



Northeastern University

College of Engineering

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13 | 14

Scholarship
Report

Global Experiential Research University

Founded in 1898, Northeastern is a global, experiential, research university offering undergraduate and graduate programs leading to degrees through the doctorate in nine colleges and schools, and select advanced degrees at graduate campuses in Charlotte, North Carolina, and Seattle, Washington.



Northeastern University
College of Engineering

» **WELCOME to the Northeastern University**
Department of Civil and Environmental Engineering «

Dear Friends,

This first annual scholarship report reflects the exceptional academic and professional accomplishments of the civil and environmental engineering faculty and Ph.D. candidates for the 2013-2014 year. With \$59 million in annual research expenditures, and 134 faculty members (36 in civil and environmental engineering) the college is expanding in both size and research scope. We look forward to a new infrastructure in 2016, adding a 220,000 square foot interdisciplinary science and engineering complex that will provide state-of-the art labs.

This year has been particularly exciting for our research presence, as it marked the successful culmination of the VOTERS center – a five-year program funded by NIST to create an innovative vehicle-mounted sensor network system to monitor road and bridge conditions – and the successful competitive renewal of the PROTECT center, which is funded by NIH to study the relationship between environmental contamination and preterm births.

Our scholars strive to use today's discovery and research to make tomorrow happen. You can see some highlights of our civil and environmental engineering faculty members at northeastern.edu/tomorrow. We hope you enjoy this report, and we look forward to sharing our future accomplishments in our annual scholarship reports.

Sincerely,

Jerome F. Hajjar, Ph.D., P.E.
CDM Smith Professor
Chair of Civil and Environmental Engineering
jf.hajjar@neu.edu

Key Contacts

Chair

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COLLEGE QUICK FACTS

134
Faculty
Members

Top 50 US
Engineering
School

Degree Programs

Undergraduate Graduate

Chemical Engineering	Bioengineering
Chemical Engineering and Physics	Biotechnology
Civil Engineering	Chemical Engineering
Computer Engineering	Civil Engineering
Computer Engineering and Physics	Computer Engineering
Electrical Engineering	Computer Systems Engineering
Electrical and Computer Engineering	Electrical and Computer Engineering
Electrical Engineering and Physics	Electrical Engineering
Industrial Engineering	Energy Systems
Mechanical Engineering	Engineering Management
Mechanical Engineering and Physics	Gordon Engineering Leadership
	Industrial Engineering
	Information Systems
	Interdisciplinary Engineering
	Mechanical Engineering
	Operations Research
	Sustainable Building Systems
	Telecommunication System Management

Federally Funded Multi-Institutional Research Centers

ALERT Awareness and Localization of Explosives-Related Threats; a Department of Homeland Security Center of Excellence

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

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

CURRENT Center for Ultra-wide-area Resilient Electric Energy Transmission Networks; a National Science Foundation Engineering Research Center, jointly supported by NSF and the Department of Energy and led by the University of Tennessee

CHOT Center for Health Organization Transformation; a National Science Foundation Industry-University Collaborative Research Center led by Texas A&M

HSyE CMS Innovation Center for Healthcare Systems Engineering; a Department of Health and Human Services Regional Systems Engineering Extension Center

PROTECT Puerto Rico Testsite for Exploring Contamination Threats; a National Institute of Environmental Health Sciences Superfund Research Program (SRP) Center

VOTERS Versatile Onboard Traffic Embedded Roaming Sensors; a National Institute of Standards and Technology (NIST) Technology Innovation Program project

CIVIL AND ENVIRONMENTAL ENGINEERING

Faculty by Scholarship Focus

Civil Infrastructure Security

Resilient Infrastructure Systems

Ayers, Joseph	Ganguly, Auroop	Silevitch, Michael
Birken, Ralf	Hajjar, Jerome	Touran, Ali
Caracoglia, Luca	Myers, Andrew	Wadia-Fascetti, Sara
Cranford, Steven	Patterson, Mark	Wang, Ming
Furth, Peter	Sheahan, Thomas	Yegian, Mishac

Structural and Building Engineering

Adams, George	Hajjar, Jerome	Wadia-Fascetti, Sara
Bernal, Dennis	Muftu, Sinan	Wang, Ming
Caracoglia, Luca	Sasani, Mehrdad	Yegian, Mishac
Cranford, Steven	Touran, Ali	

Environmental Health

Clean Water and Environmental Systems

Alshawabkeh, Akram	Gouhier, Tarik	Patterson, Mark
Beighley, Edward	Gu, April	Ruth, Matthias
Eckelman, Matthew	Hellweger, Ferdi	Suh, Helen
Fernandez, Loretta	Larese-Casanova, Philip	Trussell, Geoffrey
Ganguly, Auroop	Onnis-Hayden, Annalisa	

Geoenvironmental Engineering

Alshawabkeh, Akram
Fernandez, Loretta
Sheahan, Thomas

Sustainable Resource Engineering

Sustainable Network Systems

Eckelman, Matthew	Patterson, Mark
Furth, Peter	Trussell, Geoffrey
Ganguly, Auroop	Wadia-Fascetti, Sara
Gouhier, Tarik	Wang, Ming

Energy and Green Design

Caracoglia, Luca	Ruth, Matthias
Eckelman, Matthew	Touran, Ali
Fannon, David	Wang, Ming
Hajjar, Jerome	



Northeastern Awarded NIH Grant to Study Links Between Contaminants, Preterm Birth

Northeastern University has received a five-year, \$13.5 million award from the National Institutes of Health to continue its interdisciplinary investigation into the complex relationship between environmental contamination and preterm birth.

The multi-university research team previously received a \$10 million NIH National Institute of Environmental Health Sciences' Superfund Research Program grant in 2010 to establish the Puerto Rico Testsites for Exploring Contamination Threats (PROTECT) Center. The latest grant from the NIH will fund the next phase of a study of the extent to which exposure to commonly found chemicals, such as phthalates, is related to the extremely high preterm birthrate in Puerto Rico.

"An academic research enterprise is at its best when it can bring the brightest and most innovative minds together to solve real problems that will make a difference in people's lives—whether that impact is local or halfway across the world," said Stephen W. Director, provost and senior vice president for academic affairs. "The support of the federal government is critical to achieve our goals and to advance scientific research across disciplines."

Puerto Rico's preterm birthrate is about 17 percent. At 50 percent above the U.S. average, it is the highest rate of any U.S. jurisdiction and below only Malawi (18.1 percent) globally. Puerto Rico also has many "Superfund" sites—locations identified as high-risk for the public by the Environmental Protection Agency—in addition to more than 200 potential hazardous waste sites throughout the island.

Over the past three years, the team has documented significant contamination in the study areas and compelling preliminary associations between contaminants and preterm birth.

"We've seen extensive contamination, and women in the study area have been exposed to higher concentrations than those in the U.S.," said Akram Alshawabkeh, PROTECT's principal investigator and a professor of civil and environmental engineering at Northeastern.

While the team's research focuses on sites in Puerto Rico, the work has global implications. According to Alshawabkeh, reducing preterm birth rates will help save lives and minimize the escalating costs of healthcare. Preterm birth is the second

leading cause of death in children under the age of 5 worldwide and the leading cause of perinatal and infant mortality in the U.S. "This recognition by NIEHS enhances the college's reputation and capability for interdisciplinary research, as well as demonstrating our leadership in addressing important societal issues," said Nadine Aubry, dean of Northeastern's College of Engineering.

In addition to an epidemiological study that tracks the environmental exposures of 1,800 pregnant women, PROTECT's research projects include identifying toxicologic explanations for the connection between exposure and preterm birth; identifying xenobiotics (foreign chemical substances) that contribute to preterm birth; examining groundwater systems to understand how and where contaminants are transported; and developing sustainable, solar-powered, and environmentally-friendly technologies for the remediation of contaminated groundwater. PROTECT—which includes Northeastern, the University of Puerto Rico, and the University of Michigan—is co-directed by Alshawabkeh and Jose F. Cordero, dean of the Graduate School of Public Health at the University of Puerto Rico. The interdisciplinary team includes faculty members from Northeastern's College of Engineering, Bouvé College of Health Sciences, and College of Social Sciences and Humanities. To support its mission, PROTECT also engages with government agencies and nonprofit organizations such as March of Dimes and the Silent Spring Institute.

The project's interdisciplinary focus, Alshawabkeh said, is critical to its success. The research team includes engineers, chemists, health scientists, and toxicologists, and its work includes conducting studies, developing new technologies, and identifying strategies for policymakers to address the problem.

"When you look into a problem from only one specific discipline, you're solving one part of it," Alshawabkeh said. "But the problems we're facing as a society today are multi-layered. This team is working together to facilitate a greater understanding of this problem from many levels and identify diverse ways to solve it."

See faculty page 8



From Climate Change Comes Opportunity to Innovate

A cursory look at the Third National Climate Assessment released Tuesday by the National Climate Assessment and Development Advisory Committee yields a grim outlook. The authors state that climate change is already beginning to impact nearly every sector of the economy—and that's not all: It's already threatening human health and well being and adversely affecting our infrastructures, our water resources, our crops, our livestock, and our natural ecosystems. What's more, planning efforts to adapt and mitigate the problem are facing serious limitations.

But Northeastern professor Matthias Ruth, who co-authored two chapters of the nearly-1,200 page report, isn't pessimistic. As a leader in the emerging field of ecological economics, Ruth focuses his work on building bridges across sectors and disciplines to tackle the growing problem of climate change, especially in urban settings and he's hopeful that this approach will bear fruit.

Some people will look at the report, he said, and panic about the costs of dealing with climate change. Others will worry about the costs if we don't deal with it immediately. "And then there's a third group, and that's the one I'd love to see speak up," said Ruth, who holds appointments in the School of Public Policy and Urban Affairs and the Department of Civil and Environmental Engineering. "They are the ones who don't talk about the cost—they are the smart business people who say, 'wow, there's an opportunity here.'"

The chapters to which Ruth contributed focused on the impact of climate change on infrastructures, urban systems, and the northeastern United States. The report's collaborative approach, he said, which focused on convening experts from a wide range of disciplines in industry, government, and academia, is exactly the kind of measure we must continue to employ.

"Everything's interrelated—power, transportation, water—and they all have implications for public health," Ruth said. "So one big take home message is that we need to begin to manage these as interrelated systems." That message has

come to the forefront in this report, the third since 1990, when congress passed the Global Change Research Act mandating regular climate assessments.

The other big message is that climate change is not a topic of the future, Ruth said, noting that "It's already happening and every U.S. citizen is affected." This is evident, he said, in the increased number of heat waves in northeastern cities such as Boston, in the deterioration of our infrastructures, and in changes to biodiversity in our ecosystems.

And business as usual won't change the trend. "We draw on evermore depleted resources from all around the world to afford our lifestyles," Ruth said. "We should be smarter than that."

