Northeastern University
College of Engineering

2019 | 2020

SCHOLARSHIP REPORT
ELECTRICAL AND COMPUTER ENGINEERING

We are a leader in experiential education and interdisciplinary research, focused on Engineering for Society
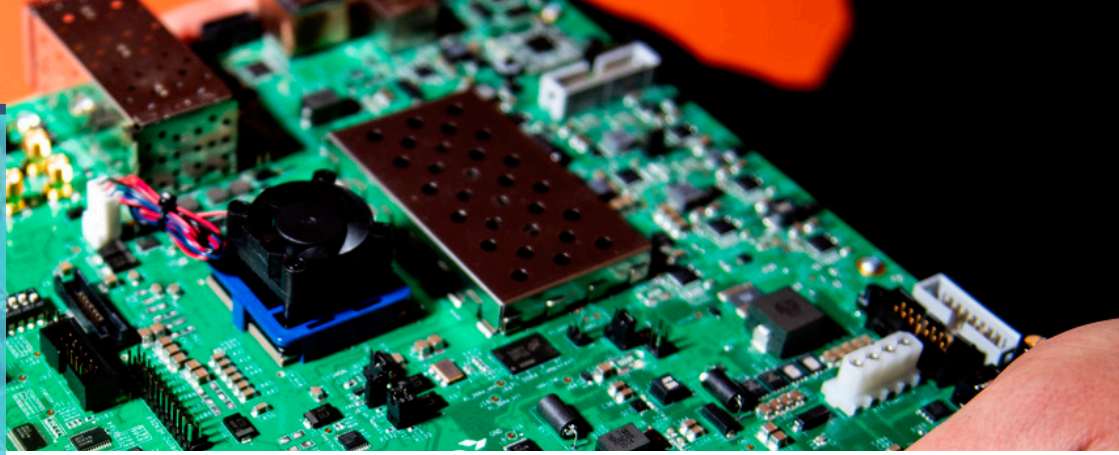
DEAR COLLEAGUES, FRIENDS, AND STUDENTS,

Advances in research and innovations in the rapidly evolving fields of cybersecurity, robotics, internet of things, next-generation wireless networks, and smart devices are profoundly reshaping the world around us. The rapid and seamless transition to online working, teaching, and social interaction thrust upon us by COVID-19 lockdowns, have been made possible by the enormous progress in the fields of information storage, processing, and transmission and the many transformative technologies in Electrical and Computer Engineering (ECE). Northeastern University's ECE department is at the forefront of all these and many more rapidly evolving areas of research and is leading the way in educating the next-generation workforce through comprehensive training and outstanding experiential learning programs.

Continuing with the strategic vision and building on the success of the previous year where three new institutes and centers in the areas of robotics, internet of things, and smart devices were formed, the faculty and researchers in ECE were successful in getting several new high-profile initiatives funded. Chief among these are the Center for Hardware and Embedded Systems Security and Trust (CHEST)—a National Science Foundation (NSF) Industry-University Cooperative Research Center (IUCRC), the successful installation of COLOSSEUM—the world's most powerful wireless emulator awarded through the support of DARPA and NSF, and the acquisition of state-of-the-art Evatec® Aluminum Nitride deposition cluster tool and ULVAC NLD 550 oxide etcher in the Kostas Nanofabrication Center. Through these infrastructural developments and institute/center initiatives, the department is forging ahead with pioneering research at the intersection of machine learning, artificial intelligence and networking, materials and devices, computer vision, adaptive robotics, hardware and cybersecurity, and more.

This year, the department added five new tenure-track faculty in the areas of IoT, Hardware Security, Smart Devices, and Artificial Intelligence. Three new research faculty and two new teaching faculty appointments were made to augment the strategic growth and vision of the department. The year also saw the addition of a new MS program in Machine Learning. To further strengthen the experiential teaching and training initiatives, the department has undertaken extensive renovation of the existing laboratory spaces including the creation of a new ECE Makerspace.

In the last year, our faculty have been the recipient of several prestigious awards including an Army Research Office Young Investigator Program Award (Assistant Professor Yanzhi Wang), a Jefferson Science Fellow (Professor Vincent Harris), and the Alexander von Humboldt Research Fellow (Professor Nian Sun), amongst several others. This annual scholarship report details the exceptional academic and professional accomplishments of our faculty and PhD candidates for the 2019-2020 year.

With excellence as our focus, we look forward to training a more equitable and inclusive engineering workforce around the world.

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

Sincerely,

Srinivas Tadigadapa
Chair of Electrical and
Computer Engineering
s.tadigadapa@northeastern.edu

QUICK FACTS ELECTRICAL AND COMPUTER ENGINEERING

The department offers **8** research concentrations and is either the lead or partner of **11** federally-funded research centers and institutes.

New Research Institutes and Centers:

- Center for Hardware and Embedded Systems Security and Trust
- Institute for Experiential Robotics
- Institute for the Wireless Internet of Things
- Northeastern SMART Center

$34M
Annual Faculty Research Expenditures

4.15%	DHHS
40.28%	NSF
11.97%	Foundation/Non-Profit
13.25%	DOD
20.79%	Federal/Other
6.27%	Industry/Corporation
2.74%	DOE
.54%	Foreign

Masters Students
365
20% Students are Women
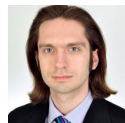
Doctoral Students
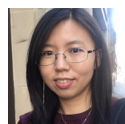## 283
25% Students are Women

RECENT HIRES

Siddhartha Ghosh
PhD, Carnegie Mellon University

Dimitrios Koutsonikolas
PhD, Purdue University

Francesco Restuccia
PhD, Missouri University of Science and Technology

Lili Su
PhD, University of Illinois

Xiaolin Xu
PhD, UMass Amherst

63 **TENURED/TENURE-TRACK** Faculty

28 **Professional Society Fellowships** Including **14** IEEE Fellows

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

COLLEGE OF ENGINEERING

With **189** tenured/tenure-track faculty and **18** multidisciplinary research centers and institutes with funding by eight federal agencies, the College of Engineering is a leader in experiential education and interdisciplinary research, with a focus on discovering solutions to global challenges to benefit society.

5 **Engineering Departments**

95 **YOUNG INVESTIGATOR** Awards

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

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

TOTAL ENROLLMENT (2019)
8460 53% Graduate
47% Undergraduate

Enrollment Growth
(2014 to 2019)

115%	MS
36%	PhD
24%	BS

FACULTY BY RESEARCH AREAS

Communications, Control & Signal Processing

Kaushik Chowdhury
Pau Closas
Jennifer Dy
Deniz Erdogmus
Vinay Ingle
Stratis Ioannidis
Josep Jornet
Dimitrios Koutsonikolas
Hanoch Lev-Ari
Jose Martinez Lorenzo
Tommaso Melodia
Sarah Ostadabbas
Purnima Ratilal-Makris
Francesco Restuccia
Masoud Salehi
Bahram Shafai
Milad Siami
Hanumant Singh
Milica Stojanovic

Computer Networks & Security

Stefano Basagni
Kaushik Chowdhury
Yunsi Fei
Engin Kirda
Dimitrios Koutsonikolas
Tommaso Melodia
Francesco Restuccia
Wil Robertson
Xiaolin Xu

Computer Systems & Software

Yunsi Fei
David Kaeli
Mieczyslaw Kokar
Miriam Leeser
Xue Lin
Fabrizio Lombardi
Ningfang Mi
Gunar Schirner
Devesh Tiwari
Yanzhi Wang
Edmund Yeh

Computer Vision, Machine Learning, & Algorithms

Octavia Camps
Jennifer Dy
Deniz Erdogmus
Yun Raymond Fu
Stratis Ioannidis
Jose Martinez Lorenzo
Waleed Meleis
Sarah Ostadabbas
Milad Siami
Lili Su
Hao Sun

Electromagnetics & Optics

Charles DiMarzio
Siddharth Ghosh
Vincent G. Harris
Yongmin Liu
Edwin Marengo
Jose Martinez Lorenzo
Hossein Mosallaei
Carey Rappaport
Purnima Ratilal-Makris
Michael B. Silevitch
Milica Stojanovic
Nian X. Sun
Srinivas Tadigadapa

Microsystems & Devices

Cristian Cassella
Hui Fang
Siddharth Ghosh
Yong-Bin Kim
Nicol McGruer
Marvin Onabajo
Matteo Rinaldi
Aatmesh Shrivastava
Nian X. Sun
Srinivas Tadigadapa

Power Electronics, Systems & Controls

Ali Abur
Mahshid Amirabadi
Bradley Lehman
Bahram Shafai
Milad Siami
Eduardo Sontag
Mario Sznaier
Wei Xie

Robotics

Jose Martinez Lorenzo
Taskin Padir
Alireza Ramezani
Bahram Shafai
Milad Siami
Hanumant Singh
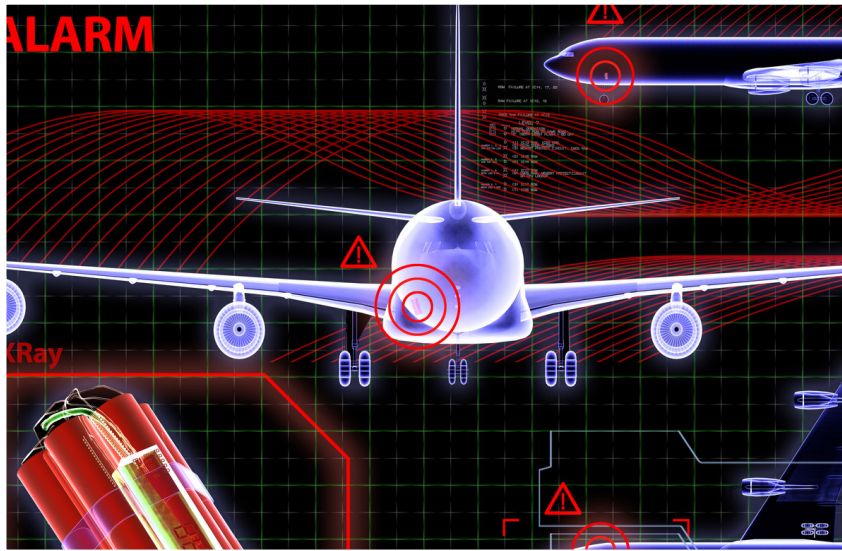
> **Airports spend millions of dollars over the course of every year double-checking the information that agents receive from personal screening devices, so making this process better and faster is a win for both the public and the industry."**
>
> **MICHAEL SILEVITCH, ALERT DIRECTOR**

ALERT Research Center Spotlight: Task Orders Awarded to Make Airports Safer

NORTHEASTERN'S ALERT (Awareness and Localization of Explosives-Related Threats) is one of nine Department of Homeland (DHS) Security Centers of Excellence (COEs) located across the country. A multi-university center, ALERT conducts research and development for effective responses to explosives-related threats.

ALERT is funded by a core grant from the U.S. Department of Homeland Security Science and Technology Directorate that equates to roughly $3.6 million a year. In addition to the Center's ongoing core research award, DHS also provides each COE with an ability to obtain task order contracts targeted to develop specific security technologies and methods.

Since June 2019, five such task orders involving initiatives to make airports safer have been awarded to ALERT at Northeastern. These projects focus on making baggage and cargo scanning processes more effective, streamlined, and cost-effective; improving the experience of people traversing airport security checkpoints; and developing consistent and measurable methods for explosives detection.

The first task order is focused on **improving the detection capabilities of airport passenger screening systems** to make physical pat-downs in the airport security checkpoint less necessary. This project is funded at $1.2 million, with Carey Rappaport, ALERT researcher and College of Engineering Distinguished Professor, electrical and computer engineering, serving as technical lead.

"Airports spend millions of dollars over the course of every year double-checking the information that agents receive from personal screening devices, so making this process better and faster is a win for both the public and the industry," says ALERT Director and College of Engineering Distinguished Professor Michael Silevitch, electrical and computer engineering.

A second task order looks at improving a crucial piece of secondary airport screening by **systematizing the swabbing** of hands, liquid containers, shoes, and the like, looking for traces of chemicals or explosives. With this $650K grant, ALERT is seeking to compare and evaluate the performance of all of the swab kits used by airports across the country.

"If we can benchmark the performance of these swabs and create a gold standard, we can better define the protocol to measure the performance from airport to airport—apples to apples," says Silevitch.

Enhancing the efficiency of airport security checkpoints is the focus of the $1.3 million task order **leveraging video analytics to improve the airport checkpoint process.** This project's aims include understanding checkpoint wait times, supporting risk-based screening to improve throughput rates, and helping identify when someone may have forgotten an item at the checkpoint, or a possible theft.

"Not only could we possibly make the process more user-friendly and streamlined, but we could also catch anomalies, such as theft and accidental leave-behinds," says Silevitch. "The TSA can't just throw those items away, so the documentation, as well as handling and storage, is time-consuming and costly—I even heard of someone who left a snake behind, which then had to be cared for by TSA! If we can flag events like that in real-time, we can eliminate the issue altogether."

Out of the terminal and into the parts of the airport most of us never go are the areas impacted by the fourth and fifth task orders: an $800K grant to **create simulation tools to visualize the contents of air cargo containers,** and a $690K grant to develop a **more effective system to detect opioids transmitted through international mail.**

"More than one million international postal items come through JFK Airport every day—and that's just a single airport," says Rappaport. "Most of it is legitimate, but it's our job to better judge which ones have the bad stuff in them."

There are several approaches to tackle the problem, but Rappaport and technical lead Silevitch are seeking a non-invasive way to screen packages that optimizes worker safety and minimizes sensing time. One option is to use millimeter wave scanning devices to search relatively small packages for loose pills or powder and target them for closer inspection.

"Throughout all five of these task orders, DHS wants the U.S. and the world, in general, to be safer," says Rappaport. "At ALERT, we try to develop expertise to address these hard problems."

ARO Young Investigator Program Award to Bring DNN Machine Learning to Mobile Devices

A DEEP NEURAL NETWORK (DNN) teaches a computer how to think like a human mind, both flexible and complex. The machine learning of DNNs has previously been thought to require computations and memory storage capacity too large for mobile delivery. To address this, Assistant Professor Yanzhi Wang, electrical and computer engineering, has been awarded a prestigious Young Investigator Program Award from the Army Research Office (ARO) on ultra-efficient, real-time DNN acceleration on mobile platforms. The ARO YIP is awarded to outstanding scientists beginning their independent careers to attract them to pursue fundamental research in areas relevant to the Army, to support their research in these areas, and to encourage their teaching and research careers.

"Previously the coding and compilations required of DNN performance and accuracy were too much for mobile," says Wang. "Our work enables the machine learning to automate the coding and reduce DNN storage by up to 6,645x on the mobile platform, saving manpower and processing power, and sacrificing no speed or accuracy."

Wang's work achieves end-to-end mobile DNN connectivity previously only thought possible within the computational and storage capabilities of desktop devices. Using a unique methodology of model compression, compilation, and design, the research offers a flexible model for DNN machine learning on the mobile platform.

Wang and his team focused first on pruning and quantization of Neural Networks based on the ADMM (Alternating Direction Methods of Multipliers) framework. Pruning requires researchers to train dense algorithmic networks, trim out the less important connections, then retrain the compressed neural networks. Wang's work combines a depth of pruning and quantization that makes DNN-level mobile storage viable.

The compiler, based on the ADMM solution framework, acts as a bridge from the data set compression to hardware application, allowing for acceleration of the DNN process. At theory, algorithm, compiler, and hardware levels, the research demonstrates the potential of accurate end-to-end data transfer in real-time.

Wang's research opens up unprecedented possibilities for mobile devices. "Extremely high-resolution object detection and recognition will be achievable," he notes. "I can envision real-time translations and question-answering, automated license plate detection, and immediate access augmented reality and virtual reality applications."

With just a phone or tablet, individual soldiers in the field will be able to more accurately recognize friendly or non-friendly objects, day or night, and give drones and helicopters more fidelity in target mapping. "In some cases, the processing speed can be up to 50x faster with the same accuracy," Wang notes. "For populations without reliable internet, if we can provide high performance processing power on hundreds of billions of devices we can make access more equitable and have a big impact."

Wang came to Northeastern from Syracuse University in the fall of 2018 with the vision of bringing this level of connectivity to the world. Now he plans to expand on scientific application, perhaps applications to better protect and guide soldiers in the field.

"I'm happy and grateful to receive the award, the work for which was only possible with the help of the department chair and the strong support of Northeastern. This new funding will allow us to expand on what we've achieved, enabling DNN to be more widespread, and making new things possible for all of us."

ARO is an element of the U.S. Army Combat Capabilities Development Command's Army Research Laboratory.
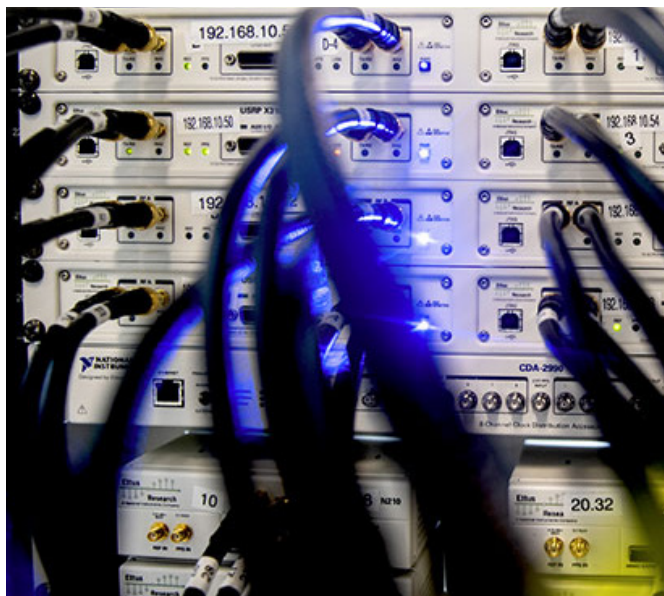
Northeastern's Institute for the Wireless Internet of Things Is Home to the World's Most Powerful Emulator of Wireless Systems

THE NATIONAL SCIENCE FOUNDATION and the Defense Advanced Research Projects Agency (DARPA) selected Northeastern University to run a massive data center that will enable researchers around the country to build and test the next generation of wireless technology and find new ways to use artificial intelligence to shape the smart devices of the future. The testbed, named Colosseum after the iconic Roman amphitheater, is the world's most powerful emulator of wireless systems. It can process more information in a single second than is estimated to be held in the entire print collection of the Library of Congress.

Colosseum is capable of creating virtual environments that have hundreds of wireless signals hurtling through them, which enables researchers to understand how these signals interact, develop artificial intelligence algorithms that allow more devices to share the wireless space, and design ways to protect the system from attackers. Colosseum moved from the Applied Physics Lab at Johns Hopkins University to Northeastern's Innovation Campus in Burlington, Massachusetts in November 2019, where it joined the Platforms for Advanced Wireless Research (PAWR) program. PAWR is co-led by Northeastern and US Ignite, where William Lincoln Smith Professor Tommaso Melodia, electrical and computer engineering, is the academic lead. The PAWR program, which is supported by the National Science Foundation, provides researchers with facilities to experimentally evaluate wireless networked systems in real-life testing scenarios. The addition of Colosseum allows researchers to virtually test their ideas before taking them to one of the program's real-world testing sites.

Colosseum is now part of the Institute for the Wireless Internet of Things, under the leadership of Melodia and his research team, including Professor Kaushik Chowdhury and Associate Professor Stefano Basagni, and Abhimanyu Gosain, technical director of PAWR. Northeastern received $5 million in funding from the National Science Foundation to take over the management of Colosseum.

Harris Named Jefferson Science Fellow by the National Academies of Sciences and Engineering

UNIVERSITY DISTINGUISHED PROFESSOR and William Lincoln Smith Chair Vincent Harris has been named a 2020-2021 Jefferson Science Fellow. The Jefferson Science Fellowship Program is designed to advance and build capacity for science, technology, and engineering expertise. It is administered by the National Academies of Sciences, Engineering, and Medicine and supported by the U.S. Department of State and the U.S. Agency for International Development (USAID). Jefferson Science Fellows spend one year at the State Department or USAID for an on-site assignment in Washington, D.C., that may involve extended stays at U.S. foreign embassies and missions. Harris is a Jefferson Science Fellow with the U.S. Department of State, Office of Environmental Quality and Transboundary Issues with the Bureau of Oceans and International Environmental and Scientific Affairs.

As a Jefferson Science Fellow, Harris will focus on building a team of specialists to monitor, gather, and prioritize information regarding interactions among U.S. and regional players influenced by China enacting its Belt Road Initiative (BRI). The BRI is a global development project initiated by the Chinese government in 2013. The undertaking involves infrastructure development and investments in more than 70 countries containing more than two-thirds of the world's population. The Chinese government calls the project an effort to establish regional connectivity that gives rise to a brighter future for affected countries. However, many see it as China's effort to further influence regional and global markets and politics. The overarching goals guiding Harris are to identify and establish sound governmental policy and develop international strategies that effectively address the needs of modern societies.

Harris is uniquely prepared for such challenges due to his extensive experience in Asia as: Visiting Distinguished Professor at the Chinese Academy of Sciences, Beijing, Huazhong University Science of Technology (HUST, Wuhan), and University of Electronic Science and Technology of China (UESTC, Chengdu); Foreign Expert Fellow (Inner Mongolia, Chinese State Administration of Foreign Expert Affairs); Visiting Professor at Tokyo-Tech; Visiting Distinguished Professor at Wayamba University of Sri Lanka; and, Fulbright Fellow (Sri Lanka), among others. In these roles, he has brought together international science and technology communities and fostered cross-cultural exchanges among leading academicians, statesmen and stateswomen, and hundreds of students and scholars.

ITC Endowed Professor **Fabrizio Lombardi**, electrical and computer engineering, in collaboration with George Washington University, was awarded a four-year $600K **National Science Foundation MEDIUM grant** for "Neural-Network-based Stochastic Computing Architectures with applications to Machine Learning."

Associate Professor **Ningfang Mi**, electrical and computer engineering, in collaboration with Florida International University, was awarded a $500K **National Science Foundation grant** for "New Techniques for I/O Behavior Modeling and Persistent Storage Device Configuration." The project will research new techniques for benchmarking and appropriately configuring storage systems in order to obtain the best possible performance and reliability.

Srinivas Tadigadapa, professor and chair of the Department of Electrical and Computer Engineering, is the recipient of the 2020 IEEE Sensors **Council Meritorious Service Award** for his outstanding long-term service to the IEEE Sensors Council.

Professor **Matteo Rinaldi** and Research Assistant Professor **Zhenyun Qian**, electrical and computer engineering, were awarded a $550K **National Science Foundation grant** for "Zero-Power Wireless Flame Detector for Ubiquitous Fire Monitoring." The project, in collaboration with United Technologies Corporation, centers on developing a smart wireless sensor that continuously monitors its environment, only turning on when a relevant event is detected, and can be used to improve fire detection, among many other applications.
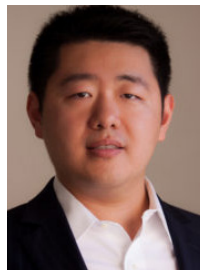
Assistant Professor **Yanzhi Wang**, electrical and computer engineering, has been awarded a prestigious **Young Investigator Program Award from the Army Research Office** (ARO) on ultra-efficient, real-time DNN acceleration on mobile platforms. Using a unique methodology of model compression, compilation, and design, the research offers a flexible model for DNN machine learning on the mobile platform. The ARO YIP is awarded to outstanding scientists beginning their independent careers to attract them to pursue fundamental research in areas relevant to the Army, to support their research in these areas, and to encourage their teaching and research careers. See page 5. Also, Wang, in collaboration with the University of Southern California, was awarded a $500K **National Science Foundation grant** for "Advanced Circuits, Architectures and Design Automation Technologies for Energy-efficient Single Flux Quantum Logic."

Professor **Milica Stojanovic**, electrical and computer engineering, was awarded the 2019 **IEEE Women in Communications Engineering (WICE) Outstanding Achievement Award** for having done outstanding technical work in the broad field of communications engineering, and achieving a high degree of visibility in the field.
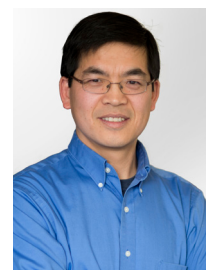
ECE Professor **Nian Sun** was awarded the prestigious **Humboldt Research Award** by the Alexander von Humboldt Foundation. Sun was also named **IEEE Fellow** for his contributions to integrated magnetic and magnetoelectric materials and devices.
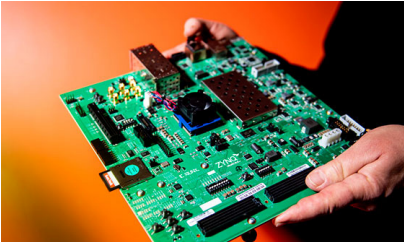
University Distinguished and William Lincoln Smith Professor **Vincent Harris**, electrical and computer engineering, has been named a **2020-2021 Jefferson Science Fellow** from the National Academies of Sciences and Engineering with the U.S. Department of State, Office of Environmental Quality and Transboundary Issues with the Bureau of Oceans and International Environmental and Scientific Affairs. He was also selected as a **Distinguished Fellow** of the International Engineering and Technology Institute. See page 6.

Bouvé College of Health Sciences Professor Eugene Tunik (PI), Electrical and Computer Engineering (ECE) Professor **Deniz Erdogmus**, ECE Associate Professor **Taskin Padir**, and Bouvé Associate Research Scientist Mathew Yarossi were award a $760K **National Science Foundation grant** for the "Coordination of Dyadic Object Handover for Human-Robot Interactions." Although engineering advancements have improved robot dexterity for independent actions, human-robot interactions for collaborative physical tasks remain deficient for practical application. The project aims to bring human-robot collaboration for object handover to new levels of performance, where the bi-directional interaction between the pair is holistic and intuitive.

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Associate Professor **Taskin Padir**, electrical and computer engineering, has been elected for a three-year term to the Executive Committee of the Robotics and Remote Systems Division of the American Nuclear Society. He was also awarded, in collaboration with UMass-Lowell, a $400K **National Science Foundation grant** for the "Cooperative Control of Humanoid Robots for Remote Operations in Nuclear Environments."

Josep Jornet, associate professor of electrical and computer engineering, was recently awarded a **$900K grant from the National Science Foundation** to be part of a collaborative project ($2.7 million total) focused on developing new Terahertz (THz) devices and their control algorithms, which will help enable wireless 6G networks. The project, Scaling WLANs to TB/sec: THz Spectrum, Architectures, and Control, focuses on improving the capacity of wireless networks to Terabits per second (a trillion of bits per second) to potentially strengthen communication protocols. Jornet will be working with researchers at Rice University and Brown University. Jornet's research was also published in *Science*. In collaboration with the University of Pennsylvania and Duke University, Jornet has theoretically designed and experimentally demonstrated the first on-chip tunable laser for orbital angular momentum modulation and multiplexing.

Associate Professor **Stratis Ioannidis**, electrical and computer engineering (ECE), is leading a **$1 million National Science Foundation grant** to drastically improve data rates and have ultra-low latency on wireless networks to support pioneering applications such as shared virtual reality experiences and autonomous cars. He is working in collaboration with ECE Professors **Jennifer Dy, Tommaso Melodia, and Kaushik Chowdhury,** and ECE Assistant Professor **Yanzhi Wang**.

Professor **Yunsi Fei**, electrical and computer engineering, has been awarded a $750K five-year grant from the National Science Foundation as the **Northeastern lead for a new multi-university research center**, CHEST, or Center for Hardware and Embedded Systems Security and Trust. Part of the Industry-University Cooperative Research Centers Program, CHEST will coordinate university-based research with the needs of industry and government partners to advance knowledge of security, assurance, and trust for electronic hardware and embedded systems.

Professor **Kaushik Chowdhury**, Assistant Professor **Pau Closas**, Professor **Deniz Erdogmus**, William Lincoln Smith Professor **Tommaso Melodia**, and Assistant Professor **Yanzhi Wang**, electrical and computer engineering, received **$1 million from Defense Advanced Research Projects Agency (DARPA)** for their project, titled "Signal Processing in Neural Networks (SPiNN) for Wireless IoT." The team will use Deep Neural Network models to enhance three basic receiver components: channel estimation and equalization; demodulation; and error correction decoding.

The Italian Scientists and Scholars in North America Foundation awarded **Francesco Restuccia**, assistant professor of electrical and computer engineering, the **2019 Mario Gerla Award for Young Investigators in Computer Science**. The competitive award acknowledges the research of young Italian investigators working in North America, whose commitment to their discipline of study is innovative, impactful and honors their country of origin.

COVID-19 Research Highlights
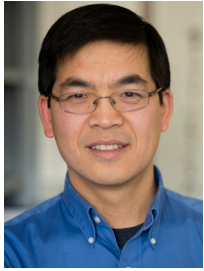
Professor **Nian Sun**, electrical and computer engineering, in collaboration with Jeremy Luban of UMass Medical School, was awarded a $200K **National Science Foundation RAPID grant** for "COVID-19: New Handheld Gas Sensors for Airborne SARS-CoV-2 Virus: Instant COVID-19 Diagnosis from Exhaled Breath" to streamline the COVID-19 detection and diagnosis process. The two are developing a handheld gas sensor for SARS-CoV-2 virus in air detection, using each of their fields of expertise. Sun specializes in sensors and electronics engineering, while Luban brings his virus, proteins, biochemistry and molecular pharmacology knowledge.

Associate Professor **Taskin Padir**, electrical and computer engineering, was awarded a $200K National **Science Foundation RAPID grant** for "Accelerating the Future of Work? Understanding Future Shifts in Technology Adoption in the Seafood Industry in Response to the COVID19 Pandemic." The project will collect ephemeral data to investigate the accelerated adoption of new technologies in the seafood industry in response to both worker and food safety concerns arising from the COVID-19 pandemic.

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

Student Honors and Awards
Selected Highlights

PhD candidate **Ao Ren**, electrical and computer engineering, advised by Assistant Professor Yanzhi Wang, has accepted an offer as an assistant professor in the Department of Electrical and Computer Engineering at Clemson University, starting Fall 2020.

PhD student **Rashida Nayeem**, electrical engineering, advised by University Distinguished Professor Dagmar Sternad, biology, jointly appointed in electrical and computer engineering, was a finalist for the **Best Paper Award** in Cognitive Robotics at the 2020 IEEE International Conference on Robotics and Automation for her paper "Transient Behavior and Predictability in Manipulating Complex Objects."
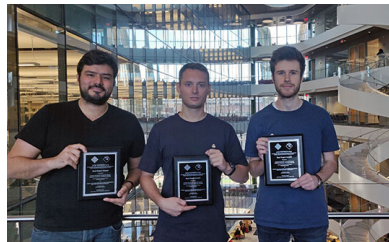
Computer Engineering PhD student **Lorenzo Bertizzolo**, along with co-authors Computer Engineering PhD student **Leonardo Bonati**, Electrical and Computer Engineering (ECE) Research Assistant Professor **Emrecan Demirors**, and ECE William Lincoln Smith Professor **Tommaso Melodia** won the Best Paper Award at the 13th ACM Workshop on Wireless Network Testbeds, Experimental evaluation & Characterization (WiNTECH) in Los Cabos, Mexico.

View all department news
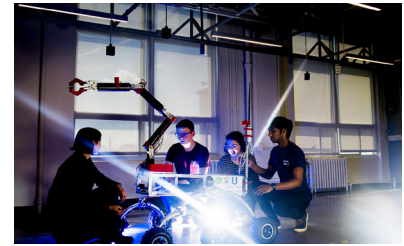
The Northeastern student team, advised by Associate Professor **Taskin Padir**, electrical and computer engineering, was one of ten teams selected as finalists for the NASA 2020 RASC-AL Special Edition: Moon to Mars Ice and Prospecting Challenge.

Northeastern's student team was one of eight student groups from U.S. colleges selected to compete in **NASA's Breakthrough, Innovative and Game-changing (BIG) Idea Challenge**. With a $90K grant and access to testing facilities at different NASA centers the students are developing a new robotic system with four legs vs. wheels which could be part of a Lunar Mission by 2023.

Electrical and Computer Engineering (ECE) PhD students **Kai Li** and **Ufuk Muncuk**, ECE Principal Research Scientist **Yousof Naderi,** and ECE Professor **Kaushik Chowdhury** were awarded the **Best Paper Award** at the IEEE GLOBECOM 2019 conference for their paper "SoftSense: Collaborative Surface-based Object Sensing and Tracking Using Networked Coils."

Electrical engineering PhD student **Jared Miller** was awarded a 2020-**2021 Chateaubriand Fellowship** offered by the Embassy of France in the United States. It supports outstanding PhD students from American universities who wish to conduct research in France for a period ranging from 4 to 9 months.

PhD Student Spotlight

Setareh Ariafar, PhD'20

Advised by College of Engineering Professors Jennifer Dy and Dana Brooks, Electrical and Computer Engineering

Setareh Ariafar joined the Machine Learning Lab and the Bio-Medical Imaging and Signal Processing Lab to pursue her doctoral studies at Northeastern University in 2015, after finishing her master's degree from Boston University, and a BS and MS from the University of Tehran, Iran. She followed an unusual path to earning a PhD as her undergraduate degree is in industrial design. Enjoying math and passionate about research, her main area of PhD study was in machine learning with a research focus on Bayesian optimization.

Many design problems involve optimization of an unknown, or partially unknown, objective function that can be costly to evaluate. For example, in drug design, the evaluation of drug efficacy across multiple drug formulations requires producing and testing new drugs, which would be subject to resource and cost limitations. Another example is minimizing the validation error of a machine learning model, such as hyperparameter tuning of a deep neural network, which involves many evaluations of the objective function. Bayesian optimization methods enable solving optimization problems whose objective functions are only available as black box functions and are expensive to evaluate. Ariafar was inspired to work on Bayesian optimization from working on the skin cancer detection from reflectance confocal microscopy image project at Northeastern. Deep learning methods work well in this application, however, tuning the hyperparameters of such approaches is challenging.

During her studies at Northeastern, Ariafar won first place in the ACM Student Research Competition Graduate Level Finals at the Grace Hopper Celebration of Women in Computing (the world's largest gathering of women in computation and science with over 15,000 attendees). After presenting her work at a NeurIPS Bayesian Optimization Workshop, the organizers and attendees were impressed by her work which led her to be recruited as an intern at Sigopt. After completing her PhD program, Ariafar joined Google Brain and continues her research in machine learning.

Ali Abur

Professor, Electrical and Computer Engineering

PhD, Ohio State University, 1985
coe.northeastern.edu/people/abur-ali

Scholarship focus: power system monitoring, estimation and optimization, fault location, and identification in power grids

Honors and awards: Fellow, Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS

Y. Lin, A. Abur
  A Highly Efficient Bad Data Identification Approach for Very Large-Scale Power Systems, 2019 IEEE Power & Energy Society General Meeting (PESGM), Atlanta, GA, 2019

D.W. Kelle, A. Abur
  Improving Performance of Multi-Area State Estimation Using Spectral Clustering, North American Power Symposium (NAPS), Wichita, KS, 2019

J. Zhao, A. Expósito, M. Netto, L. Mili, A. Abur, et al.
  Power System Dynamic State Estimation: Motivations, Definitions, Methodologies, and Future Work, IEEE Transactions on Power Systems, 34(4), 2019, 3188-3198

A. Mouco, A. Abur
  Robust L1 Estimators for Interconnected AC/DC Power Systems, IEEE Milan PowerTech, Milan, Italy, 2019

B. Donmez, G. Scioletti, A. Abur
  Robust State Estimation Using Node-Breaker Substation Models and Phasor Measurements, IEEE Milan PowerTech, Milan, Italy, 2019

A. Oner, A. Abur
  Strategic Placement of Distributed Generators Against Extreme Events, North American Power Symposium (NAPS), Wichita, KS, 2019

SELECTED RESEARCH PROJECTS

Engineering Research Center for Ultra-Wide Area Resilient Electric Energy Transmission Network
  Co-Principal Investigator, National Science Foundation

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

Robust Distributed State Estimator for Interconnected Transmission and Distribution Networks
  Principal Investigator, Department of Energy

Mahshid Amirabadi

Assistant Professor, Electrical and Computer Engineering

PhD, Texas A&M University, 2013
coe.northeastern.edu/people/amirabadi-mahshid

Scholarship focus: design, modeling and control of power converters, power electronics for renewable energy systems, microgrids, variable speed drives, and wireless power transfer

Honors and awards: Best Paper Award, Energy Conversion Congress and Exposition 2016

SELECTED PUBLICATIONS

K. Mozaffari, M. Amirabadi
  A Reduced-Switch-Count Family of Soft-Switched High-Frequency Inductive AC-Link Converters, IEEE Transactions on Power Electronics, 35(8), 2020, 7972-7990

X. Zhang, M. Khodabandeh, M. Amirabadi, B. Lehman
  A Simulation-Based Multi-Functional Differential Mode and Common Mode Filter Design Method for Universal Converters, IEEE Journal of Emerging and Selected Topics in Power Electronics, 8(1), 2020,658-672

M. Khodabandeh, E. Afshari, M. Amirabadi
  A Family of Ćuk, Zeta, and SEPIC Based Soft-Switching DC–DC Converters, IEEE Transactions on Power Electronics, 34(10), 2019, 9503-9519

K. Mozaffari, M. Amirabadi
  A Highly Reliable and Efficient Class of Single-Stage High-Frequency AC-Link Converters, IEEE Transactions on Power Electronics, 34(9), 2019, 8435-8452

E. Afshari, M. Khodabandeh, M. Amirabadi
  A Single-Stage Capacitive AC-Link AC–AC Power Converter, IEEE Transactions on Power Electronics, 34(3), 2019, 2104-2118

M. Khodabandeh, E. Afshari, M. Amirabadi
  A Single-Stage Soft-Switching High-Frequency AC-Link PV Inverter: Design, Analysis, and Evaluation of Si-Based and SiC-Based Prototypes, IEEE Transactions on Power Electronics, 34(3), 2019, 2312-2326

SELECTED RESEARCH PROJECTS

A New Class of Modular Power Converters for Next-Generation Shipboard Power Systems
  Principal Investigator, Office of Naval Research

A Universal Converter for DC, Single-Phase AC, and Multi-Phase AC Systems
  Principal Investigator, Advanced Research Projects Agency-Energy

Development of a Dynamic Tracking Supply
  Principal Investigator, Teradyne Inc.

Stefano Basagni

Associate Professor, Electrical and Computer Engineering

PhD, University of Texas, Dallas, 2001
PhD, University of Milan, Italy, 1998
coe.northeastern.edu/people/basagni-stefano

Scholarship focus: wireless networks, ad hoc networks, underwater and terrestrial sensor networking, and protocol design and testing

Honors and awards: Distinguished Scientist of the Association for Computing Machinery

SELECTED PUBLICATIONS

G. Koutsandria, V. Di Valerio, D. Spenza, S. Basagni, C. Petrioli
Wake-up Radio-based Data Forwarding for Green Wireless Networks, Computer Communications, Special Issue on Machine Learning Approaches in IoT Scenarios, 160, 172-185, 2020

V. Di Valerio, F. Lo Presti, C. Petrioli, L. Picari, D. Spaccini, S. Basagni
CARMA: Channel-Aware Reinforcement Learning-Based Multi-Path Adaptive Routing for Underwater Wire- Less Sensor Networks, IEEE Journal on Selected Area in Communications. Special issue on Machine Learning in Wireless Communications, 37(11), 2019, 1–13

B. Antonescu, M. Tehrani Moayyed, S. Basagni
Clustering Algorithms and Validation Indices for a Wide mmWave Spectrum, Information. Special issue on Emerging Topics in Wireless Communications for Future Smart Cities, 9(10), 2019, 1-17

S. Basagni, V. Di Valerio, P. Gjanci, C. Petrioli
MARLIN-Q: Multi-Modal Communica- tions for Reliable and Low-Latency Underwater Data Delivery, Ad Hoc Networks, (82), 2019, 134–145

A.V. Sheshashayee, S. Basagni
WiLE: Leader Election in Wireless Networks, Ad Hoc & Sensor Wireless Networks, 44(1–2), 2019, 1–23

SELECTED RESEARCH PROJECTS

CCRI: Grand: Colosseum: Opening and Expanding the World's Largest Wireless Network Emulator to the Wireless Networking Community
Co-Principal Investigator, National Science Foundation

MRI: SEANet: Development of a Software-Defined Networking Testbed for the Internet of Underwater Things
Co-Principal Investigator, National Science Foundation

Platforms for Advanced Wireless Research Project Office
Co-Principal Investigator, National Science Foundation

Octavia Camps

Professor, Electrical and Computer Engineering

PhD, University of Washington, 1992
coe.northeastern.edu/people/camps-octavia

Scholarship focus: computer vision, machine learning, artificial intelligence and image processing

SELECTED PUBLICATIONS

W. Liu, R. Li, M. Zheng, S. Karanam, Z. Wu, B. Bhanu, R.J. Radke, O. Camps
Towards Visually Explaining Variational Auto Encoders, IEEE/CVF Conf. On Computer Vision and Pattern Recognition (CVPR), June 2020

S. Karanam, M. Gou, Z. Wu, A. Rates-Borras, O.I. Camps, R.J. Radke
A Systematic Evaluation and Benchmark for Person Re-Identification: Features, Metrics and Datasets, IEEE Transactions on Pattern Analysis and Machine Intelligence, 41(3), 2019, 523-536

L. Wenqian, A. Sharma, O.I. Camps, M. Sznaier
DYAN: A Dynamical Atoms-Based Network For Video Prediction, Proceedings of the European Conference on Computer Vision (ECCV), 2018, 170-185

M. Gou, F. Xiong, O.I. Camps, M. Sznaier
MoNet: Moments Embedding Network, In Proceedings 2018 IEEE Conference on Computer Vision and Pattern Recog. (CVPR), Salt Lake City, Utah, 2018

M. Sznaier, O.I. Camps
SoS-RSC: A Sum-of-Squares Polynomial Approach to Robustifying Subspace Clustering Algorithms, In Proceedings 2018 IEEE Conference on Computer Vision and Pattern Recog. (CVPR), Salt Lake City, Utah, 2018

SELECTED RESEARCH PROJECTS

Collaborative Research: Data Driven Control of Switched Systems with Applications to Human Behavioral Modification
Co-Principal Investigator, National Science Foundation

Confocal Video-Mosaicking Microscopy to Guide Surgery of Superficially Spreading Skin Cancers
Principal Investigator, National Institutes of Health

Dynamic and Statistical Based Invariants on Manifolds for Video Analysis
Principal Investigator, National Science Foundation

Cristian Cassella

Assistant Professor, Electrical and Computer Engineering

PhD, Carnegie Mellon University, 2015
coe.northeastern.edu/people/cassella-cristian

Scholarship focus: acoustic resonators, nonreciprocal components, zero-power sensors for IoT, nonlinear dynamics, ultrasonic transducers

Honors and awards: Winner of the Marie Skłodowska-Curie Individual Fellowship

SELECTED PUBLICATIONS

X. Zhao, L. Colombo, Cristian Cassella
  Aluminum Nitride Two-Dimensional-Resonant-Rods, Applied Physics Letters, 116(14), 2020, 143504

H.M. Hussein, M.A. Ibrahim, G. Michetti, M. Rinaldi, M. Onabajo, C. Cassella
  Systematic Synthesis and Design of Ultra-Low Threshold 2:1 Parametric Frequency Dividers, IEEE Microwave Theory and Techniques, 2020

C. Cassella, J. Segovia-Fernandez
  High K^2_t Exceeding 6.4% Through Metal Frames in Aluminum Nitride 2-D Mode Resonators, IEEE transactions on Ultrasonics, Ferroelectrics, and Frequency Control 66(5), 2019, 958-964

J.M. Puder, J.S. Pulskamp, R.R. Rudy, C. Cassella, M. Rinaldi, G. Chen, S. Bhave, R.G. Polcawich
  Rapid Harmonic Analysis of Piezoelectric MEMS Resonators, IEEE Transactions on Ultrasonic Ferroelectrics, and Frequency Control, 6(65), 2018, 979-990

G. Chen, C. Cassella, T. Wu, M. Rinaldi
  Single-Chip Multi-Frequency Wideband Filters Based on Aluminum Nitride Cross-Sectional Lamé Mode Resonators with Thick and Apodized Electrodes, IEEE Micro Electro Mechanical Systems, 2018, 775-778

SELECTED RESEARCH PROJECTS

Ferroelectric Integrated and Reconfigurable ScAlN Technologies
  Co-Principal Investigator, DARPA

Fully Integrated Parametric Filters for Extensive Phase-Noise Reduction in Low-Power RF Front-Ends and Resonant Sensing Platforms
  Principal Investigator, National Science Foundation

Kaushik Chowdhury

Professor, Electrical and Computer Engineering

PhD, Georgia Institute of Technology, 2009
coe.northeastern.edu/people/chowdhury-kaushik

Scholarship focus: dynamic spectrum access, energy harvesting sensor networks, 5G technology, intra-body communication, and protocol design for wireless

Honors and awards: ONR Director of Research Early Career Award 2016; Chair of the IEEE Technical Committee on Simulation; National Science Foundation CAREER Award 2015

SELECTED PUBLICATIONS

P. Nguyen, U. Muncuk, A. Ashok, K.R. Chowdhury, et al.
  Battery-Free Identification Token for Touch Sensing Devices, ACM Conference on Embedded Networked Sensor Systems (SenSys), Stanford, CA, 2016

R. Doost-Mohammady, M.Y. Naderi, K.R. Chowdhury
  Performance Analysis of CSMA/CA based Medium Access in Full-Duplex Wireless Communications, IEEE Transactions on Mobile Computing, 15(6), 2016, 1457-1470

M. Swaminathan, F.S. Cabrera, J.S. Pujol, U. Muncuk, G. Schirner, K.R. Chowdhury
  Multi-Path Model and Sensitivity Analysis for Galvanic Coupled Intra-Body Communication through Layered Tissue, IEEE Transactions on Biomedical Circuits and Systems, 10(2), 2016, 339-351

M. Swaminathan, U. Muncuk, K.R. Chowdhury
  Topology Optimization for Galvanic Coupled Wireless Intra-Body Communication, IEEE International Conference on Computer Communications (INFOCOM), San Francisco, 2016

R.G. Cid-Fuentes, M.Y. Naderi, S. Basagni, K.R. Chowdhury, A. Cabellos-Aparicio, E. Alarcón
  On Signaling Power: Communications Over Wireless Energy, IEEE International Conference on Computer Communications (INFOCOM), San Francisco, 2016

SELECTED RESEARCH PROJECTS

CAREER: Integrated Data and Energy Access for Wireless Sensor Networks
  Principal Investigator, National Science Foundation

Cross Layer Approach to 5G Communications
  Co-Principal Investigator, MathWorks

End-to-End Protocol Designs that Address the Challenges of Distributed Dynamic Spectrum Access Networks
  Principal Investigator, Office of Naval Research

Pau Closas

Assistant Professor, Electrical and Computer Engineering

PhD, Universitat Politècnica de Catalunya, 2009
coe.northeastern.edu/people/closas-pau

Scholarship focus: statistical and array signal processing, estimation and detection theory, Bayesian inference, stochastic filtering, robust statistics, and game theory, with applications to positioning systems, wireless communications, and mathematical biology

Honors and awards: National Science Foundation CAREER Award, 2019; Duran Farell for Technological Research; EURASIP Best PhD Thesis Award; 2016 Institute of Navigation Early Achievements Award

SELECTED PUBLICATIONS

J. Vilà-Valls, M. Navarro, P. Closas, M. Bertinelli
 Synchronization Challenges in Deep Space Communications, IEEE Aerospace and Electronic Magazine, 2019, 34(1), 16-27

E. Arias-de-Reyna, P. Closas, D. Dardari, P.M. Djuric
 Crowd-based Learning of Spatial Fields for the IoT, IEEE Signal Processing Magazine, 35(5), 2018, 130-139

D. Borio, H. Li, P. Closas
 Huber's Non-Linearity for GNSS Interference Mitigation, Sensors, 18(7), 2018, 2217

P. Closas, A. Gusi-Amigó
 Direct Position Estimation of GNSS Receivers, IEEE Signal Processing Magazine, 34(5), 2017, 72-84

J. Vilà-Valls, P. Closas, J.T. Curran
 Multi-frequency GNSS Robust Carrier Tracking for Ionospheric Scintillation Mitigation, Journal of Space Weather and Space Climate, 7, 2017, A26

M.G. Amin, P. Closas, A. Broumandan, J.L. Volakis
 Vulnerabilities, Threats, and Authentication in Satellite-Based Navigation Systems [Scanning the Issue], Proceedings of the IEEE, 104(6), 2016, 1169-1173

D. Dardari, P. Closas, P. Djuric
 Indoor Tracking: Theory, Methods, and Technologies, IEEE Transactions on Vehicular Technology, 64(4), 2015, 1263-1278

SELECTED RESEARCH PROJECTS

CAREER: Secure and Ubiquitous Position, Navigation and Timing
 Principal Investigator, National Science Foundation

Securing GNSS-Based Infrastructures
 Principal Investigator, National Science Foundation

Charles Dimarzio

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

PhD, Northeastern University, 1996
coe.northeastern.edu/people/dimarzio-charles

Scholarship focus: optics, microscopy, coherent detection, interaction of light and sound waves hyperspectral imaging, diffusive optical tomography and ultrasound, lidar and remote sensing, multi-model imaging, Activities include: computer modeling, designing, building and testing of hardware, and processing the resulting data

SELECTED PUBLICATIONS

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, 2017

Z.R. Hoffman, C.A. DiMarzio
 Single-Image Structured Illumination Using Hilbert Transform Demodulation, Journal of Biomedical Optics, 22(5), 2017, 056011–056011

Z.R. Hoffman, C.A. DiMarzio
 Super-Resolution Structured Illumination in Optically Thick Specimens Without Fluorescent Tagging, Journal of Biomedical Optics, 22(11), 2017, 1–11

A. Vakili, J.L. Hollmann, R.G. Holt, C.A. DiMarzio
 Enhanced Tagging of Light Utilizing Acoustic Radiation Force with Speckle Pattern Analysis, Journal of Biomedical optics, 22(10), 2017, 106004

J.L. Hollmann, R. Horstmeyer, C. Yang, C.A. DiMarzio
 Diffusion Model for Ultrasound-Modulated Light, Journal of Biomedical Optics, 19(3), 2014, 035005

J.L. Hollmann, R. Horstmeyer, C. Yang, C.A. DiMarzio
 Analysis and Modeling of an Ultrasound-Modulated Guide Star to Increase the Depth of Focusing in a Turbid Medium, Journal of Biomedical Optics, 18(2), 2013, 025004

SELECTED RESEARCH PROJECTS

Coded-Illumination Fourier Ptychography for High-Content MultiModal Imaging
 Principal Investigator, National Science Foundation

Collagen Monomer Imaging
 Co-Principal Investigator, National Institutes of Health

Light Scattering Research
 Principal Investigator, Draper Labs

Jennifer Dy

Professor, Electrical and Computer Engineering

PhD, Purdue University, 2001
coe.northeastern.edu/people/dy-jennifer

Scholarship focus: machine learning, data mining, statistical pattern recognition, computer vision, and image processing

Honors and awards: National Science Foundation CAREER Award

SELECTED PUBLICATIONS

S.M. Brown, A. Webb, R.S. Mangoubi, J.G. Dy
A Sparse Combined Regression-Classification Formulation for Learning a Physiological Alternative to Clinical Post-Traumatic Stress Disorder Scores, Twenty-ninth AAAI Conference on Artificial Intelligence, 2015

J. Ross, P. Castaldi, M. Cho, J.G. Dy
Dual Beta Process Priors for Latent Cluster Discovery in Chronic Obstructive Pulmonary Disease, ACM SIGKDD Knowledge Discovery and Data Mining, 2014

D. Niu, J.G. Dy, M.I. Jordan
Iterative Discovery of Multiple Alternative Clustering Views, IEEE Transactions on Pattern Analysis and Machine Intelligence, 36(7), 2014, 1340-1353

Y. Yan, R. Rosales, G. Fung, J.G. Dy
Active Learning from Crowds, Proceedings of the 28th International Conference on Machine Learning (ICML), 2011, 1161-1168

Y. Guan, J.G. Dy, M.I. Jordan
A Unified Probabilistic Model for Global and Local Unsupervised Feature Selection, Proceedings of the 28th International Conference on Machine Learning (ICML), 2011, 1073-1080

M. Masaeli, G. Fung, J.G. Dy
From Transformation-Based Dimensionality Reduction to Feature Selection, Proceedings of the 27th International Conference on Machine Learning (ICML), 2010, 751-758

SELECTED RESEARCH PROJECTS

Automated Image Guidance for Diagnosing Skin Cancer With Confocal Microscopy
Principal Investigator, National Institutes of Health

Genetic Epidemiology of COPD
Co-Principal Investigator, National Institutes of Health

Spatio-Temporal Extremes and Associations Marine Adaptation and Survivorship under Climate Change and Rising Ocean Temperatures
Principal Investigator, National Science Foundation

Deniz Erdogmus

Professor and Vice Chair of Research, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, University of Florida, 2002
coe.northeastern.edu/people/erdogmus-deniz

Scholarship focus: machine learning, signal and image analytics, cyber-human systems

Honors and awards: Excellence in Mentoring Award; National Science Foundation CAREER Award; Søren Buus Outstanding Research Award, College of Engineering; College of Engineering Faculty Fellow

SELECTED PUBLICATIONS

V. Yildiz, P. Tian, I. Yildiz, J.M. Brown, J. Kalpathy-Cramer, J. Dy, S. Ioannidis, D. Erdogmus, S. Ostmo, S.J. Kim, R.V.P. Chan, J.P. Campbell, M.F. Chiang
Plus Disease in Retinopathy of Prematurity: Convolutional Neural Network Performance Using a Combined Neural Network and Feature Extraction Approach, Translational Vision Science and Technology, 9(2), 2020, 10

I. Yildiz, P. Tian, J. Dy, D. Erdogmus, J. Brown, J. Kalpathy-Cramer, S. Ostmo, J.P. Campbell, M.F. Chiang, S. Ioannidis
Classification and Comparison Via Neural Networks, Neural Networks, 118, 2019, 65-80

M. Han, S.Y. Gunay, G. Schirner, T. Padir, D. Erdogmus,
HANDS: A Multimodal Dataset for Modeling Toward Human Grasp Intent Inference in Prosthetic Hands, Intelligent Service Robotics, 13, 2019, 179–185

M.S. Goodwin, C.A. Mazefsky, S. Ioannidis, D. Erdogmus, M. Siegel
Predicting Aggression to Others in Youth with Autism Using Wearable Biosensor, Autism Research, 12(8), 1286-1296, 2019

SELECTED RESEARCH PROJECTS

Coordination of Dyadic Object Handover for Human-Robot Interaction
Co-Principal Investigator, National Science Foundation

Mining for Mechanistic Information to Predict Protein Function
Co-Principal Investigator, National Science Foundation

Multimodal Signal Analysis and Data Fusion for Post-traumatic Epilepsy Prediction
Co-Principal Investigator, National Institutes of Health

Probabilistic Learning with Less Labeling
Co-Principal Investigator, Defense Advanced Research Projects Agency

Signal Processing in Neural Networks for Wireless IoT
Principal Investigator, Defense Advanced Research Projects Agency

Hui Fang

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

PhD, University of California, Berkeley, 2014
coe.northeastern.edu/people/fang-hui

Scholarship focus: neural interfaces, biomimetic electronics, electronic materials & organisms

Honors and awards: National Science Foundation CAREER Award

SELECTED PUBLICATIONS

X. Han, K. J. Seo, Y. Qiang, Z. Li, S. Vinnikova, Y. Zhong, X. Zhao, P. Hao, S. Wang, H. Fang
  Nanomeshed Si Nanomembranes, npj Flexible Electronics, 3(9), 2019

Y. Qiang, P. Artoni, K. J. Seo, S. Culaclii, V. Hogan, X. Zhao, Y. Zhong, X. Han, P.-M. Wang, Y.-K. Lo, Y. Li, H. A. Patel, Y. Huang, A. Sambangi, J.S.V. Chu, W. Liu, M. Fagiolini, H. Fang
  Transparent Arrays of Bilayer-Nanomesh Microelectrodes for Simultaneous Electrophysiology and 2-Photon Imaging in the Brain, Science Advances, 4(9), 2018, eaat0626

H. Fang, K.J. Yu, C. Gloschat, Z. Yang, E. Song, C.-H. Chiang, J. Zhao, S.M. Won, S. Xu, M. Trumpis, Y. Zhong, S.W. Han, Y. Xue, D. Xu, S.W. Choi, G. Cauwenberghs, M. Kay, Y. Huang, J. Viventi, I.R. Efimov, J.A. Rogers
  Capacitively Coupled Arrays of Multiplexed Flexible Silicon Transistors for Long-Term Cardiac Electrophysiology, Nature Biomedical Engineering, 1, 2017, 0038

H. Fang, C. Battaglia, C. Carraro, S. Nemsak, B. Ozdol, J.S. Kang, H.A. Bechtel, S.B. Desai, et. al
  Strong Interlayer Coupling In Van Der Waals Heterostructures Built From Single-Layer Chalcogenides, Proceedings of the National Academy of Sciences, 111, 2014, 6198-6202

SELECTED RESEARCH PROJECTS

Massively Multiplexed Gold Microprobe Arrays for Whole Mouse-Brain Recording
  Principal Investigator, National Institutes of Health

Transforming Neural Interfaces Using Stretchable, Transparent, Multifunctional Nanomesh Microelectrodes
  Principal Investigator, National Science Foundation

Transfer Printed, Single-Crystalline Si Nanomesh Thin Films
  Principal Investigator, National Science Foundation

Yunsi Fei

Professor, Electrical and Computer Engineering

PhD, Princeton University, 2004
coe.northeastern.edu/people/fei-yunsi

Scholarship focus: computer architecture, embedded systems, hardware-oriented security, design automation, mobile computing, and underwater sensor networks

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

SELECTED PUBLICATIONS

Z. Zhang, A.A. Ding, Y. Fei
  A Fast and Accurate Guessing Entropy Estimation Algorithm for Full-Key Recovery, IACR Transactions on Cryptographic Hardware and Embedded Systems (TCHES), 2, 2020

M. Sabbagh, Y. Fei, D. Kaeli
  A Novel GPU Overdrive Fault Attack, ACM/IEEE Design Automation Conf. (DAC), July 2020

C. Gongye, Y. Fei, T. Wahl
  Reverse Engineering Deep Neural Networks Using Floating-Point Side Channel, ACM/IEEE Design Automation Conf. (DAC), July 2020

C. Luo, Y. Fei, A. Ding, P. Clause
  Comprehensive Side-Channel Power analysis of XTS-AES, IEEE Transactions on CAD (TCAD), 38, (12), 2019, 2191-2220

Z.H. Jiang, Y. Fei, D. Kaeli
  Exploiting Bank Conflict based Side-Channel Timing Leakage of GPUs, ACM Transaction on Architecture and Code Optimization (TACO), 16(4), 2019

SELECTED RESEARCH PROJECTS

Phase I IUCRC Northeastern University: Center for Hardware and Embedded System Security and Trust (CHEST)
  Principal Investigator, National Science Foundation

Protecting Confidentiality and Integrity of Deep Neural Networks against Side-Channel and Fault Attacks
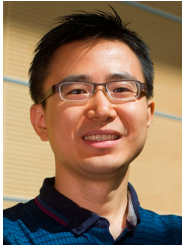 Principal Investigator, National Science Foundation

Automating Countermeasures and Security Evaluation Against Software Side-Channel Attacks
  Principal Investigator, National Science Foundation

Secure Design by RISC-V Framework
  Principal Investigator, CHEST Industry Fund

Yun Raymond Fu

Professor, Electrical and Computer Engineering; jointly appointed, Computer Science

PhD, University of Illinois, 2008
coe.northeastern.edu/people/fu-yun

Scholarship focus: machine learning and computational intelligence, social media analytics, human-computer interaction, and cyber-physical systems

Honors and awards: IEEE Fellow; OSA Fellow; SPIE Fellow; IAPR Fellow; Office of Naval Research Young Investigator Award; Army Research Office Young Investigator Award; International Neural Network Society's Young Investigator Award; IEEE CIS Outstanding Early Career Award; ACM Future of Computing Academy Member; Søren Buus Outstanding Research Award

SELECTED PUBLICATIONS

H. Liu, Z.G. Tao, Y. Fu
  Partition Level Constrained Clustering, IEEE Transactions on Pattern Analysis and Machine Intelligence, 2018

S. Li, M. Shao, Y. Fu
  Person Re-Identication by Cross-View Multi-Level Dictionary Learning, IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI), 2018

K. Li, Z. Wu, K.C. Peng, J. Ernst, Y. Fu
  Tell Me Where To Look: Guided Attention Inference Network, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2018

J.P. Robinson, M. Shao, Y. Wu, H. Liu, T. Gillis, Y. Fu
  Visual Kinship Recognition of Families In the Wild (FIW), IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI), 2018

SELECTED RESEARCH PROJECTS

EAGER: Vision-Based Activity Forecasting by Mining Temporal Causalities
  Principal Investigator, National Science Foundation

Deeply Learned Visual Commonsense and Its Applications
  Principal Investigator, Samsung Global Research Outreach

Deep Structures Boosted Self-Organized Behavior Pattern Learning for Anomaly Detection
  Principal Investigator, Office of Naval Research

Siddhartha Ghosh

Assistant Professor, Electrical and Computer Engineering
(Joining Janurary 2021)

PhD, Carnegie Mellon University, 2015
coe.northeastern.edu/people/ghosh-siddhartha

Scholarship focus: acousto-optic and acousto-electric signal processing devices, integrated photonics, piezoelectric MEMS, oscillator-based computing, nanofabrication techniques and heterogeneous material integration

Honors and awards: NSF IGERT Fellowship, University of Pennsylvania; Cornell Presidential Research Scholarship

SELECTED PUBLICATIONS

S. Ghosh, M.A. Hollis, R.J. Molnar
  Acoustoelectric Amplification of Rayleigh Waves in Low Sheet Density AlGaN/GaN Heterostructures on Sapphire, Applied Physics Letters, 114, 2019, 063502

J. Chou, S. Bramhavar, S. Ghosh, W. Herzog
  Analog Coupled Oscillator Based Weighted Ising Machine, Scientific Reports, 9, 2019, 14786

S. Ghosh, G. Piazza
  RF Oscillators Based on Piezoelectrically Driven Optical Modulation, IEEE Transactions on Electron Devices, 65, 2018, 1391

S. Ghosh, G. Piazza
  Laterally Vibrating Resonator Based Elasto-Optic Modulation in Aluminum Nitride, APL Photonics, 1, 2016, 036101

S. Ghosh, G. Piazza
  Piezoelectric Actuation of Aluminum Nitride Contour Mode Optomechanical Resonators, Optics Express 23, 2015, 15477

S. Ghosh, G. Piazza
  Photonic Microdisk Resonators in Aluminum Nitride, Journal of Applied Physics 113, 2013, 016101

Vincent G. Harris

University Distinguished Professor, William Lincoln Smith Professor, Electrical and Computer Engineering; affiliated faculty, Chemical Engineering

PhD, Northeastern University, 1990
coe.northeastern.edu/people/harris-vincent

Scholarship focus: functional materials used in high frequency applications such as sensors, radar and communication platforms, and nanotechnology, power electronics, and medical diagnostics and therapeutics

Honors and awards: Jefferson Science Fellow; Fellow, American Association for the Advancement of Science; Fellow, Institute of Electrical and Electronics Engineers; Fellow, American Physical Society; Fellow, Institute of Physics; Lee Hsun Award, Chinese Academy of Sciences, Institute of Metal Research; Fulbright Fellow; TMS, Functional Materials Division, Distinguished Scientist Award; Søren Buus Outstanding Research Award, College of Engineering; Outstanding Translational Research Award, College of Engineering; 47th Robert D. Klein Lecturer, Northeastern University

SELECTED PUBLICATIONS

P. Kulik, G. Winter, A. Sokolov, K. Murphy, C. Yu, K. Qian, O.Fitchorova, V. Harris, et al.
Broadband Free Space Impedance in Hexaferrites by Substitution of Quadrivalent Heavy Transition Metal Ions for Miniaturized RF Devices, Applied Physics Letters, 116(20), 2020, 202404

P. Andalib, V. Harris
Grain Boundary Engineering of Power Inductor Cores for Mhz Applications, Journal of Alloys and Compounds, 832, 2020, 153131 (60th Jubilee Edition)

Q. Li, Y. Chen, V.G. Harris
Clustering Effect on Permeability Spectra of Magneto-Dielectric Composites with Conductive Magnetic Inclusions, Journal of Applied Physics, 125(18), 2019, 185107

N. Jia, H. Zhang, V.G. Harris
Iron-Depleted Bi-Yig Having Enhanced Gyromagnetic Properties Suitable for Ltcc Processing, Journal of the American Ceramic Society, 102(3), 2019, 1180-1191

SELECTED RESEARCH PROJECTS

Development of Low Loss Inductor Cores and Deconvolution of Power Loss Contributions
Principal Investigator, Raytheon Corp.

