Northeastern University
College of Engineering

Engineering for Society

Boldly innovating to better our world

2017 | 2018

SCHOLARSHIP REPORT

Electrical and Computer Engineering

WE ARE A LEADER IN EXPERIENTIAL EDUCATION AND INTERDISCIPLINARY RESEARCH, FOCUSED ON ENGINEERING FOR SOCIETY

We in the Department of Electrical and Computer Engineering (ECE) are happy to provide you with our Annual Scholarship Report, describing the research and accomplishments of our esteemed faculty over the past year. This report serves as a reminder of the profound work being done here at Northeastern University.

ECE faculty are at the forefront of spurring the next-generation of wireless communication networks. In 2017, Northeastern's College of Engineering research team, led by Professor Tommaso Melodia of ECE together with U.S. Ignite, Inc., a nonprofit organization, was selected to co-direct the Project Office of the National Science Foundation (NSF) initiative: Platforms for Advanced Wireless Research (PAWR). The PAWR Project Office, or PPO, is responsible for managing $100 million in investments from the federal government and an industry consortium, and a $6.1 million NSF-funded award. This year, the PAWR PPO awarded the first round of funding. The awarded platforms will power research motivated by real-world challenges on experimental, next-generation wireless test beds at the scale of cities and communities.

Other research highlights include a $1.5 million multi-institutional grant received by University Distinguished Professor Eduardo Sontag, jointly appointed in ECE and in bioengineering, from the NSF and Semiconductor Research Corporation for "Very Large-Scale Genetic Circuit Design Automation," and a $1 million collaborative grant from the NSF awarded to Professor Melodia and Associate Professor Matteo Rinaldi for "Reliable Underwater Acoustic Video Transmission Towards Human-Robot Dynamic Interaction."

We are also recognized as a leader in the area of robotics and artificial intelligence. Associate Professor Yun Raymond Fu's spinout from his lab here at Northeastern, which specializes in artificial intelligence, was acquired by a large global cosmetics company, Shiseido Americas Corporation. Recently, our students, advised by Associate Professor Taskin Padir, won first place at the NASA RASC-AL Mars Ice Challenge, and qualified at the RoboCup@Home competition for the World Robot Summit in Tokyo. Additionally, we have opened a new interdisciplinary Robotics Research Center led by Professor Hanumant Singh, and Professor Padir's project, Collaborative Robotics to Foster Innovation in Seafood Handling, was selected to receive funding from Advanced Robotics for Manufacturing, a national consortium dedicated to improving the workforce with robotics.

Several of our faculty have also received prestigious recognitions, including professors Fu and Melodia selected as Fellows to SPIE—the international society for optics and photonics—and IEEE, respectively. Assistant Professor Stratis Ioannidis was awarded a CAREER grant from the NSF for a project, "Leveraging Sparsity in Massively Distributed Optimization"; and was also awarded a $2 million BIGDATA award from the NSF and Google, while Associate Professor Marvin Onabajo received a Young Investigator Award from the Army Research Office to develop "An On-Chip Thermal Sensing Method to Detect Malicious Integrated Circuits." Additionally, Professor Miriam Leeser was selected for a Fulbright Award to study wireless networking technology in Ireland.

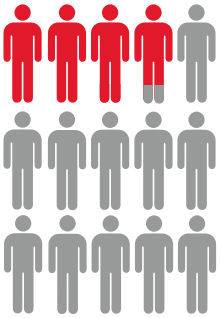
These are just a few of the many research efforts and accomplishments in ECE. We hope you can come see for yourself all of the exciting work being done in our wonderful department and college.

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

QUICK FACTS — Electrical and Computer Engineering

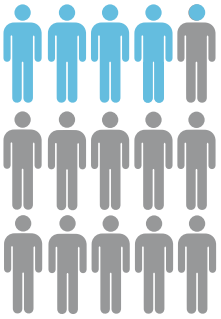
429 masters students

24.8% FEMALE



255 doctoral students

28.6% FEMALE



22
YOUNG INVESTIGATOR Awards

14
NATIONAL SCIENCE FOUNDATION CAREER Awards

58
TENURED/ TENURE-TRACK Faculty

11 IEEE FELLOWS

$53 MILLION IN ACTIVE RESEARCH GRANTS

$23M ANNUAL FACULTY RESEARCH EXPENDITURES

NSF 21%
DOD/DARPA 18%
DHS 27%
NIH 7%
DOE 4%
CORPORATE 12%
FEDERAL/OTHER 11%

The department offers seven research concentrations and is either the lead or partner of seven federally-funded research centers.

QUICK FACTS — College of Engineering

13 STATE-OF-THE-ART RESEARCH CENTERS funding by eight federal agencies

DOE, DHS, EPA, HHS, NIH, NSA, NIST, NSF

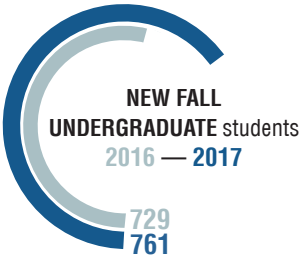
179
TENURED/ TENURE-TRACK Faculty

43
NSF CAREER Awards

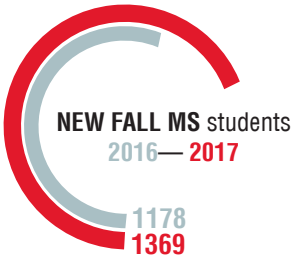
5 ENGINEERING DEPARTMENTS

Bioengineering
Chemical Engineering
Civil and Environmental Engineering
Electrical and Computer Engineering
Mechanical and Industrial Engineering

3819
UNDERGRADUATE students



3717
GRADUATE students



83
YOUNG INVESTIGATOR Awards

FACULTY HONORS AND AWARDS

Professor **Tommaso Melodia** was selected as an IEEE fellow for his contributions to underwater acoustic and multimedia networks. He is also director of research of the Project Office for the National Science Foundation initiative, Platforms for Advanced Wireless Research, responsible for $100 million in investments from the federal government and an industry consortium, and an NSF $6.1 million grant.

Assistant Professor **Stratis Ioannidis** was awarded a National Science Foundation CAREER grant for "Leveraging Sparsity in Massively Distributed Optimization." He also received a $2 million BIGDATA grant from the National Science Foundation and a donation from Google to lead a collaborative research effort for the "Design and Computation of Scalable Graph Distances in Metric Spaces: A Unified Multiscale Interpretable Perspective."

Assistant Professor **Xue Lin** and College of Engineering Distinguished Professor **David Kaeli** in collaboration with CUNY City College received an $800K National Science Foundation grant to develop "A Framework of Simultaneous Acceleration and Storage Reduction on Deep Neural Networks Using Structured Matrices."

Associate Professor **Marvin Onabajo** received a Young Investigator Award from the Army Research Office to develop "An On-Chip Thermal Sensing Method to Detect Malicious Integrated Circuits."

Professor **Tommaso Melodia** will lead a three-year $1.57 million National Science Foundation grant with Associate Professors **Stefano Basagni**, **Matteo Rinaldi**, and Professor **Milica Stojanovic** for the "Development of a Software-Defined Networking Testbed for the Internet of Underwater Things." Melodia and Rinaldi are also leading a $1 million National Science Foundation multi-institutional grant for "Reliable Underwater Acoustic Video Transmission Towards Human-Robot Dynamic Interaction."

Associate Professor **Taskin Padir's** project, entitled, "Collaborative Robotics to Foster Innovation in Seafood Handling", or FISH, to develop robots to help with processing fish in seafood plants to reduce imports and improve the production of local fisheries was selected to receive funding from Advanced Robotics for Manufacturing, a national consortium dedicated to improving the workforce with robotics.

Professor **Ali Abur** was awarded a $792K grant from the Enabling Extreme Real-time Grid Integration of Solar Energy (ENERGISE) funding program. Abur's research was one of 13 projects selected by the Department of Energy's Office of Energy Efficiency and Renewable Energy SunShot initiative.

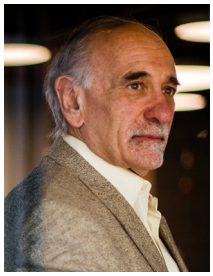
Associate Professor **Raymond Fu** was selected as a fellow of SPIE, the International Society for Optics and Photonics. Also his company Giaran Inc., which is a spin-out from his Synergetic Media Learning Lab and specializes in using artificial intelligence to allow consumers to test cosmetics products virtually, was acquired by Shiseido Americas Corporation, the subsidiary of a leading global cosmetics company.

Assistant Professor **Mahshid Amirabadi** and Professor **Brad Lehman** were awarded $660K in funding from the U.S. Department of Energy's Advanced Research Projects Agency-Energy and the Massachusetts Clean Energy Center to develop a new class of universal power converters for DC, single-phase AC, and multi-phase AC systems.

Assistant Professor **Aatmesh Shrivastava** was awarded three patents, including for "Low input voltage boost converter with peak inductor current control and offset compensated zero detection," for "Low power clock source," and for "Methods and apparatus for low input voltage bandgap reference architecture and circuits."

Professor **Miriam Leeser** was selected for a prestigious Fulbright award to study wireless and networking technology with applications to the Internet of Things, wireless networking, cognitive radio, software-defined radio, and software-defined networking at Maynooth University and the CONNECT Centre, Trinity College Dublin, Ireland.

Using an autonomous aerial drone system developed by Professor **Hanumant Singh** researchers from the Woods Hole Oceanographic Institution discovered a colony of more than 1,500,000 Adélie Penguins on the Danger Islands—more than the rest of the entire Antarctic Peninsula region combined. The discovery was announced in a paper in the journal, *Scientific Reports*.



Professor **Eduardo Sontag**, in collaboration with MIT and the University of Minnesota-Twin Cities, was awarded a $1.5 million grant jointly funded by the National Science Foundation and Semiconductor Research Corporation for "Very Large-Scale Genetic Circuit Design Automation."

Professor **Edmund Yeh** served as a member of the National Academies Panel on Review of the Information Technology Laboratory at the National Institute of Standards and Technology (NIST).

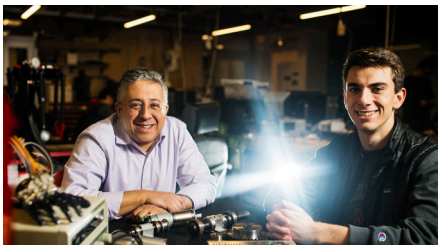
Professor Auroop Ganguly, civil and environmental engineering (CEE), Professor **Edmund Yeh**, electrical and computer engineering, and affiliated CEE Professor Stephen Flynn in collaboration with the College of Science and College of Computer and Information Science were awarded a $2.5 million National Science Foundation CRISP grant for "Interdependent Network-based Quantification of Infrastructure Resilience (INQUIRE)."

Chair and Professor **Srinivas Tadigadapa** was awarded a patent for "Ultra-high speed anisotropic reactive ion etching."

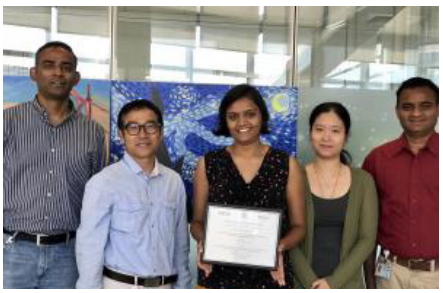
STUDENTS

Brett Daley, E'18, was named a Schwarzman Scholar, a prestigious honor given to only 142 students out of more than 4,000 applicants, enabling him to enroll in a yearlong, fully funded master's program at Schwarzman College on the Tsinghua University campus.

Elizabeth Wig, E'20, electrical engineering, and **Isaac Kresse,** S/E'19, computer engineering, earned the 2018 Barry Goldwater Scholarship, the United States premier award for outstanding young researchers in STEM fields.



Northeastern's undergraduate engineering team advised by Associate Professor **Taskin Padir,** won first place at the 2018 NASA RASC-AL Mars Ice Challenge, which is a competition sponsored by NASA to invent a way to access water far beneath the ground on Mars. The team competed at the NASA Langley Research Center against eight other finalist university teams. They won by a landslide, collecting 3,209 milliliters of water. The second-place team collected around 800 milliliters of water.



Associate Professor **Ningfang Mi** and two of her PhD students, **Janki Bhimani** and **Zhengyu Yang**, were awarded the 2018 IEEE International Conference on Cloud Computing Best Paper, "FIOS: Feature Based I/O Stream Identification for Improving Endurance of Multi-Stream SSDs."

Shuangjun Liu, a PhD student working at the Augmented Cognition Lab directed by Assistant Professor **Sarah Ostadabbas**, received $30K Amazon Web Service credit for the implementation of his research on "A Semi-Supervised Data Augmentation Approach using 3D Graphical Engines."

Associate Professor **Kaushik Chowdhury's** team was awarded an IEEE INFOCOM Best Paper Award for his paper on "WiFED: WiFi Friendly Energy Delivery with Distributed Beamforming." IEEE INFOCOM is one of the most important conferences in the networking field. For 2018, it received 1,606 submissions, of which only 309 papers were accepted. Chowdhury had a total of four papers from his lab accepted, all of which were presented by the lead student authors.

FACULTY BY RESEARCH AREAS

5

Faculty

COMPUTER NETWORKS AND SECURITY

Stefano Basagni
Kaushik Chowdhury
Engin Kirda
Tommaso Melodia
Wil Robertson

8

Faculty

COMMUNICATIONS CONTROL & SIGNAL PROCESSING

Dana Brooks
Pau Closas
Vinay Ingle
Hanoch Lev-Ari
Purnima Ratilal-Makris
Masoud Salehi
Dagmar Sternad
Milica Stojanovic

9

Faculty

MICROSYSTEMS, MATERIALS & DEVICES

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

7

Faculty

POWER ELECTRONICS, SYSTEMS AND CONTROL

Ali Abur
Mahshid Amirabadi
Bradley Lehman
Bahram Shafai
Eduardo Sontag
Mario Sznaier
Gilead Tadmor

7

Faculty

COMPUTER VISION, MACHINE LEARNING, & ALGORITHMS

Octavia Camps
Jennifer Dy
Deniz Erdogmus
Yun Raymond Fu
Stratis Ioannidis
Waleed Meleis
Sarah Ostadabbas

3

Faculty

ROBOTICS

Hanumant Singh
Taskin Padir
Alireza Ramezani

11

Faculty

COMPUTER SYSTEMS AND SOFTWARE

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

8

Faculty

ELECTROMAGNETICS & OPTICS

Charles DiMarzio
Vincent Harris
Yongmin Liu
Edwin Marengo
Jose Martinez Lorenzo
Hossein Mosallaei
Carey Rappaport
Michael B. Silevitch

ALI ABUR

Professor, Electrical and Computer Engineering

PhD, Ohio State University, 1985
ece.neu.edu/people/abur-ali

Power system monitoring, estimation and optimization, fault location, and identification in power grids Fellow, Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS

A. Rouhani, A. Abur
Constrained Iterated Unscented Kalman Filter for Dynamic State and Parameter Estimation, IEEE Transactions on Power Systems, 33(3), 2018, 2404-2414

Y. Lin, A. Abur
A New Framework for Detection and Identification of Network Parameter Errors, IEEE Transactions on Smart Grids, 9(3), 2018, 1698-1706

Y. Lin, A. Abur
Fast Correction of Network Parameter Errors, IEEE Transactions on Power Systems, 33(1), 2018, 1095-1096

A. Rouhani, A. Abur
Linear Phasor Estimator Assisted Dynamic State Estimation, IEEE Transactions on Smart Grids, 9 (1), 2018, 211-219

