# DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

We in the ECE Department are happy to provide you with our Annual Scholarship Report. This report highlights the research and accomplishments of our esteemed faculty in the past year and serves as an introduction to some new faces joining our department.

ECE has added 4 new faculty for the 2016/17 academic year. We welcome Pau Closas in positioning and tracking systems, Hui Fang in nano- and bio-electronics, Xue (Shelley) Lin in low power and high performance computing systems, and Aatmesh Shrivastava in ultra-low power circuits.

The ECE Department, and the College of Engineering as a whole, looks forward to the upcoming year as we welcome new colleagues, and continue to serve the students of Northeastern by providing the best education and opportunities possible. ECE has added 3 new master's concentrations in the area of Computer Engineering: Computer Systems and Software, Computer Networks and Security, and Computer Vision, Machine Learning, and Algorithms, and is proud to introduce a new undergraduate minor in Computational Data Analytics.

We hope you can come see for yourself the work being done in our wonderful college as we continue to work to improve all aspects of our department.

Sincerely,

Miriam Leeser
Interim Chair of Electrical and Computer Engineering
m.leeser@northeastern.edu

## QUICK FACTS

**11**
**NATIONAL SCIENCE FOUNDATION CAREER** Awards

**16**
**YOUNG INVESTIGATOR** Awards

**54**
**TENURED/ TENURE-TRACK** Faculty

**242**
**doctoral** students

# DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

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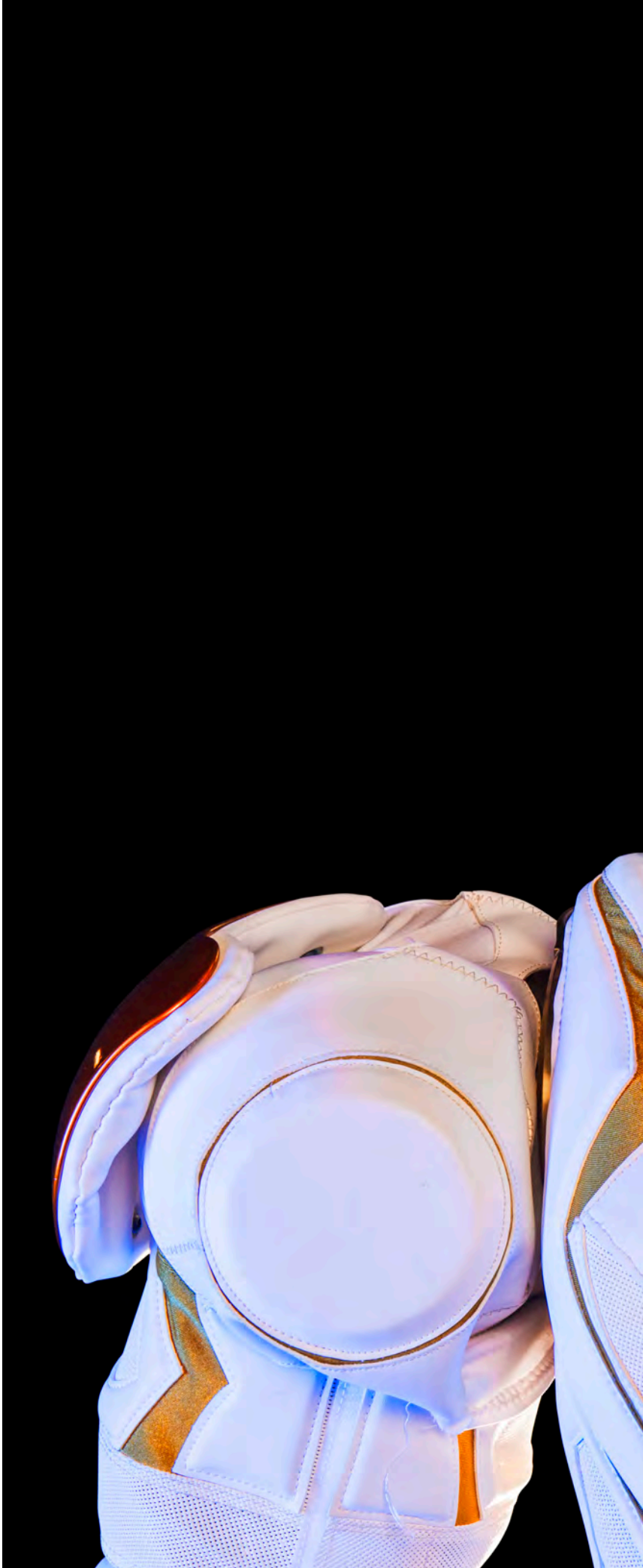
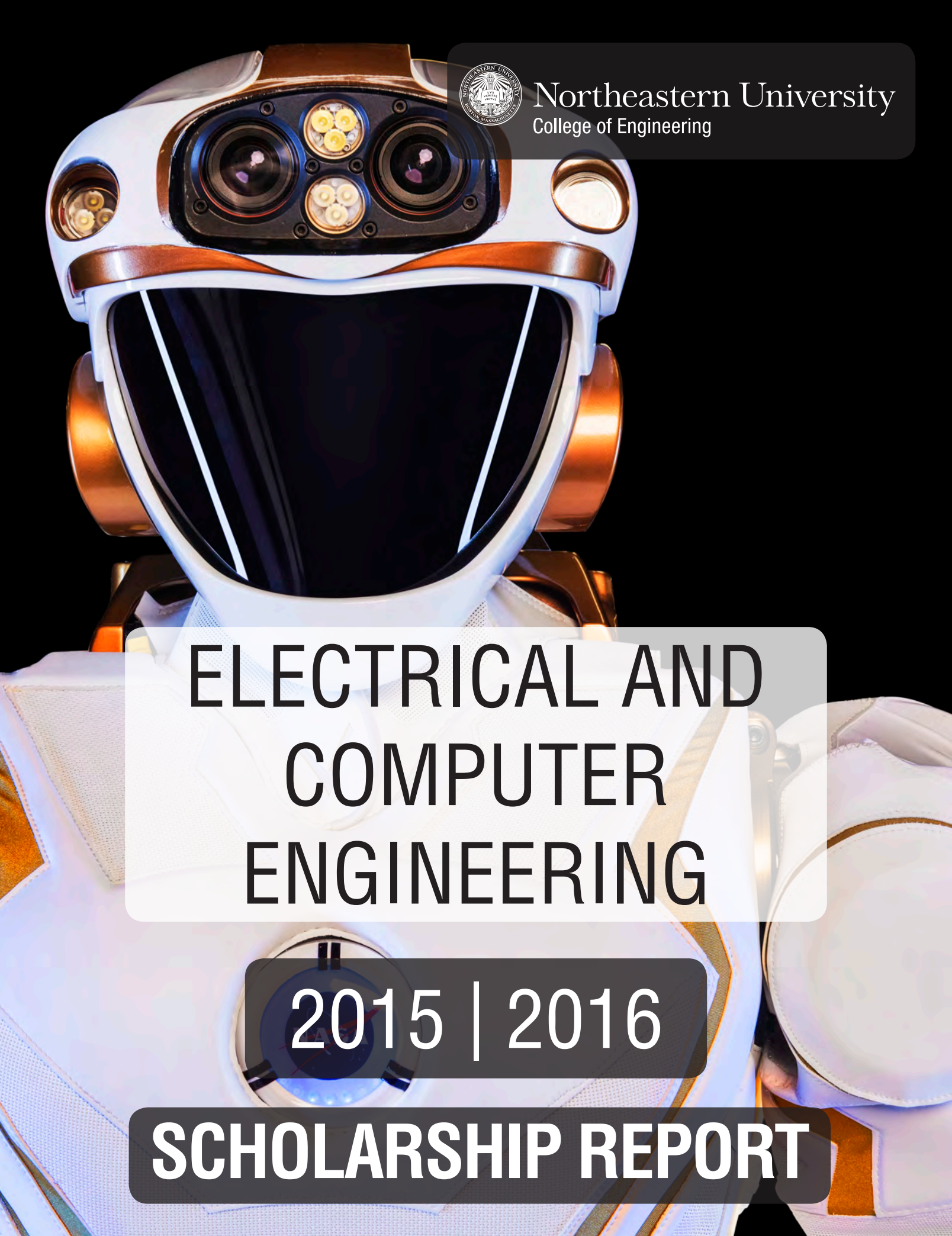
## COVER IMAGE

This image shows the Valkyrie humanoid robot designed by NASA's Johnson Space Center. NASA awarded Valkyrie to a Northeastern-led research team for research and development aimed at advancing its capabilities for future space exploration missions. It is envisioned that Valkyrie or similar robots will be critical for the pre-deployment missions in advance of NASA's planned manned MARS mission in 2030s. Over the next two years, Northeastern ECE researchers, led by **Associate Professor Taskin Padir**, will work on new algorithms to enrich Valkyrie's software libraries to perform tasks relevant to space exploration missions, such as searching for and collecting samples, repairing equipment, and exiting an airlock. In collaboration with the New England Robotics Validation and Experimentation Center, in Lowell MA, the research team will also validate tasks for 2017 NASA Space Robotics Centennial Challenge.