Revealing the Nature and Role of Interfaces in Hexaferrite– Wide Bandgap Heterostructures for Rf Electronics
Principal Investigator, Army Research Office

Vinay Ingle

Associate Professor, Electrical and Computer Engineering

PhD, Rensselaer Polytechnic Institute, 1981
coe.northeastern.edu/people/ingle-vinaykumar

Scholarship focus: multidimensional signal processing and hyperspectral imaging

SELECTED PUBLICATIONS

D. Manolakis, N. Bosowski, V. Ingle
Count Time Series Analysis: A Signal Processing Perspective, IEEE Signal Processing Magazine, 36(3), 2019

M. Pieper, V. Ingle, D. Manolakis
Sensitivity of Temperature and Emissivity Separation to Atmospheric Errors in LWIR Hyperspectral Imagery, SPIE Conference on Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXIV, SPIE 2018 Defense + Security, 2018

M. Pieper, D. Manolakis, E. Truslow, T. Cooley, M. Brueggeman, J. Jacobson, A. Weisner, V. Ingle
Effects of Wavelength Calibration Mismatch on Temperature-Emissivity Separation Techniques, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing 11, 2018, 57-67

V. Ingle, J. Proakis
Digital Signal Processing Using MATLAB, Cengage Learning, Fourth Edition, 2017

SELECTED RESEARCH PROJECTS

Algorithms for Threat Detection
Principal Investigator, MIT Lincoln Lab

Anamoly Detection in Sequential Image Frames using Low-Rank Modeling
Principal Investigator, Massachusetts Institute of Technology Lincoln Lab

Investigation of Hyperspectral Target Detection Algorithms
Principal Investigator, MIT Lincoln Lab

Performance Modeling and Prediction for LWIR Hyperspectral Target Detection Systems
Principal Investigator, Massachusetts Institute of Technology Lincoln Lab

Stratis Ioannidis

Associate Professor, Electrical and Computer Engineering

PhD, University of Toronto, 2009
coe.northeastern.edu/people/ioannidis-stratis

Scholarship focus: distributed systems, networking, machine learning, big data, and privacy

SELECTED PUBLICATIONS

I. Yıldız, J. Dy, D. Erdoğmuş, J. Kalpathy-Cramer, S. Ostmo, J.P. Campbell, M.F. Chiang, S. Ioannidis
  Fast and Accurate Ranking Regression, AISTATS, 2020

Y. Li, S. Ioannidis
  Universally Stable Cache Networks, INFOCOM, 2020

Y. Guo, J. Dy, D. Erdoğmuş, J. Kalpathy-Cramer, S. Ostmo, J.P. Campbell, M.F. Chiang, S. Ioannidis
  Accelerated Experimental Design for Pairwise Comparisons, SDM, 2019

P. Tian, Y. Guo, J. Brown, J. Kalpathy-Cramer, S. Ostmo, J.P. Campbell, M.F. Chiang, J. Dy, D. Erdoğmuş, S. Ioannidis
  A Severity Score for Retinopathy of Prematurity, KDD, 2019

I. Yıldız, P. Tian, J. Dy, D. Erdoğmuş, J. Brown, J. Kalpathy Cramer, S. Ostmo, J. P. Campbell, M. F. Chiang, S. Ioannidis
  Classification and Comparison via Neural Networks, Elsevier Journal of Neural Networks, 2019

M. Mahdian, A. Moharrer, S. Ioannidis, E. Yeh
  Kelly Cache Networks, INFOCOM, 2019

SELECTED RESEARCH PROJECTS

Assistive Integrative Support Tool for Retinopathy of Prematurity
  Principal Investigator, National Science Foundation

Caching Networks with Optimality Guarantees
  Principal Investigator, National Science Foundation

CAREER: Leveraging Sparsity in Massively Distributed Optimization
  Principal Investigator, National Science Foundation

Design and Computation of Scalable Graph Distances in Metric Spaces: A Unified Multiscale Interpretable Perspective
  Principal Investigator, National Science Foundation

Efficient and Adaptive Real-Time Learning for Next Generation Wireless Systems
  Principal Investigator, National Science Foundation

Massively Scalable Secure Computation Infrastructure Using FPGAs
  Principal Investigator, National Science Foundation

Josep M. Jornet

Associate Professor, Electrical and Computer Engineering

PhD, Georgia Institute of Technology, 2013
coe.northeastern.edu/people/jornet-josep

Scholarship focus: terahertz communications for 6G systems, wireless nano-bio-communication networks, Internet of Nano-Things

SELECTED PUBLICATIONS

Q. Xia, Z. Hossain, M. Medley, J.M. Jornet
  Synchronization and Medium Access Control Protocol for Terahertz-Band Communication Networks, IEEE Transactions on Mobile Computing, 2020

Z. Zhang, X. Qiao, B. Midya, K. Liu, J. Sun, T. Wu, W. Liu, R. Agarwal, J.M. Jornet, S. Longhi, N. M. Litchinitser, L. Feng
  Tunable Topological Charge Vortex Microlaser Via Spin-Orbit Interactions, Science, 368(6492), 2020,760-763

J.M. Jornet, Y. Bae, C. Handelmann, B. Decker, A. Balcerak, A. Sangwan, P. Miao, A. Desai, L. Feng, E.K. Stachowiak, M.K. Stachowiak
  Optogenomic Interfaces: Bridging Biological Networks with the Electronic Digital World, Proceedings of the IEEE, 2019

Z. Hossain, C. Mollica, J. Federici, J.M. Jornet
  Stochastic Interference Modeling and Experimental Validation for Pulse-based Terahertz Communication, IEEE Transactions on Wireless Communications, 18(8), 2019, 4103-4115

SELECTED RESEARCH PROJECTS

CAREER: Realizing Ultra-Broadband Terahertz Communication Networks
  Principal Investigator, National Science Foundation

Collaborative Research: Scaling WLANs in Spectrum, User Density, and Robustness
  Co- Principal Investigator, National Science Foundation

Networked Nanophotonic Devices for Stem Cell Regulation: From Optogenetics to Optogenomics
  Principal Investigator, National Science Foundation

PFI:BIC:WearNet: Smart Health Monitoring & Diagnosis System based on Wear- able Nano-biosensing Networks
  Principal Investigator, National Science Foundation

Protocol Stack Design for Frequency-agile Ultra-broadband Airborne Networks in the THz Band
  Principal Investigator, Air Force Research Lab

David Kaeli

COE Distinguished Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering, Khoury College of Computer Sciences

PhD, Rutgers University, 1992
coe.northeastern.edu/people/kaeli-david

Scholarship focus: computer architecture, GPUs, heterogeneous computing, performance analysis, security and information assurance, hardware reliability and recovery, big data analytics, workload characterization

Honors and awards: Fellow, Institute of Electrical and Electronics Engineers; Distinguished Scientist, Associate of Computing Machinery; Distinguish Professor, Heterogeneous Systems Architecture Foundation; National Science Foundation CAREER Award

SELECTED PUBLICATIONS

F. Previlon, C. Kalra, D. Tiwari, D. Kaeli
  Characterizing and Exploiting Soft Error Vulnerability Phase Behavior in GPU Applications, IEEE Transactions on Dependable and Secure Computing, 2020

T. Baruah, Y. Sun, A. Dincer, S. Mojumder, J. Abellan, Y. U., A. Josh, N. Rubin, J. Kim, D. Kaeli
  Griffin: Hardware-Software Support for Efficient Page Migration in Multi-GPU Systems, Proceedings of the 26th IEEE International Symposium on High Performance Computer Architecture, 2020, 596-609

Y. Sun, T. Baruah, S. A. Mojumder, S. Dong, X. Gong, S. Treadway, Y. Bao, D. Kaeli, et al.
  MGPUSim: Enabling Multi-GPU Performance Modeling and Optimization, Proceedings of the 46th International Symposium on Computer Architecture (ISCA '19), ACM, New York, NY, USA, 2019, 197-209

SELECTED RESEARCH PROJECTS

A Framework of Simultaneous Acceleration and Storage Reduction on Deep Neural Networks Using Structured Matrices
  Co-Principal Investigator, National Science Foundation
DARPA HIVE
  Principal Investigator, Defense Advanced Research Agency
Exploring Analysis of Environment and Health Through Multiple Alternative Clustering
  Co-Principal Investigator, National Science Foundation
Porting and Accelerating High Performance Computing Applications to the AMD ROCm Runtime Environment
  Principal Investigator, AMD

Yong-Bin Kim

Professor, Electrical and Computer Engineering

PhD, Colorado State University, 1996
coe.northeastern.edu/people/kim-yong-bin

Scholarship focus: integrated circuit design and for nanoelectronics and nano technology, high speed system integration for signal processing and communication applications, bio-chip and bio-sensor interface circuit design, electronic neuron circuit design, low power adaptive robot controller circuit design; high performance and low power VLSI design, system-on-chip (soc), and Physical VLSI CAD

SELECTED PUBLICATIONS

A. Aldahlawi, K.K. Kim, Y.-B. Kim
  GPU Architecture Opti- mization For Mobile Computing, 2019 IEEE International SoC Design Conference (ISOCC), Oct. 6-9, 2019, Jeju, South Korea, 247-248

G. Jeon, K.K. Kim, Y.-B. Kim
  Standing Wave Oscillator Based Clock Distribution Minimizing Equivalent Capacitance for Process and Temperature Variation, IEEE International SoC Design Conference (ISOCC), Jeju, South Korea, 241-242, 2019

G. Jeon, Y.-B. Kim
  Area Ecient 4GB/s Clock Data Recovery Using Im- proved Phase Interpolator with Error Monitor, 2018 IEEE International Midwest Symposium on Circuits and Systems on Circuits and Systems (MWSCAS), Windsor, Canada, 2018, 206-209

Y. Choi, G. Jeon, Y.-B. Kim, H.K. Jung
  Transceiver Design for LVSTL Signal Interface with a Low Power On-Chip Self Calibration Scheme, Elseviere Integration the VLSI Journal, 63, 2018, 148-159

G. Jeon, Y.-B. Kim
  Switched Capacitor and Infinite Impulse Response Summation for a Quad-Rate DFE 4Gb/s Data Rate, ACM GLSVLSI Conference, Banff, Alberta, Canada, 2017, 439-442

H. Zhu, W. Yang, G. Engel, Y.-B. Kim
  A Two-Parameter Calibration Technique Tracking Temperature Variations for Current Source Miamatch in DACs, IEEE Transactions on Circuits and Systems II, 64(4), 2017, 387-391

SELECTED RESEARCH PROJECTS

Compact and Power Efficient Integrated Voltage Tunable RF Multiferroic Inductors with Wide Tunable Inductance
  Principal Investigator, Winchester Technology

Semi-Self Calibration of High Speed Transceiver for DRAM Interface
  Principal Investigator, Hynix Semiconductor

Engin Kirda

Professor, Electrical and Computer Engineering; jointly appointed, Computer and Information Science

PhD, Technical University of Vienna, 2002
coe.northeastern.edu/people/kirda-engin

Scholarship focus: malware analysis and detection; web security; social network security; reverse engineering; intrusion detection

SELECTED PUBLICATIONS

M. Weissbacher, W. Robertson, E. Kirda, C. Kruegel, G. Vigna
ZigZag: Automatically Hardening Web Applications Against Client-Side Validation Vulnerabilities, In USENIX Security Symposium, Washington DC, 2015

C. Mulliner, W. Robertson, E. Kirda
Hidden GEMs: Automated Discovery of Access Control Vulnerabilities in Graphical User Interfaces, In IEEE Symposium on Security and Privacy (S&P), San Jose, CA, 2014

S. Le Blonde, A. Uritesc, C. Gilbert, Z. Leong Chua, P. Saxena, E. Kirda
Look at Targeted Attacks Through the Lense of an NGO, In USENIX Security Symposium, San Diego, CA, 2014

K. Onarlioglu, C. Mulliner, W. Robertson, E. Kirda
PrivExec: Private Execution as an Operating System Service, In IEEE Symposium on Security and Privacy (S&P), San Francisco, CA, 2013

L. Bilge, E. Kirda, C. Kruegel, M. Balduzzi
EXPOSURE: Finding Malicious Domains Using Passive DNS Analysis, In Network and Distributed Systems Security Symposium (NDSS) San Diego, CA, 2011

SELECTED RESEARCH PROJECTS

Continuum: Finding Space and Time Vulnerabilities in Java Programs
Co-Principal Investigator, Defense Advanced Research Projects Agency

DarkDroid: Exposing the Dark Side of Android Marketplaces
Principal Investigator, Defense Advanced Research Projects Agency

Firmalice: Modeling and Identifying Malice in Firmware
Principal Investigator, Defense Advanced Research Projects Agency

Collaborative: Automated Reverse Engineering of Commodity Software
Co-Principal Investigator, National Science Foundation

Mieczyslaw Kokar

Professor, Electrical and Computer Engineering

PhD, Wroclaw University of Technology, 1973
coe.northeastern.edu/people/kokar-mieczyslaw

**Scholarship focus**: cognitive radio; software engineering-self-controlling software; information fusion

SELECTED PUBLICATIONS

S. Lu, M.M. Kokar
Degrees of Information Relevance in Situation Assessment, Proceedings of the 2020 IEEE Conference on Cognitive Situation Management (CogSIMA'2020), 2020, 1–8

S. Singh, M.M. Kokar, D. Suresh
Developing an Ontology for Emergence using Formal Concept Analysis, In Tenth International Conference on Complex Systems, 2020, 1–11

J. Moskal, A. Whittington, J. Morgan, M. Kokar, B. Abbott
Validation Protocol (best paper award). In Proceedings of the International Telemetering Conference - ITC USA 2019, pages 1–9. International Foundation for Telemetering, 2019

Y. Chen, M. Güngör, S. Singh, A. Tazin, M.M. Kokar, M. Leeser
Dynamic Deployment of Communication Applications to Different Hardware Platforms using Ontological Representations, In 2018 IEEE High Performance Extreme Computing Conference, HPEC 2018, Waltham, MA, USA, 2018, 1-6

J. Moskal, M.M. Kokar, O. Hurez-Martin
Using Standardized Semantic Technologies for Discovery and Invocation of RF-Based Microservices, In Wireless Innovation Forum Conference on Wireless Communications Technologies and Software Defined Radio, 2018, 1-9

Y. Chen, M.M. Kokar, J. Moskal, D. Suresh
Mapping Spectrum Consumption Models to Cognitive Radio Ontology for Automatic Inference, Analog Integrated Circuits and Signal Processing, 2017

L. Lechowicz, M.M. Kokar
Cognitive Radio: Interoperability Through Waveform Reconfiguration, Artech House, Norwood, MA, 2015

SELECTED RESEARCH PROJECTS

IDAS: Intent-Defined Adaptive Software
Principal Investigator, Defense Advanced Research Projects Agency

Dimitrios Koutsonikolas
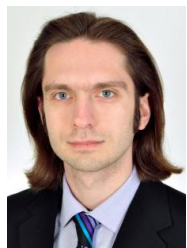
Associate Professor, Electrical and Computer Engineering
(Joining January 2021)

PhD, Purdue University, 2010
coe.northeastern.edu/people/
koutsonikolas-dimitrios

Scholarship focus: experimental wireless networking and mobile computing, with a current focus on millimeter wave networking, high-bandwidth applications (VR, 360° video streaming) over wireless networks, LTE/WiFi coexistence, energy-aware protocol design for smartphones, and wireless sensing

Honors and awards: Best Paper Awards: ACM mmNets 2019, IEEE WCNC 2017, SENSORCOMM 2007; IEEE Region 1 Technological Innovation (Academic) Award, September 2019; UB Teaching Innovation Award, June 2018; NSF CAREER Award, February 2016

SELECTED PUBLICATIONS

S.K. Saha, C. Vlachou, D. Koutsonikolas, K.-H. Kim
DeMiLTE: Detecting and Mitigating LTE Interference for Enterprise Wi-Fi in 5 GHz, In Proceedings of the Twentieth ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc), 2019

S.K. Saha, S. Aggarwal, R. Pathak, D. Koutsonikolas, J. Widmer
MuSher: An Agile Multipath-TCP Scheduler for Dual-Band 802.11ad/ac Wireless LANs, In Proceedings of the 25th ACM Annual International Conference on Mobile Computing and Networking (MobiCom), 2019

M.K. Haider, Y. Ghasempour, D. Koutsonikolas, E. Knightly
LiSteer: mmWave Beam Acquisition and Steering by Tracking Indicator LEDs on Wireless APs, In Proceedings of the 24th Annual International Conference on Mobile Computing and Networking (MobiCom), 2018

R.K. Sheshadri, K. Sundaresan, E. Chai, A. Khojastepour, S. Rangarajan, D. Koutsonikolas
BLU: Blue-Printing Interference for Robust LTE Access in Unlicensed Spectrum, In Proceedings of the 13th International Conference on emerging Networking EXperiments and Technologies (CoNEXT), 2017

SELECTED RESEARCH PROJECTS

CAREER: A Millimeter-Wave Multi-Layer WLAN Architecture for Multi-Gigabit, Always-On Connectivity
Principal Investigator, National Science Foundation

NeTS: Medium: CollaborativeResearch: Scaling WLANs in Spectrum, User Density, and Robustness
Principal Investigator, National Science Foundation

Miriam Leeser

Professor, Electrical and Computer Engineering

PhD, Cambridge University, 1988
coe.northeastern.edu/people/leeser-miriam

Scholarship focus: accelerators for compute intensive applications: Field Programmable Gate Arrays (FPGAs) and graphics processing units (GPUs); applications including biocomputing, data privacy, machine learning, software-defined radio; uses and implementations of computer arithmetic

Honors and awards: Fulbright Scholar

SELECTED PUBLICATIONS

M. Blott, T.B. Preußer, N.J. Fraser, G. Gambardella, K. O'brien, Y. Umuroglu, M. Leeser, K. Vissers
FINN-R: An End-to-End Deep-Learning Framework for Fast Exploration of Quantized Neural Networks, ACM Transactions on Reconfigurable Technology and Systems, 11(3), 2108, 16

