BOSTON
UNIVERSITY

Boston University College of Engineering
Department of Electrical & Computer Engineering

Annual Report
2009–2010

Contents

BU Department of Electrical & Computer Engineering

Message From the Chair

By almost every measure, this was an extremely successful year for Boston University's ECE Department. The year began with lively interactions with our Department's Visiting Committee, followed by a successful ABET site visit review that resulted in a full six-year reaccreditation of our two degree programs. The two external site visits provided an opportunity for strong focus on our undergraduate education program and led to new initiatives to revitalize our curriculum and increase our undergraduate enrollment. In collaboration with other Engineering departments, we introduced two new undergraduate multidisciplinary concentrations, in Nanotechnology and in Energy Technologies and Environmental Engineering, that allow our undergraduates increased exposure to emerging engineering fields. Under the leadership of Mark Horenstein, we began an outreach program to increase the visibility of ECE within the BU student population and our prospective applicants, culminated by strong faculty involvement in spring recruitment activities. This led to a 30% increase in the number of new students in the College of Engineering, and a 40% increase in the percentage of incoming students enrolling in ECE.

Another outgrowth of our discussions with our Visiting Committee was the creation of a task force for curriculum reform as part of our Undergraduate Committee led by Thomas Little. The task force's goal is to increase the flexibility of our programs to enable undergraduates to pursue specialization in different concentrations, while providing a rigorous foundation of relevant engineering science. This academic year, we are introducing new options to enable students to pursue diverse interests within ECE, including the Nanotechnology and Energy Concentrations, more flexible access to minors in other departments (Biomedical Engineering, Mechanical Engineering) and a new course in the Business of Technology Innovation, co-taught with Boston University's School of Management. A more thorough review and revision of our core course offerings in science and engineering is underway.

The Department had an excellent year in acquiring research funding, with new grants totaling approximately $12,300,000, a 20% increase over the previous year, in addition to a sizeable pool of continuing grants. Fortunately, our graduate programs also received increased interest, leading to an incoming class of 83 MS students and 26 new PhD students to support our research mission. We also added three new degrees - Master's of Engineering in Electrical Engineering, in Computer Engineering and in Photonics - which are one-year non-research graduate programs tailored to meet the demand from local industry for continuing education in engineering.

This year, we integrated three new faculty members into the department: Ayse Coskun, Ajay Joshi, and Siddharth Ramachandran, adding depth to our Computer Engineering and Photonics groups. We continued our aggressive recruitment and hired two very promising young faculty for next year: Doug Densmore and Bobak Nazer. Densmore's research combines Computer Engineering principles with synthetic biology, an area of excellence in our Biomedical Engineering Department. Nazer is an expert in information theory and network coding, and will add depth to the strong group in Information Systems and Sciences, and will also contribute to the College of Engineering's Systems Division. In addition, we added a senior faculty member who recently retired from industry, Dr. Alan Pisano, as Associate Professor of the Practice to share his valuable experiences with our undergraduates.

This past spring, we started a new Distinguished Lecture Series, hosting Susie Wee, Hewlett-Packard's Chief Technology Officer; Tsuhan Chen, Professor and Director, School of Electrical and Computer Engineering at Cornell University; and Douglas Stone, Chairman of Applied Physics at Yale University. We have already filled our Fall 2010 Calendar with three additional Distinguished Lecturers, to complement our various technical seminar series organized by the different areas in ECE.

As I mentioned in the opening sentence, by almost every measure, this was a very successful year. Unfortunately, the department suffered three major losses due to the untimely deaths of our past Chair, Franco Cerrina, and our Computer Engineering colleague, Alexander Taubin, and the retirement of Mike Ruane to join his extended family on the West Coast. Ruane had been with Boston University since 1980, and was the College of Engineering's Faculty Director of Outreach, as well as the director of our Senior Design Capstone course. Taubin joined Boston University in 2002, with extensive expertise in logic design and design automation for asynchronous systems, and was an important contributor to our graduate and undergraduate curriculum in Computer Engineering. Cerrina was both my successor and predecessor as Chair of ECE, joining the department in 2008 after an illustrious career at the University of Wisconsin focusing on nano-scale lithography. He was the key motivator behind ECE's success this past year. We will miss our departed colleagues tremendously and hope to honor their memory by continuing their success in growing ECE.

In summary, our ECE Department's growth continues to accelerate. I look forward to an even better report next year.

David A. Castañón

David Castañón
Department Chair *ad interim*
September 2010

Highlights

ECE Welcomes New Faculty Members

The Department of Electrical & Computer Engineering (ECE) was pleased to welcome three new faculty members to its ranks this year.

Associate Professor **SIDDHARTH RAMACHANDRAN** (PhD University of Illinois, Urbana-Champaign, 1998) comes to the Department after a decade in industry, most recently with OFS Laboratories. His research interests focus on the optical physics of guided waves and their applications to photonic devices. Ramachandran's contributions to the field of fiber-optics garnered him recognition as a Distinguished Member of Technical Staff at OFS Labs in 2003 and a fellow of the Optical Society of America in 2010. He is currently a topical editor for *Optics Letters* and has served on numerous conference and grant-review committees in the field of optics and applied physics.

Assistant Professor **AYSE COSKUN** (PhD University of California, San Diego, 2009) is a recent PhD recipient and alum of UCSD's System Energy Efficiency Lab. Her research concentrates on analyzing and managing temperature-induced problems in multicore system-on-chips. Coskun's key projects have involved thermal modeling and management of 3D stack architectures, proactive thermal management, and temperature and energy-aware job scheduling for multicore multithreaded systems.

Assistant Professor **AJAY JOSHI** (PhD Georgia Institute of Technology, 2006) joined the Department after completing doctoral research at Georgia Tech's Advanced Interconnect Modeling and Design Group and subsequently working as a postdoctoral researcher in the EECS department at the Massachusetts Institute of Technology as part of the Integrated Systems Group. His research interests include on-chip and off-chip communication, digital/analog circuit design, computer architecture, reliable circuits and systems, and physical design.

Ramachandran

Coskun

Joshi

Faculty Awards and Honors

HATICE ALTUG received a Young Investigator Program award from the Office of Naval Research. She was also the recipient of the National Science Foundation's Faculty Early Career Development (CAREER) award.

IRVING BIGIO was named a Boston University (BU) College of Engineering Distinguished Lecturer. He was also named an Honorary Guest Professor at the University College London.

JEFFREY CARRUTHERS was named the 2010 Professor of the Year by members of the 2010 BU College of Engineering graduating class.

AYSE COSKUN and **MARTIN HERBORDT** were named as BU College of Engineering Dean's Catalyst Award recipients for their proposal to develop widely applicable, inexpensive software methods to reduce energy consumption and enable more efficient cooling in computer systems.

AYSE COSKUN also received the "Best Paper Award" at the 17th IFIP/IEEE International Conference on Very Large Scale Integration (VLSI-SoC), 2009.

LUCA DAL NEGRO was named a recipient of the National Science Foundation's Faculty Early Career Development (CAREER) award. He also received the Early Career Research Excellence Award from the BU College of Engineering.

MARTIN HERBORDT served as the General Chair of the IEEE 20th International Conference on Application-Specific Systems,

Architectures, and Processors. He also received the Outstanding Paper Award at the International Conference on Field Programmable Logic and Applications.

SIDDHARTH RAMACHANDRAN was elevated to the rank of fellow by the Optical Society of America for his "pioneering contributions to fiber optics, including spatial mode conversion and the use of higher-order modes for fiber lasers and nonlinear optical devices."

MICHAEL RUANE was awarded the 2010 Faculty Service Award by the BU College of Engineering.

DAVID STAROBINSKI received the 2009-2010 ECE Award for Excellence in Teaching.

ARI TRACHTENBERG was named one of the inaugural recipients of the BU College of Engineering Innovative Engineering Education Faculty Fellowship.

Promotions and Tenure

ROBERTO PAIELLA was promoted to the rank of Associate Professor with tenure and Associate Professor **ANNA SWAN** was awarded tenure this year.

Undergraduate Program

In the fall of 2009, the department hosted its Visiting Committee, a collection of distinguished scholars from around the country in academia and industry. The visit produced lively discussions around undergraduate curriculum, and the department is pursuing program updates based on this and other feedback.

Also in the fall of 2009, the Department and College hosted an ABET site visit review of our programs. The visit was an excellent opportunity for self-evaluation and reflection. The visit was successful and resulted in a full six-year reaccreditation for both electrical and computer engineering.

Combined enrollment in the BS programs was 185 students across the EE and CE majors. We continue to enjoy a strong record of placement of our graduating seniors in both programs. The number of EE and CE BS degrees awarded this year were 30 and 21, respectively.

Efforts to enhance the undergraduate laboratories are successfully ongoing, with new equipment, maintenance, and upgrades this year. In both classrooms and laboratories, emphasis is placed on design, laboratory practice, and applications. Successful ideas that were initiated in previous years, such as ECE Day and the ECE Teaching Excellence Award, continued this year.

Undergraduate Student Awards

Students **TUNDE AGBOOLA**, **SCHUYLER ELDRIDGE**, **NICKVASH KANI**, **MOHAMMED RAHBINI**, and **DANIEL RYAN** of team nano-TRACK (Camera Peripheral Board for Tracking) were selected by Senior Project faculty as recipients of the 2010 P.T. Hsu Memorial Award for the best overall ECE senior design project. Daniel Ryan also received the Michael F. Ruane Award for Excellence in Senior Capstone Design. This year's winner of the ECE Day Best Presentation Award was team Trafflack, consisting of members **MATTHEW FIGUEROA**, **AARON GANICK**, **JONATHON LOBO**, **TRAVIS RICH**, and **PETER SCHIMITSCH** (more information about Senior Design can be found on page 25).

ECE junior **WES UY** was the winner of the third season of the WGBH (PBS) engineering reality competition program Design Squad. He edged out five cast members—including classmate **ANA PELUCARTE**—in the season's final episode, which aired on Sunday, December 13. Uy received a $10,000 scholarship from the Intel Foundation for the win.

Graduate Program

One new PhD student was awarded the Dean's Fellowship (DF) and matriculated in Fall 2009. This student is continuing his degree program and making excellent progress. Twelve new PhD students matriculated with Graduate Teaching Fellowships (GTFs) in the same period; ten of these students were offered Research Assistantships (RAs) for the Fall 2010 semester.

With respect to degree production, 65 and 16 students graduated with the MS and PhD degrees, respectively, during the report period. The breakdown by degree is: 50 in EE, 28 in CE, two in Photonics and one in Systems.

We experienced an excellent recruiting year for Fall 2010 admissions. After receiving more than 800 applicants to the program, we expect an incoming class of 83 MS students and 26 PhD students. With respect to fellowships and assistantships, we will be matriculating 28 new funded graduate students for the Fall 2010 semester: five Dean's Fellows, 20 GTFs and three RAs. These numbers indicate a significant increase in the number of applicants, yield on fellowship offers, and the overall quality of the fall matriculants.

In 2009 a new curriculum was developed and proposed leading to the Master of Engineering degree in Electrical Engineering, Computer Engineering, and Photonics. This proposal has been approved by the department and college and is pending review by the provost.

The College of Engineering received a grant from the U.S. Department of Education Graduate Assistance in Areas of Na-

tional Need (GAANN) Program that will provide fellowships to Biomedical or Electrical and Computer Engineering PhD students seeking to focus on nanobiotechnology. Fellows will receive a $30,000 stipend for one to two years to pursue academic studies and research in this field.

Graduate Student Awards

ECE graduate students made an impressive showing in the 2010 Science and Engineering Day hosted by the University. The College of Engineering Dean's Award was awarded to **GILBERTO BASILIO-SANCHEZ** who works under the guidance of Prof. Ted Morse. Basilio-Sanchez was also the recipient of The Office of Technology Development Award. The Center for Nanoscience and Nanobiotechnology Award was awarded to **RONAN ADATO** who works under the guidance of Prof. Hatice Altug. Adato was also the recipient of The ECE Award for having the overall best poster at the event. **IVANA STOJANOVIC** received Honorable Mention for the CISE Poster Prize.

The College of Engineering Best Dissertation award recognizes annually the most outstanding PhD research by a student completed during the year ending in April. The award was given to Dr. **ASHWIN GOPINATH** for his dissertation titled, "Electromagnetic Field Enhancement and Light Localization in Aperiodic Nanostructures." Gopinath's research was conducted under the guidance of advisor Prof. Luca Dal Negro in the Electro-Physics research area.

SONAL AMBWANI received the Best Student Poster Award at The Gordon Center for Subsurface Sensing and Imaging Systems Research and Industrial Collaboration Conference.

Major Grants

New research funding this year totaled approximately $12.3M in awards for research, of which $9.7M were awarded to ECE Principal Investigators (PI) and $2.6M were awarded to ECE faculty members working as Co-PI on projects outside of the Department. Of the PI awards, 37 were for new research projects, while 23 awards were for continuing projects.

New Awards

This year, two ECE faculty received funding from the National Science Foundation (NSF) Career Awards. **HATICE ALTUG** received $400,000 for "Nano-Plasmonic Resonances for Bio-Detection Systems" (in conjunction with the Center for Nanoscience and Nanobiotechnology (CNN)). **LUCA DAL NEGRO** received a $400,000 award for "Combined Light and Carrier Localization

in High-Refractive Index Silicon Nanocrystal Structures – A novel approach for Si-based Lasers" (in conjunction with CNN).

Dal Negro also received $238,000 in funding from DoD/AFSOR for his "DURIP – 1.54mm Optical Gain in Si and Ge-Based Structures for Optical amplification and Electrically Pumped Lasers" proposal. **THEODORE MOUSTAKAS** received $150,000 in new funding from NASA/Photon Systems, Inc. for "Development of an Electron Beam Injected Laser Structure at 235nm Based on AlGaN/AlN Multiple Quantum Wells on SiC Substrates" (in conjunction with the Photonics Center) and **IOANNIS PASCHALIDIS** (PI) and Dmytro Kosakov (Co-PI) received $309,416 in new funding from PHS/NIH/NIGMS for their research into "Refinement Methods for Protein Docking Based on Exploring Multi-Dimensional Energy Funnels" (in conjunction with the Center for Information and Systems Engineering (CISE)).

VENKATESH SALIGRAMA (PI) and **JANUSZ KONRAD** (Co-PI) received $300,000 in new funding from DoD/National Geospatial Agency for "Video Analytics: An Event Based Statistical Approach." They also received a $507,364 award from the NSF for "Frames to Events: A Statistical Approach to Activity Analysis in Multi-Camera Systems" (in conjunction with CISE). Saligrama also received $433,430 in new funding from the NSF for "CPS-Medium: Collaborative Research: The Foundations of Implicit and Explicit Communication in Cyberphysical Systems" and $402,000 from ONR/Navy for "Smart Distributed Sensor Fields."

JOSHUA SEMETER (PI) and **CLEM KARL** (Co-PI) received $775,000 in new funding from the NSF for "NR-R21: Development of Next-Generation Imaging Spectrometer Based on a Tunable Liquid Crystal Filter (in conjunction with the Center for Space Physics (CSP)). Semeter also received $250,112 in funding from the NSF for his "Investigation of Phase Coherence in Elemental Auroral Structure" (in conjunction with CSP) research.

DAVID STAROBINSKI (PI) and **ARI TRACHTENBERG** (Co-PI) received $456,731 in new funding from the NSF for "CIF: Small: Large-Scale Software Dissemination in Stochastic Wireless Networks (in conjunction with CISE). **SELIM UNLU** received $152,971 in new funding from the NSF for "Floating Light-Activated Micro-Electrical Stimulators for Neural Prosthetics."

Continuing Awards with New Funding

CHRISTOS CASSANDRAS received $122,792 in continuing funding for his DoD/Air Force grant, "Real Time Optimization in Complex Stochastic Environment" (in conjunction with CISE). **DAVID CASTAÑÓN** (PI) and **CLEM KARL** and **VENKATESH SALIGRAMA** (Co-PIs) received $275,000 in continued funding from DHS/NEU for the ALERT grant "Awareness and Location of Explosive-Related Threats" (in conjunction with CISE).

The NSF and Northeastern University continued to fund the multi university Engineering Resource Center (ERC) CenSSIS program which was in its tenth and final year. **DAVID CASTAÑÓN** (PI) and his team at BU received $314,518 in continued funding.

THOMAS LITTLE, leader of the Boston University work effort for another multi university NSF ERC, received continued funding of $495,092 for the "NSF Smart Lighting Engineering Research Center" grant.

Additionally, (PIs) **DAVID CASTAÑÓN**, **ROBERTO PAIELLA**, **MIN-CHANG LEE**, **THEODORE MORSE,** and **LUCA DAL NEGRO** received continued funding from various sources in the amounts of $150,000 or greater.

Events

Bernard M. Gordon CenSSIS NSF Site Visit

The Gordon-CenSSIS (Center for Subsurface Sensing and Imaging Systems) NSF Site Visit, held April 14, 2010, brought together CenSSIS researchers and students from BU, Northeastern University, Rennselaer Polytechnic Institute, and University of Puerto Rico Mayaguez; NSF evaluators; and Gordon-CenSSIS industry and institutional collaborators. The Year Ten site visit agenda included presentations on the Center's Strategic Plan for a Sustained ERC; Generating New Knowledge; Sustainability; Advancing Technology & Achieving Technology Transfer; Educating University and Pre-College Students; Creating Student Leaders; and Diversity Accomplishments. A student poster session and an evening celebratory dinner attended by the NSF leadership and industry partners completed the day. This was the final site visit for CenSSIS. CenSSIS' sustainable activities will continue under separate grants at the partner institutions, several in partnership with our industry colleagues; through research in our ERC testbeds (BioBED, SoilBED, MedBED, and SeaBED), through the Gordon Engineering Leadership Program (providing MS study support in sensing and imaging), and through activities of three spin-off centers: ALERT (Awareness and Localization of Explosives-Related Threats), PROTECT (Puerto Rico Testsite for Exploring Contamination Threats), and VOTERS (Versatile Onboard Traffic Embedded Roaming Sensors).

ECE Day 2010

Initiated in 1997, ECE Day is a forum for seniors to present their capstone projects and graduate students to present their research posters. Held at the end of the Spring semester, ECE Day 2010 included 14 graduate research posters and ten senior design presentations attended by students, faculty, alumni, and industry representatives.

Exploring the Boundaries of Smart Light Systems

The NSF Smart Lighting Engineering Research Center (ERC) convened its first Academia-Industry Day at the Boston University Photonics Center on February 5, 2010, to explore the latest developments in the burgeoning field of low-power, high-efficiency light emitting diodes (LEDs) and other adaptive, controllable, solid-state technologies. The conference featured 12 hours of presentations and posters from faculty and students representing the ERC's three core institutions - Rensselaer Polytechnic Institute (RPI), Boston University, and the University of New Mexico (UNM) - and observations from industry experts. Founded in 2008 by the National Science Foundation, the ERC is a multi-year, $4 million-per-year, interdisciplinary program that facilitates research, industrial collaborations and educational initiatives aimed at advancing intelligent lighting systems and a robust smart lighting industry.

Future of Light Symposium

On November 16, 2009, the Photonics Center held its 13th annual Future of Light Symposium, "Biophotonics Sensors and Systems: Point of Care Diagnostics," which showcased research in biophotonic imaging and biomedical photonics. Chaired by ECE Professor Irving Bigio, the symposium highlighted the achievements of Photonics Center researchers and collaborators from academic and medical institutions in Greater Boston and across the country. ECE Professor Selim Unlu and Affiliated Professor Jerome Mertz were among the leading researchers from academia and industry to deliver talks at the symposium.

MS Project Symposia

The MS Project Symposia are events that give MS students who have participated in a faculty-advised Project Course an opportunity to present their completed work to peers and the faculty. Symposia are held at the end of each semester. This year's events were August 7, 2009, December 11, 2009, and May 3, 2010.

Distinguished Lecture Series

In 2010 the ECE Department hosted its inaugural Distinguished Lecture Series, high-profile invited lectures delivered by luminaries from both academia and industry. The following are biographical sketches of this year's Distinguished Lecturers.

Susie Wee — February 24, 2010

Chief Technology Officer, HP

"Experiences, Devices, Services, and the Cloud"

Susie Wee is the Chief Technology Officer of Client Cloud Services in HP's Personal Systems Group. Prior to this, Susie was the founding VP of the Experience Software Business in HP's Personal Systems Group and lab director of the HP Labs Mobile and Media Systems Lab.

Wee was the co-editor of the *JPSEC standard for the security of JPEG-2000 images* and the editor of the *JPSEC amendment on File Format Security*. She was formerly an associate editor for the *IEEE Transactions on Circuits, Systems for Video Technology* and for the *IEEE Transactions on Image Processing*. In addition to working at HP Labs, Wee was a consulting assistant professor at Stanford University. She received Technology Review's Top 100 Young Innovators award and was named to ComputerWorld's Top 40 Innovators under 40. She received the INCITs Technical Excellence award and was selected to be an IEEE Fellow in 2009.

Tsuhan Chen — March 24, 2010

Director, School of Electrical and Computer Engineering, Cornell University

"Beyond Face Recognition: Understanding Images of People Using Social Context"

Tsuhan Chen is Director of the School of Electrical and Computer Engineering at Cornell University. Previously, he was Associate Department Head in the Department of Electrical and Computer Engineering at Carnegie Mellon University and worked at AT&T Bell Laboratories.

Chen served as the Editor-in-Chief for *IEEE Transactions on Multimedia*, on the Editorial Board of *IEEE Signal Processing Magazine*, and as Associate Editor for *IEEE Transactions on Circuits and Systems for Video Technology*, *IEEE Transactions on Image Processing*, *IEEE Transactions on Signal Processing*, and *IEEE Transactions on Multimedia*. He co-edited a book titled *Multimedia Systems, Standards, and Networks*.

He received the Charles Wilts Prize at the CIT and was a recipient of the NSF CAREER Award. He was elected to the Board of Governors and IEEE Signal Processing Society and chosen as a Distinguished Lecturer for the IEEE Signal Processing Society. He is a member of the Phi Tau Phi Scholastic Honor Society and Fellow of IEEE.

Douglas Stone — April 21, 2010

Chairman of Applied Physics and Professor of Physics, Yale University

"What is a Laser Anyway? Do We Really Understand Them After Fifty Years of Trying?"

Douglas Stone is Professor and Chairman of Applied Physics and Professor of Physics at Yale University.

Stone is a theoretical physicist with interests in solid-state and optical/laser physics. Specifically he is interested in theoretical issues relating to physics and electronics on the nanoscale and in micro-lasers and other optical devices for integrated optics, analyzed using the tools of quantum theory and non-linear dynamics (chaos theory). He is the author of more than 100 research and review articles in these areas and holds three patents for optical devices. He is a recipient of the McMillan Award of the University of Illinois at Urbana and a Fellow of the American Physical Society and the Optical Society of America. He is also a former Trustee and current Honorary General Member of the Aspen Center for Physics.

He is currently writing a popular book on the history of science, *The Quest of the Valiant Swabian: Einstein and the Quantum*, to be published by Princeton University Press.

Faculty and Staff

Core Faculty

MURAT ALANYALI
Associate Professor
Communication networks; performance analysis and optimization; stochastic systems

- » PhD, University of Illinois, Urbana-Champaign 1996
- » 2003 NSF CAREER Award
- » 2004 Legacy Gift Award, College of Engineering
- » Associate Editor, IEEE Control Systems Society Conference Editorial Board

HATICE ALTUG
Assistant Professor
Nano-photonic devices and sensors; photonic switches for communication and bio-sensing applications

- » PhD, Stanford University, 2006
- » 2010 ONR Young Investigator Award
- » 2010 NSF CAREER Award
- » 2009 New Investigator Award, Massachusetts Life Sciences Center
- » 2008 BU Peter Paul Career Development Professorship
- » 2008 BU College of Engineering Dean's Catalyst Award
- » 2006 Best Research Paper, IEEE LEOS Conference

ENRICO BELLOTI
Associate Professor
Computational electronics; semiconductor materials and device simulations; power electronics; parallel computing

- » PhD, Georgia Institute of Technology, 1999
- » 2005 NSF CAREER Award
- » 2003 ONR Young Investigator Award

IRVING BIGIO
Professor
Medical application of optics, lasers, and spectroscopy; biophotonics; nonlinear optics; applied spectroscopy; laser physics

- » PhD, University of Michigan, 1974
- » Fellow - Optical Society of America, American Society for Lasers In Medicine and Surgery, American Institute for Medical & Biological Engineering
- » 2010 College of Engineering Distinguished Lecturer
- » 2007 Faculty Service Award
- » Associate Editor, *Journal of Biomedical Optics*
- » Associate Editor, *Lasers in the Life Sciences*
- » Invited Nominator, 2007 Nobel Prize in Physics

RICHARD BROWER
Professor
Molecular dynamics simulation for biomolecules; lattics methods for QCD and statistical mechanics; quantum field theory of strings and particles

- » PhD, University of California, 1969
- » A.P. Sloan Research Fellow, SLAC and MIT., 1974-1976
- » Past Managing Editor, *International Journal of Computational Physics*

DAVID CAMPBELL
Professor & Provost
General nonlinear phenomena and complex systems; novel electronic materials; electron transport in semiconductor superlattices

- » PhD, Cambridge University, 1970
- » Fellow - American Physical Society, American Association for the Advancement of Science
- » Editor-in-Chief, *Chaos*; Editor, *Physics Reports*

JEFFREY CARRUTHERS
Associate Professor &
Associate Chair for Undergraduate Studies
Wireless infrared communications; broadband communications; mobile and wireless networks

- » PhD, University of California, Berkeley, 1997
- » 1999 NSF CAREER Award
- » Senior Member, IEEE
- » 2010 College of Engineering Professor of the Year
- » 2001 ECE Award for Excellence in Teaching

CHRISTOS CASSANDRAS
Professor
Analysis and control of discrete event dynamic systems; stochastic control and optimization; dynamic control of computer and communication networks

- » PhD, Harvard University, 1982
- » Fellow, IEEE and IFAC
- » Editor-in-Chief, *IEEE Transactions on Autonomic Control* (1998-2010)
- » IEEE Control Systems Society Board of Governors
- » 1991 Lilly Fellow
- » 2006 Distinguished Member Award, IEEE Control Systems Society
- » 1999 Harold Chestnut Prize
- » IEEE Distinguished Lecturer
- » Dept Editor, *Journal of Discrete Event Dynamic Systems*
- » Associate Editor, *International Journal of Intelligent Computing and Cybernetics* and *International Journal of BioSciences and Technology*
- » Past Associate Editor, *Automatica* and *IEEE Transactions on Automatic Control*
- » Past Editor, Technical Notes and Correspondence, *IEEE Transactions on Automatic Control*
- » Honorary Professor, Huazhong University of Science and Technology and Wuhan University of Science and Technology

DAVID CASTAÑÓN
Professor
Stochastic control; estimation optimization; image understanding and parallel computation

- » PhD, Massachusetts Institute of Technology, 1976
- » Associate Director, CenSSIS; Co-Director, BU CISE
- » Past President, IEEE Control Systems Society (CSS)
- » IEEE CSS Distinguished Member Award.
- » Air Force Advisory Board member
- » 2007 ECE Teaching Award
- » Associate Editor, *Computational Optimization and Applications*; Past Associate Editor, *IEEE Transactions on Automatic Control*

FRANCO CERRINA
Professor and Chair
Semiconductor devices and fabrication modeling; nanolithography; nanofabrication; optics; optical systems; X-rays; synchrotrons; DNA synthesis; system and synthetic biology

» PhD, University of Rome, 1974
» Fellow: IEEE, Optical Society of America, American Physical Society, American Association for the Advancement of Science, SPIE

AYSE COSKUN
Assistant Professor
Green computing; 3D stacked architectures; multi and many-core systems; computer architecture; embedded and cyberphysical systems

» PhD, University of California, San Diego, 2009
» 2010 BU ENG Dean's Catalyst Award
» Best Paper Award, 17th IFIP/IEEE VLSI-SoC

LUCA DAL NEGRO
Assistant Professor
Optical amplification phenomena and laser physics; optical spectroscopy of semiconductor nanostructures; photonic crystals, anderson light localization and aperiodic dielectrics; nanophotonics and plasmonics

» PhD, University of Trento, 2003
» 2010 NSF CAREER Award
» 2010 BU Early Career Research Excellence Award
» Dean's Catalyst Award, 2007

ROSCOE GILES
Professor
Advanced computer architectures; distributed and parallel computing; computational science

» PhD, Stanford University, 1975
» One of the "50 Most Important Blacks in Research Science," The Career Communications Group (CCG)
» A. Nico Haberman Award, CRA
» 1996 ENG Award for Excellence in Teaching

MARTIN HERBORDT
Associate Professor
Computer architecture; electronic design automation; configurable computing; bioinformatics

» PhD, University of Massachusetts, 1994
» 2010 BU ENG Dean's Catalyst Award
» 2008 IBM Faculty Award
» 1997 NSF CAREER Award

MARK HORENSTEIN
Professor
Applied electromagnetics; electrostatics; microelectromechanical systems

» PhD, Massachusetts Institute of Technology, 1978
» Editor-in-Chief, *Journal of Electrostatics*

ALLYN HUBBARD
Professor
VLSI design using analog and digital techniques in CMOS; neural net chips, smart sensor chips, and chips with biological applications; models of the peripheral auditory system

» PhD, University of Wisconsin-Madison, 1977
» 2002 College of Engineering Award for Excellence in Teaching

PRAKASH ISHWAR
Assistant Professor
Signal, image, and video processing (statistical, multiresolution, distributed); information theory and communications (network coding, computation, security)

» PhD, University of Illinois Urbana-Champaign, 2002
» 2005 NSF CAREER Award
» 2007 Dean's Catalyst Award

AJAY JOSHI
Assistant Professor
On-chip and off-chip communication; digital/analog circuit design; computer architecture; reliable circuits and systems; physical design

» PhD, Georgia Institute of Technology, 2006

W. CLEM KARL
Professor
Multidimensional and multiscale signal and image processing and estimation, particularly applied to geometrically and medically oriented problems

» PhD, Massachusetts Institute of Technology, 1991
» 2000 ECE Award for Excellence in Teaching
» Past Associate Editor, *Tomography & MRI, IEEE Transactions on Image Processing*; Past Assistant Editor, *Systems Control Newsletter*

MARK KARPOVSKY
Professor
Design of secure cryptographic devices and smart cards; routing in interconnection networks; design and protection of cryptographic devices; fault-tolerant computing; error correcting codes; testing and diagnosis of computer hardware

» PhD, Leningrad Electrotechnical Institute, 1967
» Fellow, IEEE

RONALD KNEPPER
Professor
VLSI integrated circuit technology; SiGe BICMOS device and circuit modeling; silicon CMOS & bipolar devices; numerical device simulation; RF/analog IC design

» PhD, Carnegie Mellon University, 1969
» Life Fellow, IEEE
» 1989 IBM Outstanding Innovation Award; 1988 IBM Division Award; 1983 IBM Outstanding Technical Achievement Award
» Past Editor, *Solid State Electronics*

JANUSZ KONRAD
Professor
Image and video processing; compression and transmission; visual sensor networks; video analytics; stereoscopic and 3D imaging; multidimensional digital signal processing

» PhD, McGill University, 1989
» Fellow, IEEE
» 2001 IEEE Signal Processing Magazine Award
» 2004-2005 EURASIP Image Communications Best Paper Award
» 2007 Dean's Catalyst Award
» Associate Technical Editor, *IEEE Communications Magazine*; Associate Editor, *EURASIP Journal on Image and Video Processing*; Past Associate Editor, *IEEE Signal Processing Letters*

Robert Kotiuga

Associate Professor
Electromagnetics; numerical methods for three-dimensional vector field problems; Whitney forms and the Finite Element Method; micromagnetics; nanoscale magnetics; geometric inverse problems; topological aspects of magnetic scalar potentials; helicity functionals; analysis of high performance interconnects

 » PhD, McGill University, 1985
 » Member, Electromagnetics Academy
 » 2007 Dean's Catalyst Award

Min-Chang Lee

Professor
Alternative energy sources and environmental impacts; radio communications; experimental plasma physics; ionospheric plasma physics

 » PhD, University of California, San Diego, 1977
 » 2008 BU ECE Award for Excellence in Teaching
 » Past Associate Editor, *AGUs Radio Science*

Lev Levitin

Professor
Information theory; physics of communication and computing; complex and organized systems; bioinformatics; quantum theory of measurement; reliable communication and computing

 » PhD, USSR Academy of Sciences, Gorky University, 1969
 » Life Fellow, IEEE
 » Member, International Academy of Informatization

Thomas Little

Professor & Associate Chair for Graduate Studies
Mobile Ad Hoc Networks (MANETs); multimedia computing; computer networking; software engineering; embedded sensor networks

 » PhD, Syracuse University, 1991
 » 1995 NSF CAREER Award
 » 2007 Dean's Catalyst Award
 » 2009 BU College of Engineering Faculty Service Award
 » Editorial Board Member, ACM/Springer Multimedia Systems, *Journal of Multimedia Tools and Applications*

Theodore Morse

Professor
Photonic material processing; optical fiber fabrication, lasers, and sensors; high power double clad fiber lasers

 » PhD, Northwestern University, 1961
 » Fulbright Fellow, Germany

Theodore Moustakas

Professor
Growth by MBE, HVPE and MOCVD of Nitride Semiconductors; Optical devices (LEDs, LDs, Optical modulators, Detectors) from deep UV to THz

 » PhD, Columbia University, 1974
 » Associate Director of the Materials Science and Engineering Division
 » Honorary Doctorate, Aristotle University for Excellence in Research
 » Fellow, American Physical Society, Electrochemical Society
 » Senior member, IEEE
 » 1998 ECE Award for Excellence in Teaching
 » Cited in "Technology Transfer Works: 100 Cases from research to realization," Better World Project
 » Special editor of the *Journal of Vacuum Science and Technology* and *Journal of Electronic Materials.*

S. Hamid Nawab

Professor
Cognition and brain signal processing; short-time and short-space signal processing; artificial intelligence in signal processing

 » PhD, Massachusetts Institute of Technology, 1982
 » 2005 College of Engineering Service Award
 » 1998 College of Engineering Award for Excellence in Teaching
 » 1993 Metcalf Award for Excellence in Teaching
 » Fellow - American Institute for Medical & Biological Engineering

William Oliver

Associate Professor
Radar studies of the upper atmosphere and ionosphere; modeling and simulation; global change in the upper atmosphere

 » PhD, University of Illinois, 1973

Roberto Paiella

Assistant Professor
Optical technologies for information processing; photonic devices based on semiconductor quantum structures, including group-III nitride quantum wells; nanoscale photonic devices and circuits; ultrafast optics

 » PhD, California Institute of Technology, 1998
 » