S.K. Jeoung, P. Su, J. Suhr, A. Vaziri, N. Jalili, Y.J. Jung
Highly Anisotropic Adhesive Film Made from Upside-Down Flat and Uniform Vertically Aligned CNTs, ACS Applied Materials and Interfaces, 8, 2016, 34061

H. Jung, Y. Kim, J. Robinson, M. Zalalutdinov, S. Hong, J. Hao, KT. Wan, Y. Jung, B. Li, X. Wang
Printing Highly Controlled Suspended Carbon Nanotube Network on Micro-Patterned Superhydrophobic Surface, Scientific Reports, 5, 2015, 15908

B. Li, Y. He, S. Lei, S. Najmaei, Y. Gong, X. Wang, J. Zhang, L. Ma, Y. Yang, S. Hong, J. Hao, G. Shi, A. George, K. Keyshar, P. Dong, L. Ge, R. Vajtai, J. Lou, Y.J. Jung, P. Ajayan
Scalable Transfer of Suspended Two Dimensional Single Crystals, Nano Letters, 15(8), 2015, 5089-5097

H. Jung, S. Kar, J. Kong, M.S. Dresselhaus, Y.J. Jung, et al.
Sculpting Carbon Bonds: Allotropic Transformation Through Solid-State Re-Engineering of–sp^2 carbon, Nature Communications, 5, 2014, 4941

Y. Kim, H. Jung, S. Park, B. Li, F. Liu, J. Hao, Y.J. Jung, et al.
Voltage-switchable Photocurrents in Single-wall Carbon Nanotube – Silicon Junctions for Analogue and Digital optoelectronics, Nature Photonics, 8, 2014, 239-243

SELECTED RESEARCH PROJECTS

Developing Strong, High Thermal Resistant, and Light Weight Materials and their Processing for the High Performance Automotive Lighting System
Principal Investigator, Ministry of Industry, Korea

DMREF: Engineering Strong, Highly Conductive Nanotube Fibers Via Fusion
Principal Investigator, National Science Foundation

Sagar Kamarthi

Professor of Mechanical and Industrial Engineering, Founding Director of Data Analytics Engineering Program

PhD, Pennsylvania State University, 1994
coe.northeastern.edu/people/kamarthi-sagar

Scholarship focus: machine learning applications in smart and sustainable manufacturing; predictive analytics for smart and connected health; data driven approaches to mass customized instruction

Honors and awards: Northeastern University Excellence in Teaching Award, 2020; Distinguished Paper Award, 2019; Martin Essigman Outstanding Teaching Award, 2019

SELECTED PUBLICATIONS

A. Ozturk, R. Mohammadi, T.T. Pierce, S. Kamarathi, et al.
Diagnostic Accuracy of Shear-Wave Elastography as a Non-Invasive Biomarker of High-Risk Non-Alcoholic Steatohepatitis (NASH) in Patients with Non-Alcoholic Fatty Liver Disease (NAFLD), Ultrasound in Medicine & Biology, 46(4), 2020, 972-980

M.O. Mohammad Javad, S. Olusegun, K. Jethwani, A. Zeid, S. Kamarthi
A Reinforcement Learning–Based Method for Management of Type 1 Diabetes: Exploratory Study, JMIR Diabetes, 4(3), 2019, e12905

S. Radhakrishnana, Y.-T.T. Lee, S. Rachuric, S. Kamarthi
Complexity and Entropy Representation for Machine Component Diagnostics, PLOS ONE, 2019

A.J. Centi, M. Atif, S.B. Golas, R. Mohammadi, S. Kamarthi, S. Agboola, J.C. Kvedar, K. Jethwani
Factors Influencing Exercise Engagement When Using Activity Trackers, JMIR mHealth and uHealth, 7(10), 2019, e11603

M. Xu, S. Radhakrishnan, S. Kamarthi, X. Jin
Resiliency of Mutualistic Supplier Manufacturer Networks, Scientific Reports, 9(1), 2019, 13559

SELECTED RESEARCH PROJECTS

Integrative Manufacturing and Production Engineering Education Leveraging Data Science Program (IMPEL)
Principal Investigator, National Science Foundation

SCH: INT: Collaborative Research: Novel Computational Methods for Continuous Objective Multimodal Pain Assessment Sensing System (COMPASS)
Co-Principal Investigator, National Science Foundation

Laurent Lessard

Associate Professor, Mechanical and Industrial Engineering

PhD, Stanford University, 2011
coe.northeastern.edu/people/lessard-laurent

Scholarship focus: control theory, linear systems, optimization algorithms, machine learning

Honors and awards: Gerald Holdridge Teaching Excellence Award, UW-Madison, 2019; NSF CAREER award, 2018; AACC O. Hugo Schuck Best Paper Award, 2013

SELECTED PUBLICATIONS

A. Sundararajan, B. Van Scoy, L. Lessard
Analysis and Design of First-Order Distributed Optimization Algorithms Over Time-Varying Graphs, IEEE Transactions on Control of Network Systems, 2020, 1-1

B. Hu, P. Seiler, L. Lessard
Analysis of Biased Stochastic Gradient Descent Using Sequential Semidefinite Programs, Mathematical Programming, 2020, 1-26

L. Lessard, X. Zhang, X. Zhu
An Optimal Control Approach to Sequential Machine Teaching, International Conference on Artificial Intelligence and Statistics, 2019

B. Hu, L. Lessard
Dissipativity Theory for Nesterov's Accelerated Method, International Conference on Machine Learning, 2017

L. Lessard, B. Recht, A. Packard
Analysis and Design of Optimization Algorithms Via Integral Quadratic Constraints, SIAM Journal on Optimization, 2016

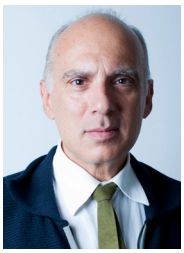
SELECTED RESEARCH PROJECTS

A Control-Theoretic Approach to Distributed Optimization
Principal Investigator, National Science Foundation

Analysis and Design of Decentralized Control Systems in the Presence of Uncertain Latency
Principal Investigator, National Science Foundation

CAREER: Automated Analysis and Design of Optimization Algorithms
Principal Investigator, National Science Foundation

Yiannis A. Levendis



COE Distinguished Professor, Mechanical and Industrial Engineering; affiliated faculty, Civil and Environmental Engineering

PhD, California Institute of Technology, 1987
coe.northeastern.edu/people/levendis-yiannis

Scholarship focus: gasification and combustion of solid fuels; generation and containment of combustion-generated pollution; synthesis and characterization of combustion-generated materials; fire suppression – fire extinction; engine design and operation

Honors and awards: Fellow, Combustion Institute; Fellow, American Society of Mechanical Engineers; Fellow, Society of Automotive Engineers; Fellow, Royal Society of Chemistry; Fellow National Academy of Inventors; Søren Buus Outstanding Research Award, College of Engineering; George Westinghouse Gold Medal, American Society of Mechanical Engineers; Percy Nicholls Award, jointly awarded by the American Society of Mechanical Engineers and the Society of Manufacturing Engineers, 2015; Elected to the Steering committee of the Greek Energy Forum, 2016; Elected Fellow of the Combustion Institute, 2018; Elected Fellow of the Royal Academy of Chemistry 2019; Elected Fellow of the National Academy of Inventors, 2019

SELECTED PUBLICATIONS

A. Panahi, N. Vorobiev, M. Schiemann, M. Tarakcioglu, M. Delichatsios ,Y.A. Levendis
Combustion Details of Raw and Torrefied Biomass Fuel Particles with Individually-Observed Size, Shape and Mass, Combustion and Flame, 207, 2019, 327-341

Z. Wang, S.C. Yelishala, G. Yu, H. Metghalchi, Y.A. Levendis
Effects of Carbon Dioxide on Laminar Burning Speed and Flame Instability of Methane/Air and Propane/Air Mixtures: A Literature Review, Energy and Fuels, 33, 2019, 9403-9418

A. Panahi, Z. Wei, G. Song, Y.A. Levendis
Influence of Stainless-Steel Catalyst Substrate Type and Pretreatment on Growing Carbon Nanotubes from Waste Postconsumer Plastics, Industrial & Engineering Chemistry Research, 58, 2019, 3009–3023

SELECTED RESEARCH PROJECTS

Containment of Greenhouse Gases Through use of Refrigerants that are based on Petroleum-derived Products and Recycled Carbon Dioxide
Principal Investigator, Funded by The American Chemical Society

Synthesis of Carbon Nanotubes from Waste Polymeric Materials using Various Catalysts
Principal Investigator, Canon Virginia Inc

Laura H. Lewis

Distinguished University and Cabot Professor of Chemical Engineering; jointly appointed, Mechanical and Industrial Engineering; George J. Kostas Research Institute for Homeland Security

PhD, University of Texas, 1993
coe.northeastern.edu/people/lewis-laura

Scholarship focus: structure-property relationships in magnetofunctional materials for energy transformations including advanced permanent magnet materials and magnetocaloric materials; strategic materials and supply chains for technological application

Honors and awards: Fulbright Scholar (2018, 2019); Fellow, American Physical Society; Northeastern University Excellence in Research and Creative Activity Award; Chair, Technical Committee of the IEEE Magnetics Society (2017-2019); Conference Editor, IEEE Transactions on Magnetics (2008-2018), NATO Technical Team Member of AVT-231 on "Scarcity of Rare Earth Materials for Electrical Power Systems;" U.S. Technical Advisory Group to ISO TC298, Rare Earth; International Advisory Committee of the Joint European Magnetics Symposia (JEMS)

SELECTED PUBLICATIONS

X. Zhang, B.T. Lejeune, R. Barua, R.W. McCallum, L.H. Lewis
Estimating the In-Operando Stabilities of $AlFe_2b_2$-Based Compounds for Magnetic Refrigeration, Journal of Alloys and Compounds, 2020, 153693

A. Adib, K.K. Afridi, M. Amirabadi, F. Fateh, M. Ferdowsi, B. Lehman, L.H. Lewis, B. Mirafzal, M. Saeedifard, M.B. Shadmand, P. Shamsi
E-Mobility–Advancements and Challenges, IEEE Access. 7, 2019, 165226-40

B.T. Lejeune, X. Du, R. Barua, J.C. Zhao, L.H. Lewis
Anisotropic Thermal Conductivity of Magnetocaloric $AlFe_2B_2$, Materialia, 1, 2018, 150-4

SELECTED RESEARCH PROJECTS

Lattice-Defective Copper Oxides as a Biocidal Tool for COVID-19 and Beyond
Principal Investigator, National Science Foundation RAPID

