

Hello everyone,

Enclosed please find Northeastern ECE's Annual Scholarship Report, highlighting the research and accomplishments of our 54 faculty in the past year, including young investigator awards from three agencies to 5 faculty. Last year marked the largest number of PhD graduates in the history of the department, with 44 students receiving doctorates. Our PhD students are also benefitting from our newly launched Professional Development Workshop Series.

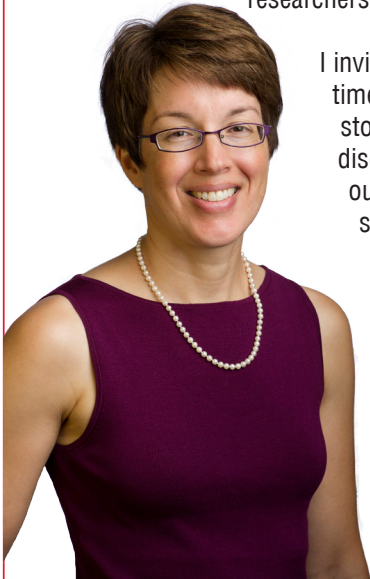
ECE has added 5 new faculty for the 2015/16 academic year, welcoming Mahshid Amirabadi in power electronics, Stratis Ioannidis in big data, Sarah Ostadabbas in cyber-human systems, Taskin Padir in robotics, and Hanu Singh in robotics and sensing. Additionally, Tommaso Melodia joined us in 2014 in the area of wireless networks.

Northeastern's College of Engineering continues its growth in both size and scope, with our newly formed Bioengineering department now offering BS, MS, and PhD degrees. We look forward to an enhanced infrastructure in 2016, adding a 220,000 square foot interdisciplinary science and engineering complex that will provide state-of-the art labs for researchers across the college.

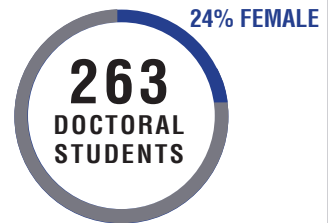
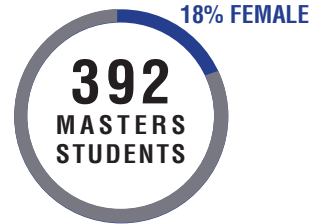
I invite you to visit us the next time you are in Boston - please stop by to share your recent discoveries with us and allow our faculty and students to share theirs with you.

Sincerely,

Sheila S. Hemami  
Chair of Electrical and  
Computer Engineering  
[hemami@ece.neu.edu](mailto:hemami@ece.neu.edu)



## QUICK FACTS



# DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

409 Dana Research Center  
360 Huntington Avenue  
Boston, MA 02115

P 617.373.4159  
F 617.373.8970

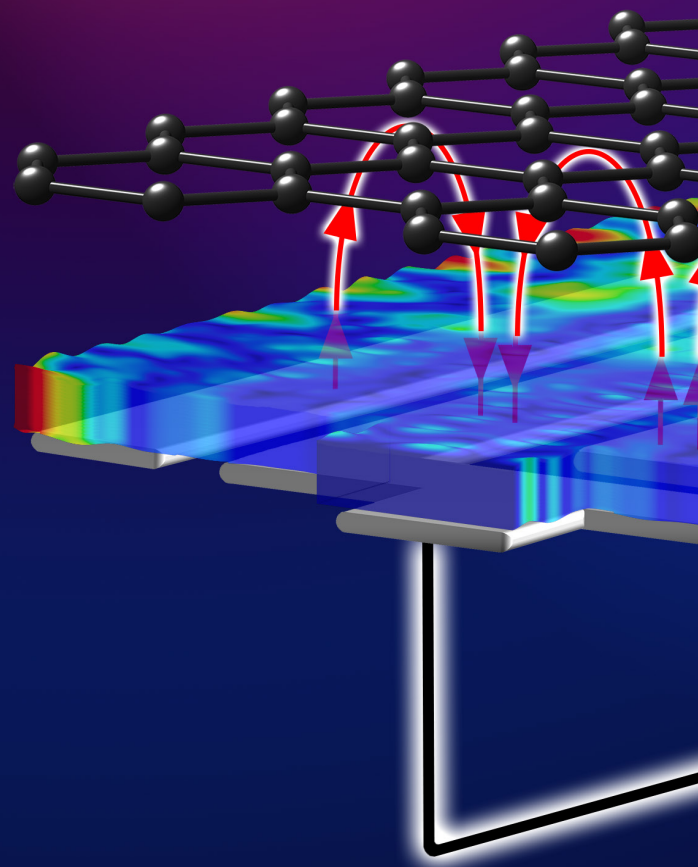
[ece.neu.edu](http://ece.neu.edu)  
[coe.neu.edu](http://coe.neu.edu)

## COVER IMAGE

The illustration depicts a virtually massless single-atom thick sheet of carbon, used as an “ideal electrode” for a laterally vibrating piezoelectric nano electro mechanical resonator. The virtually massless graphene electrode, floating at van der Waals proximity, confines the RF electric field within the active volume of the piezoelectric NEMS resonator. It differs from a conventional metal electrode in that it does not dampen the resonator’s vibration, thereby allowing the device to vibrate at its “unloaded” frequency limit, with significantly reduced energy dissipation compared to a metal electrode.

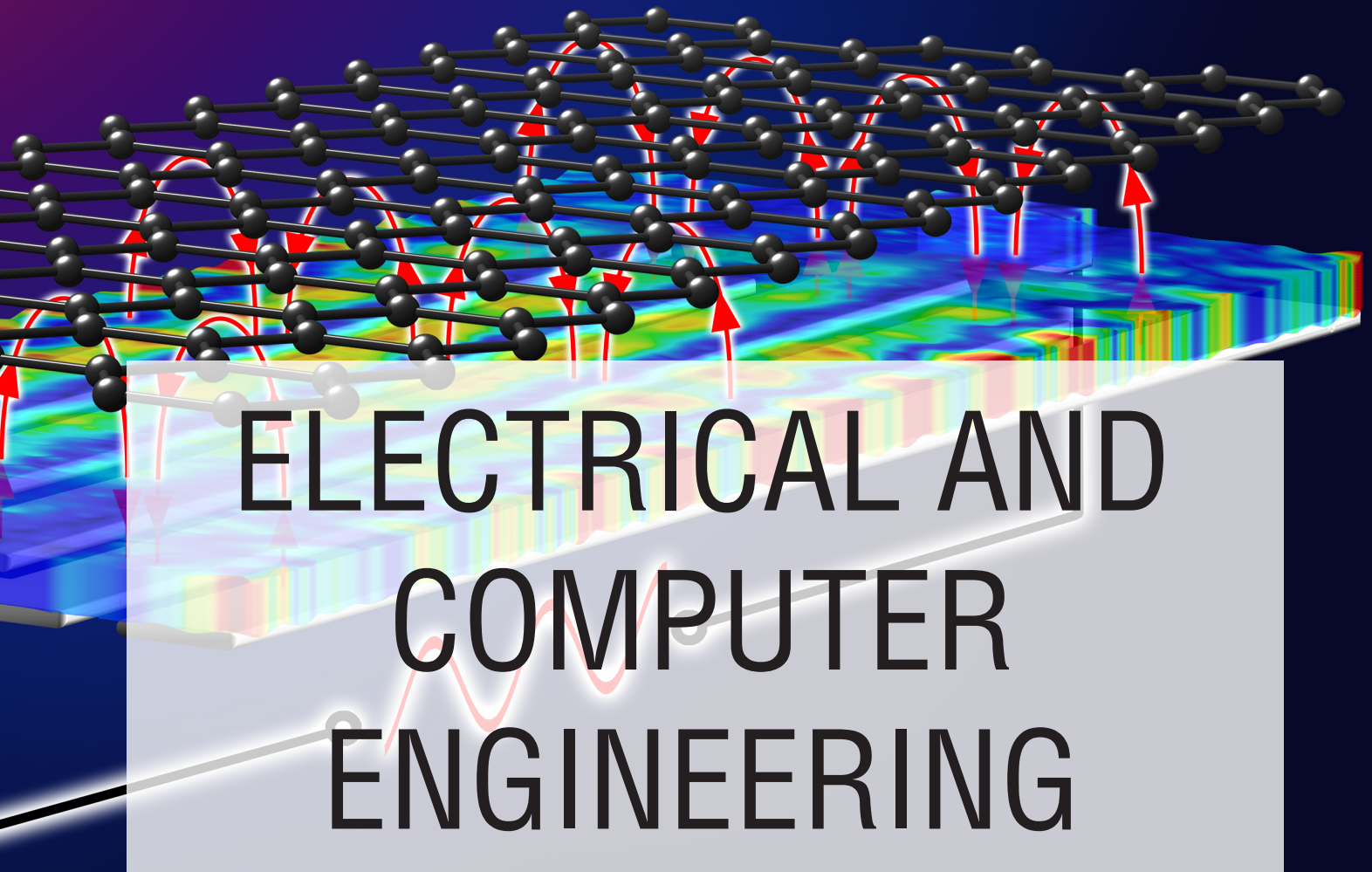
This work recently appeared in Nano Letters, “Graphene as a Massless Electrode for Ultrahigh-frequency Piezoelectric Nanoelectromechanical Systems,” Zhenyun Qian, Fangze Liu, Yu Hui, Swastik Kar, and Matteo Rinaldi.

Learn more at [northeastern.edu/nemslab](http://northeastern.edu/nemslab)





Northeastern University  
College of Engineering



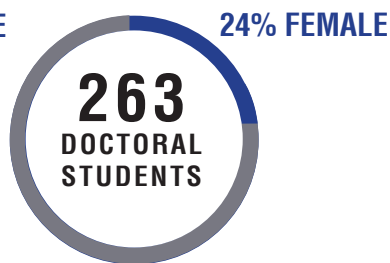
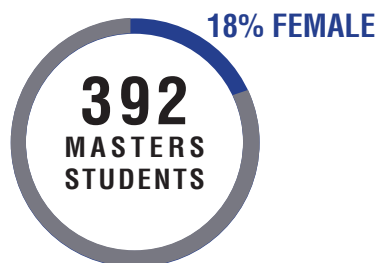
# ELECTRICAL AND COMPUTER ENGINEERING

2014 | 2015

**SCHOLARSHIP REPORT**

# QUICK FACTS

## DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING



### \$15M ANNUAL FACULTY RESEARCH EXPENDITURES

(up 37% from FY14)

NSF 21%

DOD/DARPA 18%

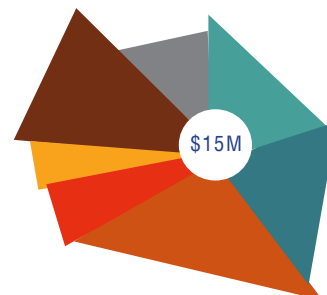
DHS 27%

NIH 7%

DOE 4%

CORPORATE 12%

FEDERAL/OTHER 11%



The department offers 5 research concentrations and is either the lead or partner of seven federally-funded research centers.

# QUICK FACTS

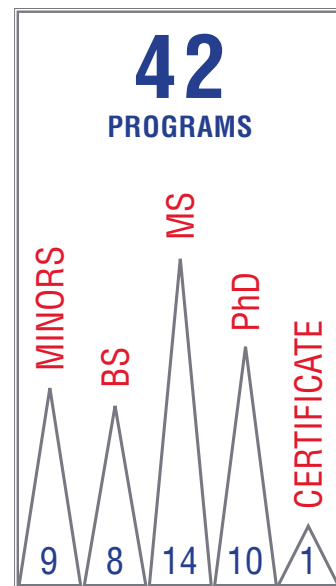
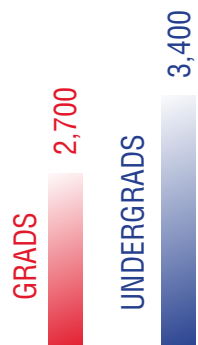
## COLLEGE OF ENGINEERING

**12** Federally Funded Multi-Institutional Research Centers



### 5 DEPARTMENTS

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





# HONORS

## ACHIEVEMENTS

\* PhD student co-author

## PATENTS

**Professor Vincent Harris** was awarded a patent for creating “Cobalt Carbide-Based Nanoparticle Permanent Magnet Materials.”

**Associate Professor Hossein Mosallaei** was awarded a patent for his designs of a “Tunable Negative Permeability Based Devices.”

**Professor Brad Lehman** was awarded a patent for his design of a “Non-Superconducting Fault Current Limiter.”

**Professor Nian Sun** was awarded a patent for his invention of “High Energy Density Vibration Energy Harvesting Device with High-Mu Material.”

**Associate Professor Charles DiMarzio** was awarded a patent for his “Tunable Laser-Based Infrared Imaging System and Method of Use Thereof.”

**Professor David Kaeli** was awarded a patent for “Evaluating and Predicting Computer System Performance Using Kneepoint Analysis.”

## BEST PAPER AWARDS

**Associate Professor Yong-Bin Kim** was selected for Best Paper at the IEEE MWSCAS 2014 conference for his paper named “Full Custom Implementation of a S-Box Circuit Architecture Using Power Gated PLA Structure,” co-authored by Ho Joon Lee\* and Kyung Ki Kim\*

**Professor Dagmar Sternad** received the Best Paper award at the International Conference for Virtual Rehabilitation during RehabWeek held in Valencia, Spain, for the paper entitled “From Theoretical Analysis to Clinical Assessment and Intervention: Three Interactive Motor Skills in a Virtual Environment.”

**Professor Edmund Yeh** was a co-recipient of the Best Paper Award at the 2015 IEEE International Conference on Communications Communication Theory Symposium, London, UK for his paper entitled “*Optimization-Based Linear Network Coding for General Connections of Continuous Flows*,” co-authored by former NEU postdoc Ying Cui, Muriel Medard, Douglas Leith, and Ken Duffy

**COE Distinguished Professor Carey Rappaport** won the best Antenna Design and Application Paper Award at the 9<sup>th</sup> European Conference on Antennas and Propagation in Lisbon, Portugal. His paper was entitled “*Multistatic Nearfield Imaging Radar for Portal Security Systems Using a High Gain Toroidal Reflector Antenna*,” co-authored by former NEU Senior Research Engineer Borja Gonzalez Valdes.

**Professor Mitch Kokar and PhD candidates Yanji Chen and Durga Suresh** won a Top Paper Award at the Wireless Innovation Forum Conference on Communications Technologies and Software Defined Radio on March 26<sup>th</sup>, 2015 in San Diego. Their paper entitled “*Mapping Spectrum Consumption Models to Cognitive Radio Ontology for Automatic Inference*”, was co-authored with Jakub Moskal from VISTology, Inc.

**COE Distinguished Professor Carey Rappaport and MIE Assistant Professor Jose Martinez-Lorenzo** won the Best Propagation Paper Award at the 8<sup>th</sup> European Conference on Antennas and Propagation for “*A compressed sensing-based imaging system*”. This paper was co-authored by Y. Rodriguez\*, Y. Alvarez, B. Gonzalez-Valdes, F. Las-Heras, and CenSSIS Senior Research Engineer B. Ganzalez.

## NATIONAL/INTERNATIONAL SERVICE

**Sheila Hemami**, Professor and Chair of the Electrical and Computer Engineering Department, has been elected Vice President of Publication Services and Products for the IEEE.

**Vincent Harris**, Professor of Electrical and Computer Engineering, has been selected as a Fulbright Fellow at the Nano-Technology Research Lab at the Wayamba University in Sri Lanka.

The student group **Enabling Engineering** delivered two low-cost communication devices to disabled children in Ecuador during their spring break. The interdisciplinary group has combined their knowledge of engineering and physical therapy to design, develop, and then deliver two low-cost communications devices to disabled children living at a pair of orphanages in Ecuador.

## FACULTY HONORS AND AWARDS

**Associate Professor Kaushik Chowdhury** was awarded a \$489K NSF CAREER Award for his project, “IDEA: Integrated Data and Energy Access for Wireless Sensor Networks.”

**Assistant Professor Ningfang Mi** was awarded a \$459K NSF CAREER Award for her project, “Capacity Planning Methodologies for Large Clusters with Heterogeneous Architectures and Diverse Applications.”

**Assistant Professor Matteo Rinaldi** was awarded a \$400K NSF CAREER Award for his project, “Nano Electro Mechanical Resonant Sensing Platform for Chip Scale, High Resolution and Ultra-Fast Terahertz Spectroscopy and Imaging.”

**Assistant Professor Marvin Onabajo** was awarded a \$500K NSF CAREER grant to investigate “Low-Power Transceiver Design Methods for Wireless Medical Monitoring.”

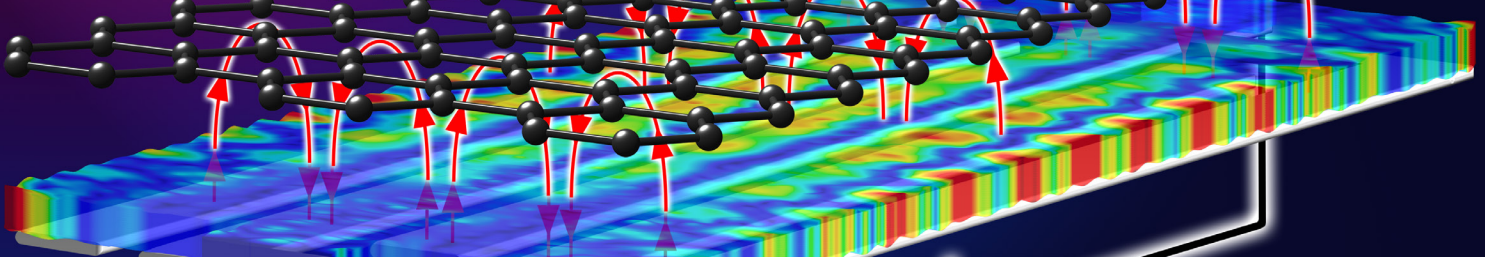
**Associate Professor Raymond Fu** was awarded an Office of Naval Research Young Investigator Award for his proposal entitled, “Deep Structures Boosted Self-Organized Behavior Pattern Learning for Anomaly Detection.”

**Assistant Professor Ningfang Mi** was awarded an Air Force Young Investigator Award for her proposal entitled, “Creating an Integrated Management Layer to Administer Heterogeneous Resources in Dynamic Workflow Clusters.”