B. Drozdenko, M. Zimmermann, T. Dao, K. Chowdhury, M. Leeser
Hardware-Software Codesign of Wireless Transceivers on Zynq Heterogeneous Systems, IEEE Transactions on Emerging Topics in Computing, 6(4), 2017, 566-578

J. Bhimani, N. Mi, M. Leeser, Z. Yang
FiM: Performance Prediction for Parallel Computation in Iterative Data Processing Applications, In Cloud Computing (CLOUD), IEEE 10th International Conference, 2017, 359-366

M. Blott, T.B. Preußer, N. Fraser, G. Gambardella, K. O'Brien, Y. Umuroglu, M. Leeser
Scaling Neural Network Performance Through Customized Hardware Architectures on Reconfigurable Logic, In 2017 IEEE International Conference on Computer Design (ICCD), 2017, 419-422

X. Fang, S. Ioannidis, M. Leeser
Secure Function Evaluation Using An FPGA Overlay Architecture, In Proceedings of the 2017 ACM/SIGDA International Symposium on Field-Programmable Gate Arrays, 2017, 257-266

SELECTED RESEARCH PROJECTS

Massively Scalable Secure Computation Infrastructure Using FPGAs
Co-Principal Investigator, National Science Foundation

Hardware/Software Implementations of Wireless Communications for 5G and Beyond
Principal Investigator, Mathworks

Brad Lehman

Professor, Electrical and Computer Engineering

PhD, Georgia Institute of Technology, 1992
coe.northeastern.edu/people/lehman-bradley

Scholarship focus: power electronics; dc-dc converters; pulse width modulation; motion control; electric motor drives; analog circuits; control theory; differential equations; time delays; nonlinear systems and control; industrial control

Honors and awards: IEEE Modeling and Control Technical Achievement Award of the IEEE Power Electronics Society; IEEE Standards Medallion; IEEE PELS Harry A. Owen, Jr. Distinguished Service Award, IEEE Award for Achievement in Power Electronics Standards, Princeton Review: The 300 Best Professors

SELECTED PUBLICATIONS

X. Zhang, Y. Li, S. Lu, H.F. Hamann, B. Hodge, B. Lehman, A Solar Time Based Analog Ensemble Method for Regional Solar Power Forecasting, IEEE Transactions on Sustainable Energy, 10(1), 2019, 268-279

M. Matam, V.R. Barry, B. Lehman
Performance Improvement of Dynamic PV Array Under Partial Shade Conditions Using M2 Algorithm, IET Renewable Power Generation, 13(8), 2019, 1239-1249

A.A. Stonier, B. Lehman
An Intelligent Based Fault Tolerant System for Solar Fed Cascaded Multilevel Inverters, IEEE Transactions on Energy Conversion, 33(3), 2018, 1047-1057

D.T. Khanmiri, R. Ball, B. Lehman
Degradation Effects on Energy Absorption Capability and Time to Failure of Low Voltage Metal Oxide Varistors, IEEE Transactions on Power Delivery, 32(5), 2017, 2272-2280

M. Forouzesh, Y.P. Siwakoti, S.A. Gorji, F. Blaabjerg, B. Lehman
Step-Up DC–DC Converters: A Comprehensive Review of Voltage-Boosting Techniques, Topologies, and Applications, IEEE Transactions on Power Electronics, 32(12), 2017, 9143-9178

SELECTED RESEARCH PROJECTS

Arc Fault Protection in Solar PV Systems
Principal Investigator, Mersen Corporation

S-STEM: Student-Pathways Opening World Engineering Resources
Principal Investigator, National Science Foundation

Hanoch Lev-Ari

Professor, Electrical and Computer Engineering

PhD, Stanford University, 1984
coe.northeastern.edu/people/lev-ari-hanoch

Scholarship focus: adaptive filtering; statistical signal processing; networked dynamic state estimation; signal processing in electric energy systems

Honors and awards: Fellow, Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS

P. Ren, A. Abur, H. Lev-Ari
Tracking Transmission Line Parameters in Power Grids Observed by PMUs, 13th IEEE PES PowerTech Conference, Milano, Italy, 2019

A. Ghanavati, H. Lev-Ari, A.M. Stankovic
A Sub-Cycle Approach to Dynamic Phasors with Application to Dynamic Power Quality Metrics, IEEE Transactions on Power Delivery, 33(5), 2018, 2217-2225

H. Lev-Ari, R.D. Hernandez, A.M. Stankovic, E.A. Marengo
Adaptive Near-Optimal Compensation in Lossy Polyphase Power Systems, IEEE Transactions on Control Systems Technology, 26(2), 2018, 732-739

B. Yan, H. Lev-Ari, A.M. Stankovic
Networked State Estimation with Delayed and Irregularly-Spaced Time-Stamped Observations, IEEE Transactions on Control of Network Systems, 5(3), 2018, 888-900

P. Ren, H. Lev-Ari, A. Abur
Tracking Three Phase Untransposed Transmission Line Parameters Using Synchronized Measurements, IEEE Transactions on Power Systems, 33(4), 2018, 4155-4163

P. Hajiyani, H. Lev-Ari, A.M. Stankovic
Mitigating Bad Data and Measurement Delay in Nonlinear Dynamic State Estimation, Proceedings of the IEEE International Symposium on Circuits and Systems (ISCAS), Montreal, 2016

P. Ren, H. Lev-Ari, A. Abur
Robust Continuous-Discrete Kalman Filter for Estimating Machine States with Model Uncertainties, 19th Power Systems Computation Conference (PSCC), Genoa, Italy, 2016

SELECTED RESEARCH PROJECTS

Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks (CURENT)
Co-Principal Investigator, National Science Foundation

Advanced Cyber-Physical Models for Estimation and Control in Naval Power and Energy Systems
Principal Investigator, Office of Naval Research

Xue Lin

Assistant Professor, Electrical and Computer Engineering

PhD, University of Southern California, 2016
coe.northeastern.edu/people/lin-xue

Scholarship focus: adversarial machine learning; deep learning acceleration and hardware implementation; cyber-physical systems

SELECTED PUBLICATIONS

M. Sun, P. Zhao, M. Gungor, M. Leeser, M. Pedram, X. Lin
3D CNN Acceleration on FPGA Using Hardware-Aware Pruning, Proceedings of the 57th Annual Design Automation Conference (DAC), 2020

T. Sato, J. Shen, N. Wang, Y. Jia, X. Lin, Q. Chen
Security of Deep Learning Based Lane Keeping Assistance Systems under Physical-World Adversarial Attack, Best Technical Poster Award at the NDSS Symposium, 2020

P. Zhao, S. Wang, C. Gongye, Y. Wang, Y. Fei, X. Lin
Fault Sneaking Attack: A Stealthy Framework for Misleading Deep Neural Networks, Proceedings of the 56th Design Automation Conference (DAC), 2019

K. Xu, S. Liu, P. Zhao, P.-Y. Chen, H. Zhang, Q. Fan, D. Erdogmus, Y. Wang, X. Lin
Structured Adversarial Attack: Towards General Implementation and Better Interpretability, Proceedings of the International Conference on Learning Representations (ICLR), 2019

X. Chen, S. Liu, K. Xu, X. Li, X. Lin, M. Hong, D. Cox
ZO-AdaMM: Zeroth-Order Adaptive Momentum Method for Black-Box Optimization, Advances in Neural Information Processing Systems (NeurIPS), 2019

SELECTED RESEARCH PROJECTS

A Framework of Simultaneous Acceleration and Storage Reduction on Deep Neural Networks Using Structured Matrices
Principal Investigator, National Science Foundation

ADMM-NN: A Unified Software/Hardware Framework of DNN Computation and Storage Reduction Using ADMM
Principal Investigator, National Science Foundation

Cultivating Robustness for Deep Learning
Principal Investigator, Air Force Research Laboratory

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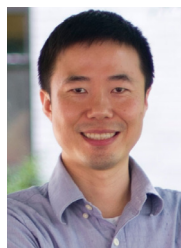
Associate Professor, joint faculty appointment in Mechanical and Industrial Engineering and Electrical and Computer Engineering

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

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

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

SELECTED PUBLICATIONS

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

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

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

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

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

SELECTED RESEARCH PROJECTS

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

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

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

Fabrizio Lombardi

ITC Endowed Professor, Electrical and Computer Engineering

PhD, University of London, 1982
coe.northeastern.edu/people/lombardi-fabrizio

Scholarship focus: fault-tolerant computing; VLSI CAD; testing, configurable computing, distributed systems

Honors and awards: Fellow, Institute of Electrical and Electronics Engineers; Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

H. Jiang, C. Shen, J. Han, F. Lombardi, P. Jonker
Adaptive Filter Designs Using Stochastic Circuits, IEEE International Symposium on Very-Large-Scale Integration, Pittsburgh, 2016, 122-127

K. Namba, F. Lombardi
A Coding Scheme for Write Time Improvement of Phase Change Memory (PCM) Systems, IEEE Transactions on Multi-Scale Computing Systems, 2(4), 2016, 291-296

X. Cui, D.Wenwen, F. Lombardi, W. Liu
A Parallel Decimal Multiplier Using Hybrid Binary Coded Decimal (BCD) Codes, Proceedings of the IEEE International Symposium on Arithmetics, San Jose, 2016, 150-155

H.A.F. Almurib, F. Lombardi, T. Nandha Kumar
Current-Based Testing, Modeling and Monitoring for Operational Deterioration of a Memristor-Based LUT, Journal of Electronic Testing Theory and Applications, 32(5), 2016, 587-599

W. Liu, L. Chen, W. Wang, F. Lombardi, M. O'Neill
Design and Analysis of Inexact Floating-Point Adders, IEEE Transactions on Computers, 65(1), 2016, 308-314

S. Zare, S. Somu, C. Vittoria, F. Lombardi
Field Sensors and Tunable Devices Using Magnetoelectric Hexaferrite on Silicon Substrates, IEEE Transactions on Electron Devices, 63(8), 2016, 3229-3235

K. Namba, F. Lombardi
High-Speed Parallel Decodable Single-Error Correcting (SEC) Codes, IEEE Transactions on Device and Material Reliability, 16(1), 2016, 30-37

L. Chen, J. Han, W. Liu, F. Lombardi
On the Design of Approximate Restoring Dividers for Error-Tolerant Applications, IEEE Transactions on Computers, 65(8), 2016, 2522-2533

Edwin Marengo

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

PhD, Northeastern University, 1997
coe.northeastern.edu/people/marengo-fuentes-edwin

Scholarship focus: theoretical and applied electromagnetics, theoretical and applied optics, scattering theory, wave inverse problems, noniterative inverse scattering, physics-based signal processing and imaging, change detection theory and applications, compressive sensing, electromagnetic information theory, analysis and design of optical and quantum holographic detectors

Honors and awards: National Science Foundation CAREER Award

SELECTED PUBLICATIONS

E.A. Marengo, E.S. Galagarza, R. Solimene
Data-Driven Linearizing Approach in Inverse Scattering, Journal of the Optical Society of America A, 34(9), 2017, 1561-1576

E.A. Marengo
Quasi-Born Approximation Scattering and Inverse Scattering of Multiple Scattering Targets, IET Radar, Sonar and Navigation, 11, 2017, 1276-1284

J. Tu, E.A. Marengo
Generalized Likelihood Ratio Test Change Detection with Optical Theorem Constraint, Journal of the Optical Society of America A, 33, 2016, 2225-2236

E.A. Marengo, J. Tu
Generalized Optical Theorem in the Time Domain, Progress in Electromagnetics Research B, 65, 2016, 1-18

E.A. Marengo, J. Tu
Optical Theorem Detectors for Active Scatterers, Waves in Random and Complex Media, 25, 2015, 682-707

E.A. Marengo
Nonuniqueness of Optical Theorem Detectors, Journal of the Optical Society of America A, 32, 2015, 1936-1942

E.A. Marengo
Inverse Diffraction Theory and Computation of Minimum Source Regions of Far Fields, Mathematical Problems in Engineering, 513953, 2014, 1-18

E.A. Marengo, J. Tu
Optical Theorem for Transmission Lines, Progress in Electromagnetics Research B, 61, 2014, 253-268

E.A. Marengo
A New Theory of the Generalized Optical Theorem in Anisotropic Media, IEEE Transactions on Antennas and Propagation, 61, 2013, 2164-2179

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, and 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

Nicol McGruer

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

PhD, Michigan State University, 1983
coe.northeastern.edu/people/mcgruer-nicol

Scholarship focus: MEMS, NEMS, RF MEMS; nanotechnology; micro/nanofabrication; microsystems; microrelay; nanoswitch; microspectrometer; microfluidics; organic FETs, organic solar cells

Honors and awards: Søren Buus Outstanding Research Award, College of Engineering, Joel and Spira Excellence in Teaching Award

SELECTED PUBLICATIONS

W.Z. Zhu, T. Wu, G. Chen, C. Cassella, M. Assylbekova, M. Rinaldi, N. McGruer
 Design and Fabrication of an Electrostatic AlN RF MEMS Switch for Near-Zero Power RF Wake-Up Receivers, IEEE Sensors Journal, 18(24), 2018, 9902–9909

Z. Qian, S. Kang, V. Rajaram, C. Cassella, N.E. McGruer, M. Rinaldi
 Zero-Power Infrared Digitizers Based on Plasmonically Enhanced Micromechanical Photoswitches, Nature Nanotechnology 12, 2017, 969–973

S.D. Berger, N.E. McGruer, G.G. Adams
 Simulation of Dielectrophoretic Assembly of Carbon Nanotubes Using 3D Finite Element Analysis, Nanotechnology, 26(15), 2015, e155602

A. Basu, R.P. Hennessy, G.G. Adams, N.E. McGruer
 Hot Switching Damage Mechanisms in MEMS Contacts–Evidence and Understanding, Journal of Micromechanics and Microengineering, 24, 2014, e105004

Y.-C. Wu, N. McGruer, G.G. Adams
 Adhesive Slip Process Between a Carbon Nanotube and a Substrate, Journal of Physics D: Applied Physics, 46, 2013, e175305

R.P. Hennessy, A. Basu, G.G. Adams, N. McGruer
 Hot-Switched Lifetime and Damage Characteristics of MEMS Switch Contacts, Journal of Micromechanics and Microengineering, 23(5), 2013, e055003

SELECTED RESEARCH PROJECTS

PLASMID (Plasmonic Microelectromechanical Infrared Digitizer), Zero-Power Sensor
 Co-Principal Investigator, Defense Advanced Research Projects Agency

Zero Power Sensors (ZePS), RF Wake-up
 Co-Principal Investigator, Defense Advanced Research Projects Agency

Waleed Meleis

Associate Dean for Graduate Education; Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, University of Michigan, 1996
coe.northeastern.edu/people/meleis-waleed

Scholarship focus: combinatorial optimization; algorithm design and analysis; scheduling; large-scale machine learning; parallel computing

Honors and awards: COE Outstanding Faculty Service Award in, COE Fostering Engineering Innovation in Education Award; Black Engineering Student Society Professor Appreciation Award; Invited to represent Northeastern at the National Academy of Engineering's Frontiers of Engineering Education Symposium; College of Engineering Outstanding Teacher Award; Martin W. Essigmann Outstanding Teaching Award, College of Engineering; Eta Kappa Nu Professor of the Year Award; Center for Innovative Course Design Teaching Award, EdTech

SELECTED PUBLICATIONS

W. Li, W. Meleis
Adaptive Adjacency Kanerva Coding for Memory-Constrained Reinforcement Learning, In International Conference on Machine Learning and Data Mining in Pattern Recognition (MLDM), Springer, New York, 2018

D. Levac, H. Dumas, W. Meleis
Development and Preliminary Usability Evaluation of a Tablet-Based Interactive Movement Tool for Pediatric Rehabilitation, JMIR Rehabilitation Assistive Technologies 25(2), 2018, e1030

W. Li, F. Zhou, K. Chowdhury, W. Meleis
QTCP: Adaptive Congestion Control with Reinforcement Learning, IEEE Transactions on Network Science and Engineering, 2018, 1-1

W. Li, F. Zhou, W. Meleis, K. Chowdhury
Dynamic Generalization Kanerva Coding in Reinforcement Learning for TCP Congestion Control Design, Proceedings of the 16th International Conference on Autonomous Agents and Multiagent Systems, Sao Paolo, Brazil, 2017

J. Radford, A. Pilny, A. Reichelmann, B. Keegan, B. Welles, J. Hoye, K. Ognyanova, W. Meleis, D. Lazer
Volunteer Science: An Online Laboratory for Experiments in Social Psychology, Social Psychology Quarterly, 79(4), 2016

Tommaso Melodia

William Lincoln Smith Professor, Electrical and Computer Engineering; Director, Institute for the Wireless Internet of Things

PhD, Georgia Institute of Technology, 2007
coe.northeastern.edu/people/melodia-tommaso

Scholarship focus: modeling, optimization, and experimental evaluation of wireless networked systems; networked implantable medical systems; multimedia sensor networks; secure tactical cognitive radio networks; underwater networks; mobile cloud computing

Honors and awards: National Science Foundation CAREER Award, IEEE Fellow, IEEE Communications Society Distinguished Lecturer, Soren Buus Outstanding Research Award

SELECTED PUBLICATIONS

F. Restuccia, T. Melodia
PolymoRF: Polymorphic Wireless Receivers Through Physical-Layer Deep Learning, Proceedings of ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (ACM MobiHoc), 2020

S. D'Oro, L. Bonati, F. Restuccia, M. Polese, M. Zorzi, T. Melodia
SI-EDGE: Network Slicing at the Edge, Proceedings of ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (ACM MobiHoc), 2020

L. Zhang, F. Restuccia, T. Melodia, S. Pudlewski
Jam Sessions: Analysis and Experimental Evaluation of Advanced Jamming Attacks in MIMO Networks, ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc), Catania, Italy, 2019

S. D'Oro, F. Restuccia, A. Talamonti, T. Melodia
The Slice Is Served: Enforcing Radio Access Network Slicing in Virtualized 5G Systems, IEEE Conference on Computer Communications (INFOCOM) Paris, France, 2019

SELECTED RESEARCH PROJECTS

Colosseum: Opening and Expanding the World's Largest Wireless Network Emulator to the Wireless Networking Community
Principal Investigator; National Science Foundation & Defense Advanced Research Projects Agency

MRI: SEANet: Development of a Software-Defined Networking Testbed for the Internet of Underwater Things
Principal Investigator, National Science Foundation

Ningfang Mi

Associate Professor, Electrical and Computer Engineering

PhD, College of William and Mary, 2009
coe.northeastern.edu/people/mi-ningfang

Scholarship focus: capacity planning; NVMe Flash Memory Devices, MapReduce/Hadoop scheduling; cloud computing; resource management; performance evaluation; workload characterization; simulation

Honors and awards: National Science Foundation CAREER Award; IBM Faculty Award; Air Force Office of Scientific Research Young Investigator Award; IEEE Cloud 2018 Best Paper Award; IPCCC 2017 Best Paper Award

SELECTED PUBLICATIONS

D. Jia, J. Bhimani, N. Nguyen, B. Sheng, N. Mi
ATuMm: Auto-tuning Memory Manager in Apache Spark, in 38th IEEE International Performance Computing and Communications Conference (IPCCC'19), London, United Kingdom, Oct. 2019

J. Bhimani, N. Mi, M. Leeser, Z. Yang
New Performance Modeling Methods for Parallel Data Processing Applications, ACM Transactions on Modeling and Computer Simulation (TOMACS), 2019

Y. Yao, H. Gao, J. Wang, B. Sheng, N. Mi
New Scheduling Algorithms for Improving Performance and Resource Utilization in Hadoop YARN Clusters, IEEE Transactions on Cloud Computing (TCC), 2019

J. Bhimani, Z. Yang, N. Mi, J.Yang, Q. Xu, M. Awasthi, R. Pandurangan, V. Balakrishnan
Docker Container Scheduler for I/O Intensive Applications running on NVMe SSDs, IEEE Transactions on Multi-Scale Computing Systems (TMSCS), 4(3), 2018, 313-326

J. Bhimani, N. Mi, Z. Yang, J. Yang, R. Pandurangan, C. Choi, V. Balakrishnan
FIOS: Feature Based I/O Stream Identification for Improving Endurance of Multi-Stream SSDs, IEEE International Conference on Cloud Computing (CLOUD'18), 2018

SELECTED RESEARCH PROJECTS

CAREER: Capacity Planning Methodologies for Large Clusters with Heterogeneous Architectures and Diverse Applications
Principal Investigator, National Science Foundation

Hossein Mosallaei

Professor, Electrical and Computer Engineering

PhD, University of California, Los Angeles, 2001
coe.northeastern.edu/people/mosallaei-hossein