Sprayable Biocidal Coatings for Tactical Shelters
Co-Principal Investigator, Department of the Army

Thermal Management Investigations Into Device-Level Thermal Management with PCMs
Co-Principal Investigator, Raytheon Corporation and ONR

Yaning Li

Associate Professor, Mechanical and Industrial Engineering

PhD, University of Michigan, 2007
coe.northeastern.edu/people/li-yaning

Scholarship focus: mechanics of materials, bio-inspired engineering, and additive manufacturing; mechanics of innovative architectured materials; mechanical metamaterials; biological materials

Honors and awards: National Science Foundation CAREER Award, DOD/AFOSR/SFFP Faculty Fellowship; International Union of Theoretical and Applied Mechanics (IUTAM) Young Investigator Travel Award

SELECTED PUBLICATIONS

B. Hasseldine, C. Gao, Y. Li
Prediction of the Anisotropic Damage Evolution of Dry Common Millet (Panicum miliaceum) Seed Under Quasi-Static Blunt Indentation, Engineering Fracture Mechanics, 214, 2019, 112-122

Y. Jiang, Y. Li
3D Printed Hybrid Auxetic Metamaterial with Chiral Cells and Reentrant Cores, Scientific Reports, 8, 2018, 2397

C. Gao, B. Hasseldine, L. Li, J. Weaver, Y. Li
Amplifying Strength, Toughness, and Auxeticity via Wavy Sutural Tessellation in Plant Seedcoats, Advanced Materials, (Inside Back Cover), 2018, 1800579

L. Liu, Y. Li
Predicting the Mixed-Mode I/II Spatial Damage Propagation along 3D-Printed Soft Interfacial Layer via a Hyperelastic Softening Model, Journal of Mechanics and Physics of Solids, 116, 2018, 17-32

Y. Jiang, Y. Li
3D Printed Chiral Cellular Solids with Amplified Auxetic Effects Due to Elevated Internal Rotation, Advanced Engineering Materials, 19(2), 2017, 1-8

L. Liu, Y. Jiang, M.C. Boyce, C. Ortiz, J. Baur, J. Song, Y. Li
The Effects of Morphological Irregularity on the Mechanical Behavior of Interdigitated Biological Sutures, Journal of Biomechanics, 58, 2017, 71-78

SELECTED RESEARCH PROJECTS

A Bio-Inspired Strategy for In-Plane Energy Dissipation Through Suture Interfaces
Principal Investigator, National Science Foundation

Mechanics of A New Family of Auxetic Chiral Composites
Principal Investigator, National Science Foundation

Mechanics of Bio-Inspired CNT-Modified Hierarchical/Fractal Interfaces
Principal Investigator, Department of Defense/Air Force Office of Scientific Research

Yingzi Lin

Professor, Mechanical and Industrial Engineering; affiliated faculty appointed in: Bioengineering

PhD, University of Saskatchewan, 2004
coe.northeastern.edu/people/lin-yingzi

Scholarship focus: Human-machine systems, human factors, biosensing and smart systems, human state and behavior modeling, transportation safety, healthcare and patient safety, human friendly mechatronics and human-robot interaction

Honors and awards: National Science Foundation CAREER Award

SELECTED PUBLICATIONS

J. Du, Q. Zhu, Y. Shi, Q. Wang, Y. Lin, D. Zhao
Cognition-Digital Twins (Cog-DT) for Personalized Information Systems of Smart Cities – A Proof of Concept, ASCE Journal of Management in Engineering, 36(2), 2020

D. Schmidt, Y. Lin
Development Towards Simple Fabrication Steps for Flexible Optoelectronic Films, Thin Solid Films, 665, 2018, 59-67

X. Wanyan, D. Zhuang, Y. Lin, X. Xiao, J.-W. Song
Influence of Mental Workload on Detecting Information Varieties Revealed by Mismatch Negativity During Flight Simulation, International Journal of Industrial Ergonomics, 64, 2018, 1–7

B. Liang, Y. Lin
Using Physiological and Behavioral Measurements in a Picture-Based Road Hazard Perception Experiment to Classify Risky and Safe Drivers, Transportation Research Part F: Psychology and Behaviour, 58, 2018, 93-105

Y. Lin, J. Breugelmans, M. Iverson, D. Schmidt
An Adaptive Interface Design (AID) for Enhanced Computer Accessibility and Rehabilitation, International Journal of Human Computer Studies, 98, 2017, 14–23

SELECTED RESEARCH PROJECTS

Cognition-Driven Display for Navigation Activities (Cog DNA): Personalized Spatial Information System Based on Information Personality of Firefighters
Co-Investigator, National Institute of Standards and Technology

Computational Methods for Continuous Objective Multimodal Pain Assessment Sensing System (COMPASS)
Principal Investigator, National Science Foundation

Decoding Multi-Modal Physiological Response Patterns for Assessing Post-Stroke Cognitive Impairment in VR-based Driving
Co-Investigator, National Institutes of Health

Yang (Emily) Liu

Assistant Professor, Mechanical and Industrial Engineering

PhD, Columbia University, 2015
coe.northeastern.edu/people/liu-yang

Scholarship focus: multiscale/multiphysics computational modeling of complex materials and structures; computational mechanics; large scale impact and blast simulation; high performance computing

Honors and awards: Best Paper Award, U.S. National Congress on Computational Mechanics

SELECTED PUBLICATIONS

C. Rao, Y. Liu
Three-Dimensional Convolutional Neural Network (3D-CNN) for Heterogeneous Material Homogenization, Computational Materials Science, 184, 2020, 109850

Y. Jiang, Y. Liu
Effect of Dielectric Imperfections on the Electroactive Deformations of Polar Dielectric Elastomers, Journal of Applied Mechanics, 86(8), 2019, 081007

Y. Liu, W.C. Sun, Z. Yuan, J. Fish
A Nonlocal Multiscale Discrete-Continuum Model for Predicting Mechanical Behavior of Granular Materials, International Journal for Numerical Methods in Engineering, 106(2), 2016, 129-160

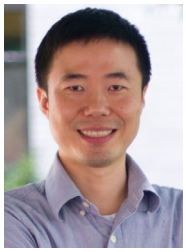
Y. Liu, W.C. Sun, J. Fish
Determining Material Parameters for Critical State Plasticity Models Based on Multilevel Extended Digital Database, ASME Journal of Applied Mechanics, 83(1), 2016, 011003

Y. Liu, V. Filonova, N. Hu, Z. Yuan, J. Fish, Z. Yuan, T. Belytschko
A Regularized Phenomenological Multiscale Damage Model, International Journal for Numerical Methods in Engineering, 99(12), 2014, 867-887

SELECTED RESEARCH PROJECTS

Machine-Learning-Enabled Bottom-Up Multiscale Computational Modeling of Ceramic Matrix Composites Under Extreme Conditions
Principal Investigator, Northeastern University

Yongmin Liu



Associate Professor, joint faculty appointment in Mechanical and Industrial Engineering and Electrical and Computer Engineering

PhD, University of California, Berkeley, 2009
coe.northeastern.edu/people/liu-yongmin

Scholarship focus: nano optics; nanoscale materials and engineering; nano devices; plasmonics; metamaterials; applied physics

Honors and awards: National Science Foundation CAREER Award, Office of Naval Research Young Investigator Award; SPIE Rising Researcher; 3M Non-Tenured Faculty Award, College of Engineering Faculty Fellow

SELECTED PUBLICATIONS

W. Ma, F. Cheng, Y.H. Xu, Q.L. Wen, Y.M. Liu
Probabilistic Representation and Inverse Design of Metamaterials Based on a Deep Generative Model with Semi-Supervised Learning Strategy, Advanced Materials 31, 2019, 1901111

W. Ma, F. Cheng, Y.M. Liu
Deep-Learning-Enabled On-Demand Design of Chiral Metamaterials, ACS Nano, 12(6), 2018, 6326–6334

H. Su, X. Shen, G. Su, L. Li, J. Ding, F. Liu, P. Zhan, Y. M. Liu, Z. Wang
Efficient Generation of Microwave Plasmonic Vortices via a Single Deep-Subwavelength Meta-Particle, Laser & Photonics Reviews, 12, 2018, 1800010

Z.J. Wang, L.Q. Jing, K. Yao, Y.H. Yang, B. Zheng, C.M. Soukoulis, H.S. Chen, Y.M. Liu
Origami-Based Reconfigurable Metamaterials for Tunable Chirality, Advanced Materials, 29, 2017, 1700412

Z.J. Wang, K. Yao, M. Chen, H. Chen, Y.M. Liu
Manipulating Smith-Purcell Emission with Babinet Metasurfaces, Physical Review Letters, 117(15), 2016, 157401

SELECTED RESEARCH PROJECTS

CAREER: Spin Plasmonics for Ultrafast All-Optical Manipulation of Magnetization in Hybrid Metal-Ferromagnet Structures
Principal Investigator, National Science Foundation

Chiroptical Sensing and Sorting by Structured Materials and Structured Light
Principal Investigator, National Science Foundation

Multi-Functional Optical Meta-Systems Enabled by Deep-Learning-Aided Inverse Design
Principal Investigator, National Science Foundation

Carol Livermore

Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering, Electrical and Computer Engineering

PhD, Harvard University, 1998
coe.northeastern.edu/people/livermore-clifford-carol

Scholarship focus: MEMS-enabled systems for assistive technologies, energy harvesting, and microscale vacuum applications; origami-enabled microfluidics and tissue engineering; carbon nanomaterials

Honors and awards: College of Engineering Faculty Fellow; National Science Foundation CAREER Award

SELECTED PUBLICATIONS

X. Xie, S. Maharjan, S. Liu, Y.S. Zhang, C. Livermore
A Modular, Reconfigurable Microfabricated Assembly Platform for Microfluidic Transport and Multitype Cell Culture and Drug Testing, Micromachines, 11(1), 2020, 2

X. Xie, M. Bigdeli Karimi, S. Liu, B. Myanganbayar, C. Livermore
Micro Motion Amplifiers for Compact Out-of-Plane Actuation, Micromachines, 9(7), 2018, 365

X. Xie, C. Kelly, T. Liu, R.J. Lang, S. Gandolfo, Y. Boukataya, C. Livermore
Origami-Enabled Microfluidics, Proceedings of the 2018 Hilton Head Solid State Sensors, Actuators, and Microsystems Workshop, 2018, 376-377

X. Xie, C. Livermore
Passively Self-Aligned Assembly of Compact Barrel Hinges for High-performance, Out-of-Plane MEMS Actuators, IEEE 30th International Conference on Micro Electro Mechanical Systems, 2017, 813-816