X. Chenxi, A. Abur
A Massively Parallel Framework for Very Large Scale Linear State Estimation, IEEE Transactions on Power Systems, 33(4), 2017, 4407-4413

Y. Lin, A. Abur
Enhancing Network Parameter Error Detection and Correction via Multiple Measurement Scans, IEEE Transactions on Power Systems, 32(3), 2017, 2417-2425

A. Rouhani, A. Abur
Real-Time Dynamic Parameter Estimation for an Exponential Dynamic Load Model, IEEE Transactions on Smart Grids, 7(3), 2016, 1530-1536

SELECTED RESEARCH PROJECTS

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

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

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

MAHSHID AMIRABADI

Assistant Professor, Electrical and Computer Engineering

PhD, Texas A&M University, 2013
ece.neu.edu/people/amirabadi-mahshid

Design, modeling and control of power converters, power electronics for renewable energy systems, microgrids, variable speed drives, and wireless power transfer

Best Paper Award, Energy Conversion Congress and Exposition 2016

SELECTED PUBLICATIONS

K. Mozaffari and M. Amirabadi
A Multifunction Series Inductive AC-Link Universal Power Converter with Reduced-Switch Count, Electronics Conference and Exposition (APEC), San Antonio, TX, 2018

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, 2018

E. Afshari, M. Khodabandeh, M. Amirabadi
A Single Stage Capacitive AC-Link AC-AC Power Converter, IEEE Transactions on Power Electronics, 2018

K. Mozaffari, M. Amirabadi, Y. Deshpande
A Single-Phase Inverter/Rectifier Topology with Suppressed Double-Frequency Ripple, IEEE Transactions on Power Electronics, 2018

A. Alfares, E. Afshari, M. Amirabadi, and B. Lehman
A Modular SCR-Based DC-DC Converter for Medium Voltage Direct Current (MVDC) Grid Applications, IEEE Energy Conversion Congress and Exposition (ECCE), 2017

M. Khodabandeh and M. Amirabadi
Closed-Loop Control of a Capacitive-Link Universal Converter with Minimum Number of Voltage Sensors, IEEE Energy Conversion Congress and Exposition (ECCE), 2017

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

STEFANO BASAGNI

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

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

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

Distinguished Scientist of the Association for Computing Machinery

SELECTED PUBLICATIONS

P. Gjanci, C. Petrioli, S. Basagni, C. A. Phillips, L. Bölöni, D. Turgut
Path Finding for Maximum Value of Information in Multi-modal Underwater Wireless Sensor Networks, IEEE Transactions on Mobile Computing, 17(2), 2018, 404-418

S. Basagni, V. Di Valerio, P. Gjanci, C. Petrioli
Harnessing HyDRO: Harvesting-Aware Data ROuting for Underwater Wireless Sensor Networks, In Proceedings of ACM MobiHoc, 2018, 271-279

S. Basagni, V. Di Valerio, P. Gjanci, C. Petrioli
Finding MARLIN: Exploiting Multi-Modal Communications for Reliable and Low-latency Underwater Networking, In Proceedings of IEEE Infocom, Atlanta, GA, 2017, 1-9

M. Girolami, S. Basagni, F. Furfari, S. Chessa
SIDEMAN: Service Discovery in Mobile Social Networks, Ad Hoc & Sensor Wireless Networks, 34(1), 2016, 1-39

Y. M. Aval, Y. Han, A. Tu, S. Basagni, M. Stojanovic, Y. Fei
Testbed-Based Performance Evaluation of Handshake-Free MAC Protocols for Underwater Acoustic Sensor Networks, In Proceedings of MTS/IEEE OCEANS, Monterey, CA, 2016, 1-7

S. Basagni, C. Petrioli, D. Spenza
CTP-WUR: The Collection Tree Protocol in Wake-up Radio WSNs for Critical Applications, In Proceedings of IEEE ICNC 2016, Kauai, HI, 2016, 1-6

R.G. Cid-Fuentes, M.Y. Naderi, S. Basagni, K.R. Chowdhury, A. Cabellos-Aparicio, E. Alarcon
On Signaling Power: Communications over Wireless Energy, In Proceedings of IEEE Infocom 2016, San Francisco, CA, 2016

SELECTED RESEARCH PROJECTS

Cross Layer Approach to 5G: Models and Protocols
Principal Investigator, MathWorks, Inc.

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 for Platform Implementation, National Science Foundation

DANA BROOKS

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Northeastern University, 1991
ece.neu.edu/people/brooks-dana

biomedical signal and image processing; medical imaging, machine learning, statistical signal processing, inverse problems, electrocardiography, bio-optical imaging, magnetic resonance imaging, transcranial neuromodulation, estimation of protein conformations from x-ray scattering, regularization, and optimization

Søren Buus Outstanding Research Award, College of Engineering; Outstanding Mentor Award, College of Engineering

SELECTED PUBLICATIONS

L. Feldman Barrett, Z. Khan, J. Dy, D.H. Brooks
Nature of Emotion Categories: Comment on Cowen and Keltner, Trends in Cognitive Sciences, 22(2) 2018, 97-99

S. Guler, M. Dannhauer, B. Roig-Solvas, A. Gkogkidis, R. Macleod, T. Ball, J.G. Ojemann, D.H. Brooks
Computationally Optimized ECoG Stimulation with Local Safety Constraints, NeuroImage, 173, 2018, 35-48

E. Onuk, J. Badger, Y. Wang, J. Bardhan, Y. Chisht, M. Akcakaya, D Brooks, D. Erdogmus, D Minh, L. Makowski
Effects of Catalytic action and Ligand Binding on Conformational Ensembles of Adenylate Kinase, Biochemistry, 56(34), 2017, 4559–4567

K. Kose, M. Gou, O. Yélamos, M. Cordova, A.M. Rossi, K.S. Nehal, E.S. Flores, O. Camps, J. Dy, D.H. Brooks, M, Rajadhyaksha
Automated Video-Mosaicking Approach for Confocal Microscopic Imaging in Vivo: An Approach to Address Challenges in Imaging Living Tissue and Extend Field of View, Scientific Reports, 7, 2017, 10759

B. Erem, R. Martinez Orellana, D.E. Hyde, J.M. Peters, F.H. Duffy, P. Stovicek, S.K. Warfield, R.S. MacLeod, G. Tadmor, D.H. Brooks
Extensions to a Manifold Learning Framework for Time-Series Analysis on Dynamic Manifolds in Bioelectric Signals, Physical Review E, 93, 2016, 042218

SELECTED RESEARCH PROJECTS

Center for Integrative Biomedical Computing
Principal Investigator, National Institutes of Health

Automated Image Guidance for Diagnosing Skin Cancer with Confocal Microscopy
Co-Investigator, National Institutes of Health

Collaborative Research: US-German Research Proposal Optimization of Human Cortical Stimulation
Principal Investigator, National Science Foundation

OCTAVIA CAMPS

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, University of Washington, 1992
ece.neu.edu/people/camps-octavia

Robust computer vision, image processing, and machine

SELECTED PUBLICATIONS

O. Camps, M. Gou, T. Hebble, S. Karanam, O. Lehmann, Y. Li, R. Radke, Z. Wu, F. Xiong
From the Lab to the Real World: Re-Identification in an Airport Camera Network, IEEE Transactions on Circuits and Systems for Video Technology, 27(3), 2017, 540-553

M. Gou, S. Karanam, W. Liu, O. Camps, R.J. Radke
A Large-Scale Multi-Camera Person Re-Identification Dataset, Workshop on Target Re-Identification and Multi-Target Camera Tracking in Conjunction with Computer Vision and Pattern Recognition, 2017

X. Zhang, Y. Wang, M. Sznaier, O. Camps
Efficient Temporal Sequence Comparison and Classification Using Gram Matrix Embeddings on a Riemannian Manifold, IEEE Conference on Computer Vision and Pattern Recognition, 2016, 4498-4507

Y. Wang, O. Camps, M. Sznaier, B. Roig Solvas
Jensen Bregman LogDet Divergence Optimal Filtering in the Manifold of Positive Definite Matrices, 9911, 2016, 221-235

M. Gou, X. Zhang, A. Rates-Borras, S. Asghari-Esfeden, O. Camps, M. Sznaier
Person Re-Identification in Appearance Imparied Scenarios, British Machine Vision Conference, 2016

C. Dicle, B. Yilmaz, O. Camps, M. Sznaier
Solving Temporal Puzzles, IEEE Conference on Computer Vision and Pattern Recognition, 2016, 5896-5905

Y. Cheng, Y. Wang, M. Sznaier, O. Camps
Subspace Clustering with Priors via Sparse Quadratically Constrained Quadratic Programming, IEEE Conference on Computer Vision and Pattern Recognition, 2016, 5204-5212

SELECTED RESEARCH PROJECTS

Dynamic Invariants for Video Scenes Understanding
Principal Investigator, National Science Foundation

Robust Identification of a Class of Structured Systems with High Dimensional Outputs and Applications
Co-Principal Investigator, National Science Foundation

CRISTIAN CASSELLA

Assistant Professor, Electrical and Computer Engineering

PhD, Carnegie Mellon University, 2015
ece.neu.edu/people/cassella-cristian

Acoustic resonators, nonreciprocal components, zero-power sensors for IoT, nonlinear dynamics,ultrasonic transducers

Winner of the Marie Skłodowska-Curie Individual Fellowship

SELECTED PUBLICATIONS

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

C. Cassella, S. Strachan, Shaw, G. Piazza
Phase Noise Suppression through Parametric Filtering, Applied Physics Letters, 110(6), 2017, 063503

Z. Qian, V. Rajaram, R. Sungho Kang, T. Wu, C. Cassella, N. McGruer, M. Rinaldi
Zero Power Infrared Digitizers Based on Plasmonically-enhanced Micromechanical Photoswitches, Nature Nanotechnology, 12(10), 2017, 969 – 973

B. Gibson, K. Qalandar, C. Cassella, G. Piazza, K. Turner
A study on the Effects of Release Area on the Quality Factor of Contour-Mode Resonators by Laser Doppler Vibrometry, IEEE Transaction on Ultrasonics, Ferroelectric and Frequency Control, 5(64), 2017, 898-904

C. Cassella
Aluminum Nitride Cross-Sectional Lamé Mode Resonators, Journal of Microelectromechanical Systems, 25(2), 2016, 275-285

C. Cassella, G. Piazza
Low Phase-Noise Autonomous Parametric Oscillator Based on a 226.7 MHz AlN Contour-Mode Resonator, IEEE transactions on Ultrasonics, Ferroelectrics, and Frequency Control, 62(4) 2015, 617-624.

KAUSHIK CHOWDHURY

Associate Professor, Electrical and Computer Engineering

PhD, Georgia Institute of Technology, 2009
ece.neu.edu/people/chowdhury-kaushik

Dynamic spectrum access, energy harvesting sensor networks, 5G technology, intra-body communication, and protocol design for wireless

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

S. De, D. Mishra, K.R. Chowdhury
Charging Time Characterization for Wireless RF Energy Transfer, IIEEE Transactions on Circuits and Systems II, 64(4), 2015, 362-366

SELECTED RESEARCH PROJECTS

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

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

PAU CLOSAS

Assistant Professor, Electrical and Computer Engineering

PhD, Universitat Politècnica de Catalunya, 2009
ece.neu.edu/people/closas-pau

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

Duran Farell for Technological Research; EURASIP Best PhD Thesis Award; 2016 Institute of Navigation Early Achievements Award

SELECTED PUBLICATIONS

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

J. Curran, M. Paonni, M. Navarro, S. Pfletschinger, P. Closas, M. Anghileri
Coding Aspects of Secure GNSS Receivers, Proceedings of the IEEE, 104(6), 2016, 1271-1287

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

A. Moragrega, P. Closas, C. Ibars
Supermodular Game for Power Control in TOA-Based Positioning, IEEE Trans. on Signal Processing, 61(12), 2013, 3246-3259

P. Closas, C. Fernández-Prades, J. Vilà-Valls
Multiple Quadrature Kalman Filtering, IEEE Transactions on Signal Processing, 60(12), 2012, 6125-6137

P. Closas, C. Fernández-Prades, J.A. Fernández-Rubio
A Bayesian Approach to Multipath Mitigation in GNSS Receivers, IEEE Journal of Selected Topics in Signal Processing, 3(4), 2009, 695-706

CHARLES DIMARZIO

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

PhD, Northeastern University, 1996
ece.neu.edu/people/dimarzio-charles

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 and 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

Z. Lai, J. Kerimo, Y. Mega, C.A. DiMarzio
Stepwise Multiphoton Activation Fluorescence Reveals a New Method of Melanin Detection, Journal of Biomedical Optics, 18(6), 2013, 061225

Z.R. Hoffman, C. DiMarzio
Structured Illumination Microscopy Using Random Intensity Incoherent Reflectance, Journal of Biomedical Optics, 2013

SELECTED RESEARCH PROJECTS

Light Scattering Research
Principal Investigator, Draper Labs

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

JENNIFER DY

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Purdue University, 2001
ece.neu.edu/people/dy-jennifer

Machine learning, data mining, statistical pattern recognition, computer vision, and image processing

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

Y. Yan, R. Rosales, G. Fung, M. Schmidt, J.G. Dy, et al.
Modeling Annotator Expertise: Learning When Everybody Knows a Bit of Something, Proceedings of the Thirteenth International Conference on Artificial Intelligence and Statistics (AISTATS), 9, 2010, 932-939

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, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, University of Florida, 2002
ece.neu.edu/people/erdogmus-deniz

Machine learning, signal and image analytics, cyber-human systems

National Science Foundation CAREER Award; Søren Buus Outstanding Research Award, College of Engineering; College of Engineering Faculty Fellow

SELECTED PUBLICATIONS

S. Salehi, D. Erdogmus, A. Gholipour
Auto-Context Convolutional Neural Network (Auto-Net) for Brain Extraction in Magnetic Resonance Imaging, IEEE TMI, 36 (11), 2017

J. Sourati, M. Akcakaya, T.K. Leen, D.Erdogmus, J.G. Dy,
Asymptotic Analysis of Objectives Based on Fisher Information in Active Learning, JMLR, 18, 2017, 1-41

M. Moghadamfalahi, M. Akcakaya, H. Nezamfar,
J. Sourati, D. Erdogmus
An Active RBSE Framework to Generate Optimal Stimulus Sequences in a BCI for Spelling, IEEE Transactions on Signal Processing, 65(20), 2017, 5381-53

E. Onuk, J. Badger, Y.J. Wang, J. Bardhan, Y. Chishti, M. Akcakaya, D.H. Brooks, D. Erdogmus, D.L. Minh, L. Makowski,
Effects of Catalytic Action and Ligand Binding on Conformational Ensembles of Adenylate Kinase, Biochemistry, 56(34), 2017, 4559–4567

M. Higger, F. Quivira, M. Akcakaya, M. Moghadamfalahi, H. Nezamfar, M. Cetin, D. Erdogmus
Recursive Bayesian Coding for BCIs, IEEE Transactions on Neural Systems and Rehabilitation Engineering, 25(6), 2016, 704 - 714

SELECTED RESEARCH PROJECTS

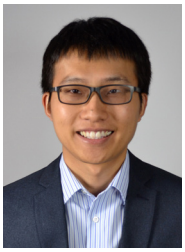
CAREER: Signal Models, Channel Capacity, and Information Rate for Noninvasive Brain Interfaces
Principal Investigator, National Science Foundation

Automated Classification of Retinopathy of Prematurity using Machine Learning
Investigator, National Institutes of Health

CHS: Small: Collaborative Research: EEG-guided Electrical Stimulation for Immersive Virtual Reality
Co-Principal Investigator, NSF

Clinical Interactions of a Brain Computer Interface for Communication
Co-Principal Investigator, NIH