**Associate Professor Purnima Ratilal-Makris** was elected a fellow of the Acoustical Society of America.

**Professor Ali Abur** received the 2014 IEEE Power & Energy Society Outstanding Power Engineering Educator Award.

**Professor Dave Kaeli** was elected an ACM Distinguished Scientist.



## FACULTY BY RESEARCH AREAS

# 11

**Faculty**

### COMMUNICATIONS AND SIGNAL PROCESSING

Dana Brooks  
Jennifer Dy  
Deniz Erdogmus  
Sheila S. Hemami  
Vinay Ingle  
Hanoch Lev-Ari  
Sarah Ostadabbas  
Purnima Ratilal-Makris  
Masoud Salehi  
Dagmar Sternad  
Milica Stojanovic

# 5

**Faculty**

### MICROSYSTEMS AND DEVICES

Yong-Bin Kim  
Nicol McGruer  
Marvin Onabajo  
Matteo Rinaldi  
Nian Sun

# 19

**Faculty**

### COMPUTER ENGINEERING, NETWORKS, AND ROBOTICS

Stefano Basagni  
Octavia Camps  
Kaushik Chowdhury  
Yunsi Fei  
Yun Raymond Fu  
Stratis Ioannidis  
David Kaeli  
Engin Kirda  
Mieczyslaw Kokar  
Miriam Leeser  
Fabrizio Lombardi  
Waleed Meleis  
Tommaso Melodia  
Ningfang Mi  
Taskin Padir  
Wil Robertson  
Gunar Schirner  
Hanu Singh  
Edmund Yeh

# 13

**Faculty**

### ELECTROMAGNETICS AND OPTICS

Anthony Devaney  
Charles DiMarzio  
Vincent Harris  
Yongmin Liu  
Edwin Marengo  
Jose Martinez Lorenzo  
Stephen McKnight  
Hossein Mosallaei  
Mark Niedre  
Carey Rappaport  
Philip Serafim  
Michael B. Silevitch  
Carmine Vittoria

# 6

**Faculty**

### POWER ELECTRONICS, SYSTEMS AND CONTROL

Ali Abur  
Mahshid Amirabadi  
Bradley Lehman  
Bahram Shafai  
Mario Sznaiar  
Gilead Tadmor

## 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

M. Göl, A. Abur

A Fast Decoupled State Estimator for Systems Measured by PMUs, IEEE Transactions on Power Systems, 30(5), 2015, 2766-2771

M. Göl, A. Abur

Hybrid State Estimator for Systems with Limited Number of PMUs, IEEE Transactions on Power Systems, 30(3), 2015, 1511-1517

A. Rouhani, A. Abur

Real-time Dynamic Parameter Estimation for an Exponential Dynamic Load Model, IEEE Transactions on Smart Grids, 99, 2015

M. Göl, A. Abur

A Robust PMU Based Three-phase State Estimator Using Modal Decoupling, IEEE Transactions on Power Systems, 29(5), 2014, 2292-2299

M. Göl, A. Abur

LAV Based Robust State Estimation for Systems Measured by PMUs, IEEE Transactions on Smart Grids, 5(4), 2014, 1808-1814

R. Emami, A. Abur

External System Line Outage Identification Using Phasor Measurement Units, IEEE Transactions on Power Systems, 28, 2013, 1035-1040

L. Zhang, A. Abur

Identifying Parameter Errors via Multiple Measurement Scans, IEEE Transactions on Power Systems, 28(4), 2013, 3916-3923

M. Göl, A. Abur

Observability and Criticality Analyses for Power Systems Measured by Phasor Measurements, IEEE Transactions on Power Systems, 28(3), 2013, 3319-3326

M. Korkali, A. Abur

Robust Fault-location Using Least-absolute-value Estimator, IEEE Transactions on Power Systems, 28(4), 2013, 4384-4392

### SELECTED RESEARCH PROJECTS

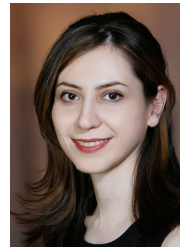
Engineering Research Center for Ultra-wide Area Resilient Electric Energy Transmission Network

Site Principal Investigator, National Science Foundation

Design of Boundary Measurements to Avoid Spreading of Errors in Power Grids

Principal Investigator, PJM Interconnection

## 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

### SELECTED PUBLICATIONS

M. Amirabadi, H. A. Toliyat, J. Baek

Bidirectional Soft-switching Series AC-link Inverter, IEEE Transactions on Industry Applications, 51, 2015, 2312-2320

M. Amirabadi, J. Baek, H.A. Toliyat, W.C. Alexander

Soft-switching AC-link three-phase AC-AC Buck-Boost Converter, IEEE Transactions on Industrial Electronics, 62, 2015, 3-14

M. Amirabadi

Extremely Sparse Parallel AC-link Universal Power Converters, Proceedings of IEEE Energy Conversion Congress and Exposition (ECCE), 2014, 1534-1541

M. Amirabadi, A. Balakrishnan, H. Toliyat, W.C. Alexander

High Frequency AC-link PV Inverter, IEEE Transactions on Industrial Electronics, 61, 2014, 281-291

M. Amirabadi, J. Baek, H.A. Toliyat

Sparse AC-link Buck-boost Inverter, IEEE Transactions on Power Electronics, 29, 2014, 3942-3953

M. Amirabadi, H. A. Toliyat, W.C. Alexander

A Multi-port AC Link PV Inverter with Reduced Size and Weight for Stand-alone Application, IEEE Transactions on Industry Applications, 49, 2013, 2217-2228

## 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](http://ece.neu.edu/people/basagni-stefano)

Wireless networks; ad hoc networks; underwater and terrestrial sensor networking; protocol design and testing

### SELECTED PUBLICATIONS

- D. Spenza, M. Magno, S. Basagni, L. Benini, M. Paoli, et al.  
Beyond Duty Cycling: Wake-up Radio with Selective Awakenings for Long-lived Wireless Sensing Systems, Proceedings of IEEE Infocom 2015, Hong Kong, China, April 26-30, 2015
- D. Mishra, S. De, S. Jana, S. Basagni, K.R. Chowdhury, et al.  
Smart RF Energy Harvesting Communications: Challenges and Opportunities, Communications Magazine, IEEE, 53(4), 2015, 70-78
- M.Y. Naderi, K.R. Chowdhury, S. Basagni  
Wireless Sensor Networks with RF Energy Harvesting: Energy Models and Analysis, Proceedings of IEEE WCNC 2015, New Orleans, LA, March 9-12, 2015, 1494-1499
- C. Petrioli, M. Nati, P. Casari, M. Zorzi, S. Basagni  
ALBA-R: Load-balancing Geographic Routing Around Connectivity Holes in Wireless Sensor Networks, IEEE Transactions on Parallel and Distributed Systems, 24(3), 2014, 529-539
- S. Basagni, C. Petrioli, R. Petroccia, D. Spaccini  
CARP: A Channel-aware Routing Protocol for Underwater Acoustic Wireless Networks, Ad Hoc Networks, Available online, August 2014
- M.Y. Naderi, K.R. Chowdhury, S. Basagni, W. Heinzelman, et al.  
Experimental Study of Concurrent Data and Wireless Energy Transfer for Sensor Networks, Proceedings of IEEE Globecom 2014, Austin, TX, December 8-12, 2014, 2543-2549
- S. Basagni, L. Boloni, C. Petrioli, C.A. Phillips, D. Turgut  
Maximizing the Value of Sensed Information in Underwater Wireless Sensor Networks via an Autonomous Underwater Vehicle, in Proceedings of IEEE Infocom 2014, Toronto, Canada, April 27- May 2, 2014, 988-996
- L. Chen, S. Cool, H. Ba, W. Heinzelman, S. Basagni, et al.  
Range Extension of Passive Wake-up Radio Systems through Energy Harvesting, Proceedings of IEEE ICC 2013, Ad Hoc and Sensor Networking Symposium, Budapest, Hungary, June 9-13, 2013, 1549-1554, Best Paper Award

### SELECTED RESEARCH PROJECTS

Development of the Northeastern University Marine Observatory Network  
Principal Investigator, National Science Foundation

## DANA BROOKS



Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Northeastern University, 1991  
[ece.neu.edu/people/brooks-dana](http://ece.neu.edu/people/brooks-dana)

Biomedical signal and image processing; medical imaging; statistical signal processing; inverse problems; electrocardiography; bio-optical imaging; magnetic resonance imaging; transcranial neuromodulation; estimation of protein conformations from X-ray scattering; regularization; optimization

Søren Buus Outstanding Research Award, College of Engineering

### SELECTED PUBLICATIONS

- A.E. Onut, M. Akcakaya, J.P. Bardhan, D. Erdogmus, D.H. Brooks, L. Makowski  
Constrained Maximum Likelihood Estimation of Relative Abundances of Protein Conformation in a Heterogeneous Mixture from Small Angle X-Ray Scattering Intensity Measurements, IEEE Transactions on Signal Processing, 63(20), 2015, 5383-5394
- J. Sourati, D. Erdogmus, J.G. Dy, D.H. Brooks  
Accelerated Learning-based Interactive Image Segmentation using Pairwise Constraints, IEEE Transactions on Image Processing, 23(7), 2014, 3057-3070
- S. Kurugol, K. Kose, B. Park, J.G. Dy, D.H. Brooks, M. Rajadhyaksha  
Automated Delineation of Dermal-epidermal Junction in Reflectance Confocal Microscopy Image Stacks of Human Skin, Journal of Investigative Dermatology, 135(3), 2014
- B. Erem, J. Coll-Font, R. Martinez-Orellana, P. Stovicek, D. Brooks  
Using Transmural Regularization and Dynamic Modeling for non-Invasive Cardiac Potential Imaging of Endocardial Pacing with Imprecise Thoracic Geometry, IEEE Transactions on Medical Imaging, 3(3), 2014, 726-738
- S. Eichelbaum, M. Dannhauer, M. Hlawitschkae, D. Brooks, T.R. Knosche, G. Scheuermann  
Visualizing Simulated Electrical Fields from Electroencephalography and Transcranial Electric Brain Stimulation: A Comparative Evaluation, NeuroImage, 2014, 513-530

### SELECTED RESEARCH PROJECTS

Center for Integrative Biomedical Computing  
Co-Investigator, National Institutes of Health

Precise Characterization of Conformational Ensembles  
Co-Investigator, National Science Foundation

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



## OCTAVIA CAMPS



Professor, Electrical and Computer Engineering;  
affiliated faculty, Bioengineering

PhD, University of Washington, 1992  
[ece.neu.edu/people/camps-octavia](http://ece.neu.edu/people/camps-octavia)

Robust computer vision; image processing;  
and machine learning

### SELECTED PUBLICATIONS

- Y. Cheng, J.A. Lopez, O. Camps, M. Sznaier  
A Convex Optimization Approach to Robust Fundamental Matrix  
Estimation, Proceedings of the IEEE Conference on Computer  
Vision and Pattern Recognition, 2015, 2170-2178
- S. Markovic, L. Siyuan, M. Sznaier, O. Camps, M. Niedre  
Computer Vision in Vivo Flow Cytometry of Low-abundance  
Circulating Cells, Bio-Optics: Design and Application  
Conference, 2015
- C. Dicle, O. Camps, M. Sznaier  
The Way They Move: Tracking Multiple Targets with Similar  
Appearance, IEEE International Conference on Computer Vision  
(ICCV), Sydney, Australia, 2013
- M. Ayazoglu, B. Yilmaz, M. Sznaier, O. Camps  
Finding Causal Interactions in Video Sequences, IEEE  
International Conference on Computer Vision (ICCV), Sydney,  
Australia, 2013
- F. Xiong, Y. Cheng, O. Camps, M. Sznaier, C. Lagoa  
Hankel Based Maximum Margin Classifiers: A Connection  
Between Machine Learning and Wiener Systems Identification,  
Proceedings 52 IEEE Conference Dec. Control, 2013, 6005-  
6010

### SELECTED RESEARCH PROJECTS

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

## KAUSHIK CHOWDHURY



Associate Professor, Electrical and Computer  
Engineering

PhD, Georgia Institute of Technology, 2009  
[ece.neu.edu/people/chowdhury-kaushik](http://ece.neu.edu/people/chowdhury-kaushik)

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

Chair of the IEEE Technical Committee on Simulation; National  
Science Foundation CAREER Award

### SELECTED PUBLICATIONS

- A. Al-Ali, Y. Sun, M. DiFelice, J. Paavola, K.R. Chowdhury  
Accessing Spectrum Databases using Interference Alignment  
in Vehicular Cognitive Radio Networks, IEEE Transactions on  
Vehicular Technology, 64(1), 2015, 263-272
- S. De, D. Mishra, K.R. Chowdhury  
Charging Time Characterization for Wireless RF Energy Transfer,  
IEEE Transactions on Circuits and Systems II, 64(4), 2015,  
362-366
- D. Mishra, S. De, S. Jana, S. Basagni, K.R. Chowdhury, et al.  
Smart RF Energy Harvesting Communications: Challenges and  
Opportunities, IEEE Communications Magazine, 33(4), 2015, 1-14
- Y. Sun, K.R. Chowdhury  
Enabling Emergency Communication through Cognitive Radio  
Vehicular Network, IEEE Communications Magazine, 52(10),  
2014, 68-75
- M.Y. Naderi, P. Nintanavongsa, K.R. Chowdhury  
RF-MAC: A Medium Access Control Protocol for Re-chargeable  
Sensor Networks Powered by Wireless Energy Harvesting,  
IEEE Transactions on Wireless Communication, 13(7), 2014,  
3926-3937
- R. Doost-Mohammady, M.Y. Naderi, K.R. Chowdhury  
Spectrum Allocation and QoS Provisioning Framework for  
Cognitive Radio with Heterogeneous Service Classes, IEEE  
Transactions on Wireless Communication, 13(7), 2014, 3938-3950

### SELECTED RESEARCH PROJECTS

- A Flexible and Extensible Solution to Incorporating new RF  
Devices and Capabilities into EWI ISR Networks  
Principal Investigator, Defense Advanced Research Projects  
Agency
- CAREER: IDEA: Integrated Data and Energy Access for Wireless  
Sensor Networks  
Principal Investigator, National Science Foundation
- EAGER: Network Protocol Stack for Galvanic Coupled Intra-body  
Sensor  
Principal Investigator, National Science Foundation
- Transport Layer Design and Analysis for Cognitive Radio Ad Hoc  
Networks  
Principal Investigator, Office of Naval Research

## ANTHONY DEVANEY



COE Distinguished Professor, Electrical and Computer Engineering

PhD, University of Rochester, 1971  
ece.neu.edu/people/devaney-anthony

Electromagnetic wave propagation, inverse scattering tomography

### SELECTED PUBLICATIONS

A.J. Devaney, E.A. Marengo, F.K. Gruber  
Time-reversal-based Imaging and Inverse Scattering of Multiply Scattering Point Targets, The Journal of the Acoustical Society of America, 118, 2005, 3129-3138

F.K. Gruber, E.A. Marengo, A.J. Devaney  
Time-reversal Imaging with Multiple Signal Classification Considering Multiple Scattering Between the Targets, The Journal of the Acoustical Society of America, 115, 2004, 3042-3047

S.K. Lehman, A.J. Devaney  
Transmission Mode Time-reversal Super-resolution Imaging, The Journal of the Acoustical Society of America, 113, 2003, 2742-2753

## 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, landmine detection, magneto-optic sensors, and multi-model imaging. Activities include computer modeling, designing, building, and testing of hardware, and processing the resulting data

### SELECTED PUBLICATIONS

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

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

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

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

### SELECTED RESEARCH PROJECTS

Coded-illumination Fourier Ptychography for High-content Multimodal Imaging  
Principal Investigator, National Science Foundation

## JENNIFER DY



Professor, Electrical and Computer Engineering;  
affiliated faculty, Bioengineering

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

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

National Science Foundation CAREER Award

### SELECTED PUBLICATIONS

- S.M. Brown, A. Webb, R.S. Mangoubi, J.G. Dy  
A Sparse Combined Regression-classification Formulation for  
Learning a Physiological Alternative to Clinical Post-Traumatic  
Stress Disorder Scores, Twenty-ninth AAAI Conference on  
Artificial Intelligence, 2015
- J. Ross, P. Castaldi, M. Cho, J.G. Dy  
Dual Beta Process Priors for Latent Cluster Discovery in Chronic  
Obstructive Pulmonary Disease, ACM SIGKDD Knowledge  
Discovery and Data Mining, 2014
- D. Niu, J.G. Dy, M.I. Jordan  
Iterative Discovery of Multiple Alternative Clustering Views,  
IEEE Transactions on Pattern Analysis and Machine Intelligence,  
36(7), 2014, 1340-1353
- Y. Yan, R. Rosales, G. Fung, J.G. Dy  
Active Learning from Crowds, Proceedings of the 28<sup>th</sup>  
International Conference on Machine Learning (ICML), 2011,  
1161-1168
- Y. Guan, J.G. Dy, M.I. Jordan  
A Unified Probabilistic Model for Global and Local Unsupervised  
Feature Selection, Proceedings of the 28<sup>th</sup> International  
Conference on Machine Learning (ICML), 2011, 1073-1080
- M. Masaeli, G. Fung, J.G. Dy  
From Transformation-Based Dimensionality Reduction to  
Feature Selection, Proceedings of the 27<sup>th</sup> International  
Conference on Machine Learning (ICML), 2010, 751-758
- Y. Yan, R. Rosales, G. Fung, M. Schmidt, J.G. Dy, et al.  
Modeling Annotator Expertise: Learning when Everybody Knows  
a Bit of Something, Proceedings of the Thirteenth International  
Conference on Artificial Intelligence and Statistics (AISTATS), 9,  
2010, 932-939

### SELECTED RESEARCH PROJECTS

- Automated Image Guidance for Diagnosing Skin Cancer With  
Confocal Microscopy  
Principal Investigator, National Institutes of Health
- Genetic Epidemiology of COPD  
Co-Principal Investigator, National Institutes of Health
- Spatio-temporal Extremes and Associations Marine Adaptation  
and Survivorship under Climate Change and Rising Ocean  
Temperatures  
Principal Investigator, National Science Foundation

## DENIZ ERDOGMUS



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

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

Brain computer interfaces, cognitive and  
interactive systems, nonlinear and statistical  
signal processing, information theory,  
machine learning

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

### SELECTED PUBLICATIONS

- B.S. Oken, U. Orhan, B. Roark, D. Erdogmus, A. Fowler,  
A. Mooney, B. Peters, M. Miller, M. Fried Oken  
BrainComputer Interface with Language Model EEG Fusion for  
Lockedin Syndrome, Neurorehabilitation and Neural Repair,  
28(4), 2014, 387-394
- A. Fowler, B. Roark, U. Orhan, D. Erdogmus, M. Fried-Oken  
Improved Inference and Autotyping in EEGbased BCI Typing  
Systems, ASSETS 2013, Bellevue, WA, Oct 2013
- H. Nezamfar, U. Orhan, S. Purwar, K. Hild, B. Oken, D. Erdogmus  
Decoding of Multichannel EEG Activity from the Visual  
Cortex in Response to Pseudorandom Binary Sequences of  
Visual Stimuli, International Journal of Imaging Systems and  
Technology, 21(2), 2011, 139-147
- Y. Huang, D. Erdogmus, M. Pavel, S. Mathan, K.E. Hild II  
A Framework for Rapid Visual Image Search using Single-trial  
Brain Evoked Responses, Neurocomputing, 74, 2011, 2041-  
2051
- D. Erdogmus  
BCI: A Timely Opportunity for Projectbased Learning, National  
Academy of Engineering Frontiers in Engineering Education  
Workshop, Irvine, California, Dec 2010

### 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
- Strengthening Human Adaptive Reasoning and Problem Solving  
(SHARP)  
Principal Investigator, Intelligence Advanced Research Projects  
Activity
- The Rehabilitation Engineering Center Research Center on  
Augmentative and Alternative Communication  
Principal Investigator, U.S. Department of Education

## YUNSI FEI



Associate 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, underwater

sensor networks

National Science Foundation CAREER Award; College of Engineering Faculty Fellow

### SELECTED PUBLICATIONS

B. Jiang, Y. Fei

Smart Home in Smart Microgrid: A Cost-effective Energy Ecosystem with Intelligent Hierarchical Agents, *IEEE Transactions on Smart Grid*, 6(1), 2015, 3-13

Y. Han, Y. Fei

TARS: A Traffic-adaptive Receiver-Synchronized MAC Protocol for Underwater Sensor Networks, *International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS)*, 2015

P. Luo, L. Zhang, Y. Fei, A.A. Ding

Towards Secure Cryptographic Software Implementation Against Side-channel Power Analysis Attacks, *International Conference on Application-specific Systems, Architectures, and Processors (ASAP)*, 2015