C. Yang, X. Xie, S. Liu, C. Livermore
Resealable, Ultra-Low Leak Micro Valve Using Liquid Surface Tension Sealing for Vacuum Applications, Proceedings of Transducers, 2017, 2071-2074

C. Yang, S. Liu, X. Xie, C. Livermore
Compact, Planar, Translational Piezoelectric Bimorph Actuator with Archimedes' Spiral Actuating Tethers, Journal of Micromechanics and Microengineering, 26(2), 2016, 124005

David Luzzi

Senior Vice Provost for Research
Vice President of the Innovation Campus at Burlington, MA; Senior Advisor to the President; Chairman of the Board, KRI at Northeastern University LLC; Professor, Mechanical and Industrial Engineering

PhD, Northwestern University, 1986
coe.northeastern.edu/people/luzzi-david

Scholarship focus: security, intelligence and resilience; corporate partnerships; intellectual property policy; technology readiness and transition; engineered materials; additive manufacturing; expeditionary cyber; cybersecurity; UAS swarms; workforce training and development

Honors and awards: Ellis Island Medal of Honor; Air Force Meritorious Civilian Service Medal; George Heilmeier Award for Research Innovation

SELECTED PUBLICATIONS

E. Abou-Hamad, Y. Kim, M. Bouhrara, Y. Saih, T. Wågberg, D.E. Luzzi, C. Goze-Bac
NMR Strategies to Study the Local Magnetic Properties of Carbon Nanotubes, Physics B: Condensed Matter, 407(4), 2012, 740-742

Y. Kim, E. Abou-Hamad, A. Rubio, T. Wågberg, AV Talyzin, D.E. Boesch, S. Aloni, A. Zettl, D. Luzzi, C. Goze-Bac
Communications: Nanomagnetic Shielding: High-Resolution NMR in Carbon Allotropes, The Journal of Chemical Physics, 132(2), 2010, 21102

E. Abou-Hamad, Y. Kim, T. Wågberg, D. Boesch, S. Aloni, A. Zettl, A. Rubio, D.E. Luzzi, C. Goze-Bac
Molecular Dynamics and Phase Transition in One-Dimensional Crystal of C60 Encapsulated Inside Single Wall Carbon Nanotubes, ACS Nano, 3(12), 2009, 3878-3883

E. Abou-Hamad, Y. Kim, A. Talyzin, C. Goze-Bac, D.E. Luzzi, C. Goze-Bac, A. Rubio, T. Wågberg
Hydrogenation of C60 in Peapods: Physical Chemistry in Nano Vessels, American Chemical Society, 113(2), 2009, 8583-8587

P. Jaroenapibal, Y. Jung, S.Evoy, D.E. Luzzi
Electromechanical Properties of Individual Single-Walled Carbon Nanotubes Grown on Focused-Ion-Beam Patterned Substrates, Ultramicroscopy, 109(2), 2009, 167-171

Kayse Lee Maass

Assistant Professor, Mechanical and Industrial Engineering

PhD, University of Michigan, 2017
coe.northeastern.edu/people/maass-kayse

Scholarship focus: stochastic optimization, network theory, facility location modeling, and supply chain design for applications regarding equity, access, human trafficking, mental health, and humanitarian logistics

Honors and awards: Industrial Engineering Professor of the Year, Global Conference on Human Trafficking and Trauma Best Research Abstract, "Rising Star" among INFORMS' Powerful, Pragmatic Pioneers, NSF Graduate Research Fellowship, INFORMS Judith Liebman Awards

SELECTED PUBLICATIONS

J.P. Caulkins, M. Kammer-Kerwick, R. Konrad, K.L. Maass, L. Martin, T. Sharkey
A Call to the Engineering Community to Address Human Trafficking, The Bridge, 49(3), 2019

K.L. Maass, A.R. Smith, E.L. Tucker, H. Schapiro, S.M. Cottrell, E. Gendron, P. Hill-Callahan, S.J. Gill, M.S. Daskin, R.M Merion, A.B. Leichtman
Comparison of Patient and Provider Goals, Expectations, and Experiences Following Kidney Transplantation, Patient Education and Counseling, 102(5), 2019, 990-1016

K.L. Maass, A. Trapp, R. Konrad
Optimizing Placement Of Residential Shelters For Human Trafficking Survivors, Socio-Economic Planning Sciences, 70, 2019

SELECTED RESEARCH PROJECTS

ISN2: Coordinated Interdiction for Disruption of Labor Trafficking in the Agricultural Sector
Principal Investigator, National Science Foundation

ISN2: Disrupting Human Trafficking via Needs Matching and Capacity Expansion
Co-Principal Investigator, National Science Foundation

EAGER: Modeling Operations of Human Trafficking Networks for Effective Interdiction
Co-Principal Investigator, National Science Foundation

EAGER: A Data Analytic Approach to Understanding Human Trafficking Networks
Co-Principal Investigator, National Science Foundation

Craig Maloney

Associate Professor, Mechanical and Industrial Engineering

PhD, University of California, Santa Barbara, 2005
coe.northeastern.edu/people/maloney-craig

Scholarship focus: modeling, simulation, and theory of nanoscale mechanics, soft matter, and glasses and amorphous materials

Honors and awards: National Science Foundation CAREER Award

SELECTED PUBLICATIONS

B. Tyukodi, D. Vandembroucq, C.E. Maloney
Avalanches, Thresholds, and Diffusion in Mesoscale Amorphous Plasticity, Physical Review E, 100, 2019 043003

A. Garg, A. Hasan, C.E. Maloney
Mesoscale Analysis of Homogeneous Dislocation Nucleation, Journal of Applied Mechanics, 86(9), 2019, 091005

B. Tyukodi, D. Vandembroucq, C.E. Maloney
Diffusion In Mesoscopic Lattice Models of Amorphous Plasticity, Physical Review Letters, 121, 2018, 145501

H. Abdi, R. Soheilian, R.M. Erb, C.E. Maloney
Paramagnetic Colloids: Chaotic Routes to Clusters and Molecules, Physical Review E, 97, 2018, 032601

Y. Wu, K. Karimi, C.E. Maloney, S. Teitel
Anomalous Stress Fluctuations in Athermal Two-Dimensional Amorphous Solids, Physical Review E, 96, 2017, 032902

SELECTED RESEARCH PROJECTS

CAREER: Plasticity and Jamming
Principal Investigator, National Science Foundation

CDSE: A Data-driven Statistical Approach to Aging and Elasticity in Colloidal Glasses
Principal Investigator, National Science Foundation

Jose Martinez Lorenzo

Associate Professor, Mechanical and Industrial Engineering; jointly appointed, Electrical and Computer Engineering

PhD, University of Vigo, 2005
coe.northeastern.edu/people/martinez-lorenzo-jose-angel

Scholarship focus: devices, circuits and sensing; antenna analysis, modeling, design, and optimization; subsurface scattering analysis; computational methods of electromagnetics; novel radar system specification and design; explosives detection

SELECTED PUBLICATIONS

A.Molaei, A. Bisulco, L. Tirado, A. Zhu, D. Cachay, A.G. Dagheyan, J.A. Martinez-Lorenzo
3D Printed E-Band Compressive Horn Antenna for High-Sensing-Capacity Imaging Applications, IEEE Antennas and Wireless Propagation Letters, 2018, 1

J.L. Crespo-Vázquez, C.J.C. Gonzalez, E. Diaz-Dorado, J.A. Martinez-Lorenzo, M. Noor-E-Alam
Evaluation of a Data Driven Stochastic Approach to Optimize the Participation of a Wind and Storage Power Plant in Day-Ahead and Reserve Markets, Energy 156(8), 2018, 278–291

A.G. Dagheyan, C. Liu, A. Molaei, J.H. Juesas, J. A. Martinez-Lorenzo
Holey-Cavity-Based Compressive Sensing for Ultrasound Imaging, Sensors, 18(6), 2018, 1674

J.H. Juesas, J.E. Thatcher, Y. Lu, J.J. Squiers, D. King W. Fan, J.M. DiMaio, J.A. Martinez-Lorenzo
Burn-Injured Tissue Detection for Debridement Surgery through Non-Invasive Optical Imaging Techniques, Biomed Opt Express, 9(4), 2018, 1809–1826

Y. Rodriguez-Vaqueiro, P. Paayam, R. Sipahi, J.A. Martinez-Lorenzo
Development of a Combined Time Frequency Technique for Accurate Extraction of pNN50 Metric from Noisy Heart Rate Measurements, International Journal of Intelligent Robotics and Applications, 2, 2018, 193–208

SELECTED RESEARCH PROJECTS

CAREER: 4D mm-Wave Compressive Sensing and Imaging at One Thousand Volumetric Frames per Second
Principal Investigator, National Science Foundation

Improved Millimeter Wave Radar AIT Characterization of Concealed Low-Contrast Body- Borne Threats
Co-Principal Investigator, Department of Homeland Security

Petrophysical Characterization and Dynamic Imaging of Flow Transport Using Coupled Multi-Physical-Field and Multi-Scale Sensing Models
Principal Investigator, Department of Homeland Security

Emanuel Melachrinoudis

Professor, Associate MIE Department Chair for Operations and Director of Industrial Engineering

PhD, University of Massachusetts, Amherst, 1980
coe.northeastern.edu/people/melachrinoudis-emanuel

Scholarship focus: deterministic operations research and multi-criteria optimization; facility location; supply chain, transportation and logistics; wireless sensor networks; and wildfire prediction and mitigation

Honors and awards: Outstanding Faculty Service Award, College of Engineering; University of Massachusetts Outstanding Alumni Award

SELECTED PUBLICATIONS

J. Santivanez, E. Melachrinoudis
Reliable Maximin-Maxisum Locations for Maximum Service Availability on Tree Networks Vulnerable to Disruptions, Annals of Operations Research, 286, 2020, 669-701

N. Zaarour, E. Melachrinoudis, S. Kapadia, H. Min
Determining the Optimal Collection Period for Returned Products in a Stochastic Environment, International Journal of Logistics Systems and Management, 33, 2019, 42-58

N. Zaarour, E. Melachrinoudis
What is in a Coefficient? The "Not so Simple" Interpretation of R2, for Relatively Small Sample Sizes, Journal of Education and Training Studies, 7, 2019, 27-40

R. Heydari, E. Melachrinoudis
A Path-Based Capacitated Network Flow Model for Empty Railcar Distribution, Annals of Operations Research, 253(2), 2017, 773-798