He said instead of putting up sea walls and other hard structures with materials from far away, we need to think about incorporating salt marshes and oyster beds along urban coastlines, as they can naturally help mitigate floods as storm surges increase. Instead of designing buildings for a climate of a hundred years ago, we need to think of alternatives to the flat black roofs that trap heat. Instead of thinking about our infrastructure systems as separate and contained, we need to imagine ways that water, energy, and transportation can work together to absorb the impacts of a changing climate.

Luckily, Ruth said, "This is the country where this happens. We pride ourselves on this entrepreneurial spirit of mobilizing resources and having the marketplace help support these decisions." He envisions a world where we take all this disparate knowledge and create something new, a world where the traditional engineering methods work in unison with our local ecosystems—all supported by data and new innovations.

"With the world largely urbanized now, if we can figure out here how to make that transition to more sustainable urban living," Ruth said, "I think we have a great business opportunity, but also a great humanitarian opportunity for other parts of the world."

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A New Era for Climate Change Science

In 2007, the Intergovernmental Panel on Climate Change released its fourth assessment report based on a new group of climate models, the value of which earned the IPCC the Nobel Peace Prize. The new models—collectively referred to as CMIP3—revealed information about climate change that sealed the deal on a number of lingering questions: Is global temperature increasing? Yes. Is it caused by humans? Almost certainly. But one major question—perhaps the most important one of all—remained. What should we do about it?

To answer that question, stakeholders would need more locally relevant information on much shorter time scales. So when the next generation of climate models was released in 2012, scientists had high hopes. These models included more physical, chemical, and biological processes, often considered at a much finer-grain than the previous models. Surely CMIP5, as the new ensemble of models is called, would provide credible projections at the scales relevant to stakeholders.

But a new study from the lab of Northeastern University associate professor of civil and environmental engineering Auroop Ganguly tells a different story. According to the team's analysis, which will be published in the journal *Climate Dynamics*, the CMIP5 models don't do a better job. In fact, some projections are even worse than the CMIP3 models that were released in 2007. "Some of the models say an area will be wetter in the future, others say it'll be drier," said Devashish Kumar, a doctoral candidate in Ganguly's Sustainability and Data Sciences laboratory and lead author on the paper. "So which is it and which should we plan for?" Professor Auroop Ganguly (center) and his students (from left) Debasish Das, Evan Kodra, Poulomi Ganguli, Devashish Kumar, Rachindra Mawalagedara, Saeed Zabet, David Wang and Babak Fard inside the SDS Lab. Photo by Mariah Tauger. A handful of earlier studies made similar claims prior to the release of the CMIP5 results. But unlike Northeastern's study, most of that work was anticipatory, since the actual data weren't yet available. While the results are sobering for a field that has, in recent years, relied on the accuracy of its models to make the most profound impact statements, Ganguly's team does not think climate modeling has necessarily reached its end. It's just that "these models may not be able to keep pace with the urgency with which the stakeholders require the problem to be solved," he explained.

That's because of longstanding gaps in our understanding of the science in areas such as cloud physics and ocean-land-atmosphere interactions, Ganguly said. While our understanding in these areas may eventually get better, the timeline will be too slow for policy makers to wait around. Additionally, climate and earth system models have intrinsic variability, which may never be overcome, "but still need to be characterized," said Ganguly. Instead, he is advocating for the use of Big Data tools to advance the field. Between observed data from various types of sensors stationed around the globe and even in space, and the data coming from the simulation models themselves, climate scientists are treading a veritable flood of data. But climate is a complex field. A change in one variable can cause ripple effects throughout the entire system, a phenomenon that poses challenges to the scientists studying it. For that reason, Ganguly said, the data deluge is only being used in pockets of the field. For instance, researchers interested in rainfall extremes look at rainfall data itself as well as data they already know may influence these extremes, such as specific atmospheric and sea surface temperatures. However, a vast treasure trove of complex data—which could also yield important insights—lies unexplored. As Ganguly put it, "We need to look at it all as an integrated whole." In another upcoming paper, which will appear in the journal *Nonlinear Processes in Geophysics*, Ganguly and doctoral candidate Evan Kodra collaborated with a large team of climate scientists, hydrologists, computer scientists, and statisticians to further address this question. This work is part of a multi-institution five-year, \$10 million grant from the National Science Foundation. While the researchers believe models will remain invaluable to the field, they argue that an optimal blend of data-driven insights and physical understanding—beyond what may be easily captured within the current generation of climate models—may be a path forward. For this to happen, Big Data tools need to be customized for complex climate data, and optimized for extremes to characterize what may ultimately be small data, from possibly elusive indicators. "Ultimately, future projections will have to be based on models," said Ganguly. "And actionable predictive insights will need to be generated based on such projections. But physics-guided data mining may need to work in tandem to inform stakeholder decisions."

[See faculty page 21](#)

GEORGE ADAMS

COE Distinguished Professor, Mechanical and Industrial Engineering; affiliated faculty: Civil and Environmental Engineering, Electrical and Computer Engineering, PhD, University of California, 1975.
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Scholarship Focus

- Contact mechanics including adhesion, friction, and plasticity
- Modeling and analysis of microelectromechanical systems (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 Recent Publications

Books and book chapters

G.G. Adams

Contacts Considering Adhesion, In Encyclopedia of Tribology, Q. Jane Wang and Yip-Wah Chung (editors), Springer Reference, 2013, 571-579

G.G. Adams

Contacts Involving Wave Propagation, Encyclopedia of Tribology, Springer Reference, 2013, 579-583

G.G. Adams

The DMT Theory of Adhesion, Encyclopedia of Tribology, Springer Reference, 2013, 3560-3565

Papers in refereed journals

H. Pan, Y.-C. Wu, G.G. Adams, G.P. Miller, N.E. McGruer

Interfacial Shear Stress Between Single-Walled Carbon Nanotubes and Gold Surfaces With and Without an Alkanethiol Monolayer, Journal of Colloid and Interface Science, 407, 2013, 133-139

J.R. Parent, G.G. Adams

A Model of a Trapped Particle Under a Plate Adhering to a Rigid Surface, Journal of Applied Mechanics, 80, 2013, 051011

Y.-C. Wu, N.E. McGruer, G.G. Adams

Adhesive Slip Process Between a Carbon Nanotube and a Substrate, Journal of Physics D: Applied Physics, 46, 2013, 175305

R.P. Hennessy, A. Basu, G.G. Adams, N.E. McGruer

Hot-Switched Lifetime and Damage Characteristics of MEMS Switch Contacts, Journal of Micromechanics and Microengineering, 23, 2013

Research Projects

Metal Contacts for High Power RF MEMS Switches

Co-Principal Investigator, Subcontract from Defense Advanced Research Projects Agency

AKRAM ALSHAWABKEH

George A. Snell Professor, Civil and Environmental Engineering; affiliated faculty, Bioengineering
PhD, Louisiana State University, 1994. Joined Northeastern in 1997
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Scholarship Focus

- Geotechnical and geoenvironmental engineering
- Soil and groundwater remediation
- Contaminant fate and transport
- Environmental restoration and health

Honors and Awards

- Fellow, American Society of Civil Engineers
- National Science Foundation CAREER Award
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Papers in refereed journals

- A. Anaya, I. Padilla, R. Macchiavelli, D. Vesper, J. Meeker, A. Alshawabkeh
Estimating Preferential Flow in Karstic Aquifers Using Statistical Mixed Models, Ground Water Journal, 2013
- S. Yuan, P. Liao, A.N. Alshawabkeh
Electrolytic Manipulation of Persulfate Reactivity by Iron Electrodes for Trichloroethylene Degradation in Groundwater, Environmental Science and Technology, 48 (1), 2013, 656-663
- S. Yuan, N. Gou, A. Alshawabkeh, A.Z. Gu
Efficient Degradation of Contaminants of Emerging Concerns by a New Electro-Fenton Process with Ti/MMO Cathode, Chemosphere, 93 (11), 2013, 2796-2804
- W. Xie, S. Yuan, X. Mao, W. Hu, P. Liao, M. Tong, A. Alshawabkeh
Electrocatalytic Activity of Pd-Loaded Ti/TiO₂ Nanotubes Cathode for TCE Reduction in Groundwater, Water Res., 47 (11), 2013, 3573-3582
- J.H. Choi, S. Maruthamuthu, Y.J. Lee, A. Alshawabkeh
Reduction of Nitrate in Agricultural Soils by Bio-Electrokinetics, Soil and Sediment Contamination: An International J., 22 (7), p 767-782, 2013
- E. Eseller-Bayat, S. Gokyer, M.K. Yegian, E. Ortakci, A. Alshawabkeh
Design and Application of Simple Shear Liquefaction Box, ASTM Geotechnical Testing Journal 36 (3), 2013, 322-330
- E. Eseller-Bayat, M.K. Yegian, A. Alshawabkeh, S. Gokyer
Liquefaction Response of Partially Saturated Sands. I: Experimental Results, Journal of Geotechnical and Geoenvironmental Engineering, 139, 2013, 863-871
- E. Eseller-Bayat, M.K. Yegian, A. Alshawabkeh, S. Gokyer
Liquefaction Response of Partially Saturated Sands. II: Empirical Model, Journal of Geotechnical and Geoenvironmental Engineering, 139, 2013, 872-879



- E. Eseller-Bayat, S. Gokyer, M.K. Yegian, R.O. Deniz, A. Alshawabkeh
Bender Elements and Bending Disks for Measurement of Shear and Compression Wave Velocities in Large Sand Specimens, ASTM Journal of Geotechnical Testing, 36 (2), 2013, 275-282
- J.D. Meeker, D.W. Cantonwine, L.O. Rivera-Gonzalez, K.K. Ferguson, B. Mukherjee, A.M. Calafat, X. Ye, L.V. Anzalota Del Toro, N. Crespo, B. Jimenez-Velez, A. Alshawabkeh, J.F. Cordero
Distribution, Variability and Predictors of Urinary Concentrations of Phenols and Parabens Among Pregnant Women in Puerto Rico, Environmental Science and Technology, 47 (7), 2013, 3439-3447
- D. Meric, F. Hellweger, S. Barbuto, N. Rahbar, A. Alshawabkeh, T. Sheahan
Model Prediction of Long-Term Reactive Core Mat Efficacy for Capping Contaminated Aquatic Sediments, Journal of Environmental Engineering, 139 (4), 2013, 564-575
- S. Yuan, M. Chen, X. Mao, A. Alshawabkeh
A Three-Electrode Column for Pd-Catalytic Oxidation of TCE in Groundwater With Automatic pH-Regulation and Resistance to Reduced Sulfur Compound Foiling, Water Research, 47 (1), 2013, 269-278
- S. Yuan, M. Chen, X. Mao, A. Alshawabkeh
Effects of Reduced Sulfur Compounds on Pd-Catalytic Hydrodechlorination of TCE in Groundwater by Cathodic H₂ Under Electrochemically Induced Oxidizing Conditions, Environmental Science and Technology, 47 (18), 2013, 10502-10509
- K. Baek, N. Kasem, A. Ciblak, D. Vesper, I. Padilla, A. Alshawabkeh
Electrochemical Removal of Selenate From Aqueous Solutions, Chemical Engineering Journal, 2013, 678-684
- K. Baek, A. Ciblak, X. Mao, E.J. Kim, A. Alshawabkeh
Iron Anode Mediated Transformation of Selenate in Sand Columns, Water Research, 47 (17), 2013, 6538-6545