Learn more at **robot.neu.edu**





Northeastern University
College of Engineering

# ELECTRICAL AND COMPUTER ENGINEERING

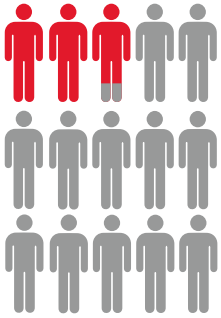
## 2015 | 2016

# SCHOLARSHIP REPORT

# QUICK FACTS — Electrical and Computer Engineering

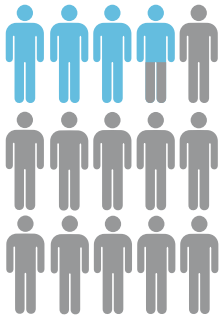
**291** masters students

18.5% FEMALE



**242** doctoral students

23% FEMALE



**16** YOUNG INVESTIGATOR Awards

**11** NATIONAL SCIENCE FOUNDATION CAREER Awards

**54** TENURED/ TENURE-TRACK Faculty

**5** NEW HIRES FOR 2015/2016

**13** IEEE FELLOWS

**$53** MILLION IN ACTIVE RESEARCH GRANTS

## $15M ANNUAL FACULTY RESEARCH EXPENDITURES

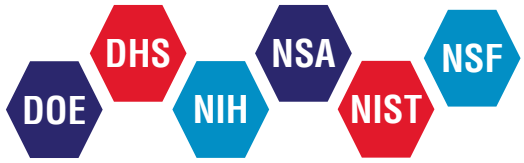
(up 37% from FY14)

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

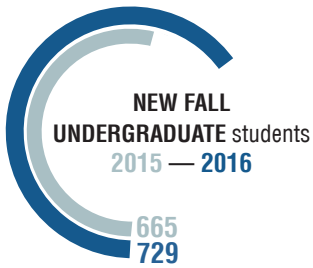

The department offers 5 research concentrations and is either the lead or partner of seven federally-funded research centers.

# QUICK FACTS — College of Engineering

**12** MULTI-INSTITUTIONAL RESEARCH CENTERS funded by six federal agencies




**169** TENURED/ TENURE-TRACK Faculty



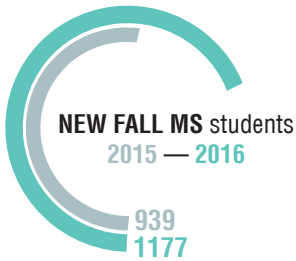

**3550** UNDERGRADUATE students

**5** ENGINEERING DEPARTMENTS

- Bio
- Chemical
- Civil and Environmental
- Electrical and Computer
- Mechanical and Industrial

**64** YOUNG INVESTIGATOR Awards

**36** NSF CAREER Awards




**3210** GRADUATE students

# HONORS

## ACHIEVEMENTS

* PhD student co-author

## PATENTS

Assistant Professor **Mahshid Amirabadi** was awarded a patent for creating "DC Capacitors-less Power Converters."

Professor **Vincent Harris** was awarded a patent for his designs of a "Cobalt Carbide-based Nanoparticle Permanent Magnet Materials."

Director of the Kostas Nanoscale Research Center **Sivasubramanian Somu,** WL Smith Chair and University Distinguished Professor **Ahmed Busnaina,** Professor **Nicol McGruer, Peter Ryan***, College of Engineering Distinguished Professor **George G. Adams, Xugang Xiong*,** and **Taehoon Kim*** were awarded a patent for "System and Method for Integrating a Single Nanowire Into a Nanocircuit."

## BEST PAPER AWARDS

Associate Professor **Yunsi Fei** was selected for Best Paper at the 2015 International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems Conference for her paper named "*TARS: A Traffic-adaptive Receiver-synchronized MAC Protocol for Underwater Sensor Networks*," co-authored by Yu Han*.

Professor **Jose Martinez-Lorenzo** received the Burke/Yannas Bioengineering Best Paper Award at the 47th Annual Meeting of the American Burn Association.

Professor **Yong-Bin Kim** was selected for Best Paper Award at the IEEE MWSCAS conference for his paper entitled "*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 **Mitch Kokar** won a Best Paper Award at the Wireless Innovation Forum Conference on Communications Technologies and Software Defined Radio for his paper was entitled "*Mapping Spectrum Consumption Models to Cognitive Radio Ontology for Automatic Inference*," co-authored by PhD candidates Yanji Chen* and Durga Suresh*.

College of Engineering Distinguished Professor **Carey Rappaport** won Best Antenna Design and Application Paper award at the 9th European Conference on Antennas and Propagation for the paper entitled "*Multistatic Nearfield Imaging Radar for Portal Security Systems Using a High Gain Toroidal Reflector Antenna.*" The paper was co-authored by former Northeastern Senior Research Engineer Borja Gonzalez Valdes.

Professor **Bahram Shafai** won the Best Paper Award at the 19th International Conference on System Theory, Control, and Computing for "*Positive Unknown Input Observer Design for Positive Linear Systems.*" This paper was co-authored by Sam Nazari and Amirreza Oghbaee.

Professor **Edmund Yeh** is the co-recipient of the Best Paper Award at the 2015 IEEE International Conference on Communications (ICC) Communication Theory Symposium for "*Optimization-based Linear Network Coding for General Connections of Continuous Flows.*" This paper was co-authored by Ying Cui (former Northeastern postdoc), Muriel Medard, Douglas Leith, and Ken Duffy.

## FACULTY HONORS AND AWARDS

Associate Professor **Stefano Basagni** was named a Distinguished Scientist of the Association for Computing Machinery.

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

Associate Professor **Yun Raymond Fu** was recognized by the IEEE Computational Intelligence Society as the awardee of 2016 IEEE CIS Outstanding Early Career Award, for contributions to neural computing, manifold learning, and visual intelligence.

Professor **Brad Lehman** was awarded the 2015 IEEE Power Electronics Society's Modeling and Control Technical Achievement Award.

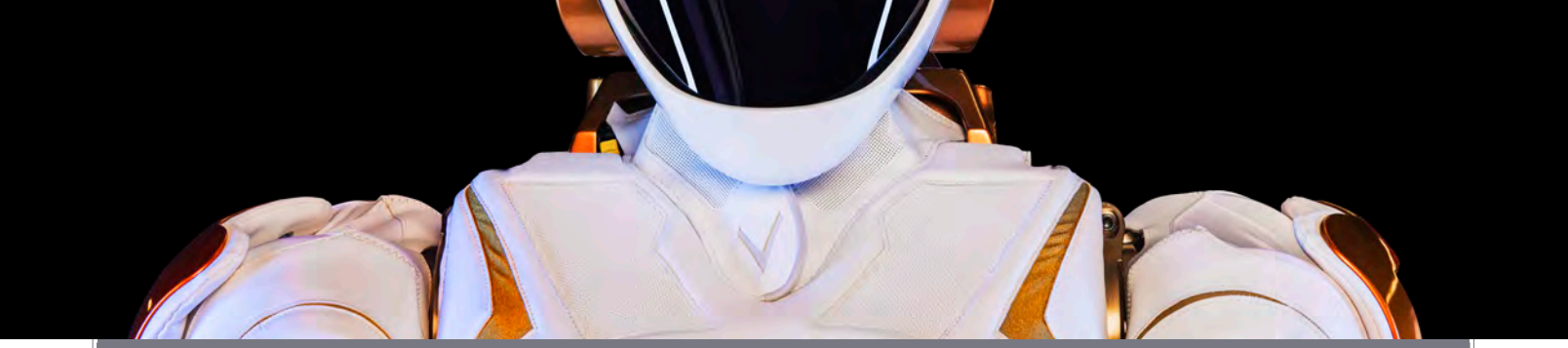
Associate Professor **Ningfang Mi** was awarded a $459K NSF CAREER Award for her project, "Capacity Planning Methodologies for Large Clusters with Heterogeneous Architectures and Diverse Applications."

Assistant Professor **Marvin Onabajo** was awarded a $500K NSF CAREER Award to investigate "Low-power Transceiver Design Methods for Wireless Medical Monitoring."

Assistant Professor **Matteo Rinaldi** was awarded the 2015 IEEE Sensors Council Early Career Award for outstanding contributions to novel multi-functional piezoelectric micro and nano electro mechanical resonant sensors.

Robert D. Black Professor and COE Distinguished Professor **Michael B. Silevitch**, along with Director of the Gordon Engineering Leadership Program **Simon Pitts** received the 2015 National Academy of Engineering Gordon Prize.

Professor **Milica Stojanovic** was awarded the 2015 IEEE Oceanic Engineering Society's Distinguished Technical Achievement Award.