H. Min, E. Melachrinoudis
A Model-based Decision Support System for Solving Vehicle Routing and Driver Scheduling Problems under Hours of Service Regulations, International Journal of Logistics Research and Applications, 19, 2016, 256-277

M. Hajian, E. Melachrinoudis, P. Kubat
Modeling Wildfire Propagation Using the Stochastic Shortest Path Problem: A Network Size Reduction Methodology, Environmental Modeling and Software, 82, 2016, 73-88

N. Zaarour, E. Melachrinoudis, M. Solomon
Phase-out of Obsolete Inventory Items in Retail Stores, European Journal of Operational Research, 255, 2016, 133-141

E. Melachrinoudis, E. Yavuz, R. Heydari
An $O(m^2+mn^2)$ Algorithm for the Bi-objective Location Problem on a Network with Mixed Metrics
International Journal of Operational Research, 23, 2015, 427-450

Hameed Metchalchi

Professor, Mechanical and Industrial Engineering

ScD, Massachusetts Institute of Technology, 1980
coe.northeastern.edu/people/metghalchi-mohamad

Scholarship focus: fundamentals of combustion such as burning speed and onset of autoignition measurement and flame stability analysis; development of chemistry reduction such as rate-controlled constrained-equilibrium method; non-equilibrium thermodynamics

Honors and awards: American Society of Mechanical Engineers James H. Potter Gold Medal; American Society of Mechanical Engineers Edward Obert Award; American Society of Mechanical Engineers Dedicated Service Award; Editor in Chief, American Society of Mechanical Engineers Journal of Energy Resources Technology; Fellow, American Society of Mechanical Engineers

SELECTED PUBLICATIONS

S. Yelishala, Z. Wang, H. Metghalchi, Y. Levendis, K. Kannaiyan, R. Sadr
Effect of Carbon Dioxide on the Laminar Burning Speed of Propane-Air Mixtures, ASME Journal of Energy Resources Technology, 141, 2019, 082205-1

Z. Bai, Z. Wang, G. Yu, Y. Yang, H. Metghalchi
Experimental Study of Laminar Burning Speed for Premixed Biomass/Air Flame, ASME Journal of Energy Resources Technology, 141, 2019, 022206-1

Z. Wang, Z. Bai, G. Yu, S. Yelishala, H. Metghalchi
The Critical Pressure at the Onset of Flame Instability of Syngas/Air/Diluent Outwardly Expanding Flame at Different Initial Temperatures and Pressures, ASME Journal of Energy Resources Technology, 141, 2019, 082207-1

G. Yu, Y. Zhang, Z. Wang, Z. Bai, H. Metghalchi
The Rate-Controlled Constrained-Equilibrium Combustion Modeling of n-butane/Oxygen/Diluent Mixtures, Fuel, 239, 2019, 786-793

SELECTED RESEARCH PROJECTS

Combustion of GTL Fuel
Principal Investigator, Qatar Foundation

LSAMP Research Project
Principal Investigator, National Science Foundation

Marilyn Minus

Professor and Chair, Mechanical and Industrial Engineering

PhD, Georgia Institute of Technology, 2008
coe.northeastern.edu/people/minus-marilyn

Scholarship focus: process-structure-properties relationships in polymer-based nano-composites fibers; polymer/nano-carbon interfacial interactions and interphase formations; lightweight composite materials; carbon-carbon composites

Honors and awards: National Science Foundation CAREER Award; Georgia Tech Outstanding Young Alumni Award

SELECTED PUBLICATIONS

B. Tin, H. Pan, H. Li, M.L. Minus, B.M. Budhlall, M.J. Sobkowicz
Improving Charge Carrier Mobility of Polymer Blend Field Effect Transistors with Majority Insulating Polymer Phase, The Journal of Physical Chemistry C, 122, 2018, 2918-2930

N. Tajaddod, H. Li, M.L. Minus
Low-Temperature Graphitic Formation Promoted by Confined Interphase Structures in Polyacrylonitrile/Carbon Nanotube Materials, Polymer, 137 2018, 346-357

J. Song, C. Chen, S. Zhu, M. Zhu, J. Dai, U. Ray, Y. Li, Y. Kuang, Y. Li, N. Quispe, M.L. Minus, et al.
Processing Bulk Natural Wood into a High-Performance Structural Material, Nature, 554, 2018, 224-228

H. Li, M.L. Minus
On the Formation of Potential Polymer-Nanotube Blends by Liquid-Solid Phase Separation Polymer, Polymer, 131, 2017, 179-192

SELECTED RESEARCH PROJECTS

Forming True Blend: Developing New Processing Routes for Polymer-Based Nano-Composites
Principal Investigator, Air Force Office of Scientific Research

S-STEM: Student-Pathways Opening World Energy Resources (S-POWER)
Co-Principal Investigator, National Science Foundation

Mohsen Moghaddam

Assistant Professor, Mechanical and Industrial Engineering

PhD, Purdue University, 2016
coe.northeastern.edu/people/moghaddam-mohsen

Scholarship focus: cyber-physical manufacturing, human-machine collaboration, user-centered design, artificial intelligence, machine learning

SELECTED PUBLICATIONS

M. Moghaddam, Q. Chen, A.V. Deshmukh
A Neuro-Inspired Computational Model for Adaptive Fault Diagnosis, Expert Systems with Applications, 140, 2020 112879

A. Zeid, S. Sundaram, M. Moghaddam, S. Kamarthi, T. Marion
Interoperability in Smart Manufacturing: Research Challenges, Machines, 7(2), 2019, 21

M. Moghaddam, A.V. Deshmukh
Resilience of Cyber-Physical Manufacturing Control Systems, Manufacturing Letters, 20, 2019, 40-44

M. Moghaddam, M.N. Cadavid, C.R. Kenley, A.V. Deshmukh
Reference Architectures for Smart Manufacturing: A Critical Review, Journal of Manufacturing Systems, 49, 2018, 215-225

M. Moghaddam, S.Y. Nof
Collaborative Service-Component Integration in Cloud Manufacturing, International Journal of Production Research, 56(1-2), 2017, 677-691

M. Moghaddam, S.Y. Nof
Best Matching Theory & Applications, Springer International Publishing, 2017

S.Y. Nof, J. Ceroni, W. Jeong, M. Moghaddam
Revolutionizing Collaboration through e-Work, e-Business, e-Service, Springer-Verlag, Berlin Heidelberg, 2015

SELECTED RESEARCH PROJECTS

Cognitive On-Demand Design Advisor
Co-Principal Investigator, Digital Manufacturing and Design Innovation Institute

Developing Integrative Manufacturing and Production Engineering Curricula That Leverage Data Science
Co-Principal Investigator, National Science Foundation

Sinan Müftü

Associate Dean for Faculty Affairs; Professor, Mechanical and Industrial Engineering; affiliated faculty, Civil and Environmental Engineering

PhD, University of Rochester, 1994
coe.northeastern.edu/people/muftu-sinan

Scholarship focus: cold-spray additive manufacturing; high velocity impact of micron scale particles; mechanics and tribology of axially moving materials; numerical simulation of tissue healing and bone remodeling

Honors and awards: Fellow, American Society of Mechanical Engineers; Søren Buus Outstanding Research Award, College of Engineering; Martin W. Essigman Outstanding Teaching Award, College of Engineering

SELECTED PUBLICATIONS

S. Irandoust, S. Müftü
The Interplay Between Bone Healing and Remodeling Around Dental Implants, Scientific Reports, 10, 2020,4335

J. Sun, R. Ran, S. Müftü, A.Z. Gu, K.-T. Wan
The Mechanistic Aspects of Microbial Transport in Porous Media, Colloids And Surfaces A, 603, 2020, 125169

E. Lin, I. Nault, O.C. Ozdemir, V.K. Champagne, Jr., A. Nardi, S. Müftü
Thermo-Mechanical Deformation History and the Residual Stress Distribution in Cold Spray, Journal of Thermal Spray Technology, 2020

E. Lin, Q. Chen, O.C. Ozdemir, V.K. Champagne, S. Müftü
Effects of Interface Bonding on the Residual Stresses in Cold-Sprayed Al-6061: A Numerical Investigation, Journal of Thermal Spray Technology, 28, 2019, 472-483

SELECTED RESEARCH PROJECTS

Additive Manufacturing and Advanced Materials Processing
Technical Point of Contact, Army Research Laboratory

Advancing Additive Repair Technologies and Cold Spray for Sustainment of Maritime Assets
Technical Point of Contact, NAVSEA

Collaborative Research: High-Strain-Rate Dynamics of Copolymer Microparticles for Advanced Additive Manufacturing
Principal Investigator, National Science Foundation

Collaborative Research: Mechanics of Fusion of Dissimilar Lipid Bilayers and Multi-Lamellar Vesicles
Co-Principal Investigator, National Science Foundation

Engineered Materials and Materials Design of Engineered Materials (EMMDEM)
Technical Point of Contact, Army Research Laboratory

Hamid Nayeb-Hasemi

Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering

PhD, Massachusetts Institute of Technology, 1982
coe.northeastern.edu/people/nayeb-hashemi-hamid

Scholarship focus: biomechanics and mechanics

Honors and awards: Fellow, American Society of Mechanical Engineers

SELECTED PUBLICATIONS

A.D. Orsi, P.K. Canavan, A. Vaziri, R. Goebel, O.A. Kapasi
H. Nayeb-Hashemi
The Effects of Graft Size and Insertion Site Location During Anterior Cruciate Ligament Reconstruction on Intercondylar Notch Impingement, The Knee, 24, 2017, 525-535

G. Liu, R. Ghosh, A. Vaziri, A. Hossieni, H. Bahloo
H. Nayeb-Hashemi
Biomimetic Composite Inspired by Venous Leaf, Journal Of Composite Materials, 2017, 1-12

Y. Zheng, H. Bahloo, D. Mousanezhad, A. Vaziri,
H. Nayeb-Hashemi
Displacement and Stress Fields in a Functionally Graded Fiber-Reinforced Rotating Disk with Nonuniform Thickness and Variable Angular Velocity, Journal of Engineering Materials and Technology, Transaction of the ASME, 2017, 139, 1-10

H. Abdi, J. Papadopoulos, H. Nayeb-Hashemi, A. Vaziri
Enhanced Elastic-Foundation Analysis of Balanced Single Lap Adhesive Joints, International Journal of Adhesion& Adhesive, 2, 2017, 80-91

G. Liu, R. Ghosh, D. Mousanezhad, A. Vaziri,
H. Nayeb-Hashemi
Thermal Conductivity of Biomimetic Leaf Composite, Journal Of Composite Materials, 2017, 1-10

