# Northeastern University
**College of Engineering**

## 2018 | 2019

# SCHOLARSHIP REPORT
# MECHANICAL AND INDUSTRIAL ENGINEERING

# Dear Colleagues and Students,

The Department of Mechanical and Industrial Engineering is the largest disciplinary department at Northeastern University's College of Engineering, with a total student enrollment of nearly 3,000 in 2018. We offer 20 degree programs at the BS, MS, and PhD level in mechanical and industrial engineering as well as interdisciplinary and even multidisciplinary programs, including innovative degrees such as a BS in Mechanical Engineering/JD in Law 3+3 program, and BS in Mechanical Engineering and Physics, and MS degrees in Data Analytics Engineering, Energy Systems, Human Factors, Robotics, and Operations Research, to name a few.

Our undergraduate mechanical and industrial engineering programs are ABET accredited, and the department offers flexible programs to enable students to personalize their pathways through combined majors, electives, minors, concentrations, accelerated master's degrees, and graduate certificates. Our department has over 70 tenured/tenure-track and teaching faculty. Since 2011, we hired 32 tenured/tenure-track faculty, propelling multiple research clusters in the department toward excellence, while our increase in teaching faculty enable educational excellence to advance even further. Our faculty are accomplished in their field, such as University Distinguished Professor Ahmed Busnaina who was named a Fellow of the National Academy of Inventors this past year, and Professor Hameed Metghalchi who was awarded the American Society of Mechanical Engineers George Westinghouse Medal.

Collaboration with government, academia and industry is part of our focus. As such we have established large-scale collaborations with major industrial companies including General Electric, Raytheon, and Northrop. The industrial collaborations augment multiple governmental supports secured by our faculty, such as the $20M contract order from the US Army Research Office and $125M contract order from the US Veterans Health Administration.

According to the US News and World Report, our mechanical engineering graduate program moved up 14 places to No. 43 in five years, while our industrial engineering graduate program has moved up three places to No. 33 during the same period. This momentum will continue through strategic growth. I invite alumni and other stakeholders to join us in propelling this department even further, and also invite all to consider this department for your education and for research and development projects.

We thank you for your interest and if you have any further questions or information needs, please don't hesitate to reach out to us.

Sincerely,

Emanuel Melachrinoudis
Professor and Interim
Department Chair
Mechanical and
Industrial Engineering
e.melachrinoudis@northeastern.edu

# Mechanical and Industrial Engineering

**2** **federally funded** research centers

NSF/DHHS Healthcare Systems Engineering Institute

NSF CENTER for High-rate Nanomanufacturing

## $145M
**Contract Vehicle**

$125M: five years from the Veterans Health Administration

$20M: three years from Army Research Labs

## 1584 **Graduate Students** Enrolled

## 28 **Professional** Society Fellows

**National Academy Member**
Vinod Sahney, University Distinguished Professor

**20** Young Investigator Awards, including **15** National Science Foundation CAREER Awards

**RECENT HIRES**

**Yaning Li**
PhD, University of Michigan

**Yi Zheng**
PhD, Columbia University

## 56 **TENURED/ TENURE-TRACK** Faculty

# College of Engineering

With **185** tenured/tenure-track faculty and **16** 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.
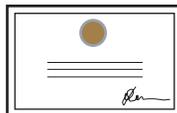
## 48 **NSF CAREER** Awards

## 5 **Engineering Departments**

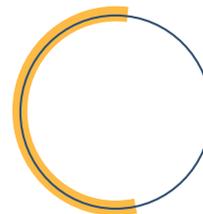## 90 **YOUNG INVESTIGATOR** Awards

## 993 Graduate Students Placed on Co-op (2018-19)

### STUDENTS ENROLLED
## 8080
**52% Graduate**
1485 New MS (Fall 2018)
**48% Undergraduate**
675 New BS (Fall 2018)

William Lincoln Smith Chair and University Distinguished Professor **Ahmed Busnaina** has been selected as a Fellow of the National Academy of Inventors for having demonstrated a highly prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on the quality of life, economic development, and welfare of society.



Professor **Hameed Metghalchi** was awarded the American Society of Mechanical Engineers' 2019 ASME George Westinghouse Gold Medal "for 40 years of scientific research and educational efforts in the field of power generation, which have contributed to improved plant operation and efficiency, and reduced pollutants; and for successfully promoting the dissemination of research as editor of ASME's *Journal of Energy Resources Technology*."



Associate Professor **Jose Martinez-Lorenzo** (PI), mechanical and industrial engineering (MIE) and electrical and computer engineering (ECE), along with ECE Professor Tommaso Melodia, ECE Associate Professor Kaushik Chowdhury, ECE/MIE Professor

**Hanumant Singh**, and ECE Affiliated Faculty Chris Amato were awarded a $1.5M Air Force Research Laboratory (AFRL) grant for "Robust Decentralized Classification and Coordination Algorithms for Swarms of Small Unmanned Aerial Systems."

Professors **Yingzi Lin** (PI) and **Sagar Kamarthi**, in collaboration with the University of Texas at Arlington and Brigham & Women's Hospital, were awarded a $1.2M National Science Foundation grant for "Novel Computational Methods for Continuous Objective Multimodal Pain Assessment Sensing System (COMPASS)."





Assistant Professor **John "Peter" Whitney**, and Affiliated Faculty member **Robert Platt** were awarded a $750K National Science Foundation grant for creating "A New Robotic Arm for Contact-Rich Manipulation." The research introduces a new way to design robots that allows them to easily feel when they are in contact with people and objects.

**James Benneyan**, professor and director of the Healthcare Systems Engineering Institute, received, in collaboration with Brigham and Women's Hospital (lead), a $1.8M R18 award from the Agency for Healthcare Research and Quality for a Patient Safety Learning Lab



to develop real-time predictive/detection models of patient misdiagnoses. Benneyan also received a $450K NIH/NIDA award for "Model-Informed Understanding and Mitigation of the U.S. Opioid and Heroin Epidemic."

Associate Professor **Yongmin Liu** and ECE/Khoury College of Computer Sciences Associate Professor Yun "Raymond" Fu were awarded a $530K National Science Foundation grant for "Multi-Functional Optical Meta-Systems Enabled by Deep-Learning-Aided Inverse Design."
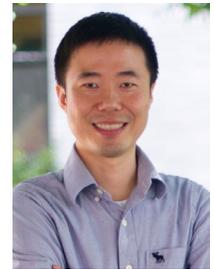


Assistant Professor **Chun-An "Joe" Chou** was awarded a Collaborative Research Travel Grant from Burroughs Wellcome Fund for his research project, "Data-Driven Method for Learning and Recognizing Dynamical Systems in Computational Neuroscience." The grant program supports academic scientists to begin and continue a collaboration to address biomedical questions.



Assistant Professors **Xiaoning "Sarah" Jin** and **Hongli Zhu** were awarded a $544K National Science Foundation grant for "Manufacturing USA: Precision Alignment of Roll-to-Roll Printing of Flexible Paper Electronics Through Modeling and Virtual Sensor-based Control."

Assistant Professor **Xiaoning "Sarah" Jin** and **Anqi He**, PhD'21, received the Best Paper Award at the ASME International Manufacturing Science and Engineering Conference 2019, which took place in Erie, PA for their paper "Failure Detection and Remaining Life Estimation for Ion Mill Etching Process Through Deep-Learning Based Multimodal Data Fusion."

The **Paradigm Hyperloop** team, an international team of students from Northeastern University and Memorial University of Newfoundland & Labrador, placed eighth in the world, and third in North America at the 2019 SpaceX Hyperloop competition in California.