# FACULTY BY RESEARCH AREAS

## 11
**Faculty**

### COMMUNICATIONS AND SIGNAL PROCESSING

Dana Brooks
Pau Closas
Jennifer Dy
Deniz Erdogmus
Vinay Ingle
Hanoch Lev-Ari
Sarah Ostadabbas
Purnima Ratilal-Makris
Masoud Salehi
Dagmar Sternad
Milica Stojanovic

## 7
**Faculty**

### MICROSYSTEMS AND DEVICES

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

## 20
**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
Xue Lin
Fabrizio Lombardi
Waleed Meleis
Tommaso Melodia
Ningfang Mi
Taskin Padir
Wil Robertson
Gunar Schirner
Hanumant Singh
Edmund Yeh

## 12
**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
Michael B. Silevitch
Carmine Vittoria

## 6
**Faculty**

### POWER ELECTRONICS, SYSTEMS AND CONTROL

Ali Abur
Mahshid Amirabadi
Bradley Lehman
Bahram Shafai
Mario Sznaier
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

Y. Lin, A. Abur
A New Framework for Detection and Identification of Network Parameter Errors, IEEE Transactions on Smart Grids, 99, 2016

A. Rouhani, A. Abur
Linear Phasor Estimator Assisted Dynamic State Estimation, IEEE Transactions on Smart Grids, 99, 2016

Y. Lin, A. Abur
Highly Efficient Implementation for Parameter Error Identification Method Exploiting Sparsity, IEEE Transactions on Power Systems, 99, 2016, 1-9

G. Feng, A. Abur
Fault Location Using Wide-area Measurements and Sparse Estimation, IEEE Transactions on Power Systems, 31(4), 2015, 2938-2945

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, 7(3), 2015, 1530-1536

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

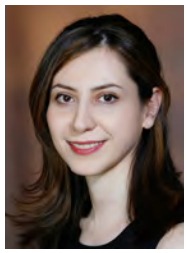
M. Göl, A. Abur
LAV Based Robust State Estimation for Systems Measured by PMUs, IEEE Transactions on Smart Grids, 5(4), 2014, 1808-1814

## SELECTED RESEARCH PROJECTS

Identification and Correction of Network Parameter Errors
Principal Investigator, ISO-New England

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

# MAHSHID AMIRABADI



Assistant Professor, Electrical and Computer Engineering

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

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

## SELECTED PUBLICATIONS

S.A.KH. Mozaffari Niapour, M. Amirabadi
Extremely Sparse Parallel AC-link Universal Power Converters, IEEE Transactions on Industry Applications, 52(3), 2016, 2456-2466

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 threephase 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

## SELECTED RESEARCH PROJECTS

A Novel Inverter for Wireless Charging
Principal Investigator, Korea Railroad Research Institute

A Reliable PV Inverter for Reducing the Overall Cost of Residential PV Systems
Principal Investigator, The Massachusetts Technology Transfer Center at UMass

# STEFANO BASAGNI

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

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

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

Distinguished Scientist of the Association for Computing Machinery

## SELECTED PUBLICATIONS

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

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

L. Chen, J. Warner, P.L. Yung, D. Zhou, W. Heinzelman, I. Demirkol, U. Muncuk, K.R. Chowdhury, S. Basagni
Reach2-mote: A Range Extending Passive Wake-up Wireless Sensor Node, ACM Transactions on Sensor Networks, 11(4):64, 2015, 1-64

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

## SELECTED RESEARCH PROJECTS

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

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

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, and optimization

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

## SELECTED PUBLICATIONS

S. Guler, M. Dannhauer, B. Erem, R. Macleod, D. Tucker, S. Turovets, P. Luu, D. Erdogmus, D.H. Brooks
Optimization of Focality and Direction in Dense Electrode Array Transcranial Direct Current Stimulation (tDCS), Journal of Neural Engineering, 13(3), 2016, 36020-36033

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

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

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

## SELECTED RESEARCH PROJECTS

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

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

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

# OCTAVIA CAMPS

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

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

Robust computer vision, image processing, and machine 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

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

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

## SELECTED PUBLICATIONS

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

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

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

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

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

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

## SELECTED RESEARCH PROJECTS

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

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

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

# PAU CLOSAS

Assistant Professor, Electrical and Computer Engineering

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

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

Duran Farell for Technological Research; EURASIP Best PhD Thesis Award; Senior Member, Institute of Electrical and Electronics Engineers

## SELECTED PUBLICATIONS

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

J. Vilà-Valls, P. Closas, C. Fernández-Prades, J.A. López-Salcedo, G. Seco-Granados
Adaptive GNSS Carrier Tracking under Ionospheric Scintillation: Estimation vs Mitigation, IEEE Communications Letters, 19(6), 2015, 961-964

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

J. Dampf, T. Pany, W. Bär, J. Winkel, C. Stöber, K. Fürlinger, P. Closas, J.A. Garcia-Molina
More Than We Ever Dreamed Possible: Processor Technology for GNSS Software Receivers in the Year 2015, Inside GNSS, 10(4), 2015, 62-72

X. Liu, M. Liang, Y. Morton, P. Closas, T. Zhang, Z. Hong
Performance Evaluation of MSK and OFDM modulations for Future GNSS signals, GPS Solutions, 18(2), 2014, 13

A. Fernández, M. Wis, P. Closas, C. Fernández-Prades, J.A. García, F. Zanier, M. Crisci
Analysis of Signal Tracking Techniques for Multipath Mitigation, GPS World, 24(11), 2013, 44-50

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

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

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

# CHARLES DIMARZIO

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

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

Optics, microscopy, coherent detection, interaction of light and sound waves, hyperspectral imaging, diffusive optical tomography and ultrasound, landmine detection, magneto-optic sensors, multi-model imaging, and 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 28th International Conference on Machine Learning (ICML), 2011, 1161-1168

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

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

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

## SELECTED RESEARCH PROJECTS

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

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

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

# DENIZ ERDOGMUS

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, and 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 ModelEEG 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 Singletrial 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)
Co-Principal Investigator, Intelligence Advanced Research Projects Activity

The Rehabilitation Engineering Research Center on Augmentative and Alternative Communication
Co-Principal Investigator, U.S. Department of Education

# HUI FANG

Assistant Professor, Electrical and Computer Engineering

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

Nano-electronics, bio-integrated electronics, and nano-physics

## SELECTED PUBLICATIONS

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

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

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

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

H. Fang, S. Chuang, T. C. Chang, K. Takei, T. Takahashi, A. Javey
High-performance Single Layered WSe2 p-FETs with Chemically Doped Contacts, Nano Letters, 12, 2012, 3788-3792

J. Nah, H. Fang, C. Wang, K. Takei, M. H. Lee, E. Plis, S. Krishna, A. Javey
III–V Complementary Metal–oxide–semiconductor Electronics on Silicon Substrates, Nano Letters, 12, 2012, 3592-3595

H. Fang, S. Chuang, K. Takei, H. S. Kim, E. Plis, C.-H. Liu, S. Krishna, Y.-L. Chueh, A. Javey
Ultrathin-body, High-mobility InAsSb-on-insulator Field-effect Transistors, IEEE Electron Device Letters, 33, 2012, 504-506

K. Takei, H. Fang, S. B. Kumar, R. Kapadia, Q. Gao, M. Madsen, H. S. Kim, C.-H. Liu, et. al.
Quantum Confinement Effects in Nanoscale-thickness InAs Membranes, Nano Letters, 11, 2011, 5008–5012

# 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, and underwater sensor networks

National Science Foundation CAREER Award; College of Engineering Faculty Fellow

## SELECTED PUBLICATIONS

Y. Han, Y. Fei
DAP-MAC: A Delay-aware Probability-based MAC Protocol for Underwater Acoustic Sensor Networks, Elsevier Ad Hoc Networks (ADHOC), 48, 2016, 80-92

P. Luo, C. Li, Y. Fei
Concurrent Error Detection for Reliable SHA-3 Design, Association for Computing Machinery Great Lake Symposium on VLSI (GLSVLSI), 2016

Z. Jiang, Y. Fei, D.R. Kaeli
A Complete Key Recovery Timing Attack on a GPU, International Symposium on High-Performance Computer Architecture (HPCA), 2016

L. Zhang, A.A. Ding, Y. Fei, P. Luo
A Unified Metric for Quantifying Information Leakage of Cryptographic Devices Under Power Analysis Attacks, Asiacrypt, 2015

C. Luo, Y. Fei, P. Luo, S. Mukherjee, D. Kaeli
Side-channel Power Analysis of a GPU AES Implementation, International Conference on Computer Design (ICCD), 2015

B. Jiang, Y. Fei
Smart Home in Smart Microgrid: A Cost-effective Energy Ecosystem with Intelligent Hierarchical Agents, IEEE Transactions on Smart Grid (TSG), 6(1), 2015, 3-13

## SELECTED RESEARCH PROJECTS

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

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

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

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

# YUN RAYMOND FU

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

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

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

Office of Naval Research Young Investigator Award; Army Research Office Young Investigator Award; International Neural Network Society's Young Investigator Award; Søren Buus Outstanding Research Award; Grainger Foundation Frontiers of Engineering 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, American Association for the Advancement of Science, Distinguished Scientist Award, The Materials, Minerals, and Metals Society; Fellow, Institute of Electrical and Electronics Engineers; Fellow, American Physical Society; Fellow, Institute of Physics; Fellow, Institute of Engineering and Technology; Institute of Metal Research's Lee Hsun Lecture Award; Fulbright Senior Fellow; Søren Buus Outstanding; Research Award, College of Engineering