SELECTED RESEARCH PROJECTS

High-Performance Biodegradable Composites from Qatari Date Palm Waste
Principal Investigator, National Priorities Research Program

Knee Injury Prevention and Osteoarthritis Risk in Obesity
Co-Principal Investigator, National Priorities Research Program

Novel Multi Functional Composite Sandwich Panel
Principal Investigator, National Priorities Research Program

Vinod Sahney

University Distinguished Professor, Mechanical and Industrial Engineering

PhD, University of Wisconsin, Madison, 1970
coe.northeastern.edu/people/sahney-vinod

Scholarship focus: health care initiatives; industrial engineering; operations research

Honors and awards: Member, Institute of Medicine, National Academy of Science; Member, National Academy of Engineering; Fellow, Health Care Information and Management Systems Society; Fellow, Institute of Industrial Engineers; Gilbreth Award for Lifetime Contribution to Industrial Engineering; Institute for Industrial and Systems Engineering; Atrius Health Care, Boston, MA Board of Directors; Syntel Inc., Board of Directors; SCL Health System, Denver, Board of Directors; Brigham and Women's Hospital, Boston, MA, Patient Safety Research Center, Advisory Board

SELECTED PUBLICATIONS

A. Zeid, S. Kamarthi, V.K. Sahney
Research Issues in Patient Centric Healthcare, International Journal of Collaborative Enterprise, 4(1/2), 2014, 1-135

V.K. Sahney
Managing Implementation: The Unanswered Question, Frontiers of Health Services Management, 20(3), 2004, 29-36

V.K. Sahney
Generating Management Research on Improving Quality, Health Care Management Review, 2(4), 2003, 335-347

J.R. Griffith, V. Sahney, R.A. Mohr
Re-Engineering Health Care: Building on CQI, Health Administration Press, Ann Arbor, MI, 1995

Sandra Shefelbine

Professor, Mechanical and Industrial Engineering; joint faculty, Bioengineering

PhD, Stanford University, 2002
coe.northeastern.edu/people/shefelbine-sandra

Scholarship focus: multi-scale bone biomechanics–how the structure and composition of bone influences its mechanical properties; mechano-adaptation of bone and joint– how tissue responds to mechanical signals

SELECTED PUBLICATIONS

B.K. Connizzo, J.M. Piet, S.J. Shefelbine, A.J. Grodzinsky
Age-Associated Changes in the Response of Tendon Explants to Stress Deprivation is Sex-Dependent, Connective Tissue Research, 61(1), 2020, 48-6

R.P. Main, S.J. Shefelbine, L.B. Meakin, M.J. Silva, M.C.H van der Meulen, B.M. Willie
Murine Axial Compression Tibial Loading Model to Study Bone Mechanobiology: Implementing the Model and Reporting Results, Journal of Orthopaedic Research, 38, 2020, 233–252

B. Depalle, C.M. McGilvery, S. Nobakhti, N. Aldegaither, S.J. Shefelbine, A.E. Porter
Osteopontin Regulates Type I Collagen Fibril Formation In Bone Tissue, Acta Biomaterialia, 2020

S.M. Sadeghian, C.L. Lewis, S.J. Shefelbine
Predicting Growth Plate Orientation with Altered Hip Loading: Potential Cause of Cam Morphology, Biomech Model Mechanobiol, 19(2), 2020, 701-712

V. Kondiboyina, L.B. Raine, A.F. Kramer, N.A. Khan, C.H. Hillman, S.J. Shefelbine
Skeletal Effects of Nine Months of Physical Activity in Obese and Healthy-Weight Children, Medicine and Science in Sports and Exercise, 52(2), 2020, 434-440

A.E. Draghici, J.A. Taylor, M.L. Bouxsein, S.J. Shefelbine
Effects of FES-Rowing Exercise on the Time-Dependent Changes in Bone Microarchitecture After Spinal Cord Injury: A Cross-Sectional Inves-tigation, JBMR Plus, 3(9), 2019, e10200

J. Piet, D. Hu, Q. Meslier, R. Baron, S.J. Shefelbine
Increased Cellular Presence After Sciatic Neurectomy Improves the Bone Mechano-adaptive Response in Aged Mice, Calcified Tissue International, 105(3), 2019, 316–330

SELECTED RESEARCH PROJECTS

Manipulating Fluid Flow in Mechanoadaptation of Bone
Principal Investigator, National Science Foundation

Mechanobiology of Joint Morphogenesis: Manipulating Salamander Limbs
Principal Investigator, National Science Foundation

Hanumant Singh

Professor and Program Director MS Robotics, Electrical and Computer Engineering; jointly appointed, Mechanical and Industrial Engineering

PhD, Massachusetts Institute of Technology, 1995
coe.northeastern.edu/people/singh-hanumant

Scholarship focus: robotic sensors, systems, platforms, and algorithms including high resolution optical and acoustic sensing; underwater vehicles (AUV, ROV, towed and manned vehicles), unmanned surface vehicles, and unmanned aerial systems; system architectures for navigation, docking and power; and the interactions between these subsystems

SELECTED PUBLICATIONS

C. Murphy, J. Walls, T. Schneider, H. Singh, et al.
CAPTURE: A Communications Architecture for Progressive Transmission via Underwater Relays with Eavesdropping, IEEE Journal of Oceanic Engineering, 39(1), 2014, 1-13

H. Singh, W. Freeman, et al.
Camouflaging an Object from Many Viewpoints, Proceedings of the 2014 Computer Vision and Pattern Recognition Conference, 1-8

K.E. Smith, H. Singh, et al.
Discovery of a Recent, Natural Whale Fall on the Continental Slope Off Anvers Island, Western Antarctic Peninsula, Deep Sea Research Part I: Oceanographic Research Papers, 90, 2014, 76-80

G. Williams, J. Wilkinson, T. Maksym, H. Singh, C. Kunz, et al.
Mapping Ice Thickness and Extreme Deformation of Antarctic Sea Ice from an Autonomous Underwater Vehicle, Nature Geoscience, 8, 2014, 61-67

M. Yi Cheung, J. Leighton, U. Mitra, H. Singh, F.S. Hover
Performance of Bandit Methods in Acoustic Relay Positioning, Proceedings of the 2014 Automatic Control Conference, 2014, 4708-4714

C. Kunz, H. Singh
Map Building Fusing Acoustic and Visual Information Using Autonomous Underwater Vehicles, Journal of Field Robotics, 30(5), 2013, 1556-4967

H. Singh, K. Nakamura, M. Jakobssen, T. Shank, et al.
Effusive and Explosive Volcanism on the Ultraslow-Spreading Gakkel Ridge, 85° E, Geochemistry, Geophysics, Geosystems, 13(10), 2012

Rifat Sipahi

Professor and Associate Chair for UG Affairs and Program Director MS Robotics, Mechanical and Industrial Engineering

PhD, University of Connecticut, 2005
coe.northeastern.edu/people/sipahi-rifat

Scholarship focus: control systems and mechatronics; stability analysis and control synthesis of dynamical systems with delays; interplay between stability, delays, and graphs; control-systems-aided human-machine systems; engineering education research; disability research; systems biology

Honors and awards: Outstanding Young Investigator, Dynamic Systems and Control Division/American Society of Mechanical Engineers; College of Engineering Faculty Fellow; Defense Advanced Research Projects Agency Young Faculty Award; Fellow, American Society of Mechanical Engineers; Senior Member, Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS

A. Ramirez, M. Koh, R. Sipahi
An Approach to Compute and Design the Delay Margin of a Large-Scale Matrix Delay Equation, International Journal of Robust and Nonlinear Control, 29(4), 2019, 1101-1121

A. Ramirez, R. Sipahi, S. Mondie, R. Garrido
Fast Consensus in a Large-Scale Multi-Agent System with Directed Graphs Using Time-Delayed Measurements, Philosophical Transactions A, 377, 2019, 20180130

G.K.H Zupanc, F.B. Zupanc, R. Sipahi
Stochastic Cellular Automata Model of Tumorous Neurosphere Growth: Roles of Developmental Maturity and Cell Death, Journal of Theoretical Biology, 467, 2019, 100-110

A. Ramirez, R. Sipahi
Multiple Intentional Delays Can Facilitate Fast Consensus and Noise Reduction in a Multi-Agent System, IEEE Transactions on Cybernetics, 49(4), 2019, 1224-1235

A. Ramirez, R. Sipahi
Single-Delay and Multiple-Delay Proportional-Retarded Protocols for Fast Consensus in a Large-Scale Network, IEEE Transactions on Automatic Control, 64(5), 2019, 2142-2149

SELECTED RESEARCH PROJECTS

Graph-Based Control Design for Network Dynamics with Time Delays
Principal Investigator, National Science Foundation

A Three-Dimensional Model of Spinal Cord Growth and Repair in a Regeneration-Competent Organism
Co-Principal Investigator, National Science Foundation

Hongwei Sun

Professor, Mechanical and Industrial Engineering

PhD, Institute of Engineering Thermophysics, Chinese Academy of Sciences, 1998
coe.northeastern.edu/people/sun-hongwei

Scholarship focus: multiphase thermal transport phenomena, acoustic wave bio and chemical sensors and actuators, thermal management of fibers and films, thermal energy storage materials and processing, microchannel cooling systems, nanoimprinting process and applications, MEMS/NEMS fabrication, microfluidics and bioMEMS; nanoscale magnetic assembly and applications

Honors and awards: 2017 ASME International Conference on Nanochannels, Minichannels and Microchannels (ICNMM) Best Poster Award; UML Entrepreneurial Faculty Award

SELECTED PUBLICATIONS

K. Zheng, J. Zhang, H. Dodiuk, S. Kenig, C. Barry, H. Sun, J. Mead
Effect of Superhydrophobic Composite Coatings on Drag Reduction in Laminar Flow, ACS Appl. Polym. Mater, 2(4), 2020, 1614–1622

J. Su, H. Esmaeilzadeh, P. Wang, S. Ji, M. Inalpolat, M. Charmchi, H. Sun
Effect of Wetting States on Frequency Response of a Micropillar-based Quartz Crystal Microbalance, Sensors and Actuators A: Physical, 286, 2019, 115-122

J. Su, H. Esmailzadeh, F. Zhang, Q. Yu, G. Cernigliaro, J. Xu, H. Sun
An Ultrasensitive Micropillar-based Quartz Crystal Microbalance Device for Real-time Measurement of Protein Immobilization and Protein-protein Interaction, Biosensors and Bioelectronics (Impact Factor: 7.47), 2018, 325-331