Research Projects

Puerto Rico Testsite for Exploring Contamination Threats (PROTECT), a National Institute of Environmental Health Sciences Superfund Research Center. PROTECT investigates the relationship between environmental contamination and preterm birth

Principal Investigator, National Institutes of Health

Induced Partial Saturation (IPS) Through Transport and Reactivity for Liquefaction Mitigation

Co-Principal Investigator, National Science Foundation

JOSEPH AYERS

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Scholarship Focus

- Neurophysiology and behavior
- Biorobotics and electronic nervous systems
- Synthetic biology

Selected Recent Publications

Books and book chapters

A. Westphal, D. Blustein, J. Ayers

A Biomimetic Neuronal Network-Based Controller for Guided Helicopter Flight,
Biomimetic and Biohybrid Systems, Springer, 2013, 299-310



Research Projects

RoboBees: A Convergence of Body, Brain and Colony

Principal Investigator, National Science Foundation

Utilizing Synthetic Biology to Create Programmable Micro-Bio-Robots

Co-Principal Investigator, Office of Naval Research

Cyberplasm - An Autonomous Micro-Robot Constructed Using Synthetic Biology

Principal Investigator, National Science Foundation

Modernization and Enhancement of the Seawater System and Research Infrastructure at Northeastern University's Marine Science Center

Co-Principal Investigator, National Science Foundation

Biomimetics of Jellyfish Tentacles

Principal Investigator, Schlumberger Doll, Inc

R. EDWARD BEIGHLEY

Associate Professor, Civil and Environmental Engineering
PhD, University of Maryland, 2001. Joined Northeastern in 2013
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Scholarship Focus

- Hydrologic and hydraulic modeling
- Remote sensing of the hydrologic cycle
- Hydrologic impacts of climate and/or land use change
- Flood hazard and risk assessment

Selected Recent Publications

Papers in refereed journals

H.H. Ramadan, R.E. Beighley, A.S. Ramamurthy

Sensitivity of the Litani Basin's Runoff in Lebanon to Climate Change, International Journal of Environment and Pollution 52 (1/2), 2013, 65–81

H.H. Ramadan, R.E. Beighley, A.S. Ramamurthy

Investigating Temperature and Precipitation Trends in Lebanon's Largest River; the Litani Basin, Journal of Water Resources Planning and Management, ASCE, 139, 2013, 86-95

Research Projects

Terrestrial Hydrology, Decomposing the Water Storage Signal from Basins in Varied Climate Settings with Remote Sensing and Modeling

Principal Investigator, National Aeronautics and Space Administration

Gravity Recovery and Climate Experiment (GRACE) mission Science Team Program, Enhancement of GRACE Temporal Gravity Field Solutions to Study Terrestrial Water Dynamics in the Congo Basin

Co-Principal Investigator, National Aeronautics and Space Administration



DIONISIO BERNAL

Professor, Civil and Environmental Engineering

PhD, University of Tennessee, 1979. Joined Northeastern in 1986

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Scholarship Focus

- System identification
- Model updating
- Damage characterization
- Input identification
- Earthquake engineering
- Soil-Structure interaction



Honors and Awards

American Society of Civil Engineers Moisseiff Award

Selected Recent Publications

Books and book chapters

D. Bernal

An Encyclopedia on Structural Health Monitoring, Springer, ch. 21, 2013

Papers in refereed journals

D. Bernal

Kalman Filter Damage Detection Under Changing Process and Measurement Noise, Mechanical Systems and Signal Processing, 39 (1), 2013, 361-371

D. Bernal, M. Doheler, S. Mozzafari, K. Kwan, L. Yang

First Mode Damping Ratios for Buildings, Earthquake Spectra, preprints, 2013

D. Bernal

Damage Localization and Quantification from the Image of Changes in Flexibility, J. Engineering Mechanics ASCE, 140 (2), 2014, 279-286

D. Bernal, A. Ussia

Sequential Deconvolution in Input Reconstruction, Mechanical Systems and Signal Processing, online, 2014

Research Projects

NEESR: Next Generation Dissipation Guidelines for New and Existing Structures using the NEES Database

Principal Investigator, National Science Foundation

Algorithm-Fused High Performance Damage Detector: Optimal Sensor Distributions

Principal Investigator, National Science Foundation

Assessment of Seismic Provisions on Effects of Multi-Component Excitation Using Instrumental Data and Adaptive Principal Component Reconstruction Scheme

Principal Investigator, California Strong Motion Instrumentation Program

IGERT: Intelligent Diagnostics for Aging Civil Infrastructure

Co-Principal Investigator, National Science Foundation

RALF BIRKEN

Research Assistant Professor, Civil and Environmental Engineering; affiliated faculty, Electrical and Computer Engineering, PhD, University of Arizona, 1997. Joined Northeastern in 2009
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Scholarship Focus

- Near-surface geophysics
- Electromagnetic geophysics
- Integration of multi-channel multi-domain sensors into geophysical subsurface imaging systems
- Non-destructive testing



Selected Recent Publications

Book and book chapters

M.L. Wang, R. Birken

Sensing Solutions for Assessing and Monitoring Roads, ch. 15 in Wang, M. L., Lynch, J.P., and Sohn, H. (editors), *Sensor Technologies for Civil Infrastructures: vol. 2: Applications in Structural Health Monitoring*: Woodhead Publishing, 2014

R. Birken, M. Oristaglio

Mapping Subsurface Utilities with Mobile Electromagnetic Geophysical Sensor Arrays, ch. 12 In Wang, M. L., Lynch, J.P., and Sohn, H. (editors), *Sensor Technologies for Civil Infrastructures: vol. 2: Applications in Structural Health Monitoring*: Woodhead Publishing, 2014

R. Birken, J. Zhang, G. Schirner

System Level Design of a Roaming Multi-Modal Multi-Sensor System, ch. 6 in Wang, M. L., Lynch, J.P., and Sohn, H. (editors), *Sensor Technologies for Civil Infrastructures: vol. 2: Applications in Structural Health Monitoring*: Woodhead Publishing, 2014

Papers in refereed journals

D. Busuioc, K. Ebnabbasi, R. Birken, M. Wang

Taper Design of Co-Planar Tapered Slot Antenna by Chebyshev Transformer, *Journal of Electromagnetic Waves and Applications*, Antennas and Propagation, 60 (5), 2013

Research Projects

VOTERS: Versatile Onboard Traffic Embedded Roaming Sensors

Co-Principal Investigator, National Institute of Standards and Technology

NANOGLUC: A Salivary Glucose Sensor (Bridge Phase)

Co-Principal Investigator, Nano Bio Systems

LUCA CARACOGLIA

Associate Professor, Civil and Environmental Engineering

PhD, University of Trieste, 2001. Joined Northeastern in 2005

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Scholarship Focus

- Structural engineering
- Structural dynamics
- Wind engineering
- Wind-induced vibration and cable dynamics
- Wind-based energy harvesting systems
- Wind energy



Honors and Awards

National Science Foundation CAREER Award

Selected Recent Publications

Papers in refereed journals

D.-W. Seo, L. Caracoglia

Estimating Life-Cycle Monetary Losses Due to Wind Hazards: Fragility Analysis of Long-Span Bridges, Engineering Structures, 56, 2013, 1593–1606

G.-F. Giaccu, L. Caracoglia

Generalized Power-Law Stiffness Model for Nonlinear Dynamics of in-Plane Cable Networks, Journal of Sound and Vibration, 332 (8), 2013, 1961–1981

L. Caracoglia

An Euler - Monte Carlo Algorithm Assessing Moment Lyapunov Exponents for Stochastic Bridge Flutter Predictions, Computers and Structures, 122, 2013, 65–77

E.H. Hernandez, D. Bernal, L. Caracoglia

Online Monitoring of Wind Induced Stresses and Fatigue Damage in Instrumented Structures, Structural Control and Health Monitoring, 20 (10), 2013, 1291-1302

G.-F. Giaccu, L. Caracoglia, B. Barbiellini

Modeling “Unilateral” Response in the Cross-Ties of a Cable Network: Deterministic Vibration, Journal of Sound and Vibration, 333, 2014, 4427–4443

F. Moghim, L. Caracoglia

Effect of Computer-generated Turbulent Wind Field on Trajectory of Compact Debris: a Probabilistic Analysis Approach, Engineering Structures, 59, 2014, 195–209

Research Projects

CAREER: An Innovative Performance-Based Simulation Framework for High-Rise Buildings Against Wind Hazards

Principal Investigator, National Science Foundation

STEVEN CRANFORD

Assistant Professor, Civil and Environmental Engineering
PhD, Massachusetts Institute of Technology, 2012. Joined Northeastern in 2012
617.373. 4400 | s.cranford@neu.edu | coe.neu.edu/Research/nice

Scholarship Focus

- Full atomistic molecular modeling; molecular dynamics
- Multi-scale modeling and model development; coarse-graining approaches
- Structural mechanics and engineering
- Nano-mechanics and molecular mechanics
- Materiomics



Selected Recent Publications

Papers in refereed journals

S. Cranford

Thermal Stability of Idealized Folded Carbyne Loops, Nanoscale Research Letters, 8 (490), 2013

S. Cranford

Increasing Silk Fibre Strength Through Heterogeneity of Bundled Fibrils, Journal of the Royal Society Interface, 10 (82), 2013

N. Pugno, S. Cranford, M.J. Buehler

Simultaneous Material and Structural Optimization in the Spider Web Attachment Disk, Small, 9 (16), 2013, 2747–2756

S. Cranford, J. de Boer, C.A. van Blitterswijk, M.J. Buehler

Materiomics: An-omics Approach to Biomaterials Research, Advanced Materials, 25 (6), 2013, 802-824

S. Cranford

Buckling Induced Delamination of Graphene Composites, Applied Physics Letters, 102, 2013

S. Cranford, M.J. Buehler

Critical Cross-Linking to Mechanically Couple Polyelectrolytes and Flexible Molecules, Soft Matter, 9, 2013, 1076-1090

Research Projects

Multi-phase Topologically Controlled Structural Fuses Inspired by Nature

Principal Investigator, Haythornthwaite Research Initiation

MATTHEW ECKELMAN

Assistant Professor, Civil and Environmental Engineering; affiliated faculty, Chemical Engineering
PhD, Yale University, 2009. Joined Northeastern in 2012
617.373.4256 | m.eckelman@neu.edu

Scholarship Focus

- Environmental impacts of metals production, use, emissions, and recovery
- Life cycle assessment of novel materials and devices
- Systems modeling of bioenergy and bio-based industrial chemicals
- Material and energy use in urban environments and civil infrastructure

