Welcome to the inaugural Annual Report for the Department of Electrical and Computer Engineering (ECE) at Tufts University School of Engineering. It has been my pleasure to serve as department chair since September 2012. The tremendous growth seen in engineering at Tufts over the past decade has certainly been felt in ECE. This period has seen the hiring of nine of our current 13 tenured and tenure-track faculty as well as both of our Professors of the Practice. The current group includes four IEEE Fellows and eight National Science Foundation (NSF) Faculty Early Career Development (CAREER) award winners. Since 2007, our research expenditures have grown by a factor of 3.5 with 2013 funding at just over $2 million, supporting more than 20 graduate research assistants, up from five in 2007.

The past year in particular has been a strong one for ECE. On the research front, Assistant Professor Usman Khan was awarded an NSF CAREER grant for his work in wireless sensor networks. Associate Professor Tom Vandervelde’s $3 million Major Research Instrumentation (MRI) award from the NSF will support the construction of a molecular beam epitaxy system for the synthesis of next generation solar cells. Professor Jeff Hopwood secured multiple awards from the Air Force, including a Multidisciplinary University Research Initiative (MURI) grant for developing microplasma technologies to characterize laser discharge of metastable atoms and as the basis for new forms of metamaterial-based sensing methods. Finally, Assistant Professor Shuchin Aeron’s work with Schlumberger on acoustic processing methods for oil and gas exploration is indicative of our effort to move beyond federal funding sources for support of basic research.

The success of our faculty extends well beyond funding. In addition to receiving tenure and promotion to the rank of Associate Professor, professor Vandervelde was the recipient of the 2014 School of Engineering Faculty Mentoring Award. Professor Karen Panetta was named Associate Dean for Graduate Education in the School of Engineering and was awarded the 2013 IEEE William E. Sayle II Award for Achievement in Education. Also within the IEEE, Associate Professor Sameer Sonkusale was named to a two-
year term as chair of the Biomedical and Lifesciences Circuits and Systems Technical Committee.

Among our students, doctoral candidate Nicole Pfiester Latham was awarded an NSF Graduate Research Fellowships in 2014. This year two juniors, Will Lenk and Ean Wong, and one sophomore, Norihito Naka, were named Tufts Summer Scholars and received support for their work with professors Sonkulsale, Aeron, and Vandervelde. For the third year running, students from ECE were awarded the Stephen and Geraldine Ricci Interdisciplinary Prize, a $10,000 award for translation of research discoveries from the laboratory to real-world applications. This year, Nana Kwakwa, E14, and Alex Henry, E15, were part of a team that won for their project to create a wireless sensor to monitor blood oxygen concentration in neural tissue.

The department’s alumni have also enjoyed much success in the past year. Sampathkumar Veeraraghavan, EG10, was honored with the IEEE-Eta Kappa Nu Outstanding Young Professional Award as well as the 2013 IEEE MGA Achievement Award for technological and leadership excellence in relation to his automated screening system. The department was thrilled to name Jian “Jerry” Guo, E11, as the inaugural recipient of the Joseph Noonan Doctoral Research Prize. In summary, the Tufts ECE Department continues to enjoy strength in all aspects of our programs. With the strength of our students, alumni, faculty and staff, we look forward to having this growth only continue to accelerate in the coming years.

Eric Miller
Electrical and Computer Engineering
Professor and Chair
More than 66,000 bridges in the United States—one in nine—are structurally deficient, according to a report by Transportation for America. These bridges span more than 1,500 miles, and currently require engineers to physically inspect the structures to collect data. Wireless Sensor Networks (WSNs) have been proposed as an autonomous way to monitor bridges; however, WSN power sources lack the necessary energy for long-range transmission of data.