## SELECTED PUBLICATIONS

A.S. Sokolov, M. Geiler, V.G. Harris
Broadband Ferromagnetic Resonance Linewidth Measurement by a Microstripline Transmission Resonator, Applied Physics Letters, 108(17), 2016

P. Taheri, R. Barua, J. Hsu, M. Zamanpour, Y. Chen, V.G. Harris
Structure, Magnetism, and Magnetostrictive Properties of Mechanically Alloyed Fe 81 Ga 19, Journal of Alloys and Compounds, 661, 2016, 306-311

X. Wu, S. Yan, W. Liu, Z. Feng, Y. Chen, V.G. Harris
Influence of Particle Size on the Magnetic Spectrum of NiCuZn Ferrites for Electromagnetic Shielding Applications, Journal of Magnetism and Magnetic Materials, 401, 2016, 1093-1096

M. Bi, X. Wang, H. Lu, L. Deng, K.J. Sunday, M.L. Taheri, V.G. Harris
Magnetic and Microwave Properties of Amorphous FeCoNbBCu Thin Films, Journal of Applied Physics, 119(2), 2016

F. Chen, X. Wang, Y. Nie, Q. Li, J. Ouyang, Z. Feng, Y. Chen, V.G. Harris
Ferromagnetic Resonance Induced Large Microwave Magnetodielectric Effect in Cerium Doped Y3Fe5O12 Ferrites, Scientific Reports, 6, 2016, 28206

Z. Su, Q. Li, X Wang, B. Hu, Z. Feng, Y. Chen, V.G. Harris
Room Temperature Magnetoelectric Effect of YFeO3-Y3Fe5O12 Ferrite Composites, Journal of Alloys and Compounds, 656, 2016, 465-469

## SELECTED RESEARCH PROJECTS

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

Magnetodielectric Heterostructures and Composites
Principal Investigator, Rogers Corp

Nonlinear Properties of Ferrite Materials
Principal Investigator, Raytheon

# 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

E. Truslow, S. Golowich, D. Manolakis, V. Ingle
Performance Metrics and Evaluation of Chemical Identification Systems, Optical Engineering, SPIE , 55(2), 2016

R. Herrero, V. Ingle
Backward and Forward Linear Prediction Applied to Ultraspectral Image Processing—Effects on Rate Distortion, Signal Image and Video Processing, 10(4), 2016, 639-646

R. Herrero, V. Ingle
Ultraspectral Image Compression using Two-stage Prediction: Prediction Gain and Rate-distortion Analysis, Signal Image and Video Processing, 10(4), 2016, 729-736

M. Pieper, D. Manolakis, E. Truslow, V. Ingle, T. Cooley, M. Brueggeman, A. Weisner, J. Jacobson
Comparison of Hyperspectral Change Detection Algorithms, SPIE Conference, Imaging Spectrometry XX, 2015

M. Pieper, D. Manolakis, V. Ingle, T.W. Cooley, M. Brueggeman, A. Weisner, J. Jacobson
New Insights and Practical Considerations in Hyperspectral Change Detection, IEEE International Geoscience and Remote Sensing Symposium (IGARSS), 2015

E. Truslow, S. Golowich, D. Manolakis, V. Ingle
Metrics for the Comparative Evaluation of Chemical Plume Identification Algorithms, SPIE DSS Conference, 2015

E. Truslow, M. Pieper, V. Ingle, S. Golowich
Performance Evaluation of a Remote-sensing Chemical Identification Algorithm, IEEE IGARSS, 2015

## 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-stratis

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

## SELECTED PUBLICATIONS

S. Ioannidis, E. Yeh
Adaptive Caching Networks with Optimality Guarantees, International Conference on Measurements and Modeling of Computer Systems (SIGMETRICS), Antibes San Juan Les Pins, 2016

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

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

## SELECTED RESEARCH PROJECTS

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

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

# DAVID KAELI

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

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

Computer architecture; GPUs; heterogeneous computing; performance analysis; security and information assurance; hardware reliability and recovery; Big Data analytics; workload characterization

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

## SELECTED PUBLICATIONS

S. Mukherjee, Y. Sun, P. Blinzer, A. K. Ziabari, D. Kaeli
A Comprehensive Performance Analysis of HSA and OpenCL 2.0, Proceedings of the IEEE International Symposium on Performance Analysis of Systems and Software, 2016, 183-192

Z.-H. Jiang, Y. Fei, D. Kaeli
A Complete Key Recovery Timing Attack on a GPU, Proceedings of the IEEE International Symposium on High Performance Computer Architecture, 2016, 394-405

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 29th 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

## SELECTED RESEARCH PROJECTS

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

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

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

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

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

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

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

# YONG-BIN KIM

Professor, Electrical and Computer Engineering

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

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

## SELECTED PUBLICATIONS

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

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

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

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

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

## SELECTED RESEARCH PROJECTS

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

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

# ENGIN KIRDA

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

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

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

## SELECTED PUBLICATIONS

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

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

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

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

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

## SELECTED RESEARCH PROJECTS

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

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

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

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

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

# MIECZYSLAW KOKAR

Professor, Electrical and Computer Engineering

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

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

## SELECTED PUBLICATIONS

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

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

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

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

L. Grande, M. Sherman, H. Zhu, M.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.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.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.M. Kokar
Waveform Reconstruction from Ontological Description, Journal of Analog Integrated Circuits and Signal Processing, Published electronically, 2013

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

## 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 and Interim Chair, Electrical and Computer Engineering; affiliated faculty, Bioengineering

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

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

## SELECTED PUBLICATIONS

M. Sabbagh, M. Uecker, A.J. Powell, M. Leeser, M.H. Moghari
Cardiac MRI Compressed Sensing Image Reconstruction with a Graphics Processing Unit, International Symposium on Medical Information and Communication Technology (ISMICT), 2016

R. Subramanian, B. Drozdenko, E. Doyle, R. Ahmed, M. Leeser, K.R. Chowdhury
High-level System Design of IEEE 802.11b Standard-compliant Link Layer for MATLAB-based SDR, IEEE Access, 4, 2016, 149-1509

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

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

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 Datawith GPUs, Biomed Central Research Notes, 7(528), 2014

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

## SELECTED RESEARCH PROJECTS

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

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

# BRAD LEHMAN

Professor, Electrical and Computer Engineering

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

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

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

## 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-hanoch

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

Fellow, Institute of Electrical and Electronics Engineers

## SELECTED PUBLICATIONS

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

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

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

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

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

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

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

## 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

# XUE LIN

Assistant Professor, Electrical and Computer Engineering

PhD, University of Southern California, 2016
ece.neu.edu/people/lin-xue

Near-threshold computer for low-power embedded systems; high-performance and mobile cloud computing systems; machine learning and computing in (embedded) cyber-physical systems

## SELECTED PUBLICATIONS

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

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

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

Y. Wang, X. Lin, M. Pedram
A Stackelberg Game-based Optimization Framework of the Smart Grid with Distributed PV Power Generations and Data Centers, IEEE Transaction Energy Conversion, 29(4), 2014, 978-987

Y. Wang, X. Lin, Y. Kim, Q. Xie, M. Pedram, N. Chang
Single-source, Single Destination Charge Migration in Hybrid Electrical Energy Storage Systems, IEEE Transaction VLSI Systems, 22(12), 2014, 2752-2765

X. Lin, Y. Wang, M. Pedram, J. Kim, N. Chang
Designing Fault-tolerant Photovoltaic Systems, IEEE Design & Test (MDAT), 31(3), 2014, 76-84

Y. Wang, X. Lin, Y. Kim, N. Chang, M. Pedram
Architecture and Control Algorithms for Combatting Partial Shading in Photovoltaic Systems, IEEE Transaction Computer-aided Design of Integrated Circuits and Systems, 33(6), 2014, 917-930

Y. Wang, X. Lin, M. Pedram
Adaptive Control for Energy Storage Systems in Households with Photovoltaic Modules, IEEE Transaction Smart Grid, 5(2), 2014, 992-1001

# YONGMIN LIU

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

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

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

Office of Naval Research Young Investigator Award; 3M Non-Tenured Faculty Award; Air Force Summer Faculty Fellow

## SELECTED PUBLICATIONS

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

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

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

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

## SELECTED RESEARCH PROJECTS

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

# FABRIZIO LOMBARDI

ITC Endowed Professor, Electrical and Computer Engineering

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

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

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

## SELECTED PUBLICATIONS

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. Berestesky
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

# WALEED MELEIS

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

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

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

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

## SELECTED PUBLICATIONS

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

S. Guler, M. Dannhauer, B. Erem, R. Macleod, D. Tucker, S. Turovets P. Luu, W. Meleis, D. Brooks
Optimizing Stimulus Patterns for Dense Array TDCS with Fewer Sources than Electrodes Using a Branch and Bound Algorithm, International Symposium on Biomedical Imaging (ISBI'16), Prague, Czech Republic, 2016