Honors and Awards

International Laudise Prize in Industrial Ecology



Selected Recent Publications

Papers in refereed journals

R. Wang, M.J. Eckelman, J.B. Zimmerman

[Consequential Environmental and Economic Life Cycle Assessment of Green and Gray Stormwater Infrastructures for Combined Sewer Systems](#), Environmental Science & Technology, 47 (19), 2013

M.J. Eckelman, M.R. Chertow

[Life Cycle Energy and Environmental Benefits of a U.S. Industrial Symbiosis](#), International Journal of Life Cycle Assessment, 18 (8), 2013

L. Dahlben, M.J. Eckelman, A. Hakimian, S. Somu, J.A. Isaacs

[Environmental Life Cycle Assessment of a Carbon Nanotube-Enabled Semiconductor Device](#), Environmental Science & Technology, 47 (15), 2013

M.J. Eckelman

[Life Cycle Assessment in Support of Sustainable Transportation](#), Environmental Research Letters, 8 (2), 2013

R.J. Lifset, M.J. Eckelman

[Material Efficiency in a Multi-Material World](#), Philosophical Transactions of the Royal Society, 371 (1986), 2013

L. Sima, E. Kelner-Levine, M.J. Eckelman, K.M. McCarty, M. Elimelech

[Water Flows, Energy Demand, and Market Analysis of the Informal Water Sector in Kisumu, Kenya](#), Ecological Economics, 87, 2013, 137-144

L. Ciacci, W. Chen, F. Passarini, M.J. Eckelman, I. Vassura, L. Morselli

[Historical Evolution of Anthropogenic Aluminum Stocks and Flows in Italy](#), Resources, Conservation, and Recycling, 72, 2013, 1-8

M.J. Eckelman, M. Altonji, A. Clark, M. Jenkins, B. Lakin

[Life Cycle Environmental and Economic Assessment of Municipal Water Storage Options: Infrastructure Refurbishment Versus Replacement](#), ASCE Journal of Infrastructure Systems, 2014

MATTHEW ECKELMAN continued

M.J. Eckelman, Y. Arakaki, W.A. Ashton, K. Hanaki, L.C. Malone-Lee, S. Nagashima

Island Waste Management and Industrial Ecology, Journal of Industrial Ecology 18 (2), 2014, 306-317

L. Soh, M. Montazeri, M.J. Eckelman, B. Haznedaroglu, J. Peccia, J.B. Zimmerman

Evaluating Microalgal Integrated Biorefinery Schemes: Empirical Controlled Growth Studies and Life Cycle Assessment, Bioresource Technology 151, 2014, 19-27

Research Projects

Ethics Education in Life Cycle Design, Engineering, and Management

Principal Investigator, National Science Foundation

Designing and Integrating Life Cycle Assessment Methods for Nanomanufacturing Scale-up

Co-Principal Investigator, National Science Foundation

UV-curable Biobased Wood Flooring Coatings

Co-Principal Investigator, U.S. Dept. of Agriculture Critical Agricultural Materials

Transformation of Lignin into Building Blocks for Protective Coatings

Senior Personnel, U.S. Dept. of Agriculture Critical Agricultural Materials

DAVID FANNON

Assistant Professor, School of Architecture; jointly appointed, Civil and Environmental Engineering MS, University of California, Berkeley, 2014. Joined Northeastern in 2013
617.373.4637 | d.fannon@neu.edu

Scholarship Focus

- Sustainable systems
- Building technology
- High-performance, low-energy sustainable building design
- Personal environmental control devices



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LORETTA FERNANDEZ

Assistant Professor, Civil and Environmental Engineering; jointly appointed, Marine and Environmental Sciences, PhD, Massachusetts Institute of Technology, 2010. Joined Northeastern in 2013
617.373.5461 | l.fernandez@neu.edu

Scholarship Focus

- Urban coastal sustainability
- Tools and sampling techniques for understanding transport processes and biological availability of persistent organic pollutants (POPs)
- Predicting toxic effects to resident biota and humans and assessing remediation options



Honors and Awards

- National Research Council, Research Associateship
- National Science Foundation, Graduate Research Fellowship

Selected Recent Publications

Papers in refereed journals

L. Fernandez, W. Lao, K. A. Maruya, R. M. Burgess

Calculating the Diffusive Flux of Persistent Organic Pollutants Between Sediments and the Water Column on the Palos Verdes Shelf Superfund Site Using Polymeric Passive Samplers, Environmental Science & Technology, 48, 2014, 3925-3924

Research Projects

Quantitative Thermodynamic Exposure Assessment (Q-TEA) Supporting Resilient Contaminated Sediment Site Restoration

Passive Sampling, Strategic Environmental Research and Development Program

PETER FURTH

Professor, Civil and Environmental Engineering

PhD, Massachusetts Institute of Technology, 1981. Joined Northeastern in 1981

617.373.2447 | pfurth@coe.neu.edu | coe.neu.edu/~pfurth

Scholarship Focus

- Traffic signal control
- Transit signal priority
- Transit operations modeling
- Transit data collection and sampling
- Bicycle transportation

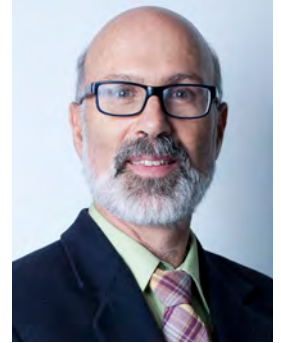
Research Projects

Self-Organizing Traffic Signals

Principal Investigator, National Science Foundation

Bicycle Network Analysis

Principal Investigator, Delaware Department of Transportation



AUROOP GANGULY

Associate Professor, Civil and Environmental Engineering
PhD, Massachusetts Institute of Technology, 2002. Joined Northeastern in 2011
617.373.3710 | a.ganguly@neu.edu | northeastern.edu/sds

Scholarship Focus

- Climate extremes and water sustainability
- Data sciences for complex systems

Selected Recent Publications

Books and book chapters

A.R. Ganguly, E. Kodra, S. Chatterjee, A. Banerjee, H.N.Najm

Computational Data Sciences for Actionable Insights on Climate Extremes and Uncertainty, ch. 5, in Ting Yu, Nitesh Chawla and Simeon Simoff (Eds.),

Computational Intelligent Data Analysis for Sustainable Development, Chapman and Hall / CRC Press, 2013, 127-156

A.R. Ganguly, J. Whitmeyer, O. Omitaomu, P. Brecke, M. Hadžikadic, P. Gilman, et al.

Towards a Characterization and Systematic Evaluation Framework for Theories and Models of Human, Social, Behavioral, and Cultural Processes within Agent-Based Models, in Managing Complexity: Practical Considerations in the Development and Application of ABMs to Contemporary Policy Challenges, Studies in Computational Intelligence, Springer Berlin Heidelberg, 504, 2013, 93-136

Papers in refereed journals

J. Kawale, S. Liess, A. Kumar, M. Steinbach, A.R. Ganguly, N.F. Samatova, F. Semazzi, P. Snyder, V. Kumar

A Graph Based Approach to find Teleconnections in Climate Data, Statistical Analysis and Data Mining, American Statistical Association, 6 (3), 2013, 158-179

A.R. Ganguly, E.A. Kodra, A. Banerjee, S. Boriah, S. Chatterjee, S. Chatterjee, et. al

Toward Enhanced Understanding and Projections of Climate Extremes Using Physics-Guided Data Mining Techniques, Nonlinear Processes in Geophysics Discussions, 1, 2014, 51-96

D. Das, J. Dy, J. Ross, Z. Obradovic, A.R. Ganguly

Non-Parametric Bayesian Mixture of Sparse Regressions with Application Towards Feature Selection for Statistical Downscaling, Nonlinear Processes in Geophysics Discussions, 1, 2014, 615-648

D. Kumar, E. Kodra, A.R. Ganguly

Regional and Seasonal Intercomparison of CMIP3 and CMIP5 Climate Model Ensembles for Temperature and Precipitation, Climate Dynamics, 2014

Research Projects

Expeditions in Computing: Understanding Climate Change: A Data-Driven Approach

Co-Principal Investigator, National Science Foundation

Climate and Population Change Impacts on the Water-Energy Nexus and US Power Production

Principal Investigator, Advanced Research Projects Agency

Disaster Resilience of Buildings, Infrastructure, and Communities

Co-Principal Investigator, National Institute of Standards and Technology



TARIK GOUHIER

Assistant Professor, Civil and Environmental Engineering; jointly appointed, Marine and Environmental Sciences, PhD, McGill University, 2010. Joined Northeastern in 2012
781.581.7370 | tarik.gouhier@gmail.com | northeastern.edu/synchrony

Scholarship Focus

- Developing dynamical models for ecological and environmental processes
- Theoretical ecology
- Effects of environmental change

Selected Recent Publications

Papers in refereed journals

T.C. Gouhier, F. Guichard, B. A. Menge

Designing Effective Reserve Networks for Non-Equilibrium Metacommunities, Ecological Applications, 23, 2013, 1488-1503

P.L. Zarnetske, T. C. Gouhier, S. D. Hacker, E. Seabloom, V. Bokil

Indirect Effects and Facilitation Among Native and Non-Native Species Promote Invasion Success Along an Environmental Stress Gradient, Journal of Ecology, 101, 2013, 905-915

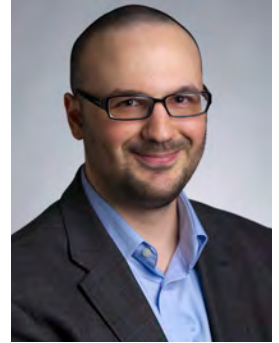
T.C. Gouhier, F. Guichard

Synchrony: Quantifying Variability in Space and Time, Methods in Ecology and Evolution, 5, 2014, 524-533

Research Projects

Ecosystem Response to Climate Change: Role of Ecological Subsidies and Species Interactions

Co-Principal Investigator, National Science Foundation



Scholarship Focus

- Environmental toxicology and nanotoxicity
- Biological wastewater treatment and nutrient removal
- Pollutants and pathogens detection in water
- Biosensors
- Water disinfection and byproducts
- Bioremediation



Honors and Awards

- College of Engineering Faculty Fellow
- National Science Foundation CAREER Award
- National Science Foundation Education BRIGE Award
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Books and book chapters

A.Z. Gu

Attached Growth and Combined Bio-Processes, Wastewater Engineering –Treatment and Reuse, ch. 9, Metcalf & Eddy, Inc., McGraw-Hill, New York, NY 10020, Fifth edition, 2013

Papers in refereed journals

X. Wang, Y.Y. Li, A.Z. Gu, K.-T. Wan

Predicting Macroscopic Colloidal Deposition and Transportation Based on Dimensionless Tabor's Parameter, Nano LIFE, 3 (1), 2013

S.H. Yuan, N. Gou, A. Alshawabkeh, A.Z. Gu

Efficient Degradation of Contaminants of Emerging Concerns by a new Electro-Fenton Process with Ti/MMO Cathode, Chemosphere, 93 (11), 2013, 2796-2804

D. Li, S. Zeng, A.Z. Gu, M. He, H. Shi

Inactivation, Reactivation and Regrowth of Indigenous Bacteria in Reclaimed Water After Chlorine Disinfection of a Municipal Wastewater Treatment Plant, Journal of Environmental Science, 25 (7), 2013, 1319-1325

Y. Li, X. Wang, A. Onnis-Hayden, K.-T. Wan, A.Z. Gu

Universal Quantifier Derived from AFM Analysis Links Cellular Mechanical Properties and Cell-Surface Integration Forces with Microbial Deposition and Transport Behavior, Environmental Science and Technology, 48 (3), 2014, 1769-1778

M. Khatri, D. Bello, A.K. Pal, J.M. Cohen, S. Woskie, T. Gassert, J. Lan, A.Z. Gu, P. Demokritou, P. Gaines

Evaluation of Cytotoxic Genotoxic and Inflammatory Responses of Nanoparticles from Photocopiers in Three Human Cell Lines, Particle and Fibre Toxicology, 10 (42), 2014

APRIL GU continued

Research Projects

A Novel Bio-Mechanical Model of Bacterial Adhesion

Co-Principal Investigator, National Science Foundation

CAREER: Mechanistic Toxicity Assessment Of Emerging Contaminants for Water Quality Monitoring

Principal Investigator, National Science Foundation

Collaborative Research: Impact of Wastewater-Derived Organic Nitrogen on Eutrophication

Principal Investigator, National Science Foundation

Development of Biosensors for Water Quality Monitoring

Principal Investigator, CDM and William and Diane Howard Scholarship

Effect of Advanced Oxidation Processes on Effluent Organic Nutrients Composition- Implications on Bio-Availability and Eutrophication Potential

Principal Investigator, Water Environment Research Foundation

Environmental Sustainability Assessment of Nutrient Removal Technologies via Life Cycle Assessment

Principal Investigator, Water Environment Research Foundation

JEROME HAJJAR

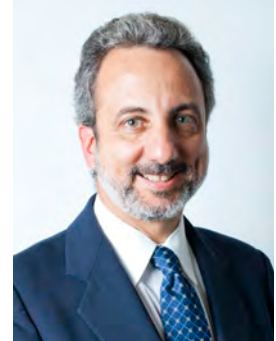
CDM Smith Professor and Chair, Civil and Environmental Engineering
PhD, Cornell University, 1988. Joined Northeastern in 2010
617.373.3242 | jf.hajjar@neu.edu | coe.neu.edu/~jfhajjar

Scholarship Focus

- Earthquake engineering
- Computational analysis
- Experimental testing
- Structural stability
- Steel and composite steel/concrete structures

Honors and Awards

- Fellow, American Society of Civil Engineers
- Fellow, Structural Engineering Institute
- Norman Medal, American Society of Civil Engineers
- Shortridge Hardesty Award, American Society of Civil Engineers
- T. R. Higgins Lectureship Award, American Institute of Steel Construction
- Special Achievement Award, American Institute of Steel Construction
- Walter L. Huber Civil Engineering Research Prize, American Society of Civil Engineers
- Breakthrough Award, Popular Mechanics



Selected Recent Publications

Papers in refereed journals

- J.S. Steelman, E.T. Filipov, L.A. Fahnestock, J.R. Revell, J.M. LaFave, J.F. Hajjar, D.A. Foutch
Experimental Behavior of Steel Fixed Bearings and Implications for Seismic Bridge Response, Journal of Bridge Engineering, ASCE, 2013
- S.B. Walsh, D.J. Borello, B. Guldur, J.F. Hajjar
Data Processing of Point Clouds for Object Detection for Structural Engineering Applications, Computer-Aided Civil and Infrastructure Engineering, 28 (7), 2013, 495-508
- E.T. Filipov, L.A. Fahnestock, J.M. LaFave, J.F. Hajjar, D.A. Foutch, J.S. Steelman
Seismic Performance of Highway Bridges with Fusing Bearing Components for Quasi-Isolation, Earthquake Engineering and Structural Dynamics, 42 (9), 2013, 1375-1394
- J.S. Steelman, L.A. Fahnestock, E.T. Filipov, J.M. La Fave, J.F. Hajjar, D.A. Foutch
Shear and Friction Response of Non-Seismic Laminated Elastomeric Bridge Bearings Subject to Seismic Demands, Journal of Bridge Engineering, ASCE, 18 (7), 2013, 612-623
- T. Perea, R.T. Leon, J.F. Hajjar, M.D. Denavit
Full-Scale Tests of Slender Concrete-Filled Steel Tubes: Axial Behavior, Journal of Structural Engineering, ASCE, 139 (7), 2013, 1249-1262
- E.T. Filipov, L.A. Fahnestock, J.S. Steelman, J.F. Hajjar, J.M. LaFave, D.A. Foutch
Evaluation of Quasi-Isolated Seismic Bridge Behavior Using Nonlinear Bearing Models, Engineering Structures, 49 (1), 2013, 168-181

JEROME HAJJAR continued

- M.R. Eatherton, X. Ma, H. Krawinkler, G.G. Deierlein, J.F. Hajjar
Quasi-Static Behavior of Controlled Rocking Steel Frames, Journal of Structural Engineering, ASCE, 04014083, 2014
- M.R. Eatherton, X. Ma, H. Krawinkler, D. Mar, S. Billington, J.F. Hajjar, G.G. Deierlein
Design Concepts for Controlled Rocking of Self-Centering Steel Braces, Journal of Structural Engineering, ASCE, 04014082, 2014
- T. Perea, R.T. Leon, J.F. Hajjar, M.D. Denavit
Full-Scale Tests of Slender Concrete-Filled Steel Tubes: Interaction Behavior, Journal of Structural Engineering, ASCE, 0401405, 2014
- S. Szyniszewski, B.H. Smith, J.F. Hajjar, B.W. Schafer, S.R. Arwade
The Mechanical Properties of a Sintered, Hollow Sphere, Steel Foam, Materials and Design, 54, 2014, 1083-1094

Research Projects

- NRI: Large: Collaborative Research: Fast and Accurate Infrastructure Modeling and Inspection with Low-Flying Robots**
 Principal Investigator, National Science Foundation
- Reliability-based Hurricane Risk Assessment for Offshore Wind Farms**
 Co-Principal Investigator, National Science Foundation
- Deconstructable Systems for Sustainable Design of Steel and Composite Structures**
 Principal Investigator, National Science Foundation
- An Integrated Platform for Validated Prediction of Collapse of Structures**
 Co-Principal Investigator, National Science Foundation
- Reconfiguring Steel Structures: Energy Dissipation and Buckling Mitigation Through the Use of Steel Foams**
 Co-Principal Investigator, National Science Foundation
- Disaster Resilience of Buildings, Infrastructure, and Communities**
 Co-Principal Investigator, National Institute of Standards and Technology
- Thermal Break Strategies for Cladding Systems in Building Structures**
 Principal Investigator, Charles Pankow Foundation
- Thermal Break Strategies in Steel Building Structures**
 Principal Investigator, American Institute of Steel Construction
- Design for Deconstruction in Steel Structures**
 Principal Investigator, American Institute of Steel Construction
- Disaster and Infrastructure Resiliency Planning**
 Principal Investigator, Massachusetts Port Authority
- Risk and Decision Making for the Hurricane Threat to Offshore Wind Farms**
 Co-Principal Investigator, Massachusetts Clean Energy Center

FERDI HELLWEGER

Associate Professor, Civil and Environmental Engineering; affiliated faculty, Bioengineering
ScD, Columbia University, 2004. Joined Northeastern in 2004
617.373.3992 | ferdi@coe.neu.edu | systemsbioecology.org

Scholarship Focus

- Surface water quality
- Eutrophication and biogeochemical modeling
- Microbial ecology and evolution
- Individual/agent-based modeling
- Systems bioecology



Honors and Awards

Environmental Merit Award, U.S. Environmental Protection Agency

Selected Recent Publications

Papers in refereed journals

J.-U. Kreft, C. Plugge, V. Grimm, C. Prats, J. Leveau, T. Banitz, S. Baines, J. Clark, A. Ros, I. Klapper, C. Topping, T. Field, A. Schuler, E. Litchman, F. Hellweger

Mighty Small: Observing and Modeling Individual Microbes Becomes Big Science, PNAS, 110 (45), 2013, 18027-18028

N.D. Fredrick, J.A. Berges, B.S. Twining, D. Nuñez-Milland, F.L. Hellweger

Exploring Mechanisms of Intracellular P Heterogeneity in Cultured Phytoplankton Using Agent Based Modeling, Applied and Environmental Microbiology, 79 (14), 2013

F.L. Hellweger

A Simple Model of Tetracycline Antibiotic Resistance in the Aquatic Environment: Accounting for Metal Co-Selection, Journal of Environmental Engineering, 8 (2), 2013, 480-497

F.L. Hellweger

Escherichia Coli Adapts to Tetracycline Resistance Plasmid (pBR322) by Mutating Endogenous Potassium Transport: in Silico Hypothesis Testing, FEMS Microbiology Ecology, 83 (3), 2013

X. Ruan, F. Schellenger, F.L. Hellweger

Accounting for N Fixation in Simple Models of Lake N Loading/Export, Environmental Science and Technology, 48 (10), 2014, 5667-5673

F.L. Hellweger, N. Fredrick, J.A. Berges

Age-Related Stress Resistance Improves Fitness of Yeast: Support from Agent-Based Simulations, BMC Systems Biology, 8 (18), 2014

Research Projects

Dimensions: Collaborative Research: Anthropogenic Nutrient Input Drives Genetic, Functional and Taxonomic Biodiversity in Hypereutrophic Lake Taihu, China

Principal Investigator, National Science Foundation

Collaborative Research: Causes and Mechanisms of Cell Death in Freshwater Phytoplankton

Principal Investigator, National Science Foundation

Consortium for Ocean Sensing In the Nearshore Environment (COSINE)

Principal Investigator, National Oceanic and Atmospheric Administration

PHILIP LARESE-CASANOVA

Assistant Professor, Civil and Environmental Engineering
 PhD, University of Iowa, 2006. Joined Northeastern in 2010
 617.373.2899 | phil@coe.neu.edu | coe.neu.edu/~phil

Scholarship Focus

- Environmental chemistry and mineralogy
- Transformation of water pollutants
- Nanomaterial sorbents for water treatment

Honors and Awards

National Science Foundation CAREER Award

Selected Recent Publications

Books and book chapters

P. Larese-Casanova

Reactions at the Hematite Surface with Fe(II) and Environmental Contaminants, In Hematite: Sources, Properties, and Application, Deniz Morel, Ed. Nova Science Publishers, Inc.: NY, 2013, 41-63

Papers in refereed journals

A.E.P. Schellenger, P. Larese-Casanova

Oxygen Isotope Indicators of Selenate Reaction with Fe(II) and Fe(III) Hydroxides, Environmental Science and Technology, 47 (12), 2013, 6254-6262

P. Larese-Casanova, R.E. Blake

Measurement of $\delta^{18}\text{O}$ Values in Arsenic and Selenium Oxyanions, Rapid Communications in Mass Spectrometry, 27 (1), 2013, 117-126

N. Cai, P. Larese-Casanova

Sorption of Carbamazepine by Commercial Graphene Oxides: A Comparative Study with Granular Activated Carbon and Multiwalled Carbon Nanotubes, Journal of Colloid and Interface Science, 426, 2014, 152-161

Research Projects

CAREER: Quantum Dot Degradation in Aquatic Environments

Principal Investigator, National Science Foundation

Insights to Selenium Cycling and Remediation Revealed by Stable Oxygen Isotopes

Principal Investigator, National Science Foundation



Scholarship Focus

- Mechanics and tribology of axially moving, thin materials and flexible 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

Selected Recent Publications

Papers in refereed journals

J. Aguirrebeitia, S. Müftü, M. Abasolo, J. Vallejo

Experimental Study of the Removal Force in Conical Implant-Abutment Interfaces, Journal of Prosthetic Dentistry, 111 (4), 2013

H.Y. Chou, S. Müftü

On Peri-Implant Bone Healing Due to Immediate Loading in Dental Implant Treatments, Journal of Biomechanics, 46 (5), 2013, 871-878

J. Shi, S. Müftü, A.Z. Gu, K.T. Wan

Adhesion of a Cylindrical Shell in the Presence of DLVO Surface Potential, Journal of Applied Mechanics, 80, 2013

Research Projects

A Novel Biomechanical Model of Bacterial Adhesion and Aggregation

Co-Principal Investigator, National Science Foundation

Collaborative Research: Mechano-Lipidomics and Mechano-Cytosis of Drug Delivery Liposomes

Co-Principal Investigator, National Science Foundation

Theoretical and Experimental Investigation of Bonding in Cold Spray

Principal Investigator, Plasma Giken Kogyo Co

Tape Path Mechanics

Principal Investigator, International Storage Industry Consortium

Fundamentals of Bonding and Kinetic Consolidation Processes

Co-Principal Investigator, National Science Foundation



ANDREW MYERS

Assistant Professor, Civil and Environmental Engineering
 PhD, Stanford University, 2009. Joined Northeastern in 2011
 617.373.3813 | atm@neu.edu | northeastern.edu/atm

Scholarship Focus

- Structural engineering
- Multi-scale experimental testing
- Computational simulation
- Natural catastrophe risk assessments
- Probabilistic modeling

Honors and Awards

Civil and Environmental Engineering Excellence in Teaching Award

Selected Recent Publications

Papers in refereed journals

V. Valamanesh, A.T. Myers

Aerodynamic Damping and the Seismic Response of Horizontal Axis Wind Turbine Towers, Journal of Structural Engineering, ASCE, 2014

A. Myers, A., Kanvinde, G. Deierlein, J. Baker

Probabilistic Formulation of the Cyclic Void Growth Model to Predict Ultralow Cycle Fatigue in Structural Steel, Journal of Engineering Mechanics, 140 (6), 2014, 04014028

Research Projects

Collaborative Research: Reliability-Based Hurricane Risk Assessment for Offshore Wind Farms

Principal Investigator, National Science Foundation

SBIR: Optimization of Tapered Spiral Welding for Wind Turbine Towers (Phase II)

Co-Principal Investigator, National Science Foundation

Reliability-Based Hurricane Risk Assessment for Offshore Wind Farms

Principal Investigator, National Science Foundation

Coll. Research: GOALI: Enabling Advanced Wind Turbine Tower Manufacturing with Reliability-Based Design

Principal Investigator, National Science Foundation

SBIR: Development of On-Site Conical Spiral Welders for Large Turbine Towers

Co-Principal Investigator, Department of Energy

Risk and Decision-making for the Hurricane Threat to Offshore Wind Farms

Principal Investigator, Massachusetts Clean Energy Center

Keystone Tower Systems – Wind Tower Demonstration Project

Co-Principal Investigator, Massachusetts Clean Energy Center



ANNALISA ONNIS-HAYDEN

Assistant Academic Specialist, Civil and Environmental Engineering
PhD, University of Cagliari, 2004. Joined Northeastern in 2006
617.373.2005 | aonnis@coe.neu.edu

Scholarship Focus

- Biological treatment processes
- Ecotoxicology and toxicity assessment
- Microbial population dynamics and ecology in engineered biological systems
- Water disinfection

Honors and Awards

Civil and Environmental Engineering Excellence in Teaching Award

Selected Recent Publications

Papers in refereed journals

Y. Li, X. Wang, A. Onnis-Hayden, K.T. Wan, A.Z. Gu

Universal Quantifier Derived from AFM Analysis Links Cellular Mechanical Properties and Cell-Surface Integration Forces with Microbial Deposition and Transport Behavior, Environmental Science and Technology, 48 (3), 2014

Research Projects

Investigate Mechanisms for Optimization and Design of Sidestream EBPR Processes as a Sustainable Approach for Achieving Stable and Efficient P Removal

Co-Principal Investigator, Water Environment Research Foundation

Insights to Selenium Cycling and Remediation Revealed by Stable Oxygen Isotopes

Co-Principal Investigator, National Science Foundation

Impact of Wastewater Derived Nutrients to Eutrophication

Co-Principal Investigator, Water Environment Research Foundation

Sustainability Evaluation of Nutrient Removal Technologies Using Comprehensive Life Cycle Assessment-Economical, Ecological and Regulation Implications

Co-principal investigator Water Environment Research Foundation



MARK PATTERSON

Professor, Marine and Environmental Sciences; jointly appointed, Civil and Environmental Engineering PhD, Harvard University, 1985. Joined Northeastern in 2013
617.373.2059 | m.patterson@neu.edu

Scholarship Focus

- Marine robotics
- Environmental fluid mechanics
- Biomechanics
- Mass transfer



Selected Recent Publications

Papers in refereed journals

C. Rose, J.M. Adams, E.K. Hinchey, J.A. Nestlerode, M.R. Patterson

[The Incredible Shrinking Cup Lab: Connecting with Ocean and Great Lakes Scientists to Investigate the Effect of Depth and water Pressure on Polystyrene](#), Science Activities 50, 2013, 1-7

K. Sebens, G. Bernardi, M.R. Patterson, D. Burkepile

[Saturation Diving and Underwater Laboratories: How Underwater Technology has Aided Research on Coral Biology and Reef Ecology](#), Research and Discoveries: The Revolution of Science Through Scuba, Smithsonian Contributions to the Marine Sciences, Smithsonian Institution Scholarly Press, Washington, D.C., 39, 2013, 39-52

Research Projects

[How Does the Gastrovascular System in Perforate and Imperforate Corals Affect Physiological Response to Environmental Stress?](#)

Principal Investigator, National Science Foundation

[RAPID: Underwater Robotics Applied to STEM Education: a Time-Sensitive Discovery in Marine Archeology](#)

Principal Investigator, National Science Foundation

MATTHIAS RUTH

Professor, Public Policy and Urban Affairs; jointly appointed, Civil and Environmental Engineering
PhD, University of Illinois, 1992. Joined Northeastern in 2012
617.373.7938 | m.ruth@neu.edu | northeastern.edu/matthiasruth

Scholarship Focus

- Dynamic modeling of social, economic and environmental systems
- Urban infrastructure systems analysis and modeling
- Urban climate impacts and adaptation
- Energy and resources economics and policy



Selected Recent Publications

Papers in refereed journals

- J. Wachsmuth, A. Blohm, S. Gössling-Reisemann, T. Eickemeier, M. Ruth, R. Gasper, S. Stürmann
How Will Renewable Power Generation be Affected by Climate Change?, The Case of a Metropolitan Region in Northwest Germany, *Energy*, 58, 2013, 192–201
- J. Zhu, M. Ruth
Exploring the Resilience of Industrial Ecosystems, *Journal of Environmental Management*, 122, 2013, 65-75
- J. Zhu, M. Ruth
The Development of Regional Collaboration for Resource Efficiency: a Network Perspective on Industrial Symbiosis, *Computers, Environment and Urban Systems*, 44, 2014, 37–46
- M. Ruth, R.S. Franklin
Livability for All? Conceptual Limits and Practical Implications, *Applied Geography*, 49, 2014, 18-23

Research Projects

- Disaster and Infrastructure Resiliency Planning Study*
Co-Principal Investigator, Kleinfelder Northeast Inc.
- The Effect of Energy-Saving Regulations on the Location of Manufacturing*
Principal Investigator, National Science Foundation
- Black Carbon Inventory for Maryland*
Principal Investigator, Maryland Department of the Environment
- Linking Global and Regional Energy Strategies*
Co-Principal Investigator, Research Council of Norway

MEHRDAD SASANI

Associate Professor, Civil and Environmental Engineering

PhD, University of California at Berkeley, 2001. Joined Northeastern in 2001

617.373.5222 | sasani@neu.edu | coe.neu.edu/~sasani

Scholarship Focus

- Progressive collapse of structures
- Earthquake engineering
- Structural integrity
- Structural reliability

Honors and Awards

National Science Foundation CAREER Award

Selected Recent Publications

Book and book chapters

M. Sasani

[Progressive Collapse Resistance of Reinforced Concrete Structures](#), ch 11, in Blast Mitigation: Experimental and Numerical Studies, 2014, 331-350

Papers in refereed journals

J.A. Murray, M. Sasani

[Seismic Shear-Axial Failure of Reinforced Concrete Columns Versus System Level Structural Collapse](#), Journal of Engineering Failure Analysis, 32, 2013, 382-401

L. Keyvani, M. Sasani, Y. Mirzaei

[Compressive Membrane Action in Progressive Collapse Resistance of RC Flat Plates](#), Engineering Structures, 59, 2014, 554–564

S. Sagioglu, M. Sasani

[Progressive Collapse Resisting Mechanisms of Reinforced Concrete Structures and Effects of Initial Damage Locations](#), Journal Structural Engineering, ASCE, 140 (3), 2014, 1-12

Research Projects

[NEESR: Near Collapse Performance of Existing RC Concrete Frame Buildings](#)

Principal Investigator, National Science Foundation

[Fundamental Science of Progressive Collapse resistance of RC Structures](#)

Project Leader, Department of Homeland Security Center of Excellence



THOMAS SHEAHAN

Professor, Civil and Environmental Engineering; Sr. Associate Dean for Academic Affairs, College of Engineering
ScD, Massachusetts Institute of Technology, 1991. Joined Northeastern in 1991
617.373.3995 | tsheahan@coe.neu.edu | northeastern.edu/tsheahan

Scholarship Focus

- Rate effects in soils
- Offshore geohazards
- Sampling disturbance effects
- Laboratory instrumentation

Honors and Awards

Fellow, American Society of Civil Engineers

Selected Recent Publications

Papers in refereed journals

K. Santora, E.J. Mason, T.C. Sheahan

A Model for Progressive Mentoring in Science and Engineering Education and Research, Innovative Higher Education, 38 (5), 2013, 427-440

D. Meric, F. Hellweger, S. Barbuto, N. Rahbar, A.N. Alshawabkeh, T.C. Sheahan

Model Prediction of Long-Term Reactive Core Mat Efficacy for Capping Contaminated Aquatic Sediments, ASCE Journal of Environmental Engineering, 139 (4), 2013

D. Meric, A.N. Alshawabkeh, J.P. Shine, T.C. Sheahan

Bioavailability of Hydrophobic Organic Compounds in Thin-Layered Sediments, Chemosphere, 103, 2014, 281-289

Research Projects

Sustainable Adaptive Gradients in the Coastal Environment: Reconceptualizing the Role of Infrastructure in Resilience

Co-Principal Investigator, National Science Foundation

Puerto Rico Testsite for Exploring Contamination Threats (PROTECT)

Training Core Leader, National Institutes of Health



MICHAEL SILEVITCH

Robert D. Black Professor, COE Distinguished Professor, Electrical and Computer Engineering; affiliated faculty, Civil and Environmental Engineering, PhD, Northeastern University, 1971. Joined Northeastern in 1972
617.373.3033 | m.silevitch@neu.edu | northeastern.edu/alert

Scholarship Focus

- Subsurface sensing and imaging
- Medical and security screening systems
- Multi-partner large center development

Honors and Awards

Life Fellow, Institute of Electrical and Electronics Engineers

Research Projects

Awareness and Localization of Explosives Related Threats (ALERT), a Department of Homeland Security Center of Excellence. ALERT seeks to conduct transformational research, technology and educational development for effective characterization, detection, mitigation and response to the explosives-related threats facing the country and the world

Director and Principal Investigator, Department of Homeland Security

Puerto Rico Testsite to Explore Contaminant Threats (PROTECT), a National Institute of Environmental Health Sciences Superfund Research Center. PROTECT investigates the relationship between environmental contamination and preterm birth

Research Translation Core co-Leader, National Institutes of Health

The Bernard M. Gordon Center for Subsurface Sensing and Imaging Systems, A Graduated NSF Engineering Research Center. Gordon-CenSSIS was created to develop new technologies to detect hidden objects, and to use those technologies to meet real-world subsurface challenges in areas as diverse as noninvasive breast cancer detection and underground pollution assessment

Director and Principal Investigator, National Science Foundation

Research and Development of Reconstruction Advances in CT Based Object Detection Systems

Principal Investigator, Department of Homeland Security



Scholarship Focus

- Exposure assessment
- Environmental epidemiology
- Air pollution

Selected Recent Publications

Papers in refereed journals

M.A. Kioumourtoglou, A. Zanobetti, B.A. Coull, J. Schwartz, F. Dominici, H.H. Suh

The Effect of Primary Organic Particles on Emergency Hospital Admissions Among the Elderly in 3 US Cities, Environmental Health, 12 (68), 2013

E.S. Baja, J.D. Schwartz, B.A. Coull, G.A. Wellenius, P.S. Vokonas, H.H. Suh

Structural Equation Modeling of Parasympathetic and Sympathetic Response to Traffic Air Pollution in a Repeated Measures Study, Environmental Health, 12 (81), 2013

H. Gibson, A. Zanobetti, S. Sarnat, H.H. Suh, B.E. Coull, D.E. Gold

Short-term Effects of Air Pollution on Oxygen Saturation in a Cohort of Senior Adults in Steubenville, Journal of Occupational and Environmental Medicine, American College of Occupational and Environmental Medicine, 56 (2), 2014

M.A. Kioumourtoglou, B.A. Coull, F. Dominici, P. Koutrakis, J. Schwartz, H.H. Suh

The Impact of Source Contribution Uncertainty on the Effects of Source-Specific PM_{2.5} on Hospital Admissions: a Case Study in Boston, MA., Journal of Exposure Science and Environmental Epidemiology, 24 (4), 2014, 365-71

S. Kingsley, H.H. Suh, D.L. MacIntosh, G.W. Wellenius

Proximity of US Schools to Major Roadways: A Nationwide Assessment, Journal of Exposure Science and Environmental Epidemiology, 24 (3), 2014, 253-259

M.A. Kioumourtoglou, D. Spiegelman, A. Szpiro, J. Kaufman, L. Sheppard, B. Hong, F. Laden, R. Williams, J. Yanosky, H.H. Suh

Exposure Measurement Error in PM_{2.5} Health Effects Studies: A Pooled Analysis of Eight Personal Exposure Validation Studies, Environmental Health, 13 (2), 2014

Research Projects

Assessment of the Impact of Fine Particle Composition on Cause-Specific Hospital Admissions

Principal Investigator, Electric Power Research Institute

Measurement Errors in Environmental Epidemiology

Co-Investigator, National Institutes of Health

Data Linkages in the National Children's Study

Co-Investigator, National Institute of Child Health and Human Development

Impact of Air Pollution, Weather, and Lifestyle on Health in Older Americans

Principal Investigator, National Institute of Environmental Health Sciences



ALI TOURAN

Professor, Civil and Environmental Engineering

PhD, Stanford University, 1980. Joined Northeastern in 1987

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Scholarship Focus

- Risk assessment
- Construction cost
- Schedule uncertainty
- Project delivery systems
- Simulation
- Construction productivity



Honors and Awards

- Fellow, American Society of Civil Engineers
- President's Award, Boston Society of Civil Engineers

Selected Recent Publications

Papers in refereed journals

P. Bakhshi, A. Touran

[A Method for Calculating Cost Correlation among Construction Projects in a Portfolio](#), International Journal of Architecture, Engineering and Construction, 1 (3), 2012, 134-141

P. Bakhshi, A. Touran

[A New Approach for Contingency Determination in a Portfolio of Construction Projects](#), Journal of Risk Analysis and Crisis Response, 2 (4), 2012, 223-232

A.P. Gurgun, A. Touran

[PPP Experience in the International Arena – Case of Turkey](#), Journal of Management in Engineering, ASCE, 10, 2013

A.P. Gurgun, Y. Zhang, A. Touran

[Schedule Contingency Analysis for Transit Projects Using a Simulation Approach](#), Journal of Civil Engineering & Management, 19 (4), 2013, 465-475

Research Projects

[Managing a Portfolio of Projects – Metrics for Improvement](#)

Principal Investigator, Construction Industry Institute

GEOFFREY TRUSSELL

Professor and Chair, Marine and Environmental Sciences; affiliated faculty, Civil and Environmental Engineering, PhD, College of William & Mary, 1998. Joined Northeastern in 2002
781.581.7370 | g.trussell@neu.edu | northeastern.edu/trussell

Scholarship Focus

- Factors affecting the relative importance of nonconsumptive predator effects and trait-mediated indirect interactions
- The link between the ecology of fear and ecosystem function
- Biogeographic variation in community recovery and community assembly rules
- The evolutionary and ecological significance of inducible defenses

Honors and Awards

- Ray Lankester Investigatorship
- Sigma Delta Tau Outstanding Professor



Selected Recent Publications

Papers in refereed journals

S.D. Peacor, B.L. Peckarsky, G.C. Trussell, J.R. Vonesh

Costs of Predator-Induced Phenotypic Plasticity: A Graphical Model for Predicting the Contribution of Nonconsumptive and Consumptive Effects of Predators on Prey, *Oecologia*, 171 (1), 2013

J.D. Long, L. Porturas, E. Jones, C. Kwan, G.C. Trussell

Seaweed Traits Linked to Wave Exposure Determine Predator Avoidance, *Marine Ecology Progress Series*, 483, 2013, 143-151

B. Luttbegg, G.C. Trussell

How the Informational Environment Shapes how Prey Estimate Predation Risk and the Resulting Indirect Effects of Predators, *The American Naturalist*, 181 (2), 2013, 182-194

J. van den Heuvel, M. Saastamoinen, P.M. Brakefield, T.B.L. Kirkwood, B.J. Zwaan, D.P. Shanley

*The Predictive Adaptive Response: Modeling the Life-History Evolution of the Butterfly *Bicyclus Anynana* in Seasonal Environments*, *The American Naturalist*, 181 (2), 2013

J.L. Orrock, E.L. Preisser, J.H. Grabowski, G.C. Trussell

The Cost of Safety: Refuges Increase the Impact of Predation Risk in Aquatic Systems, *Ecology*, 94 (3), 2013

B.R. Silliman, M.W. McCoy, G.C. Trussell, C.M. Crain, P.J. Ewanchuk, M.D. Bertness

Non-Linear Interactions between Consumers and Flow Determine the Probability of Plant Community Dominance on Maine Rocky Shores, *PloS one*, (8), 2013

E.S. Bryson, G.C. Trussell, P.J. Ewanchuk

Broad-Scale Geographic Variation in the Organization of Rocky Intertidal Communities in the Gulf of Maine, *Ecological Monographs*, 2014

N.D. Chu, S.T. Kaluziak, G.C. Trussell, S.V. Vollmer

*Phylogenomic Analyses Reveal Latitudinal Population Structure and Polymorphisms in Heat Stress Genes in the North Atlantic Snail *Nucella Lapillus**, *Molecular Ecology*, 23 (7), 2014

L.P. Miller, C.M. Matassa, G.C. Trussell

Climate Change Enhances the Negative Effects of Predation Risk on an Intermediate Consumer, *Global Change Biology*, 2014

Research Projects

Context-Dependency of Marine Biodiversity-Ecosystem Function Relationships

Co-Principal Investigator, National Science Foundation

SARA WADIA-FASCETTI

Professor, Civil and Environmental Engineering; Associate Dean, Research and Graduate Studies
 PhD, Stanford University, 1994. Joined Northeastern in 1994
 617.373.2711 | swf@coe.neu.edu | coe.neu.edu/~swf

Scholarship Focus

- Condition assessment methodologies for infrastructure systems
- Life cycle and life span analysis
- Nondestructive testing and evaluation
- Structural and earthquake engineering uncertainty

Honors and Awards

- American Society of Engineering Education Sharon Keillor Award for Women in Engineering Education
- Minorities in Engineering Award, American Society of Engineering Education
- National Science Foundation CAREER Award
- Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, selected by President Bush and awarded at the White House



Selected Recent Publications

Papers in refereed journals

- K. Belli, S. Wadia-Fascetti, C. Rappaport
Integrated Sensor and Media Modeling Environment Developed and Applied to Ground-Penetrating Radar Investigation of Bridge Decks, Journal of Computing in Civil Engineering, 25 (1), 2011, 10-20
- K. Belli, C. Rappaport, S. Wadia-Fascetti
A Time Domain Equivalent Source Model of an Impulse GPR Antenna Based on Measured Radiation Field, Research in Nondestructive Evaluation, 22 (4), 2011, 197-207
- A. Ganguli, C.M. Rappaport, D. Abramo, S. Wadia-Fascetti
Synthetic Aperture Imaging for Flaw Detection in a Concrete Medium, NDT & E International, 45 (1), 2012, 79-90

Research Projects

Northeastern ADVANCE, Northeastern ADVANCE is an institutional transformation award working with the Office of the Provost to promote positive changes in the work environment that will advance women and all faculty in research environments that are increasingly interdisciplinary and global
 Principal Investigator, National Science Foundation

IGERT: Intelligent Diagnostics for Aging Civil Infrastructure
 Principal Investigator, National Science Foundation

VOTERS: Versatile Onboard Traffic Embedded Roaming Sensors, VOTERS creates an innovative vehicle-mounted sensor network system to monitor road and bridge conditions
 Co-Principal Investigator/Deputy Director, National Institute of Standards and Technology

CenSSIS: Center for Subsurface Sensing and Imaging Systems, Gordon-CenSSIS was created to develop new technologies to detect hidden objects, and to use those technologies to meet real-world subsurface challenges in areas as diverse as noninvasive breast cancer detection and underground pollution assessment
 Investigator, National Science Foundation

MING WANG

COE Distinguished Professor, Civil and Environmental Engineering
PhD, University of New Mexico, 1983. Joined Northeastern in 2008
617.373.3900 | mi.wang@neu.edu

Scholarship Focus

- Experimental mechanics
- Fiber reinforced composites
- Construction materials
- Recycled waste materials
- Structural dynamics
- Earthquake engineering
- Structural health monitoring
- Structural damage assessment
- Sensor technology for infrastructure



Honors and Awards

Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Books and book chapters

M. Wang, J.P. Lynch, H. Sohn

Sensor Technologies for Civil Infrastructures: Performance Assessment and Health Monitoring, Woodhead Publishing Limited, UK, 2013

Papers in refereed journals

V.V. Saykin, Y. Zhang, Y. Cao, M.L. Wang, J.G. McDaniel

Pavement Macrottexture Monitoring through Sound Generated by Tire-Pavement Interaction, Journal of Engineering Mechanic, ASCE, 139 (3), 2013, 264-271

S. Cho, J. Yim, S. Shin, H. Jung, C.-B. Yun, M.L. Wang

Comparative Field Study of Cable Tension Measurement Methods for Cable-stayed Bridge, Journal of Bridge Engineering, ASCE, 18 (8), 2013, 748-757

Y. Liu, C.-L. Chen, Y. Zhang, S. Sonkusale, M. L. Wang, M.R. Dokmeci

SWNT-Based Nanosensors for Wireless Detection of Explosives and Chemical Warfare Agents by Remote Single Chips SWNT Sensors, IEEE Sensor, 13 (1), 2013, 202-209

Y. Lu, Y. Zhang, J.G. McDaniel, M.L. Wang

Mobile Acoustic Subsurface Sensing for Pavement, Sensors, MDPI, Sweden, 13 (5), 2013, 5881-5896

W. Zhang, Y. Liu, M. Wang

Highly Efficient DNA-Functionalized Carbon Nanotube Sensor Array for Gas Monitoring, Journal of Smart Structures and Systems, 12 (1), 2013, 073-095

Research Projects

VOTERS: Versatile Onboard Traffic Embedded Roaming Sensors, VOTERS creates an innovative vehicle-mounted sensor network system to monitor road and bridge conditions

Principal Investigator, National Institute of Standards and Technology

Nano-Bio Saliva Glucose Sensing Systems

Principal Investigator, Keyghobad Joint Venture and Nano-Bio Systems

MISHAC YEGIAN

COE Distinguished Professor, Civil and Environmental Engineering

PhD, Massachusetts Institute of Technology, 1976. Joined Northeastern in 1976

617.373.2448 | myegian@neu.edu | coe.neu.edu/Depts/CIV/faculty/myegian

Scholarship Focus

- Soil dynamics
- Geosynthetics
- Seismic response of landfills
- Base isolation
- Use of shaking table in earthquake engineering
- Liquefaction
- Bridges



Honors and Awards

Fellow, American Society of Civil Engineers

Selected Recent Publications

Papers in refereed journals

E. Eseller-Bayat, S. Gokyer, M.K. Yegian, A. Alshawabkeh

Liquefaction Response of Partially Saturated Sands: Experimental Results, ASCE Journal of Geotechnical and Geoenvironmental Engineering, 139 (6), 2013

E. Eseller-Bayat, S. Gokyer, M.K. Yegian, A. Alshawabkeh

Liquefaction Response of Partially Saturated Sands: An Empirical Model, ASCE Journal of Geotechnical and Geoenvironmental Engineering, 139 (6), 2013

E. Eseller-Bayat, S. Gokyer, M.K. Yegian, E. Ortakci, A. Alshawabkeh

Design and Application of Simple Shear Liquefaction Box, ASTM Geotechnical Testing Journal, 36 (3), 2013

E. Eseller-Bayat, S. Gokyer, M.K. Yegian, O. Deniz, A. Alshawabkeh

Bender Elements and Bending Disks for Measurement of Shear and Compression Wave Velocities in Large Fully and Partially Saturated Sand Specimens, ASTM Geotechnical Testing Journal, 36 (2), 2013

Research Projects

TOPIC: NEESR: Induced Partial Saturation (IPS) Through Transport and Reactivity for Liquefaction Mitigation

Principal Investigator, National Science Foundation

BURAK CESME

PhD, 2013 Civil and Environmental Engineering
Advisor, Peter Gregory Furth | Transportation Engineering

Self-Organizing Traffic Signals for Arterial Control

This dissertation presents a new paradigm for arterial signal control, “self-organizing traffic signals”. The proposed logic begins with a foundation of actuated control, but with added rules that can lead signals to synchronize with their “neighboring” intersections to provide coordination. The objectives of this research are:

1. To develop control algorithms that are free of any cycle length, but still have coordination mechanisms through communication among neighboring intersections, making them self-organizing at an arterial level.
2. To develop control algorithms to improve the efficiency of actuated control on local level, particularly with respect to gap-out on multi-lane approaches.
3. To achieve a flexible signal control framework that has the ability to respond to fluctuations in traffic demand and recover from TSP interruptions.
4. To develop control policies for oversaturated arterials, which focus on maximizing the throughput to limit oversaturation and manage growing queues.

See full dissertation at iris.lib.neu.edu/civil_eng_diss/20

NICOLE MARIE MARTINO

PhD, 2014 Civil and Environmental Engineering
Advisor, Ming Wang | Structural Engineering
martino.ni@husky.neu.edu

Quantifying Reinforced Concrete Bridge Deck Deterioration Using Ground Penetrating Radar

This dissertation examines the relationship between GPR and deck deterioration, and develop a model to determine deterioration quantities with GPR alone. The beginning of this research determines that not only is the relationship between GPR and rebar corrosion stronger than the relationship between GPR and delaminations, but that the two are exceptionally correlated (90.2% and 86.6%). Next, multiple bridge decks were assessed with GPR and half-cell potential (HCP). Statistical parameters like the mean and skewness were computed for the GPR amplitudes of each deck, and coupled with actual corrosion quantities based on the HCP measurements to form a future bridge deck model that can be used to assess any deck with GPR alone. Finally, in order to understand exactly which component of rebar corrosion (rust, cracking or chloride) attenuates the GPR data, computational modeling was carried out to isolate each variable. The results indicate that chloride is the major contributor to the rebar reflection attenuation, and that computational modeling can be used to accurately simulate GPR attenuation due to chloride.

See full dissertation at iris.lib.neu.edu/civil_eng_diss/21

FARID MOGHIM

PhD, 2014 Civil and Environmental Engineering
Advisor, Luca Caracoglia | Structural Engineering

Wind-Borne Debris Trajectory in High Winds: Application to the Protection of Tall Building Façades

This dissertation describes the development of a probability-based framework for the analysis of debris trajectory in simulated boundary layer winds and for the prediction of the probability of impact against the vertical façade of these buildings. The work focuses on compact debris, i.e., objects of small dimensions and negligible mass moment of inertia (e.g., roof ballast elements, gravel, “bluff” shingles, etc.) The trajectories were computed for three different wind fields: (i) uniform wind field with constant horizontal velocity and no turbulence, (ii) “sudden” vertical gust superimposed to the uniform wind field and (iii) fully turbulent wind field.

See full dissertation at iris.lib.neu.edu/civil_eng_diss/23

DONG-WOO SEO

PhD, 2013 Civil and Environmental Engineering
Advisor, Luca Caracoglia | Structural Engineering
seo.d@husky.neu.edu

Effects of Errors in Flutter Derivatives on the Wind-Induced Response of Cable-Supported Bridges

This dissertation discusses the development and implementation of a methodology for the buffeting response of cable-supported bridges, including uncertainty in the aeroelastic input (i.e., flutter derivatives, FDs). Flutter derivatives are the most important part of the loading and are estimated in a wind tunnel experiment. A second order polynomial model (“model curve”) for the flutter derivatives is proposed. The coefficients of this polynomial are random variables, whose probability distribution is conditional on the reduced wind speed. For computational reasons in subsequent analysis, however, this dependency is neglected and the probability of these random variables is treated as independent of the reduced wind speed. For analysis purposes the first- and second-order statistics are estimated from experiments, treating all the wind speed data as part of the same population. Wind tunnel experiments are conducted at Northeastern University and a section model of a truss-type bridge deck is used.

See full dissertation at iris.lib.neu.edu/civil_eng_diss/19

A Portfolio Management Decision Support System for Transit Projects

This dissertation presents three aspects of transit projects have been examined: Schedule, Cost, and Escalation. The escalation is examined here mainly due to the long duration and large capital investment of transit projects. In this research, a new probabilistic analysis system: Portfolio Management Decision Support System (PMDSS) has been developed. The system consists of four modules, allowing users to perform (1) expenditure and contingency planning, (2) escalation analysis, (3) portfolio ranking and (4) Bayesian updating. The expenditure or cash flow planning will allow users to obtain periodic expenditures for all individual projects as well as the portfolio, while considering cost and duration uncertainties. For contingency planning, singularity functions have been applied to project cost and schedule, resulting in an efficient model for contingency draw-down throughout project's life cycle.

See full dissertation at iris.lib.neu.edu/civil_eng_diss/22

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The Interdisciplinary Science and Engineering Complex (ISEC)

at Northeastern is a 220,000 square foot complex scheduled to open in 2016. This facility will help grow Northeastern's research by providing state of the art infrastructure, and increasing the capacity to attract top students, faculty and academic leaders. The ISEC will connect the main campus to the expanded area with a fly-over pedestrian bridge. The six story building will contain wet, dry, and computational research facilities plus interactive teaching and learning spaces. The project was recently featured in ASCE's Civil Engineering Magazine (bit.ly/NU_ASCE). **Learn more at northeastern.edu/isec.**

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