A.A. Ding, L. Zhang, Y. Fei, P. Luo

A Statistical Model for Multivariate DPA on Masked Devices, *International Workshop on Cryptographic Hardware and Embedded Systems*, 2014, 147-169

J.C. Martinez-Santos, Y. Fei

Leveraging Speculative Architectures for Run-time Program Validation, *ACM Transactions on Embedded Computing Systems*, 13(1), 2013, 498-505

### SELECTED RESEARCH PROJECTS

MRI: Development of a Testbed for Side-Channel Analysis and Security Evaluation-TeSCASE

Principal Investigator, National Science Foundation

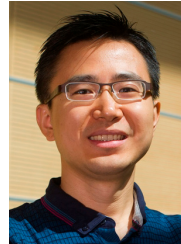
Security Vulnerability Evaluation of Blackfin BF70x Processor Family Using Side Channel Attack

Principal Investigator, Analog Devices, Incorporated

TWC: Medium: Collaborative: A Unified Statistics-based Framework for Side-channel Attack Analysis and Security Evaluation of Cryptosystems

Principal Investigator, National Science Foundation

## 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

Office of Naval Research Young Investigator Award; Army Research Office Young Investigator Award; International Neural Network Society's Young Investigator Award

### SELECTED PUBLICATIONS

S. Li, Y. Fu

Learning Balanced and Unbalanced Graphs via Low-rank Coding, *IEEE Transactions on Knowledge and Data Engineering (T-KDE)*, 27(5), 2015, 1274-1287

Y. Fu

Human-centered Social Media Analytics, Springer, 2014

Y. Kong, Y. Jia, Y. Fu

Interactive Phrases: Semantic Descriptions for Human Interaction Recognition, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 36(9), 2014, 1775-1788

Y. Fu

Low-rank and Sparse Modeling for Visual Analysis, Springer, 2014

K. Li, Y. Fu

Prediction of Human Activity by Discovering Temporal Sequence Patterns, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 36(8), 2014, 1644-1657

### SELECTED RESEARCH PROJECTS

Pinpoint Geolocation using Multi-source Multi-dimensional Big Data from Social Media

Principal Investigator, Naval Postgraduate School

Deep Structures Boosted Self-organized Behavior Pattern Learning for Anomaly Detection

Principal Investigator, Office of Naval Research

Wireless Sensing of Speech Kinematics & Acoustics for Remediation

Co-Principal Investigator, National Science Foundation

Intention Sensing Through Video-based Imminent Activity Prediction

Principal Investigator, Army Research Office

Methods for Multimedia Search and Retrieval by Fusing Data across Various Sources or Domains

Principal Investigator, MIT Lincoln Laboratory

Multimodal Speech Translation for Assistive Communication

Co-Principal Investigator, National Institutes of Health

Sensing and Modeling Behavior in Response to Environmental Changes

Principal Investigator, Air Force Office of Scientific Research



## VINCENT G. HARRIS



University Distinguished Professor, William Lincoln Smith Professor, Electrical and Computer Engineering; jointly appointed, 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, 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

- Y. Peng, X. Wu, Z. Chen, F. Wang, X. Wang, V.G. Harris, et al.  
BiFeO<sub>3</sub> Tailored Low Loss M-type Hexaferrite Composites Having Equivalent Permeability and Permittivity for Very High Frequency Applications, *Journal of Alloys and Compounds*, 630, 2015, 48-53
- T. Zhou, D. Zhang, L. Jia, F. Bai, L. Jin, V.G. Harris, et al.  
Effect of NiZn Ferrite Nanoparticles Upon the Structure, Magnetic, and Gyromagnetic Properties of Low-Temperature Processed LiZnTi Ferrites, *Journal of Physical Chemistry C*, 119(23), 2015, 13207-13214
- X. Wang, Q. Li, Z. Su, W. Gong, R. Gong, Y. Chen, V.G. Harris  
Enhanced Microwave Absorption of Multiferroic Co<sub>2</sub>Z Hexaferrite–BaTiO<sub>3</sub> Composites with Tunable Impedance Matching, *Journal of Alloys and Compounds*, 643, 2015, 111-115
- M. Zamanpour, S.P. Bennett, L. Majidi, Y. Chen, V.G. Harris  
Process Optimization and Properties of Magnetically Hard Cobalt Carbide Nanoparticles via Modified Polyol Method, *Journal of Alloys and Compounds*, 625, 2015, 138-143
- Z. Su, Q. Li, X. Wang, B. Hu, Z. Feng, Y. Chen, V.G. Harris  
Tunable Permittivity and Permeability of Low Loss Z+ Y-type Ferrite Composites for Ultra-high Frequency Applications, *Journal of Applied Physics*, 117(17), 2015, 17E506

### SELECTED RESEARCH PROJECTS

- Accelerated Development of Magnetodielectrics Having Equivalent Permeability and Permittivity for RF Applications  
Principal Investigator, Rogers Corp
- Design and Development of Multifunctional Electromechanical Ceramics  
Principal Investigator, Army Research Office
- Magnetodielectric Heterostructures and Composites  
Principal Investigator, Rogers Corp
- Nonlinear Properties of Ferrite Materials  
Principal Investigator, Raytheon
- The Northeastern University Program in Strategic Materials  
Co-Principal Investigator, Army Research Office

## SHEILA S. HEMAMI



Professor and Chair, Electrical and Computer Engineering

PhD, Stanford University, 1994  
ece.neu.edu/people/hemami-sheila

Multimedia signal processing; image and video compression and transmission; visual psychophysics

Fellow, Institute of Electrical and Electronics Engineers

### SELECTED PUBLICATIONS

- R. Vanam, E.A. Riskin, R.E. Ladner, S.S. Hemami  
Fast Algorithms for Designing Nearly Optimal Lookup Tables for Complexity Control of the H. 264 Encoder, *Signal, Image and Video Processing*, 7(5), 2013, 991-1003
- H.R. Wu, A.R. Reibman, W. Lin, F. Pereira, S.S. Hemami  
Perceptual Visual Signal Compression and Transmission, *Proceedings of the IEEE*, 101(9), 2013, 2025-2043
- L. McLaughlin, S.S. Hemami  
Reduced-reference Video Quality Assessment with Scalable Overhead, *IEEE International Conference on Image Processing*, 2013, 1622-1626
- A. Wang, S.S. Hemami, A. Molnar  
Angle-sensitive Pixels: A New Paradigm for Low-power, Low-cost 2D and 3D Sensing, *IS&T/SPIE Electronic Imaging*, 2012, 1-13
- S.S. Hemami, F.M. Ciaramello, S.S. Chen, N.G. Drenkow, et al.  
Comparing User Experiences in 2D and 3D Videoconferencing, *IEEE International Conference on Image Processing*, Orlando, Florida, 2012
- F.M. Ciaramello, S.S. Hemami  
A Computational Intelligibility Model for Assessment and Compression of American Sign Language Video, *IEEE Transactions on Image Processing*, 2011, 3014-3027
- D.M. Rouse, S.S. Hemami, R. Pepion, P. Le Callet  
Estimating the Usefulness of Distorted Natural Images Using an Image Contour Degradation Measure, *Journal of the Optical Society of America: A*, 28(2), 2011, 157-188
- D.S. Swamy, K.J. Butler, D.M. Chandler, S.S. Hemami  
Parametric Quality Assessment of Synthesized Textures, *IS&T/SPIE Electronic Imaging*, 7865, 2011, 1-9

## 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

- S. Niu, S.E. Golowich, V. Ingle, D.G. Manolakis  
Hyperspectral Chemical Plume Quantification and Temperature Estimation, Proceedings of SPIE conference on Defense and Security (9088); Sensor Technologies; 2014, 90880V
- S. Niu, S.E. Golowich, V. Ingle, D.G. Manolakis  
New Approach to Remote Gas-phase Chemical Quantification: Selected-band Algorithm, Optical Engineering, 53(2), 2014, 021111
- R. Herrero, V. Ingle  
Ultraspectral Image Preprocessing with Tridimensional Space Filling Curves, Open Transactions on Information Processing; 1(1), 2014, 27-42
- R. Herrero, V. Ingle  
Analytical and Comparative Analysis of Lossy Ultraspectral Image Compression, SPIE DSS Conference, 2013
- C. Brett, R. DiPietro, D. Manolakis, V. Ingle  
Efficient Implementation of Hyperspectral Chemical Detection, SPIE Security and Defense Conference, Dresden Germany, 2013
- R. Herrero, V. Ingle  
Space-Filling Curves Applied To Compression Of Ultra-Spectral Images, Journal of Signal, Image and Video Processing, Springer, 9(6), 2013, 1249-1257
- S. Niu, S. Golowich, V. Ingle, D. Manolakis  
Implications and Mitigation of Model Mismatch and Covariance Contamination for Hyperspectral Chemical Agent Detection, Journal of Optical Engineering–SPIE, 52(2), 2013, 026202
- S. Niu, S. Golowich, V. Ingle, D. Manolakis  
New Approach to Remote Gasphase Chemical Quantification: Selected-Band Algorithm, Journal of Optical Engineering–SPIE, 53(2), 2013, 021111

### SELECTED RESEARCH PROJECTS

- Algorithms for Vector Time Series Data Analysis  
Principal Investigator, Massachusetts Institute of Technology  
Lincoln Lab
- Hyperspectral Detection Algorithms with False Alarm Mitigation  
Principal Investigator, Massachusetts Institute of Technology
- Signal Processing of Long Wave Hyperspectral Imagery  
Principal Investigator, Massachusetts Institute of Technology  
Lincoln Lab

## STRATIS IOANNIDIS



Assistant Professor, Electrical and Computer Engineering

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

Big data and privacy in distributed systems, particularly the recommender systems that are prevalent in e-commerce companies and online services such as Yahoo, Facebook, Amazon, and Netflix

### SELECTED PUBLICATIONS

- K. Nayak, X.S. Wang, S. Ioannidis, U. Weinsberg, N. Taft, E. Shi  
GraphSC: Parallel Secure Computation Made Easy, Symposium on Security and Privacy (S&P), San Jose, CA, 2015, 1-42
- A. Karbasi, S. Ioannidis, L. Massoulié  
From Small-world Networks to Comparison-based Search, IEEE Transactions on Information Theory (IT), 2015
- Y. Sun, S. Ioannidis, A. Montanari  
Learning Mixtures of Linear Classifiers, International Conference on Machine Learning (ICML), Beijing, China, 2014
- S. Ioannidis, A. Montanari, U. Weinsberg, S. Bhagat, N. Fawaz, N. Taft  
Privacy Tradeoffs in Predictive Analytics, International Conference on Measurements and Modeling of Computer Systems (SIGMETRICS), Austin, TX, 2014

## 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; heterogeneous computing; performance analysis; embedded systems; security and information assurance;

back-end compilers; profile-guided optimization; hardware reliability and recovery; image databases; software engineering; workload characterization; GPGPU

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

### SELECTED PUBLICATIONS

A.K. Ziabari, J.L. Abellan, R. Ubal, C. Chen, A. Joshi, D. Kaeli  
Leveraging Silicon-photonic NOC for Designing Scalable GPUs, Proceedings of the 29<sup>th</sup> ACM International Conference on Supercomputing, 2015, 273-282

D. Kaeli, P. Mistry, D. Schaa, D. Zhang  
Heterogeneous Computing with OpenCL 2.0, Morgan Kaufmann Publishing, 2015

Y. Ukidave, F.N. Paravecino, L. Yu, C. Kalra, D. Kaeli, et al.  
NUPAR: Benchmark Suite for Modern GPU Architectures, Proceedings of the 6<sup>th</sup> ACM/SPEC International Conference on Performance Engineering, 2015, 253-264

M. Wilkening, V. Sridharan, S. Li, F. Previlon, D. Kaeli, et al.  
Calculating Architectural Vulnerability Factors for Spatial Multi-bit Transient Faults, Proceedings of the 47<sup>th</sup> Annual IEEE/ACM International Symposium on Microarchitecture, 2014, 293-305

B. Jang, D. Schaa, P. Mistry, D. Kaeli  
Exploiting Memory Access Patterns to Improve Memory Performance in Data Parallel Architectures, IEEE Transactions on Parallel and Distributed Computing, 22(1), 2011, 105-118

### SELECTED RESEARCH PROJECTS

Collaborative Research: Leveraging Intra-chip/Inter-chip Silicon Photonic Networks for Designing Next-generation Accelerators  
Principal Investigator, National Science Foundation

BIGDATA: IA: Exploring Analysis of Environment and Health Through Multiple Alternative Clustering

Co-Principal Investigator, National Science Foundation  
Engineering Strong, Highly Conductive Nanotube Fibers Via Fusion  
Co-Principal Investigator, National Science Foundation

MRI: Development of a Testbed for Side-channel Analysis and Security Evaluation (TeSCASE)

Co-Principal Investigator, National Science Foundation

Multi-disciplinary Preparation of Next Generation Information Assurance Practitioners

Co-Principal Investigator, National Science Foundation

Puerto Rico Testsite for Exploring Environmental Contamination Threats (PROTECT)

Co-Principal Investigator, National Institutes of Health

## YONG-BIN KIM



Associate 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

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

Noise Reduction Technique Through Bandwidth Switching for Switched-capacitor Amplifier, IEEE Transactions on Circuits and Systems 1(TCAS1), 62(7), 2015, 1707-1715

I. Jung, Y.-B. Kim

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

Y. Choi, Y.-B. Kim

A Mixed-signal Self-calibration Technique for Baseband Filters in System-on-chip Mobile Transceivers, 2014 ACM GLSVLSI Conference(GLSVLSI 2014), Houston, 2014, 312-316

H. Chauhan, Y. Choi, M. Onabajo, I. Jung, Y.-B. Kim

Accurate and Efficient On-chip Spectral Analysis for Built-in Testing and Calibration Approaches, IEEE Transactions on VLSI Systems, 22(3), 2014, 497-506

T.M. Rookmmaker, M.S. Kim, Y.-B. Kim

Design and Analysis of the Quadfferential Amplifier, Elsevier Microelectronics, 43(10), 2012, 697-707

S. Lin, Y.-B. Kim, F. Lombardi

Design of Ternary Memory Cell Using CNTFETs, IEEE Transactions on Nanotechnology, 11(5), 2012, 1019-1025

### 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](http://ece.neu.edu/people/kirda-engin)

Malware analysis and detection; web security;  
social network security; reverse engineering;

intrusion detection

### SELECTED PUBLICATIONS

- M. Weissbacher, W. Robertson, E. Kirda, C. Kruegel, G. Vigna  
ZigZag: Automatically Hardening Web Applications Against  
Client-side Validation Vulnerabilities, In USENIX Security  
Symposium, Washington DC, 2015
- C. Mulliner, W. Robertson, E. Kirda  
Hidden GEMs: Automated Discovery of Access Control  
Vulnerabilities in Graphical User Interfaces, In IEEE Symposium  
on Security and Privacy (S&P), San Jose, CA, 2014
- S. Le Blonde, A. Urites, C. Gilbert, Z. Leong Chua, P. Saxena, E. Kirda  
Look at Targeted Attacks through the Lense of an NGO, In  
USENIX Security Symposium, San Diego, CA, 2014
- K. Onarlioglu, C. Mulliner, W. Robertson, E. Kirda  
PrivExec: Private Execution as an Operating System Service, In  
IEEE Symposium on Security and Privacy (S&P), San Francisco,  
CA, 2013
- L. Bilge, E. Kirda, C. Kruegel, M. Balduzzi  
EXPOSURE: Finding Malicious Domains Using Passive DNS  
Analysis, In Network and Distributed Systems Security  
Symposium (NDSS) San Diego, CA, 2011

### SELECTED RESEARCH PROJECTS

- Continuum: Finding Space and Time Vulnerabilities in Java  
Programs  
Co-Principal Investigator, Defense Advanced Research Projects  
Agency
- DarkDroid: Exposing the Dark Side of Android Marketplaces  
Principal Investigator, Defense Advanced Research Projects  
Agency
- Firmalice: Modeling and Identifying Malice in Firmware  
Principal Investigator, Defense Advanced Research Projects  
Agency
- TWC: Medium: Collaborative: Automated Reverse Engineering of  
Commodity Software  
Co-Principal Investigator, National Science Foundation
- ZIGZAG: Secure Execution of Client-Side Web Application  
Components  
Principal Investigator, Office of Naval Research

## MIECZYSŁAW KOKAR



Professor, Electrical and Computer Engineering

PhD, Wrocław University of  
Technology, 1973  
[ece.neu.edu/people/kokar-mieczyslaw](http://ece.neu.edu/people/kokar-mieczyslaw)

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

### SELECTED PUBLICATIONS

- Y. Chen, M.M. Kokar, J. Moskal, D. Suresh  
Mapping Spectrum Consumption Models to Cognitive Radio  
Ontology for Automatic Inference, Wireless Innovation Forum  
Conference on Wireless Communications Technologies and  
Software Defined Radio, Wireless Innovation Forum, 2015,  
\*Best paper award
- D. Suresh, M.M. Kokar, J. Moskal, Y. Chen  
Updating CRO to CRO2, In Wireless Innovation Forum  
Conference on Wireless Communications Technologies and  
Software Defined Radio, Wireless Innovation Forum, 2015
- B.E. Ulicny, J.J. Moskal, M.M. Kokar, K. Abe, J. Smith  
Inference and Ontologies, In A. Kott, C. Wang, and R. F.  
Erbacher, editors, Cyber Defense and Situational Awareness,  
Springer, 2014, 167-199
- L. Grande, M. Sherman, H. Zhu, M. Kokar, J. Stine  
IEEE DySPAN 1900.5 Efforts To Support Spectrum Access  
Standardization, 2013 IEEE Military Communications  
Conference (MILC OM 2013), San Diego, 2013
- D. Suresh, M. Kokar, J. Moskal  
Prototyping SCA Transceiver APIs Using a Generic Reasoner  
API, SDR Winn-Comm: Wireless Innovation Forum Conference  
on Wireless Communications Technologies and Software  
Defined Radio, Washington D.C., 2013
- B. Ulicny, J. Moskal, M. Kokar  
Situational Awareness from Social Media, Proceedings of the  
Eighth Conference on Semantic Technologies for Intelligence,  
Defense, and Security, Fairfax, VA, 2013, 87-92
- L. Lechowicz, M. Kokar  
Waveform Reconstruction from Ontological Description, Journal  
of Analog Integrated Circuits and Signal Processing, Published  
electronically, 2013

### SELECTED RESEARCH PROJECTS

- Detection and Learning of Unexpected Behaviors of Systems of  
Dynamical Systems by Using the Q2 Abstractions  
Principal Investigator, Air Force Research Laboratory



## MIRIAM LEESER



Professor, Electrical and Computer Engineering;  
affiliated faculty, Bioengineering

PhD, Cambridge University, 1988  
[ece.neu.edu/people/leeser-miriam](http://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

### SELECTED PUBLICATIONS

N. Moore, M. Leeser, L. Smith King

Kernel Specialization Provides Adaptable GPU Code for Particle Image Velocimetry, IEEE Transactions on Parallel and Distributed Systems, 26(4), 2015, 1049-1058

M. Leeser, S. Mukherjee, J. Brock

Fast Reconstruction of 3D Volumes from 2D CT Projection Data with GPUs, Biomed Central Research Notes, 7(528), 2014

N. Moore, M. Leeser, L. Smith King

Kernel Specialization for Improved Adaptability and Performance on Graphics Processing Units (GPUs), 27<sup>th</sup> IEEE International Parallel and Distributed Processing Symposium (IPDPS), May 2013

M. Leeser, D. Yablonski, D. Brooks, L. Smith King

The Challenges of Writing Portable, Correct and High Performance Libraries for GPUs, ACM SIGARCH Computer Architecture News, 39(4), 2011, 2-7