HUI FANG



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

PhD, University of California, Berkeley, 2014
ece.neu.edu/people/fang-hui

Nano-electronics, bio-electronics, materials surfaces and interfaces

SELECTED PUBLICATIONS

Y. Qiang, K.J. Seo, X. Zhao, P. Artoni, N. Golshan, S. Culaclii, P.-M. Wang, W. Liu, K.S. Ziemer, M. Fagiolini, H. Fang
Bilayer Nanomesh Structures for Transparent Recording and Stimulating Microelectrodes, Advanced Functional Materials, 2017, 1704117

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

K.J. Seo, Y. Qiang, I. Bilgin, S. Kar, C. Vinegoni, R. Weissleder, H. Fang
Transparent Electrophysiology Microelectrodes and Interconnects from Metal Nanomesh, ACS Nano, 11, 2017, 4365-4372

H. Fang, J. Zhao, K. Yu, E. Song, A.B. Farimani, C.H. Chiang, X. Jin, Y. Xue, D. Xu, W. Du, K.J. Seo, Y. Zhong, Z. Yang, S. Won, G. Fang, S.W. Choi, S. Chaudhuri, Y. Huang, M. Ashraful Alam, J. Viventi, N.R. Aluru, J.A. Rogers
Ultra-thin, Transferred Layers of Thermally Grown Silicon Dioxide as Biofluid Barriers for Bio-Integrated Flexible Electronic Systems, PNAS, 113, 2016, 11682-11687

K.J. Yu, D. Kuzum, S.-W. Hwang, B.H. Kim, H. Juul, N.H. Kim, S.M. Won, K. Chiang, M. Trumpis, A.G. Richardson, H. Cheng, H. Fang, et. al.
Bioresorbable Silicon Electronics for Transient Spatiotemporal Mapping of Electrical Activity from the Cerebral Cortex, Nature Materials, 15, 2016, 782-791

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

H. Fang, H.A. Bechtel, E. Plis, M. C. Martin, S. Krishna, E. Yablonovitch, A. Javey
Quantum of Optical Absorption in Two-Dimensional Semiconductors, Proceedings of the National Academy of Sciences,110, 2013, 11688-11691

H. Fang, M. Tosun, G. Seol, T-C. Chang, K. Takei, J. Guo, A. Javey
Degenerate n-Doping of Few-Layer Transition Metal Dichalcogenides by Potassium, Nano Letters, 13, 2013, 1991-1995

YUNSI FEI

Professor, Electrical and Computer Engineering

PhD, Princeton University, 2004
ece.neu.edu/people/fei-yunsi

Computer architecture, embedded systems, hardware-oriented security, design automation, mobile computing, and underwater sensor networks

National Science Foundation CAREER Award; College of Engineering Faculty Fellow

SELECTED PUBLICATIONS

C. Luo, Y. Fei, L. Zhang, A.A. Ding, P. Luo, S. Mukherjee, D. Kaeli
Power Analysis Attack of an AES GPU Implementation, Springer J. Hardware & System Security (HASS), 2(1), 2018, 69-82

P. Luo, K. Athanasiou, Y. Fei, T. Wahl
Algebraic Fault Analysis of SHA-3 Under Relaxed Fault Models, IEEE Trans. on Information Forensics and Security, 13(7), 2018

Y. Han, Y. Fei
TARS: A Traffic-Adaptive Receiver-Synchronized Medium Access Control Protocol for Underwater Sensor Networks, ACM Trans. On Sensor Networks (TOSN), vol. 13(4), 2017, 27:1-27:25

Z. Jiang, Y. Fei
A Novel Cache Bank Timing Attack, ACM Int. Conf. Computer-Aided Design (ICCAD), Nov. 2017.

P. Luo, K. Anthansiou, L.Zhang, Z. Jiang, Y. Fei, A.A. Ding, T. Wahl
A First Step Towards Automatic Compiler Assisted Threshold Implementation Design, IEEE Int. Conf. on Computer Design (ICCD), 2017

A. Adam Ding, L. Zhang, F. Durvaux, F-X. Standaert, Y. Fei
Toward Sound and Optimal Leakage Detection Procedure, Smart Card Research and Advanced Application Conference (CARDIS), 2017

SELECTED RESEARCH PROJECTS

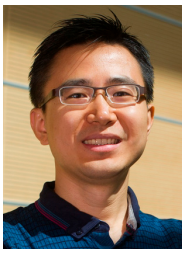
TWC: Medium: Automating Countermeasures and Security Evaluation Against Software Side-Channel Attacks
Principal Investigator, National Science Foundation

Embedded Hardware-based Security and Side Channel Analysis
Principal Investigator, Analog Devices

MRI: Development of a Testbed for Side-channel Analysis and Security Evaluation-TeSCASE
Principal Investigator, National Science Foundation

STARSS: Side-Channel Analysis and Resiliency Targeting Accelerators
Co-Principal Investigator, National Science Foundation and Semiconductor Research Corporation

YUN RAYMOND FU



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

PhD, University of Illinois, 2008
ece.neu.edu/people/fu-yun

Machine learning and computational intelligence, social media analytics, human-computer interaction, and cyber-physical systems

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

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

H. Liu, Z.g Tao, Y. Fu
Partition Level Constrained Clustering, IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI), 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

Y. Zhang, Y.Tian, Y.Kong, B. Zhong Y. Fu
Residual Dense Network for Image Super-Resolution, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2018

SELECTED RESEARCH PROJECTS

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

Images Assisted Video Recognition by Heterogeneous Knowledge Transfer
Principal Investigator, Army Research Office

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

Large-Scale Video Translation by Deep Learning and Knowledge Graph
Principal Investigator, Department of Defense (DOD), DURIP

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

VINCENT G. HARRIS

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

PhD, Northeastern University, 1990
ece.neu.edu/people/harris-vincent

Design and processing of advanced materials with emphasis on high frequency device applications for radar, communication, and sensing

Fellow, Fullbright; Fellow, American Association for the Advancement of Science, Distinguished Scientist Award, The Materials, Minerals, and Metals Society; Fellow, Institute of Electrical and Electronics Engineers; Fellow, American Physical Society; Fellow, Institute of Physics; Fellow, Institute of Engineering and Technology; Institute of Metal Research's Lee Hsun Lecture Award; Fulbright Senior Fellow; Søren Buus Outstanding; Research Award, College of Engineering

SELECTED PUBLICATIONS

P. Andalib, Y. Chen, V.G. Harris
Concurrent Core Loss Suppression and High Permeability by Introduction of Highly Insulating Intergranular Magnetic Inclusions to MnZn Ferrite, IEEE Magnetics Letters, 9, 2018

V.G. Harris, V. Šepelák
Mechanochemically Processed Zinc Ferrite Nanoparticles: Evolution of Structure and Impact of Induced Cation Inversion, Journal of Magnetism and Magnetic Materials, 465, 2018, 603-610

Z. Zheng, Q. Feng, Y. Chen, V.G. Harris
High-Frequency Magnetic Properties of Ca-Substituted Co 2 Z and Co 2 W Barium Hexaferrite Composites, IEEE Transactions on Magnetics, 54 (6), 2018, 1-6

G. Li, Y. Chen, V.G. Harris
Particle-Size Distribution Modified Effective Medium Theory and Validation by Magneto-Dielectric Co-Ti Substituted BaM Ferrite Composites, Journal of Magnetism and Magnetic Materials, 453, 2018, 44-47

J. Liu, Q. Jin, S. Wang, P. Yu, C. Zhang, C. Luckhardt, Z. Su, R. Barua, V.G. Harris
An Insight into Formation Mechanism of Rapid Chemical Co-Precipitation for Synthesizing Yttrium Iron Garnet Nano Powders, Materials Chemistry and Physics, 208, 2018, 169-176

SELECTED RESEARCH PROJECTS

Accelerated Development of Magnetodielectrics Having Equivalent Permeability and Permittivity for RF Applications
Principal Investigator, Rogers Corp

Magnetodielectric Heterostructures and Composites
Principal Investigator, Rogers Corp

Nonlinear Properties of Ferrite Materials
Principal Investigator, Raytheon

MAgnetics on GaN for Next GEneration T/R Systems (MAGNETS)
Principal Investigator, DARPA, Subaward from Qorvo

VINAY INGLE

Associate Professor, Electrical and Computer Engineering

PhD, Rensselaer Polytechnic Institute, 1981
ece.neu.edu/people/ingle-vinaykumar

Multidimensional signal processing and hyperspectral imaging

SELECTED PUBLICATIONS

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

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

N. Bosowski, V. Ingle, D. Manolakis
Generalized Linear Models for Count Time Series, International Conference on Acoustics, Speech and Signal Processing, New Orleans, 2017

M. Pieper, D. Manolakis, E. Truslow, V. Ingle, T. Cooley, M. Brueggeman, J. Jacobson, A. Weisner
Performance Limitations of Temperature Emissivity Separation Techniques in Long-Wave Infrared Hyperspectral Imaging Applications, Optical Engineering, 56(8), 2017

SELECTED RESEARCH PROJECTS

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

Joint Exploitation of LIDAR and Hyperspectral Imagery
Principal Investigator, Massachusetts Institute of Technology Lincoln Lab

Machine Learning Algorithms for Anamoly Detection in Sequential Image Frames
Principal Investigator, Massachusetts Institute of Technology Lincoln Lab

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

Algorithms for Threat Detection
Principal Investigator, MIT Lincoln Lab

STRATIS IOANNIDIS

Assistant Professor, Electrical and Computer Engineering

PhD, University of Toronto, 2009
ece.neu.edu/people/ioannidis-stratis

Distributed systems, networking, machine learning, big data, and privacy

SELECTED PUBLICATIONS

J. Bento, S. Ioannidis
A Family of Tractable Graph Distances, SDM, 2018

Y. Guo, P. Tian, J. Kalpathy-Cramer, S. Ostmo, J.P. Campbell, M.F. Chiang, D. Erdogmus, J. Dy, S. Ioannidis
Experimental Design Under the Bradley-Terry Model, IJCAI-ECAI, 2018

A. Moharrer, S. Ioannidis
Distributing Frank-Wolfe via Map-Reduce, ICDM, 2017

D. Koutra, A. Dighe, S. Bhagat, U. Weinsberg, S. Ioannidis, C.Faloutsos, J. Bolot
PNP: Fast Path Ensemble Method for Movie Design, KDD, 2017

S. Ioannidis, E. Yeh
Adaptive Caching Networks with Optimality Guarantees, SIGMETRICS, 2016

SELECTED RESEARCH PROJECTS

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

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

Caching Networks with Optimality Guarantees
Principal Investigator, National Science Foundation

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

Privacy-preserving Data Mining over FPGAs in the Datacenter
Principal Investigator, Google Faculty Research Award

DAVID KAELI

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

PhD, Rutgers University, 1992
ece.neu.edu/people/kaeli-david

Computer architecture, GPUs, heterogeneous computing,performance analysis, security and information assurance, hardware reliability and recovery,big data analytics, workload characterization

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

A. Villegas, R. Asenjo, A. Navarro, O. Plata D. Kaeli
Lightweight Hardware Transactional Memory for GPU Scratchpad Memory, in IEEE Transactions on Computers, 67(6), 2018, 816-829

C. Lunardi, F. Previlon, D. Kaeli, P. Rech
On the Efficacy of ECC and the Benefits of FinFET Transistor Layout for GPU Reliability, IEEE Transactions on Nuclear Science, 2018

Y. Sun, S. Mukherjee, T. Baruah, S. Dong, J. Gutierrez, P. Mohan D. Kaeli
Evaluating Performance Tradeoffs on the Radeon Open Compute Platform, IEEE International Symposium on Performance Analysis of Systems and Software, May 2018, 209-218.

C. Luo, Y. Fei, L. Zhang, A. Ding, P. Luo, S. Mukherjee D. Kaeli
Power Analysis Attack of an AES GPU Implementation, Journal of Hardware System Security, 2(1), 2018, 69-82

SELECTED RESEARCH PROJECTS

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

Exploring Analysis of Environment and Health Through Multiple Alternative Clustering
Co-Principal Investigator, National Science Foundation

Leveraging Intra-Chip/Inter-Chip Silicon Photonic Networks for Designing Next-Generation Accelerators
Principal Investigator, National Science Foundation

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

Puerto Rico Testsite for Exploring Environmental Contamination Threats
Co-Principal Investigator, National Institutes of Environmental Health Sciences

Side-Channel Analysis and Resiliency Targeting Accelerators
Principle Investigator, National Science Foundation and Semiconductor Research Corporation

YONG-BIN KIM

Professor, Electrical and Computer Engineering

PhD, Colorado State University, 1996
ece.neu.edu/people/kim-yong-bin

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

G. Jeon, Y.-B. Kim
A 4Gb/s Half-Rate DFE with Switched-Cap and IIR Summation for Data Correction, IEEE International Symposium on Circuits and Systems, Baltimore, MD, 2017, 2392-2395

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

W. Wei, K. Namba, F. Lombardi, Y.-B. Kim
A Novel Scheme for Tolerating Single Event/Multiple Bit Upsets (SEU/MBU) in Non-Volatile Memories, IEEE Transactions on Computers, 65(3), 2016, 781-790

Y. Choi, Y.-B. Kim
A Novel On-Chip Impedance Calibration Method for LPDDR4 Interface Between DRAM and AP/SoC, Association for Computing Machinery GLSVLSI Conference, 2016, 215-219

H. Zhu, R. Kapusta, Y.-B. Kim
Noise Reduction Technique Through Bandwidth Switching for Switched-Capacitor Amplifier, IEEE Transactions on Circuits and Systems 1(TCAS1), 62(7), 2015, 1707-1715

I. Jung, Y.-B. Kim
A 12-bit 32MS/s SAR ADC Using Built-In Self Calibration Technique to Minimize Capacitor Mismatch, 2014 IEEE International Symposium on Defect and Fault Tolerance in VLSI and Nanotechnology Systems(DFT), August 3-6, Amsterdam, Netherlands, 2014, 275-279

SELECTED RESEARCH PROJECTS

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

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

ENGIN KIRDA

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

PhD, Technical University of Vienna, 2002
ece.neu.edu/people/kirda-engin

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

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

ZIGZAG: Secure Execution of Client-Side Web Application Components
Principal Investigator, Office of Naval Research

MIECZYSLAW KOKAR

Professor, Electrical and Computer Engineering

PhD, Wroclaw University of Technology, 1973
ece.neu.edu/people/kokar-mieczyslaw

Cognitive radio; software engineering-self-controlling software; information fusion

SELECTED PUBLICATIONS

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

J.J. Moskal, M.M. Kokar, V. Roman, R.B. Normoyle, R. P. Guseman
Towards a SpectralSPARQL standard for exchanging EMS knowledge, In MILCOM 2017: Military Communications Conference, IEEE, 2017

S. Singh, S. Lu, M.M. Kokar, and P.A. Kogut
Detection and Classification of Emergent Behaviors Using Multi-Agent Simulation Framework (WIP), Spring Simulation Multi-Conference, Society for Modeling & Simulation (SCS), 2017

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

Y. Chen, M.M. Kokar, J. Moskal, D. Suresh
Mapping Spectrum Consumption Models to Cognitive Radio Ontology for Automatic Inference, Wireless Innovation Forum Conference on Wireless Communications Technologies and Software Defined Radio, Wireless Innovation Forum, 2015, *Best paper award

D. Suresh, M.M. Kokar, J. Moskal, Y. Chen
Updating CRO to CRO2, In Wireless Innovation Forum Conference on Wireless Communications Technologies and Software Defined Radio, Wireless Innovation Forum, 2015