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

# 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

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

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

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

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

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

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

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 Maximal Spectral-efficiency Networking
Principal Investigator, Air Force Research Laboratory

# NINGFANG MI

Associate Professor, Electrical and Computer Engineering

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

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

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

## SELECTED PUBLICATIONS

Y. Yao, H. Gao, J. Wang, N. Mi, B. Sheng
OPERA: Opportunistic and Efficient Resource Allocation in Hadoop YARN by Harnessing Idle Resources, International Conference on Computer Communication and Networks (ICCCN), Waikoloa, Hawaii, 2016

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. 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, Defense Advanced Research Projects Agency

Designer Solids Nanoantennas and Material
Principal Investigator, Army Research Office

MURI, Multiscale Mathematical Modeling and Design Realization of Novel 2D Functional Materials
Co-Principal Investigator, Army Research Office

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

H. Chauhan, V. Kvartenko, R. Coxe, T. Weber, M. Onabajo
An Optimization Platform for Digital Predistortion of Power Amplifiers, IEEE Design & Test, 33(2), 2016, 49-58

C.-H. Chang, L. Xu, M. Onabajo
Instrumentation Amplifier and Current Injection Circuit Design for Input Impedance Boosting in Biopotential and Bioimpedance Measurements, Analog Integrated Circuits and Signal Processing, 88(2), 2016, 289-302

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

# SARAH OSTADABBAS

Assistant Professor, Electrical and Computer Engineering

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

Machine learning/pattern recognition; signal and image processing; human decision support systems; augmented cognition system with medical applications

## SELECTED PUBLICATIONS

S. Ostadabbas, S.N. Housley, N. Sebkhi, K. Richards, D. Wu, Z. Zhang, M.G. Rodriguez, L. Warthen, C. Yarbrough, S. Balagaje, A.J. Butler, M. Ghovanloo
A Tongue-controlled Robotic Rehabilitation: Preliminary Evidence for Function and Quality of Life Improvement in Stroke Survivors, Journal of Rehabilitation Research and Development (JRRD), 2016

S. Ostadabbas, N. Sebkhi, M. Zhang, S. Rahim, L.J. Anderson, F. Lee, M. Ghovanloo
A Vision-based Respiration Monitoring System for Passive Airway Resistance Estimation, IEEE Transactions on Biomedical Engineering (TBME), 2016

S. Ostadabbas, M. Ghovanloo, A.J. Butler
Developing A Tongue Controlled Exoskeleton for a Wrist Tracking Exercise: A Preliminary Study, Journal of Medical Devices (JMD), 9, 2015

S. Ostadabbas, M. Nourani, R. Yousefi, M. Pompeo
A Knowledge-based Modeling for Plantar Pressure Image Reconstruction, IEEE Transactions on Biomedical Engineering (TBME), 61(10), 2014, 2538-2549

S. Ostadabbas, R. Yousefi, M. Nourani, M. Faezipour, L. Tamil, M. Pompeo
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; affiliated faculty Mechanical and Industrial Engineering

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

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

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

## SELECTED PUBLICATIONS

C.G. Atkeson, M. DeDonato, X. Long, F. Polido, T. Padir, et. al.
Team WPI-CMU: Achieving Reliable Humanoid Behavior in the DARPA Robotics Challenge, Journal of Field Robotics, Special Issue on the DARPA Robotics Challenge Finals, 2016. Sinyukov,

N. Banerjee, X. Long, R. Du, F. Polido, S. Feng, C.G. Atkeson, M. Gennert, T. Padir
Human-supervised Control of the ATLAS Humanoid Robot for Traversing Doors in Human Robots, IEEE-RAS 15th International Conference, 2015, 722-729

V. Dimitrov, V. Jagtap, J. Skorinko, S. Chernova, M. Gennert, T. Padir
Human-centered Design of a Cyber-physical System for Advanced Response to Epidemics, EMBC 2015 Annual International Conference of the IEEE, Milan, Italy, 2015

M.P. DeDonato, V. Dimitrov, T. Padir
Towards an Automated Checked-baggage Inspection System Augmented with Robots, SPIE Defense+Security, Sensors, and Command, Control, Communications, and Intelligence (C3I) Technologies for Homeland Security and Homeland Defense XIII, 2014

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

## SELECTED RESEARCH PROJECTS

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

Customer Discovery for Field-deployable Indoor Localization Technology
Principal Investigator, National Science Foundation

Enhancing Disabilities Engineering Research and Education Through Robotics Capstone Projects
Principal Investigator, National Science Foundation

Model-based Designs in Smart Environments to Enable Independent Living
Principal Investigator, Intel Corporation

Realization of a Medical Cyber-physical System to Enhance Safety of Ebola Workers
Principal Investigator, National Science Foundation

# 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

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

M. Tajdini, B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, A. Morgenthaler, C. Rappaport
Efficient 3D Forward Modeling of GPR Scattering from Rough Ground, IEEE International Symposium on Antennas and Propagation, Vancouver, Canada, 2015, 1686-1687

B. Gonzalez-Valdez, Y. Alvarez Lopez, J.A. Martinez Lorenzo, F. Las-Heras Andres, C. Rappaport
A Hybrid SAR — Model Based Method for High Resolution Imaging, IEEE International Symposium on Antennas and Propagation, Memphis, TN, 2014, 653-654

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

## 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

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

## SELECTED PUBLICATIONS

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

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

Z. Qian, Y. Hui, F. Liu, S. Kar, M. Rinaldi
Graphene-aluminum NEMS Resonant Infrared Detector, Microsystems and Nanoengineering, 2, 2016, 16026

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

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

## SELECTED RESEARCH PROJECTS

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

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

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

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

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

# WILLIAM ROBERTSON

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

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

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

## SELECTED PUBLICATIONS

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

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

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

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

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

## SELECTED RESEARCH PROJECTS

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

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

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

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

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

# MASOUD SALEHI

Associate Professor, Electrical and Computer Engineering

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

Error correcting codes; information theory; digital communications

## SELECTED PUBLICATIONS

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

N. Yang, M. Salehi
A Family of Orthogonal Full Rate Differential Space Time Block Code Systems, Proceedings of the IEEE Military Communications Conference (MILCOM), Baltimore, MD, October 6-8, 2014, 569-574

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 48th Annual Conference on Information Sciences and Systems, Princeton, New Jersey, 2014, 1-5

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

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

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 47th 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

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

## SELECTED PUBLICATIONS

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

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

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

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

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

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

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

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

## SELECTED RESEARCH PROJECTS

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

Power Efficient Emerging Heterogeneous Platforms
Principal Investigator, National Science Foundation

# BAHRAM SHAFAI

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

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

Control Systems; digital signal processing; robust and optimal control

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

## SELECTED PUBLICATIONS

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

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

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

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

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

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

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

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

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

# AATMESH SHRIVASTAVA

Assistant Professor, Electrical and Computer Engineering

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

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

## SELECTED RESEARCH PROJECTS

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

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

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

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

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

A. Klinefelter, N.E. Roberts, Y. Shakhsheer, P. Gonzalez, A. Shrivastava, A. Roy, K. Craig, M. Faisal, J. Boley, S. Oh, Y. Zhang, D. Akella, D. Wentzloff, B.H. Calhoun
A 6.45 µW Self-powered IoT SoC with Integrated Energy-harvesting Power Management and ULP Asymmetric Radios, IEEE Solid-State Circuits Conference (ISSCC), 2015

A. Shrivastava, D.D. Wentzloff, B.H. Calhoun
A 10mV-input Boost Converter with Inductor Peak Current Control and Zero Detection for Thermoelectric Energy Harvesting, IEEE Custom Integrated Circuits Conference (CICC), 2014

# 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

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

Life Fellow, Institute of Electrical and Electronics Engineers; 2015 National Academy of Engineering Gordon Prize, for developing an innovative method to provide graduate engineers with the necessary personal skills to become effective engineering leaders

## SELECTED RESEARCH PROJECTS

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

**CenSSIS: Center for Subsurface Sensing and Imaging Systems**, Gordon-CenSSIS, a graduated NSF Engineering Research Center, 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
ece.neu.edu/people/singh-hanumant

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

## SELECTED PUBLICATIONS

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

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

K.E. Smith, H. Singh, H., et al.
Discovery of a Recent, Natural Whale Fall on the Continental Slope Off Anvers Island, Western Antarctic Peninsula, Deep Sea Research Part I: Oceanographic Research Papers, 90, 2014, 76-80

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

M. Yi Cheung, J. Leighton, U. Mitra, H. Singh, F.S. Hover
Performance of Bandit Methods in Acoustic Relay Positioning, Proceedings of the 2014 Automatic Control Conference, 2014, 4708-4714

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

H. Singh, K. Nakamura, M. Jakobssen, T. Shank, et al.
Effusive and Explosive Volcanism on the Ultraslow-spreading Gakkel Ridge, 85°E, Geochemistry, Geophysics, Geosystems,13(10), 2012

# DAGMAR STERNAD

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

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

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

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

## SELECTED PUBLICATIONS

W.T.V. Chu, S.W. Park, T.D. Sanger, D. Sternad
Dystonic Children Can Learn a Novel Motor Skill: Strategies That are Tolerant to High Variability, IEEE Transactions on Neural Systems and Rehabilitation Engineering, 2016