X. Wang, M. Leeser

VFloat: A Variable Precision Fixed and Floating-point Library for Reconfigurable Hardware, ACM Transactions on Reconfigurable Technology and Systems, 3(3), 2010, 1-34

X. Wang, M. Leeser

K-means Clustering for Multispectral Images Using Floating-point Divide, IEEE Symposium on Field-programmable Custom Computing Machines (FCCM), 2007, 151-162

N. Moore, A. Conti, M. Leeser, L. Smith King

Vforce: An Extensible Framework for Reconfigurable Supercomputing, Computer, Published by the IEEE, 2007, 39-49

### SELECTED RESEARCH PROJECTS

MRI: Development of a Testbed for Side Channel Analysis and Security Evaluation

Co-Principal Investigator, National Science Foundation

Ensuring Reliability and Portability of Scientific Software for Heterogeneous Architectures

Co-Principal Investigator, National Science Foundation

## BRAD LEHMAN



Professor, Electrical and Computer Engineering

PhD, Georgia Institute of Technology, 1992  
[ece.neu.edu/people/lehman-bradley](http://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

### SELECTED PUBLICATIONS

J.-H. Huang, Y. Zhao, B. Lehman

Fast Reconfigurable Photovoltaic Switching Cell Integrated within DC-DC Converters, Proceedings of the IEEE Applied Power Electronics Conference and Exposition (APEC), Fort Worth, TX, 2014, 629-636

S. Chen, P. Li, B. Lehman, R. Ball, J.F. de Palma

A New Topology of Bridge-Type Non-Superconducting Fault Current Limiter, IEEE Applied Power Electronics Conference and Exposition (APEC), Long Beach, CA, 2013

S. Chen, P. Li, D. Brady, B. Lehman

Determining the Optimum Grid-Connected Photovoltaic Inverter Size, Solar Energy, 87, 2013, 96-116

Y. Zhao, B. Lehman, R. Ball and J.-F. de Palma

Graph-based Semi-supervised Learning for Fault Detection and Classification in Solar Photovoltaic Arrays, in Fifth IEEE Energy Conversion Congress & Exposition (ECCE), Denver, CO, 2013

Y. Zhao, J. de Palma, J. Mosesian, R. Lyons, B. Lehman

Line-line Fault Analysis and Protection Challenges in Solar Photovoltaic Arrays, IEEE Transactions on Industrial Electronics, IEEE Transactions on Industrial Electronics, 60(9), 2013, 3784-3795

### SELECTED RESEARCH PROJECTS

A Multi-Model Machine Learning-Solar Forecasting Technology

Principal Investigator, United States Department of Energy

Advanced 100W Solar Blanket for Squad Power

Principal Investigator, Department of Defense

## HANOCH LEV-ARI



Professor, Electrical and Computer Engineering

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

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

Fellow, Institute of Electrical and Electronics Engineers

### SELECTED PUBLICATIONS

- P. Argyropoulos, H. Lev-Ari, A. Abur  
Subband Transmission Line Modeling for Robust Power System Transient Simulation, IEEE PES General Meeting, Denver, 2015
- B. Yan, H. Lev-Ari, A.M. Stankovic  
Robust Continuous-discrete Kalman Filter for Time-stamped Delay Mitigation in Networked Estimation and Control Systems, 46<sup>th</sup> North American Power Symposium, Pullman, 2014
- P. Argyropoulos, H. Lev-Ari  
Customized Wavelets for Improved Fault Location Quality in Power Systems, IEEE Power and Energy Conference at Illinois (PECI), Champaign, IL, 2013
- L. Peng, H. Lev-Ari  
Estimating the Autocorrelation Function of an Arbitrarily Time-variant System Response, IEEE International Conference on Acoustics, Speech and Signal Processing, Vancouver, BC, May 2013, 6249-6253
- P. Argyropoulos, H. Lev-Ari, A.M. Stankovic  
IIR Phasor-Banks: Causal, Delay-free, Numerically Robust, Customizable Uniform-DFT-Like Perfect Reconstruction Filter Banks, IEEE International Conference on Acoustics, Speech and Signal Processing, Vancouver, BC, 2013, 5613-5617
- M. Korkali, H. Lev-Ari, A. Abur  
Traveling-Wave-Based Fault-location Technique for Transmission Grids via Wide-area Synchronized Voltage Measurements, IEEE Transactions on Power Systems, 27(2), 2012, 1003-1011
- A.M. Stankovic, H. Lev-Ari, M.M. Perisic  
Analysis and Implementation of Model-based Linear Estimation of Dynamic Phasors, IEEE Transactions on Power Systems, 19, 2004, 1903-1910

### SELECTED RESEARCH PROJECTS

- Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks (CURENT)  
Co-Principal Investigator, National Science Foundation
- Cyber-physical Models for Estimation, Control and Fault Management in Naval Energy Systems  
Principal Investigator, Office of Naval Research

## YONGMIN LIU



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

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

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

Air Force Summer Faculty Fellow

### SELECTED PUBLICATIONS

- W.L. Gao, F.Z. Fang, Y.M. Liu, S. Zhang  
Chiral Surface Waves Supported by Biaxial Hyperbolic Metamaterials, Light: Science and Applications, 2015, e238
- Z.B. Li, K. Yao, F.N. Xia, S. Shen, J.G. Tian, Y. M. Liu  
Graphene Plasmonic Metasurfaces to Steer Infrared Light, Scientific Reports, 5, 2015, 12423
- Q.H. Guo, W.L. Gao, J. Chen, Y.M. Liu, S. Zhang  
Line Degeneracy and Strong Spin-orbit Coupling of Light with Bulk Bianisotropic Metamaterials, Physical Review Letters, 115, 2015, e067402
- C. L. Zhao, Y. M. Liu, Y. H. Zhao, N. Fang, T. J. Huang  
Reconfigurable Plasmofluidic Lens, Nature Communications, 4(2350), 2013, 1-8
- Y.M. Liu, S. Palomba, Y. Park, T. Zentgraf, X.B. Yin, X. Zhang  
Compact Magnetic Antennas for Directional Excitation of Surface Plasmons, Nano Letters, 12(9), 2012, 4853-4858
- Y.M. Liu, X. Zhang  
Metamaterials: A New Frontier of Science and Technology, Chemical Society Reviews, 40, 2011, 2494-2507
- S.C. Kehr, Y.M. Liu, et al.  
Near-field Examination of Perovskite-based Superlenses and Superlens-enhanced Probe-object Coupling, Nature Communications, 2(249), 2011, 1-9
- T. Zentgraf, Y.M. Liu, M.H. Mikkelsen, J. Valentine, X. Zhang  
Plasmonic Luneburg and Eaton Lenses, Nature Nanotechnology, 6, 2011, 151-155
- M. Liu, T. Zentgraf, Y.M. Liu, G. Bartal, X. Zhang  
Light-driven Nanoscale Plasmonic Motors, Nature Nanotechnology, 5, 2010, 570-573
- Y. M. Liu, T. Zentgraf, G. Bartal, X. Zhang  
Transformational Plasmon Optics, Nano Letters, 10(6), 2010, 1991-1997
- J. Yao, Z. Liu, Y.M. Liu, Y. Wang, C. Sun, G. Bartal, et al.  
Optical Negative Refraction in Bulk Metamaterials of Nanowires, Science, 321(5891), 2008, 930
- Y.M. Liu, G. Bartal, D.A. Genov, X. Zhang  
Subwavelength Discrete Solitons in Nonlinear Metamaterials, Physical Review Letters, 99, 2007, 153901

## 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

J. Han, J. Liang, F. Lombardi

Analysis of Error Masking and Restoring Properties of Sequential Circuits, *IEEE Transactions on Computers*, 62(9), 2013, 1694-1704

K. Namba, W. Wei, F. Lombardi

Extending Non-Volatile Operation to DRAM Cells, *IEEE Access*, 1, 2013, 758-769

J. Han, J. Liang, F. Lombardi

New Metrics for the Reliability of Approximate and Probabilistic Adders, *IEEE Transactions on Computers*, 62(9), 2013, 1760-1771

G. Cho, F. Lombardi

On the Delay of a CNTFET with Undeposited CNTs by Gate Width Adjustment, *Journal of Electronic Testing Theory and Applications*, 29(3), 2013, 261-273

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

Single-Configuration Fault Detection in Application-Dependent Testing of FPGA Interconnects, *Proceedings of IET Computers and Digital Techniques*, 7(3), 2013, 132-141

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

Testing a Nano Crossbar for Multiple Fault Detection, *IEEE Transactions on Nanotechnology*, 12(4), 2013, 477-485

## 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

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

E.A. Marengo, P. Beresteksky

Cramer-rao Bound Study of Multiple Scattering Effects in Target Separation Estimation, *International Journal of Antennas and Propagation*, 572923, 2013, 1-10

E.A. Marengo

Inverse Diffraction Theory and Computation of Minimum Source Regions of far Fields, *Mathematical Problems in Engineering*, 513953, 2014, 1-18

E.A. Marengo, J. Tu

Optical Theorem for Transmission Lines, *Progress in Electromagnetics Research B*, 61, 2014, 253-268

E.A. Marengo

Multipole Theory and Algorithms for Target Support Estimation, *International Journal of Antennas and Propagation*, 515240, 2013, 1-15

E.A. Marengo, F.K. Gruber

Optical-theorem-based Coherent Scatterer Detection in Complex Environments, *International Journal of Antennas and Propagation*, 231729, 2013, 1-12

### SELECTED RESEARCH PROJECTS

Wave-based Algorithms and Bounds for Target Support Estimation

Principal Investigator, Air Force Office of Scientific Research

## 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

I.A. Osaretin, M.W. Shields, J.A. Martinez-Lorenzo, W.J. Blackwell  
A Compact 118-GHz Radiometer Antenna for the Micro-Sized Microwave Atmospheric Satellite, *IEEE Antennas & Wireless Propagation Letters*, 13, 2014, 1533-1536

Y. Rodriguez-Vaqueiro, C. Rappaport, J.A. Martinez-Lorenzo, et al.  
Fourier-based Imaging for Multistatic Radar Systems, *IEEE Transactions on Microwave Theory and Techniques*, 62(8), 2014, 1798-1810

Y. Alvarez, J.A. Martinez-Lorenzo, C. Rappaport, et al.  
On the Combination of SAR and Model Based Techniques for High-Resolution Real-Time Two-Dimensional Reconstruction, *IEEE Transactions on Antennas & Propagation*, 62(10), 2014, 5180-5189

Y. Rodriguez-Vaqueiro, J.A. Martinez-Lorenzo  
On the use of Passive Reflecting Surfaces and Compressive Sensing Techniques for Detecting Security Threats at Standoff Distances, *International Journal on Antennas & Propagation*, 248351, 2014, 1-8

J.A. Martinez-Lorenzo, F. Las-Heras, C. Rappaport, et al.  
Sparse Array Optimization using Simulated Annealing and Compressed Sensing for Near-Field Millimeter Wave Imaging, *IEEE Transactions on Antennas & Propagation*, 62(4), 2014, 1716-1722

### SELECTED RESEARCH PROJECTS

Advanced Algorithm Development for Multiband GPR Radar Detection of Buried Mines  
Co-Principal Investigator, US Army Night Vision and Electronic Sensors Directorate

Advanced Imaging and Detection of Security Threats using Compressive Sensing  
Principal Investigator, Department of Homeland Security

Advanced Mechanical-Electromagnetic Applications for next Generation Environmental Monitoring  
Principal Investigator, National Oceanic and Atmospheric Administration

Multi-Modality Electromagnetic Detection and Localization of Implanted Explosives Using Ultra low Field MRI and Nuclear Quadrupole Resonance  
Co-Principal Investigator, Defense Advanced Research Projects Agency

## NICOL MCGRUER



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

PhD, Michigan State University, 1983  
ece.neu.edu/people/mcgruer-nicol

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

Søren Buus Outstanding Research Award, College of Engineering

### SELECTED PUBLICATIONS

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

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

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

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

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

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

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

### SELECTED RESEARCH PROJECTS

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

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



## STEPHEN MCKNIGHT



Professor, Electrical and Computer Engineering,  
Gordon Engineering Leadership Program

PhD, University of Maryland, 1976  
[ece.neu.edu/people/mcknight-stephen](http://ece.neu.edu/people/mcknight-stephen)

Submillimeter devices and materials; optical  
and infrared materials and systems; magnetic  
materials; engineering education

### SELECTED PUBLICATIONS

- S.W. McKnight, C. Zahopoulos  
Scientific Foundations of Engineering, Cambridge University  
Press, 2015
- S.W. McKnight, C. Zahopoulos  
Scientific Foundations of Engineering: A New Curricular Model  
for Engineering Education, Proceeding of the 2105 ASEE Annual  
Conference and Exposition, Seattle, WA, 11316, 2015
- S.W. McKnight, M.E. Pelletier, P. Leventman  
A First-year 'Introduction to Engineering' Course at a  
Community College Using Hands-on MATLAB Experiment  
Control, Proceedings of the ASEE Annual Conference and  
Exposition, San Antonio, TX, 2012
- C.N. Javdekar, S.W. McKnight, M.E. Pelletier  
High-tech Tools for Freshman Engineers, Proceedings of the  
2011 ASEE Annual Conference and Exposition, Vancouver, 2011
- S.W. McKnight, M.B. Silevitch, P. Cheney, J. Beaty  
A Graduate Curriculum for Engineering Leadership, Proc. Intern.  
Conf. on Engineering Leadership, Coimbra, Portugal, 2007
- S.W. McKnight, E.B. Ekholm  
Attenuation and Dispersion for High-Tc Superconducting  
Microstrip Lines, IEEE Transactions on Microwave Theory and  
Techniques, 38(4), 2002, 387-396
- S.W. McKnight, G. Tadmor, M. Ruane, R. Rodriguez-Solis,  
G. Saulnier  
Creating 'High-Tech Tools and Toys Lab' Learning Environments  
at Four Universities, Proceeding of the Frontiers in Education  
Conference, Boston, MA, 2002, SE3-SE7
- S.A. Oliver, P. Shi, W. Hu, H. How, S.W. McKnight, N.E. McGruer,  
P. Zavracky, C. Vittoria  
Integrated Self-biased Hexaferrite Microstrip Circulators for  
Millimeter-wavelength Applications, IEEE Transactions on  
Microwave Theory and Techniques, 49(2), 2001, 385-387
- M.B. Silevitch, S.W. McKnight, C. Rappaport  
A Unified Discipline of Subsurface Sensing and Imaging  
Systems, Subsurface Sensing Technologies and Applications, 1,  
2000, 1-21

## WALEED MELEIS



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

PhD, University of Michigan, 1996  
[ece.neu.edu/people/meleis-waleed](http://ece.neu.edu/people/meleis-waleed)

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

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

- D. Lazer, W. Meleis, B. Foucault Wells, C. Riedl, et al.  
Performing Massively Open Online Social Experiments with  
Volunteer Science, Workshop on Crowdsourcing and Online  
Behavioral Experiments (COBE) at the ACM Conference on  
Economics and Computation, 2015
- 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
- W. Meleis, et al.  
Volunteer Science as a Platform for Studying Team Processes  
and Performance, Cooperative Team Networks Workshop at  
the International School and Conference on Network Science  
(NetSci), 2014
- D. Brooks, S. Muftu, W. Meleis, R. Moore, K.-T. Wan, et al.  
Detecting Solid Masses in Phantom Breast Using Mechanical  
Indentation, Experimental Mechanics, 54,(6), 2014, 935-942
- C. Karbeyaz, B. Foucault Welles, J. Hoye, W. Meleis, D. Lazer, et al.  
Information Navigation and Hidden Profile Experiments on the  
Volunteer Science Web Laboratory, International Sunbelt Social  
Network Conference (Sunbelt XXXIV), Florida, US, 2014
- J. Tai, J. Zhang, J. Li, W. Meleis, N. Mi,  
ArA: Adaptive Resource Allocation for Clouds under Burst  
Workloads, Proceedings of the IEEE International Performance  
Computing and Communications Conference (IPCCC), Orlando,  
Florida, 2011, 1-8
- K. Chowdhury, R. Doost-Mohammady, W. Meleis, et al.  
Cooperation and Communication in Cognitive Radio Networks  
based on TV Spectrum Experiments, Proceedings of IEEE  
International Symposium on a World of Wireless Mobile and  
Multimedia Networks (WoWMoM), Lucca, Italy, 2011, 1-9

## TOMMASO MELODIA



Associate 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

N. Cen, Z. Guan, T. Melodia

Multi-view Wireless Video Streaming Based on Compressed Sensing: Architecture and Network Optimization, *Proceedings of ACM International Symposium on Mobile Ad Hoc Networking and Computing*, 2015, 1-10

G.E. Santagati, T. Melodia

U-Wear: Software-defined Ultrasonic Networking for Wearable Devices, *Proceedings of ACM Conference on Mobile Systems, Services and Applications (MOBISYS)*, Florence, Italy, May 2015, 1-16

Z. Guan, G.E. Santagati, T. Melodia

Ultrasonic Intra-body Networking: Interference Modeling, Stochastic Channel Access and Rate Control, *Proceedings of the IEEE Conference on Computer Communications*, Hong Kong, 2015, 1-9

S. Pudlewski, N. Cen, Z. Guan, T. Melodia

Video Transmission Over Lossy Wireless Networks: A Cross-Layer Perspective, *IEEE Journal of Selected Topics in Signal Processing*, 9(1), 2015, 6-21

E. Demirors, G. Sklivanitis, G.E. Santagati, T. Melodia, et al.

Design of a Software-defined Underwater Acoustic Modem with Real-time Physical Layer Adaptation Capabilities, *Proceedings of the International Conference on Underwater Networks and Systems*, 2014, 1-8

### SELECTED RESEARCH PROJECTS

CAREER: Towards Ultrasonic Networking for Implantable Biomedical Devices

Principal Investigator, National Science Foundation

Networking Medical Implants Through Ultrasounds

Principal Investigator, National Science Foundation

Small: Towards Real-Time Video Streaming in the Internet of Underwater Things

Principal Investigator, National Science Foundation

Toward Distributed Decision Making in Cognitive Radio Ad-hoc Networks Based on Bilevel Equilibrium Programming

Principal Investigator, National Science Foundation

Toward Maximal Spectral-efficiency Networking

Principal Investigator, Air Force Research Laboratory

## NINGFANG MI



Assistant 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. Tai, D. Liu, Z. Yang, X. Zhu, J. Lo, N. Mi

Improving Flash Resource Utilization at Minimal Management Cost in Virtualized Flash-based Storage Systems, *IEEE Transactions on Cloud Computing (TCC)*, 1, 2015, 1-14

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 (TCC)*, 2015, 1-14

J. Tai, B. Sheng, Y. Yao, N. Mi

SLA-Aware Data Migration in A Shared Hybrid Storage Cluster, *Journal of Cluster Computing (CC)*, 2015, 1-13

Y. Yao, J. Wang, B. Sheng, J. Lin, N. Mi

HaSTE: Hadoop YARN Scheduling Based on Task-Dependency and Resource-demand, *IEEE International Conference on Cloud Computing (Cloud'14)*, Anchorage, AK, 2014, 184-191

Y. Yao, J. Tai, B. Sheng, N. Mi

LsPS: A Job Size-based Scheduler for Efficient Assignments in Hadoop, *IEEE Transactions on Cloud Computing (TCC)*, 99, 2014, 1-14