Scholarship focus: electromagnetics and optics; quantum systems; nanoscale materials and metamaterials, nanoantennas; THz-IR-Visible Devices; multiscale computation and mathematical-numerical models

SELECTED PUBLICATIONS

A. Forouzmand, H. Mosallaei
A Tunable Semiconductor-Based Transmissive Metasurface: Dynamic Phase Control with High Transmission Level, Laser & Photonics Review, 14(6), 2020, 1900353

H. Barati Sedeh, M.M. Salary, H. Mosallaei
Topological Space-Time Photonic Transitions in Angular-Momentum-Biased Metasurfaces, Advanced Optical Materials, 8(11), 2020, 2000075

M.M. Salary, H. Mosallaei
Time-Modulated Conducting Oxide Metasurfaces for Adaptive Multiple Access Optical Communication, IEEE Trans. Antennas Propagat, 68(3), 2020, 1628-1642

M.M. Salary, H. Mosallaei
Inverse Design of Radiative Thermal Meta-Sources Via Discrete Dipole Approximation Model, Journal of Applied Physics, 125, 2019, 163107

M.M. Salary, S. Jafar-Zanjani, H. Mosallaei
Nonreciprocal Optical Links Based on Time-Modulated Nanoantenna Arrays: Full-Duplex Communication, Physical Review B, 99, 2019, 045416

M.M. Salary, S. Inampudi, K. Zhang, E.B. Tadmor, H. Mosallaei
Mechanical Actuation of Graphene Sheets Via Optically Induced Forces, Physical Review B, 94, 2016, 235403

SELECTED RESEARCH PROJECTS

Nanoantennas for Engineering Waves on the Surface
Principal Investigator, Air Force Office of Scientific Research

Marvin Onabajo

Associate Professor, Electrical and Computer Engineering

PhD, Texas A&M University, 2011
coe.northeastern.edu/people/onabajo-marvin

Scholarship focus: design of analog, radio frequency, and mixed-signal integrated circuits; built-in test and calibration techniques for systems-on-a-chip; on-chip temperature sensors for thermal monitoring and built-in testing

Honors and awards: National Science Foundation CAREER Award; Martin Essigman Outstanding Teaching Award, College of Engineering; ARO Young Investigator Program Award

SELECTED PUBLICATIONS

M.A.A. Ibrahim, M. Onabajo
A Low-Power Bfsk Transmitter Architecture for Biomedical Applications, IEEE Trans. on Circuits and Systems I: Regular Papers, 67(5), 2020, 1527-1540

S. Abdelfattah, A. Shrivastava, M. Onabajo
A Chopper Instrumentation Amplifier with Fully Symmetric Negative Capacitance Generation Feedback Loop and Online Digital Calibration for Input Impedance Boosting, Proc. IEEE Intl. Midwest Symp. on Circuits and Systems (MWSCAS), 2019, 774-777

M. Zlochisti, S.A. Zahrai, N. Le Dortz, M. Onabajo
Comparator Design and Calibration for Flash Adcs within Two-Step Adc Architectures, Proc. IEEE Intl. Symp. on Circuits and Systems (ISCAS), 2019, 1-5

M.A.A. Ibrahim, M. Onabajo
Sinusoidal Signal Generation through Successive Integration, Proceedings of IEEE International Symposium on Circuits and Systems (ISCAS), 2019

C.H. Chang, M. Onabajo
Analysis and Demonstration of an IIP3 Improvement Technique for Low-Power RF Low-Noise Amplifiers, IEEE Trans. on Circuits and Systems I: Regular Papers, 65(3), 2018, 859-869

SELECTED RESEARCH PROJECTS

An On-Chip Thermal Sensing Method to Detect Malicious Integrated Circuits
Principal Investigator, Army Research Office

CAREER: Low-Power Transceiver Design Methods for Wireless Medicalx Monitoring
Principal Investigator, National Science Foundation

Novel Implantable Smart Magnetoelectric NanoRFIDs for Large-Scale Neural Magnetic Recording and Modulation
Co-Principal Investigator, National Institutes of Health

Sarah Ostadabbas

Assistant Professor, Electrical and Computer Engineering

PhD, University of Texas at Dallas, 2014
coe.northeastern.edu/people/ostadabbas-sarah

Scholarship focus: machine learning/pattern recognition; computer vision, affective computing, human-machine interaction

SELECTED PUBLICATIONS

D. Hejazi, S. Liu, A. Farnoosh, S. Ostadabbas, S. Kar
Development of Use-specific High Performance Cyber-Nanomaterial Optical Detectors by Effective Choice of Machine Learning Algorithms, Machine Learning: Science and Technology, 1(2), 2020

S. Liu, S. Ostadabbas
Seeing Under the Cover: A Physics Guided Learning Approach for In-Bed Pose Estimation, 22nd International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI'19), October 13-17, 2019, Shenzhen, China

B. Rezaei, Y. Christakis, B. Ho, K. Thomas, K. Erb, S. Ostadabbas, S. Patel
Target-Specific Action Classification for Automated Assessment of Human Motor Behavior from Video, Sensors, 19(19), 2019, 4266

S. Liu, S. Ostadabbas
A Semi-Supervised Data Augmentation Approach using 3D Graphical Engines, 9th International Workshop on Human Behavior Understanding: at the European Conference on Computer Vision (ECCV'18), September 8-14, 2018, Munich, Germany

SELECTED RESEARCH PROJECTS

CRII: SCH: Semi-Supervised Physics-Based Generative Model for Data Augmentation and Cross-Modality Data Reconstruction
Principal Investigator, National Science Foundation

NCS-FO: Leveraging Deep Probabilistic Models to Understand the Neural Bases of Subjective Experience
Co-Principal Investigator, National Science Foundation-Neural and Cognitive Systems

NRI: EAGER: Teaching Aerial Robots to Perch Like a Bat via AI-Guided Design and Control
Principal Investigator, National Science Foundation

SCH: INT: Collaborative Research: Detection, Assessment and Rehabilitation of Stroke-Induced Visual Neglect Using Augmented Reality (AR) and Electroencephalography (EEG)
Principal Investigator, National Science Foundation

Taskin Padir

Associate Professor, Electrical and Computer Engineering; Director, Institute for Experiential Robotics

PhD, Purdue University, 2004
coe.northeastern.edu/people/padir-taskin

Scholarship focus: humanoid robots dexterous manipulation, model-based robot design, human- supervised robot autonomy, medical cyber-physical systems

Honors and awards: Kalenian Award for Entrepreneurial Spirit, HEART: Humans Empowered with Assistive Robot Technologies; COE Fostering Engineering Innovation in Education Award

SELECTED PUBLICATIONS

D.A. Sinyukov, T. Padir
  CWave: Theory and Practice of a Fast Single-Source Any-Angle Path Planning Algorithm, Robotica, 38(2), 2020

A.O. Onol, P. Long, T. Padir
  Contact-Implicit Trajectory Optimization Based on a Variable Smooth Contact Model and Successive Convexification, IEEE International Conference on Robotics and Automation (ICRA), 2019

M. Zhong, J. Wu, Y. Yan, J. Hajjar, T. Padir
  Towards Automated Post-Disaster Damage Assessment of Critical Infrastructure with Small Unmanned Aircraft Systems, IEEE International Symposium onTechnologies for Homeland Security, Woburn, October 23-24, 2018

X. Long, M. Wonsick, V. Dimitrov, T. Padır
  Anytime Multi-Task Motion Planning for Humanoid Robots, In Intelligent Robots and Systems (IROS), IEEE/RSJ International Conference, 2017, 4452-4459

SELECTED RESEARCH PROJECTS

Accessible Testing on Humanoid-Robot-R5 and Evaluation of NASA Administered (ATHENA) Space Robotics Challenge
  Principal Investigator, National Aeronautics and Space Administration

Bridging the Digital Gap and Identifying Cross-Cultural Pathways for Adoption of IoT Technologies to Support Super-Aging Societies in the U.S. and Japan
  Principal Investigator, National Science Foundation

Co-worker Robots to Impact Seafood Processing (CRISP): Designs, Tools and Methods for Enhanced Worker Experience
  Principal Investigator, National Science Foundation

Alireza Ramezani

Assistant Professor, Electrical and Computer Engineering

PhD,University of Michigan, 2014
coe.northeastern.edu/people/ramezani-alireza

Scholarship focus: analysis and feedback control of nonlinear systems; control of bipedal and aerial robot locomotion; bio-inspired robotics

SELECTED PUBLICATIONS

E. Sihite, P. Kelly, A. Ramezani
  Computational Structure Design of a Bio-Inspired Armwing Mechanism, IEEE Robotics and Automation Letters (RA-L), 2020. Also accepted in IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Las Vegas, NV, October 25-29, 2020

P. Dangol, A. Ramezani
  Performance and Robustness Satisfaction in a Thruster-assisted Legged Robot, International Federation of Automatic Control (IFAC), Berlin, Germany, 2020

P. Dangol, A. Ramezani, N. Jalili
  Performance Satisfaction in Midget, a Thruster-Assisted Bipedal Robot, American Control Conference (ACC), Denver, CO, 2020

A. Ramezani
  Towards Flapping Flight Upside-Down Landing Through Differential Manipulation of Inertial Dynamics, IEEE International Conference on Robotics and Automation (ICRA), Paris, France, 2020

A.C.B. de Oliveira, A. Ramezani
  Thruster-assisted Center Manifold Shaping in Bipedal Legged Locomotion, International Conference on Advanced Intelligent Mechatronics (AIM), Boston, MA, 2020

SELECTED RESEARCH PROJECTS

SCOUT and DOGHOUSE
  Principal Investigator, NASA's Space Technology Mission Directorate's Game Changing Development Program

Teaching Aerial Robots to Perch Like a Bat via AI-Guided Design and Control
  Co-Principal Investigator, NSF National Robotics Initiative

Carey Rappaport

COE Distinguished Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Massachusetts Institute of Technology, 1987
coe.northeastern.edu/people/rappaport-carey

Scholarship focus: antennas, electromagnetic computation, subsurface sensing and imaging, explosives detection, security system conceptualization and design. Bioelectromagnetics, microwave tissue imaging, electromagnetic breast cancer detection and treatment, cardiac ablation therapy, microwave assisted balloon angioplasty, catheter-based sensing

Honors and awards: Fellow and Distinguished Lecturer, Institute of Electrical and Electronics Engineers; Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

M. Tajdini, B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, A. Morgenthaler, C. Rappaport
  Real-Time Modeling of Forward-Looking Synthetic Aperture Ground Penetrating Radar Scattering From Rough Terrain, IEEE Transactions on Geoscience and Remote Sensing, 57(5), 2019, 2754-2765

Y. Fuse, B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, C. Rappaport
  Model-Based Clutter Reduction Method for Forward Looking Ground Penetrating Radar Imaging Ground Penetrating Radar, 1(2), 2018, 96-112

C. Rappaport, B. Gonzalez-Valdes
  Multistatic Nearfield Imaging Radar for Portal Security Systems Using a High Gain Toroidal Reflector Antenna, European Conference on Antennas and Propagation (EuCAP), Lisbon, Portugal, 2015, *best paper award

SELECTED RESEARCH PROJECTS

Awareness and Localization of Explosive-Related Threats (ALERT)
  Co-Principal Investigator, Department of Homeland Security

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

Purnima Ratilal-Makris

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Massachusetts Institute of Technology, 2002
coe.northeastern.edu/people/ratilal-makris-purnima

Scholarship focus: remote sensing; underwater acoustics; acoustical oceanography; bioacoustics; ultrasound imaging; nonlinear scattering; wave propagation in random media; signal, image and array processing; statistical inference theory

Honors and awards: Fellow, Acoustical Society of America; Presidential Early Career Award for Scientists and Engineers; Office of Naval Research Young Investigator Award

SELECTED PUBLICATIONS

C. Zhu, H. Garcia, A. Kaplan, M. Schinault, N.O. Handegard, O.R. Godø, W. Huang, P. Ratilal
  Detection, Localization and Classification of Multiple Mechanized Ocean Vessels over Continental-Shelf Scale Regions with Passive Ocean Acoustic Waveguide Remote Sensing, Remote Sensing, 10(11), 2018, 1699

H.A. Garcia, C. Zhu, M.E. Schinault, A.I. Kaplan, N.O. Haandegard, O.R. Godø, H. Ahonen, N.C. Makris, D. Wang, W. Huang, P. Ratilal
  Temporal-Spatial, Spectral and Source Level Distributions of Fin Whale Vocalisations in the Norwegian Sea Observed with a Coherent Hydrophone, ICES Journal of Marine Science, 76(1), 2018, 268-283

D. Wang, P. Ratilal
  Angular Resolution Enhancement Provided by Nonuniformly-Spaced Linear Hydrophone Arrays in Ocean Acoustic Waveguide Remote Sensing, Remote Sensing, 9(10), 2017, 1036, 1-16

D. Wang, H.Garcia, W. Huang, D.D. Tran, A.D. Jain, D.H. Yi, Z. Gong, J.M. Jech, O.R. Godoe, N.C. Makris, P. Ratilal
  Vast Assembly of Vocal Marine Mammals from Diverse Species on Fish Spawning Ground, Nature, 531, 2016, 366-370

Z. Gong, D. Tran, P. Ratilal
  Comparing Passive Source Localization and Tracking Approaches With a Towed Horizontal Receiver Array in an Ocean Waveguide, The Journal of the Acoustical Society of America, 134, 2013, 3705-3720

M. Andrews, Z. Gong, P. Ratilal
  Effects of Multiple Scattering, Attenuation and Dispersion in Waveguide Sensing of Fish, Journal of the Acoustical Society of America, 130, 2011, 1253-1271

Francesco Restuccia

Assistant Professor, Electrical and Computer Engineering

PhD, Missouri University of Science and Technology, 2016
coe.northeastern.edu/people/restuccia-francesco

Scholarship focus: next-generation wireless communications, artificial intelligence, embedded systems, wireless security

Honors and awards: ISSNAF Mario Gerla Award for Young Investigators in Computer Science

SELECTED PUBLICATIONS

F. Restuccia, T. Melodia
DeepWiERL: Bringing Deep Reinforcement Learning to the Internet of Self-Adaptive Things, Proceedings of IEEE INFOCOM, 2020

F. Restuccia, T. Melodia
PolymoRF: Polymorphic Wireless Receivers Through Physical-Layer Deep Learning, Proceedings of ACM MobiHoc, October 2020

S. D'Oro, L. Bonati, F. Restuccia, M. Polese, M. Zorzi, T. Melodia
SI-EDGE: Network Slicing at the Edge, Proceedings of ACM MobiHoc, October 2020

S. D'Oro, F. Restuccia, T. Melodia
Toward Operator-to-Waveform 5G Radio Access Network Slicing, IEEE Communications Magazine, 58(4), 2020

SELECTED RESEARCH PROJECTS

Deep Reinforcement Learning for Polymorphic IoT Platforms
Co-Principal Investigator, Raytheon Company

Toward Secure-by-Design Polymorphic IoT Platforms
Co-Principal Investigator, Office of Naval Research

Matteo Rinaldi

Professor, Electrical and Computer Engineering

PhD, University of Pennsylvania, 2010
coe.northeastern.edu/people/rinaldi-matteo

Scholarship focus: understanding and exploiting the fundamental properties of micro/nanomechanical structures and advanced nanomaterials to engineer new classes of micro and nanoelectromechanical systems (M/NEMS) with unique and enabling features applied to the areas of chemical, physical and biological sensing and low power reconfigurable radio communication systems

Honors and awards: IEEE Sensors Council Early Career Award; National Science Foundation CAREER Award; Defense Advanced Research Projects Agency Young Faculty Award

SELECTED PUBLICATIONS

C. Cassella, Y. Hui, Z. Qian, G. Hummel, M. Rinaldi
Aluminum Nitride Cross-Sectional Lamé Mode Resonators, IEEE/ASME Journal of Microelectromechanical Systems, 25(2), 2016, 275-285

C. Cassella, G. Chen, Z. Qian, G. Hummel, M. Rinaldi
Cross-sectional Lamé Mode Ladder Filters for UHF Wideband Applications, IEEE Electron Device Letters, 37, 2016, 681-683

Y. Hui, J. S. Gomez-Diaz, Z. Qian, A. Alu', M. Rinaldi
Plasmonic Piezoelectric Nanomechanical Resonator for Spectrally Selective Infrared Sensing, Nature Communications, 7, 2016, 11249

Z. Qian, F. Liu, Y. Hui, S. Kar, M. Rinaldi
Graphene as a Massless Electrode for Ultra-High-Frequency Piezoelectric Nano Electro Mechanical Systems, Nano Letters, 15(7), 2015, 4599-4604

SELECTED RESEARCH PROJECTS

CAREER: Nano Electro Mechanical Resonant Sensing Platform for Chip Scale, High Resolution and Ultra-Fast Terahertz Spectroscopy and Imaging
Principal Investigator, National Science Foundation

Intrinsically Switchable and Programmable MEMS Filter Array
Principal Investigator, Defense Advanced Research Projects Agency

Microelectromechanical Resonant Circulator (MIRC)
Principal Investigator, DARPA MTO SPAR Program

Plasmonic Microelectromechanical Infrared Digitizer (PLASMID)
Principal Investigator, DARPA MTO N-Zero Program

Zero Power Sensors (ZePS)
Principal Investigator, DARPA MTO N-Zero Program

William Robertson

Associate Professor, Computer & Information Science; jointly appointed, Electrical and Computer Engineering

PhD, University of California, Santa Barbara, 2009
coe.northeastern.edu/people/robertson-wil

Scholarship focus: trustworthy computing architectures; web security; statistical machine learning for anomaly detection; malware analysis using adversarial program analysis; reverse engineering; intrusion detection

SELECTED PUBLICATIONS

A. Ozcan, C. Mulliner, W. Robertson, E. Kirda, et al.
BabelCrypt: The Universal Encryption Layer for Mobile Messaging Applications, Proceedings of the International Conference on Financial Cryptography and Data Security (FC), Isla Verde, PR, 2015, 1-15

M. Weissbacher, W. Robertson, E. Kirda, C. Kruegel, G. Vigna
ZigZag: Automatically Hardening Web Applications Against Client-Side Validation Vulnerabilities, Proceedings of the USENIX Security Symposium, Washington DC, 2015, 737-752

C. Mulliner, W. Robertson, E. Kirda
Hidden GEMs: Automated Discovery of Access Control Vulnerabilities in Graphical User Interfaces, Proceedings of the IEEE Symposium on Security and Privacy (Oakland), San Jose, CA, 2014, 1-14

SELECTED RESEARCH PROJECTS

Automated Inference of High-Level Program Structure
Principal Investigator, Office of Naval Research

Continuum: Finding Space and Time Vulnerabilities in Java Programs
Principal Investigator, Defense Advanced Research Projects Agency

DarkDroid: Exposing the Dark Side of Android Marketplaces
Co-Principal Investigator, Defense Advanced Research Projects Agency

Firmalice: Modeling and Identifying Malice in Firmware
Co-Principal Investigator, Defense Advanced Research Projects Agency

Multi-Disciplinary Preparation of Next Generation Information Assurance Practitioners
Co-Principal Investigator, National Science Foundation

Masoud Salehi

Associate Professor and Associate Chair for Graduate Studies, Electrical and Computer Engineering

PhD, Stanford University, 1979
coe.northeastern.edu/people/salehi-masoud

Scholarship focus: error correcting codes; information theory; digital communications

SELECTED PUBLICATIONS

M Sadeghzadeh, M Salehi
Physical Layer Security in Multi-User Wireless Networks: Interference Effect on Large Scale Analysis, Proceedings of the 2020 IEEE 91st Vehicular Technology Conference, VTC2020-Spring, 2020, 1-6

K. Firouzbakht, G. Noubir, M. Salehi
Multi-Carrier Jamming Mitigation: A Proactive Game Theoretic Approach, in Proactive and Dynamic Network Defense, Springer Verlag, 2019, 249-264

M. Sadeghzadeh, M. Maleki, M. Salehi
Large-Scale Analysis of Regularized Block Diagonalization Precoding for Physical Layer Security of Multi-User MIMO Wireless Networks, IEEE Transactions on Vehicular Technology, 68(6), 2019, 5820-5834

M. Sadeghzadeh, M. Maleki, M. Salehi, H.R. Bahrami
Large-Scale Analysis of Physical-Layer Security in Multi-User Wireless Networks, IEEE Transactions on Communications, 66(12), 2018, 1-1

M. Sadeghzadeh, M. Maleki, M. Salehi, H. Bahrami
Large Scale Analysis of Physical Layer Security in Multi-User Wireless Networks, Proceedings of the IEEE International Conference on Communications (ICC), Paris, France, 2017

M. Sadeghzadeh, M. Maleki, M. Salehi
Large Scale Analysis of Regularized Block Diagonalization Precodering for Physical Layer Security in Multi-User Wireless Networks, IEEE Globecom Conference, Singapore, 2017