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

J. Ahn, Z. Zhang, D. Sternad
Noise Induces Biased Estimation of the Correction Gain, PLoS ONE, 11(7), 2016, e0158466, 2016

M.E. Huber, D. Sternad
Implicit Guidance to Stable Performance in a Rhythmic Perceptual-motor Skill, Experimental Brain Research, 233(6), 2015, 1783-1799

S.-W. Park, D. Sternad
Robust Retention of Individual Sensorimotor Skill After Self-guided Practice, Journal of Neurophysiology, 2015

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, Journal of Experimental Psychology: Human Perception and Performace, 41(2), 2015, 525-541

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

## SELECTED RESEARCH PROJECTS

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

Multi-center Trial of Augmented Sensory Feedback in Children with Dyskinetic CP
Co-Principal Investigator, National Institutes of Health

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

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

# MILICA STOJANOVIC

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

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

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

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

## SELECTED PUBLICATIONS

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

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

E.Zorita, M.Stojanovic
Space-frequency Block Coding for Underwater Acoustic Communications, IEEE Journal of Oceanic Engineering, 40(2), 2015, 303-314

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

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

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

## SELECTED RESEARCH PROJECTS

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

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

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

# NIAN SUN

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

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

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

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

## SELECTED PUBLICATIONS

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

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

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

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

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

## SELECTED RESEARCH PROJECTS

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

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

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

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

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

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

# MARIO SZNAIER

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

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

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

IEEE Control Systems Society Distinguished Member Award

## SELECTED PUBLICATIONS

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

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

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

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

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

## SELECTED RESEARCH PROJECTS

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

# GILEAD TADMOR

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

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

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

## SELECTED PUBLICATIONS

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

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

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

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

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

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

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

# 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

# SELECTED PhD THESES

## Yashar Motedayen Aval

PhD 2015, Electrical and Computer Engineering; Advisor, Milica Stojanovic

### MULTI-CARRIER COMMUNICATION OVER TIME-VARYING ACOUSTIC CHANNELS

In this dissertation we address the fundamental question of acoustic channel capacity (achievable rate) for single-input-multi-output (SIMO) acoustic channels using a per-path Rician fading model, and focusing on two scenarios: narrowband channels where the channel statistics can be approximated as frequency- independent, and wideband channels where the nominal path loss is frequency-dependent. In each scenario, we compare several candidate power allocation techniques, and show that assigning uniform power across all frequencies for the first scenario, and assigning uniform power across a selected frequency-band for the second scenario, are the best practical choices in most cases, because the long propagation delay renders the feedback information outdated for power allocation based on the estimated channel response. We quantify our results using the channel information extracted form the 2010 Mobile Acoustic Communications Experiment (MACE'10).

See full dissertation at **coe.neu.edu/YasharAval**

## Hari Chauhan

PhD 2016, Electrical Engineering; Advisor, Marvin Onabajo

### DIGITALLY-ASSISTED DESIGN, SIMULATION AND TESTING TECHNIQUES FOR OPTIMIZATION OF ANALOG AND RF INTEGRATED CIRCUITS

This dissertation focuses on the design and integration of digital circuits with analog/RF circuits for performance optimizations. Spectral analysis for the evaluation of analog/RF circuits is a standard procedure for which the fast Fourier transform (FFT) algorithm is widely used. However, the majority of existing FFT implementations on chips consume excessive area and power for built-in testing applications. In this research, an FFT-based performance monitoring technique with multi-tone test signals has been created for efficient on-chip spectral analysis of analog/RF circuits. This method enables to estimate third-order intermodulation components of up to 50 dB below the fundamental tones with an accuracy of ±1.5 dB based on the output spectrum of analog circuits. The capability of this technique to accurately determine the power of two test tones as well as their distortion components and intermodulation products was demonstrated by designing an on-chip linearity calibration scheme for a tunable low-noise amplifier.

See full dissertation at **coe.neu.edu/HariChauhan**

## Koorosh Firouzbakht

PhD 2015, Electrical and Computer Engineering; Advisor, Masoud Salehi

### PACKETIZED WIRELESS COMMUNICATION UNDER JAMMING

In this dissertation, we develop two general game-theoretic frameworks, constrained zero-sum and constrained bimatrix, that can be used to model many interactive communication scenarios in wireless networks when physical layer jamming is present.

In constrained games, players' strategies are limited to a subset of all possible strategies and as a result, a broader class of problems can be modeled by using these frameworks.

Furthermore, we formulate the interactions between adaptive communicating nodes and smart power limited adversaries by constrained zero-sum and constrained bimatrix games and provide necessary and sufficient conditions under which existence of the Nash equilibrium solutions for these non-typical games are guaranteed.

See full dissertation at **coe.neu.edu/KooroshFirouzbakht**

## Yuan Gao

PhD 2015, Electrical Engineering; Advisor, Nianxiang Sun

### E-FIELD TUNABLE RG INTEGRATED MULTIFERROIC INDUCTORS AND TRANSFORMERS FOR RFIC APPLICATIONS

The goals of this dissertation are designing and fabricating magnetic inductors with characteristic high quality factor and high tunability potential by E-field on Si substrate. The research work includes three parts. Firstly, integrated RF inductors with high quality factor have been designed, fabricated, measured and analyzed. Secondly, based on the fabricated high Q inductors, a new type of tunable RF multiferroic inductors have been made on 0.5mm thick ferroelectric (011) cut lead magnetsium niobate - lead titanate (PMN-PT) slab. Lastly, with the same magnetic material and fabrication process, we present a micromachined implementation of embedded magnetic solenoid transformers with high quality factor (Q) and low insertion loss.

See full dissertation at **coe.neu.edu/YuanGao**

# Yu Han

PhD 2016, Computer Engineering; Advisor, Yunsi Fei

### STOCHASTIC MEDIUM ACCESS CONTROL FOR UNDERWATER ACOUSTIC SENSOR NETWORKS

In this dissertation, we address the inefficiency issues in random-access MAC for UWSNs, using a stochastic sending probability-based approach. We propose three handshaking-free underwater MAC solutions targeting the same goal: high network throughput, low packet end-to-end delay, and robustness under dynamics and controlled implementation complexity. The three solutions are based on a common utility-based probability optimization framework, but with different design considerations and objective functions. We first leverage the feature of long propagation delay, often taken as negative, to improve the parallelism between multiple senders. Our proposed protocol, the Delay-Aware Probability-based underwater MAC protocol (DAP-MAC), characterizes the group compatibility relation, a proposed indicator for successful concurrent transmissions, and utilizes this relation in the stochastic optimization framework for the best transmission strategy.

See full dissertation at **coe.neu.edu/YuHan**

# Kuo-Lun Huang

PhD 2016, Electrical and Computer Engineering; Advisor, Masoud Salehi

### EFFICIENT ALGORITHMS FOR STOCHASTIC DECODING OF LDPC CODES

In this study, we propose a reduced-latency stochastic decoding algorithm for LDPC codes. The proposed algorithm, called Conditional Stochastic Decoding (CSD), improves error rate performance and reduces the decoding latency by more than 30% compared with the existing stochastic decoders. We also characterize the performance of CSD in various communication schemes. For example, we show the advantages of using the proposed CSD algorithm in the Automatic Repeat reQuest (ARQ) scheme when compared with other iterative decoding algorithms. We extend our study of stochastic decoding to non-AWGN channel models including the Binary Symmetric Channel (BSC), the Z-channel, and the Rayleigh fading channel. We introduce scaling methods to improve the performance of stochastic decoding on these channel models. On the Rayleigh fading channel, the proposed method not only reduces the computational complexity of the stochastic decoding, but also provides 3-dB improvement in performance and lowers the error floor. Simplicity of hardware implementation, low latency, and good error rate performance of the proposed schemes make them suitable for emerging communication standards.

See full dissertation at **coe.neu.edu/Kuo-LunHuang**

# Chengcheng Jia

PhD 2016, Electrical and Computer Engineering; Advisor, Yun Raymond Fu

### LOW-RANK TENSOR LEARNING FOR HUMAN ACTION RECOGNITION

In this thesis, we focus on the social security problem, in particular human action recognition, and give the analystics in two lines, (1) machine learning algorithms for action recognition, (2) applying algorithms for novel problems in action recognition, e.g., missing-modality problem, dimensionality reduction. These two lines are detailed in following. For machine learning algorithm, extracting features from high-dimensional action data is crucial in human action recognition. The usual approach is finding a subspace, i.e., projecting high-dimensional data into a low-dimensional subspace containing main pattern of original data and fewer variables, for classification. First of all, data representation is crucial for action video which contains spatiotemporal information. To this end, we propose high-order tensor to represent the action videos, and employ tensor decomposition methods for dimensionality reduction. Second, different problems in action recognition tasks are solved by machine learning algorithms, such as transfer learning, low-rank learning, manifold learning.