Assistant Professor Usman Khan received an NSF CAREER Award to conduct research on his novel solution to the wireless transmission problem: data collection and processing via Unmanned Arial Vehicles (UAVs) that interface with existing WSNs to provide low-cost, low-maintenance, autonomous data collection and inspection. In collaboration with Assistant Professor Babak Moaveni the Department of Civil and Environmental Engineering, Khan has been testing the viability of his concept on a footbridge at Tufts that spans the distance between Dowling Hall and the main campus. Moaveni outfitted the bridge with accelerometers and thermocouples that transmit data to a collection hub for analysis.

The research team will upgrade the sensors to WSNs that use RFID tags to store and transmit (partially) processed data to a lightweight UAV quadcopter. A network of quadcoptors will autonomously navigate to the sensors placed on the bridge and process the RFID tag data. After analyzing the data, the UAVs may reprogram the sensors to sample data more frequently based on heavy traffic patterns among other scenarios.

The data analysis may also prompt the UAVs to gather auxiliary information such as images of joints and beams. Khan’s investigation in dynamic task allocation, distributed path planning, and collaborative navigation builds upon some of the classical work in convex geometry and Euclidean metrics. His work frames this distributed control problem using structured systems theory, by which efficient controllability and actuation methods can be developed. By establishing rigorous analytical arguments, members of Khan’s lab are working toward implementing a functional, remote monitoring and inspection prototype.

“This smart monitoring and inspection system is a step toward improving the sustainability and resilience of the current infrastructure,” said Khan.

In 2014, Khan was elevated to the rank of Senior Member of the IEEE, an honor held by fewer than 8 percent of the nearly 415,000 members of this professional society.

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Associate Professor **Sameer Sonkusale** was named chair of the Biomedical and Lifesciences Circuits and Systems Technical Committee in IEEE Circuits and Systems Society for a two-year term. **Sonkusale** also secured support from the Tufts Faculty Research Awards Committee in support of his work in the area of Characterization of Terahertz Circuits and Devices. The grant will allow for the purchase of instrumentation enabling **Sonkusale’s** lab to test and evaluate the performance of miniaturized circuits and sensors that operate at terahertz frequencies, a regime of the electromagnetic spectrum of great interest recently for problems in sensing and communications.

Professor **Mohammed Afsar** and Associate Professor **Valencia Joyner Koomson** were awarded a $470,000 grant from the National Science Foundation for a project aimed at the development of low-cost, miniaturized devices and circuits for use in high-frequency radar and communications systems. The effort rests on the integrating of these devices, based on novel nanoscale hexaferrite materials, into traditional CMOS processing.

Professor **Karen Panetta** was appointed Associate Dean for Graduate Education beginning September 2013. **Panetta** was awarded the 2013 IEEE William E. Sayle II Award for Achievement in Education, an award given annually to a member of the IEEE Education Society to recognize significant contributions over a period of years in the IEEE Education Society.

**Assistant Professor Shuchin Aeron** recently received an NSF award in support of his work on the study of high-dimensional signals and systems. This multidisciplinary effort, which includes ECE faculty as well as faculty from Tufts’ Department of Mathematics, is aimed at developing novel and efficient methods for representing and processing data in applications ranging from medical imaging and video to satellite remote sensing and geophysical exploration.

This research also has implications for machine learning for recommendation systems and for unsupervised clustering of various types of data. Several such methods have been proposed and applied to problems of facial recognition, video completion (see images) and learning over social networks.
Professor **Jeffrey Hopwood** was been awarded a Multidisciplinary University Research Initiative (MURI) grant. The research program will leverage Hopwood’s microplasma technology to investigate plasma-based reconfigurable photonic crystals and metamaterials. This proposal focuses on the fundamental science necessary for the development of high bandwidth reconfigurable plasma-based systems for controlling electromagnetic fields. The five-year effort is a collaboration that includes Tufts, Stanford University, Penn State, UCLA, UT-Austin, and the University of Washington.

Professor **Jeff Hopwood** and Research Assistant Professor **Alan Hoskinson** have received funding from the US Air Force for a new research program with Emory University, the Air Force Institute of Technology, and industrial partners. The program will study and develop excited-state rare gas lasers. The Tufts team will design low-voltage microdischarges operating at atmospheric pressure and then measure their production of the metastable atoms which are at the core of proposed laser technology.

Professors **Sameer Sonkusale** and **Valencia Joyner Koomson** were awarded support from the National Science Foundation’s Instrument Development for Biological Research program to host a conference that brought together a highly interdisciplinary group of biologists, physicists, engineers, industry experts, and government officials to discuss best practices for the development and dissemination of instrumentation for biological research.

Professor of the Practice **Ron Lasser** and Lecturer **Brian Aull**, Ph.D., were chosen as a Tufts CELT Faculty Fellows for the fall 2014 semester. Professor Lasser has been with the ECE department since 2006 where he has revolutionized the design component of the undergraduate curriculum as well as the introductory circuits class taken by students from across the School of Engineering. Aull, a member of the technical staff at MIT Lincoln Laboratory where he has developed photon counting imagers, regularly teaches the introductory circuits class in ECE at Tufts to rave reviews.

Associate Professor **Tom Vandervelde**, who was granted tenure this year, was selected to receive the 2014 School of Engineering Faculty Mentoring Award. This is the second time Vandervelde was honored with this award. This award, which he first received in 2011, recognizes faculty members who have demonstrated outstanding support of graduate students from course completion through research and post-degree placement.

Professor **Vandervelde** has won multiple prestigious research awards, including a $400,000 early career award from the National Science Foundation in 2011 for promising research on the conversion of heat to electricity. That same year, he was awarded a $450,000 early career award from the United States Air Force Office of Scientific Research for research into multi-modal infrared cameras. Vandervelde also received the Intelligence Community Young Investigator Award for $240,000 in 2012 to develop energy applications from infrared camera technology. He was recently elevated to the rank of Senior Member in the Optics Society of America in 2014.
Tufts University School of Engineering Associate Professor Tom Vandervelde has received a Major Research Instrumentation grant from the National Science Foundation. The grant will enable Vandervelde to build a multi-chamber molecular beam epitaxy (MBE) system that will anchor a new laboratory able to generate advanced semiconductors not only to support his research needs, but also for external academic and industrial partners. “By providing an inexpensive option for researchers looking to create unique, one-off devices, this facility can fill a critical void in the semiconductor field,” says Vandervelde, who is the director of the Renewable Energy and Applied Photonics (REAP) Laboratories at Tufts University.

Vandervelde’s work involves advanced semiconductors, which form the basis of all modern electronics and are frequently created using MBE systems. These semiconductors make possible sophisticated electronics such as high-speed transistors in cellular phones, night vision systems used by the U.S. military, and WiFi. The MBE process allows researchers to deposit one single elemental atom at a time, building up atomic layers of materials on a flat substrate inside a single vacuum chamber, which isolates the sample from contaminants, including the air itself. The NSF grant will allow Vandervelde to build a system in which scientists can transfer a single sample through a series of interconnected deposition chambers, all within an extreme vacuum. The sequential deposition of different combinations of materials within each respective chamber will allow for the creation of novel materials and the development of state-of-the-art semiconductor devices with unprecedented capabilities. Some examples include ultra-efficient solar cells, computer chips with photonic interconnects, and infrared cameras for medical diagnosis.

The MBE system will be the foundation of an Epitaxial Core Laboratory in the School of Engineering. This new facility will be directed by Vandervelde, and staffed by an experienced epitaxialist, who will maintain the system and generate samples for academic and industrial researchers.
Associate Professor Mai Vu joined the Department of Electrical and Computer Engineering in January 2013. She leads the Laboratory for Communications in Networked Systems (LINKS), which conducts research in wireless communications, signal processing and networked communications. She and her group have published extensively in the areas of cooperative and cognitive communications, MIMO systems and energy-efficient techniques, with applications in future cellular systems and ad hoc networks. One of the group’s current research projects is sponsored by the Office of Naval Research. The project investigates the use of relay coding to multicast information in a wireless network under strict priority and varying physical link conditions. Project outcome promises networked communication strategies for reliable and robust wireless networks. Vu is a senior member of IEEE, has served on the technical program committee of numerous IEEE conferences, and is currently an editor for the IEEE Transactions on Wireless Communications.

Lisa Pinals received her Bachelor of Science in electrical engineering from Tufts, E12, summa cum laude, and her master’s degree from Columbia University with research focused on the simulation of optical interconnection networks for high-performance computing systems. For her Ph.D., Lisa returned to Tufts to work with Associate Professor Mai Vu and is pursuing research in cooperation and resource allocation for multiuser wireless communication systems. She is currently investigating the use of relay coding techniques to boost communication throughput and reliability among multiple users, which can be applied to both cellular and ad-hoc networks. Her work is funded by the Office of Naval Research. In addition, Lisa is a recipient of the National Science Foundation Graduate Research Fellowship and the IEEE Life Member Graduate Study Fellowship.

Ph.D. candidate Maria Clara De Paolis Kaluza and master’s candidate Meera Pravin Punjiya both received honorable mentions from the NSF Graduate Research Fellowship Program.
Nicole Pfiester Latham received her Bachelor of Science in physics at Purdue University, where she played an active role in developing the local Women in Physics chapter both as a founding member and the Undergraduate Chair of the 2011 Midwest Conference for Undergraduate Women in Physics. Her undergraduate research focused on condensed matter physics and semiconductor materials through the use of molecular beam epitaxy, which she used to explore the growth mechanics of GaN nanowires. As a National Science Foundation Graduate Research Fellow, Nicole now works with Associate Professor Tom Vandervelde in the Renewable Energy and Applied Photonics (REAP) Labs. Her work focuses on leveraging metamaterials, or man-made, nanostructured materials with specifically designed properties including those not found in nature, to enhance the operation of thermophotovoltaic (TPV) cells and photodetectors. She has published recent work on the development of thermally robust, high-temperature selective emitters aimed at the band gap of TPV photodiodes to increase their efficiency. The use of metals like platinum and iridium and the introduction of protective top layers means these emitters can withstand temperatures nearing 1000°C. Nicole has also looked to metamaterials to create stacked polarizing filters whose layers can be turned on and off independently of each other. Such a filter would increase the resolution of present multi-directional filters threefold.

Summer Scholar Awards

Sophomore Norihito Naka received a Tufts Summer Scholars award to work in Associate Professor Tom Vandervelde’s Renewable Energy and Applied Photonics Laboratories. His work focuses on using novel material combinations to create thermally stable metamaterial emitters for thermophotovoltaics. These emitters will enable the efficient conversion of heat to usable electricity for a wide range of source temperatures.

Junior Ean Wong was named a Tufts Summer Scholar and worked with Assistant Professor Shuchin Aeron on a project entitled “Controlled Sensing for Behavioral Video Data Streams by EEG data analysis,” which will enable economical and scalable analysis of behavior (visually perceptible actions) associated with various EEG epileptic events by reducing the volume of video data recorded by orders of magnitude. This research is in collaboration with the EEG monitoring lab of Dr. Chris Dulla in the Department of Neuroscience at Tufts University School of Medicine.

Junior Will Lenk was named a Tufts Summer Scholar to support his work with Associate Professor Sameer Sonkusale on building flexible electronic devices to monitor chronic wounds. His work focused on the electronics platform for sensing, signal processing and wireless communication for variety of smart wound dressing platforms.

Ph.D. candidate Nicole Pfiester Latham was awarded an NSF Graduate Research Fellowship for her work utilizing metamaterials to create a selective thermal emitter that will enhance thermophotovoltaic efficiencies, opening up the possibility of harnessing energy from lower temperature sources like cars or body heat.