B.E. Ulicny, J.J. Moskal, M.M. Kokar, K. Abe, J. Smith
Inference and Ontologies, In A. Kott, C. Wang, and R. F. Erbacher, editors, Cyber Defense and Situational Awareness, Springer, 2014, 167-199

B. Ulicny, J. Moskal, M.M. Kokar
Situational Awareness from Social Media, Proceedings of the Eighth Conference on Semantic Technologies for Intelligence, Defense, and Security, Fairfax, VA, 2013, 87-92

S. Li, M.M. Kokar
Flexible Adaptation in Cognitive Radios, Springer, Springer New York Heidelberg Dordrecht London, 2012

SELECTED RESEARCH PROJECTS

Converged Collaborative Elements for RF Task Operations
Principal Investigator, DARPA

MIRIAM LEESER

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Cambridge University, 1988
ece.neu.edu/people/leeser-miriam

Accelerators for compute intensive applications: reconfigurable hardware and graphics processing units (GPUs); applications including biocomputing, machine learning, software-defined radio; uses and implementations of computer arithmetic

Fulbright Scholar, 2018

SELECTED PUBLICATIONS

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

J. Bhimani, Z. Yang, M. Leeser, N. Mi
Accelerating Big Data Applications Using Lightweight Virtualization Framework on Enterprise Cloud, High Performance Extreme Computing Conference (HPEC), IEEE, 2017, 1-7

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, 2017

C. Liu, M. Leeser
A Framework for Developing Parallel Applications with High Level Tasks on Heterogeneous Platforms, Proceedings of the 8th International Workshop on Programming Models and Applications for Multicores and Manycores, 2017, 74-79, ACM

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, ACM

B. Drozdenko, M. Zimmermann, T. Dao, K. Chowdhury, M. Leeser
Modeling Considerations for the Hardware-Software Co-design of Flexible Modern Wireless Transceivers, 22nd International Conference on Field Programmable Logic and Applications (FPL), 2016

X. Fang, M. Leeser
Open-source Variable-Precision Floating-Point Library for Major Commercial FPGAs, ACM Transactions on Reconfigurable Technology Systems, 9(3), 2016

SELECTED RESEARCH PROJECTS

Ensuring Reliability and Portability of Scientific Software for Heterogeneous Architectures
Co-Principal Investigator, National Science Foundation

Hardware/Software Implementations of WiFi and LTE Communications
Principal Investigator, Mathworks

BRAD LEHMAN

Professor, Electrical and Computer Engineering

PhD, Georgia Institute of Technology, 1992
ece.neu.edu/people/lehman-bradley

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

IEEE Modeling and Control Technical Achievement Award of the IEEE Power Electronics Society; IEEE Standards Medallion

SELECTED PUBLICATIONS

W. Huang, B. Lehman
Analysis and Verification of Inductor Coupling Effect in Interleaved Multiphase dc-dc Converters, IEEE Transactions on Power Electronics, 31(7), 2016, 5004-5017

W. Huang, B. Lehman
A Compact Coupled Inductor for Interleaved Multiphase DC-DC Converters, IEEE Transactions on Power Electronics, 31(10), 2016, 6770-6775

D.O. Neacsu, Y. Zheng, B. Lehman
An SD Card Flash-Memory-Based Implementation of a Multioptimal Three-Phase PWM Generator, IEEE Transactions on Power Electronics, 31(1), 2016, 39-51

S. Chen, P. Li, R. Ball, J.-F. de Palma, B. Lehman
Analysis of a Switched Impedance Transformer-Type Nonsuperconducting Fault Current Limiter, IEEE Transactions on Power Electronics, 30(4), 2015, 1925-1936

J. Zhang, B.M. Hodge, S. Lu, H.F. Hamann, B. Lehman, J. Simmons, E. Campos, V. Banunarayanan, J. Black, J. Tedesco
Basline and Target Values for Regional and Point PV Power Forecasts: Toward Improved Solar Forecasting, Solar Energy, 122, 2015, 804-819

G. Spagnuolo, G. Petrone, B. Lehman, C.A. Ramos Paja, Y. Zhao, M.L. Orozco Gutierrez
Control of Photovoltaic Arrays: Dynamical Reconfiguration for Fighting Mismatched Conditions and Meeting Load Requests, IEEE Industrial Electronics Magazine, 9(1), 2015, 62-76

Y. Zhao, R. Ball, J. Mosesian, J.F. de Palma, B. Lehman
Graph-Based Semi-Supervised Learning for Fault Detection and Classification in Solar Photovoltaic Arrays, IEEE Transactions on Power Electronics, 30(5), 2015, 2848-2858

SELECTED RESEARCH PROJECTS

A Multi-Model Machine Learning-Solar Forecasting Technology
Principal Investigator, United States Department of Energy

Advanced 100W Solar Blanket for Squad Power
Principal Investigator, Department of Defense

HANOCH LEV-ARI

Professor, Electrical and Computer Engineering

PhD, Stanford University, 1984
ece.neu.edu/people/lev-ari-hanoch

Adaptive filtering; statistical signal processing; spectrum analysis and estimation; networked dynamic state estimation

Fellow, Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS

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

P. Ren, H. Lev-Ari and 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

P. Argyropoulos, H. Lev-Ari, A. Abur
Subband Transmission Line Modeling for Robust Power System Transient Simulation, IEEE PES General Meeting, Denver, 2015

P.E. Argyropoulos, H. Lev-Ari
Wavelet Customization for Improved Fault Location Quality in Power Networks, IEEE Transactions on Power Delivery, 30(5), 2015, 2215-2223

B. Yan, H. Lev-Ari, A.M. Stankovic
Robust Continuous-Discrete Kalman Filter for Time-Stamped Delay Mitigation in Networked Estimation and Control Systems, 46th North American Power Symposium, Pullman, 2014

L. Peng, H. Lev-Ari
Estimating the Autocorrelation Function of an Arbitrarily Time-Variant System Response, IEEE International Conference on Acoustics, Speech and Signal Processing, Vancouver, BC, May 2013, 6249-6253

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
ece.neu.edu/people/lin-xue

Adversarial machine learning; deep learning acceleration and hardware implementation; cyber-physical systems

SELECTED PUBLICATIONS

P. Zhao, S. Liu, Y.Wang, X. Lin
An ADMM-Based Universal Framework for Adversarial Attacks on Deep Neural Networks, Proceedings of ACM Multimedia (ACM MM), 2018

S. Wang, X. Wang, P. Zhao, D.Kaeli, P. Chin, X.Lin
Defensive Dropout for Hardening Deep Neural Networks Under Adversarial Attacks ,Proceedings of International Conference on Computer Aided Design (ICCAD), 2018

Y. Wang, C. Ding, G. Yuan, S.Liao, Z. Li,
X. Ma, B. Yuan, X.Qian, J. Tang, Q. Qiu, X.Lin
Towards Ultra-High Performance and Energy Efficiency of Deep Learning Systems: An Algorithm-Hardware Co-Optimization Framework, Proceedings of the 32nd AAAI Conference on Artificial Intelligence (AAAI-18), 2018

Mengshu Sun, Yuankun Xue, Paul Bogdan, Jian Tang, Yanzhi Wang, and Xue Lin
Hierarchical and Hybrid Energy Storage Devices in Data Centers: Architecture, Control and Provisioning, PLOS ONE, 2018

Q. Xie, X. Lin, Y. Wang, S. Chen
Performance Comparisons Between 7nm Finfet and Conventional Bulk CMOS Standard Cell Libraries, IEEE Transaction Circuits and Systems II, 62(8), 2015, 761-765

Y. Wang, X. Lin, M. Pedram
A Near-Optimal Model-Based Control Algorithm for Households Equipped with Residential Photovoltaic Power Generation and Energy Storage Systems, IEEE Transaction Sustainable Energy, 2015, 1-10

X. Lin, Y. Wang, Q. Xie, M. Pedram
Task Scheduling with Dynamic Voltage and Frequency Scaling for Energy Minimization in the Mobile Cloud Computing Environment, IEEE Transaction Services Computing, 8(2), 2014, 175-186

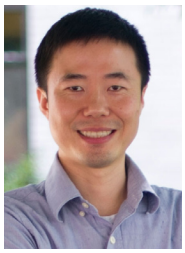
SELECTED RESEARCH PROJECTS

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

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

Adversarial Neural Networks
Principal Investigator, U.S. Office of Naval Research

YONGMIN LIU



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

PhD, University of California, Berkeley, 2009
mie.neu.edu/people/liu-yongmin

Nano optics; nanoscale materials and engineering; nano devices; plasmonics; metamaterials; applied physics

NSF CAREER Award, Office of Naval Research Young Investigator Award; SPIE Rising Researcher; 3M Non-Tenured Faculty Award

SELECTED PUBLICATIONS

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

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

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

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

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

C.L. Zhao, Y.M. Liu, Y.H. Zhao, N. Fang, T.J. Huang
Reconfigurable Plasmofluidic Lens, Nature Communications, 4(2350), 2013, 1-8

Y.M. Liu, S. Palomba, Y. Park, T. Zentgraf, X.B. Yin, X. Zhang
Compact Magnetic Antennas for Directional Excitation of Surface Plasmons, Nano Letters, 12(9), 2012, 4853-4858

Y.M. Liu, X. Zhang
Metamaterials: A New Frontier of Science and Technology, Chemical Society Reviews, 40, 2011, 2494-2507

T. Zentgraf, Y.M. Liu, M.H. Mikkelsen, J. Valentine, X. Zhang
Plasmonic Luneburg and Eaton Lenses, Nature Nanotechnology, 6, 2011, 151-155

SELECTED RESEARCH PROJECTS

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

Reconfigurable Metamaterials for Beam Steering, Imaging and Sensing at Infrared Frequencies
Principal Investigator, Office of Naval Research

FABRIZIO LOMBARDI

ITC Endowed Professor, Electrical and Computer Engineering

PhD, University of London, 1982
ece.neu.edu/people/lombardi-fabrizio

Fault-tolerant computing; VLSI CAD; testing, configurable computing, distributed systems

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

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

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

P. Zhu, J. Han, Y. Guo, F. Lombardi
Reliability and Criticality Analysis of Communication Networks by Stochastic Computation, IEEE Network Magazine, 30(6), 2016, 70-76

K. Namba, F. Lombardi
Single Multiscale-Symbol Error Correction Codes for Multiscale Storage Systems, IEEE Transactions on Computers, 65(6), 2016, 2005-2009

EDWIN MARENGO

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

PhD, Northeastern University, 1997
ece.neu.edu/people/marengo-fuentes-edwin

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

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

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

PhD, University of Vigo, 2005
mie.neu.edu/people/martinez-lorenzo-jose-angel

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

A. Molaei, J.H.Juesas, W. Blackwell, J.A. Martinez-Lorenzo
Interferometric Sounding Using a Metamaterial-based Compressive Reflector Antenna, IEEE Transactions on Antennas and Propagation, 66(5), 2018, 2188–2198

SELECTED RESEARCH PROJECTS

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

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
ece.neu.edu/people/mcgruer-nicol

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

Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

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

H. Pan, Y.-C. Wu, G.G. Adams, G.P. Miller, N. McGruer
Interfacial Shear Stress Between Single-Walled Carbon Nanotubes and Gold Surfaces With and Without an Alkanethiol Monolayer, Journal of Colloid and Interface Science, 407, 2013, 133-139

C. Pramanik, Y. Li, A. Singh, W. Lin, J.L. Hodgson, J.B. Briggs, S. Ellis, P. Müller, N.E. McGruer, G.P. Miller
Water Soluble Pentacene, Journal of Materials Chemistry C, 1, 2013, 2193-2201

P. Ryan, Y.-C. Wu, S. Somu, G. Adams, N. McGruer
Single Walled Carbon Nanotube Electromechanical Switching Behavior with Shoulder Slip, Journal of Micromechanics and Microengineering, 21, 2011, e045028

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

PhD, University of Michigan, 1996
ece.neu.edu/people/meleis-waleed

Combinatorial optimization; algorithm design and analysis; scheduling; large-scale machine learning; parallel computing

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

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

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

L. Hayward, S. Ventura, M. Mahanna, W. Meleis
Inter-Professional Collaboration between Physical Therapy, Speech Language Pathology and Engineering Faculty and Students to Address Global Pediatric Rehabilitation Needs: A Case Report, Journal of Physical Therapy Education, 30(4), 2016

C. Wu, W. Li, W. Meleis,
Rough Sets-Based Prototype Optimization in Kanerva-Based Function Approximation, IEEE/WIC/ACM International Conference on Intelligent Agent Technology, 2015

J. Radford, B. Keegan, J. Hoye, C. Karbeyaz, K. Ognyanova, B. Foucault Welles, W. Meleis, D. Lazer
Conducting Massively Open Online Social Experiments with Volunteer Science, International AAAII Conference on Web and Social Media, 2015

TOMMASO MELODIA

Professor, Electrical and Computer Engineering

PhD, Georgia Institute of Technology, 2007
ece.neu.edu/people/melodia-tommaso

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

National Science Foundation CAREER Award

SELECTED PUBLICATIONS

Z. Guan, L. Bertizzolo, E. Demirors, T. Melodia,
WNOS: An Optimization-based Wireless Network Operating System, in Proc. of ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc), Los Angeles, USA, 2018

Z. Guan, T. Melodia
CU-LTE: Spectrally-Efficient and Fair Coexistence Between LTE and Wi-Fi in Unlicensed Bands, Proceedings of AIEEE Conference on Computer Communications (INFOCOM), San Francisco, CA, 2016

G.E. Santagati, T. Melodia
U-Wear: Software-Defined Ultrasonic Networking for Wearable Devices, Proceedings of ACM Conference on Mobile Systems, Services and Applications (MOBISYS), Florence, Italy, May 2015, 1-16

Z. Guan, G.E. Santagati, T. Melodia
Ultrasonic Intra-Body Networking: Interference Modeling, Stochastic Channel Access and Rate Control, Proceedings of the IEEE Conference on Computer Communications, Hong Kong, 2015, 1-9

E. Demirors, G. Sklivanitis, G.E. Santagati, T. Melodia, et al.
Design of a Software-Defined Underwater Acoustic Modem with Real-Time Physical Layer Adaptation Capabilities, Proceedings of the International Conference on Underwater Networks and Systems, 2014, 1-8

SELECTED RESEARCH PROJECTS

PAWR: Platforms for Advanced Wireless Research
Director of Research, National Science Foundation

NeTS: Small: Beyond Separate-then-centralize: A Cellular Operating System to Optimize Software-defined 5G Wireless Networks
Principal Investigator, National Science Foundation

CAREER: Towards Ultrasonic Networking for Implantable Biomedical Devices
Principal Investigator, National Science Foundation

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

Toward Maximal Spectral-Efficiency Networking
Principal Investigator, Air Force Research Laboratory

NINGFANG MI

Associate Professor, Electrical and Computer Engineering

PhD, College of William and Mary, 2009
ece.neu.edu/people/mi-ningfang

Capacity planning; MapReduce/Hadoop scheduling; cloud computing; resource management; performance evaluation; workload characterization; simulation; virtualization

National Science Foundation CAREER Award; IBM Faculty Award; Air Force Office of Scientific Research Young Investigator Award

SELECTED PUBLICATIONS

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, 2018 IEEE International Conference on Cloud Computing (CLOUD'18), 2018, (Best Paper Award)

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), 2018

Z. Yang, M. Hoseinzadeh, P. Wong, J. Artoux, C. Mayers, D.T. Evans, R.T. Bolt, J. Bhimani, N. Mi, S. Swanson
H-NVMe: A Hybrid Framework of NVMe-based Storage System in Cloud Computing Environment , 36th IEEE International Performance Computing and Communications Conference (IPCCC'17), San Diego, CA, 2017. (Best Paper Award)