K. Firouzbakht, G. Noubir, M. Salehi
Linearly Constrained Bimatrix Games in Wireless Communications, IEEE Transactions on Communications, 64, 2016, 429-440

K.-L. Huang, V.C. Gaudet, M. Salehi
A Hybrid ARQ Scheme Using LDPC Codes with Stochastic Decoding, Proceedings of the 49th Annual Conference on Information Sciences and Systems, 2015, 1-4

N. Yang, M. Salehi
A Family of Orthogonal Full Rate Differential Space Time Block Code Systems, Proceedings of the IEEE Military Communications Conference (MILCOM), Baltimore, MD, 2014, 569-574

Gunar Schirner

Associate Professor, Electrical and Computer Engineering

PhD, University of California, Irvine, 2008
coe.northeastern.edu/people/schirner-gunar

Scholarship focus: embedded computer systems; novel architectures for embedded vision; cyber-physical systems; system-level design and methodologies; hardware/software co-design

SELECTED PUBLICATIONS

N. Teimouri, H. Tabkhi, G. Schirner
Alleviating Scalability Limitation of Accelerator-based Platforms, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), June 2018

J. Zhang, H. Tabkhi, G. Schirner
DS-DSE: Domain-Specific Design Space Exploration for Streaming Applications, Design Automation and Test in Europe (DATE), Dresden, Germany, March 2018

N. Teimouri, H. Tabkhi, G. Schirner
Improving Scalability of CMPs with Dense ACCs Coverage, Design Automation and Test in Europe (DATE), Dresden, Germany, March 2016

N. Teimouri, H. Tabkhi, G. Schirner
Revisiting Accelerator-Rich CMPs: Challenges and Solutions, Proceedings of the 52nd Annual Design Automation Conference (DAC), San Francisco, CA, 84, 2015

C. Zhang, H. Tabkhi, G. Schirner
Studying Inter-Warp Divergence Aware Execution on GPUs, IEEE Computer Architecture Letters, 15(2), 2015, 117-120

H. Tabkhi, G. Schirner
Application-Guided Power Gating Reducing Register File Static Power, IEEE Transactions on Very Large Scale Integration (TVLSI), 22(12), 2014, 2513-2526

J. Zhang, G. Schirner
Automatic Specification Granularity Tuning for Design Space Exploration, Design Automation and Test in Europe (DATE), Dresden, Germany, 2014, 1-6

SELECTED RESEARCH PROJECTS

Collaborative Research: Nested Control of Assistive Robots through Human Intent Inference
Co-Principal Investigator, National Science Foundation

Domain-Specific Computing enabling Real-Time AI Inference on the Edge for Expeditionary Cyber Missions
Principal Investigator, Office of Naval Research

Bahram Shafai

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, George Washington University, 1985
coe.northeastern.edu/people/shafai-bahram

Scholarship focus: control systems and signal processing; robust and optimal control, positive dynamic systems, fault detection, observer theory, robotics and distributed control of multi-agent systems, control of biological systems

Honors and awards: Associate Editor, Systems Man and Cybernetics; Member of Program Committee IEEE CCTA 2020, Senior Life Member, Institute of Electrical and Electronics Engineers, Lifetime Achievement Award from World Automation Congress, Certificate of Appreciation for Technical Seminar Institute of Electrical and Electronics Engineers, Young Professionals

SELECTED PUBLICATIONS

B. Shafai, S. Nazari, A. Moradmand
A Direct Algebraic Approach to Design State Feedback and Observers for Singular Systems, Proceedings of 2019 IEEE Conference on Control Technology and Applications (CCTA), Hong Kong, China, 2019, 835-842

S. Nazari, B. Shafai
Distributed Unknown Input Observers for Fault Detection and Isolation, Proceedings of 2019 IEEE 15th International Conference on Control and Automation (ICCA), Edinburgh, United Kingdom, 2019, 319-324

B. Shafai, A. Moradmand, S. Nazari
Observer-Based Controller Design for Systems with Derivative Inputs, Proceedings of 2019 57th Annual Allerton Conference on Communication, Control, and Computing, IL, 2019, 1038-1044

S. Nazari, B. Shafai, A. Moradmand
Robust Intrusion Detection in Dynamic Networks, Proceedings of 2019 IEEE Conference on Control Technology and Applications (CCTA), Hong Kong, China, 2019, 988-993

S. Nazari, B. Shafai
Robust Fault Detection & Isolation in Distributed Dynamic Systems, Proceedings of 2019 6th International Conference on Control, Decision and Information Technologies (CoDIT), Paris, France, 2019, 1941-1946

B. Shafai, M. Naghnaeian, J. Chen
Stability Radius Formulation of $L\sigma$-Gain in Positive Stabilization of Regular and Time-Delay Systems, IET Journal of Control Theory and Applications, 2019, 2327-2335

Aatmesh Shrivastava

Assistant Professor, Electrical and Computer Engineering

PhD, University of Virginia, 2014
coe.northeastern.edu/people/shrivastava-aatmesh

Scholarship focus: ultra-low Power circuits and systems, analog computing, precision circuits, hardware security

SELECTED PUBLICATIONS

Z. Xu, N. Mirchandani, M.A.A. Ibrahim, M. Onabajo, A. Shrivastava
A High Efficiency DC-DC Converter Architecture with Adjustable Switching Frequency to Suppress Noise Injection in RF Receiver Front-Ends, IEEE International Symposium on Circuits and Systems (ISCAS), May-2020, Seville, Spain

Y. Zhang, N. Mirchandani, M. Onabajo, A. Shrivastava
RSSI Amplifier Design for a Feature Extraction Technique to Detect Seizures with Analog Computing, IEEE International Symposium on Circuits and Systems (ISCAS), May-2020, Seville, Spain

D.T. O'Brien, B. Gridley, A. Trlica, J. Wang, A. Shrivastava,
Urban Heat Islets: Street Segments with Higher Land Surface Temperatures Experience a Greater Increase in Medical Emergencies during Heat Advisories, American Journal on Public Health, May 2020

N. Zaeimbashi, H. Lin, C. Dong, X. Liang, M. Nasrollahpour, N. Sun, A. Matyushov, Y. He, X. Wang, C. Tu, Y. Wei, Y. Zhang, S. Cash, M. Monabjo, A. Shrivastava, N.X. Sun
NanoNeuroRFID: A Wireless Implantable Device Based on Magnetoelectric Antennas, IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology, 3(3), 2019, 206-215

SELECTED RESEARCH PROJECTS

Ultra-Low Power Analog Computing and Dry Skin Electrode Contact Interface Design Techniques for Systems-On-A-Chip with EEG Sensing and Feature Extraction
Principal Investigator, National Science Foundation

Novel Implantable Smart Magnetoelectric NanoRFIDs for Large-Scale Neural Magnetic Recording and Modulation
Co-Principal Investigator, National Institutes of Health

Radio Receiver Architecture and Building Blocks for Ultra Low Power Communications
Co-Principal Investigator, Interdigital

Milad Siami

Assistant Professor, Electrical and Computer Engineering

PhD, Lehigh University, 2017
coe.northeastern.edu/people/siami-milad

Scholarship focus: sparse sensing and control in cyber-physical networks and robotics; distributed systems theory and applications; network optimization and control; hard limits and tradeoffs in large-scale dynamical networks

SELECTED PUBLICATIONS

M. Siami, A. Olshevsky, A. Jadbabaie
Deterministic and Randomized Actuator Scheduling With Guaranteed Performance, IEEE Transactions on Automatic Control, 66(4), 2021

M. Siami, A. Jadbabaie
A Separation Theorem for Joint Sensor and Actuator Scheduling with Guaranteed Performance Bounds, Automatica, 56(8), 2020

M. Siami, N. Motee, G. Buzi, B. Bamieh, M. Khammash, J.C. Doyle
Fundamental Limits and Tradeoffs in Autocatalytic Pathways, IEEE Transactions on Automatic Control, 65(2), 2020, 733-740

Y. Ghaedsharaf, M. Siami, C. Somarakis, N. Motee
Performance Improvement in Noisy Linear Consensus Networks with Time-Delay, IEEE Transactions on Automatic Control, 64(6), 2019, 2457-2472

M. Siami, N. Motee
Abstraction of Linear Dynamical Networks with Guaranteed Systemic Performance Measures, IEEE Transactions on Automatic Control, 63(10), 2018, 3301-3316

M. Siami, S. Bolouki, B. Bamieh, N. Motee
Centrality measures in Linear Consensus Networks with Structured Network Uncertainties, IEEE Transaction on Control of Network Systems, 5(3), 2018, 924-934

M. Siami, N. Motee
Growing Linear Dynamical Networks Endowed by Spectral Systemic Performance Measures, IEEE Transactions on Automatic Control, 63(7), 2018, 2091-2106

M. Siami, J. Skaf
Structural Analysis and Design of Distributed System Throttlers, IEEE Transactions on Automatic Control, 63(2), 2018, 540-547

S. Bolouki, R.P. Malhame, M. Siami, N. Motee
Eminence Grise Coalitions: On the Shaping of Public Opinion, IEEE Transactions on Control of Network Systems. 4(2), 2017, 133-145

Michael B. Silevitch

Robert D. Black Professor, COE Distinguished Professor, Electrical and Computer Engineering; affiliated faculty, Civil and Environmental Engineering; Director, CenSSIS

PhD, Northeastern University, 1971
coe.northeastern.edu/people/silevitch-michael

Scholarship focus: subsurface sensing and imaging systems, detection of explosives related anomalies, engineered system development and engineering leadership

Honors and awards: Life Fellow, Institute of Electrical and Electronics Engineers; National Academy of Engineering Gordon Prize, for developing an innovative method to provide graduate engineers with the necessary personal skills to become effective engineering leaders

SELECTED RESEARCH PROJECTS

ALERT: Awareness and Localization of Explosives Related Threats, 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

CenSSIS: Center for Subsurface Sensing and Imaging Systems, Gordon-CenSSIS, a graduated NSF Engineering Research Center, 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

Hanumant Singh

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

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

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

SELECTED PUBLICATIONS

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

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

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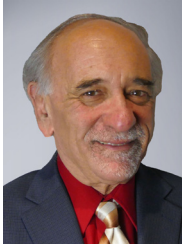
C. Kunz, H. Singh
  Map Building Fusing Acoustic and Visual Information Using Autonomous Underwater Vehicles, Journal of Field Robotics, 30(5), 2013, 1556-4967

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

Eduardo Sontag

University Distinguished Professor, Electrical and Computer Engineering; jointly appointed, Bioengineering

PhD, University of Florida, 1977
coe.northeastern.edu/people/sontag-eduardo

Scholarship focus: feedback control theory, systems biology, cancer, and biomedicine

Honors and awards: IEEE Control Systems Field Award; IFAC Fellow; AMS Fellow; SIAM Fellow; IEEE Fellow; Reid Prize in Applied Mathematics, SIAM; Bode Prize, IEEE

SELECTED PUBLICATIONS

A.P. Tran, M. Ali Al-Radhawi, I. Kareva, J. Wu, D.J. Waxman, E.D. Sontag
  Delicate Balances in Cancer Chemotherapy: Modeling Immune Recruitment and Emergence of Systemic Drug Resistance, Frontiers in Immunology, 12(12), 2020, 874891

J. Greene, C. Sanchez-Tapia, E.D. Sontag
  Mathematical Details on a Cancer Resistance Model, Frontiers in Bioengineering and Biotechnology, 2020

J.M. Greene, J.L. Gevertz, E.D. Sontag
  A Mathematical Approach to Distinguish Spontaneous from Induced Evolution of Drug Resistance during Cancer Treatment, JCO Clinical Cancer Informatics, 3, 2019, 1-20

D.K. Agrawal, R. Marshall, V. Noireaux, E.D. Sontag
  In Vitro Implementation of Robust Gene Regulation in a Synthetic Biomolecular Integral Controller, Nature Communications, 10, 2019, 1-12

E.V. Nikolaev, A. Zloza, E.D. Sontag
  Immunobiochemical Reconstruction of Influenza Lung Infection -Melanoma Skin Cancer Interactions, Frontiers in Immunology, 10, 2019, 4

M.A. Al-Radhawi, D. Del Vecchio, E.D. Sontag
  Multi-Modality in Gene Regulatory Networks with Slow Gene Binding, PLoS Computational Biology, 15, 2019, e1006784

SELECTED RESEARCH PROJECTS

Design Principles of Molecular Computing Using Engineered Enzymes
  Co-Principal Investigator, National Science Foundation

SemiSynBio: Very Large-Scale Genetic Circuit Design Automation
  Principal Investigator, Seminconductor Research Corporation

Theory-Based Engineering of Biomolecular Circuits in Living Cells
  Co-Principal Investigator, Air Force Office of Scientific Research

Dagmar Sternad

University Distinguished Professor, Biology; jointly appointed: Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, University of Connecticut, 1995
coe.northeastern.edu/people/sternad-dagmar

Scholarship focus: motor control and learning, variability and stability, human-robot interaction, dynamic modeling

Honors and awards: Faculty of the Year, Award from Residential Life, Klein Lectureship Award; Distinguished Lecturer on Life and the Sciences of Complexity, University of Connecticut

SELECTED PUBLICATIONS

S. Bazzi, D. Sternad
  Human Control of Complex Objects: Towards More Dexterous Robots, Advanced Robotics, 2020, 1-19

M.E. Huber, E. Chiovetto, M.A. Giese, D. Sternad
  Rigid Foot Soles Improve Balance in Beam Walking but Improvements do not Persist with Bare Feet, Scientific Reports, 10(1), 2020, 7629

J. Hermus, J.A. Doeringer, D. Sternad, N. Hogan
  Separating Neural Influences from Peripheral Mechanics: The Speed-Curvature Relation in Mechanically-Constrained Actions, Journal of Neurophysiology, 123, 2020, 1870–1885

D. Levac, M.E. Huber, D. Sternad
  Learning and Transfer of Complex Motor Skills in Virtual Reality: A Perspective Review, Journal of NeuroEngineering and Rehabilitation, 16(1), 2019, 121

W.J. Sohn, R. Sipahi, T.D. Sanger, D. Sternad
  Portable Motion-Analysis Device for Upper Limb Research, Assessment and Rehabilitation in Non-Laboratory Settings, IEEE Journal of Translational Engineering in Health and Medicine, 7, 2019, 1-14

SELECTED RESEARCH PROJECTS

Collaborative Research: Learning to Control Dynamically Complex Objects
  Co-Investigator, National Science Foundation

Collaborative Research: Neural Basis of Motor Expertise
  Principal Investigator, National Institutes of Health

Collaborative Research: Towards Robots with Human Dexterity
  Principal Investigator, National Science Foundation

Predictability in Complex Object Control
  Principal Investigator, National Institutes of Health

US-German-Israeli Collaborative Research: Hierarchical Coordination of Complex Actions
  Principal Investigator, National Science Foundation

Milica Stojanovic

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Northeastern University, 1993
coe.northeastern.edu/people/
stojanovic-milica

Scholarship focus: wireless communications and networks, underwater acoustic transmission, statistical system characterization, adaptive signal processing

Honors and awards: Distinguished Technical Achievement Award and Distinguished Lecturer, IEEE Ocean Engineering Society; Fellow, Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS

R. Ahmed, M. Stojanovic
Grouped Packet Coding: A Method for Reliable Communication Over Fading Channels With Long Delays, IEEE Journal of Oceanic Engineering, 99, 2018, 1-11

A. Tadayon, M. Stojanovic
Low-Complexity Super-Resolution Frequency Offset Estimation for High Data Rate Acoustic OFDM Systems, IEEE Journal of Oceanic Engineering, 2018, 1-11

R. Ahmed, M. Stojanovic
Joint Power and Rate Control for Packet Coding Over Fading Channels, IEEE Journal of Oceanic Engineering, 42(3), 2016, 697-710

Y. Aval, S.K. Wilson, M. Stojanovic
Capacity of Acoustic Channels and Practical Power-Allocation Strategies, IEEE Journal of Oceanic Engineering, Special Issue on Underwater Communications, 40(4), 2015, 785-795

Y. Aval, M. Stojanovic
Differentially Coherent Multichannel Detection of Acoustic OFDM Signals, IEEE Journal of Oceanic Engineering, 40(2), 2015, 251-268

P. Qarabaqi, M. Stojanovic
Statistical Characterization and Computationally Efficient Modeling of a Class of Underwater Acoustic Channels, IEEE Journal of Oceanic Engineering, Special Issue on Underwater Communications, 38(4), 2013, 701-717

SELECTED RESEARCH PROJECTS

Active Communication, Sensing and Control in Actuated Underwater Sensing Networks
Principal Investigator, Office of Naval Research

Development of a Software-Defined Networking Testbed for the Internet of Underwater Things
Principal Investigator, National Science Foundation

Lili Su
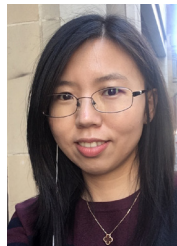
Assistant Professor, Electrical and Computer Engineering

PhD, University of Illinois, 2017
coe.northeastern.edu/people/su-lili

Scholarship focus: distributed machine learning, security and fault-tolerance, neural computation, bio-inspired distributed algorithms, blockchains, autonomous cars, algorithm design

Honors and awards: Best Student Paper Award Finalist, DISC 2016; Best Student Paper Award, SSS 2015; Rising Stars in EECS (2018)

SELECTED PUBLICATIONS

L. Su, N.H. Vaidya
Non-Bayesian Learning in the Presence of Byzantine Adversaries, Distributed Computing, Springer, 32(4), 2019, 277-289

L. Su, P. Yang
On Learning Over-Parameterized Neural Networks: A Functional Approximation Perspective, Neural Information Processing Systems (NIPS), 2019, 2641-2650

L. Su, J. Xu
Securing Distributed Gradient Descent in High Dimensional Statistical Learning, ACM on Measurement and Analysis of Computing Systems, 3(1), 2019, 12

L. Su, C.-J. Chang, N. Lynch
Spike-Based Winner-Take-All Computation: Fundamental Limits and Order-Optimal Circuits, Neural Computation, The MIT Press, 31(12), 2019, 2523-2561

Y. Chen, L. Su, J. Xu
Distributed Statistical Machine Learning in Adversarial Settings: Byzantine Gradient Descent, ACM on Measurement and Analysis of Computing Systems, 1(2), 2017, 44

SELECTED RESEARCH PROJECTS

Distributed Machine Learning Security
Principal Investigator, Center for Science of Information, National Science Foundation

Nian Sun
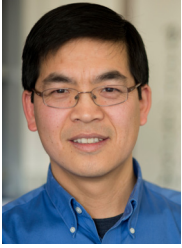
Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Stanford University, 2002
coe.northeastern.edu/people/sun-nian-xiang

Scholarship focus: micro/nanofabricated sensors, including antennas, electrochemical gas sensors, magnetic field sensors, strain and pressure sensors, etc.; magnetic, ferroelectric and magnetoelectric materials; RF/microwave magnetic and magnetoelectric devices design, fabrication and testing; materials properties at RF/microwave frequency

Honors and awards: Fellow, Institute of Physics; Fellow, Institute of Engineering and Technology; Office of Naval Research Young Investigator Award; National Science Foundation CAREER Award; Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

Z. Wang, C. Dong, X. Wang, M. Li, T. Nan, X. Liang, H. Chen, Y. Wei, H. Zhou, N.X. Sun
Highly Sensitive Integrated Flexible Tactile Sensors with Piezoresistive $Ge_2Sb_2Te_5$ Thin Films, npj Flexible Electronics, (1), 2018, 17

T. Nan, H. Lin, Y. Gao, A. Matyushov, G. Yu, H. Chen, N. Sun, S. Wei, Z. Wang, N.X. Sun
Acoustically Actuated Ultra-Compact NEMS Magnetoelectric Antennas, Nature Communications, 8(1), 2017, 296

S. Emori, B.A. Gray, H.M. Jeon, J. Peoples, M. Schmitt, K. Mahalingam, M. Hill, N.X. Sun
Coexistence of Low Damping and Strong Magnetoelastic Coupling in Epitaxial Spinel Ferrite Thin Films, Advanced Materials 29(34), 2017, 1701130

Z. Zhou, M. Trassin, Y. Gao, Y. Gao, D. Chen, N.X. Sun
Probing Electric Field Control of Magnetism Using Ferromagnetic Resonance, Nature Communications, 6, 2015, 6082

SELECTED RESEARCH PROJECTS

Novel Implantable Smart Magnetoelectric NanoRFIDs for Large-Scale Neural Magnetic Recording and Modulation
Principal Investigator, National Institutes of Health

NSF Nanosystems Engineering Research Center (ERC) for Translational Applications of Nanoscale Multiferroic Systems (TANMS)
Co-Principal Investigator, National Science Foundation Engineering Research Centers