The unique properties of metamaterials are able to tailor the radiated spectrum from the emitter to the source temperature, maximizing the amount of useful photons while minimizing photodiode heating.
More than eighty people gathered at the Class of 2014 Senior Dinner in the Tufts Alumnae Lounge in May. The dinner is an annual event hosted by the department in recognition of the academic accomplishment of the seniors and the completion of their Capstone projects. In attendance were graduating ECE seniors and their families, invited guests, members of the ECE Advisory Board, alumni, faculty, and staff. At the reception, faculty visited with students, parents, and guests to discuss the senior projects and the excitement surrounding future plans. A buffet dinner was served while Senior Project videos were shown highlighting the Capstone projects. The evening concluded with the presentation of awards, plaques, and certificates to students, faculty, staff, and alumni.

Morris and Sid Heyman Prize
Junior William Lenk and senior Tolga Zeybek were recipients of the Morris and Sid Heyman Prize based on their academic achievements and future promise in the field. This award was established in 1980 by the bequest of Mrs. Sid L. Heyman in memory of her husband, Morris Heyman, who graduated from Tufts in 1919 with a Bachelor of Science degree in electrical engineering. The scholarship is awarded to one or more undergraduate students in the Department of Electrical Engineering.

Harry Poole Burden Prize
The Harry Poole Burden Prize in Electrical Engineering established in 1973 by friends of Harry Burden, H53, dean of the College of Engineering from 1936 to 1957. The award recognizes the best design or research projects done by electrical engineering undergraduate students during the current academic year. The award recipients were seniors Michael Abboud, Nathan Harada, Alexander Henry, Tolga Zeybek, and junior William Lenk.

Amos Emerson Dolbear Scholarship
This year’s recipients of the Amos Emerson Dolbear Scholarship were seniors John Pothier, Joshua Rapp, and Jesse Zhang. The award is given to seniors who have shown promise in the field of electrical engineering or physics. The awards were created by the bequest of Katherine E. Dolbear of the Class of 1897 in memory of an eminent scientist and teacher at Tufts.

Last year’s winners of the Stephen and Geraldine Ricci Interdisciplinary Prize delivered a lecture on November 13, 2013. Mical Nobel, E13, and Hassan Oukacha, E13, presented their project to improve an ophthalmological device used to diagnose the recommended course of treatment for glaucoma patients.
Class of 2014 Mentor Plaques

Professor Jeffrey Hopwood, Engineering and Business Librarian Karen Vagts, Engineering Lab Coordinator Warren Gagosian, and ECE alumnus Benson Christalin, E09, EG11, were honored with Senior Design Mentor Award plaques. The awards are in recognition of their interest and effort in guiding and working with the ECE seniors on their senior year projects in the 2013–2014 school year.

Hopwood was honored as a mentor for his effort on the “Steinway Piano Project.” Vagts was presented with a mentor plaque to acknowledge her time spent working on the “Senior Handbook Project.” Gagosian was presented with his award by the entire ECE Class of 2014 for his selfless dedication to provide design support for their Capstone projects. Christalin was given his award for his guidance on a project for “Sequencing Toys for Childhood Development.”

Perseverance in the Face of Risks and Obstacles
Alex Henry and Nana Kwasi Kwakwa “Wireless Multi-spectral NIRS to Monitor Tissue Hemodynamic Status” Awarded to the student team that has encountered numerous problems throughout the academic year in recognition of their efforts to work by themselves and in collaboration with graduate students, instructors, professors, and with hard determination to make their project succeed.

Best Promise for Future Technology and Its Application Shayne Hubbard, Brian McLaughlin, and Josh Rapp “Steinway Piano Project” Awarded for the efforts to develop a working prototype demonstrating the best promise for a future technology and its application to solve a real-world problem.

Most Innovative Chima Chiamaka and Stephen Akaeze “An Indoor High-speed ‘LIFI’ Network Based on Optical WDM” Awarded for the efforts to develop a working prototype demonstrating an interesting and innovating technology and its application.

Most Likely to be a Product Michael Abboud, Francesco Pittaluga, and Jesse Zhang “Noise Cancelling iPhone App” Awarded for the efforts to develop a technology, demonstrate a working prototype, and to present their project in a product development context.

Total Impact Project Beau Wood and Chelsea Stevens “Survey of Wellbeing of Young Children (eSWYC)” Awarded for the efforts to develop or adapt a technology into a working prototype that has the potential to make a societal and ethical impact.

Editor’s Choice Award
Postdoctoral fellow Arvind Saibaba was the lead author on a paper that received an Editors’ Choice Award from Water Resources Research. He is currently working on optical topographic imaging methods for breast cancer detection.

Ricci Prize Winners
For the third year running, ECE students were awarded the Stephen and Geraldine Ricci Interdisciplinary Prize. Nana Kwakwa, E14, and Alex Henry, E15, in collaboration with computer science doctoral candidates Tomoki Shibata, Samuel Hincks, and Daniel Afergan were awarded the Ricci Interdisciplinary Prize for their project “A wireless device to monitor blood oxygen concentration in tissue to aid in developing an adaptive information delivery system.”

Best Paper Award
Doctoral student Mohammadreza Doostmohammadian was awarded a Best Student Paper Finalist Award from the IEEE Systems, Man and Cybernetics Society at the IEEE International Conference on Networking, Sensing and Control for his paper entitled, “Distributed Algorithm for Shortest Path Problem in Undirected Graphs via Randomized Strategy.”
Doctoral Recipients

Dante F. DeMeo
M.S. Tufts University
B.S. Tufts University
Dissertation Advisor: Tom Vandervelde
Dissertation Title: Nanostructures and Metaphotonics for Thermophotovoltaic Generation of Electricity

Samuel lvo Ramsay MacNaughton
M.S. Tufts University
B.S. Tufts University
Dissertation Advisor: Sameer Sonkusale
Dissertation Title: A Gas Chromatograph / Chemiresistor Array for Multi-modal, CMOS-compatible Electronic Nose for the Identification and Quantification of Gases and Their Mixtures

George Saveriades
M.S. Tufts University
B.S. Tufts University
Dissertation Advisor: Joseph Noonan
Dissertation Title: The Effects of Magnetic Exposure on the Nervous System: A Study on the Effects of Low-strength Low-frequency Magnetic Fields on Neurotransmitter Exocytosis and Cell Viability through Ionic Cyclotron Resonance Frequency

Anjali Sharma
M.S. Tufts University
B.E. Thapar University, India
Dissertation Advisor: Mohammed Afsar
Dissertation Title: Characterization and Study of Ferromagnetic Resonance of Micro and Nano Ferrites at Microwave and Millimeter Waves

Corey M. Shemelya
M.S. Tufts University
B.S. Allegheny College
Dissertation Advisor: Tom Vandervelde
Dissertation Title: Photonics: Photodiodes and Metamaterials for Thermophotovoltaics and Photodetection Applications

Wangren Xu
M.S. Royal Institute of Technology, Sweden
B.E. Dong Hua University, China
Dissertation Advisor: Sameer Sonkusale
Dissertation Title: Metamaterials with Active Circuits

School of Engineering Dean Linda Abriola, Wangren Xu, and Associate Professor Sameer Sonkusale at the Doctoral Hooding Ceremony on the Bromfield-Pearson Lawn on May 18, 2013 during commencement weekend
ECE AT A GLANCE

ECE STATISTICS

42 degrees awarded for the 2013 - 2014 academic year.

Over 50% of grant funding supported by the National Science Foundation.