See full dissertation at **coe.neu.edu/ChengchengJia**

# Bingnan Jiang

PhD 2016, Computer Engineering; Advisor, Yunsi Fei

### OPTIMIZATION AND MANAGEMENT OF CYBER-PHYSICAL SYSTEMS

My dissertation has been focused on the optimization and prediction model design for cost-effective and energy-efficient CPS--smart grid and PHEVs. First, a novel cost-effective energy ecosystem is proposed for a residential microgrid with renewable energy resources. It effectively coordinates demand response (DR), distributed generations (DGs), and energy storage management through a three-level hierarchical optimization, in which particle swarm optimization (PSO) algorithm and environment-adaptive Q-learning algorithm are applied. Second, I explore the application of modern vehicle-to-grid (V2G) technologies on smart grid reactive power compensation. On-board chargers of plug-in electric vehicles (PEVs) are proposed to be utilized as mobile volt-ampere reactive (VAR) resources. Third, an on-road PHEV power management system is proposed which utilizes the information of stochastic vehicle driving states and real-time traffic conditions. With these stochastic elements incorporated, a two-level hierarchical optimization model is developed based on multi-stage stochastic quadratic programming (MSQP) and Markov decision process (MDP).

See full dissertation at **coe.neu.edu/BingnanJiang**

# SELECTED PhD THESES

## Erfan Kherikhahi

PhD 2015, Electrical Engineering; Advisor, Nicol McGruer

### CONTACT EFFECTS IN PENTACENE FIELD EFFECT TRANSISTORS

This dissertation focuses on the effect of the energy barrier at the semiconductor-metal junction in pentacene transistors.

To quantitatively extract and analyze the effect of the contact, a novel method of Kelvin probing is introduced and investigated. This method, while involving simple fabrication and measurement procedures, offers the extraction of voltage drops at the drain and source interfaces. To demonstrate the validity of the method as well as the existence of an energy barrier at the metal-pentacene interface, systematic measurements are done by modulating the metal-pentacene barrier height in pentacene transistors. For this work IrO2, Au, RuO2 and Ti metals with respective reported work functions of 5.6 eV, 5.1 eV, 4.6 eV and 4.3 eV are used.

See full dissertation at **coe.neu.edu/ErfanKherikhahi**

## Ho Joon Lee

PhD 2016, Computer Engineering; Advisor, Yong-Bin Kim

### A PROCESS AND TEMPERATURE TOLERANT LOW POWER SEMI-SELF CALIBRATION OF HIGH SPEED TRANSCEIVER FOR DRAM INTERFACE

This thesis presents a novel process and temperature variation compensation technique for semi-self impedance calibration of the transmission line driver. Based on the impedance mismatch analysis, a new semi-self impedance calibration circuit for high speed transceiver design is proposed to compensate the driver impedance mismatch caused by the process and temperature variation using process and temperature monitoring circuit. In this thesis, the Low Voltage Swing Terminated Logic (LVSTL) using a VSSQ termination and an adaptive calibration scheme are proposed. The LVSTL generates high frequency low voltage-swing signals with the VSSQ termination to reduce power consumption along with slew-rate control circuits. 2 stacked PU/PD network circuit are designed and each PU(Pull-UP)/PD(Pull-Down) network has two data inputs with the delay of the input data to control the slew rate of the inputs. VOHdrift control scheme is also presented to address the VOH drift issue of VDDQ raised by NMOS rather than PMOS. To prevent the VOH drift phenomenon, a weak NMOS transistor is connected in parallel with NMOS PD transistor to provide a leakage path, resulting in a reduced but fixed $V_{OH}$ level.

See full dissertation at **coe.neu.edu/HoJoonLee**

## Jiliang Liu

PhD 2015, Electrical and Computer Engineering; Advisor, Lee Makowski

### SCANNING X-RAY MICRODIFFRACTION STUDIES OF THE MOLECULAR ARCHITECTURE OF BIOLOGICAL TISSUES

In this dissertation I apply scanning x-ray micro-diffraction, a new advanced synchrotron technology, to study the molecular structure of three tissues: 1. Myelin within the peripheral nervous system (PNS); 2. Plant cell walls in Arabidopsis stems; 3. Protein aggregation in human brain sections from Alzheimer's patients. A suite of custom software was developed to overcome the challenge of processing a large amount of data collected by scanning micro diffraction and to extract complex features from the scattering patterns of these different tissues. These improvements in software have greatly expanded the utility scanning microdiffraction technology for analysis of detailed information about the molecular architecture of myelin in the nodal, paranodal, and juxtaparanodal regions; the structural heterogeneities within the Arabidopsis stem; and pathological molecular structures that arise in Alzheimer's disease. We anticipate significant expansion of the use of this method for studies of the molecular architecture of intact tissues and the alteration of these structures due to wounds, specific mutations or pathological conditions.

See full dissertation at **coe.neu.edu/JiliangLiu**

## Thomas McCormick

PhD 2016, Computer Engineering; Advisor, David Kaeli

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

In this dissertation, we present FSAware, a novel algorithmic approach that enhances existing flash translation layer (FTL) designs. Specifically, FSAware reduces overall WAF by separately supporting the write requests associated with the file data and file system overhead produced by host file system write activities. FSAware distinguishes file data write requests from file system overhead write requests by characterizing the file system installed on the flash memory system by the host system. We consider the File Allocation Table (FAT) format, which is specifically selected for its ubiquity in embedded computer applications. FSAware is applicable to both block-mode and page-mode style FTLs.

See full dissertation at **coe.neu.edu/ThomasMcCormick**

# Tianxiang Nan

PhD 2016, Electrical and Computer Engineering; Advisor, Nian Sun

## MAGNETOELECTRIC HETEROSTRUCTURES FOR SPINTRONICS AND MAGNETIC SENSING

This study first shows that by utilizing a unique ferroelastic polarization switching path-way, one can achieve non-volatile electric-field-switching of magnetism in multiferroic heterostructures with different ferroelectric single crystals through a strain-mediated magnetoelectric coupling. In the same system, with atomically-thin ferromagnets, the interfacial charge-mediated should also be taken into account. The charge- and strain- mediated coupling mechanisms are demonstrated and precisely quantified by the electric-field-tuning of ferromagnetic resonance. With the same technique, magnetic relaxation including intrinsic and extrinsic damping has also been shown to be strongly correlated to the strain, which is attributed to the electric-field-modification of spin-orbit coupling. Moreover, I will also show the tuning of spin-orbit torques from the spin- Hall effect with applied voltage probed with spin-torque ferromagnetic resonance and show the possible application on voltage tunable spin-Hall nano-oscillators.

See full dissertation at **coe.neu.edu/TianxiangNan**

# Hooman Nezamfar

PhD 2016, Electrical and Computer Engineering; Advisor, Deniz Erdogmus

## FLASHLIFE™, A CONTEXT-AWARE CODE-VEP BASED BRAIN COMPUTER INTERFACE FOR DAILY LIFE USING EEG SIGNALS

In this dissertation, we introduce FlashLife™, a context aware language independent brain interface, suitable for everyday needs of an individual with disabilities. FlashLife™ provides control and communication abilities all through the same stimulation method using a single EEG electrode or eye tracking. In addition, use of the context information along with a probabilistic classification and decision making mechanism adds more robustness and flexibility at the same time. The stimulation paradigm provides highly accurate and fast classifications making use of short Calibration sessions. FlashLife™ provides performance estimates for each individual for different tasks taking advantage of the Calibration data. The stimulation paradigm has been put into use by different applications to do different tasks. A short list of applications is, FlashType(TM) for typing, FlashNav(TM) for navigation, FlashGrab(TM) for object manipulation and FlashPlay(TM) for entertainment in a virtual environment.

See full dissertation at **coe.neu.edu/HoomanNezamfar**

# Kham Nguyen

PhD 2016, Electrical Engineering; Advisor, Gilead Tadmor

## ADAPTIVE BOOSTING FOR AUTOMATIC SPEECH RECOGNITION

In this work, the Gaussian mixture models (GMM)-based classifier is used to convert each acoustic feature vector to a posterior probability vector given all classes. Furthermore, an adaptive boosting (AdaBoost) algorithm is applied to combine the classifiers to enhance the performance. The training of GMM-based AdaBoost classifiers requires very expensive computation. To make it feasible for very large vocabulary speech recognition systems with thousands of hours of training data, we have implemented a hierarchical AdaBoost to split the whole training to multiple parallel processes. The speed up reduced the training data time from about more 100 days to within a week. The AdaBoost features were then used successfully to combine with spectral feature for ASR. Compared to the baseline of the standard features, the AdaBoost system reduced the word-error-rate (WER) by 2%. Moreover, the AdaBoost system also contributed consistent gains on the system combination even compared with a very strong baseline.

See full dissertation at **coe.neu.edu/KhamNguyen**

# Vivian Esperanza Pera

PhD 2016, Electrical Engineering; Advisor, Mark Niedre

## NOVEL BIPHOTONIC IMAGING CONCEPTS

In this work, we consider the development of novel biophotonic imaging concepts from both a signal processing and hardware perspective. With respect to the former, we employ classic and recent signal processing approaches to (1) explore the optimization of system design for a novel time-domain hyperspectral tomographic imager; and (2) develop novel, intrinsically-regularized algorithms for the processing of fluorescence molecular tomography (FMT) data from two instrument prototypes. With respect to the latter, we consider the construction of a custom microscope to be used for label-free enumeration and characterization of circulating cells in vivo.