For the second year in a row in 2018, Northeastern's student chapter of the **Institute for Operations Research and the Management Sciences (INFORMS)** was one of the schools awarded the Student Chapter Cum Laude Award



Two start-up companies, Boston Materials and Mobile Pixels, both founded by mechanical engineering students and alumni, each won the 2018 MassChallenge Boston, which is a global business accelerator program for companies in the early stages of development. Boston Materials, a Gold level winner, was co-founded by **Michael Segal**, E'16, and **Anvesh Gurijala**, E'16, along with Associate Professor **Randall Erb**. Mobile Pixels, which was co-founded by **Stephen Ng**, ME'19, along with MIT alumni, was selected as a Diamond level winner.
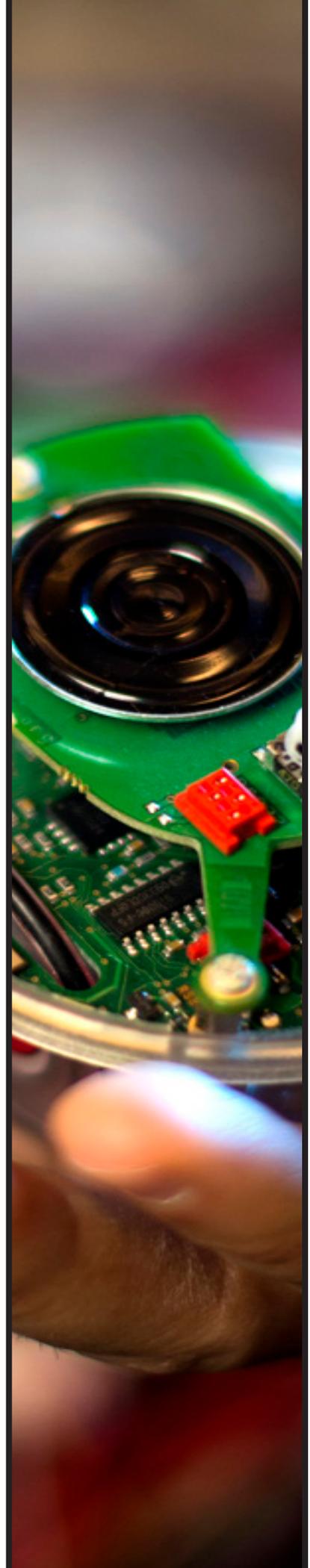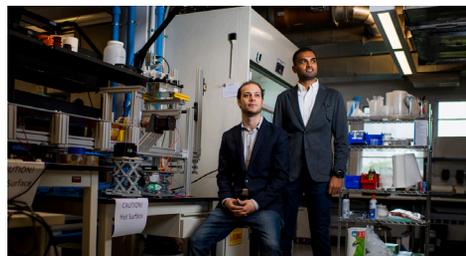
# FACULTY BY RESEARCH AREAS

## Biomechanics & Soft Matters – Solids and Fluids

Samuel Felton
Andrew Gouldstone
Carlos Hidrovo
Safa Jamali
Yaning Li

Yingzi Lin
Carol Livermore
Jose Martinez Lorenzo
Sinan Muftu
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
Gregory Kowalski

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

George Adams
Michael Allshouse
Andrew Gouldstone
Carlos Hidrovo
Yaning Li
Yang "Emily" Liu

Carol Livermore
Craig Maloney
Jose Martinez Lorenzo
Sinan Muftu
Hamid Nayeb-Hashemi
Sandra Shefelbine

Kai-Tak Wan
John "Peter" Whitney
Ibrahim Zeid

## Mechatronics and Systems – Control, Robotics, & Human Machines

Samuel Felton
Babak Heydari
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
Abhishek Kumar
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
Yongmin Liu
Yang "Emily" Liu
Carol Livermore

Craig Maloney
Mohammad E. Taslim
Moneesh Upmanyu
Kai-Tak Wan
Yi Zheng

## Resilient Systems

Muhammad Noor E Alam
James Bean
Mehdi Behroozi
James Benneyan
Thomas Cullinane

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

# GEORGE ADAMS

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

PhD, University of California at Berkeley, 1975
coe.northeastern.edu/people/adams-george

**Scholarship focus**: contact mechanics including adhesion, friction, and plasticity; modeling and analysis of MEMS; modeling and analysis in nanomechanics

**Honors and awards**: Fellow, American Society of Mechanical Engineers; Fellow, Society of Tribologists and Lubrication Engineers; Søren Buus Outstanding Research Award, College of Engineering

## SELECTED PUBLICATIONS

G.G. Adams
A Crack Close to and Perpendicular to an Interface: Resolution of Anomalous Behavior With a Cohesive Zone, Journal of Applied Mechanics, 86, 2019, 031008

G.G. Adams
A Semi-Infinite Strip Pressed Against an Elastic Half-Plane With Frictional Slip, Journal of Applied Mechanics, 85(2), 2018

N.K. Mohammadi, G.G. Adams
Self-Excited Oscillations of a Finite-Thickness Elastic Layer Sliding Against a Rigid Surface With a Constant Coefficient of Friction, Journal of Applied Mechanics, 85(2), 2018

D. Hu, G.G. Adams
A Boundary Condition Correction for the Clamped Constraint of Elastic Plate/Beam Theory, International Journal of Solids and Structures, 124, 2017, 229-234

A. Basu, G.G. Adams, N.E. McGruer
A Review of Micro-Contact Physics, Materials, and Failure Mechanisms in Direct-Contact RF MEMS Switches, Journal of Micromechanics and Microengineering, 26, 2016

F. Oweiss, G.G. Adams
Adhesion of an Axisymmetric Elastic Body: Ranges of Validity of Monomial Approximations and a Transition Model, Tribology International, 100, 2016, 287-292

G. Stan, G.G. Adams
Adhesive Contact Between a Rigid Spherical Indenter and an Elastic Multi-Layer Coated Substrate, International Journal of Solids and Structures, 87, 2016, 1-10

# 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**: 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

T.I. Faiz, C. Vogiatzis, Md. Noor-E-Alam
A Column Generation Algorithm for Vehicle Scheduling and Routing Problems, Computers and Industrial Engineering, 130, 2019, 222-236

T.I. Faiz, Md. Noor-E-Alam
Data Center Supply Chain Configuration Design: A Two-Stage Decision Approach, Socio-Economic Planning Sciences, 66, 2019, 119-135

M.M. Hasan, Md. Noor-E-Alam, X. Wang, D. Zepeda G. Young
Hospital Readmissions to Non-Index Hospitals: Patterns and Determinants Following the Adoption of the Medicare Readmission Reduction Penalty Program, Journal for Healthcare Quality, forthcoming, 2019

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

J.L. Crespo-Vazquez, C. Carrillo, E. Diaz-Dorado, Jose A. Martinez Lorenzo, Md. Noor-E-Alam
A Machine Learning Based Stochastic Optimization Frame-work for a Wind and Storage Power Plant Participating in Energy Pool Market, Applied Energy, 232, 2018, 341-357

A.M.M Sharif Ullah, Md. Noor-E-Alam
Big Data Driven Graphical Information Based Multi Criteria Decision Making, Applied Soft Computing, 63, 2018, 23-38

J.L. Crespo-Vazquez, C. Carrillo, E.L. Diaz-Dorado, J.A. Martinez, Md. 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, 2018, 278-291

# 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

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

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

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

M.R. Allshouse, T. Peacock
Refining Finite-Time Lyapunov Exponent Ridges and the Challenges of Classifying Them, Chaos, 25, 2015, 087410

## SELECTED RESEARCH PROJECTS

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

# 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

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

B. Yildirim, H. Fukunuma, T. Ando, A. Gouldstone, S. Müftü
A Numerical Investigation into Cold Spray Bonding Processes, Journal of Tribology, 137, 2015, 11102-11113