### 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



Associate 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

- S. Valleau, S.K. Saikin, M. Rostami, H. Mosallaei, et al.  
Electromagnetic Study of the Chlorosome Antenna Complex of *Chlorobium-tepidum*, *ACS Nano*, 8(4), 2014, 3884-3894
- J. Cheng, H. Mosallaei  
Optical Metasurfaces for Beam Scanning in Space, *Optics Letters*, 39(9), 2014, 2719-2722
- M. Farmahini-Farahani, J. Cheng, H. Mosallaei  
Metasurfaces Nanoantennas for Light Processing, *Journal of the Optical Society of America B*, 30(9), 2013, 2365-2370
- B. Memarzadeh, H. Mosallaei  
Multimaterial Loops as the Building Block for a Functional Metasurface, *Journal of the Optical Society of America B*, 30(7), 2013, 1827-1834
- E. Chernobrovkina, S.K. Saikin, S. Valleau, H. Mosallaei, et al.  
Parametric Hierarchical Matrix Approach for the Wideband Optical Response of Large-scale Molecular Aggregates, *Journal of Applied Physics*, 114, 2013, e164315
- J. Cheng, W.L. Wang, H. Mosallaei, E. Kaxiras  
Surface Plasmon Engineering in Graphene Functionalized with Organic Molecules: A multi-scale Theoretical Investigation, *Nano Letters*, 14(1), 2013, 50-56

### SELECTED RESEARCH PROJECTS

- Computationally-designed Materials for Wave Synthesis  
Principal Investigator, Office of Naval Research
- Designer Solids Nanoantennas and Material  
Principal Investigator, Army Research Laboratory
- Large-area, 3D Optical Metaminerals with Tunability and Low Loss  
Co-Principal Investigator, Office of Naval Research
- Multiscale Mathematical Modeling and Design Realization of Novel 2D Functional Materials  
Co-Principal Investigator, Office of Naval Research
- Nanoantennas for Engineering Waves on the Surface  
Principal Investigator, Air Force Office of Scientific Research

## MARK NIEDRE



Associate Professor, Electrical and Computer Engineering; jointly appointed, Bioengineering

PhD, University of Toronto, 2004  
ece.neu.edu/people/niedre-mark

Biomedical optics and non-invasive imaging, rare cell detection and tracking in the body, ultrafast time-domain diffuse optical imaging, image reconstruction and biomedical signal processing

College of Engineering Faculty Fellow; Massachusetts Life Sciences Center New Investigator Award; Søren Buus Outstanding Research Award, College of Engineering

### SELECTED PUBLICATIONS

- S. Markovic, S. Li, M. Niedre  
Performance of Computer Vision In Vivo Flow Cytometry with Low Fluorescence Contrast, *Journal of Biomedical Optics*, 20(3), 2015, 35005
- V. Pera, D.H. Brooks, M. Niedre  
On the use of Cramer-Rao Bounds in diffuse optical Tomography, *Journal of Biomedical Optics*, 19(2), 2014, 025002
- S. Markovic, B. Li, V. Pera, M. Sznajer, O. Camps, M. Niedre  
A Computer Vision Approach to RareCell In Vivo Flow Cytometry, *Cytometry A*, 83A, 2013, 1113-1123
- N. Pestana, L. Mortensen, J. Runnels, M. Niedre, et al.  
An Improved Prototype Diffuse Fluorescence Flow Cytometer for High Sensitivity Detection of Rare Circulating Cells In Vivo, *Journal of Biomedical Optics*, 18(7), 2013, 77002
- Y. Mu, N. Valim, M. Niedre  
Evaluation of a Fast Single-photon Avalanche Photodiode for Measurement of Early Transmitted Photons Through Diffusive Media, *Optics Letters*, 38(12), 2013, 2098-2100
- N. Valim, J. Brock, M. Leaser, M. Niedre  
The Effect of Temporal Impulse Response on Experimental Reduction of Photon Scatter in Time-resolved Diffuse Optical Tomography, *Physics in Medicine and Biology*, 58(2), 2013, 335-349

### SELECTED RESEARCH PROJECTS

- High Resolution Multiplexed Fluorescence Tomography  
Principal Investigator, National Institutes of Health
- Ultra-rare Cell In Vivo Flow Cytometry  
Principal Investigator, National Institutes of Health

## MARVIN ONABAJO



Assistant 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

### SELECTED PUBLICATIONS

- L. Xu, J. Feng, Y. Ni, M. Onabajo  
Test Signal Generation for the Calibration of Analog Front-end Circuits in Biopotential Measurement Applications, *Proceedings of IEEE 57<sup>th</sup> International Midwest Symposium on Circuits and Systems*, 2014, 949-952
- C.-H. Chang, M. Onabajo  
IIP3 Enhancement of Subthreshold Active Mixers, *IEEE Transactions on Circuits and Systems II: Express Briefs*, 60(11), 2013, 731-735
- M. Onabajo, J. Silva-Martinez  
Analog Circuit Design for Process Variation-Resilient Systems-on-a-Chip, New York, NY, Springer, 2012
- H. Chauhan, Y. Choi, M. Onabajo, I. Jung, Y.-B. Kim  
Accurate and Efficient On-chip Spectral Analysis for Built-in Testing and Calibration Approaches, *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, 22(3), 2014, 497-506
- C.-J. Park, M. Onabajo, J. Silva-Martinez  
External Capacitor-less Low Drop-out Regulator with 25dB Superior Power Supply Rejection in the 0.4-4MHz Range, *IEEE Journal of Solid-State Circuits*, 27(2), 2014, 486-501

### SELECTED RESEARCH PROJECTS

- CAREER: Low-Power Transceiver Design Methods for Wireless Medical Monitoring  
Principal Investigator, National Science Foundation
- Integrated Self-calibrated Analog Front-end for Biopotential and Bioimpedance Measurements  
Principal Investigator, National Science Foundation
- RF Power Amplifier Linearization with Digital Predistortion  
Principal Investigator, Analog Devices, Incorporated

## SARAH OSTADABBAS



ADVANCE Faculty Fellow, 2015/16; Assistant Professor, 2016, Electrical and Computer Engineering

PhD, University of Texas at Dallas, 2013

Computer-aided decision making, human-machine interface, medical sensing and diagnostic systems, telemedicine, embedded software and hardware co-design

### SELECTED PUBLICATIONS

- S. Ostadabbas, M. Nourani, R. Yousefi, M. Pompeo  
A Knowledge-based Modeling for Plantar Pressure Image Reconstruction, *IEEE Transactions on Biomedical Engineering*, 61(10), 2014, 2538-2549
- R. Yousefi, M. Nourani, S. Ostadabbas, I. Panahi  
A Motion-tolerant Adaptive Algorithm for Wearable Photoplethysmographic Biosensors, *IEEE Transactions on Information Technology in BioMedicine*, 18(2), 2014, 670-681
- S. Ostadabbas, M. Nourani, M. Pompeo  
Pressure Ulcer Studies: A Review from an Engineering Perspective, *IEEE Reviews in Biomedical Engineering*, 2014
- H. Ghasemzadeh, S. Ostadabbas, E. Guenterberg, et al.  
Wireless Medical Embedded Systems: A Review of Signal Processing Techniques for Classification, *IEEE Sensors Journal*, 13(2), 2013, 423-437 (Ranked Top 20 Accessed Articles in First Half of 2013)
- S. Ostadabbas, R. Yousefi, M. Nourani, M. Faezipour, et al.  
A Resource-Efficient Planning for Pressure Ulcer Prevention, *IEEE Transactions on Information Technology in BioMedicine (TITB)*, 16(6), 2012, 1265-1273



## TASKIN PADIR



Associate Professor, Electrical and Computer Engineering

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

Modeling and control of robot systems; human-in-the-loop robot control; intelligent vehicles; and realization of 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

M. DeDonato, V. Dimitrov, F. Polido, T. Padir, et. al.  
Human-in-the-loop Control of a Humanoid Robot for Disaster Response: A Report from the DARPA Robotics Challenge Trials, *Journal of Field Robotics*, Special Issue on the DARPA Robotics Challenge Trials, 32(2), 2015, 275-292

D. Sinyukov, R. Desmond, M. Dickerman, T. Padir  
Multi-modal Control Framework for a Semi-autonomous Wheelchair Using Modular Sensor Designs, *Journal of Intelligent Service Robotics*, 7(3), 2014, 145-155

T. Padir, C.S. Ritchie, T.K. Houston, et al.  
Robot-assisted Home Hazard Assessment for Fall Prevention: A Feasibility Study, *Journal of Telemedicine and Telecare*, 22(1), 2014, 3-10

T. Padir, L. Lai, T.R. Eisenbarth, L. Venkatasubramanian, et al.  
Security of Autonomous Systems Employing Embedded Computing and Sensors, *Micro, IEEE*, 33(1), 2013, 80-86

T. Padir, G.S. Fischer, S. Chernova, M.A. Gennert, et al.  
A Unified and Integrated Approach to Teaching a Two-course Sequence in Robotics Engineering, *Journal of Robotics and Mechatronics*, Special Issue on Education of Robotics and Mechatronics, 23(5), 2011, 1-11

### SELECTED RESEARCH PROJECTS

Enhancing Disabilities Engineering Research and Education Through Robotics Capstone Projects

Principal Investigator, National Science Foundation

Holistic Design Methodology for Automated Implementation of Human-in-the-loop Cyber-physical Systems

Co-Principal Investigator, National Science Foundation

Nested Control of Assistive Robots Through Human Intent Inference

Co-Principal Investigator, National Science Foundation

Realization of a Medical Cyber-physical System to Enhance Safety of Ebola Workers

Principal Investigator, National Science Foundation

Systems, Software, and Simulation: Meeting the DARPA Robotics Challenge

Co-Principal Investigator, Defense Advanced Research Projects Agency

## CAREY RAPPAPORT



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

PhD, Massachusetts Institute of Technology, 1987  
ece.neu.edu/people/rappaport-carey

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

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

### SELECTED PUBLICATIONS

Y. Álvarez, F. Las-Heras, B. Gonzalez-Valdes, J.A. Martínez-Lorenzo, C. Rappaport

Accurate Profile Reconstruction Using An Improved SAR Based Technique, *Proceedings of the IEEE International Antennas and Propagation Symposium (IAPS)*, 2013, 818-819

B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, C. Rappaport  
Dual Band SAR Processing for Low Dielectric Contrast Buried IED Detection, *Proceedings of the IEEE IAPS*, 2013, 1080-1081

C. Rappaport, B. Gonzalez-Valdes, G. Allan, et al.  
Optimizing Element Positioning in Sparse Arrays for Nearfield Mm-Wave Imaging, *Proceedings of the IEEE Phased Array Conference*, 13, 2013, 333-335

Y. Álvarez, F. Las-Heras, B. Gonzalez-Valdes, J.A. Martínez-Lorenzo, C. Rappaport  
Material Characterization Using A Millimeter Wave Portal-Based Imaging System for Security Screening, *Proceedings of the IEEE Homeland Security Technology Conference*, 2013, 511-516

### SELECTED RESEARCH PROJECTS

Awareness and Localization of Explosive-Related Threats (ALERT)

Co-Principal Investigator, Department of Homeland Security

Concept Development And Modeling For Communicating With Oil Drilling Heads Using Low Frequency Electromagnetic Waves

Principal Investigator, Draper Laboratory Incorporated

Multi-Modality Electromagnetic Detection and Localization of Implanted Explosives Using Ultra Low Field MRI and Nuclear Quadrupole Resonance

Principal Investigator, Defense Advanced Research Projects Agency

## PURNIMA RATILAL-MAKRIS



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

PhD, Massachusetts Institute of Technology, 2002  
ece.neu.edu/people/ratilal-makris-purnima

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

Presidential Early Career Award for Scientists and Engineers; Office of Naval Research Young Investigator Award

### SELECTED PUBLICATIONS

- Z. Gong, A.D. Jain, D. Tran, P. Ratilal, et al.  
Ecosystem Scale Acoustic Sensing Reveals Humpback Whale Behavior Synchronous with Herring Spawning Processes and Re-evaluation Finds No Effect of Sonar on Humpback Song Occurrence in the Gulf of Maine in Fall 2006, PLoS ONE, 9(10), 2014, e104733
- D. Tran, W. Huang, A. Bohn, D. Wang, N. Makris, P. Ratilal, et al.  
Using a Coherent Hydrophone Array for Observing Sperm Whale Range, Classification, and Shallow-water Dive Profiles, The Journal of the Acoustical Society of America, 135(6), 2014, 3352-3363
- Z. Gong, D. Tran, P. Ratilal  
Comparing Passive Source Localization and Tracking Approaches With a Towed Horizontal Receiver Array in an Ocean Waveguide, The Journal of the Acoustical Society of America, 134, 2013, 3705-3720
- Z. Gong, T. Chen, P. Ratilal, N. Makris  
Temporal Coherence of the Acoustic Field Forward Propagated Through a Continental Shelf with Random Internal Waves, The Journal of the Acoustical Society of America, 134, 2013, 3476-3485
- D. Tran, M. Andrews, P. Ratilal  
Probability Distribution for Energy of Saturated Broadband Ocean Acoustic Transmission: Results from Gulf of Maine 2006 Experiment, Journal of the Acoustical Society of America, 132, 2012, 3659-2672
- 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



Assistant 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

National Science Foundation CAREER Award; Defense Advanced Research Projects Agency Young Faculty Award

### SELECTED PUBLICATIONS

- Z. Qian, F. Liu, Y. Hui, S. Kar and M. Rinaldi  
Graphene as a Massless Electrode for Ultra-high-frequency Piezoelectric Nano Electro Mechanical Systems, Nano Letters, 15(7), 2015, 4599-4604
- Y. Hui, T. Nan, N.X. Sun, M. Rinaldi  
High Resolution Magnetometer based on a High Frequency Magnetoelectric MEMS-CMOS Oscillator, IEEE/ASME Journal of Microelectromechanical Systems, 24(1), 2015, 134-143
- G. Hummel and M. Rinaldi  
Switchable 2-Port Aluminum Nitride MEMS Resonator Using Monolithically Integrated 3.6THz Cut-Off Frequency Phase-Change Switches, Proceedings of the 2015 Joint Conference of the IEEE International Frequency Control Symposium & European Frequency and Time Forum, Denver, 2015, 706-708
- Y. Hui, Z. Qian, G. Hummel and M. Rinaldi  
Pico-watts Range Uncooled Infrared Detector Based on a Freestanding Piezoelectric Resonant Microplate with Nanoscale Metal Anchors, Proceedings of the 2014 Solid-state Sensors, Actuators and Microsystems Workshop, Hilton Head Island, 2014, 387-390

### SELECTED RESEARCH PROJECTS

- Plasmonic Microelectromechanical Infrared Digitizer (PLASMID)  
Principal Investigator, DARPA MTO N-Zero program
- Zero Power Sensors (ZePS)  
Principal Investigator, DARPA MTO N-Zero program
- 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
- Nanofabricated Neural Probes with Ultra-sensitive Integrated Compact RF NEMS Magnetoelectric Sensors for Electro-Magneto-Brain Activity Mapping  
Co-Principal Investigator, Keck Foundation

## WILLIAM ROBERTSON



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

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

Trustworthy computing architectures; web security; statistical machine learning for anomaly detection; malware analysis using adversarial program analysis; reverse engineering; intrusion detection

### SELECTED PUBLICATIONS

- A. Ozcan, C. Mulliner, W. Robertson, E. Kirda, et al.  
BabelCrypt: The Universal Encryption Layer for Mobile Messaging Applications, Proceedings of the International Conference on Financial Cryptography and Data Security (FC), Isla Verde, PR, 2015, 1-15
- M. Weissbacher, W. Robertson, E. Kirda, C. Kruegel, G. Vigna  
ZigZag: Automatically Hardening Web Applications Against Client-side Validation Vulnerabilities, Proceedings of the USENIX Security Symposium, Washington DC, 2015, 737-752
- C. Mulliner, W. Robertson, E. Kirda  
Hidden GEMs: Automated Discovery of Access Control Vulnerabilities in Graphical User Interfaces, Proceedings of the IEEE Symposium on Security and Privacy (Oakland), San Jose, CA, 2014, 1-14
- M. Weissbacher, T. Lauinger, W. Robertson  
Why is CSP Failing? Trends and Challenges in CSP Adoption, Proceedings of the International Symposium on Research in Attacks, Intrusions, and Defenses (RAID), Gothenburg, 2014, 1-22
- K. Onarlioglu, C. Mulliner, W. Robertson, E. Kirda  
PrivExec: Private Execution as an Operating System Service, Proceedings of the IEEE Symposium on Security and Privacy (Oakland), San Francisco, CA, 2013, 1-16

### SELECTED RESEARCH PROJECTS

- Automated Inference of High-Level Program Structure  
Principal Investigator, Office of Naval Research
- Continuum: Finding Space and Time Vulnerabilities in Java Programs  
Principal Investigator, Defense Advanced Research Projects Agency
- DarkDroid: Exposing the Dark Side of Android Marketplaces  
Co-Principal Investigator, Defense Advanced Research Projects Agency
- Firmalice: Modeling and Identifying Malice in Firmware  
Co-Principal Investigator, Defense Advanced Research Projects Agency
- Multi-disciplinary Preparation of Next Generation Information Assurance Practitioners  
Co-Principal Investigator, National Science Foundation

## MASOUD SALEHI



Associate Professor, Electrical and Computer Engineering

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

Error correcting codes; information theory; digital communications

### SELECTED PUBLICATIONS

- K.-L. Huang, V.C. Gaudet, M. Salehi  
A Hybrid ARQ Scheme Using LDPC Codes with Stochastic Decoding, Proceedings of the 49<sup>th</sup> 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
- John G. Proakis and Masoud Salehi  
Fundamentals of Communication Systems, Second Edition  
Pearson, 2014
- K. Firouzbakht, G. Noubir, M. Salehi  
On the Performance of Adaptive Packetized Wireless Communication Links Under Jamming, IEEE Transactions on Wireless Communications, 13(7), 2014, 3481-3495
- K.-L. Huang, V. Gaudet, M. Salehi  
Output Decisions for Stochastic LDPC Decoders, Proceedings of the 48<sup>th</sup> Annual Conference on Information Sciences and Systems, Princeton, New Jersey, 2014, 1-5
- K. Firouzbakht, G. Noubir, M. Salehi  
Packetized Wireless Communication Under Jamming, a Constrained Bimatrix Game, Proceedings of the IEEE Global Communications Conference (GLOBECOM), 2014, 740-745
- K. Firouzbakht, G. Noubir, M. Salehi  
Quadratic Program Solution of Communication Links Under Jamming, Proceedings of the 48<sup>th</sup> Asilomar Conference on Signals, Systems and Computers, 2014, 1011-1015
- O. Vahabzadeh, M. Salehi  
A Novel Two-user Cooperation Scheme for Cooperative Communications Based on Protograph-based Low-density Parity-check (LDPC) Codes, Proceedings of the 47<sup>th</sup> annual conference on Information Sciences and Systems, 2013, 1-4
- J.G. Proakis, M. Salehi, G. Bauch  
Contemporary Communication Systems Using Matlab, Third Edition Cengage Learning 2013

## GUNAR SCHIRNER



Associate Professor, Electrical and Computer Engineering

PhD, University of California, Irvine, 2008  
[ece.neu.edu/people/schirner-gunar](http://ece.neu.edu/people/schirner-gunar)

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

### SELECTED PUBLICATIONS

- H. Tabkhi, G. Schirner  
 A Joint SW/HW Approach for Reducing Register File Vulnerability, *ACM Transactions on Architecture and Code Optimization (ACM TACO)*, 2015
- N. Teimouri, H. Tabkhi, G. Schirner  
 Revisiting Accelerator-rich CMPs: Challenges and Solutions, *Proceedings of the 52nd Annual Design Automation Conference (DAC)*, San Francisco, CA, 84, 2015
- H. Tabkhi G. Schirner  
 Application-guided Power Gating Reducing Register File Static Power, *IEEE Transactions on Very Large Scale Integration (TVLSI)*, 22(12), 2014, 2513-2526
- J. Zhang, G. Schirner  
 Automatic Specification Granularity Tuning for Design Space Exploration, *Design Automation and Test in Europe (DATE)*, Dresden, Germany, 2014, 1-6
- H. Tabkhi, R. Bushey, G. Schirner  
 Function-level Processor (FLP): A High Performance, Minimal Bandwidth, Low Power Architecture for Market-oriented MPSoCs, *IEEE Embedded Systems Letters*, 2014
- H. Tabkhi, R. Bushey, G. Schirner  
 Function-level Processor (FLP): Raising Efficiency by Operating at Function Granularity for Market-oriented MPSoCs, *IEEE International Conference on Application-specific Systems, Architectures and Processors (ASAP)*, Zurich, Switzerland, 2014
- G. Schirner, M. Götz, A. Rettberg, M. Zanella, F. J. Rammig  
*Embedded Systems: Design, Analysis and Verification*, 403, Springer, 2013
- G. Schirner, D. Erdogmus, K. Chowdhury, T. Padiar  
 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

## PHILIP SERAFIM



Professor, Electrical and Computer Engineering

ScD, Massachusetts Institute of Technology, 1963  
[ece.neu.edu/people/serafim-philip](http://ece.neu.edu/people/serafim-philip)

Electromagnetics; nonlinear optics; microwaves; remote sensing; electrodynamics of random media; plasma turbulence; ionospheric scintillations; gaseous lasers

### SELECTED PUBLICATIONS

- J. Peñano, P. Sprangle, B. Hafizi, D. Gordon, P. Serafim  
 Terahertz Generation in Plasmas Using Two-color Laser Pulses, *Physical Review E*, 81(2), 2010, 026407



## BAHRAM SHAFAI



Professor, Electrical and Computer Engineering;  
affiliated faculty, Bioengineering

PhD, George Washington University, 1985  
[ece.neu.edu/people/shafai-bahram](http://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, M. Saif

Proportional-integral Observer in Robust Control, Fault Detection, and Decentralized Control of Dynamic Systems, Control and Systems Engineering, Springer International Publishing, 2015, 13-43

S.M.M. Alavi, M. Saif, B. Shafai

Accurate State Estimation in DC-DC Converters Using a Proportional Integral Observer (PIO), Proceedings of 23<sup>rd</sup> IEEE International Symposium on Industrial electronics (ISIE), 2014, 1304-1309

R. Ghadami, B. Shafai

Distributed Observer-based LQR Design for Multi-agent Systems, Proceeding of ISIAC, World Automation Congress, Kona, HI, 2014, 520-526

P. Brunet, B. Shafai

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

B. Shafai, A. Oghbaee

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

B. Shafai, A. Oghbaee

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

B. Shafai, A. Oghbaee, T. Tanaka

Positive Stabilization with Maximum Stability Radius for Linear Time-delay Systems, 2014 IEEE 53<sup>rd</sup> Annual Conference on Decision and Control, 2014, 1948-1953

R. Ghadami, B. Shafai

Decomposition-based Distributed Control for Continuous-time Multi-agent Systems, IEEE Transactions on Automatic Control, 58(1), 2013, 258-264

## MICHAEL B. SILEVITCH



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

PhD, Northeastern University, 1971  
[ece.neu.edu/people/silevitch-michael](http://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

#### Awareness and Localization of Explosives Related Threats

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

Director and Principal Investigator, Department of Homeland Security

#### The Bernard M. Gordon Center for Subsurface Sensing and Imaging Systems

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

Director and Principal Investigator, National Science Foundation

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

Principal Investigator, Department of Homeland Security

## HANUMANT SINGH



Professor, Electrical and Computer Engineering; jointly appointed, Marine and Environmental Sciences

PhD, Massachusetts Institute of Technology, 1995

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

### SELECTED PUBLICATIONS

- C. Murphy, J. Walls, T. Schneider, H. Singh, et al.  
CAPTURE: A Communications Architecture for Progressive Transmission via Underwater Relays with Eavesdropping, *IEEE Journal of Oceanic Engineering*, 39(1), 2014, 1-13
- H. Singh, W. Freeman, et al.  
Camouflaging an Object from Many Viewpoints, *Proceedings of the 2014 Computer Vision and Pattern Recognition Conference*, 1-8
- K.E. Smith, H. Singh, H., et al.  
Discovery of a Recent, Natural Whale Fall on the Continental Slope Off Anvers Island, Western Antarctic Peninsula, *Deep Sea Research Part I: Oceanographic Research Papers*, 90, 2014, 76-80
- G. Williams, J. Wilkinson, T. Maksym, H. Singh, C. Kunz, et al.  
Mapping Ice Thickness and Extreme Deformation of Antarctic sea Ice from an Autonomous Underwater Vehicle, *Nature Geoscience*, 8, 2014, 61-67
- M. Yi Cheung, J. Leighton, U. Mitra, H. Singh, F.S. Hover  
Performance of Bandit Methods in Acoustic Relay Positioning, *Proceedings of the 2014 Automatic Control Conference*, 2014, 4708 - 4714
- C. Kunz, H. Singh  
Map Building Fusing Acoustic and Visual Information Using Autonomous Underwater Vehicles, *Journal of Field Robotics*, 30(5), 2013, 1556-4967
- H. Singh, K. Nakamura, M. Jakobssen, T. Shank, et al.  
Effusive and Explosive Volcanism on the Ultraslow-spreading Gakkel Ridge, 85°E, *Geochemistry, Geophysics, Geosystems*, 13(10), 2012

## DAGMAR STERNAD



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

PhD, University of Connecticut, 1995  
[ece.neu.edu/people/sternad-dagmar](http://ece.neu.edu/people/sternad-dagmar)

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

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

### SELECTED PUBLICATIONS

- D. Sternad, K.P. Kording  
Carrot or Stick in Motor Learning, *Nature Neuroscience*, 18(4), 2015, 480-481
- M.E. Huber, D. Sternad  
Implicit Guidance to Stable Performance in a Rhythmic Perceptual-motor Skill, *Experimental Brain Research*, 233(6), 2015, 1783-1799
- M.E. Huber, A.E. Seitchik, A. Brown, D. Sternad, S.G. Harkins  
The Effect of Stereotype Threat on Performance of a Rhythmic Motor Skill, *American Psychological Association*, 41(2), 2015, 525-541
- S.-W. Park, D. Sternad  
Robust Retention of Individual Sensorimotor Skill After Self-Guided Practice, *Journal of Neurophysiology*, 2015
- D. Sternad, M.E. Huber, N. Kuznetsov  
Acquisition of Novel and Complex Motor Skills: Stable Solutions Where Intrinsic Noise Matters Less, *Advances in Experimental Medicine and Biology*, 826, 2014, 101-124
- B. Nasserouleslami, C.J. Hasson, D. Sternad  
Rhythmic Manipulation of Objects with Complex Dynamics: Predictability Over Chaos, *PLoS Computational Biology*, 10(10), 2014, e1003900
- M.O. Abe, D. Sternad  
Directionality in Distribution and Temporal Structure of Variability in Skill Acquisition, *Frontiers in Human Neuroscience*, 7(225), 2013

### SELECTED RESEARCH PROJECTS

- EAGER: Challenging the Cognitive-control Divide  
Co-Principal Investigator, National Science Foundation
- Clinical Studies on the Control of Movements in Infants and Adults  
Principal Investigator, National Institutes of Health
- Multi-center Trial of Augmented Sensory Feedback in Children with Dyskinetic CP  
Co-Principal Investigator, National Institutes of Health
- Variability and Stability of Skill Acquisition  
Principal Investigator, National Institutes of Health

## MILICA STOJANOVIC



Professor, Electrical and Computer Engineering;  
affiliated faculty, Bioengineering

PhD, Northeastern University, 1993  
[ece.neu.edu/people/stojanovic-milica](http://ece.neu.edu/people/stojanovic-milica)

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

Fellow, Institute of Electrical and Electronics Engineers

### SELECTED PUBLICATIONS

Y. Aval, M. Stojanovic

Differentially Coherent Multichannel Detection of Acoustic OFDM Signals, *IEEE Journal of Oceanic Engineering*, 40(2), 2015, 251-268

P. Qarabaqi, M. Stojanovic

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

S. Yerramalli, M. Stojanovic, U. Mitra

Partial FFT Demodulation: A Detection Method for Doppler Distorted OFDM Systems, *IEEE Transactions on Signal Processing*, 60(11), 2012, 5906-5918

J. Heidemann, M. Stojanovic, M. Zorzi

Underwater Sensor Networks: Applications, Advances, and Challenges, *Philosophical Transactions of the Royal Society A*, 2012, 158-175

A. Radosevic, D. Fertoni, T. Duman, J. Proakis, M. Stojanovic  
Bounds on the Information Rate for Sparse Channels with Large Memory and I.U.D. Inputs, *IEEE Transactions on Communications*, 59(12), 2011, 3343-3352

### SELECTED RESEARCH PROJECTS

NeTS: Large: Collaborative Research: Exploration and Exploitation in Actuated Communication Networks

Principal Investigator, National Science Foundation

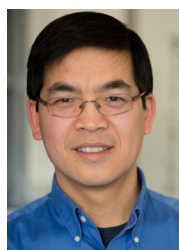
Intelligent Coordination and Adaptive Classification for Naval Autonomous Systems

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](http://ece.neu.edu/people/sun-nian-xiang)

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

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

### SELECTED PUBLICATIONS

Z. Zhou, M. Trassin, Y. Gao, Y. Gao, D. Chen,...N.X. Sun

Probing Electric Field Control of Magnetism Using Ferromagnetic Resonance, *Nature Communications*, 6, 2015, 6082

T. Nan, Y. Hui, M. Rinaldi, N.X. Sun

Self-biased 215MHz Magnetoelectric NEMS Resonator for Ultra-sensitive DC Magnetic Field Detection, *Scientific Reports*, 3, 2013, 1985

M. Liu, Z. Zhou, T. Nan, B.M. Howe, G.J. Brown, N.X. Sun

Voltage Tuning of Ferromagnetic Resonance with Bistable Magnetization Switching in Energy-efficient Magnetoelectric Composites, *Advanced Materials*, 25(10), 2013, 1435-1439

J. Lou, M. Liu, D. Reed, Y. Ren, N.X. Sun

Giant Electric Field Tuning of Magnetism in Novel Multiferroic FeGaB/Lead Zinc Niobate Lead Titanate Heterostructures, *Advanced Materials*, 21(46), 2009, 4711-4715

S.X. Wang, N.X. Sun, M. Yamaguchi, S. Yabukami

Sandwich Films: Properties of a New Soft Magnetic Material, *Nature*, 407, 2000, 150-151

### SELECTED RESEARCH PROJECTS

Integrated Thermoelectric Materials and Devices

Principal Investigator, Analog Devices, Incorporated

Multiferroic Materials for RF Applications

Principal Investigator, Defense Advanced Research Projects Agency

Nanofabricated Neural Probes with Ultra-sensitive Integrated Compact RF NEMS Magnetoelectric Sensors for Electro-magneto-brain Activity Mapping

Principal Investigator, Keck Foundation

Novel Multiferroic Heterostructures for Translational Compact and Power Efficient Voltage Tunable Devices

Principal Investigator, National Science Foundation

Power Efficient Voltage Tunable Spin Hall Nano Oscillators with Multiferroic Heterostructures

Principal Investigator, Air Force Research Laboratory

Sensitive and Selective Chemical Sensor Using Molecularly-Imprinted Single Layer Graphene

Principal Investigator, Air Force

## MARIO SZNAIER



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

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

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

IEEE Control Systems Society Distinguished Member Award

### SELECTED PUBLICATIONS

- B. Yilmaz, C. Lagoa, M. Sznaiier  
An Efficient Atomic Norm Minimization Approach to Identification of Low Order Models, 2013 IEEE 52<sup>nd</sup> Annual Conference on Decision and Control, 2013, 5834-5839
- M. Ayazoglu, B. Yilmaz, M. Sznaiier, O. Camps  
Finding Causal Interactions in Video Sequences, IEEE International Conference on Computer Vision, Sydney, 2013
- C. Dicle, O. Camps, M. Sznaiier  
The Way They Move: Tracking Multiple Targets with Similar Appearance, IEEE International Conference on Computer Vision, Sydney, Australia, 2013
- K. Bekiroglu, M. Sznaiier, C. Lagoa, B. Shafai  
Vision Based Control of an Autonomous Blimp with Actuator Saturation Using Pulse Width Modulation, Proceedings of the 2013 IEEE International Conference on Control Applications, 2013, 1036-1041
- Y. Cheng, Y. Wang, M. Sznaiier  
Worst Case Optimal Estimators for Switched Linear Systems, Proceedings of the 52<sup>nd</sup> 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

## GILEAD TADMOR



Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

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

Applications of dynamics in imaging, robust and nonlinear control, reduced order models, fluid flow control

### SELECTED PUBLICATIONS

- K. Aleksic-Roeßner, R. King, O. Lehmann, G. Tadmor, et al.  
On the Need of Nonlinear Control for Efficient Model-based Wake Stabilization, Theoretical and Computational Fluid Dynamics, 28(1), 2014, 23-49
- L. Mirkin, T. Shima, G. Tadmor  
Sampled-Data  $H^2$  Optimization of Systems with I/O Delays via Analog Loop Shifting, IEEE Transactions on Automatic Control, 59, 2014, 787-791
- M. Schlegel, B.R. Noack, P. Jordan, A. Dillman, G. Tadmor, et al.  
On Least-order Flow Representations of Aerodynamics and Aeroacoustics, Journal of Fluid Mechanics, 697, 2012, 367-398
- S. Laxminarayan, G. Tadmor, et al.  
Modeling Habituation in Rat EEG Evoked Responses via a Neural Mass Model with Feedback, Biological Cybernetics, 105, 2011, 371-397
- A. Cavalieri, G. Daviller, P. Comte, P. Jordan, G. Tadmor, et al.  
Using Large Eddy Simulation to Explore Sound-source Mechanisms in Jets, Journal of Sound and Vibration, 330, 2011, 4098-4113



## CARMINE VITTORIA



COE Distinguished Professor, Electrical and Computer Engineering

PhD, Yale University, 1970  
ece.neu.edu/people/vittoria-carmine

Electromagnetic wave propagation in anisotropic media, physics of magnetism, high temperature superconductors and weak link devices, and ferrites and composites magnetic metal alloys and magnetic superlattices miniature microwave circuits

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

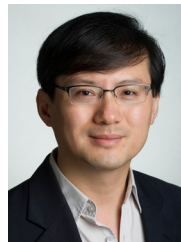
### SELECTED PUBLICATIONS

- K. Ebnabbasi, M. Mohebbi, C. Vittoria  
Coaxial Line Technique to Measure Constitutive Parameters in Magnetoelectric Ferrite Materials, Microwave and Optical Components Letters, 23(9), 2013, 504-506
- M. Mohebbi, K. Ebnabbasi, C. Vittoria  
First Observation of Magnetoelectric Effect In M-Type Hexaferrite Thin Films, Journal of Applied Physics, 113, 2013, 1-5
- M. Mohebbi, C. Vittoria  
Growth of Y-Type Hexaferrite Thin Films by Alternating Target Laser Ablation Deposition, Journal of Magnetism and Magnetic Materials, 344, 2013, 158-161
- M. Mohebbi, K. Ebnabbasi, C. Vittoria  
In-Situ Deposition of C-Axis Oriented Barium Ferrite Films for Microwave Applications, IEEE Transactions on Magnetics, 49(7), 2013
- K. Ebnabbasi, M. Mohebbi, C. Vittoria  
Room Temperature Magneto-electric Effects in Bulk Polycrystalline Materials of M-and Z-Type Hexaferrites, Journal of Applied Physics, 113, 2013
- K. Ebnabbasi, M. Mohebbi, C. Vittoria  
Strong Magnetoelectric Coupling in Hexaferrites at Room Temperature, Journal of Applied Physics, 113, 2013, 17C707

### SELECTED RESEARCH PROJECTS

Novel Epitaxial Films of ME Hexaferrite Materials  
Principal Investigator, Army Research Office

## EDMUND YEH



Professor, Electrical and Computer Engineering

PhD, Massachusetts Institute of Technology, 2001  
ece.neu.edu/people/yeh-edmund

Future internet architecture, cross-layer design and optimization of wireless networks, wireless network science, network economics, wireless sensor networks, network information theory and coding, smart power grids

Alexander von Humboldt Fellowship; Best Paper Award, IEEE International Conference on Communications; Army Research Office Young Investigator Program Award; Senior Member of the Institute of Electrical and Electronics Engineers; Secretary, IEEE Information Theory Society

### SELECTED PUBLICATIONS

- E. Yeh, R.A. Berry  
Throughput Optimal Control of Cooperative Relay Networks, IEEE Transactions on Information Theory, 53(10), 2007, 3827-3833
- R.A. Berry, E. Yeh  
Cross-layer Wireless Resource Allocation, IEEE Signal Processing Magazine, 21(5), 2004, 59-68
- E. Yeh, A.S. Cohen  
Throughput and Delay Optimal Resource Allocation in Multiaccess Fading Channels, Proceedings of the International Symposium on Information Theory (ISIT), Yokohama, Japan, 2003, 245
- L. Zhang, D. Estrin, J. Burke, V. Jacobson, E. Yeh, et al.  
Named Data Networking (NDN) Project, Technical Report ndn-0001, PARC, 2010
- A. Bedekar, S. Borst, K. Ramanan, P. Whiting, E. Yeh  
Downlink Scheduling in CDMA Data Networks, Global Telecommunications Conference, Rio De Janeiro, Brazil, 1999, 2653-2657

### SELECTED RESEARCH PROJECTS

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

NeTS: Small: Collaborative Research: Large Scale Networks and Information Flow: From Emergent Behavior to Algorithm Design  
Principal Investigator, National Science Foundation

Scalable Distributed and Dynamic Forwarding and Caching Algorithms for named Data Networks  
Principal Investigator, Cisco Systems, Incorporated

## Abdulla K. Al-Ali

PhD 2014, Computer Engineering; Advisor, Kaushik Chowdhury

### **DATABASE-ASSISTED END-TO-END THEORETICAL AND SIMULATION FRAMEWORK FOR COGNITIVE RADIO NETWORKS**

This thesis provides the following contributions: (a) An end-to-end transport layer called TFRC-CR is devised that uses equation based transmission rate control, and relies on database updates rather than intermediate node information. (b) A framework for vehicular cognitive radio is created that uses cross-correlation between 2G signals obtained from an Android device and signals from the TV white space to reduce the number of database queries. Moreover, this framework also involves a practical demonstration of interference alignment to optimally use the channel during the querying process. (c) An extension for the network simulator-3 that provides cognitive abilities, such as spectrum sensing, primary user detection, and spectrum hand-off to the research community which allows them to simulate these complex radios in a virtual environment.

