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

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.

Assistant 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 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.”

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.
<table>
<thead>
<tr>
<th>Faculty</th>
<th>COMPUTER NETWORKS AND SECURITY</th>
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<tbody>
<tr>
<td>Stefano Basagni</td>
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<td>Kaushik Chowdhury</td>
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<td>Engin Kirda</td>
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<td>Tommaso Melodia</td>
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<td>Wil Robertson</td>
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<tr>
<th>Faculty</th>
<th>COMMUNICATIONS CONTROL &amp; SIGNAL PROCESSING</th>
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<tr>
<td>Dana Brooks</td>
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<td>Pau Closas</td>
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<td>Vinay Ingle</td>
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<td>Hanoch Lev-Ari</td>
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<td>Purnima Ratilal-Makris</td>
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<td>Masoud Salehi</td>
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<td>Dagmar Sternad</td>
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<td>Milica Stojanovic</td>
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<th>Faculty</th>
<th>MICROSYSTEMS, MATERIALS &amp; DEVICES</th>
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<td>Cristian Cassella</td>
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<td>Hui Fang</td>
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<td>Yong-Bin Kim</td>
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<td>Nicol McGruer</td>
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<td>Marvin Onabajo</td>
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<td>Matteo Rinaldi</td>
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<td>Aatmesh Shrivastava</td>
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<td>Nian Sun</td>
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<td>Srinivas Tadigadapa</td>
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<th>Faculty</th>
<th>POWER ELECTRONICS, SYSTEMS AND CONTROL</th>
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<tr>
<td>Ali Abur</td>
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<td>Mahshid Amirabadi</td>
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<td>Bradley Lehman</td>
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<td>Bahram Shafai</td>
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<td>Eduardo Sontag</td>
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<td>Mario Sznaier</td>
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<td>Gilead Tadmor</td>
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<th>Faculty</th>
<th>COMPUTER VISION, MACHINE LEARNING, &amp; ALGORITHMS</th>
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<tr>
<td>Octavia Camps</td>
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<td>Jennifer Dy</td>
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<td>Deniz Erdogmus</td>
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<td>Yun Raymond Fu</td>
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<td>Stratis Ioannidis</td>
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<td>Waleed Meleis</td>
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<td>Sarah Ostadabas</td>
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<th>Faculty</th>
<th>ROBOTICS</th>
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<tr>
<td>Hanumant Singh</td>
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<td>Taskin Padir</td>
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<td>Alireza Ramezani</td>
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<th>Faculty</th>
<th>COMPUTER SYSTEMS AND SOFTWARE</th>
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<td>Yunsi Fei</td>
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<td>David Kaeli</td>
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<td>Mieczyslaw Kokar</td>
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<td>Miriam Leeser</td>
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<td>Xue Lin</td>
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<td>Fabrizio Lombardi</td>
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<td>Ningfang Mi</td>
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<td>Gunar Schirner</td>
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<td>Devesh Tiwari</td>
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<td>Yanzhi Wang</td>
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<td>Edmund Yeh</td>
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<th>Faculty</th>
<th>ELECTROMAGNETICS &amp; OPTICS</th>
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<tr>
<td>Charles DiMarzio</td>
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<td>Vincent Harris</td>
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<td>Yongmin Liu</td>
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<td>Edwin Marengo</td>
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<td>Jose Martinez Lorenzo</td>
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<td>Hossein Mosallaei</td>
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<td>Carey Rappaport</td>
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<td>Michael B. Silevitch</td>
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</table>
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
Y. Lin, A. Abur
Y. Lin, A. Abur
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
Y. Lin, A. Abur
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
S. Basagni, V. Di Valerio, P. Gjanci, C. Petrioli
S. Basagni, V. Di Valerio, P. Gjanci, C. Petrioli
M. Girolami, S. Basagni, F. Furfari, S. Chessa
Y. M. Aval, Y. Han, A. Tu, S. Basagni, M. Stojanovic, Y. Fei
S. Basagni, C. Petrioli, D. Spenza
R.G. Cid-Fuentes, M.Y. Naderi, S. Basagni, K.R. Chowdhury, A. Cabellos-Aparicio, E. Alarcon