See full dissertation at **coe.neu.edu/VivianPera**

# SELECTED PhD THESES

## Ming Shao

PhD 2016, Computer Engineering; Advisor, Yun Fu

### EFFICIENT TRANSFER FEATURE LEARNING AND ITS APPLICATIONS ON SOCIAL MEDIA

In this thesis, we focus on the popular social media data such as, face, object, digital number images, and study the problems of social media analytics in two lines: (1) developing efficient and effective machine learning tools given limited or poor training data by considering the structure of the data from different domains, (2) applying existing or developed machine learning tools to novel social media problems, e.g., kinship verification, family photo understanding.

A critical observation is that faces of parents captured while they were young are more like their children's compared with images captured when they are old. Therefore, we can readily apply the proposed transfer learning methods to kinship verification defined above, where kin relation between young parent and child is the source problem, while that between old parent and child is the target. Promising research outcome can be extended to real-world applications: family album management, image retrieval and annotation, missing children search, etc.

See full dissertation at **coe.neu.edu/MingShao**

## Zhijuan Su

PhD 2016, Electrical Engineering; Advisor, Vincent G. Harris

### DEVELOPMENT OF LOW LOSS HEXAFERRITE MATERIALS FOR MICROWAVE APPLICATIONS

This study focuses on hexaferrites, which have been widely used in microwave and millimeter wave devices as permanent magnets and as gyromagnetic materials, e.g., in circulators, filters, isolators, inductors, and phase shifters. Many efforts have been made to design light and miniature circulators with self-biased ferrite materials. We report the magnetic and structural properties of a series of W-type barium hexaferrites of composition BaZnn2-xCoxFe16O27 where x=0.15, 0.20, and 0.25. The anisotropy field of these BaW ferrites decreased with the substitution of divalent Co ions, while, they maintained crystallographic c-axis texture. The measured anisotropy field was ~10 kOe, and a hysteresis loop squareness Mr/Ms=79% was obtained due to well-controlled grain size within the range of single domain scale. U-type barium hexaferrite thin films were deposited on (0001) sapphire substrates by pulsed laser deposition. The results indicate a measured anisotropy field of ~8 kOe, and the saturation magnetization ($4\varpi$Ms) of 3.6 kG.

See full dissertation at **coe.neu.edu/ZhijuanSu**

## Enqiang Sun

PhD 2016, Computer Engineering; Advisor, David Kaeli

### CROSS-PLATFORM HETEROGENEOUS RUNTIME ENVIRONMENT

In this dissertation, we have designed a cross-platform heterogeneous runtime environment which provides a high-level, unified execution model that is coupled with an intelligent resource management facility. The main motivation for developing this runtime environment is to provide OpenCL programmers with a convenient programming paradigm to fully utilize all possible devices in a system and incorporate flexible workload balancing schemes without compromising the user's ability to assign tasks according to the data affinity. Our work removes much of the cumbersome initialization of the platform, and now devices and related OpenCL objects are hidden under the hood.

Equipped with this new runtime environment and associated programming interface, the programmer can focus on designing the application and worry less about customization to the target platform. Further, the programmer can now take advantage of multiple devices using a dynamic workload balancing algorithm to reap the benefits of task-level parallelism.

See full dissertation at **coe.neu.edu/EnqiangSun**

## Eric Truslow

PhD 2016, Electrical Engineering; Advisor, Vinay K. Ingle

### PERFORMANCE EVALUATION OF HYPERSPECTRAL CHEMICAL DETECTION SYSTEMS

In this dissertation we demonstrate that using a detector bank followed by an identifier can achieve superior performance relative to either algorithm individually. Remote sensing of chemical vapor plumes is a difficult but important task with many military and civilian applications. Hyperspectral sensors operating in the long wave infrared (LWIR) regime have well demonstrated detection capabilities. However, the identification of a plume's chemical constituents, based on a chemical library, is a multiple hypothesis-testing problem that standard detection metrics do not fully describe. Our approach partitions and weights a confusion matrix to develop both the standard detection metrics and an identification metric based on the Dice index.

See full dissertation at **coe.neu.edu/EricTruslow**

# Jing Tu

PhD 2016, Electrical Engineering; Advisor, Edwin A. Marengo

## GENERALIZED OPTICAL THEOREM DETECTION IN RANDOM AND COMPLEX MEDIA

This PhD dissertation presents a new wave physics-based approach for the detection of targets or changes in rather arbitrary backgrounds. The problem of detecting changes of a medium or environment based on active, transmitplus-receive wave sensor data is at the heart of many important applications including radar, surveillance, remote sensing, nondestructive testing, and cancer detection. This is a challenging problem because both the change or target and the surrounding background medium are in general unknown and can be quite complex. The proposed methodology is rooted on a fundamental result of wave theory called the optical theorem, which gives real physical energy meaning to the statistics used for detection.

See full dissertation at **coe.neu.edu/JingTu**

# Bei Yan

PhD 2015, Computer and Electrical Engineering; Advisor, Hanoch Lev-Ari

## NETWORKED DYNAMIC STATE ESTIMATION WITH TIME-STAMPED MULTI-SENSOR OBSERVATIONS

In this dissertation the performance of a continuous-discrete Kalman filter using multi-sensor observations is analyzed in the presence of irregular sampling, observation/control delay, bad data and system parameter inaccuracy. We show that the average error covariance depends only on system parameters and on the moment generating function of the irregular sampling interval of the multi-sensor sampling pattern. We obtain lower and upper bounds on the average error covariance, as well as a necessary condition for its stability, expressed in terms of the region of convergence of the sampling interval moment generating function. We provide an explicit expression for the added effect of delayed time-stamped observations on the steady-state error covariance of our networked Kalman filter.

See full dissertation at **coe.neu.edu/BeiYan**

# Yash Ukidave

PhD 2016, Computer Engineering; Advisor, David Kaeli

## ARCHITECTURAL AND RUNTIME ENHANCEMENTS FOR DYNAMICALLY CONTROLLED MULTI-LEVEL CONCURRENCY ON GPUS

In this thesis, we propose a dynamic and adaptive mechanism to manage multi-level concurrency on a GPU. We present a new scheduling mechanism for dynamic spatial partitioning on the GPU. Our mechanism monitors and guides current execution of compute workloads on a device. To enable this functionality, we extend the OpenCL runtime environment to map multiple command queues to a single GPU, and effectively partition the device. The result is that kernels that can benefit from concurrent execution on a partitioned device can more effectively utilize more of the available compute resources of a GPU. We also introduce new scheduling mechanisms and partitioning policies to match the computational requirements of different applications. Our partitioning/scheduling mechanism uses machine learning to analyze the current execution state of the GPU. We improve the effectiveness of adaptive partitioning and TMM by tracking execution time behavior of real world applications.

See full dissertation at **coe.neu.edu/YashUkidave**

# Yi Yao

PhD 2016, Computer and Electrical Engineering; Advisor, Mi Ningfang

## RESOURCE MANAGEMENT IN CLUSTER COMPUTING PLATFORMS FOR LARGE SCALE DATA PROCESSING

In this dissertation, we mainly focus on improving system efficiency and performance for cluster computing platforms, i.e., Hadoop MapReduce and Hadoop YARN, by designing the following new scheduling algorithms and resource management schemes. First, we developed a Hadoop scheduler (LsPS), which aims to improve average job response times by leveraging job size patterns of different users to tune resource sharing between users as well as choose a good scheduling policy for each user. We further presented a self-adjusting slot configuration scheme, named TuMM, for Hadoop MapReduce to improve the makespan of batch jobs. The major goal of our new scheme is to improve system resource utilization without incurring severe resource contentions due to resource over provisioning.

See full dissertation at **coe.neu.edu/YiYao**

# Ye Zhao

PhD 2016, Electrical Engineering; Advisor, Brad Lehman

## FAULT DETECTION, CLASSIFICATION AND PROTECTION IN SOLAR PHOTOVOLTAIC ARRAYS

This dissertation reviews the challenges and limitations of existing fault detection and protection solutions in solar PV arrays. For the first time, a 35kW commercial-scale PV laboratory is designed to study faults under real-working conditions and to discover the "blind spots" in conventional fault protection schemes. It is shown that the line-line fault may not be detectable by traditional overcurrent protection devices (OCPD) under certain conditions. Therefore, the fault may remain in the PV system as a safety concern.

To eliminate the detection "blind spot," outlier rules, such as statistical outlier detection rules (ODRs) and local outlier factors (LOFs) are proposed in PV-string monitoring systems. To further identify the fault types (or so-called fault classification), machine learning algorithms are studied in solar PV arrays. To overcome the drawbacks of supervised learning algorithms, a semi-supervised learning algorithm is proposed. The dissertation demonstrates the effectiveness in fault detection and classification in both simulation and experimental results.

See full dissertation at **coe.neu.edu/YeZhao**

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