H. Gao, Z. Yang, J. Bhimani, T. Wang, J. Wang, N. Mi, B. Sheng
AutoPath: Harnessing Parallel Execution Paths for Efficient Resource Allocation in Multi-Stage Big Data Frameworks, The 26th International Conference on Computer Communications and Networks, Vancouver, Canada, 2017

J. Bhimani, N. Mi, M. Leeser, Z. Yang
FiM: Performance Prediction for Parallel Computation in Iterative Data Processing Applications, IEEE International Conference on Cloud Computing, Honolulu, Hawaii, 2017

Y. Yao, J. Wang, B. Sheng, C.C. Tan, N. Mi
Self-Adjusting Slot Configurations for Homogeneous and Heterogeneous Hadoop Clusters, IEEE Transactions on Cloud Computing, 5(2), 2017, 344-357

SELECTED RESEARCH PROJECTS

AFOSR YIP: Creating an Integrated Management Layer to Administer Heterogeneous Resources in Dynamic Workflow Clusters
Principal Investigator, Air Force Office of Scientific Research

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; affiliated faculty, Bioengineering

PhD, University of California, Los Angeles, 2001
ece.neu.edu/people/mosallaei-hossein

Electromagnetics and optics; quantum systems; nanoscale materials and metamaterials, nanoantennas; THz-IR Devices; multiscale computation and mathematical-numerical models

SELECTED PUBLICATIONS

A. Forouzmand, H. Mosallaei
Dynamic Beam Control via Mie-Resonance Based Phase-Change Metasurface: A Theoretical Investigation, Optics Express, 26(14) 2018

A. Forouzmand, M.M. Salary, S. Inampudi, H. Mosallaei
A Tunable Multigate Indium-Tin-Oxide-Assisted All-Dielectric Metasurface, Advanced Optical Materials, 6(7), 2018, 1701275

S. Inampudi, J. Cheng, M.M. Salary, H. Mosallaei
Unidirectional Thermal Radiation from SiC metasurface, JOSA B, 35(1), 2018

M.M. Salary, S. Inampudi, H. Mosallaei
Characterization of Optomechanical Modes in Multilayer Stack of Graphene sheets, Journal of Materials Research, 2017

J. Cheng, D. Ansari, H. Mosallaei
Wave Manipulation with Designer Dielectric Metasurfaces, Optics Lett, 39(21), 2014, 6285-6288

S. Valleau, S.K. Saikin, D. Ansari O.B., M. Rostami, H. Mosallaei, A. Aspuru-Guzik
Electromagnetic Study of the Chlorosome Antenna Complex of Chlorobium-Tepidum, ACS Nano, 2014

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
ece.neu.edu/people/onabajo-marvin

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

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

SELECTED PUBLICATIONS

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

G. Jha, M.A.A. Ibrahim, M. Onabajo
A Low-Power Complex Bandpass Gm-C Filter with Dynamic Range Expansion Through Adaptive Biasing, Proc. IEEE Intl. Symp. on Circuits and Systems (ISCAS), 2018

C.-H. Chang, S.A. Zahari, K. Wang, L. Xu, I. Farah, M. Onabajo
An Analog Front-End Chip with Self-Calibrated Input Impedance for Monitoring of Biosignals via Dry Electrode-Skin Interfaces, IEEE Transactions on Circuits and Systems I: Regular Papers, 64,(6), 2017, 2666-2678

S. A. Zahrai, M. Zlochisti, N. Le Dortz, M. Onabajo
A Low-Power High-Speed Hybrid ADC with Merged Sample-and-Hold and DAC Functions for Efficient Subranging Time-Interleaved Operation, IEEE Trans. on Very Large Scale Integration (VLSI) Systems, 25(11), 2017, 3193-3206

L. Xu, C.-H. Chang, M. Onabajo
A 0.77mW 2.4GHz RF Front-end with -4.5dBm In-Band IIP3 Through Inherent Filtering, IEEE Microwave and Wireless Components Letters, 26(5), 2016, 352-354

SELECTED RESEARCH PROJECTS

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

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

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

SARAH OSTADABBAS

Assistant Professor, Electrical and Computer Engineering

PhD, University of Texas at Dallas, 2014
ece.neu.edu/people/ostadabbas-sarah

Machine learning/pattern recognition; computer vision, affective computing, human-machine interaction

SELECTED PUBLICATIONS

B. Rezaei, S. Ostadabbas
Moving Object Detection through Robust Matrix Completion Augmented with Objectness, IEEE Journal of Selected Topics in Signal Processing (J-STSP), 2018

S. Liu, S. Ostadabbas
Inner Space Preserving Generative Pose Machine, European Conference on Computer Vision (ECCV'18), 2018, Munich, Germany

Y. Yin, M. Nabian, M. Fan, C. Chou, M. Gendron, S. Ostadabbas
Facial Expression and Peripheral Physiology Fusion to Decode Individualized Affective Experience, Affective Computing Workshop of the 27th International Joint Conference on Artificial Intelligence (IJCAI-2018)

A. Farnoosh, M. Nabian, P. Closas, S. Ostadabbas
First-Person Indoor Navigation via Vision-Inertial Data Fusion, IEEE/ION PLANS Conference, 2018, 1213-1222

S. Liu, S. Ostadabbas
A Vision-Based System for In-Bed Posture Tracking, Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (ICCV/ACVR'17) 1373-1382

B. Rezaei, S. Ostadabbas
Background Subtraction via Fast Robust Matrix Completion, Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (ICCV/RSL-CV'17), 2017, 871-1879

A. Farnoosh, M. Nourani, S. Ostadabbas
Spatially-Continuous Plantar Pressure Reconstruction Using Compressive Sensing, Proceedings of the 2nd Machine Learning for Healthcare Conference (MLHC'17), in Journal of Machine Learning Research (JMLR) Track, 68, 2017

SELECTED RESEARCH PROJECTS

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

Decoding Situational Empathy: A Graph Theoretic Approach Towards Introducing a Quantitative Empathy Measure
Principal Investigator, Northeastern Tier 1 Grant

NCS-FO: Leveraging Deep Probabilistic Models to Understand the Neural Bases of Subjective Experience
Co-Principal Investigator, NSF-NCS

TASKIN PADIR

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

PhD, Purdue University, 2004
ece.neu.edu/people/padir-taskin

Humanoid robots dexterous manipulation, model-based robot design, human-supervised robot autonomy, medical cyber-physical systems

Kalenian Award for Entrepreneurial Spirit, HEART: Humans Empowered with Assistive Robot Technologies; Romeo L. Moruzzi Young Faculty Award for Innovation in Undergraduate Education

SELECTED PUBLICATIONS

S. Zanlongo, F. Abodo,P. Long, T. Padir, L. Bobadilla
Multi-Robot Scheduling and Path-Planning for Non-Overlapping Operator Attention, In 2018 Second IEEE International Conference on Robotic Computing (IRC), 2018, 87-94

D. Sinyukov, T. Padir
CWave: High-Performance Single-Source Any-Angle Path Planning on a Grid, IEEE International Conference on Robotics and Automation, Singapore, 2017

V. Dimitrov, J. Vazquez, T. Padir
LocATER: Localization and Accountability Technologies for Emergency Responders, IEEE International Symposium on Technologies for Homeland Security, Boston, MA, 2017

X. Long, P. Long, T. Padir
Compositional Autonomy for Humanoid Robots with Risk-Aware Decision-Making, Humanoid Robotics (Humanoids), IEEE-RAS 17th International Conference, 2017, 553-560

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

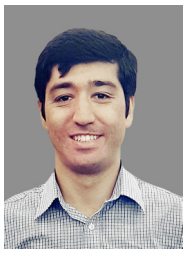
Collaborative Robotics to Foster Innovation in Seafood Handling
Principal Investigator, Advanced Robotics for Manufacturing (DOD)

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

Collaborative Research: Cooperative Control of Humanoid Robots for Remote Operations in Nuclear Environments
Principal Investigator, Department of Energy

LocATER: Localization and Accountability Technology for Emergency Responders
Principal Investigator, National Science Foundation

ALIREZA RAMEZANI



Assistant Professor, Electrical and Computer Engineering

PhD,University of Michigan, 2014
ece.neu.edu/people/ramezani-alireza

Analysis and feedback control of nonlinear systems; control of bipedal robot locomotion; formal methods for highly dynamic systems; bio-inspired robotics; spacecraft design; control, guidance & navigation of swarms of spacecraft

SELECTED PUBLICATIONS

A. Ramezani, S.U. Ahmed, J.E. Hoff, S.J. Chung, S. Hutchinson
Describing aerial locomotion of an Articulated MAV with Stable Periodic Orbits, Biomimetic and Biohybrid Systems: The 6th Int'l. Conference on Biomimetic and Biohybrid Systems, Lecture Notes in Artificial Intelligence, 2017, 394-405

S.U. Ahmed, A. Ramezani, S.J. Chung, S. Hutchinson
From Rousettus Aegyptiacus Landing to Robotic Landing: Regulation of CG-CP Distance Using a Nonlinear Closed-Loop Feedback, IEEE International Conference on Robotics and Automation (ICRA), 2017, 3560-3567

A. Ramezani, S.J. Chung, S. Hutchinson
A Biomimetic Robotic Platform to Study Flight Specializations of Bats, Science (Robotics-AAAS), 2(3), 2017

J.E. Hoff, A. Ramezani, S.J. Chung, S. Hutchinson
Synergistic Design of a Bio-Inspired Micro Aerial Vehicle with Articulated Wings, Robotics Science and Systems Conference (RSS), 2016

A. Ramezani, X. Shi, S.J. Chung, S. Hutchinson
Bat Bot (B2), a Biologically Inspired Flying Machine, Proc. IEEE International Conference on Robotics and Automation (ICRA), 2016, 3219-3226

A. Ramezani, J. Hurst, K.A. Hamed, J.W. Grizzle
Performance Analysis and Feedback Control of Atrias, a 3D Bipedal Robot, ASME Journal of Dynamic Systems Measurement and Control, 136(2), 2014, 21012

H.W. Park, A. Ramezani, J.W. Grizzle
A Finite State Machine for Accommodating Unexpected Large Ground Height Variations in Bipedal Robot Walking, IEEE Transactions on Robotics,29(2), 2013, 331-345

CAREY RAPPAPORT

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

PhD, MIT, 1987
ece.neu.edu/people/rappaport-carey

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

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

SELECTED PUBLICATIONS

G. Ghazi, C. Rappaport, J.A. Martinez-Lorenzo
Improved SAR Imaging Contour Extraction Using Smooth Sparsity-Driven Regularization, IEEE Antennas and Wireless Propagation Letters, 15(2), 2016, 266-269

B. Gonzalez-Valdes, Y. Alvarez, S. Mantzavinos, C.M. Rappaport, F. Las-Heras, J.A. Martinez-Lorenzo
Improving Security Screening: A Comparison of Multistatic Radar Configurations for Human Body Imaging, IEEE Antennas and Propagation Magazine, 58(4), 2016, 35-47

B. Gonzalez-Valdes, Y. Alvarez, Y. Rodriguez-Vaqueiro, A. Arboleya-Arboleya, A. Garcia-Pino, C. Rappaport, F. Las-Hera, J.A. Martinez-Lorenzo
Millimeter Wave Imaging Architecture for the On-the-Move Whole Body Imaging, IEEE Transactions on Antennas and Propagation, 64(6), 2016, 2328-2338

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

Y. Alvarez, Y. Rodriguez-Vaqueiro, B. Gonzalez-Valdes, C. Rappaport, F. Las-Heras, J.A. Martinez-Lorenzo
Three-Dimensional Compressed Sensing-Based Millimeter-Wave Imaging, IEEE Transactions on Antennas and Propagation, 63(12), 2015, 5868-5873

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

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

PhD, MIT, 2002
ece.neu.edu/people/ratilal-makris-purnima

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

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

SELECTED PUBLICATIONS

W. Huang, D. Wang, H. Garcia, O.R. Godø P. Ratilal
Continental Shelf-Scale Passive Acoustic Detection and Characterization of Diesel-Electric Ships Using a Coherent Hydrophone Array, Remote Sensing, 9(8), 2017, 772, 1-27

D. Wang and 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

D. Tran, W. Huang, A. Bohn, D. Wang, N. Makris, P. Ratilal, et al.
Using a Coherent Hydrophone Array for Observing Sperm Whale Range, Classification, and Shallow-Water Dive Profiles, The Journal of the Acoustical Society of America, 135(6), 2014, 3352-3363

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

MATTEO RINALDI

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

PhD, University of Pennsylvania, 2010
ece.neu.edu/people/rinaldi-matteo

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

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

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

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

WILLIAM ROBERTSON

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

PhD, University of California, Santa Barbara, 2009
ece.neu.edu/people/robertson-wil

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

M. Weissbacher, T. Lauinger, W. Robertson
Why is CSP Failing? Trends and Challenges in CSP Adoption, Proceedings of the International Symposium on Research in Attacks, Intrusions, and Defenses (RAID), Gothenburg, 2014, 1-22

K. Onarlioglu, C. Mulliner, W. Robertson, E. Kirda
PrivExec: Private Execution as an Operating System Service, Proceedings of the IEEE Symposium on Security and Privacy (Oakland), San Francisco, CA, 2013, 1-16

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, Electrical and Computer Engineering

PhD, Stanford University, 1979
ece.neu.edu/people/salehi-masoud

Error correcting codes; information theory; digital communications

SELECTED PUBLICATIONS

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

Large Scale Analysis of Physical Layer Security in Multi-User Wireless Networks, Proceedings of the IEEE International Conference on Communications (ICC), Paris, France, 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, October 6-8, 2014, 569-574

J.G. Proakis, M. Salehi
Fundamentals of Communication Systems, Second Edition Pearson, 2014

K. Firouzbakht, G. Noubir, M. Salehi
On the Performance of Adaptive Packetized Wireless Communication Links Under Jamming, IEEE Transactions on Wireless Communications, 13(7), 2014, 3481-3495

K.-L. Huang, V. Gaudet, M. Salehi
Output Decisions for Stochastic LDPC Decoders, Proceedings of the 48th Annual Conference on Information Sciences and Systems, Princeton, New Jersey, 2014, 1-5

K. Firouzbakht, G. Noubir, M. Salehi
Packetized Wireless Communication Under Jamming, a Constrained Bimatrix Game, Proceedings of the IEEE Global Communications Conference (GLOBECOM), 2014, 740-745

K. Firouzbakht, G. Noubir, M. Salehi
Quadratic Program Solution of Communication Links Under Jamming, Proceedings of the 48th Asilomar Conference on Signals, Systems and Computers, 2014, 1011-1015

GUNAR SCHIRNER

Associate Professor, Electrical and Computer Engineering

PhD, University of California, Irvine, 2008
ece.neu.edu/people/schirner-gunar

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

SELECTED PUBLICATIONS

H. Tabkhi, G. Schirner
A Joint SW/HW Approach for Reducing Register File Vulnerability, ACM Transactions on Architecture and Code Optimization (ACM TACO), 2015

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

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

H. Tabkhi, R. Bushey, G. Schirner
Function-Level Processor (FLP): A High Performance, Minimal Bandwidth, Low Power Architecture for Market-Oriented MPSoCs, IEEE Embedded Systems Letters, 2014

H. Tabkhi, R. Bushey, G. Schirner
Function-Level Processor (FLP): Raising Efficiency by Operating at Function Granularity for Market-Oriented MPSoCs, IEEE International Conference on Application-specific Systems, Architectures and Processors (ASAP), Zurich, Switzerland, 2014

G. Schirner, M. Götz, A. Rettberg, M. Zanella, F.J. Rammig
Embedded Systems: Design, Analysis and Verification, 403, Springer, 2013

G. Schirner, D. Erdogmus, K. Chowdhury, T. Padir
The Future of Human-in-the-Loop Cyber-Physical Systems, IEEE Computer, 46(1), 2013, 36-45

SELECTED RESEARCH PROJECTS

Collaborative Research: Holistic Design Methodology for Automated Implementation of Human-in-the-loop Cyber-physical Systems
Principal Investigator, National Science Foundation

Power Efficient Emerging Heterogeneous Platforms
Principal Investigator, National Science Foundation

BAHRAM SHAFAI

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, George Washington University, 1985
ece.neu.edu/people/shafai-bahram

Control Systems; digital signal processing; robust and optimal control

Associate Editor, Editorial Board and Program Chair of ISIAC-WAC; Senior Member, Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS

B. Shafai, S. Nazari, A. Oghbaee
Positive Unknown Input Observer Design for Positive Linear Systems, Proceedings 19th International Conference on System Theory, Control and Computing (ICSTCC), Cheile Gradistei, Romania, 2015, 360-365

B. Shafai, M. Saif
Proportional-Integral Observer in Robust Control, Fault Detection, and Decentralized Control of Dynamic Systems, Control and Systems Engineering, Springer International Publishing, 2015, 13-43

S.M.M. Alavi, M. Saif, B. Shafai
Accurate State Estimation in DC-DC Converters Using a Proportional Integral Observer (PIO), Proceedings of 23rd IEEE International Symposium on Industrial electronics (ISIE), 2014, 1304-1309

R. Ghadami, B. Shafai
Distributed Observer-Based LQR Design for Multi-agent Systems, Proceeding of ISIAC, World Automation Congress, Kona, HI, 2014, 520-526

P. Brunet, B. Shafai
Identification of Loudspeakers Using Fractional Derivatives, Journal of the Audio Engineering Society, 62(7/8), 2014, 505-515

B. Shafai, A Oghbaee
Positive Observer Design for Fractional Order Systems, Proceeding of ISIAC, World Automation Congress, Kona, HI, 2014, 531-537

B. Shafai, A Oghbaee
Positive Quadratic Stabilization of Uncertain Linear System, Proceeding of IEEE Multi-conference on Systems and Control, CAA, Antibes, France, 2014, 1412-1417

B. Shafai, A. Oghbaee, T. Tanaka
Positive Stabilization with Maximum Stability Radius for Linear Time-Delay Systems, 2014 IEEE 53rd Annual Conference on Decision and Control, 2014, 1948-1953

R. Ghadami, B. Shafai
Decomposition-Based Distributed Control for Continuous-Time Multi-Agent Systems, IEEE Transactions on Automatic Control, 58(1), 2013, 258-264

AATMESH SHRIVASTAVA

Assistant Professor, Electrical and Computer Engineering

PhD, University of Virginia, 2014
ece.neu.edu/people/shrivastava-aatmesh

Self-powered and ultra-low power circuits and system; energy-harvesting and power-first system/computer architecture; internet-of-things; ultra-low power bio-medical and neural circuits and systems; exascale computing; high reliability system design

SELECTED PUBLICATIONS

N. Shafiee, S. Tewari, B. Calhoun, A. Shrivastava
Infrastructure Circuits for Lifetime Improvement of Ultra-Low Power IoT Devices, IEEE Transactions on Circuits and Systems 1: Regular Papers, PP(99), 2017, 1-13

N.E. Roberts, K. Craig, A. Shrivastava, S. Wooters, Y. Shaksheer, D. Wentzloff, B.H. Calhoun
A 236nW-56.5dBm Sensitivity Bluetooth Low-Energy Wakeup Receiver with Energy Harvesting in 65nm CMOS, IEEE Solid-state Circuits Conference (ISSCC), 2016

A. Shrivastava, D. Akella, B.H. Calhoun
A 1.5nW, 32.768kHz XTAL Oscillator Operational from 0.3V Supply, IEEE Journal of Solid-state Circuits, 51(3), 2016, 686-696

A. Roy, A. Klinefelter, F.B. Yahya, X. Chen, P. Gonzalez, D. Akella, J. Boley, K. Craig, M. Faisal, S. Oh, N.E. Roberts, Y. Shakhsheer, A. Shrivastava, D. Vasudevan, D.D. Wentzloff, B.H. Calhoun
A 6.45μW Self-Powered SoC with Integrated Energy-Harvesting Power Management and ULP Asymmetric Radios for Portable Biomedical Systems, IEEE Transactions on Biomedical Circuits and Systems, 9(6), 2015, 862-874 *Invited paper to the special issue on International Solid State Circuits Conference 2015

A. Shrivastava, N.E. Roberts, O.U. Khan, D.D. Wentzloff, B.H. Calhoun
A 10mV-Input Boost Converter with Inductor Peak Current Control and Zero Detection for Thermoelectric and Solar Energy Harvesting with 220mV Cold-start and -14.5dBm, 915MHz RF Kick-Start, IEEE Journal of Solid-State Circuits, 2015 *Invited paper to the special issue on Custom Integrated Circuits Conference 2014

A. Shrivastava, K. Craig, N.E. Roberts, D. Wentzloff, B.H. Calhoun
A 32nW Bandgap Reference Voltage Operational from 0.5V Supply for Ultra-Low Power Systems, IEEE Solid-State Circuits Conference (ISSCC), 2015

SELECTED RESEARCH PROJECTS

A Temperature Sensor Network to Study Public Health and Community Resilience Impacts of Heat Waves at Micro-Spatial Levels in the Town of Brookline
Contact Principal Investigator, Northeastern University

CSR: Small: 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, NSF

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
ece.neu.edu/people/silevitch-michael

Subsurface sensing and imaging systems, detection of explosives related anomalies, engineered system development and engineering leadership

Life Fellow, Institute of Electrical and Electronics Engineers; 2015 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. It 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, Electrical and Computer Engineering; jointly appointed, Mechanical and Industrial Engineering

PhD, MIT, 1995
ece.neu.edu/people/singh-hanumant

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

SELECTED PUBLICATIONS

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

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

K.E. Smith, H. Singh, H., 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

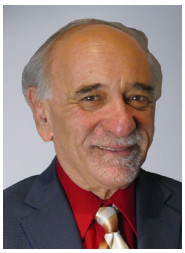
G. Williams, J. Wilkinson, T. Maksym, H. Singh, C. Kunz, et al.
Mapping Ice Thickness and Extreme Deformation of Antarctic Sea Ice from an Autonomous Underwater Vehicle, Nature Geoscience, 8, 2014, 61-67

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
ece.neu.edu/people/sontag-eduardo

Feedback control theory, systems biology, cancer, and biomedicine

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

SELECTED PUBLICATIONS

E.V. Nikolaev, S.J. Rahi, E.D. Sontag
Chaos in Simple Periodically-Forced Biological Models, Biophysical Journal, 114, 2018, 1232-1240

T.H. Segall-Shapiro, E.D. Sontag, C.A. Voigt
Engineered Promoters Enable Constant Gene Expression at any Copy Number in Bacteria, Nature Biotechnology, 36, 2018, 352-358

J.K. Kim, E.D. Sontag
Reduction of Multiscale Stochastic Biochemical Reaction Networks Using Exact Moment Derivation, PLoS Computational Biology, 13(6), 2017, e1005571

E.D. Sontag
A Dynamical Model of Immune Responses to Antigen Presentation Predicts Different Regions of Tumor or Pathogen Elimination, Cell Systems, 4, 2017, 1-11

E.D. Sontag
Dynamic Compensation, Parameter Identifiability, and Equivariances, PLoS Computational Biology, 13, 2017, 1005447

S. Barish, M.F. Ochs, E.D. Sontag, J.L. Gevertz
Evaluating Optimal Therapy Robustness by Virtual Expansion of a Sample Population, with a Case Study in Cancer Immunotherapy, Proceedings of the National Academy of Sciences, 114, 2017, 6277-6286

E.V. Nikolaev, E.D. Sontag
Quorum-Sensing Synchronization of Synthetic Toggle Switches: A Design Based on Monotone Dynamical Systems Theory, PLoS Computational Biology, 12, 2016, e1004881

SELECTED RESEARCH PROJECTS

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

Model-Guided Discovery and Optimization of Navy-Relevant Cell-Based Sensors
Co-Principal Investigator, Office of Naval research

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

Self-Modifying and Fast Analog Molecular Computing with Designed Enzymes
Co-Principal Investigator, DARPA

DAGMAR STERNAD

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

PhD, University of Connecticut, 1995
ece.neu.edu/people/sternad-dagmar

Motor control and learning, variability and stability, virtual rehabilitation, dynamic modeling, rhythmic and discrete movements as primitives for action

Klein Lectureship Award; Distinguished Lecturer on Life and the Sciences of Complexity, Center for the Ecological Study of Perception and Action

SELECTED PUBLICATIONS

S.W. Park, H. Marino, S. Charles, D. Sternad, N. Hogan
Moving Slowly is Hard for Humans: Limitations of Dynamic Primitives, Journal of Neurophysiology, 118(1), 2017, 69-83

P. Stein, E.L. Saltzman, K.G. Holt, D. Sternad
Is Failed Predictive Control a Risk Factor for Focal Dystonia?, Motor Disorders, 31(12), 2016, 1772-1777

C.J. Hasson, Z. Zhang, M.O. Abe, D. Sternad
Neuromotor Noise is Malleable by Amplification of Perceived Error, PLoS Computational Biology, 2016

M.E. Huber, N. Kuznetsov, D. Sternad
Persistence of Reduced Neuromotor Noise in Long-term Motor Skill Learning, Journal of Neurophysiology, 116(6), 2016, 2922-2935

SELECTED RESEARCH PROJECTS

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

Collaborative Research: Challenging the Cognitive-control Divide
Principal Investigator, National Science Foundation

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

Quantification of Predictive Motor Impairments in Individuals with ASD
Principal Investigator, National Institutes of Health

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

Multi-Center Trial of Augmented Sensory Feedback in Children with Dyskinetic CP
Co-Investigator, National Institute of Health

MILICA STOJANOVIC

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Northeastern University, 1993
ece.neu.edu/people/stojanovic-milica

Wireless communications and networks, underwater acoustic transmission, statistical system characterization, adaptive signal processing

Distinguished Technical Achievement Award, IEEE Ocean Engineering Society; Fellow, Institute of Electrical and Electronics Engineers; IEEE/OES Distinguished Lecturer

SELECTED PUBLICATIONS

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

S. Yerramalli, M. Stojanovic, U. Mitra
Partial FFT Demodulation: A Detection Method for Doppler Distorted OFDM Systems, IEEE Transactions on Signal Processing, 60(11), 2012, 5906-5918

J. Heidemann, M. Stojanovic, M. Zorzi
Underwater Sensor Networks: Applications, Advances, and Challenges, Philosophical Transactions of the Royal Society A, 2012, 158-175

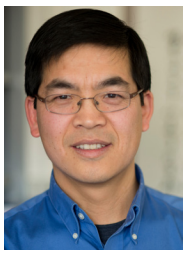
SELECTED RESEARCH PROJECTS

NeTS: Large: Collaborative Research: Exploration and Exploitation in Actuated Communication Networks
Principal Investigator, National Science Foundation

Intelligent Coordination and Adaptive Classification for Naval Autonomous Systems
Principal Investigator, Office of Naval Research

MRI: Development of the Northeastern University Marine Observatory NETwork (NU MONET)
Co-Principal Investigator, National Science Foundation

NIAN SUN



Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Stanford University, 2002
ece.neu.edu/people/sun-nian-xiang
web.northeastern.edu/sunlab

Magnetic, ferroelectric and magnetoelectric materials; RF/microwave magnetic and magnetoelectric devices design, fabrication and testing; materials properties at RF/microwave frequency; range self-assembly of magnetic nanostructures

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. 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

T. Nan, Y. Hui, M. Rinaldi, N.X. Sun
Self-biased 215MHz Magnetoelectric NEMS Resonator for Ultra-sensitive DC Magnetic Field Detection, Scientific Reports, 3, 2013, 1985

M. Liu, Z. Zhou, T. Nan, B.M. Howe, G.J. Brown, N.X. Sun
Voltage Tuning of Ferromagnetic Resonance with Bistable Magnetization Switching in Energy-Efficient Magnetoelectric Composites, Advanced Materials, 25(10), 2013, 1435-1439

J. Lou, M. Liu, D. Reed, Y. Ren, N.X. Sun
Giant Electric Field Tuning of Magnetism in Novel Multiferroic FeGaB/Lead Zinc Niobate Lead Titanate Heterostructures, Advanced Materials, 21(46), 2009, 4711-4715

S.X. Wang, N.X. Sun, M. Yamaguchi, S. Yabukami
Sandwich Films: Properties of a New Soft Magnetic Material, Nature, 407, 2000, 150-151

SELECTED RESEARCH PROJECTS

Integrated Thermoelectric Materials and Devices
Principal Investigator, Analog Devices, Incorporated

Multiferroic Materials for RF Applications
Principal Investigator, Defense Advanced Research Projects Agency

Nanofabricated Neural Probes with Ultra-sensitive Integrated Compact RF NEMS Magnetoelectric Sensors for Electro-magneto-brain Activity Mapping
Principal Investigator, Keck Foundation

Novel Multiferroic Heterostructures for Translational Compact and Power Efficient Voltage Tunable Devices
Principal Investigator, National Science Foundation

Power Efficient Voltage Tunable Spin Hall Nano Oscillators with Multiferroic Heterostructures
Principal Investigator, Air Force Research Laboratory

Sensitive and Selective Chemical Sensor Using Molecularly-Imprinted Single Layer Graphene
Principal Investigator, Air Force

MARIO SZNAIER

Dennis Picard Trustee Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, University of Washington, 1989
ece.neu.edu/people/sznaier-mario

Robust control; reduced order models; video-based control; applications to dynamics in imaging and video processing; information extraction from high volume data streams

IEEE Control Systems Society Distinguished Member Award

SELECTED PUBLICATIONS

B. Yilmaz, C. Lagoa, M. Sznaier
An Efficient Atomic Norm Minimization Approach to Identification of Low Order Models, 2013 IEEE 52nd Annual Conference on Decision and Control, 2013, 5834-5839

M. Ayazoglu, B. Yilmaz, M. Sznaier, O. Camps
Finding Causal Interactions in Video Sequences, IEEE International Conference on Computer Vision, Sydney, 2013

C. Dicle, O. Camps, M. Sznaier
The Way They Move: Tracking Multiple Targets with Similar Appearance, IEEE International Conference on Computer Vision, Sydney, Australia, 2013

K. Bekiroglu, M. Sznaier, C. Lagoa, B. Shafai
Vision Based Control of an Autonomous Blimp with Actuator Saturation Using Pulse Width Modulation, Proceedings of the 2013 IEEE International Conference on Control Applications, 2013, 1036-1041

Y. Cheng, Y. Wang, M. Sznaier
Worst Case Optimal Estimators for Switched Linear Systems, Proceedings of the 52nd IEEE Conference on Decision and Control, 2013, 4036-4041

SELECTED RESEARCH PROJECTS

Robust Identification and Model (in) Validation of Switched Hammerstein/Wiener Systems and Applications
Principal Investigator, National Science Foundation

SRINIVAS TADIGADAPA

Professor and Chair of Electrical and Computer Engineering

PhD, Cambridge University, 1994
ece.neu.edu/people/tadigadapa-srinvas

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

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

C. Zhang, S. Tadigadapa
Modified Inductively Coupled Plasma Reactive Ion Etch Process for High Aspect Ratio Etching of Fused Silica, Borosilicate and Aluminosilicate Glass Substrates, Sensors and Actuators A: Physical, 273, 2018, 147-158