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
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
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
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
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
Person Re-Identification in Appearance Impaired 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
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
C. Cassella
C. Cassella, G. Piazza
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

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

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


R. Doost-Mohammady, M.Y. Naderi, K.R. Chowdhury

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

R.G. Cid-Fuentes, M.Y. Naderi, S. Basagni, K.R. Chowdhury, A. Cabellos-Aparicio, E. Alarcón

S. De, D. Mishra, K.R. Chowdhury

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

Principal Investigator, National Science Foundation
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
Z.R. Hoffman, C.A. DiMarzio
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
J.L. Hollmann, R. Horstmeyer, C. Yang, C.A DiMarzio
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

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

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
M. Masaali, 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
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

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

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


Bioresorbable Silicon Electronics for Transient Spatiotemporal Mapping of Electrical Activity from the Cerebral Cortex, Nature Materials, 15, 2016, 782-791

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. Pilis, 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
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. Anthanasiou, 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
Z. Jiang, Y. Fei
P. Luo, K. Anthanasiou, 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-identification 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, Fulbright; 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
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 Ultraspatical Imaging XXIV, SPIE 2018
Defence + 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,
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
Anomaly 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 Anomaly 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
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
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; Distinguished 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
C. Luo, Y. Fei, L. Zhang, A. Ding, P. Luo, S. Mukherjee D. Kaeli

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-Principal 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 Mismatch in DACs, IEEE Transactions on Circuits and Systems II, 64(4), 2017, 387-391

W. Wei, K. Namba, F. Lombardi, Y.-B. Kim

Y. Choi, Y.-B. Kim

H. Zhu, R. Kapusta, Y.-B. Kim

I. Jung, Y.-B. Kim

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

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. Ursic, 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

L. Bilge, E. Kirda, C. Kruegel, M. Balduzzi

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
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
Y. Chen, M.M. Kokar, J. Moskal, D. Suresh
D. Suresh, M.M. Kokar, J. Moskal, Y. Chen
B. Ulicny, J. Moskal, M.M. Kokar
S. Li, M.M. Kokar

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
J. Bhimani, Z. Yang, M. Leeser, N. Mi
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
X. Fang, S. Ioannidis, M. Leeser
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


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

HANOC 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

P. Ren, H. Lev-Ari and A. Abur

P. Hajiyani, H. Lev-Ari, A.M. Stankovic

P. Ren, H. Lev-Ari, A. Abur

P. Argyropoulos, H. Lev-Ari, A. Abur

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

L. Peng, H. Lev-Ari

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
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
Y. Wang, X. Lin, M. Pedram
X. Lin, Y. Wang, Q. Xie, M. Pedram

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/lin-yongmin
Nano optics; nanoscale materials and engineering; nano devices; plasmonics; metamaterials; applied physics

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
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
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, 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

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

K. Namba, F. Lombardi

H.A.F. Almurib, F. Lombardi, T. Nandha Kumar

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

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

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

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

E.A. Marengo, J. Tu

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

E.A. Marengo

E.A. Marengo

E.A. Marengo, J. Tu

E.A. Marengo
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

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

Y. Rodriguez-Vaqueiro, P. Paayam, R. Sipahi, J.A. Martinez-Lorenzo

A. Molaei, J.H.Juesas, W. Blackwell, J.A. Martinez-Lorenzo

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

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

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

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


P. Ryan, Y.-C. Wu, S. Somu, G. Adams, N. McGruer

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
L. Hayward, S. Ventura, M. Mahanna, W. Meleis
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 AAAI 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,
Z. Guan, T. Melodia
G.E. Santagati, T. Melodia
Z. Guan, G.E. Santagati, T. Melodia

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
H. Gao, Z. Yang, J. Bhimani, T. Wang, J. Wang, N. Mi, B. Sheng
J. Bhimani, N. Mi, M. Leeser, Z. Yang
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
J. Cheng, D. Ansari, H. Mosallaei
Wave Manipulation with Designer Dielectric Metasurfaces, Optics Lett, 39(21), 2014, 6285-6288
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