S. Gheybi Hashemabad, T. Ando
Ignition Characteristics of Hybrid Al-Ni-$Fe_2O_3$ and Al-Ni-CuO Reactive Composites Fabricated by Ultrasonic Powder Consolidation, Combustion and Flame, 162, 2015, 1144-1152

T. Hu, S. Zhalehpour, A. Gouldstone, S. Müftü, T. Ando
A Method for the Estimation of the Interface Temperature in Ultrasonic Joining, Metallurgical and Materials Transactions A, 45A, 2014, 2545-2552

## SELECTED RESEARCH PROJECTS

Production of Porous Aluminum and High Colbalt WC-Co Composites
Principal Investigator, Hitachi Metals, Ltd

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

# JAMES BEAN

Provost and Senior Vice President of Academic Affairs; 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 control; particulate and chemical defects in semiconductor manufacturing; high rate nanomanufacturing; NEMS devices and nanomaterials based nanoelectronics

**Honors and awards**: Fellow, American Society of Mechanical Engineers; Fellow, the Adhesion Society; Fellow, National Academy of Inventors; Fulbright Senior Scholar, Outstanding Translational Research Award, Søren Buus Outstanding Research Award, College of Engineering

## SELECTED PUBLICATIONS

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

Z. Chai, S.A. Abbasi, A. Busnaina
  Scalable Directed Assembly of Highly Crystalline 2,7-Dioctyl[1]Benzothieno[3,2-b][1]Benzothiophene (C8-BTBT) Films, ACS Applied Materials & Interfaces, 10(21), 2018, 18123-18130

C. Yilmaz, A. Sirman, A. Halder, A. Busnaina
  High-Rate Assembly of Nanomaterials on Insulating Surfaces Using Electro-Fluidic Directed Assemblys, ACS Nano, 11(8), 2017, 7679–7689

C. Yilmaz, C. Sarisozen, V. Torchilin, A. Busnaina
  Novel Nanoprinting for Oral Delivery of Poorly Soluble Drugs, Methodist DeBakey Cardiovascular Journal, 12(3), 2016, 157-162
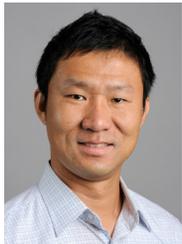
## SELECTED RESEARCH PROJECTS

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

Novel Nanoprinting for Oral Delivery of Poorly Soluble Drugs
  Principal Investigator, National Science Foundation

# 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

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

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

M. Fan, C.-A. Chou
Detecting Abnormal Patterns of Epileptic Seizures Via Temporal Synchronization of EEG Signals, IEEE Transactions on Biomedical Engineering, 2018

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

M.S. Tootooni, P.K. Rao, C.-A. Chou, Z. Kong
A Spectral Graph Theoretic Approach for Monitoring Multivariate Time Series Data From Complex Dynamical Processes, IEEE Transactions on Automation Science and Engineering, 15(1), 2018, 127-144

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

C.-A. Chou, T.O. Bonates, C. Lee, W.A. Chaovalitwongse
Multi-Pattern Generation Framework for Logical Analysis of Data, Annals of Operations Research, 249(1), 2017, 329-349

# THOMAS CULLINANE

Program Director, Engineering Management; Professor, Mechanical and Industrial Engineering; affiliated faculty appointment in: Business Administration

PhD, Virginia Polytechnic Institute and State University, 1972
coe.northeastern.edu/people/cullinane-thomas

**Scholarship focus**: analysis and design of efficient facilities focusing on inventory space control, materials handling and staffing levels

**Honors and awards**: Fellow, Institute of Industrial Engineers

## SELECTED PUBLICATIONS

S. Erbis, S. Kamarthi, T. Cullinane, J.A. Isaacs
Multistage Stochastic Programming Model (MSP) for Carbon Nanotube Production Capacity Expansion Planning, ACS Sustainable Chemistry and Engineering, 2(7), 2014, 1633-1641

A. Topcu, J. Benneyan, T. Cullinane
A Simulation Optimization Approach for Reconfigurable Inventory Space Planning in Remanufacturing Facilities, International Journal of Business Performance and Supply Chain Modeling, 5(1), 2013, 86-114

T. Cullinane, T. Marion, J.H. Friar
A Multi-Disciplinary New Product Development Course for Technological Entrepreneurs, Journal of the Academy of Business Education, 13, 2012, 71-89

# 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

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

Composite and Ceramic Manufacturing Technologies
Principal Investigator, Raytheon Corporation

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

The Roles of Heterogeneities and Anisotropy in Fracture Toughness and Crack Propagation
Co-Principal Investigator, National Science Foundation

# ÖZLEM ERGUN

Professor, 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

M. Celik, A. Lorca, Ö. Ergun, P. Keskinocak
A Decision-Support Tool for Post-Disaster Debris Operations, Production and Operations Mangaement, 26(6), 2017, 1076-1091

M. Jahre, J. Kembro, T. Rezvanian, Ö. Ergun, S.J. Håpnes, P. Berling
Integrating Supply Chains for Emergencies and Ongoing Operations in UNHCR, Journal of Operations Management, 45, 2016, 1-134

M. Celik, Ö. Ergun, P. Keskinocak
The Post-Disaster Debris Clearance Problem with Incomplete Information, Operations Research, 63(1), 2015, 65-85

L. Gui, A. Atasu, Ö. Ergun, B. Toktay
Fair and Efficient Implementation of Collective Extended Producer Responsibility Legislation, Management Science, 2014, 1-56

Ö. Ergun, L. Gui, J.L. Heier Stamm, P. Keskinocak, J.L. Swann
Improving Humanitarian Operations Through Collaboration, Production and Operations Management special issue on Humanitarian Operations and Crisis Management, 23(6), 2014, 1002-1014

## SELECTED RESEARCH PROJECTS

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

Multi-Agent Modeling Framework for Mitigating Distributed Disruptions in Critical Supply Chains
Co-Principal Investigator, National Science Foundation

Resource Allocation with Learning in Dynamic and Partially Observable Networks
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

# SAMUEL FELTON

Assistant Professor, Mechanical and Industrial Engineering

PhD, Harvard University, 2015
coe.northeastern.edu/people/felton-samuel

**Scholarship focus**: soft robots; transformable robots; self-folding machines; rapid prototyping; biomimetic design

**Honors and awards**: National Defense Science and Engineering Graduate Fellowship

## SELECTED PUBLICATIONS

C. Liu, A. Orlofsky, C. Kitcher, S. Felton
A Self-Folding Pneumatic Piston for Mechanically Robust Origami Robots, IEEE Robotics and Automation Letters 4(2), 2019, 1372-1378

M. Oliveira, C. Davis, S. Bradford, T. Disarro, J. Smith, S. Felton
Design and Characterization of Electrostatic Zipper Hinges, Smart Materials and Structures 28(7), 2019, 075002

F. Zuliani, C. Liu, J. Paik, S. Felton
Minimally Actuated Transformation of Origami Machines, IEEE Robotics and Automation Letters 3(3), 2018, 1426-1433

C. Liu, S. Felton
A Self-Folding Robot Arm for Load-Bearing Operations, IEEE/RSJ International Conference on Intelligent Robots and Systems, 2017, 1979-1986

# ANDREW GOULDSTONE

Professor, Mechanical and Industrial Engineering; affiliated faculty, Chemical Engineering; Director, Michael J. and Ann Sherman Center for Engineering

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

T. Hu, S. Zhalehpour, A. Gouldstone, et al.
A Method for the Estimation of the Interface Temperature in Ultrasonic Joining, Metallurgical And Materials Transactions A-Physical Metallurgy And Materials Science, 45A(5), 2014, 2545-2552