Mario Sznaier

Dennis Picard Trustee Professor, Electrical and Computer Engineering

PhD, University of Washington, 1989
coe.northeastern.edu/people/sznaier-mario

Scholarship focus: robust control, control oriented identification, semi-algebraic optimization, information extraction from high volume data streams, dynamics-enabled machine learning

Honors and awards: IEEE Control Systems Society Distinguished Member Award, IEEE Fellow; Faculty Research Team Award, College of Engineering; Students Speak Teaching Award

SELECTED PUBLICATIONS

T. Dai, M. Sznaier
A Semi-Algebraic Approach to Data Driven Control of Continuous Time Nonlinear Systems, IEEE Control Systems Letters, 5(2), 2020, 487-492

W. Lucia, G. Franzè, M. Sznaier
A Hybrid Command Governor Scheme for Rotary Wings Unmanned Aerial Vehicles, IEEE Transactions on Control Systems Technology, 2(28), 2020, 361-375

B. Yilmaz, K. Bekiroglu, C. Lagoa, M. Sznaier
A Randomized Algorithm for Parsimonious Model Identification, IEEE Transactions on Automatic Control, 63(2), 2018, 532-539

Y. Wang, J. Lopez, M. Sznaier
Convex Optimization Approaches to Information Structured Decentralized Control, IEEE Transactions on Automatic Control, 63(10), 2018, 3393-3403

K. Bekiroglu, M. Ayazoglu, C. Lagoa, M. Sznaier
Hankel Matrix Rank as Indicator of Ghost in Bearing-Only Tracking, IEEE Transactions on Aerospace and Electronic Systems, 54(6), 2018, 2713-2723

SELECTED RESEARCH PROJECTS

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

Data Driven Control of Switched Systems with Applications to Human Behavioral Modification
Principal Investigator, National Science Foundation

Verifiable, Control-Oriented Learning on the Fly
Principal Investigator at Northeastern University, Multidisciplinary University Research Initiatives, Air Force Office of Scientific Research

Srinivas Tadigadapa

Professor and Chair of Electrical and Computer Engineering

PhD, Cambridge University, 1994
coe.northeastern.edu/people/
tadigadapa-srinvas

Scholarship focus: sensor devices and smart sensor systems realized through interdisciplinary field of microelectromechanical systems (MEMS); including the design, optimization, fabrication, testing, and networking of such transducers; fabrication of novel micro and nano-sensors and actuators by integrating non-traditional materials using silicon planar microfabrication techniques and exploring phenomenon at the micro-nano interfaces; development of sustainable sensing solutions for biomedical applications including investigation of robust magnetic technologies for interfacing to the brain

Honors and awards: IEEE Fellow; Alexander von Humboldt Fellowship in Germany; Walton Fellowship, Science Foundation of Ireland; Fellow of the Institute of Physics, London; Life-Fellow of the Cambridge Philosophical Society; Founding Editor-in-Chief of IEEE Sensors Letters Journal

SELECTED PUBLICATIONS

D.S. Kim, R. Du, S.-Y. Yu, Y. Yin, S. Dong, Q. Li, S.E. Mohney, X. Li, S.Tadigadapa
  Enhanced Thermoelectric Efficiency in Nanocrystalline Bismuth Telluride Nanotubes, Nanotechnology, 31(36), 2020, 365703

D. Kumaran, S. Tadigadapa, M. Panchagnula
  A Study of Spray Performance of MEMS Based Microscale Pressure Swirl Atomizer, Atomizers & Sprays, 20(6), 2019, 477–491

D. Butler, N. Goel, L. Goodnigh, S. Tadigadapa, A. Ebrahimi
  Detection of Bacterial Metabolism in Lag-Phase using Impedance Spectroscopy of Agar-integrated 3D Microelectrodes, Biosensors and Bioelectronics, 126, 2019, 269 – 276

I. Sandeep, V. Toutam, S. Tadigadapa
  Robust Visibility of Graphene Monolayer on Patterned Plasmonic Substrates, Nanotechnology, 30(1), 2019, 015202

SELECTED RESEARCH PROJECTS

Continuous Urine Assay Instrumentation for Monitoring Kidney Function
  Principal Investigator, National Science Foundation

EAGER: Gate Tunable Thermo-Plasmonic Mid-Ir Coherent Light Emitters
  Principal Investigator, National Science Foundation

Multi-Gas Sensor Demonstrator Program
  Principal Investigator, Invensense-TDK

Devesh Tiwari

Assistant Professor, Electrical and Computer Engineering

PhD, North Carolina State University, 2013
coe.northeastern.edu/people/tiwari-devesh

Scholarship focus: large scale high performance computing systems; Data-intensive computing; cloud computing; machine learning and big data analytics; quantum computing

SELECTED PUBLICATIONS

S. Lu, B. Luo, T. Patel, Y. Yao, D. Tiwari, W. Shi
  Making Disk Failure Predictions SMARTer!, Proceedings of the 18th USENIX Conference on File and Storage Technologies (FAST), 2020

T. Patel, B. Li, R.B. Roy, D. Tiwari
  UREQA: Leveraging Operation-Aware Error Rates for Effective Quantum Circuit Mapping on NISQ-Era Quantum Computers, Proceedings of the USENIX Annual Technical Conference (USENIX ATC), 2020

T. Patel, D. Tiwari
  PERQ: Fair and Efficient Power Management of Power-Constrained Large-Scale Computing Systems, Proceedings of the 28th International Symposium on High-Performance Parallel and Distributed Computing (HPDC), 2019

T. Patel, S. Byna, G.L. Lockwood, D. Tiwari
  Revisiting I/O Behavior in Large-Scale Storage Systems: The Expected and the Unexpected, Proceedings of the 32th IEEE/ACM Int'l Conference on High Performance Computing, Networking, Storage and Analysis (SC), 2019

SELECTED RESEARCH PROJECTS

FLECHA: Accurate and Efficient Fault Injection Methodologies for Large-Scale Parallel Programs
  Principal Investigator, Department of Energy/Lawrence Livermore National Security, LLC

MEWA: New Methods for Performance Benchmarking and Evaluation of Emerging Data-Intensive Workloads on Heterogeneous Computing Accelerators
  Principal Investigator, Air Force Research Lab/MIT Lincoln Laboratory

North East Storage Exchange
  Principal Investigator, National Science Foundation/Boston University

REYAZ: Reliability-Aware Job Scheduling for HPC Systems
  Principal Investigator, National Science Foundation

Yanzhi Wang

Assistant Professor, Electrical and Computer Engineering

PhD, University of Southern California, 2014
coe.northeastern.edu/people/wang-yanzhi

Scholarship focus: real-time and energy-efficient deep learning and artificial intelligence systems, model compression of deep neural networks (DNNs), neuromorphic computing and non-von Neumann computing paradigms

Honors and awards: Army Research Office Young Investigator Award; Top Paper Award, IEEE Cloud Computing Conference (CLOUD); System Design Contest Special Service Recognition Award at DAC; Massachusetts Acorn Innovation Award, Faculty Research Awards from Google, Mathworks, etc.; Best Paper Award, IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP); Best Paper Award, IEEE/ACM International Symposium on Low Power Electronic Design (ISLPED)

SELECTED PUBLICATIONS

W. Niu, X. Ma, S. Lin, S. Wang, X. Qian, X. Lin, Y. Wang, B. Ren
  PatDNN: Achieving Real-Time Dnn Execution on Mobile Devices with Pattern-Based Weight Pruning, in ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2020

X. Ma, F-M. Guo, W. Niu, X. Lin, J. Tang, K. Ma, B. Ren, Y. Wang
  PCONV: The Missing but Desirable Sparsity in Dnn Weight Pruning for Real-Time Execution on Mobile Device, AAAI Conference on Artificial Intelligence (AAAI), 2020

R. Cai, A. Ren, O. Chen, N. Liu, C. Ding, X. Qian, J. Han, W. Luo, N. Yoshikawa, Y. Wang
  A Stochastic-Computing Based Deep Learning Framework Using Adiabatic Quantum-Flux-Parametron Superconducting Technology, in Proceedings of International Symposium on Computer Architecture (ISCA), 2019

SELECTED RESEARCH PROJECTS

CNS Core: Small: Collaborative: Content-based Viewport Prediction Framework for Live Virtual Reality Streaming
  Principal Investigator, National Science Foundation

PatDNN: Towards 100X Acceleration and Real-Time DNN Execution on Mobile Platforms
  Principal Investigator (YIP), Army Research Office

SPX: Collaborative Research: FASTLEAP: FPGA based Compact Deep Learning Platform
  Principal Investigator, National Science Foundation

Xiaolin Xu

Assistant Professor, Electrical and Computer Engineering

PhD, University of Massachusetts Amherst, 2016
coe.northeastern.edu/people/xu-xiaolin

Scholarship focus: hardware security and trust, high-performance VLSI, computer architecture, and embedded systems

SELECTED PUBLICATIONS

B. Shakya, X. Xu, M. Tehranipoor, D. Forte
  CAS-Lock: A Security-Corruptibility Trade-off Resilient Logic Locking Scheme, IACR Transactions on Cryptographic Hardware and Embedded Systems (TCHES), 1, 2020, 175-202

S. Best, X. Xu
  An All-Digital True Random Number Generator Based on Chaotic Cellular Automata Topology, IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2019

X. Xu, F. Rahman, B. Shakya, A. Vassilev, D. Forte, M. Tehranipoor
  Electronics Supply Chain Integrity Enabled by Blockchain, ACM Transactions on Design Automation of Electronic Systems (TODAES), 31, 2019

X. Xu, S. Keshavarz, D. Forte, M. Tehranipoor, D.E. Holcomb
  Oscillation as a Mechanism for Autonomous Majority Voting in PUFs, IEEE Transactions on Very Large Scale Integration Systems (TVLSI), 26(11), 2018, 2431-2442

X. Xu, B. Shakya, M. Tehranipoor, D. Forte
  Novel Bypass Attack and BDD-based Tradeoff Analysis Against all Known Logic Locking Attacks, International Conference on Cryptographic Hardware and Embedded Systems (CHES), 2017

SELECTED RESEARCH PROJECTS

Bolstering UAV Cybersecurity Education through Curriculum Development with Hands-on Laboratory Framework
  Principal Investigator, National Science Foundation

Edmund Yeh
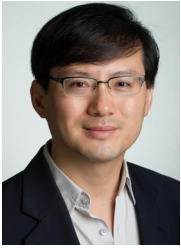
Professor, Electrical and Computer Engineering

PhD, Massachusetts Institute of Technology, 2001
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Scholarship focus: data-centric network architectures, fog/edge computing, resilient network infrastructures, network science, network information theory and coding, cross-layer control and optimization of wireless networks, network economics

Honors and awards: Alexander von Humboldt Research Fellowship; Army Research Office Young Investigator Award; Best Paper Award, IEEE International Conference on Communications (ICC), 2015; Best Paper Award, ACM Conference on Information-Centric Networking (ICN), 2017; Best Paper Award, IEEE International Conference on Ubiquitous and Future Networks (ICUFN), 2012; Faculty Research Team Award, 2017

SELECTED PUBLICATIONS

K. Kamran, E. Yeh, Q. Ma
  DECO: Joint Computation, Forwarding and Data Placement in Data-Driven Computing Networks, Proceedings of ACM MobiHoc, Catania, Italy, July 2-5, 2019

D. Malak, M. Medard, E. Yeh
  Tiny Codes for Guaranteeable Delay, IEEE Journal on Selected Areas in Communications, 37(4), 2019, 809-825

S. Ioannidis, E. Yeh
  Adaptive Caching Networks with Optimality Guarantees, IEEE/ACM Transactions on Networking, 26(2), 2018, 737-750

Y. Cui, M. Medard, E. Yeh, D. Leith, K. Duffy
  Optimization-Based Linear Network Coding for General Connections of Continuous Flows, IEEE/ACM Transactions on Networking, 26(5), 2018, 2033-2047

SELECTED RESEARCH PROJECTS

Generalized Network Assisted Transport (GNAT)
  Principal Investigator, Defense Advanced Research Projects Agency

Joint Optimization of Routing and Caching in Wireless Heterogeneous Networks
  Principal Investigator, Intel Corporation

SDN-Assisted NDN for Data Intensive Experiments
  Principal Investigator, National Science Foundation

Nan Cen

PhD 2019, Electrical Engineering; Advisor, Tommaso Melodia

New Wireless Technologies For Next-generation Internet-of-things

The explosion of the Internet of Things (IoTs) will result in billions of heterogeneous, low-power and low-complexity devices, and will enable diverse sets of applications, ranging from pervasive surveillance systems, health-care, smart cities, precision agriculture, industrial automation as well as military, and expanding over air, space, water, underground as well as in the human body. Along with the pervasive expansion and innovation of the IoT, researchers are faced with a plethora of technical challenges, including: (i) Low-power low-complexity algorithms are required for capability- and resource-limited IoT devices, where processing large amounts of sensed data is impossible, especially for multimedia data. (ii) Scaling out zillions of mobile devices, machines and objects in IoT in a few available bands in legacy radio spectrum will inevitably lead to the dreaded spectrum crunch problem. Towards addressing these challenges, we first propose a new paradigm for multi-view encoding and decoding based on Compressed Sensing (CS), which reduces the computational complexity for resource-limited IoT devices. Based on the proposed CS encoding/decoding architecture, a power-minimizing delivery algorithm in multi-path multi-hop networks is further proposed to reduce the power consumption, thus prolonging the lifetime of "things" in IoT.

See full dissertation at
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Yuan Guo

PhD 2019, Electrical and Computer Engineering; Advisor, Stratis Ioannidis

Experimental Design Under Comparisons

Labels generated by human experts via comparisons exhibit smaller variance compared to traditional sample labels. Collecting comparison labels is challenging over large datasets, as the number of comparisons grows quadratically with the dataset size. We study the following experimen- tal design problem: given a budget of expert comparisons, and a set of existing sample labels, we determine the comparison labels to collect that lead to the highest classification improvement. We study several experimental design objectives motivated by the Bradley-Terry model. The resulting optimization problems amount to maximizing submodular functions. We especially study a natural experimental design objective, namely, D-optimality. This objective is known to perform well in practice, and is submodular, making the selection approximable via the greedy algorithm. A naive greedy implementation has $O(Nd^2K)$ complexity, where N is the dataset size, d is the feature space dimension, and K is the number of generated comparisons. We show that, by exploiting the inherent geometry of the dataset namely, that it consists of pairwise comparison's the greedy algorithms complexity can be reduced to $O(N^2(K + d) + N(dK + d^2) + d^2K)$.

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

Samer Haidar

PhD 2020, Electrical Engineering; Advisor, Nian Sun

Chip-scale thermoelectric energy harvester for room temperature applications

Thermoelectric energy harvesters have emerged as a solution for power generation by converting wasted heat directly into electrical energy through the Seebeck effect. As a result, they play a critical role in the development of the Internet-of-Things (IoT) wireless devices and sensors. High efficiency thermoelectric (TE) materials are important for power generation and help reduce our dependence on fossil fuels and reduce greenhouse gas emissions. Recent advances in fabrication technology have enabled these devices to be constructed at the chip-scale level promoting the use with low power devices such as wireless sensors and wearable applications. Thermoelectric n-type bismuth telluride (Bi2Te3) films and p-type antimony telluride (Sb2Te3) films are grown on SiO2/Si substrates using RF magnetron sputtering via physical vapor deposition (PVD) process. The objective of this dissertation is to study the crystal structure, grain size and elemental composition for 1μm and 10μm thermoelectric films deposited using different deposition conditions and using various heat treatment recipes.

See full dissertation at
coe.northeastern.edu/20/SamerHaider

Farimah Mapar

PhD 2019, Electrical Engineering; Advisor, Ron Weiss

Computational design of a neuronal logic device and genetic reprogramming of human iPSCs to control neuronal identity in vitro

Neuromorphic computing is a new paradigm to create novel electronic circuits comprising interconnected artificial neuron-like elements. We have devised a novel approach in neuromorphic circuit design to shift the focus from dense networks to circuit design at the element-level, to enable such circuits to perform designed logic operations that are both relevant in electronics and pervasive in biological neuronal circuitry in the human brain. More specifically, we focused our attention on a bistable toggle switch and aim to design a neuronal circuit to implement this mechanism. First, we identify mutual inhibition as a recognized underlying mechanism behind bistability in biological neuronal networks. Using a Leaky Integrate-and-Fire model, we analyze the performance of mutual inhibition as a bistable neuronal toggle switch and demonstrate that this traditional circuitry fails to maintain stable switching, which calls for a de novo design. We propose a novel neuronal circuit design, termed staged mutual inhibition, and benchmark our new design against the traditional direct mutual inhibition. We further analyze the switching delay to conclude that our proposed design achieves 100% stability at the cost of longer switching delay.

See full dissertation at
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Sam Nazari

PhD 2019, Electrical and Computer Engineering; Advisor, Bahram Shafai

Robust Fault Detection And Network Resilience

This dissertation summarizes the results of my doctoral studies in robust fault detection and network resilience in distributed dynamic systems. In this endeavor, my main focus is to extend robust fault detection and isolation ideas to the distributed setting with an emphasis on cyber-security applications. Along the way, my co-authors and I also extend the theory of unknown input observers (UIOs) into the realm of positive linear dynamic systems (PLDS), and in order to address the problem of simultaneous faults and unknown disturbances in fault detection for positive linear systems, we proposed an observer structure that leverages the disturbance decoupling properties of the UIO along with the residual generation capabilities of the proportional-integral observer (PIO). With respect to networked systems, my first technical contribution develops distributed system models in order to capture the dynamic behavior of the agents in a cooperative setting under nominal and perturbed conditions. By exploring the structure and response of these distributed models, I am able to show that two popular consensus protocols lead to cooperative networks that are in fact positive linear dynamic systems, \ie their response remains in the positive orthant. For these networks, I propose two fault detection and isolation schemes that only utilize the observations of an agent's local neighbors for fault diagnosis.

See full dissertation at
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Pengxiang Ren

PhD 2019, Electrical Engineering; Advisor, Ali Abur

Robust Multi-area State Estimation For Large Scale Power Systems

Renewable energy technologies, such as wind and solar power, are becoming increasingly attractive complementary resources to the existing energy supplies, because of climate change and energy diversification concerns. The increased percentages of power generated by stochastic renewable energy sources require new system operation strategies dealing with the issues related reliability of the monitoring, control, generation and transmission system. State estimator (SE), as a crucial component of energy management system (EMS), provides the most likely state of a power system based on the measurements received from various equipment and substations. The robustness of state estimators is critical in order to serve other operation and market applications in power system control centers, such as security assessment, unit commitment, economic dispatch, etc. There are a number of reasons which may result in unreliable state estimation solutions, including equipment failures, human factors, not updated network, malicious cyber attack, variations of ambient conditions, etc.

See full dissertation at
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Yue Wu

PhD 2019, Computer Engineering; Advisor, Yun Fu

Face Recognition By Deep Learning

This dissertation focuses on real world challenges when applying deep learning for face recognition. Face recognition aims to recognize people using their face images, which is a hot topic in computer vision field. Especially tons of face data exist on social media nowadays and yield tremendous real world applications. We explore five applications along with challenges applying deep learning algorithms. First, we aim to recognize the large number of people, which is the bottleneck for training a deep convolutional neural network of which the output is equal to the number of people. An independent softmax model is introduced to split the single classifier into several small classifiers, which decomposes the large scale training procedure into several medium training procedures which can be solved separately. Second, we study the low-shot face recognition problem, in which there is very limited number of training samples for some people to recognize. A hybrid classifier framework is presented with multiple classifiers to decompose a single classifier into multiple classifiers that each works well for a part of data. Third, feature representation learning with unbalance data is studied for the face verification application.

See full dissertation at
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Fan Zhou

PhD 2019, Electrical and Computer Engineering; Advisor, Kaushik Chowdhury

Transport Protocol Design For End-to-end Data Delivery In Emerging Wireless Networks

Driven by the rapidly increasing popularity of Internet-connected phones, tablets and wearable devices, new wireless technologies and standards are emerging at an unprecedented pace. The evolution of wireless networking opens a myriad of possible mobile applications, which have greatly transformed the way we access information, entertain and connect with others. A critical question is how to satisfy the quality of service (QoS) requirements for various applications by delivering the data to users reliably and efficiently under different networking conditions. While many protocols have been proposed for better QoS, they usually requires modification to the networking core or heavy interaction between the layers of the networking stack. Therefore, the goal of dissertation is to develop lightweight, scalable and end-to-end transport solutions to bridge the long-standing gap between the increasing diversity of the mobile applications and the constant evolving wireless technologies. We first focus on studying how to tweak the logic and functionality of traditional TCP protocol given a new wireless networks with different link properties in the context of cognitive radio (CR) network.

See full dissertation at
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COVER IMAGE

Kaushik Chowdhury, professor of electrical and computer engineering, works on a drone in the Interdisciplinary Science and Engineering Complex. Chowdhury has created a company called Deep Charge to develop technology that transforms any surface into an intelligent wireless charger in order to deliver power to multiple devices.