G. Jha, M.A.A. Ibrahim, M. Onabajo

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

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, 871-879

A. Farnoosh, M. Nourani, S. Ostadabbas

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

D. Sinyukov, T. Padir

V. Dimitrov, J. Vazquez, T. Padir

X. Long, P. Long, T. Padir

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

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


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

A. Ramezani, X. Shi, S.J. Chung, S. Hutchinson

A. Ramezani, J. Hurst, K.A. Hamed, J.W. Grizzle

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
eaec.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

B. Gonzalez-Valdes, Y. Alvarez, S. Mantzavinos, C.M. Rappaport, F. Las-Heras, 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


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
eaec.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

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

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.

Z. Gong, D. Tran, P. Ratilal

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
C. Cassella, G. Chen, Z. Qian, G. Hummel, M. Rinaldi
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

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
M. Weissbacher, W. Robertson, E. Kirda, C. Kruegel, G. Vigna
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
K. Onarlioglu, C. Mulliner, W. Robertson, E. Kirda

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

K. Firouzbakht, G. Noubir, M. Salehi

K.-L. Huang, V. Gaudet, M. Salehi

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

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

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. Retterberg, M. Zanella, F.J. Rammig

G. Schirner, D. Ergodmus, 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

B. Shafai, M. Saif

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

P. Brunet, B. Shafai

B. Shafai, A Oghbaee

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

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


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. 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


Contact Principal Investigator, Northeastern University

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.

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


C. Kunz, H. Singh

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/ternad-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

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

Y. Aval, M. Stojanovic

P. Qarabaqi, M. Stojanovic

S. Yerramalli, M. Stojanovic, U. Mitra

J. Heidemann, M. Stojanovic, M. Zorzi

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

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

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 Electromagneto-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

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

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-srinivas

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

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

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

Extensions to a Manifold Learning Framework for Time Series Analysis on Dynamic Manifolds in Bioelectric Signals, Physical Review E, 93, 2016, 042218

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


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


DEVESH TIWARI
Assistant Professor, Electrical and Computer Engineering
PhD, North Carolina State University, 2013
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
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. Gupta, T. Patel, C. Engelmann, and D. Tiwari

J. Kelley, C. Stewart, N. Morris, D. Tiwari, Y. He, S. Elnikety

B. Nie, J. Xue, S. Gupta, C. Engelmann, E. Smirni, D. Tiwari

S. Gupta, T. Patel, C. Engelmann, D. Tiwari

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
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

E. Yeh, T. Ho, Y. Cui, M. Burd, R. Liu, D. Leong

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

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


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

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

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

Co-Principal Investigator, National Science Foundation
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

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 multispectral configurations; and (4) Investigation of novel compressive antennas, which spatially modulate the wavefield in order to enhance the information transfer efficiency 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 accounting 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
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 Moore's 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](http://coe.neu.edu/18/PilinJunsangsri)

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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](http://coe.neu.edu/18/ChaoLiu)

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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](http://coe.neu.edu/18/XianchaoLong)

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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](http://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](http://coe.neu.edu/18/MiladMahdian)

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**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](http://coe.neu.edu/18/AmirMomeni)

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**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\textsuperscript{TM} Mini XT system) and were tested using multiple systems on real life scenarios.

See full dissertation at [coe.neu.edu/18/UriPeer](http://coe.neu.edu/18/UriPeer)
**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, $t \approx 80 \mu s$) and high resolution (noise equivalent power, NEP $\approx 656 \text{ pW Hz}^{1/2}$) 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 $\approx 130 \text{ pW Hz}^{1/2}$) narrowband infrared detectors suitable for IR spectroscopy and multispectral imaging system.

See full dissertation at [coe.neu.edu/18/ZhenyunQian](http://coe.neu.edu/18/ZhenyunQian)

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**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](http://coe.neu.edu/18/NasibehTeimouri)

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**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 HiCPS 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](http://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
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.