J. Obungoloch, J.R. Harper, S. Consevage, S. Tadigadapa et al.
Design of a Sustainable Prepolarizing Magnetic Resonance Imaging System for Infant Hydrocephalus, Magnetic Resonance Materials in Physics, Biology and Medicine, 2018, 1-12

C. Zhang, A. Cocking, E. Freeman, Z. Liu, S. Tadigadapa
On-Chip Glass Microspherical Shell Whispering Gallery Mode Resonators, Scientific Reports, 2017

D. Gaddes, W. Brian Reeves, S. Tadigadapa
A Calorimetric Biosensing System for Quantification of Urinary Creatinine, ACS Sensors, 2017

H. Min, W. Zhang, C. Ashraf, D. Allara, A.C.T. Van Duin, S. Tadigadapa
Modified Random Sequential Adsorption Model For Understanding Kinetics of Proteins Adsorption at a Liquid-Solid Interface, Langmuir, 2017

E. Freeman, J. Harper, N. Goel, I. Gilbert, J. Unguris, S. Schiff, S. Tadigadapa
Improving The Magnetoelectric Performance of Metglas/Pzt Laminates by Annealing in Magnetic Field, Smart Materials & Structures, 2017

SELECTED RESEARCH PROJECTS

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

Implantable Brain Microelectromechanical Magnetic Sensing and Stimulation (MEMS-MAGSS)
Co-Principal Investigator, National Institutes of Health

GILEAD TADMOR

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Weizmann Institute of Science, 1984
ece.neu.edu/people/tadmor-gilead

Control systems; dynamical systems; low order modeling and estimation in complex systems; medical imaging

SELECTED PUBLICATIONS

V. Troshin, A. Seifert, D. Sidilkover, G. Tadmor
Proper Orthogonal Decomposition of Flow-Field in Non-Stationary Geometry, Journal of Computational Physics, 311, 2016, 329-337

B. Erem, R. Martinez Orellana, D.E. Hyde, J.M. Peters, F.H. Duffy, P. Stovicek, S.K. Warfield, R.S. MacLeod, G. Tadmor, D.H. Brooks
Extensions to a Manifold Learning Framework for Time Series Analysis on Dynamic Manifolds in Bioelectric Signals, Physical Review E, 93, 2016, 042218

K. Aleksic-Roeßner, R. King, O. Lehmann, G. Tadmor, et al.
On the Need of Nonlinear Control for Efficient Model-based Wake Stabilization, Theoretical and Computational Fluid Dynamics, 28(1), 2014, 23-49

L. Mirkin, T. Shima, G. Tadmor
Sampled-Data H^2 Optimization of Systems with I/O Delays via Analog Loop Shifting, IEEE Transactions on Automatic Control, 59, 2014, 787-791

M. Schlegel, B.R. Noack, P. Jordan, A. Dillman, G. Tadmor, et al.
On Least-Order Flow Representations of Aerodynamics and Aeroacoustics, Journal of Fluid Mechanics, 697, 2012, 367-398

S. Laxminarayan, G. Tadmor, et al.
Modeling Habituation in Rat EEG Evoked Responses via a Neural Mass Model with Feedback, Biological Cybernetics, 105, 2011, 371-397

A. Cavalieri, G. Daviller, P. Comte, P. Jordan, G. Tadmor, et al.
Using Large Eddy Simulation to Explore Sound-Source Mechanisms in Jets, Journal of Sound and Vibration, 330, 2011, 4098-4113

DEVESH TIWARI

Assistant Professor, Electrical and Computer Engineering

PhD, North Carolina State University, 2013
www.ece.neu.edu/people/tiwari-devesh

Large scale high performance computing systems; Data-intensive computing; cloud computing; machine learning and big data analytics

SELECTED PUBLICATIONS

K. Mohit, S. Gupta, T. Patel, M. Wilder, W. Shi, S. Fu, C. Engelmann, D. Tiwari
Understanding and Analyzing Interconnect Errors and Network Congestion on a Large Scale HPC System, In Dependable Systems and Networks (DSN), 48th Annual IEEE/IFIP International Conference 2018

S.S. Vazhkudai, R. Miller, D. Tiwari, C. Zimmer, F. Wang, S. Oral, R. Gunasekaran, D. Steinert
GUIDE: A Scalable Information Directory Sevice to Collect, Federate, and Analyze Logs for Operational Insights Into a Leadership HPC Facility, In Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, 45, 2017, 1-12

S. Gupta, T. Patel, C. Engelmann, and D. Tiwari
Failures in Large Scale Systems: Long-Term Measurement, Analysis, and implications, In Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, 45, 2017, 44

J. Kelley, C. Stewart, N. Morris, D. Tiwari, Y. He, S. Elnikety
Obtaining and Managing Answer Quality for Online Data-Intensive Services, ACM Transactions on Modeling and Performance Evaluation of Computing Systems (TOMPECS), 2(2), 2017, 11

B. Nie, J. Xue, S. Gupta, C. Engelmann, E. Smirni, D. Tiwari
Characterizing Temperature, Power, and Soft-Error Behaviors in Data Center Systems: Insights, Challenges, and Opportunities, In Proceedings of the 25th IEEE International Symposium on the Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS) 2017, 22-31

S. Gupta, T. Patel, C. Engelmann, D. Tiwari
Failures in Large Scale Systems: Long-term Measurement, Analysis, and Implications, Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, 44, 2017, 12

SELECTED RESEARCH PROJECTS

Toward Optimizing Big Data Workloads on Large Scale Systems with Multi-tier Storage Hierarchies
Principal Investigator, ORNL/DOE

A Statistical Learning and Modeling Approach for Analyzing Failures in Heterogeneous Large-scale Systems
Principal Investigator, ORNL/DOE

YANZHI WANG

Assistant Professor, Electrical and Computer Engineering

PhD, University of Southern California, 2014
ece.neu.edu/people/wang-yanzhi

Energy-efficient and high-performance implementations of deep learning and artificial intelligence systems; neuromorphic computing and non-von Neumann computing paradigms; cyber-security in deep learning systems; emerging deep learning algorithms/systems such as Bayesian neural networks, generative adversarial networks (GANs) and deep reinforcement learning

IEEE International Conference on Acoustics, Speech, and Signal Processing, Best Paper Award, IEEE/ACM International Symposium on Low Power Electronic Design (ISLPED)

SELECTED PUBLICATIONS

R. Cai, A. Ren, N. Liu, X. Qian, M. Pedram, Y. Wang
VIBNN: Hardware Celeration of Bayesian Neural Networks, ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2018

Y. Wang, C. Ding, Z. Li, G. Yuan
Towards Ultra-High Performance and Energy Efficiency of Deep Learning Systems: An Algorithm-Hardware Co-Optimization Framework, The Thirty Second AAAI Conference on Artificial Intelligence (AAAI), 2018

Z. Zhao, K. Pugdeethosapol, S. Lin, Z. Li, C. Ding, Y. Wang, Q. Qiu
Learning Topics using Semantic Locality, International Conference on Pattern Recognition (ICPR), 2018

X. Ma, Y. Zhang, G. Yuan, A. Ren, Z. Li, J. Han, J. Hu, Y. Wang
An Area and Energy Efficient Design of Domain-Wall Memory Based Deep Convolutional Neural Networks using Stochastic Computing, International Symposium on Quality Electronic Design (ISQED), 2018

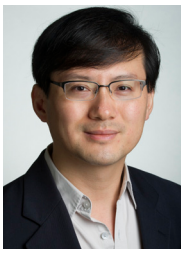
Y. Liu, S. Liu, Y. Wang, F. Lombardi, J. Han
A Stochastic Computational Multi-Layer Perceptron with Backward Propagation, IEEE Transactions on Computers, 2018

SELECTED RESEARCH PROJECTS

NeTS: Medium: Collaborative Research: Big Data Enabled Wireless Networking: A Deep Learning Approach
Co-Principal Investigator, National Science Foundation

CPS: Medium: Enabling Multimodal Sensing, Real-Time Onboard Detection and Adaptive Control for Fully Autonomous UnmannedAerial Systems
Co-Principal Investigator, National Science Foundation

EDMUND YEH



Professor, Electrical and Computer Engineering

PhD, MIT, 2001
ece.neu.edu/people/yeh-edmund

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

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

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

S. Ioannidis, E. Yeh
Jointly Optimal Routing and Caching for Arbitrary Network Topologies, Proceedings of ACM Conference on Information-Centric Networking (ICN), Berlin, Germany, 2017

Y. Cui, M. Medard, E. Yeh, D. Leith, K. Duffy
Optimization-Based Linear Network Coding for General Connections of Continuous Flows, Proceedings of IEEE International Conference on Communications (ICC) - Communication Theory Symposium, London, UK, 2015

E. Yeh, T. Ho, Y. Cui, M. Burd, R. Liu, D. Leong
VIP: A Framework for Joint Dynamic Forwarding and Caching in Named Data Networks, Proceedings of ACM Conference on Information-Centric Networking (ICN), Paris, France, 2014, 117-126

E. Sasoglu, E. Telatar, E. Yeh
Polar Codes for the Two-user Multiple-access Channel, IEEE Transactions on Information Theory, 59(10), 2013, 6583-6592

SELECTED RESEARCH PROJECTS

FIA: Collaborative Research: Named Data Networking
Principal Investigator, National Science Foundation

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

CC* Integration: SANDIE: SDN-Assisted NDN for Data Intensive Experiments
Principal Investigator, National Science Foundation

Modeling, Analysis and Control for Robust Interdependent Networks
Principal Investigator, Defense Threat Reduction Agency

SELECTED PhD THESES

Yale Chang

PhD 2017, Electrical Engineering; Advisor, Jennifer Dy

CLUSTERING WITH FLEXIBLE CONSTRAINTS AND APPLICATION TO DISEASE SUBTYPING

In this dissertation, we explore various ways to incorporate expert input to guide clustering. First, domain experts often have an idea regarding properties that clustering solutions should have in order to be useful based on domain relevant scores. We propose a framework to jointly optimize the usefulness and quality of a clustering solution. Second, besides instance-level constraints, feature-level structures can also be utilized to improve clustering. We consider two types of feature-level structures: 1) decision rules on a small set of features to provide interpretable clusterings; and 2) a feature similarity matrix used to guide the embeddings for clustering. 3) Instead of supervision from one expert, it is becoming more common for supervision to be available from multiple experts as data can be shared and processed by increasingly larger audiences. To address this new clustering paradigm, we make the following contributions: 1) Because experts are not oracles, their inputs are prone to errors as well. We build a probabilistic model to learn the shared latent clustering structure in the data by explicitly modeling the accuracy of each expert. 2) Since different experts might provide supervision with varying views in mind, we build a Bayesian probabilistic model for learning multiple latent clustering views from multiple experts. Besides demonstrating the superior performance of our proposed approaches on synthetic and benchmark data sets, we also applied them to discover subtypes of a complex lung disease, called chronic obstructive pulmonary disease (COPD), and obtained clinically meaningful results.

See full dissertation at **coe.neu.edu/18/YaleChang**

Xin Fang

PhD 2017, Computer Engineering; Advisor, Miriam Leeser

PRIVACY PRESERVING COMPUTATIONS ACCELERATED USING FPGA OVERLAYS

This research investigates, implements and evaluates secure computation generation using a heterogeneous computing platform featuring FPGAs. Unlike traditional FPGA design, overlay architecture on FPGAs is adopted since the SFE problem is too large to map to a single FPGA. The system leverages hardware acceleration to tackle the scalability and efficiency challenges inherent in SFE. To that end, we designed and implemented a generic, reconfigurable architecture as a coarse-grained FPGA overlay. On the host side, tools include SFE problem generator, parser and automatic host code generation tool are provided. Compared with tailored approaches that are tied to the execution of a specific SFE structure, and require full reprogramming of an FPGA with each new execution, our design allows re-purposing an FPGA to evaluate different SFE tasks without the need for reprogramming, and fully explores the parallelism for any GC problem. Our system demonstrates significant speedup compared with existing software platforms.

See full dissertation at **coe.neu.edu/18/XinFang**

Shen Feng

PhD 2017, Computer Engineering; Advisor, Gunar Schirner

HOLISTIC FRAMEWORK FOR HUMAN-IN-THE-LOOP CYBER-PHYSICAL SYSTEMS USING BODY/BRAIN-COMPUTER INTERFACES

This dissertation addresses the challenges in the design, development, and deployment of various assistive BBCI applications from three aspects: horizontal integration of multidisciplinary efforts, vertical integration across various design phases, and human interface devices for BBCIs. To capture various applications, we formalize the applications and identify their common functionality. Utilizing the application abstraction, we propose a holistic BBCI-based Assistive Technology (BAT) framework providing generic modules for multiples disciplines with well-define interfaces to work together. The framework allows a modular, distribution composition and can be configured to support a wide range of applications. In addition, our framework adopts a model-based design (MBD) approach to accelerate the development of embedded assistive applications from computational modeling to rapid prototyping and finally automated embedded deployment. Our framework unifies the development across various hardware types and connection mechanisms. Our domain-specific synthesis tool, HSyn, empowers algorithm designers to prototype portable, hardware-agnostic applications in MATLAB while offering an automatic path to embedded deployment.
See full dissertation at **coe.neu.edu/18/ShenFeng**

Galia Ghazi

PhD 2017, Electrical Engineering; Advisor, Jose A. Martinez Lorenzo

MODELING AND EXPERIMENTAL VALIDATION FOR 3D MM-WAVE RADAR IMAGING

The overarching goal of this thesis is the development and experimental validation of a next generation inexpensive, high-resolution radar system that can distinguish security threats hidden on individuals located at 2-10 meters range. In pursuit of this goal, this thesis proposes the following contributions: (1) Development and experimental validation of a new current-based, high-frequency computational method to model large scattering problems (hundreds of wavelengths) involving lossy, penetrable and multi-layered dielectric and conductive structures, which is needed for an accurate characterization of the wave-matter interaction and EM scattering in the target region; (2) Development of combined Norm-1, Norm-2 regularized imaging algorithms, which are needed for enhancing the resolution of the images while using a minimum number of transmitting and receiving antennas; (3) Implementation and experimental validation of new calibration techniques, which are needed for coherent imaging with multistatic congurations; and (4) Investigation of novel compressive antennas, which spatially modulate the waveeld in order to enhance the information transfer effciency between sampling and imaging regions and use of Compressive Sensing algorithms.

See full dissertation at **coe.neu.edu/18/GaliaGhazi**

Zachary R. Hoffman

PhD 2018, Electrical Engineering; Advisor, Charles A. DiMarzio

STRUCTURED ILLUMINATION FOR IN-VIVO SECTIONING AND IMAGING

In this dissertation the research considers two new methods of applying and processing SIM. Random modulation patterns are considered which do not rely on discrete phase differences and are therefore much more robust at depth. In parallel, a complimentary super-resolution method is applied to extract both depth information, as well as enhanced resolution that exceeds the diffraction limit of the system. Secondly, a new single image processing scheme, based on the Hilbert transform is developed to process traditional discrete frequency, modulation patterns. This method mitigates the need for phase alignment greatly increasing the depth of the sectioning, as well as allowing for real-time processing. Further, we produce these images using an LED source in reflectance, obviating the need for fluorescent markers, which we are able to demonstrate by producing in-vivo images on a human subject. This research extends the depth of SIM to 100um within a tissue sample bringing it much closer to other clinical tools, such as Confocal, at a fraction of the cost.

See full dissertation at **coe.neu.edu/18/ZacharyRHoffman**

Peter Jen-Hung Huang

PhD 2017, Electrical Engineering; Advisor, Bradley Lehman

INTEGRATING DC/DC CONVERSION WITH POSSIBLE RECONFIGURATION WITHIN SUBMODULE SOLAR PHOTOVOLTAIC SYSTEMS

This dissertation first proposes a method to merge photovoltaic (PV) cells or PV panels within the internal components DC-DC converters. The purpose of this merged structure is to reconfigure the PV modules between series and parallel connections using high switching frequencies (hundreds of kHz). This leads to multi-levels of voltages and currents that become applied to the output filter of the converter. Further, this research introduces a concept of a switching cell that utilizes the reconfiguration of series and parallel connections in DC-DC converters. The switching occurs at high switching frequency and the switches can be integrated to be within the solar panels or in between the solar cells. The concept is generalized and applied to basic buck and boost topologies. As examples of the new types of converters: reconfigurable PV-buck and PV-boost converter topologies are presented. It is also possible to create other reconfigurable power converters: non-isolated and isolated topologies. Analysis, simulation and experimental verification for the reconfigurable PV-buck and PV-boost converters are presented extensively to illustrate proof of concept. Benefits and drawbacks of the new approach are discussed.

See full dissertation at **coe.neu.edu/18/PeterJenHungHuang**

Wei Huang

PhD 2017, Electrical Engineering; Advisor, Purnima Ratilal-Makris

TEMPORAL-SPECTRAL CHARACTERIZATION AND CLASSIFICATION OF MARINE MAMMAL VOCALIZATIONS AND DIESEL-ELECTRIC SHIPS RADIATED SOUND OVER CONTINENTAL SHELF SCALE REGIONS WITH COHERENT HYDROPHONE ARRAY MEASUREMENTS

We provide detailed analysis of over 15,000 fin whale 20 Hz vocalizations received on Oct 13, 2006 in the Gulf of Maine. These vocalizations are separated into 16 clusters following the clustering approaches. Seven of these types are prominent, each acounting for between 8% to 16% and together comprise roughly 85% of all the analyzed vocalizations. The 7 prominent clusters are each more abundant during nighttime hours by a factor of roughly 2.5 times than that of the daytime. The diel-spatial correlation of the 7 prominent clusters to the simultaneously observed densities of their fish prey, the Atlantic herring in the Gulf of Maine, is provided which implies that the factor of roughly 2.5 increase in call rate during night-time hours can be attributed to increased fish-feeding activities.

See full dissertation at **coe.neu.edu/18/WeiHuang**

SELECTED PhD THESES

Pilin Junsangsri

PhD 2017, Computer Engineering; Advisor, Fabrizio Lombardi

DESIGN AND MODELING OF NONVOLATILE MEMORIES BY RESISTIVE SWITCHING ELEMENTS

With the continued scaling in the nano ranges, the technology roadmap predicted by Moores Law is becoming difficult to meet. So-called emerging technologies have been widely reported to supersede or complement CMOS. This type of design style is commonly referred to as hybrid because it exploits different characteristics of emerging technologies. This is very attractive for memories in which the modular (cell-based) organization of these systems is well suited to new technologies and innovative paradigms for design. This research presents new hybrid memory design which employ emerging technologies; such as memristor, phase change memory (PCM), programmable metallization cell (PMC), and racetrack memory (RM); and CMOS. By introduced new HSPICE macromodel of these emerging technologies and their memory applications such as the nonvolatile memory cell, CAM, TCAM, NVSRAM, and crossbar array, hybrid nonvolatile memory cells are generated. With its nonvolatile storage element, fast switching time, low power consumption, and good scalability, the hybrid memory cell of emerging technologies and CMOS would be one of the most promising candidates for the next generation of the nonvolatile memory.

See full dissertation at **coe.neu.edu/18/PilinJunsangsri**

Chao Liu

PhD 2017, Computer Engineering; Advisor, Miriam Leeser

UNITED TASKS AND CONDUITS FOR PROGRAMMING ON HETEROGENEOUS COMPUTING PLATFORMS

In this research, we propose a lightweight and flexible parallel programming framework, Unified Tasks and Conduits (UTC), for heterogeneous computing platforms. In this framework, we provide high level program components, tasks and conduits, for a user to easily construct parallel applications. In a program, computational workloads are abstracted as task objects and different tasks make use of conduit objects for communication. Multiple tasks can run in parallel on different devices and each task can launch a group of threads for execution. In this way, we can separate an applications' high-level structure from low-level task implementations. When porting such a parallel application to utilize different computing resources on different platforms, the applications' main structure can remain unchanged and only adopt appropriate task implementations, easing the development effort. Also, the explicit task components can easily implement task and pipeline parallelism. In addition, the multiple threads of each task can efficiently implement data parallelism as well as overlapping computation and communication.

See full dissertation at **coe.neu.edu/18/ChaoLiu**

Xianchao Long

PhD 2017, Electrical Engineering; Advisor, Taskin Padir

OPTIMIZATION-BASED WHOLE-BODY MOTION PLANNING FOR HUMANOID ROBOTS

This research is aimed at designing and validating a general purpose optimization-based motion planning algorithm for completing practical tasks with humanoid robots. The key features of the planner include flexibility, applicability, reproducibility and reusability for different types of robots. Through formulating the robot kinematics properties, the task requirements and the collision avoidance requirements as the objective and constraint functions in our motion planner, a wide range of optimal, feasible, and collision-free motions can be generated.

See full dissertation at **coe.neu.edu/18/XianchaoLong**

Pei Luo

PhD 2017, Computer Engineering; Advisor, Yunsi Fei

SIDE-CHANNEL SECURITY ANALYSIS AND PROTECTION OF SHA-3

This dissertation investigates both side-channel security analysis and protection of SHA-3 systems. I propose novel power analysis and fault analysis methods, and also effective countermeasures against these attacks. For side-channel power analysis, I examine hardware implementations and propose effective attack methods using power leakages from the first round output and the first round θ operation. To protect SHA-3 systems against side-channel power analysis, I adopt the operation shuffling method as the countermeasure. I propose algorithms to identify and explore the shuffling space automatically and then add shuffling into SHA-3 implementations. Recently Threshold Implementation (TI) has been a prevalent countermeasure against power analysis attacks with provable security. I adopt the method and implement it within the compilation process to automatically generate secure SHA-3 code.

See full dissertation at **coe.neu.edu/18/PeiLuo**

Milad Mahdian

PhD 2017, Electrical Engineering; Advisor, Edmund Yeh

OPTIMIZATION OF CONTENT-CENTRIC NETWORKS

In the first chapter of this thesis, we develop MIRCC, a rate-based, multipath-aware congestion control approach for ICN. We first present MIRCC's algorithm for single-path flows and develop a non-recursive rate-calculation algorithm which achieves max-min fairness, high link utilization and short flow completion time. We then focus on multi-path flows and design a novel hybrid scheme with dual-class rate management, in which each flow has two rate levels: the primary rate is ensured a level of max-min fairness between all flows and the secondary rate is managed to consume remaining bandwidth resulting in full link utilization.

See full dissertation at **coe.neu.edu/18/MiladMahdian**

Amir Momeni

PhD 2017, Electrical and Computer Engineering, Advisor, David Kaeli

EXPLOITING THREAD-LEVEL PARALLELISM ON RECONFIGURABLE ARCHITECTURES: A CROSS-LAYER APPROACH

This thesis explores and addresses OpenCL-HLS challenges using three different approaches. In the first approach we consider source-level optimization, where we evaluate the impact of OpenCL source-level decisions on the resulting data-path and FPGA execution efficiency. Our aim is to analyze the correlation between OpenCL parallelism semantics and parallel execution on FPGA devices. We want to be able to guide OpenCL programmers to develop optimized code on an FPGA. We study the impact of different grains (fine and coarse-grained), and forms of parallelism (spatial and temporal), exposed by OpenCL on the generated data-path. We also study the efficiency of the OpenCL Pipe semantic when targeting an FPGA.

See full dissertation at **coe.neu.edu/18/AmirMomeni**

Uri Peer

PhD 2017, Electrical and Computer Engineering, Advisor, Jennifer Dy

AUTOMATED TARGET DETECTION FOR GEOPHYSICAL APPLICATIONS

This dissertation presents a novel unsupervised method for automatically detecting targets, and extracting information about them and the medium in which they reside. It does so by efficiently analyzing strips of the B-Scan, and detecting the geometrical signature of a target in the image. Most existing detection methods are supervised, which means that one has to provide a training set (which can be labor expensive) in order to train a classifier. By contrast, the method presented here is unsupervised and is model based, which alleviates the need to manually annotate a training set. Another drawback of many existing methods is the underlying assumption of a homogeneous medium. This assumption is greatly relaxed for this method, since it assumes no prior knowledge of the medium. Instead, it learns the medium's properties from the targets themselves. Furthermore, this method is designed to be computationally efficient, applicable in real time applications. The current work presents two version of this algorithm. The first version was designed to detect locally isolated targets (i.e. - without having cross targets interferences in the B-Scan). The second version generalizes the first, and is able to locate targets in complex scenarios, at the cost of increasing computational complexity. Both versions were implemented on a commercial \ ac{GPR} system (GSSI's StructureScan^{TM} Mini XT system) and were tested using multiple systems on real life scenarios.

See full dissertation at **coe.neu.edu/18/UriPeer**

SELECTED PhD THESES

Zhenyun Qian

PhD 2017, Electrical Engineering; Advisor, Matteo Rinaldi

MICRO AND NANO ELECTROMECHANICAL SYSTEMS FOR NEAR-ZERO POWER INFRARED DETECTION

This dissertation presents the design and the experimental verification of high performance uncooled IR detectors based on Aluminum Nitride (AlN) nano electromechanical resonators, and a first-of-its-kind near-zero power IR digitizer based on plasmonically-enhanced micromechanical photoswitches. The unique advantages of the piezoelectric AlN thin film in terms of scaling in thickness and transduction efficiency are exploited by the first experimental demonstration of ultra-fast (thermal time constant, t~ 80 μs) and high resolution (noise equivalent power, NEP ~ 656 pW/Hz 1/2) AlN NEMS resonant IR detectors with reduced pixel size comparable to the state-of-the-art microbolometers. Furthermore, the spectral selectivity of the proposed IR detector technology is investigated and demonstrated by the seamless integration of ultra-thin plasmonic absorbers. The first prototypes show strong absorption (> 92%) in mid-wavelength infrared range with a narrow bandwidth (full width at half maximum, FWHM < 17%), resulting in the demonstration of high resolution (NEP ~ 130 pW/Hz1/2) narrowband infrared detectors suitable for IR spectroscopy and multispectral imaging system.

See full dissertation at **coe.neu.edu/18/ZhenyunQian**

Nasibeh Teimouri

PhD 2017, Electrical and Computer Engineering; Advisor, Gunar Schirner

IMPROVING SCALABILITY OF CHIP-MULTIPROCESSORS WITH MANY HW ACCELERATORS

This dissertation explores and alleviates the scalability limitations of ACMPs. To this end, the dissertation first proposes an analytical model to holistically explore how bottlenecks emerge on shared resources with increasing number of ACCs. Afterward, it proposes ACMPerf, an analytical model to capture the impact of the resources bottlenecks on the achievable ACCs benefits. Then, to open a path toward more scalable integration of ACCs, the dissertation identifies and formalizes ACC communication semantics. The semantics describe four primary aspects: data access, synchronization, data granularity, and data marshalling.

See full dissertation at **coe.neu.edu/18/NasibehTeimouri**

Fernando Quivira

PhD 2017, Electrical and Computer Engineering; Advisor, Deniz Erdogmus

HUMAN-IN-THE-LOOP ASSISTIVE CYBER PHYSICAL SYSTEM CONTROL USING PHYSIOLOGICAL SIGNALS

In this dissertation, we present a robotic hand prosthesis control application in the HilCPS framework. The objective of this work is to develop an active hand prosthesis for people with amputated upper limbs. First, we formulate the intent inference pipeline as a continuous grasp classification problem that can be solved with a probabilistic switched dynamical system formulation. We implement linear and non-linear models of surface EMG and compare their performance against standard processing approaches. Second, we show how context evidence in the form of mobile eye-tracking can improve grasp classification performance thus increasing theoretical system reliability. Finally, we address the problem of mapping hand grasp types to low-level joint trajectories on a simulated prosthetic hand prototype using continuous space deep reinforcement learning. We show that using a standard grasp metric as a scoring mechanism in the reward function can enable the learning of grasp motion paths from a wide range of sensor data including joint angles, RGB-D from a palm camera and contact forces.

See full dissertation at **coe.neu.edu18/FernandoQuivira**

Delin Wang

PhD 2017, Electrical Engineering; Advisor, Purnima Ratilal

CONTINENTAL-SHELF SCALE PASSIVE OCEAN ACOUSTIC WAVEGUIDE REMOTE SENSING OF MARINE MAMMALS AND OTHER SUBMERGED OBJECTS INCLUDING DETECTION, LOCALIZATION, AND CLASSIFICATION

In this thesis, we develop the basics of the Passive Ocean Acoustic Waveguide Remote Sensing (POAWRS) technique for the instantaneous continental-shelf scale detection, localization and species classification of marine mammal vocalizations. POAWRS uses a large-aperture, densely sampled coherent hydrophone array system with orders of magnitude higher array gain to enhance signal-to-noise ratios (SNR) by coherent beamforming, enabling detection of underwater acoustic signals either two orders of magnitude more distant in range or lower in SNR than a single hydrophone. The ability to employ coherent spatial processing of signals with the POAWRS technology significantly improves areal coverage, enabling detection of oceanic sound sources over instantaneous wide areas spanning 100 km or more in diameter. The POAWRS approach was applied to analyze marine mammal vocalizations from diverse species received on a 160-element Office Naval Research Five Octave Research Array (ONR-FORA) deployed during their feeding season in Fall 2006 in the Gulf of Maine. The species-dependent temporal-spatial distribution of marine mammal vocalizations and correlation to the prey fish distributions have been determined.

See full dissertation at **coe.neu.edu/18/DelinWang**

Handong Zhao

PhD 2017, Electrical and Computer Engineering; Advisor, Yun Fu

ROBUST UNSUPERVISED SUBSPACE LEARNING FOR VISUAL REPRESENTATION

In this dissertation, both cases are discussed. Specifically, in single-view subspace clustering (Part 1), we propose a novel graph-based method, ESSB: Ensemble Subspace Segmentation under Block-wise constraints, which unifies least squares regression and locality preserving graph regularizer into an ensemble learning framework. The “divide-and-conquer” strategy is applied to features, resulting in an efficient framework to handle the high-dimensional data. For the large-scale data, we propose a Fast Regression Coding (FRC) scheme to optimize regression codes, and simultaneously train a non-linear function to approximate the codes. By using FRC, we develop an efficient Regression Coding Clustering (RCC) framework to solve the large-scale clustering problem, consisting of sampling, FRC and clustering. Besides, we provide a theorem to guarantee that the non-linear function has a first-order approximation ability and a group effect. The theorem manifests that the codes are easily used to construct a dividable similarity graph.

See full dissertation at **coe.neu.edu/18/HandongZhao**

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COVER IMAGE

Anas Abou Allaban, E'20, Tarik Kelestemur, ME'18, and Naoki Yokoyama, E/ME'18, under the direction of Associate Professor Taskin Padir, electrical and computer engineering, work on a Toyota robot, developing code and software to program a "human support robot" to be able to assist elderly people who want to remain in their homes. The team participated in the global RoboCup@Home competition, placing fourth overall (the best of any U.S. team), landing them a spot to participate in the World Robot Summit in Tokyo.