Electrical Engineering: Ph.D. Dissertation Topics

2019 Dissertation Titles

- Efficient template representation for face recognition: Image sampling from face collections, Principal Investigator (P.I): Gerard Medioni, Professor
- Human Activity Analysis with Graph Signal Processing Techniques, P.I: Antonio Ortega, Professor
- Security and Privacy in Information Processing, P.I: Leana Golubchik, Professor
- Curvature Analysis of the Power Grid: Congestion, Congestion Management, and Line Tripping Cascade Anticipation, P.I: Edmond Jonckheere, Professor
- Light-Matter Interactions in Engineered Microstructures: Hybrid Opto-Thermal Devices and Infrared Thermal Emission Control, P.I: Michelle Lynn Povinelli, Professor
- Machine Learning For Efficient Network Management, P.I: Viktor Prasanna, Professor
- Fabrication and Application of Plasmonic Nanostructures: A Story of Nano-Fingers, P.I: Wei Wu, Associate Professor
- The Selective Area Growth and Coalescence of Indium Phosphide Nanostripe Arrays on Silicon through MOCVD for NIR Monolithic Integration, P.I: Paul Dapkus, Professor
- Building Blocks for 3D Integrated Circuits:Single Crystal Compound Semiconductor Growth and Device Fabrication on Amorphous Substrates, P.I: Rehan Kapadia, Assistant Professor
- Local-aware Deep Learning: Methodology and Applications, P.I: C.-C. Jay Kuo, Professor
- Design and Testing of SRAMS Resilient to Bias Temperature Instability (BTI) Aging, P.I: Sandeep K. Gupta, Professor
- Interaction Dynamics and Coordination for Behavioral Analysis in Dyadic Conversations, P.I: Shrikanth Narayanan, Professor
- Microresonator-based Kerr Frequency Comb for High-Speed Optical Communications and Signal Processing, P.I: Alan Willner, Professor
- Video Object Segmentation and Tracking with Deep Learning Techniques, P.I: C.-C. Jay Kuo, Professor
- Verification and Testing of Rapid Single-Flux-Quantum (RSFQ) Circuit for Certifying Logical Correctness and Performance, P.I: Sandeep Gupta, Professor
- Improving the Sensitivity and Spatial Coverage of Cardiac Arterial Spin Labeling for Assessment of Coronary Artery Disease, P.I: Krishna Nayak, Professor
- Resonant light-matter interactions in nanophotonic structures: For manipulating optical forces and thermal emission, P.I: Michelle Lynn Povinelli, Professor
- Digital to Radio Frequency Conversion Techniques, P.I: Mike Chen, Associate Professor
- Analysis, design, and optimization of large-scale networks of dynamical systems, P.I: Mihailo Jovanovic, Professor
- Nonuniform Sampling and Digital Signal Processing for Analog-to-Digital Conversion, P.I: Shuo-Wei Chen, Associate Professor

- Improving Spectrum Efficiency of 802.11ax Networks, P.I: Konstantinos Psounis, Professor
- Radar Remote Sensing of Permafrost Landscapes and Active Layer Soil Properties, P.I: Mahta Moghaddam, Professor
- Object Classification Based on Neural-Network-Inspired Image Transforms, P.I: C.-C. Jay Kuo, Professor
- Functional real-time MRI of the upper airway, P.I: Krishna Nayak, Professor
- Electromagnetic Scattering Models for Satellite Remote Sensing of Soil Moisture Using Reflectometry from Microwave Signals of Opportunity., P.I: Mahta Moghaddam, Professor
- Power-Efficient Biomimetic Neural Circuits, P.I: Alice Parker, Professor
- High-Performance Distributed Computing Techniques for Wireless IoT and Connected Vehicle Systems, P.I: Bhaskar Krishnamachari, Professor
- Asynchronous Optimization Over Weakly Coupled Renewal Systems, P.I: Michael Neely, Professor
- Optoelectronic, Thermoelectric, and Photocatalytic Properties of Low Dimensional Materials, P.I: Stephen Cronin, Professor
- Estimation of graph Laplacian and covariance matrices, P.I: Antonio Ortega, Professor
- Discovering and Querying Implicit Relationships in Semantic Data, P.I: Viktor K. Prasanna, Professor
- 2D Layered Materials: Fundamental Properties and Device Applications, P.I: Han Wang, Associate Professor
- Exploiting diversity with online learning on the Internet of Things, P.I: Bhaskar Krishnamachari, Professor
- Solution of Inverse Scattering Problems via Hybrid Global and Local Optimization, P.I: Mahta Moghaddam, Professor
- Closed-Loop Brain-Machine Interfaces for Control of Brain States, P.I: Maryam Shanechi, Assistant Professor
- On Efficient Data Transfers Across Geographically Dispersed Datacenters, P.I: Cauligi Raghavendra, Professor
- Landmark-Free 3D Face Modeling for Facial Analysis and Synthesis, P.I: Ram Nevatia, Professor
- Data and Computation Redundancy in Stream Processing Applications for Improved Fault Resiliency and Real-Time Performance, P.I: Stephen Crago, Associate Professor
- Design, Modeling, and Analysis for Cache-Aided Wireless Device-to-Device Communications, P.I: Andreas Molisch, Professor
- Coded Computing: A Transformative Framework for Resilient, Secure, Private, and Communication Efficient Large Scale Distributed Computing, P.I: Salman Avestimehr, Professor
- Reinforcement Learning with Generative Models for Non-parametric MDPs, P.I: Rahul Jain, Associate Professor