See full dissertation at [coe.neu.edu/iris/AbdullaAlAli](http://coe.neu.edu/iris/AbdullaAlAli)

## Anirban Basu

PhD 2014, Computer Engineering; Advisors, Nicol McGruer, George Adams

### **AN EXPERIMENTAL INVESTIGATION OF HOT SWITCHING CONTACT DAMAGE IN RF MEMS SWITCHES**

This dissertation presents work focused on contact damage in Ruthenium-on-Ruthenium microcontacts has been investigated under hot switching conditions. Using an AFM based test setup, developed at Northeastern University for the purpose of contact testing, a large number of experiments were performed to observe and understand the mechanisms that lead to microcontact damage and ultimately its failure. The structure used was a clamped-clamped beam structure with a contact bump at its center. A flat topped mating pillar formed the other end of the contact and this pillar was mounted on a piezoactuator whose expansion and contraction, leading to contacts closing and opening, replicated switching cycles.

See full dissertation at [coe.neu.edu/iris/AnirbanBasu](http://coe.neu.edu/iris/AnirbanBasu)

## Pascal Brunet

PhD 2014, Electrical Engineering; Advisor, Bahram Shafai

### **NONLINEAR SYSTEM MODELING AND IDENTIFICATION OF LOUDSPEAKERS**

This dissertation considers modeling and identification of nonlinear systems pertinent to loudspeakers with nonlinear distortion effects. It is well known that when loudspeakers are driven at high playback levels the nonlinear characteristics of these speakers become a major source of sound degradations. Nonlinear distortion not only diminishes listening pleasure but more importantly impairs speech intelligibility. Consequently it is essential to find a good model that matches to the loudspeaker response for the purpose of predicting and preventing the nonlinear distortion. This becomes particularly important for the purpose of improving sound quality of mobile phones. This report analyzes the loudspeaker operation and provides nonlinear modeling techniques that can reliably be used for its identification process. Frequency domain and state-space modeling are considered and emphasis is given towards model that mix polynomial nonlinear state-space models and fractional order state-space models.

See full dissertation at [coe.neu.edu/iris/PascalBrunet](http://coe.neu.edu/iris/PascalBrunet)

## Song Chen

PhD 2014, Electrical Engineering; Advisor, Bradley Lehman

### **A NON-SUPERCONDUCTING FAULT CURRENT LIMITER (NSFCL)**

In this thesis, we study and review the various topologies of the emerging FCL technology, compare their advantages and limitations, and propose a Non-Superconducting Fault Current Limiter (NSFCL) topology. The NSFCL is optimized to protect against short transients and to work in conjunction with existing protection devices, hence it is simple, low-cost, and more compact than prior art. We analyze the operation of the proposed NSFCL topology under normal condition and different fault conditions, and validate the concept with simulations and experiments of a prototype on a 3-phase 600V system in a UL-certified high power lab. In the tests, the NSFCL successfully protects the system from 100kA potential fault current, by limiting the fault current to a pre-determined level of 50A.

See full dissertation at [coe.neu.edu/iris/SongChen](http://coe.neu.edu/iris/SongChen)

## Rahman Doost-Mohammady

PhD 2014, Computer Engineering; Advisor, Kaushik Chowdhury

### OPPORTUNISTIC WIRELESS SPECTRUM ACCESS: PROTOCOLS, ANALYSIS AND APPLICATIONS

This thesis proposes methods for achieving efficient spectrum access through devising protocols for identifying and sharing unused spectrum, analyzing the theoretical bounds of these protocols, and implementing these solutions in practical medical and vehicular environments.

A significant portion of the thesis is focused on opportunistic spectrum access within licensed frequency bands, where cognitive radios transmit on frequencies without interfering with the primary users in them. First, a cooperative sensing method based on reinforcement learning technique is designed to efficiently detect spectrum opportunities. After identifying portions of the available spectrum, a channel allocation technique is devised for the cognitive radios with quality of service provisioning.

See full dissertation at [coe.neu.edu/iris/RahmanDoost](http://coe.neu.edu/iris/RahmanDoost)

## Mohsen Farmahini Farahani

PhD 2014, Electrical Engineering; Advisor, Hossein Mosallaei

### PLASMONICS AND METASURFACES FOR INFRARED WAVE ENGINEERING

This dissertation investigates several novel passive components composed of plasmonic materials at infrared regime. As an example for a passive plasmonic component, we present a bandpass filter integrated into a metal-insulator-metal (MIM) waveguide at mid-infrared range. Design techniques already developed in microwave and circuit theory used to realize the filter. The insulator is air and metal parts are silver where their loss considered in our simulations. The filter passband is from 27 THz to 33 THz (9.1  $\mu\text{m}$  to 11.1  $\mu\text{m}$ ) and the simulated insertion loss is 1.7 dB. The filter length is 16.9  $\mu\text{m}$ , almost 1.7 times center wavelength (10  $\mu\text{m}$ ).

See full dissertation at [coe.neu.edu/iris/MohsenFarmahini](http://coe.neu.edu/iris/MohsenFarmahini)

## Ankita Shah Faulkner

PhD 2014, Electrical Engineering; Advisor, Ahmed Busnaina

### ELECTRODE ARCHITECTURES FOR EFFICIENT IONIC AND ELECTRONIC TRANSPORT PATHWAYS IN HIGH-POWER LITHIUM ION BATTERIES

The first aim of this dissertation was to develop electrode architectures that enhance electronic and ionic transport pathways in large and small area lithium ion electrodes. These architectures will utilize the unique electronic and mechanical properties of carbon nanotubes to create robust electrode scaffolding that improves electrochemical charge transfer. Using extensive physical and electrochemical characterization, the second aim is to investigate the effect of electrode parameters on electrochemical performance and evaluate the performance against standard commercial electrodes. These parameters include surface morphology, electrode composition, electrode density, and operating temperature. Finally, the third aim is to investigate commercial viability of the electrode architecture. This will be accomplished by developing pouch cell prototypes using a high-rate and low cost scale-up process. Through this work, we aim to realize a commercially viable high-power electrode technology.

See full dissertation at [coe.neu.edu/iris/AnkitaFaulkner](http://coe.neu.edu/iris/AnkitaFaulkner)

## Trifon Fitchorov

PhD 2014, Electrical and Computer Engineering; Advisor, Vincent Harris

### ELECTRIC FIELD-DRIVEN TUNING OF MULTIFERROIC TRANSDUCERS AND ANTENNAS THROUGH CHANGES IN FIELD STRENGTH AND MATERIAL MORPHOLOGY

This dissertation demonstrates experimentally and theoretically that tuning of magnetic properties of the heterostructures can be controlled through applied electric field. Significant CME effect is found in all three heterostructures: FeCoV/PZN-PT (31 Oe cm kV<sup>-1</sup>), Metglas/PMN-PT (23 Oe cm kV<sup>-1</sup>), and FeGa/PMN-PT (12.5 Oe cm kV<sup>-1</sup>). The tunabilities of remanence ( $M_r$ ), coercivity ( $H_c$ ), and squareness ( $SQ = M_r / M_s$ ) are demonstrated. A sensitive dependence of CME effect on the magnitude of the applied electric field is discovered in the time and frequency domains, especially near the electric coercive field, and an alternative path to magnetization reversal is identified.

See full dissertation at [coe.neu.edu/iris/TrifonFitchorov](http://coe.neu.edu/iris/TrifonFitchorov)

## Nastaran Ghadar

PhD 2015, Electrical and Computer Engineering; Advisor, Deniz Erdogmus

### **AUTOMATIC RECOGNITION OF PRIMATE BEHAVIORS AND SOCIAL INTERACTIONS FROM VIDEOS**

In this dissertation, we describe a framework that adopts current practices from computer vision and machine learning in creating the preliminary steps towards solving the problem of automatically recognizing behaviors of primates in a social group (in this case, a pen hosting a group of 3 or more primates). Several challenges need to be overcome in order to achieve primate activity recognition from videos, some of which are: the massive size of continuous video recordings from multiple cameras over days and weeks, illumination variations throughout the day, background changes due to moving objects in the pen and humans passing by (e.g. for feeding or observing), highly variable shapes and poses of primates, and the low visibility of color-coded primate collars causing difficulty in identifying the primates.

See full dissertation at [coe.neu.edu/iris/NastaranGhadar](http://coe.neu.edu/iris/NastaranGhadar)

## Sindhu Ghanta

PhD 2015, Electrical and Computer Engineering; Advisor, Jennifer Dy

### **BAYESIAN NONPARAMETRICS AND MARKED POISSON PROCESSES**

This dissertation explores the use of marked Poisson point processes within a Bayesian nonparametric framework. The Poisson point process underlies a wide range of combinatorial stochastic processes and as such has been a key object driving research in Bayesian nonparametrics. We explore Poisson point processes in combination with probabilistic shape and appearance priors for detection/segmentation of objects/patterns in 1D, 2D and 3D frameworks. This probabilistic formulation encompasses uncertainty in number, location, shape, and appearance of the feature of interest, be it in images or time-series data.

The generative process of the model can be explained as sampling a random number of objects at random locations from a Poisson process. The shape of each object is sampled from a shape model. The appearance inside and outside the shape boundary is sampled from an appearance model with foreground and background parameters respectively.

See full dissertation at [coe.neu.edu/iris/SindhuGhanta](http://coe.neu.edu/iris/SindhuGhanta)

## Scott Gillette

PhD 2014, Electrical Engineering; Advisor, Vincent Harris

### **HIGHLY SENSITIVE TUBE-TOPOLOGY MAGNETOELECTRIC MAGNETIC SENSORS**

This dissertation focuses on development and characterization of tube-topology ME composites as magnetic field sensors. The novel topology is most notable for demonstrating high zero-external-bias sensitivity, low noise floor, low-frequency bandwidth, and self-powered, stable room temperature operation. Numerous characterization studies are included in this work where several devices are analyzed as a function of test-field, DC-bias field, geometry, material choice, and more. The overall conclusions drawn upon these results indicate strongly that the tube-topology ME magnetic field sensor holds promise to compete with existing hall-effect and flux-gate magnetometers. ME composites are at the tipping point of commercialization for use in magnetometry applications and are emerging as a valuable technology for use in numerous creative ways.

See full dissertation at [coe.neu.edu/iris/ScottGillette](http://coe.neu.edu/iris/ScottGillette)

## Murat Gol

PhD 2014, Electrical Engineering; Advisor, Ali Abur

### **INCORPORATION OF PMUS IN POWER SYSTEM STATE ESTIMATION**

The dissertation describes new observability and criticality analysis methods for power systems measured by both SCADA and PMU measurements. Prior to state estimation observability analysis needs to be performed to check if the system is observable with respect to the given measurement set, i.e. if the state estimation problem has a unique solution. Moreover, it is important to identify the critical measurements, whose removal causes unobservability. It should be noted that conventional observability and criticality analysis methods cannot be applied if there are PMUs in the system. The dissertation then introduces an observability restoration method for unobservable power systems by optimally placing pseudo-measurements, such that they all will be strictly critical.

See full dissertation at [coe.neu.edu/iris/MuratGol](http://coe.neu.edu/iris/MuratGol)



## Margery Hines

PhD 2015, Electrical Engineering; Advisor, Carey Rappaport

### AUTONOMOUS ROBOTIC DETECTION OF ANTI-PERSONNEL LANDMINES USING GROUND-PENETRATING RADAR AND ON-CONTACT ANTENNAS

This dissertation proposes the use of ground-contact antennas, which greatly improve signal penetration and are less affected by ground clutter, thereby simplifying data analysis. Achieving contact between the surface and the antennas is done by integrating the antennas onto the feet of the Walking Tri-Sphere, a non-articulated walking robotic platform designed by Square One Systems Design (Jackson, WY, USA). Rather than imaging the subsurface, localization of potential targets is achieved using a robust geometric analysis, minimizing the required number of GPR scans. Overall, by using fewer scans and simpler data processing techniques, this method is capable of increasing the surveying speed of traditional GPR methods.

See full dissertation at [coe.neu.edu/iris/MargeryHines](http://coe.neu.edu/iris/MargeryHines)

## Chung-Ti Hsu

PhD 2014, Electrical Engineering; Advisor, Bradley Lehman

### INCREASED ENERGY DELIVERY FOR PARALLEL BATTERY PACKS WITH NO REGULATED BUS

In this dissertation, a new approach to paralleling different battery types is presented. A method for controlling charging/discharging of different battery packs by using low-cost bi-directional switches instead of DC-DC converters is proposed. The proposed system architecture, algorithms, and control techniques allow batteries with different chemistry, voltage, and SOC to be properly charged and discharged in parallel without causing safety problems. The physical design and cost for the energy management system is substantially reduced. Additionally, specific types of failures in the maximum power point tracking (MPPT) in a photovoltaic (PV) system when tracking only the load current of a DC-DC converter are analyzed. The periodic nonlinear load current will lead MPPT realized by the conventional perturb and observe (P&O) algorithm to be problematic. A modified MPPT algorithm is proposed and it still only requires typically measured signals, yet is suitable for both linear and periodic nonlinear loads.

See full dissertation at [coe.neu.edu/iris/ChungHsu](http://coe.neu.edu/iris/ChungHsu)

## Bolin Hu

PhD 2015, Electrical Engineering; Advisor, Vincent Harris

### CRYSTAL GROWTH OF HEXAFERRITE ARCHITECTURE FOR MAGNETOELECTRICALLY TUNABLE MICROWAVE SEMICONDUCTOR INTEGRATED DEVICES

A nanoscale-driven crystal growth of magnetic hexaferrites was successfully demonstrated at low growth temperatures (25-40% lower than the temperatures required often for crystal growth). This outcome exhibits thermodynamic processes of crystal growth, allowing ease in fabrication of advanced multifunctional materials. Most importantly, the crystal growth technique is considered theoretically and experimentally to be universal and suitable for the growth of a wide range of diverse crystals. In the present experiment, the conical spin structure of  $\text{Co}_2\text{Y}$  ferrite crystals were found to give rise to an intrinsic magnetoelectric effect. Our experiment reveals a remarkable increase in the conical phase transition temperature by  $\sim 150$  K for  $\text{Co}_2\text{Y}$  ferrite, compared to 5-10 K of  $\text{Zn}_2\text{Y}$  ferrites recently reported. The high quality  $\text{Co}_2\text{Y}$  ferrite crystals, having low microwave loss and magnetoelectricity, were successfully grown on wide bandgap semiconductor GaN.

See full dissertation at [coe.neu.edu/iris/BolinHu](http://coe.neu.edu/iris/BolinHu)

## Yu Hui

PhD 2015, Electrical Engineering; Advisor, Matteo Rinaldi

### ALUMINUM NITRIDE PIEZOELECTRIC MICROELECTROMECHANICAL RESONANT PHYSICAL SENSORS

In this dissertation, a stepping stone towards the development of compact, power efficient and high resolution physical sensors: infrared (IR) detectors and magnetic field sensors, is set by taking the unique advantage of the AlN MEMS/NEMS resonant technology, which is the combination of extremely high sensitivity to external perturbations (due to their very reduced dimensions) and ultra-low noise performance (due to the intrinsically high quality factor,  $Q$ , of such resonant devices). For the first time, a spectrally selective uncooled NEMS resonant IR detector based on a plasmonic piezoelectric material is demonstrated, showing high resolution (noise equivalent power of  $2.1 \text{ nW/Hz}^{1/2}$ ) and ultra-fast response (thermal time constant of  $440 \text{ }\mu\text{s}$ ), marking a milestone towards the implementation of a new class of high performance, miniaturized and low power IR spectroscopy and multi-spectral imaging systems.

See full dissertation at [coe.neu.edu/iris/EEYuHui](http://coe.neu.edu/iris/EEYuHui)

## Inseok Jung

PhD 2014, Electrical Engineering; Advisor, Yong-Bin Kim

### SELF-CALIBRATION APPROACH FOR MIXED SIGNAL CIRCUITS IN SYSTEMS-ON-CHIP

In this dissertation, several novel self-calibration design techniques in mixed-signal mode circuits are proposed for an analog to digital converter (ADC) to reduce mismatch error and improve performance. These are essential components in SOCs and the proposed self-calibration approach also compensates the process variations.

The proposed novel self-calibration approach targets the successive approximation (SA) ADC. First of all, the offset error of the comparator in the SA-ADC is reduced using the proposed approach by enabling the capacitor array in the input nodes for better matching. In addition, the auxiliary capacitors for each capacitor of DAC in the SA-ADC are controlled by using synthesized digital controller to minimize the mismatch error of the DAC. Since the proposed technique is applied during foreground operation, the power overhead in SA-ADC case is minimal because the calibration circuit is deactivated during normal operation time.

See full dissertation at [coe.neu.edu/iris/InseokJung](http://coe.neu.edu/iris/InseokJung)

## Mert Korkali

PhD 2014, Electrical Engineering; Advisor, Ali Abur

### ROBUST AND SYSTEMWIDE FAULT LOCATION IN LARGE-SCALE POWER NETWORKS VIA OPTIMAL DEPLOYMENT OF SYNCHRONIZED MEASUREMENTS

This dissertation addresses a novel method for fault location in power systems, while providing a new vision for the deployment of wide-area measurement systems and the application of robust estimation techniques in an effort to achieve systemwide, cost-effective, and resilient fault-location capability in large-scale power systems.

The first part of this dissertation introduces a novel methodology for synchronized-measurement-based fault location in large-scale power grids. The method is built on the notion of traveling waves that propagate throughout the power network. The approach is based upon capturing the arrival times of the fault-initiated traveling waves using a few synchronized sensors and triangulating the location of the fault with the aid of the recorded arrival times of these waves. In order to pinpoint (locate) the faults, these sparsely distributed sensors are exploited to capture point-on-wave samples of transient voltages after the occurrence of a fault.

See full dissertation at [coe.neu.edu/iris/MertKorkali](http://coe.neu.edu/iris/MertKorkali)

## Kang Li

PhD 2015, Computer Engineering; Advisor, Yun Fu

### VIDEO EVENT RECOGNITION AND PREDICTION BASED ON TEMPORAL STRUCTURE ANALYSIS

In this thesis, several studies of high-level video content understanding were presented, which address these difficulties and narrow the semantic gap effectively. In particular, we have focused on two types of videos, namely human activity video and unconstrained consumer video. The proposed temporal structure analysis frameworks significantly extend the domains of video that can be understood by machine vision systems.

In aspect of human activity recognition, we notice that in case a time-critical decision is needed, there is no work that utilizes the temporal structure of videos for early prediction of ongoing human activity. Thus we present a general activity prediction framework in which human activities can be characterized by a complex temporal composition of constituent simple actions and interacting objects. Then we extend our work to the 3D cases of action prediction motivated by recent advent of the cost-effective sensors, such as depth camera Kinect.

See full dissertation at [coe.neu.edu/iris/KangLi](http://coe.neu.edu/iris/KangLi)

## Jennifer Mankin

PhD 2014, Electrical and Computer Engineering; Advisor, David Kaeli

### CLASSIFICATION OF MALWARE PERSISTENCE MECHANISMS USING LOW-ARTIFACT DISK INSTRUMENTATION

In this thesis, we present DIONE, a flexible rule-based disk I/O monitoring and analysis infrastructure. DIONE interposes between a system-under-analysis and its hard disk, intercepting disk accesses and reconstructing high-level file system and registry changes as they occur. We evaluate the accuracy and performance of DIONE, and show that it can achieve 100% accuracy in reconstructing file system operations, with a performance penalty less than 2% in many cases.

Given the trustworthy behavioral traces obtained by DIONE, we convert file system-level events to high-level capabilities. For this, we use model checking, a formal verification approach that compares a model extracted from a behavioral trace to a given specification.