I. Mirzaee, M. Song, M. Charmchi, H. Sun
Microfluidics Based On-Chip Impinger for Airborne Particle Collection, Lab on a Chip (Impact Factor: 5.586), 16(12), 2016

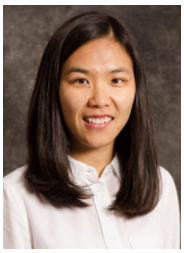
SELECTED RESEARCH PROJECTS

Collaborative Research: A Low-Cost, "Digital" Biosensing Platform with Single Protein Biomarker Sensitivity
Principal Investigator, National Science Foundation

Nanoscale Metal Network Enhanced Phase Change Materials
Principal Investigator, National Science Foundation

Thermal Management of Fibers and Films- Smart Textile Platforms for Heating, Cooling and Signature
Principal Investigator, U.S. Army

Xiaoyu Tang



Assistant Professor, Mechanical and Industrial Engineering
(Joining Janurary 2021)

PhD, Princeton University, 2018
coe.northeastern.edu/people/tang-xiaoyu

Scholarship focus: fluid mechanics, soft matter, microfluidics, active colloidal systems, electrokinetic flow, interfacial phenomena, complex fluids, reactive flow, biological flow; additive manufacturing, material synthesis and processing in flow, oil/gas recovery and remediation

Honors and awards: Summerfield Fellowship, Princeton University

SELECTED PUBLICATIONS

X. Tang, A. Saha, C. Sun, C. K. Law
Spreading and Oscillation Dynamics of Drop Impacting Liquid Film, Journal of Fluid Mechanics, 881, 2019, 859-871

A. Saha, Y. Wei, X. Tang, C. K. Law
Kinematics of Vortex Ring Generated by a Drop Upon Impacting a Liquid Pool, Journal of Fluid Mechanics, 875, 2019, 842-853

X. Tang, A. Saha, C. K. Law, C. Sun
Bouncing Drop on Liquid Film: Dynamics of Interfacial Gas Layer, Physics of Fluids, 31(1), 2019, 013304

X. Tang, A. Saha, C. K. Law, C. Sun
Effect of Viscosity on the Drop Impact on Liquid Film, Langmuir, 34(8), 2018, 2654-2662

X. Tang, A. Saha, C. K. Law, C. Sun
Nonmonotonic Response of Drop Impacting on Liquid Film: Mechanism And Scaling, Soft Matter, 12(20), 2016, 4521-4529

Z. Li, F. Fang, X. Tang, N. Cai
Effect of Temperature on the Carbonation Reaction of Cao With CO2, Energy Fuels, 26(4), 2012, 2473-2482

X. Tang, Z. Li, F. Fang, N. Cai, H. Yang
AFM Investigation of the Morphology of $CaSO_4$ Product Layer Formed during Direct Sulfation on Polished Single-Crystal $CaCO_3$ Surfaces at High CO_2 Concentrations, Proceedings of the Combustion Institute, 33(2), 2011, 2683-2689

Mohammad E. Taslim

Professor and Program Director for Energy Systems, Mechanical and Industrial Engineering

PhD, University of Arizona, 1981
coe.northeastern.edu/people/taslim-mohammad

Scholarship focus: experimental and numerical research in gas turbine cooling technology, solar and wind energy, non-newtonian liquid droplet interactions with hydrophobic surfaces, nano-sensors

Honors and awards: Fellow, American Society of Mechanical Engineers; Associate Fellow, American Institute of Aeronautics and Astronautics; Member, IGTI Heat Transfer Committee

SELECTED PUBLICATIONS

F. Xue, M.E. Taslim
Detailed Flow Analyses through Crossover Holes Between Two Adjacent Rib-Roughened Cooling Channels and the Resulting Impingement Heat Transfer, Journal of Turbomachinery, 141(5), 2019, 051003-1-9

F. Xue, M.E. Taslim
Flow and Heat Transfer in a Rib-Roughened Trailing-Edge Cooling Channel with Crossover Impingement, International Journal of Gas Turbine, Propulsion and Power Systems, 10(1), 2019, 1-11

Z. Borzooeian, M.E. Taslim, O. Ghasemi, S. Rezvani, G. Borzooeian
A High Precision Length-Based Carbon Nanotube Ladder, RSC Advances, 8, 2018, 36049–36055

Z. Borzooeian, M.E. Taslim, O. Ghasemi, S. Rezvani, G. Borzooeian, A. Nourbakhsh
A High Precision Method for Length-Based Separation of Carbon Nanotubes Using Bio-Conjugation, SDS-PAGE and Silver Staining, PLOS one Journal, 13(6), 2018

X. Huang, K.T. Wan, M.E. Taslim
Axisymmetric Rim Instability of Water Droplet Impact on a Super-Hydrophobic Surface, Physics of Fluids, 30, 2018, 094101

SELECTED RESEARCH PROJECTS

Experimental and Numerical Heat Transfer Related to the Cooling of Gas Turbine Hot Sections
Principal Investigator, General Electric Aviation

Experimental/Numerical Study of Droplet Impact of Newtonian as Well as Non-Newtonian Fluids on Super Hydrophobic Surfaces
Co-Principal Investigator, American Chemical Society

Rheological Characterization of Airborne Droplets of Petro-Hydrocarbon Liquids using Ultrasonic Resonance
Co-Principal Investigator, American Chemical Society

Moneesh Upmanyu

Professor, Mechanical and Industrial Engineering

PhD, University of Michigan, 2001
coe.northeastern.edu/people/upmanyu-moneesh

Scholarship focus: computational techniques that span multiple scales, atomic-to continuum, to quantify the structure property relations in established and emerging material systems, both in technology and nature

SELECTED PUBLICATIONS

P. Waduge, J. Larkin, M. Upmanyu, S. Kar, M. Wanunu
Programmed Synthesis of Freestanding Graphene Nanomembrane Arrays, Small, 11(5), 2015, 597-603

L.X. Lu, M.S. Bharathi, M. Upmanyu, Y.W. Zhang
Growing Ordered and Stable Nanostructures on Polyhedral Nanocrystals, Applies Physics Letters, 105, 2014, 1-6

A. Shahabi, H. Wang, M. Upmanyu
Shaping Van Der Waals Nanoribbons via Torsional Constraints: Scrolls, Folds and Supercoils, Scientific Reports 4, 2014, 7004

C. Wang, M. Upmanyu
Shear Accommodation in Dirty Grain Boundaries, Europhysics Letters, 106(2), 2014, 1-6

E. T. Nilsen, R. Arora, M. Upmanyu
Thermonastic Leaf Movements in Rhododendron During Freezethaw Events: Patterns, Functional Significances, and Causes, Environmental and Experimental Botany, 106, 2014, 34-43

Z. Ma, D. McDowell, E. Panaitescu, A.V. Davidov, M. Upmanyu, L. Menon
Vapor-Liquid-Solid Growth of Serrated GaN Nanowires: Shape Selection Driven by Kinetic Frustration, Journal of Materials Chemistry C, 1, 2013, 7294-7302

SELECTED RESEARCH PROJECTS

Computational Studies of Nanocrystal Growth
Principal Investigator, National Science Foundation

DMREF: Engineering Strong, Highly Conductive Nanotube Fibers Via Fusion
Co-Principal Investigator, National Science Foundation

Enhanced Stability and Mechanics of Ultra-Fine Grained Metals via Engineered Solute Segregation
Principal Investigator, US Army Research Office

Microstructure-Sensitive Modeling and Experimentation of Single Particle Impact During Cold Spray of Metallic Particles
Co-Principal Investigator, Army Research Office

Kai-Tak Wan

Professor, Mechanical and Industrial Engineering

PhD, University of Maryland at College Park, 1993
coe.northeastern.edu/people/wan-kai-tak

Scholarship focus: cellular biomechanics; water filtration; thin film adhesion and characterization; subsurface mechano-sensing; shell adhesion; fundamental intersurface forces

Honors and awards: National Science Foundation CAREER Award; College of Engineering Faculty Fellow

SELECTED PUBLICATIONS

S. Liu, K.-T. Wan
Path of a Solid Inclusion Embedded in a Soft Matrix Subject to Finger Palpation, International Journal of Solids and Structures, 2020

J.Sun, R. Ran, S. Muftu, A.Z. Gu, K.-T. Wan
The Mechanistic Aspects of Microbial Transport in Porous Media, Coloids and Surfaces A, 603, 2020, 125169

S. Liu, K.-T. Wan
A Preliminary Two-Dimensional Palpation Mechanics for Detecting a Hard Inclusion by Indentation of a Soft Matrix Under Large Strain, Journal of Applied Mechanics, 86, 2019, 051009

S.E. Julien, A. Lii-Rosales, K.-T. Wan, Y. Han, M.C. Tringides, J.W. Evans, P.A. Thiel
Squeezed Nanocrystals: Equilibrium Configuration of Metal Clusters Embedded Beneath the Surface of a Layered Material, Nanoscale, 11, 2019, 6445

J. Sun, S. Müftü, A.Z. Gu, K.-T. Wan
Intersurface Adhesion in the Presence of Capillary Condensation, Journal of Applied Mechanics, 85, 2018, 061009

W. Wang, J.V. Gray, S.E. Julien, K.-T. Wan
Mechanical Characterization of a Convex Shell (Contact Lens) with Meridional Thickness Variation, Experimental Mechanics, 58(6), 2018, 997–1002

SELECTED RESEARCH PROJECTS

Mechanical Integrity and Long Term Reliability of Photovoltaic Panels
Principal Investigator, National Institute of Standards and Technology/Department of Energy

Mechanics of Fusion of Dissimilar Lipid BiLayers and Multi-Lamellar Vesicles
Principal Investigator, National Science Foundation

John (Peter) Whitney

Assistant Professor, Mechanical and Industrial Engineering

PhD, Harvard University, 2012
coe.northeastern.edu/people/whitney-peter

Scholarship focus: human-safe robots, medical robotics, soft robotics and soft-material manufacturing, MEMS, microrobotics, bio-inspired design, flapping aerodynamics and insect flight

Honors and awards: Best paper award finalist, International Conference on Robotics and Automation

SELECTED PUBLICATIONS

E. Schwarm, K. Gravesmill, J.P. Whitney
A Floating-Piston Hydrostatic Linear Actuator and Remote-Direct-Drive 2-DOF Gripper, IEEE International Conference on Robotics and Automation, 2019

E. Mendoza, J.P. Whitney
A Testbed for Haptic and Magnetic Resonance Imaging-Guided Percutaneous Needle Biopsy, IEEE Robotics and Automation Letters, 4(4), 2019, 3177-3183

N. Burkhard, S. Frishman, A. Gruebele, J.P. Whitney, R. Goldman, B.L. Daniel, M.R. Cutkosky
A Rolling-Diaphragm Hydrostatic Transmission for Remote MR-Guided Needle Insertion, IEEE International Conference on Robotics and Automation, 2017

J.P. Whitney, T. Chen, J. Mars, J.K. Hodgins
A Hybrid Hydrostatic Transmission and Human-Safe Haptic Telepresence Robot, IEEE International Conference on Robotics and Automation, 2016

N.O. Perez-Arancibia, J.P. Whitney, R.J. Wood,
Lift Force Control of Flapping-Wing Microrobots Using Adaptive Feedforward Cancellation Schemes, IEEE Transactions on Mechatronics, 18, 2013, 1-14

P.S. Sreetharan, H. Tanaka, J.P. Whitney, et al.
Progress on "Pico" Air Vehicles, International Journal of Robotics Research, 31(11), 2012, 1292-1302

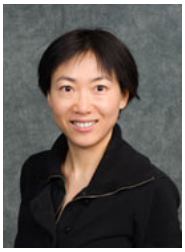
SELECTED RESEARCH PROJECTS

NRI: FND: Controllable Compliance: A New Robotic Arm for Contact-Rich Manipulation
Principal Investigator, National Science Foundation

Remote-Direct-Drive Haptic Manipulators for Learning Augmented Explosive Ordinance Disposal In Unstable and Visually-Denied Environments
Principal Investigator, Office of Naval Research

CHS: Small: Collaborative: Teleoperation with Passive, Transparent Force Feedback for MR-Guided Interventions
Principal Investigator, National Science Foundation

Wei Xie



Assistant Professor, Mechanical and Industrial Engineering

PhD, Northwestern University, 2014
coe.northeastern.edu/people/xie-wei

Scholarship focus:interpretable AI, IoT, computer simulation, data integrity and big data analytics, data-driven stochastic optimization, blockchain design and development for complex end-to-end cyber-physical system learning and risk management with applications, including biopharmaceutical manufacturing and supply chains, smart power grids with renewable energy, and health care

Honors and awards: Outstanding Publication Award from the INFORMS Simulation Society

SELECTED PUBLICATIONS

H. Zheng, W. Xie, B. Feng
Green Simulation Assisted Reinforcement Learning with Model Risk for Biomanufacturing Learning and Control, Winter Simulation Conference, 2020

K. Wang, W. Xie, W. Wu, B. Wang, J. Pei, M. Baker, Q. Zhou
Simulation-Based Digital Twin Development for Blockchain Enabled End-to-End Industrial Hemp Supply Chain Risk Management, Winter Simulation Conference, 2020

W. Xie, P. Zhang, R. Chen, Z. Zhou
A Nonparametric Bayesian Framework for Short-Term Wind Power Probabilistic Forecast, IEEE Transactions on Power Systems, 34(1), 2019

B. Wang, Q. Zhang, W. Xie
Bayesian Sequential Data Collection for Stochastic Simulation Calibration Using Detailed Sample Paths, European Journal of Operational Research, 227(1), 2019, 300-316

W. Xie, P. Zhang, R. Chen, Z. Zhou
A Nonparametric Bayesian Framework for Short-Term Wind Power Probabilistic Forecast, IEEE Transactions on Power Systems, 2018, 1-1

W. Xie, P. Zhang, I. Ryzhov
A Simulation-Based Prediction Framework for Stochastic System Dynamic Risk Management, Winter Simulation Conference, 2018

W. Xie, B. Wang, Q. Zhang
Metamodel-Assisted Risk Analysis for Stochastic Simulation with Input Uncertainty, Winter Simulation Conference, 2018

W. Xie, C. Li, P. Zhang
A Factor-Based Bayesian Framework for Risk Analysis in Large-Scale Stochastic Simulations, ACM Transactions on Modeling and Computer Simulation, 27(4), 2017, 1-31

Ibrahim Zeid

Professor, Mechanical and Industrial Engineering

PhD, University of Akron, 1981
coe.northeastern.edu/people/zeid-ibrahim

Scholarship focus: mechanics; personalized medicine; simulation techniques and complex networks analysis

Honors and awards: Fellow, American Society of Mechanical Engineers

SELECTED PUBLICATIONS

S. Onel, A. Zeid, S. Kamarthi
Agent-Based Simulation and Analysis of a Complex Adaptive Supply Network, International Journal of Collaborative Enterprise, 4(3), 2014, 188

I. Zeid, J. Chin, C. Duggan, S. Kamarthi
Engineering Based Learning: A Paradigm Shift for High School STEM Teaching, International Journal of Engineering Education, 30(4), 2014, 1-12

A. Zeid, S. Kamarthi, V. Sahney
Forward: Research Issues in Patient Centric Healthcare Delivery, International Journal of Collaborative Enterprise, 4(1-2), 2014, 1-2

G.M. Uddin, K.S. Ziemer, I. Zeid, S. Kamarthi
Monte Carlo Study of the Molecular Beam Epitaxy Process for Manufacturing Magnesium Oxide Nano Scale Films, IIE Transactions, 47, 2014, 1-16

S. Vadde, A. Zeid, S. Kamarthi
Optimal Pricing and Disposal Decisions for Product Recovery Facilities Under a Single Portfolio, International Journal of Collaborative Enterprise, 4(3), 2014

E. Tuncel, I. Zeid, S. Kamarthi
Solving Large Scale Disassembly Line Balancing Problems with Uncertainty Using Reinforcement Learning, International Journal of Intelligent Manufacturing, 25, 2014, 647-659

SELECTED RESEARCH PROJECTS

ITEL: Investing in Tomorrow's Engineering Leaders
Principal Investigator, National Science Foundation

TRANSFORMing Liberal Arts Careers to Meet Demand for Advanced mfg Workforce
Principal Investigator, National Science Foundation

Yi Zheng

Associate Professor, Mechanical and Industrial Engineering

PhD, Columbia University, 2014
coe.northeastern.edu/people/zheng-yi

Scholarship focus: thermo-fluids, multifunctional composites, multi-phase structured matter, micro/nanoengineering

Honors and awards: Soleeva Energy Innovation Award, National Science Foundation CAREER Award, National Institutes of Health RI-INBRE Early Career Development Award, NASA EPSCoR Research Infrastructure Development Award, Rhode Island Science & Technology Advisory Council Award

SELECTED PUBLICATIONS

Y. Tian, L. Qian, X. Liu, A. Ghanekar, G. Xiao, Y. Zheng
Highly Effective Radiative Cooling Device, Scientific Reports, 2019, 9(1) 1-11

Y. Tian, A. Ghanekar, L. Qian, O. Gregory, G. Xiao, Y. Zheng
Near-infrared Optics of Nanoparticles Embedded Silica Thin Films, Optics Express, 27(4), 2019, A148-A157

A. Ghanekar, Y. Tian, M. Ricci, O. Gregory, Y. Zheng
Performance Enhancement of Near-Field Thermoradiative Devices Using Hyperbolic Metamaterials, Journal of Photonics for Energy, 9(3), 2019, 032706

X. Liu, Y. Tian, A. Ghanekar, Y. Zheng
Spectral Selectivity of Multiple Nanoparticles Doped Thin Films, Optics Express, 27(20), 2019, A1591-A1600

A. Ghanekar, Y. Tian, M. Ricci, O. Gregory, Y. Zheng
Dynamic Optical Response of SU-8 upon UV Treatment, Optical Materials Express, 8(7), 2018, 2017-2025

A. Ghanekar, Y. Tian, M. Ricci, O. Gregory, Y. Zheng
Near-field Thermal Rectification Devices Using Phase Change Periodic Nanostructure, Optics Express, 26(2), 2018, A209-A218

SELECTED RESEARCH PROJECTS

CAREER: Investigation of Nanoscale Radiative Heat Transfer for Enhanced Thermal Infrared Energy Conversion and Cooling
Principal Investigator, National Science Foundation

Functional Composites for Solar Energy Exploration
Principal Investigator, Soleeva Energy Inc

Novel Metamaterials for Infrared Radiative Cooling
Principal Investigator, NASA EPSCoR RID

Hongli (Julie) Zhu

Assistant Professor, Mechanical and Industrial Engineering

PhD, South China University of Technology, 2009
coe.northeastern.edu/people/zhu-hongli

Scholarship focus: advanced manufacturing, multifunctional bio-inspired material from nature; sustainable energy storage; nano/micro fabrication of devices and materials; bendable, implantable and biocompatible electronics; application of sustainable biomateria in life science

Honors and awards: Innovator of the year 2013, University of Maryland; Jakob Wallenberg Scholarship, Sweden

SELECTED PUBLICATIONS

D.X. Cao, Y.J. Xing, K. Tantratian, X. Wang, H.L. Zhu, et al.
3D Printed High Performance Lithium Metal Microbatteries Enabled by Nanocellulose, Advanced Materials, 31(14), 2019, 1807313

Q. Zhang, D.X. Cao, Y. Ma, A. Natan, P. Auron, H.L. Zhu
Sulfide-based Solid-state Electrolytes: Synthesis, Stabilities and Potential for All Solid-state Batteries, Advanced Materials, 2019

H.Y. Li, Z. Cheng, Q. Zhang, A. Natan, Y. Yang, D.X. Cao, H.L. Zhu
Bacterial-Derived, Compressible, and Hierarchical Porous Carbon for High-Performance Potassium-Ion Batteries, Nano Letters, 18(11), 2018, 7407-7413

Y. Jiao, A. Mukhopadhyay, Y. Ma, L. Yang, A.M. Hafez, H. Zhu
Ion Transport Nanotube Assembled with Vertically Aligned Metallic MoS2 for High Rate Lithium-Ion Batteries, Advanced Energy Materials, 2018, 1702779-1702787

A.M. Hafez, J. Yucong, S. Jianjian, M. Yi, C. Daxian, L. Yuanyue, Z. Hongli
Stable Metal Anode Enabled by Porous Lithium Foam with Superior Ion Accessibility, Advanced Materials, 2018, 1802156

SELECTED RESEARCH PROJECTS

Enabling Advanced Electrode Architecture through Printing Technique
Principal Investigator, Department of Energy

Engineering the Metal Sulfide Interface in All Solid State Batteries through Operando Study
Principal Investigator, National Science Foundation

Precision Alignment of Roll-to-Roll Printing of Flexible Paper Electronics Through Modeling and Virtual Sensor-Based Control
Principal Investigator, National Science Foundation

Salman Ali Abbasi

PhD 2019, Mechanical Engineering;
Advisor, Jacqueline Isaacs

Surface Engineering Assisted Directed Assembly-based Printing Of Electronic Devices

The potential environmental and economic benefits of avoiding the resource-intensive, subtractive semiconductor fabrication processes have driven the development of additive manufacturing techniques such as inkjet, screen, transfer and aerosol jet printing. Most printing techniques, however, have poor resolution, while techniques capable of nanoscale printing suffer from low throughput and poor morphology control over large areas. Thus, there is need to improve the resolution, throughput and control of existing processes, and for a high-throughput, readily integrable process capable of printing micro and nanoscale features with controllable thickness on a variety of substrates for various device applications. The first part of this thesis enhances the understanding of previously demonstrated capillary force assisted and transfer-based printing methods with nanoscale resolution. The effect of geometrical constraints on the thickness and morphology of printed features is investigated for fluidic assembly on resist patterned substrates by varying the resist height, feature width, and withdrawal speed. A confinement effect, which increases thickness for narrower, deeper features is identified and explained. For transfer printing onto polymers, the structural properties needed for successfully embedding materials into a polymer substrate from a template are investigated by varying crosslink density and molecular weight of crosslinked and amorphous polymer films, respectively.

See full dissertation at
coe.northeastern.edu/19/SalmanAliAbbasi

Amir Abdollahi Namin

PhD 2019, Industrial Engineering;
Advisor, Jacqueline Isaacs

Assessment Of Sustainability Tradeoffs In Renewable Energy Generation And Additive Manufacturing

Renewable energy generation and additive manufacturing are becoming more widespread, in part because of their sustainability benefits, where sustainability is measured by its environmental, economic and social attributes. The first part of the dissertation explores the economic and environmental tradeoffs of using energy generated by onsite roof-mounted high efficiency solar panels to power manufacturing facilities. The System Advisor Model (SAM) was used to investigate viability of solar irradiance for facilities across all of the industrial sectors in all U.S. states using the Manufacturing Energy Consumption Survey (MECS) database. Five case studies further explore the economic feasibility and environmental implications of installing onsite roof-mounted high efficiency solar PV systems for industrial facilities in five select U.S. states (California, Florida, Indiana, New Jersey, and Texas), which have varying levels of solar irradiance, different incentives, and solar policies. Results indicate that lower Levelized Cost of Energy (LCOE) and positive Net Present Value (NPV) can be achieved under certain conditions with the economic payback time ranging from 3 to 15 years. Energy Pay Back Time (EPBT) could be less than two years for the five select states with the CO2 equivalent abatement cost ranging from $0.5 - $151 per ton.

See full dissertation at
coe.northeastern.edu/19/AmirAbdollahiNamin

Selected PhD Theses

Miaolin Fan

PhD 2019, Industrial Engineering;
Advisor, Chun-An Chou

A Network-based Data Fusion Method For Multi-modal Physiological Signals

In recent decades, the emerging field of multimodal physiological data fusion has demonstrated the capability of computational methods for decoding the functionality of human mind and body. In this dissertation, we aim to find the most discriminative representations of the (neuro-)physiological activities for classifying these conditions with not only the decomposition of brain dynamics, but also the pattern of complex interactions across varied temporal and spatial scales. To this end, a novel approach is proposed which bridges between network science and time series analysis in order to characterize the interrelationship patterns among subsystems in human brain and body with model validation using real-world dataset. The first part is focused on discovering nonlinear dynamics of scalp electroencephalography (EEG) and other types of physiological time series using complex network models and machine learning algorithms. Human physiological signals usually exhibit highly nonlinear and non-stationary dynamics which can be used for assessing or discriminating various patterns under different conditions. To address this challenge, we employed multivariate machine learning algorithms for a data-driven discrimination model of emotional or pathological states, which is capable to identify the regions or features associated with the states of interests using the nonlinear dynamics underlying neurophysiological time series.

See full dissertation at
coe.northeastern.edu/19/MiaolinFan

Xiao Huang

PhD 2019, Mechanical Engineering;
Advisor, Mohammad Taslim

Dynamics Of Newtonian And Non-newtonian Liquid Droplet Impact On Super-hydrophobic Solid Surfaces

The dynamics of liquid droplet impact on a super-hydrophobic surface was investigated experimentally and theoretically. The reactions of Newtonian droplet impact on a super-hydrophobic surface at low impact velocities (0-1.7m/s) and low Weber numbers (0 - 200) were revisited. The work further extended the investigation to non-Newtonian drops such as shear-thickening cornstarch and shear-thinning blood. The spreading dynamics of pure water, milk, 15wt.% cornstarch colloidal solution and healthy rabbit blood drops were studied by experiments and compared to the previous reported theoretical models. While the Roisman's model agreed well with the Newtonian drop spreading, a large deviation was observed in the experiments with non-Newtonian drops, especially of blood. Further theoretical analysis revealed the effects of the blood shear thinning properties on the droplet spreading. With the knowledge of the experimental spreading dynamics, we developed a rim instability theory to explain the fingering behavior by modifying the classical Rayleigh-Plateau instability. Our model accurately predicted the fingering behavior of water, milk and cornstarch drops, but over-estimated the blood droplet fingering at high impact Weber numbers (greater than 105).

See full dissertation at
coe.northeastern.edu/19/XiaoHuang

Tina Rezvanian

PhD 2019, Mechanical Engineering;
Advisor, Ozlem Ergun

Integrating Data-driven Forecasting And Large-scale Optimization To Improve Humanitarian Response Planning And Preparedness

This dissertation investigates the advantages of optimization and machine learning algorithms to characterize, predict, and solve Response Planning and Preparedness problems in large-scale humanitarian organizations. Organizations often base their operational decisions on the staff's experiential knowledge rather than data-driven mechanisms. International professionals are one of the most valuable resources for humanitarian organizations that deliver food and relief items. The problem of assigning such personnel to positions based on their preferences is a two-sided stable matching problem. Many two-sided markets form a matching between their agents by running centralized clearinghouse algorithms that ensure "stable" and "perfect" assignments. When dealing with large-scale organizations, agents often are not aware of all of their options or inquiring about all candidates/positions can be costly. It is a well-known fact that a perfect matching in a system with partial information on agents' preferences is incompatible with ensuring stability. To address this issue, we design cycle-based approximation mechanism that models negotiations between self-interested agents and identifies a greater-cardinality matching by relaxing stability minimally while maximizing social welfare for all agents across multiple matching cycles. Similar to many other humanitarian organizations, UNHCR operates separate supply chains for the ongoing (OO) and emergency relief (ER) operations, which is costly and susceptible to variances in ER demand quantities.

See full dissertation at
coe.northeastern.edu/19/TinaRezvanian

Seyedehyasamin Salamat

PhD 2019, Mechanical Engineering;
Advisor, Carlos Hidrovo

A Study On The Multiscale Mechanisms Of Transport In Water Desalination Systems Using Capacitive Deionization

Brackish groundwater is an invaluable yet overlooked water resource which can be leveraged to mitigate the unprecedented water scarcity experienced around the globe. Capacitive Deionization (CDI) represents a highly efficient and economical alternative to the common, energy intensive desalination methods for low salinity water streams. In CDI a small voltage is applied to separate ionic species from aqueous solutions and adsorb them into a highly porous material. Extraction of these ions lowers the solution concentration at the exit. The electrodes can then be discharged and regenerated by desorbing the adsorbed ions. CDI is a complex system comprised of several highly coupled transport mechanisms taking place at different length and time scales. In this work, a comprehensive theoretical and experimental study is conducted to further understand the underlying physics of CDI and to improve its the performance. First, I conduct a parametric study to investigate the interrelationship between the multiscale transport phenomena in CDI. The findings demonstrate that despite the superiority of the systems with high mass Péclet number in the desalination performance, units at low mass Péclet number show higher energetic efficiency. Based on these findings, next, I introduce an operational method aimed at enhancing the overall output of CDI.

See full dissertation at
coe.northeastern.edu/19/SeyedehyasaminSalamat

Selected PhD Theses

Aybike Ulusan

PhD 2019, Industrial Engineering;
Advisor, Ozlem Ergun

Optimizing Post-disruption Response And Recovery Operations To Improve Resilience Of Critical Infrastructure Systems

Critical infrastructure systems (CIS) underpin almost every aspect of the modern society by providing the essential functions through overlaying service networks. In the case of a disruption, the functionality of these networks are degraded, which adversely affects the daily lives and economic productivity of communities. Thus, after an extreme event, in order to minimize the negative impact to society, it is crucial to restore the disrupted services provided by CIS as soon as possible and improve resilience of the CIS. In this dissertation, we focused on disruptions created by natural hazards on transportation CIS, and developed mathematical models and methods to efficiently plan the post-disaster response and recovery operations. However the problem can be generalized to any type of a disruption and applied to any type of CIS. In the aftermath of a natural disaster, the transportation network is disrupted due to the debris blocking the roads and obstructing the flow of relief aid and search-and-rescue teams between critical facilities and disaster sites. In the first few days following a disaster, in order to deliver aid to those in need, blocked roads should be cleared by pushing the debris to the sides. In this context, we defined the road network recovery problem (RNRP) as finding a schedule to clear the roads with limited resources such that all the service demanding locations are served, in the shortest possible time.

See full dissertation at
coe.northeastern.edu/19/AybikeUlusan

Zikun Yu

PhD 2019, Mechanical Engineering;
Advisor, John Whitney

An Ethercat-based Real-time Control System Design For A Remote-direct-drive 2-dof Manipulator

The control system of a high-DOF human-interaction robot requires the high-frequency simultaneous control of multiple joints, which needs the capability to handle computation-massive tasks with low latancies. Aiming at the force control of 2-DOF fluid-actuated manipulator, I'm going to introduce a distributed infrastructure design with good flexibility and scalability, while maintaining a high-quality real-time performance. In this thesis, a motor control library, arranged on a core-isolated real-time machine, is developed to provide control implementers with functional APIs and input/output mapping of low-level data structures from SOEM (Simple Open EtherCAT Master) interfacing the direct-drive motors and peripheral sensors via EtherCAT bus communication. While on a remote machine, the ROS (Robot Operating System) is deployed to deal with high-level non-realtime applications, including algorithm processing, data visualization and status analysis. At the same time, a user-friendly Python proxy with a couple of control APIs are offered as an auxiliary medium besides the ROS native interfaces.

See full dissertation at
coe.northeastern.edu/19/ZikunYu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COVER IMAGE

Yingzi Lin, professor of mechanical and industrial engineering, is developing a Continuous Objective Multimodal Pain Assessment Sensing System that improves pain assessment and management.