- Noise Aware Methods for Robust Speech Processing Applications, P.I: Shrikanth Narayanan, Professor
- Physics and applications of energetic electrons resulting from nanosecond-scale transient plasma, P.I: Martin Gundersen, Professor
- Automatic Conversion from Flip-Flop to 3-Phase Latch-Based Designs, P.I: Peter Beerel, Professor
- Structured Visual Understanding and Generation, P.I: C.-C. Jay Kuo, Professor
- Exploitation of Sparse and Low-rank Structures for Tracking and Channel Estimation, P.I: Urbashi Mitra, Professor
- Flag the faults for reliable quantum computing, P.I: Benjamin Reichardt, Associate Professor
- Exploring Complexity Reduction in Deep Learning, P.I: Peter Beerel, Professor

2018 Dissertation Titles

- Novel Theoretical Characterization and Optimization of Experimental Efficiency for Diffusion MRI, P.I: Justin Haldar, Assistant Professor
- Low-Power, Dual Sampling-Rate, Shared-Architecture ADC For Implantable Biomedical Systems, P.I: Aluizio Prata, Associate Professor
- An Asynchronous Resilient Circuit Template and Automated Design Flow, P.I: Massoud Pedram, Professor
- Unsupervised Learning of Holistic 3D Scene Understanding, P.I: Ram Nevatia, Professor
- Temporal Perception and Reasoning in Videos, P.I: Ram Nevatia, Professor
- Multimodal Reasoning of Visual Information and Natural Language, P.I: Ram Nevatia, Professor
- Integrated Control of Traffic Flow, P.I: Petros Ioannou, Professor
- Subsurface SAR Image Formation for Discrete Point Targets, P.I: Mahta Moghaddam, Professor
- Toward Robust Affective Learning from Speech Signals Based on Deep Learning Techniques, P.I: Shrikanth Narayanan, Professor
- Integrated Photonics Assisted Electron Emission Devices, P.I: Rehan Kapadia, Assistant Professor
- Improving Reliability, Power and Performance in Hardware Transactional Memory, P.I: Michel Dubois, Professor
- Production-level test issues in delay line based asychronous designs, P.I: Peter Beerel, Professor
- Architecture Design and Algorithmic Optimizations for Accelerating Graph Analytics on FPGA, P.I: Viktor Prasanna, Professor
- Achieving Efficient MU-MIMO and Indoor Localization via Switched-beam Antennas, P.I: Konstantinos Psounis, Professor
- Control and Optimization of Complex Networked Systems Wireless Communication and Power Grids, P.I: Edmond Jonckheere, Professor

Electrical Engineering: Ph.D. Dissertation Topics

- A Data-Driven Approach to Compressed Video Quality Assessment Using Just Noticeable Difference, P.I: C.-C. Jay Kuo, Professor
- High-dimensional Magnetic Resonance Imaging of Microstructure, P.I: Justin Haldar, Associate Professor
- Signal Processing for Channel Sounding: Parameter Estimation and Calibration, P.I: Andreas Molisch, Professor
- Cathode and Anode Materials for Sodium Ion Batteries, P.I: Chongwu Zhou, Professor
- In Plane a & Cross-Plane Thermoelectric Characterizations of van Der Waals Heterostructures, P.I: Stephen Cronin, Professor
- Zero-Power Sensing and Processing with Piezoelectric Resonators, P.I: Eun Kim, Professor
- Exploiting Side Information for Link Setup and Maintenance in Next Generation Wireless Networks, P.I: Andreas Molisch, Professor
- Advanced Cell Design and Reconfigurable Circuits for Single Flux Quantum Technology, P.I: Massoud Pedram, Professor
- Theory of Memory-Enhanced Neural Systems and Image-Assisted Neural Machine Translation, P.I: C.-C. Jay Kuo, Professor
- Towards Data-Intensive Processing Architectures for Improving Efficiency in Graph Processing, P.I: Jeffrey Draper, Associate Professor
- Functional connectivity analysis and network identification in the human brain, P.I: Richard Leahy, Professor
- Applications of orbital angular momentum in high-capacity free-space optical communications, P.I: Alan Willner, Professor
- Cache Analysis and Techniques for Optimizing Data Movement Across the Cache Hierarchy for HPC Workloads, P.I: Jeffrey Draper, Adjunct Associate Professor
- Efficient Estimation and Discriminative Training for the Total Variability Model, P.I: Shrikanth Narayanan, Professor
- Matrix Factorization for Noise-Robust Representation of Speech Data, P.I: Shrikanth Narayanan, Professor
- Clocking Solutions for SFQ Circuits, P.I: Peter Beerel, Professor
- Towards Green Communications: Energy Efficient Solutions for the Next Generation Cellular Mobile Communication Systems, P.I: Massoud Pedram, Professor
- Data-Driven H-Infinity Loop-Shaping Controller Design and Stability of Switched Nonlinear Feedback Systems with Average Time-Variation Rate, P.I: Michael Safonov, Professor
- Hot Carriers in Bare Metals and Photocatalytically Active Defect Sites in Dielectric/Metal Structures, P.I: Stephen Cronin, Professor
- Understanding Dynamics of Cyber-Physical Systems: Mathematical Models, Control Algorithms and Hardware Incarnations, P.I: Paul Bogdan, Assistant Professor
- Energy-efficient design techniques and architectures for high-speed (GS/s) analog-to-digital converters, P.I: Mike Shuo-Wei Chen, Associate Professor

- Improving the Speed-Power-Accuracy Trade-Off in Low-Power Analog Circuits by Reverse Back-Body Biasing, P.I: Edward Maby, Professor
- A Data-Driven Approach to Image Splicing Localization, P.I: C.-C. (Jay) Kuo, Professor
- Team Decision Theory and Decentralized Stochastic Control, P.I: Ashutosh Nayyar, Assistant Professor
- Metasurfaces in 3D Applications: Multiscale Stereolithography and Inverse Design of Diffractive Optical Elements for Structured Light, P.I: Wei Wu, Associate Professor
- Reconfigurable Optical Signal Processing for Efficient Spectrum Utilization in High-Speed Optical Communication Systems, P.I: Alan Willner, Professor

2017 Dissertation Titles

- Fabrication and Characterization of Toroidal Resonators for Optical Process Improvement, P.I: Andrea Armani, Associate Professor
- Improving Efficiency to Advance Resilient Computing, P.I: Jeffrey Draper, Associate Professor
- A Deep Learning Approach to Online Single and Multiple Object Tracking, P.I: C.-C. Jay Kuo, Professor
- PROTECTING HAMILTONIAN-BASED QUANTUM COMPUTATION USING ERROR SUPPRESSION AND ERROR CORRECTION, P.I: Daniel Lidar, Professor
- Joint Routing, Scheduling, and Resource Allocation in Multi-hop Networks: from Wireless Ad-hoc Networks to Distributed Computing Networks, P.I: Andreas Molisch, Professor
- On Practical Network Optimization: Convergence, Finite Buffers, and Load Balancing, P.I: Michael Neely, Associate Professor
- Sampling Theory for Graph Signals with Applications to Semi-supervised Learning, P.I: Antonio Ortega, Professor
- Compression of signal on graphs with the application to image and video coding, P.I: Antonio Ortega, Professor
- Deep Learning Techniques for Supervised Pedestrian Detection and Critically-Supervised Object Detection, P.I: C,-C. Jay Kuo, Professor
- Optimizing Privacy and Performance in Spectrum Access Systems, P.I: Konstantinos Psounis, Assoictae Professor
- Using formal optimization techniques to improve the performance of mobile and data center networks, P.I:, Konstantinos Psounis, Assoictae Professor
- Machine Learning Techniques for Perceptual Quality Enhancement and Semantic Image Segmentation, P.I: C.-C. Jay Kuo, Professor
- Sparse Feature Learning for Dynamic Subsurface Imaging, P.I: Behnam Jafarpour, Associate Professor
- Novel Optimization Tools for Structured Signals Recovery: Channels Estimation and Compressible Signal Recovery, P.I: Urbashi Mitra, Professor

Electrical Engineering: Ph.D. Dissertation Topics

- Machine Learning Techniques for Outdoor and Indoor Layout Estimation, P.I: C.-C. Jay Kuo, Professor
- Adaptive Control: Transient Response Analysis and Related Problem Formulations, P.I: Michael Safonov, Professor
- Graph-based Models and Transforms for Signal/Data Processing with Applications to Video Coding, P.I: Antonio Ortega, Professor
- Feature Learning for Imaging and Prior Model Selection, P.I: Behnam Jafarpour, Associate Professor
- Object Localization with Deep Learning Techniques, P.I: C.-C. Jay Kuo, Professor
- Neuronal Signal Synchrony, Rhythmicity, and Rate Variability in Neuromuscular Systems, P.I: Edmond Jonckheere, Professor
- Coded Computing: Mitigating Fundamental Bottlenecks in Large-scale Data Analytics , P.I: Salman Avestimehr, Associate Professor
- Learning, Adaptation and Control to Enhance Wireless Network Performance, P.I: Bhaskar Krishnamachari, Professor
- Theoretical and Computational Foundations for Cyber-Physical Systems Design, P.I: Paul Bogdan, Assistant Professor
- A generic spur and interference mitigation platform for next generation digital phase-locked loops, P.I: Mike Shuo-Wei Chen, Associate Professor
- Optical Wave Mixing for Tunable Delays and High-Speed Signal Processing, P.I: Alan Willner, Professor
- Modeling Intermittently Connected Vehicular Networks, P.I: Bhaskar Krishnamachari, Professor
- GaAs Nanowire Optoelectronic and Carbon Nanotube Electronic Device Applications, P.I: Chongwu Zhou, Professor
- New Lagrangian Methods for Constrained Convex Programs and Their Applications, P.I: Michael Neely, Associate Professor
- On-Chip Kerr Frequency Comb Generation and Its Effects on The Application of Optical Communications, P.I: Alan Willner, Professor
- Using beams carrying orbital angular momentum for communications and remote sensing, P.I: Alan Willner, Professor
- Multi-constrained Inversion Algorithms for Microwave Imaging, P.I: Mahta Moghaddam, Professor
- Nano-Fabricated Devices in Electrochemistry and Cancer Therapy, P.I: Wei Wu, Associate Professor
- Light Matter Interactions in Engineered Structures: Radiative Thermal Management & Light-Assisted Assembly of Reconfigurable Optical Matter, P.I: Michelle Povinelli, Associate Professor
- Utilizing Context and Structure of Reward Functions to Improve Online Learning in Wireless Networks, P.I: Bhaskar Krishnamachari, Professor

Electrical Engineering: Ph.D. Dissertation Topics

- Data-Driven Optimization for Indoor Localization, P.I: Bhaskar Krishnamachari, Professor
- Real-Time Channel Sounder Designs for Millimeter-Wave and Ultrawide-Band Communications, P.I: Andreas Molisch, Professor
- Hybrid Beamforming for Massive MIMO, P.I: Andreas Molisch, Professor
- Machine Learning Paradigms for Behavioral Coding, P.I: Shrikanth Narayanan, Professor
- Multidimensional Characterization of Propagation Channels for Next Generation Wireless and Localization Systems, P.I: Andreas Molisch, Professor
- Architectural Innovations for Mitigating Data Movement Cost on Graphics Processing Units and Storage Systems, P.I: Murali Annavaram, Professor
- Design and Analysis of Reduced Complexity Transceivers for Massive MIMO and UWB Systems, P.I: Andreas Molisch, Professor
- Astrocyte-Mediated Plasticity and Repair in CMOS Neuromorphic Circuits, P.I: Alice Parker, Professor
- Relative Positioning, Network Formation, and Routing in Robotic Wireless Networks, P.I: Bhaskar Krishnamachari, Professor
- Towards an Understanding of the Impact of Dependent Blocking on Localization Performance, P.I: Andreas Molisch, Professor
- Energy-efficient Computing: Datacenters, Mobile Devices, and Mobile Clouds, P.I: Massoud Pedram, Professor
- Reconfigurable High-Speed Processing and Noise Mitigation of Optical Data, P.I: Alan Willner, Professor