See full dissertation at [coe.neu.edu/iris/JenniferMankin](http://coe.neu.edu/iris/JenniferMankin)

## Babak Memarzadeh Isfahani

PhD 2014, Electrical Engineering; Advisor, Hossein Mosallaei

### PLASMONIC METASURFACES WITH TAILORED LINEAR AND NONLINEAR BUILDING BLOCKS

In the first chapter there is brief review of metamaterials and plasmonic metasurfaces. In the second chapter we present the concept of transmit array concentrator implemented in optics. Planar concentric loop antennas are used as the elements for a  $21 \times 21$  array to concentrate the incident plane wave at a desired distance. Finite difference time domain is used to obtain the performance of the periodic array of each element on the transmit array and then free space dyadic Green's function is employed to find the field distribution at each point, to show the focusing behavior of the metasurface. The third chapter investigates the concept of multi-layered tripod frequency selective surfaces in infrared. A full wave analysis based on finite difference time domain technique is applied to comprehensively characterize the structure and obtain the performance for both normal and oblique waves (for TE and TM polarizations).

See full dissertation at [coe.neu.edu/iris/BabakMemarzadeh](http://coe.neu.edu/iris/BabakMemarzadeh)

## Perhaad Mistry

PhD 2014, Computer Engineering; Advisor, David Kaeli

### ARCHITECTURAL SUPPORT FOR IRREGULAR PROGRAMS AND PERFORMANCE MONITORING FOR HETEROGENEOUS SYSTEMS

This thesis proposes architectural enhancements to the profiling and workgroup scheduling subsystems of heterogeneous devices. The profiling and workgroup scheduling subsystems have been augmented with a resource known as the Offload Control Unit. The OCU enables performance monitoring of compute units with throughput counters. Throughput counters provide utilization information of compute units and the performance knowledge generated is utilized to improve execution performance for priority and data-driven workloads. Throughput counters and the software profiling subsystems result in a runtime that allows performance monitoring, profiling and specializations of applications built using heterogeneous computational pipelines. The scheduling capabilities proposed enable utilization of heterogeneous systems for workloads with QOS and non-homogeneous workgroup distributions.

See full dissertation at [coe.neu.edu/iris/PerhaadMistry](http://coe.neu.edu/iris/PerhaadMistry)

## Marjan Mohebbi

PhD 2014, Electrical Engineering; Advisor, Carmine Vittoria

### MAGNETOELECTRIC HEXAFERRITE THIN FILMS GROWTH FOR NEXT GENERATION DEVICE APPLICATIONS

In this dissertation, alternating target laser ablation deposition (ATLAD) is used for in-situ deposition of M-type and Y-type hexaferrites. There have been considerable reports on epitaxial growth of M-type hexaferrite but not on Y-types, since it is very difficult and challenging to produce them. One of the main problems is the need of substrate temperatures in excess of  $1150^{\circ}\text{C}$  which requires additional expensive high temperature equipment. Our developed process can be done at lower temperatures by PLD equipment and can form unique crystal structures which cannot be achieved by other techniques.

See full dissertation at [coe.neu.edu/iris/MarjanMohebbi](http://coe.neu.edu/iris/MarjanMohebbi)

## Sidi Niu

PhD 2014, Electrical Engineering; Advisor, Vinay Ingle

### QUANTIFICATION OF CHEMICAL GASEOUS PLUMES ON HYPERSPECTRAL IMAGERY

In this dissertation, we evaluate and investigate the advantages and limitations of a number of quantification algorithms that span a variety of assumptions. With these in-depth insights we gain, a new quantification algorithm is proposed for single gas quantification which is superior to all state-of-the-art algorithms in almost every aspects including applicability, accuracy, and efficiency. The new method, called selected-band algorithm, achieves its superior performance through an accurate estimation of the unobservable off-plume radiance. The reason why off-plume radiance is recoverable relies on a common observation that most chemical gases only exhibit strong absorptive behavior in certain spectral bands. Those spectral bands where the gas absorption is almost zero or small are ideal to carry out background estimation. In this thesis, the new selected-band algorithm is first derived from its favorable narrow-band sharp-featured gas and then extended to an iterative algorithm that suits all kinds of gases. The performance improvement is verified by simulated data for a variety of experimental settings.

See full dissertation at [coe.neu.edu/iris/SidiNiu](http://coe.neu.edu/iris/SidiNiu)

## Umut Orhan

PhD 2014, Electrical Engineering; Advisor, Deniz Erdogan

### RSVP KEYBOARD: AN EEG BASED BCI TYPING SYSTEM WITH CONTEXT INFORMATION FUSION

In this dissertation RSVP aims to be accessible to the population with limited eye gaze control by presenting sequences of symbols on a screen over time at a fixed focal area and in rapid succession. As a response to the infrequent novel target stimulus (oddball paradigm), brain generates P300, an event related potential which is a positive deflection in the scalp voltage mainly in the centro-parietal areas with an average latency just over 300 ms. This natural novelty response allows us to design interfaces by detecting the intent using EEG.

See full dissertation at [coe.neu.edu/iris/UmutOrhan](http://coe.neu.edu/iris/UmutOrhan)

## Lang Peng

PhD 2014, Electrical Engineering; Advisor, Hanoch Lev-Ari

### EFFICIENT ESTIMATION AND TRACKING OF RESPONSE STATISTICS FOR (RANDOMLY) TIME-VARIANT SYSTEMS

In this dissertation we develop efficient time -recursive alternatives to the existing non-recursive procedure for estimating the system's response autocorrelation. In addition, we exploit the structure and sparsity of the covariance matrix associated with our WIP interpretation to develop lag-recursive solutions that achieve a further reduction of the overall computational cost. In particular, we explore the possibility of using the maximum entropy method (MEM) to obtain a computationally efficient direct estimate of the system's (multi-channel) Doppler-spread spectrum.

See full dissertation at [coe.neu.edu/iris/LangPeng](http://coe.neu.edu/iris/LangPeng)

## Parastoo Qarabaqi

PhD 2014, Electrical Engineering; Advisor, Milica Stojanovic

### STATISTICAL CHARACTERIZATION OF A CLASS OF UNDERWATER ACOUSTIC COMMUNICATION CHANNELS

In this dissertation, we offer a statistical channel model, which incorporates physical laws of acoustic propagation (frequency-dependent attenuation, bottom-surface reflections) as well as the effects of inevitable random local displacements.

We focus on random displacements on two scales: small-scale effects, that involve distances on the order of a few wavelengths, and large-scale effects, that involve many wavelengths. Small-scale effects include scattering and motion-induced Doppler shifting, and are responsible for fast variations of the instantaneous channel response; while large-scale effects describe the location uncertainty and changing environmental conditions, and affect the locally-averaged received power.

See full dissertation at [coe.neu.edu/iris/ParastooQarabaqi](http://coe.neu.edu/iris/ParastooQarabaqi)

## Anup Kumar Singh

PhD 2014, Electrical Engineering; Advisor, Nicol McGruer

### ORGANIC PHOTOVOLTAICS USING NOVEL PENTACENE DERIVATIVES

In this thesis, present the OPV cell designs (bilayer or planar and bulk heterojunction type), fabrication steps, electrical results and discuss them to correlate the experimental findings with simulation data.

One of the most promising organic semiconductors is pentacene, which acts mainly as a donor molecule. It is observed that PCE does not improve above this optimum mobility value of about 10-4 cm<sup>2</sup>/V-s. Donor and acceptor thicknesses are also optimized using the simulation program to get the best efficiency. We also investigate the effect of exciton diffusion length of organic semiconductor on power conversion efficiency, and simulations suggest that PCE almost saturates above certain value of exciton diffusion length.

See full dissertation at [coe.neu.edu/iris/AnupSingh](http://coe.neu.edu/iris/AnupSingh)



## Jianzhe Tai

PhD 2014, Electrical and Computer Engineering; Advisor, Ningfang Mi

### RESOURCE MANAGEMENT IN ENTERPRISE CLUSTER AND STORAGE SYSTEMS

In this thesis, we present our works on resource management in large scale systems, especially for enterprise cluster and storage systems. Large-scale cluster systems have become quite popular among a community of users by offering a variety of resources. Such systems require complex resource management schemes for multi-objective optimizations and should be specific to different system requirements. In addition, burstiness has often been found in enterprise workloads, being a key factor in performance degradation. Therefore, it is an extremely challenging problem of managing heterogeneous resources (e.g., computing, networking and storage) for such a large scale system under bursty conditions while providing performance guarantee and cost efficiency.

See full dissertation at [coe.neu.edu/iris/JianzheTai](http://coe.neu.edu/iris/JianzheTai)

## Osso Vahabzadeh

PhD 2014, Electrical Engineering; Advisor, Masoud Salehi

### EFFICIENT LOW-DENSITY PARITY-CHECK CODES FOR COOPERATIVE COMMUNICATION

In this dissertation, we address code design problem for cooperative communication over different channel models with emphasis on low complexity designs and structured codes that are attractive for practical implementation. We start with the problem of designing efficient codes for the relay node in Gaussian relay channels. For a class of capacity approaching codes for this channel model, called bilayer lengthened LDPC (BL-LDPC) codes, we calculate a measure of decoding complexity as a function of the number of decoding iterations and propose a technique to design complexity-optimized BL-LDPC codes by minimizing the complexity measure of these codes. This is made possible by generalizing the EXIT charts to the case of BL-LDPC codes. Motivated by the fact that there are usually stricter hardware restrictions at the relay node, our technique targets minimizing the decoding complexity of the relay code. Furthermore, excessive delay due to decoding high rate codes at the relay results in additional delay at the destination. Using our technique, we design bilayer codes with noticeable reduction in decoding complexity and delay compared to the rate-optimized codes reported in the literature.

See full dissertation at [coe.neu.edu/iris/OssoVahabzadeh](http://coe.neu.edu/iris/OssoVahabzadeh)

## Niksa Valim

PhD 2014, Electrical Engineering; Advisor, Mark Niedre

### INSTRUMENTATION AND METHODS FOR TIME-RESOLVED DIFFUSE FLUORESCENCE IMAGING

We studied the impact of instrumentation on early-arriving photon measurements and showed that this had a significant effect on instrument performance compared to theoretical models. Specifically the effects of i) instrument temporal impulse response function, ii) detector sensitivity and iii) detected signal levels were studied. Based on this work, an improved early-photon tomography prototype was developed and validated in our lab.

Complimentary to this work, we studied time-resolved and multispectral analysis of FMT data sets with multiple fluorescent targets. In general, the narrow (~200 nm) "diagnostic window" in biological tissue in the red and NIR wavelength range, combined with the broad emission spectra of organic fluorophores limits the number concurrent fluorescent targets in an imaging system to one or two.

See full dissertation at [coe.neu.edu/iris/NiksaValim](http://coe.neu.edu/iris/NiksaValim)

## Alexandru Vasile

PhD 2015, Electrical Engineering; Advisor, Octavia Camps

### HIERARCHICAL IMAGE GEO-LOCATION ON A WORLD-WIDE SCALE

In this thesis, we leverage multiple large geo-spatial databases to create a 3D world model and develop a hierarchical image geo-location framework using a coarse-to-fine localization approach. Starting at the coarsest level, a query image is geo-located to regions of the world through a probabilistic terrain classification approach using a 6.5 million image Flickr database. Next, a novel medium-scale localization method is developed to rule out most of the regions and establish candidate geo-locations with geo-positioning accuracy at a city level. Results from the combined hierarchical classifier demonstrate a 10% improvement over current state-of-the-art. A fine-scale geo-location stage was also developed to determine the pose of a query image to street-level geo-positioning accuracy.

See full dissertation at [coe.neu.edu/iris/AlexandruVasile](http://coe.neu.edu/iris/AlexandruVasile)

## Curtis Watson

PhD 2014, Computer Engineering; Advisor, Waleed Meleis

### **SIGNAL DETECTION AND DIGITAL MODULATION CLASSIFICATION-BASED SPECTRUM SENSING FOR COGNITIVE RADIO**

In this dissertation, we describe a spectrum sensing architecture that characterizes the carrier frequency and bandwidth of all narrowband signals present in the spectrum, along with the modulation type of those signals that are located within a licensed portion of the spectrum. From this radio identification, a cognitive radio can better determine an opportunity to access the spectrum while avoiding primary users.

We describe a narrowband signal detection algorithm that takes an iterative approach to jointly estimate the carrier frequency and bandwidth of individual narrowband signals contained within a received wideband signal. Our algorithm has a number of tunable parameters, and the algorithm gives consistent performance as we varied these parameter values. Our algorithm outperforms the expected performance of an energy detection algorithm, in particular at lower signal-to-noise ratio (SNR) values. These behavioral features make our algorithm a good choice for use in our spectrum sensing architecture.

See full dissertation at [coe.neu.edu/iris/CurtisWatson](http://coe.neu.edu/iris/CurtisWatson)

## Wei Wei

PhD 2015, Electrical and Computer Engineering;  
Advisor, Fabrizio Lombardi

### **NOVEL PARADIGMS AND DESIGNS OF NANOMETRIC MEMORIES**

This dissertation of study has investigated low power design techniques and methods to accomplish the tolerance improvement to the soft error, especially in the SEU. It achieves research and design concentrated on the memory circuit at nano scaled CMOS from various perspectives, including SRAM, DRAM, hybrid memory and multiple level memory. Moreover, by implementing the novel technology like Single-Electron transfer and Resistive RAM (RRAM), the designs are capable of replacing conventional MOSFET-based memory circuit and compatible with the MOSFET fabrication process. The proposed memory circuits have been evaluated with extensive HSPICE simulations. Finally, novel design of memory circuits have been demonstrated from architecture level with SPEC benchmark simulation and characterized the performance improvement of the implemented cache. In sum, this manuscript presents the adequate investigations on the nanometric memory designs, verification and characterization, facilitating novel design techniques with the emerging technology implementation.

See full dissertation at [coe.neu.edu/iris/WeiWei](http://coe.neu.edu/iris/WeiWei)

## Fei Xiong

PhD 2014, Electrical Engineering; Advisor, Octavia Camps

### **MANIFOLD EMBEDDING WITH DYNAMIC AND/OR CLASSIFICATION SUPERVISION**

In this dissertation, we propose a set of nonlinear manifold embedding tools that exploit supervised learning information to find low dimensional data embeddings that preserve spatial and/or temporal correlations characteristics hidden in high dimensional data such as videos and images.

The proposed methods extend the maximum variance embedding objective used in the existing Semi-Definite Embedding (SDE) algorithm by incorporating large margin, low dynamic order and large margin dynamic classification objectives, respectively. These three different supervision objectives benefit the embeddings with linear separation between classes, simple dynamics and separation between different dynamics.

See full dissertation at [coe.neu.edu/iris/FeiXiong](http://coe.neu.edu/iris/FeiXiong)

## Ayse Yilmazer

PhD 2014, Electrical and Computer Engineering; Advisor, David Kaeli

### **MICRO-ARCHITECTURAL SUPPORT FOR IMPROVING SYNCHRONIZATION AND EFFICIENCY OF SIMD EXECUTION ON GPUS**

This dissertation presents a new approach to enhance the efficiency and scalability of GPU synchronization. The proposed scheme can enable applications that work on shared data to effectively communicate at finer levels of granularity.

To achieve this ambitious goal, we propose a new synchronization approach called Hierarchical Queuing Locks (HQL). HQL is a novel hardware-based synchronization mechanism which provides efficient use of resources through execution blocking and hierarchical queuing. To provide a queue-based locking mechanism, HQL extends current GPU L1 and L2 cache management protocols by adding a synchronization protocol. Integration of HQL's synchronization protocol simplifies the synchronization, but adds a level of complexity to the cache management protocol. Given this added complexity to the cache management scheme, as part of this dissertation we provide a formal verification of the proposed HQL synchronization protocol.

See full dissertation at [coe.neu.edu/iris/AyseYilmazer](http://coe.neu.edu/iris/AyseYilmazer)

## Esra Negris Yolacan

PhD 2014, Computer Engineering; Advisor, David Kaeli

### LEARNING FROM SEQUENTIAL DATA FOR ANOMALY DETECTION

In this thesis, we address context-aware multi-class anomaly detection as applied to discrete sequences and develop a context learning approach using an unsupervised learning paradigm. We begin the anomaly detection process by applying our approach to differentiate normal behavior classes (contexts) before attempting to model abnormal behavior. This approach leads to stronger learning on each class by taking advantage of the power of advanced models to identify normal behavior of the sequence classes. We evaluate our discrete sequence-based anomaly detection framework using two illustrative applications: 1) System call intrusion detection and 2) Crowd anomaly detection. We also evaluate how clustering can guide our context-aware methodology to positively impact the anomaly detection rate. In this thesis, we utilize a Hidden Markov Model (HMM) to perform anomaly detection. A HMM is the simplest dynamic Bayesian network. A HMM is a Markov model which can be used when the states are not observable, but observed data is dependent on these hidden states.

See full dissertation at [coe.neu.edu/iris/EsraYolacan](http://coe.neu.edu/iris/EsraYolacan)

## Sheng You

PhD 2014, Electrical Engineering; Advisor, Deniz Erdogan

### AUTOMATIC SUBLINGUAL MICROCIRCULATION IMAGE ANALYSIS AND QUANTITATIVE ASSESSMENT OF THE MICROCIRCULATION

In this dissertation, our objective is to develop a fully functional, automatic computer assisted diagnosis tool providing quantitative microvascular measurements for the characterization of sublingual microcirculation in healthy subjects and infected patients and assist doctors in determining pathological conditions of patients.

See full dissertation at [coe.neu.edu/iris/ShengYou](http://coe.neu.edu/iris/ShengYou)

## Jiaxing Zhang

PhD 2014, Computer Engineering; Advisor, Gunar Schirner

### INTEGRATING ALGORITHM-LEVEL DESIGN AND SYSTEM-LEVEL DESIGN THROUGH SPECIFICATION SYNTHESIS

This thesis introduces a specification synthesis approach that joins two design methodologies, Algorithm-Level Design (ALD) and System-Level Design (SLD), to establish a new Algorithm-Architecture Co-design flow. We designed and implemented an algorithm-to-specification synthesizer: Algo2Spec, which out of an algorithm model captured in ALD, such as Simulink, synthesizes into an SLD languages (SLDL) specification (e.g. SpecC/SystemC) enabling SLD exploration. Expanding the rich sets of SLD facilities into higher abstraction levels in ALD forms a new joint co-design methodology. The new flow seamlessly spans from the Simulink environment down to heterogeneous implementations crossing multiple abstractions. Our tools empower designers to construct, simulate, validate, explore, and deploy models in rapid feedback cycles. Our results illustrated the opportunities and benefits of our approach on a set of real-world applications and showed a significantly shortened design time.

See full dissertation at [coe.neu.edu/iris/JiaxingZhang](http://coe.neu.edu/iris/JiaxingZhang)

## Ziyao Zhou

PhD 2014, Electrical Engineering; Advisor, Nian Sun

### VOLTAGE CONTROL OF MAGNETISM

In our work, different mechanism-based magnetoelectric (ME) coupling in multiferroics heterostructure was investigated for the development of novel generation, voltage-controllable, high-speed, compact RF/microwave devices with greater energy efficiency.

Firstly, ME coupling was realized in different magnetic thin film/ferroelectric slab heterostructures. By decreasing the saturation magnetization of Cr doping Ni magnetic thin film, large ME coupling in NiCr/PbZr<sub>0.52</sub>Ti<sub>0.48</sub>O<sub>3</sub> (PZT) and NiCr/PbZn<sub>1/3</sub>Nb<sub>2/3</sub>O<sub>2.4</sub>(PbTiO<sub>3</sub>)<sub>0.6</sub> (PZNPT) was obtained. Furthermore, non-volatile voltage impulse tunability was discovered through electric field-induced phase transition in FeGaB/PZNPT multiferroics heterostructure.

See full dissertation at [coe.neu.edu/iris/ZiyaoZhou](http://coe.neu.edu/iris/ZiyaoZhou)

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