Faculty Publications

ECE Research Expenditures

A total of 57 awarded grants

Distribution of Active Projects

2013-2014 ANNUAL REPORT • 13
Robert Shin
MIT Lincoln Laboratory, Head of Intelligence, Surveillance, and Reconnaissance (ISR) and Tactical Systems Division

Bob Treiber
Boston Engineering, President

Jan van der Spiegel
University of Pennsylvania, ECE Professor, Former Chair

Matt Verminske
Kiva Systems, Director of Hardware Engineering

Dmitri Volfson
Pfizer, Director of Statistics, Research Statistics, Neuroscience Unit

Robert T-I. Shin, member of the ECE External Advisory Board, was recently honored by MIT with the 2014 Irwin Sizer Award for his work in establishing the Beaver Works, a model for project-based educational collaboration between the MIT campus and Lincoln Laboratory.

Sampathkumar Veeraraghavan, EG10, was honored with the IEEE-Eta Kappa Nu Outstanding Young Professional Award and the 2013 IEEE MGA Achievement Award for technological and leadership excellence.

Brian Muse, E09, co-founded a digital agency and product development company called One Mighty Roar (OMR). In 2014, OMR began incubating a product called Robin, which aims to create the “smart office” using presence-sensing and building automation. OMR raised $1.4 million in seed funding and has spun Robin into its own company, which remains the main focus for the future.

Premkumar Natarajan, EG96, former executive vice president of Raytheon BBN Technologies, took the helm at the USC Viterbi School of Engineering’s Information Sciences Institute (ISI), a world leader in the research and development of advanced information processing, computer and communications technologies.
Professor and Department Chair
Eric Miller
Ph.D., Massachusetts Institute of Technology
Physics-based signal and image processing and inverse problems

Professors
Mohammed Nurul Afsar
Ph.D., University of London
Precision microwave, millimeter, submillimeter, terahertz, infrared wave; Solid, liquid and gaseous state physics, spectroscopy

Jeffrey Hopwood
Ph.D., Michigan State University
Microwave circuit design for microplasma generation, microplasma-based environmental sensors and other microsystem applications

Karen Panetta
Ph.D., Northeastern University
Image and signal processing for security and medical applications, modeling and simulation, multimedia

Douglas Preis
Ph.D., Utah State University
Signal analysis, digital signal processing, audio engineering, electromagnetic theory

Aleksandar Stanković
Ph.D., Massachusetts Institute of Technology
Analytical and experimental work involving modeling, control, and estimation in electric energy processing

Associate Professors
Chorning Hwa Chang
Ph.D., Drexel University
Computer architecture, parallel processing, computer networking, hardware description languages, simulation and programmable logic design

Valencia Joyner Koomson
Ph.D., University of Cambridge
Design of silicon-based mixed-mode VLSI systems (analog, digital, RF, optical), analog signal processing

Sameer Sonkusale
Ph.D., University of Pennsylvania
Integrated circuits for sensors and instrumentation, nanoelectrochemical systems on silicon, CMOS Image sensors for scientific imaging

Tom Vandervelde
Ph.D., University of Virginia
Interaction of light with matter, physics of nanostructures (semiconductor photonics and electronics) and interfaces

Mai Vu
Ph.D., Stanford University
Network communications and signal processing

Assistant Professors
Shuchin Aeron
Ph.D., Boston University
Statistical Signal Processing (SSP), inverse problems, compressed sensing, information theory, convex optimization, machine learning

Usman Khan
Ph.D., Carnegie Mellon University
Robotics, signal processing, sensing in the context of distributed estimation and control algorithms, distributed, iterative algorithms in random environments

Research Assistant Professor
Alan Hoskinson
Ph.D., University of Wisconsin
Applications of atmospheric-pressure plasmas, spectroscopic plasma diagnostics, plasma modeling, thin film deposition

Professors of the Practice
Ronald Lasser
Ph.D., Carnegie Mellon University
Digital image processing, computer animation, swarm robotics, innovation, engineering method and design

Brian Tracey
Ph.D., Massachusetts Institute of Technology
Imaging techniques and image processing, computational acoustics and acoustical signal processing, biomedical signal processing and medical device development