C.T. Nguyen, H.M. Gonnermann, Y. Chen, A. Gouldstone
Film Drainage and the Lifetime of Bubbles, Geochemistry Geophysics Geosystems, 14(9), 2013, 3616-3631

J.H. Kim, A. Gouldstone, C.S. Korach
Analysis of Spherical Indentation of an Elastic Bilayer Using a Modified Perturbation Approach, MEMS and Nanotechnology, 4, 2011, 53-57

B. Choi, Y. Wu, S. Sampath, A. Gouldstone
Modified Indentation Techniques to Probe Inelasticity in Ni-5%Al Coatings from Different Processes, Journal of Thermal Spray Technology, 18(1), 2009, 65-74

L.H. Weng, A. Gouldstone, Y.H. Wu, W.L. Chen
Mechanically Strong Double Network Photocrosslinked Hydrogels from N,N-Dimethylacrylamide and Glycidyl Methacrylated Hyaluronan, Biomaterials, 29(14), 2008, 2153-2163

## SELECTED RESEARCH PROJECTS

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

# JACKIE GRIFFIN

Assistant Professor, 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; Outstanding IE Professor Award

## SELECTED PUBLICATIONS

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

H.K. Aksoy, S.M. Gupta
Improving Remanufacturing Systems Decisions by Bayesian Approach, International Journal of Industrial Engineering, 25(3), 2018, 316-334

M.T. Dulman, S.M. Gupta
Maintenance and Remanufacturing Strategy: Using Sensors to Predict the Status of Wind Turbines, Journal of Remanufacturing, 8(3), 2018, 131-152

A.Y. Alqahtani, S.M. Gupta
Money-Back Guarantee Warranty Policy with Preventive Maintenance Strategy for Sensor-Embedded Remanufactured Products, Journal of Industrial Engineering International, 14(4), 2018, 767-782

# BABAK HEYDARI

Associate Professor, 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

Assistant 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

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

S. Narayanan, H. Kim, A. Umans, S. Yang, X. Li, S.N. Schiffres, S.R. Rao, I.A. McKay, C.A. Rios Perez, C.H. Hidrovo, E.N. Wang
A Thermophysical Battery for Storage-Based Climate Control, Applied Energy, 189, 2017, 31-43

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

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

L. Pourzahedi, P. Zhai, J.A. Isaacs, M.J. Eckelman
Life Cycle Energy Benefits of Carbon Nanotubes for Electromagnetic Interference (EMI) Shielding Applications, Journal of Cleaner Production, 142(4), 2017, 1971-1978

P. Zhai, J.A. Isaacs, M.E. Eckelman
Net Energy Benefits of Carbon Nanotube Applications, Applied Energy, 173, 2016, 624-634

# SAFA JAMALI

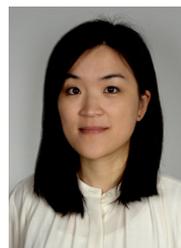Assistant Professor, Mechanical and Industrial Engineering

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

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, 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

X. Gu, X. Jin, J. Ni
Estimation of Active Maintenance Opportunity Windows in Production Lines, Journal of Manufacturing Systems, 45, 2017, 109-120

X. Jin, D. Siegel, B. Weiss, E. Gamel, W. Wang, J. Lee, J. Ni
The Present Status and Future Growth of Maintenance in US Manufacturing: Results from a Pilot Survey, Manufacturing Review, 2016

X. Gu, X. Jin, J. Ni
Prediction of Passive Maintenance Opportunity Windows on Bottleneck Machines in Complex Manufacturing Systems, ASME Transactions on Journal of Manufacturing Science and Engineering, 137(3), 2015, 031017

X. Jin, S.J. Hu, J. Ni, G. Xiao
Assembly Strategies for Product Remanufacturing with Variable Quality Returns, IEEE Transactions on Automation Science and Engineering, 10(1), 2013, 76-85

## SELECTED RESEARCH PROJECTS

Achieving Smart Factory through Predictive Dynamic Scheduling
Principal Investigator, Digital Manufacturing Innovation Institute

16

# 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

## SELECTED PUBLICATIONS

S. Radhakrishnan, S. Erbis, J.A. Isaacs, S. Kamarthi
Novel Keyword Co-Occurrence Networks Based Methods to Foster Systematic Reviews of Scientific Literature, PLOS ONE, 2017

M.G. Uddin, K.S. Ziemer, A. Zeid, Y.-T.T. Lee, S. Kamarthi
Process Control Model for Growth Rate of Molecular Beam Epitaxy of MgO (111) Nanoscale Thin Films on 6H-SiC (0001) Substrates, International Journal of Advanced Manufacturing Technology, 91(1-4), 2017, 907–916

S. Radhakrishnan, A. Duvvuru, S. Sultornsanee, S. Kamarthi
Phase Synchronization Based Minimum Spanning Trees for Analysis of Financial Time Series with Nonlinear Correlations, Physica A: Statistical Mechanics and its Applications, 444, 2016, 259-270

S. Kamarthi, S. Sultornsanee, A. Zeid
Recurrence Quantification Analysis to Estimating Surface Roughness in Finish Turning Processes, International Journal of Advanced Manufacturing Technology, 87(1-4), 2016, 451–460

S. Erbis, Z. Ok, J.A. Isaacs, J.C. Benneyan, S. Kamarthi
Review of Research Trends and Methods in Nano Environmental, Health and Safety Risk Analysis, Risk Analysis: An International Journal, 2016, 1-18

S. Erbis, S. Kamarthi, A. Abdollahi-Namin, A. Hakimian, J.A. Isaacs
Stochastic Goal Programming Model for Sustainable CNT-Enabled Lithium-Ion Battery Manufacturing, Environmental Science: Nano, 3, 2016, 1447-1459

## SELECTED RESEARCH PROJECTS

Achieving Smart Factory Through Predictive Dynamic Scheduling
Co-Principal Investigator, Digital Manufacturing and Design Innovation Institute

Smart Manufacturing Performance Assurance (Mpass) Through Equipment Monitoring
Principal Investigator, National Institute of Standards of Technology

# GREGORY KOWALSKI



Associate Professor, Mechanical and Industrial Engineering

PhD, University of Wisconsin, 1978
coe.northeastern.edu/people/kowalski-gregory

**Scholarship focus**: energy related and calorimeter studies related to pharmaceutical developments; simulation of thermal effects on laser beam propagation through heated materials; simulating microscale heat transfer phenomena and its effects on laser beam propagation; Simulation of laser welding processes

**Honors and awards**: Fellow, American Society of Mechanical Engineers

## SELECTED PUBLICATIONS

A.J. Conway, W.M. Saadi, F.L. Sinatra, G.J. Kowalski, D. Larson, J. Fiering
Dispersion of a Nanoliter Bolus in Microfluidic Co-Flow, Journal of Micromechanics and Microengineering: Structures, Devices, and Systems, 24(3), 2014, 034006

U. Piana, G.J. Kowalski, M. Zenouzi
Incorporating Reliability and Failure Models into Energy System Analysis, Proceedings of the 8th International Conference on Energy Sustainability co-located with the 12th Fuel Cell Science, Engineering & Technology Conference, Boston, MA, 2014, 1-9

A. Emdadi, Y. Emami, M. Zenouzi, A. Lak, B. Panahirad, A. Lotfi, F. Lak, G.J. Kowalski
Potential of Electricity Generation by the Salinity Gradient Energy Conversion Technologies in the System of Urmia Lake- Gadarchay River, Proceedings of the 8th International Conference on Energy Sustainability Co-located with the 12th Fuel Cell Science, Engineering & Technology Conference, Boston, MA, 2014, 1-8

G.J. Kowalski, M. Modaresifar, M. Zenouzi
Significance of Transient Exergy Terms in a New Tray Design Solar Desalination Device, Journal of Energy Resources Technology, 137(1), 2014, 1-8

## SELECTED RESEARCH PROJECTS

Energy Storage Systems
Principal Investigator, 3 Phase Renewables

# YIANNIS 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; 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

## SELECTED PUBLICATIONS

C. Wen, J. Zhang, Y.A. Levendis, M.A. Delichatsios
A Method to Assess Downward Flame Spread and Dripping Characteristics of Fire-Retardant Polymer Composites, Fire and Materials, 42, 2018, 347–357

C. Zhuo, H. Richter, Y.A. Levendis
Carbon Nanotube Production from Ethylene in $CO_2/N_2$ Environments, Journal of Energy Resources Technology, 140(8), 2019, 085001-1-9

X. Ren, X. Meng, A. Panahi, E. Rokni, R. Sun, Y.A. Levendis
HCl Release from Combustion of Corn Straw in a Fixed Bed, Journal of Energy Resources Technology, 140, 2018, 051801-1-9

A. Panahi, M. Tarakcioglu, M. Schiemann, M. Delichatsios, Y.A. Levendis
On the Particle Sizing of Torrefied Biomass for Co-Firing with Pulverized Coal, Combustion and Flame, 194, 2018, 72-84

## SELECTED RESEARCH PROJECTS

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

Pyrolysis of Polyethylene Terephthalate (PETE) Wastes to MW-CNTs,
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 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; Conference Editor, IEEE Transactions on Magnetics, NATO Technical Team Member of AVT-231 on "Scarcity of Rare Earth Materials for Electrical Power Systems," appointed by U.S. National Coordinator

## SELECTED PUBLICATIONS

B.D. Plouffe, S.K. Murthy, L.H. Lewis
Fundamentals and Application of Magnetic Particles in Cell Isolation and Enrichment: A Review, Reports on Progress in Physics, 78(1), 2015, 016601

L.H. Lewis, F.E. Pinkerton, et al.
De Magnete et Meteorite: Cosmically-Motivated Materials, IEEE Magnetics Letters, 5, 2014

R. McCallum, L.H. Lewis, R. Skomski, M.J. Kramer, I.E. Anderson
Practical Aspects of Modern and Future Permanent Magnets, Annual Review of Materials Research, 44(1), 2014, 451-477

L.H. Lewis, F. Jiménez-Villacorta
Perspectives on Permanent Magnetic Materials for Energy Conversion and Power Generation, Metallurgical and Materials Transactions A, 44(1), 2013, 2-20

G. Srajer, L.H. Lewis, S.D. Bader, et al.
Advances in Nanomagnetism Via X-Ray Techniques, Review Article, Journal of Magnetism and Magnetic Materials, 307(1), 2006, 1-31

## SELECTED RESEARCH PROJECTS

Program in Engineered Mat'ls and Materials Design of Engineered Mat'ls
Co-Principal Investigator, Army Research Office

Promotion and Control of $L1_0$ FeNi Phase Formation for Permanent Magnet Applications
Principal Investigator, Rogers Corporation

# 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 interactions, interface design and user experiences, system integration and evaluation; smart systems and nonintrusive sensors, human friendly mechatronics, human state detection and information fusion; human factors in transportation and healthcare

**Honors and awards**: National Science Foundation CAREER Award

## SELECTED PUBLICATIONS

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

H. Cai, Y. Lin
Coordinating Cognitive Assistances with Cognitive Engagement Control Approaches in Human-Machine Interactions, IEEE Transactions on Systems, Man and Cybernetics Part A: Humans and Systems, 42(2), 2012, 286-294

Y. Lin
A Natural Contact Sensor Paradigm for Non-intrusive and Real-time Sensing of Bio-Signals in Human-Machine Interactions, IEEE Sensors Journal, Special Issue on Cognitive Sensor Networks, 11(3), 2011, 522-529

## SELECTED RESEARCH PROJECTS

CAREER: Bridging Cognitive Science and Sensor Technology: Nonintrusive and Multimodality Sensing in Human Machine Interactions
Principal Investigator, National Science Foundation

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

# YANG (EMILY) LIU

Assistant Professor, Mechanical and Industrial Engineering

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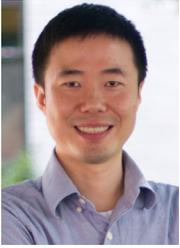coe.northeastern.edu/people/liu-yang

**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

H. Zhang, Y. Liu, H. Sun, S. Wu
Transient Dynamic Behavior of Polypropylene Fiber Reinforced Mortar Under Compressive Impact Loading, Construction and Building Materials, 111(0), 2016, 30-42

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

H. Sun, D. Feng, Y. Liu, M.Q. Feng
Statistical Regularization for Identification of Structural Parameters and External Loadings Using State Space Models, Computer-Aided Civil and Infrastructure Engineering, 30(11), 2015, 843-858

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

# 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.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

K. Yao, Y.M. Liu
  Controlling Electric and Magnetic Resonances for Ultracompact Nanoantennas with Tunable Directionality, ACS Photonics, 3, 2016, 953-963

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

W.L. Gao, F.Z. Fang, Y.M. Liu, S. Zhang
  Chiral Surface Waves Supported by Biaxial Hyperbolic Metamaterials, Light: Science and Applications, 2015, e238

## SELECTED RESEARCH PROJECTS

CAREER: Spin Plasmonics for Ultrafast All-Optical Manipulation of Magnetization in Hybrid Metal-Ferromagnet Structures
  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, 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

## SELECTED RESEARCH PROJECTS

EFRI-ODISSEI: Origami and Assembly Techniques for Human-Tissue-Engineering (OATH)
  Principal Investigator, National Science Foundation

# DAVID LUZZI

Senior Vice Provost for Research
Vice President of the Innovation Campus at Burlington, MA; 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**: NSF Graduate Research Fellowship, INFORMS Judith Liebman Award, Richard and Eleanor Towner Prize for Outstanding PhD Research

## SELECTED PUBLICATIONS

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

E.L. Tucker, A.R. Smith, M.S. Daskin, H. Schapiro, S.M. Cottrell, E. Gendron, P. Hill-Callahan, S.J. Gill, A.B. Leichtman, R.M. Merion, K.L. Maass
Life and Expectations Post-Kidney Transplant: A Qualitative Analysis of Patient Response, BMC Nephrology, 20(175), 2019, 1-10

M.S. Daskin, K.L. Maass
Location Analysis and Network Design, Chapter 17, Operations, Logistics and Supply Chain Management, H. Zijm, M. Klumpp, A. Regattieri, S. Heragu editors, Springer, 2019, 379-398

L.M. Flowers, K.L. Maass, G.J. Melin, R.L. Campbell, C.M. Lohse, P.J. Novotny, J.J. Westphal, D.M. Nestler, K.S. Pasupathy
Consequences of the 48-Hour Rule: A Lens into the Psychiatric Patient Flow Through an Emergency Department, American Journal of Emergency Medicine, 36(11), 2018, 2029-2034

## SELECTED RESEARCH PROJECTS

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

Modeling Online Sex Trafficking Networks for Effective Interdiction: Operations and Organizational Features
Principal Investigator, The TellFinder Alliance

# 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

A. Garg, A. Acharya, C.E. Maloney
A Study of Conditions for Dislocation Nucleation in Coarser-than-Atomistic Scale Models, Journal of the Mechanics and Physics of Solids, 75, 2015, 76–92

K.M. Salerno, C.E. Maloney, M.O. Robbins
Avalanches in Strained Amorphous Solids: Does Inertia Destroy Critical Behavior?, Physical Review Letters, 109, 2012, e105703

A. Hasan, C.E. Maloney
Inferring Elastic Properties of an fcc Crystal from Displacement Correlations: Sub-Space Projection and Statistical Artifacts, Physical Review E 90, 87(5-1), 2012, e062309

A. Hasan, C.E. Malonewy
Saddle-Node Scalings in Homogeneous Dislocation Nucleation, International Journal for Multiscale Computational Engineering, 10, 2012, 101-108

D. Kaya, N. Green, C.E. Maloney, M.F. Islam
Density Invariant Vibrational Modes in Disordered Colloidal Crystals, Physical Review E, 83(5), 2011, e051404

K. Karimi, C.E. Maloney
Local Anisotropy in Globally Isotropic Granular Packings, Physical Review Letters, 107, 2011, e268001

## 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, Interim MIE Department Chair 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 network lifetime maximization with sink mobility; wildfire prediction and mitigation

**Honors and awards**: Outstanding Faculty Service Award, College of Engineering

## SELECTED PUBLICATIONS

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

J. Santivanez, E. Melachrinoudis
  Reliable Maximin-Maxisum Locations for Maximum Service Availability on Tree Networks Vulnerable to Disruptions, Annals of Operations Research, 2018

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

N. Zaarour, E. Melachrinoudis, M. Solomon, H. Min
  The Optimal Determination of the Collection Period for Returned Products in the Sustainable Supply Chain, International Journal of Logistics Research and Applications, 17, 2014, 35-45

# HAMEED METGHALCHI

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, Associate Chair for Graduate Studies and Research, Interim Director of Energy Systems Program, 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

## 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

E. C. Green, Y. Zhang, H. Li, M.L. Minus
Gel-Spinning of Mimetic Collagen and Colla-Gen/Nano-Carbon Fibers: Understanding Multi-Scale Influences on Molecular Ordering and Fibril Alignment, Journal of the Mechanical Behavior of Biomedical Materials, 65 2017, 552-564

## SELECTED RESEARCH PROJECTS

CAREER: Understanding Directionally Templated Interphase Processing-Structure Development and Relationships in Polymer Nano-composite Materials
Principal Investigator, National Science Foundation

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 symbiosis, customer-centric design, artificial intelligence, machine learning

## SELECTED PUBLICATIONS

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

M. Moghaddam, S.Y. Nof
Real-time Optimization and Control Mechanisms for Collaborative Demand and Capacity Sharing, International Journal of Production Economics, 171(P4), 2016, 495-506

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

# SINAN MÜFTÜ

Interim 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**: mechanics and tribology of axially moving materials; webs; numerical simulation of tissue healing and bone remodeling; high velocity impact of micron scale particles

**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

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

O.C. Ozdemir, Q. Chen, S. Müftü, V.K. Champagne
Modeling the Continuous Heat Generation in the Cold Spray Coating Process, Journal of Thermal Spray Technology, 28, 2019, 108-123

J. Sun, A. Gu, S. Müftü, K.T. Wan
Adhesion of a Solid Elastic Sphere onto a Rigid Planar Substrate in the Presence of Moisture, Journal of Applied Mechanics, 85, 2018, 061009

Q. Chen, A. Alizadeh-Dehkharghani, W. Xie, X. Wang, V. Champagne, A. Gouldstone, J.-H. Lee, S. Müftü
High Strain Rate Material Behavior and Adiabatic Material Instability in Impact of Micron-Scale Al-6061 Particles, Journal of Thermal Spray Technology, 27, 2018, 641-653

J. Sun, N. Tandogan, A. Gu, S. Müftü, E.D. Goluch, K.T. Wan
Measuring Particle Adhesion-Detachment and Filtration Efficiency by Microfluidics, Colloids and Surfaces B: Interfaces, 165, 2018, 381-387

## SELECTED RESEARCH PROJECTS

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

R.B. Woodward, S.J. Shefelbine, R. Vaidyanathan
Pervasive Monitoring of Motion and Muscle Activation: Inertial and Mechanomyography Fusion, IEEE/ASME Transactions on Mechatronics, 22(5), 2017, 2022-2033

R. DeSouza, B. Javaheri, R.S. Collinson, C. Chenu, S.J. Shefelbine, P.D. Lee, A.A. Pitsillides
Prolonging Disuse in Aged Mice Amplifies Cortical But Not Trabecular Bones' Response to Mechanical Loading, Journal of Musculoskeletal & Neuronal Interactions, 17(3), 2017, 218-225

K.P. Chadwick, S.J. Shefelbine, A. Pitsillides, J.R. Hutchinson
Finite-Element Modelling of Mechanobiological Factors Influencing Sesamoid Tissue Morphology in the Patellar Tendon of an Ostrich, Royal Society Open Science, 4(6), 2017, 170133

P. Yadav, S.J. Shefelbine, E. Pontén, E.M. Gutierrez-Farewik
Influence of Muscle Groups' Activation on Proximal Femoral Growth Tendency, Biomechanics and Modeling in Mechanobiology, 2017

A.E. Draghici, D. Potart, J.L. Hollmann, V. Pera, Q. Fang, C.A. DiMarzio, J.A. Taylor, M.J. Niedre, S.J. Shefelbine
Near Infrared Spectroscopy for Measuring Changes in Bone Hemoglobin Content after Exercise in Individuals with Spinal Cord Injury, Journal of Orthopaedic Research: Official Publication of the Orthopaedic Research Society, 36(1), 2017, 183-191

A.E. Draghici, G. Picard, J.A. Taylor, S.J. Shefelbine
Assessing Kinematics and Kinetics of Functional Electrical Stimulation Rowing, Journal of Biomechanics, 53, 2017, 120-126

## SELECTED RESEARCH PROJECTS

Hetrogeneity and Anisotropy in Fracture Toughness
Principal Investigator, National Science Foundation

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

# HANUMANT SINGH

Professor, 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, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering

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, 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

Y. Rodriguez-Vaqueiro, P. Parsinejad, J. Martinez Lorenzo, R. Sipahi
Development of a Combined Time-Frequency Technique for Accurate Extraction of pNN50 metric from Noisy Heart Rate Measurements, Special Issue on Human-Centered Robotics in International Journal of Intelligent Robotics and Applications, 2(2), 2018, 193

M. Koh, R. Sipahi
Effect of Edge Elimination on the Delay Margin of a Class of LTI Consensus Systems, IEEE Transactions on Automatic Control, 63(12), 2018, 4397-4404

R. Sipahi, G.K.H. Zupanc
Stochastic Cellular Automata Model of Neurosphere Growth: Roles of Proliferative Potential, Contact Inhibition, Cell Death, and Phagocytosis, Journal of Theoretical Biology, 445, 2018, 151-165

## 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

# MOHAMMAD E. TASLIM

Professor, 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; affiliated faculty, Bioengineering, Civil and Environmental 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
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

T. Zhu, G. Li, S. Müftü, K.-T. Wan
One-Dimensional Constrained Blister Test to Measure Thin Film Adhesion, Journal of Applied Mechanics, 85, 2018, 054501

J. Sun, N. Tandogan, A.Z. Gu, Sinan Müftü, E.D. Goluch, K.-T. Wan
Quantification of Colloidal Filtration of Polystyrene Micro-Particles on Glass Substrate Using a Microfluidic Device, Colloids and Surfaces B: Biointerfaces, 165, 2018, 381–387

## 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 and blockchain design for complex end-to-end cyber-physical system risk management with applications, including bio-pharmaceutical manufacturing and supply chains, smart power grids with renewable energy, health care and transportation infrastructure

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

## SELECTED PUBLICATIONS

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

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

Y. Yi, W. Xie
An Efficient Budget Allocation Approach for Quantifying the Impact of Input Uncertainty in Stochastic Simulation, ACM Transactions on Modeling and Computer Simulation, 27(4), 2017, 25

W. Xie, B.L. Nelson, R.R. Barton
A Bayesian Framework for Quantifying Uncertainty in Stochastic Simulation, Operations Research, 62(6), 2014, 1439-1452

# 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**: 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, 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

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

A. Ghanekar, M. Ricci, Y. Tian, O. Gregory, Y. Zheng
Strain-Induced Modulation of Near-field Radiative Transfer, Applied Physics Letters, 112, 2018, 241104

A. Ghanekar, G. Xiao, Y. Zheng
High Contrast Far-field Radiative Thermal Diode, Scientific Reports, 7, 2017, 6339

## SELECTED RESEARCH PROJECTS

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

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 $MoS_2$ 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

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

Fully Water-Soluble Bioelectronics with Skin-Conforming Galactomannan
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

# Dan Hu

PhD 2018, Mechanical Engineering;
Advisor, George Adams

## Structural Connections in Mechanical Design: from Nano- to Macro-Scale

Connections between structural members are ubiquitous in the field of mechanical design. In this dissertation we do several analyzes for different kinds of structural connections a natural connection due to adhesion, a two-sided constraint connection, and a bolted jointed connection. This work ranges from the nano-scale, as in the adhesive contact, to the macro-scale, as in the bolted joint.

First consider a natural connection in which adhesive contact and the resulting morphology of micro-/nano-scale beams/plates on a sinusoidal/grooved surface are the subject. There are three different ways to model this behavior: a) without induced tension as has been studied in a previous investigation; b) with the stiffening effect due to the contact regions being prevented from slipping axially, thereby inducing tension due to transverse displacement; c) the case with frictional slip regions which reduces the induced tension compared to case (b). This analysis uses continuum beam theory with bending and induced tension as needed. The three different models show significant quantitative differences.

Now consider an elastic strip clamped between two rigid plates over a portion of its length. For this two-sided constraint connection, the correction for rotational stiffness within the support is taken into account. This rotational stiffness is determined by applying a distributed load (statically equivalent to a couple moment) to such a constrained infinite elastic strip in plane strain. The displacement profile is determined analytically and approximated by a straight line. The ratio of the applied moment to the slope of this line provides the rotational stiffness. Examples are given for a cantilever and a fixed-fixed plate/beam as well as for a clamped circular plate.

See full dissertation at
**coe.northeastern.edu/18/DanHu**

# Majid Bigdeli Karimi

PhD 2018, Mechanical Engineering;
Advisor, Carol Livermore

## Acoustically-Driven Directed Assembly in Three Dimensional and Microfluidic Environments

Directed or selective assembly can create ordered microsystems for a broad range of applications from sensing to the life sciences. One example is templated assembly by selective removal (TASR), which has been shown to be able to selectively assemble microscale objects and biological cells by size into predetermined locations on a 2D surface based on the surface's geometry and acoustic excitation. Although directed assembly excels at ordering structures on exposed 2D surfaces, it is less well developed for forming 3D and hierarchical architectures such as are typically required for metamaterials, tissue engineering or medical diagnostic devices. One potential solution to the challenge of creating 3D and hierarchical systems using directed assembly is to integrate the assembly techniques with other microscale technologies such as microfluidics or the folding of 2D surfaces into the third dimension. However, the physics of directed assembly processes a not independent of their context, and applying directed assembly to folding and microfluidic systems requires that their physics be understood and taken into account. This research examines the engineering principles that underlie the integration of the TASR process into folding and microfluidic systems and demonstrates TASR's successful integration into these systems.

See full dissertation at
**coe.northeastern.edu/18/MajidBigdeliKarimi**

# Min Hyong Koh

PhD 2018, Mechanical Engineering;
Advisor, Rifat Siphi

## Effects of Delays and Network Graphs on Multi-Agent Network Dynamics Stability and Performance

Dynamics of multi-agent systems (MAS) is influenced by communication/activation delays as well as network characteristics. Here, the aim is to design network graphs and develop control algorithms for a class of MAS considering critical the interplay between network delays and network graphs. Specifically, the network graphs influence not only the stability of MAS guaranteed when delay is less than a certain margin, delay margin, but also the performance, reaching speed of agents to a common steady state (consensus).

See full dissertation at
**coe.northeastern.edu/18/MinHyongKoh**

# Sanwei Liu

PhD 2018, Mechanical Engineering;
Advisor, Carol Livermore

## Mechanical Properties of Fused Carbon Nanotube Networks

The extraordinary mechanical, electrical, and thermal properties of carbon nanotubes make them ideal building blocks for multifunctional materials. However, disorganized network assembly and non-ideal constituent carbon nanotubes make macroscopic production-level networks significantly less ideal than individual carbon nanotubes. By creating covalently bonded molecular junctions in place of weaker van der Waals interactions, carbon electrical graphitization offers a way to improve the mechanical properties of the network with controlled current pulses. This study investigates the possibility of improving the mechanical performance of macro-scale carbon nanotube structures through electrical graphitization.

See full dissertation at
**coe.northeastern.edu/18/SanweiLiu**

# Troy Lundstorm

PhD 2019, Mechanical Engineering;
Advisor, Nader Jalili

## Wideband Vibration Attenuation Via Self-Sensing Piezoelectric Array Resonator

The attenuation of undesirable vibration in flexible structures has been a subject of considerable study over the past century due to its potential increase in structure fatigue life, improved performance/failure reduction of vibrationally-sensitive componentry and its effect on human-machine interactions (e.g. vehicle suspension, skyscraper sway, hand tool vibration, fine motor aids for the neurologically-impaired). Much of this early work was focused on the attenuation of structure response using passive isolation and tuned absorber systems, but these devices tend to have limited effective bandwidths and they are unable to adapt to potential changes in the host structure or excitation spectra. The tuned vibration absorber (TVA) was originally developed to attenuate base structure response at a single, critical frequency yielding a destructive interference condition at that frequency. The TVA was intended to be disposable, sparing the host structure from expensive fatigue damage/degraded performance. Advances in this field have led to the development of passive tuning techniques where multiple resonances can be mitigated with a single, distributed TVA. In addition, further improvements can be made with the application of modern actuator/sensor technology and advanced control techniques including delayed and/or modal feedback. Previous research has shown that piezoelectric materials are quite effective sensors/actuators for vibration control problems due to their fast response and high sensitivity/force generation. In addition, these materials are capable of simultaneous actuation/sensing when placed in a balanced capacitive bridge.

See full dissertation at
**coe.northeastern.edu/19/TroyLundstorm**

# Soodabeh Milanlouei

PhD 2019, Industrial Engineering;
Advisor, Albert-Laszlo Barabasi

## Network Science: Applications From Network Structure To Health

From biological networks to social networks, we are surrounded by many complex networks with diverse nature and structure. Given the important role these networks play in our daily life, science and economy, their understanding, mathematical description, prediction, and control have become a major intellectual and scientific challenge of the 21st century. In response, the field of Network Science has emerged, drawing on theories and methods including graph theory, statistical mechanics, data mining, inferential modeling, and social structure. In this dissertation, we focus on the application of Network Science in two distinct areas: network structure and health. In the first chapter, we explore the properties of physical networks, where the nodes and links are physical objects unable to cross each other. These non-crossing conditions constrain their layout geometry and affect how networks form, evolve and function. We developed a modeling framework that accounts for the physical reality of nodes and links, allowing us to explore how the non-crossing conditions affect the network geometry. For small link thicknesses, we observed a weakly interacting phase where the layout avoids the link crossings via local link rearrangements, without altering the overall layout geometry. Once the link thickness exceeds a critical threshold, a strongly interacting phase emerges, where multiple geometric quantities scale with link thickness. We observed a deep universality, finding that the observed scaling properties are independent of the underlying network topology. In the second chapter, we investigate the role that diet plays in the development of Coronary Heart Disease (CHD).

See full dissertation at
**coe.northeastern.edu/19/SoodabehMilanlouei**

# Aidin Panahi

PhD 2019, Mechanical Engineering;
Advisor, Yiannis Levendis

## On The Combustion And Pyrolysis Of Fossil And Alternative Fuels To Minimize Their Environmental Impacts

Climate change and generation of solid wastes are among the most pressing challenges of the 21st century. Concerns about the environmental impact of greenhouse gas emissions from the combustion of fossil fuels have promoted the use of alternative sources of energy. These include renewable biomass and organic wastes (both agricultural and post-consumer). Options include firing these alternative fuels in dedicated boilers or co-firing them with coal in existing coal-fired boilers, as such infrastructure is already available, and it only requires limited modifications. In both cases, knowledge on the details of the pyrolysis and combustion behaviors of these fuel types is needed. Thus, in this work investigations have been conducted where: (i) Torrefaction, pyrolysis and combustion characteristics of pulverized biomass (woody, herbaceous and crop wastes) were assessed. Pyrolysis and combustion of raw and torrefied biomass particles took place under high heating rates and temperatures, similar to those prevailing in utility furnaces. Using optical and scanning electron microscopy it was determined that biomass particles undergo fusion and melting, and thereby their typical initial needle shapes transform to spheroidal or elliptical shapes. (ii) Combustion details of biomass were investigated by burning individual biomass particles, both raw and torrefied, of a priori-know mass, size and shape, under experimental conditions that are suitable for utility boilers. Based on a combination of these experimental techniques and appropriate numerical modeling it was determined that torrefied biomass chars that are formed under high heating rates and high temperature conditions burned as thin-wall cenospheres. (iii) A methodology was established for finding the torrefied biomass grind size that is suitable for firing or co-firing with coal in existing pulverized fuel boilers.

See full dissertation at
**coe.northeastern.edu/19/AidinPanahi**

# Guangying Yi

PhD 2019, Mechanical Engineering;
Advisor, Hameed Metghalchi

## Combustion Characteristics of Hydrocarbon Fuels And Fuandamentals of Rate-controlled Constrained-Equilibrium and its Applications

Ignition delay time and laminar burning speed are the most commonly investigated combustion characteristics, which are important indicators for combustor design. Syngas, or synthesis gas, and Gas-to-Liquid (GTL) fuel has gained considerable attention in recent years due to its clean combustion behavior when compared to the conventional fuels. Theoretical predictions on ignition delay time and laminar burning speed of GTL and mixture of JP-8/syngas have been investigated using a detailed kinetic model (DKM). In thermodynamics, gas dynamics and many other fields it is very important to determine the non-equilibrium behavior of a system. The most accurate way to do this is to set up and solve the detailed kinetic model. Since the DKM contains rate equations for every variable, the model may become very complicated when it is applied to a system that is three-dimensional and has many species or even coupled with turbulent model. Sometimes it is impossible to solve the model numerically because of the wide range of time and length scales. Rate-controlled constrained-equilibrium (RCCE) is a method which can help reduce the modeling and computational efforts. In this dissertation, fundamentals of RCCE and the development of different RCCE models are presented. The RCCE method is described in detail and then applied on methane, propane and butane combustions. Comparison between RCCE, DKM and shock tube experimental data show good performance of RCCE prediction on ignition delay times.

See full dissertation at
**coe.northeastern.edu/19/GuangyingYi**
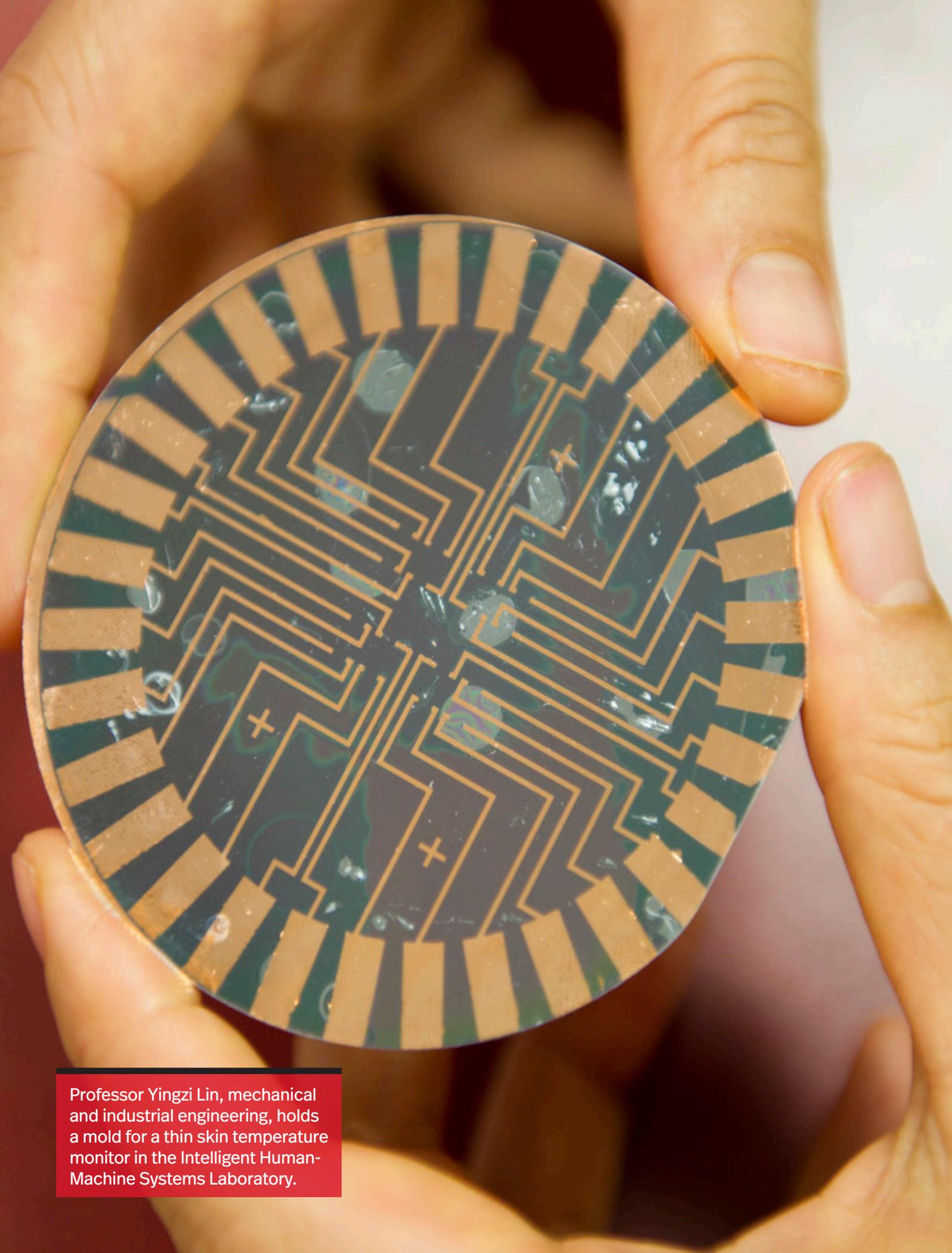
Professor Yingzi Lin, mechanical and industrial engineering, holds a mold for a thin skin temperature monitor in the Intelligent Human-Machine Systems Laboratory.

Northeastern University
College of Engineering

# DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING

Northeastern University
334 Snell Engineering Center
360 Huntington Avenue
Boston, MA 02115

P  617.373.2740

mie.northeastern.edu
coe.northeastern.edu

## COVER IMAGE

Assistant professor Samuel Felton and PhD candidate Chang Liu recently published a paper demonstrating that origami structures can be shifted quickly and simply between different structures.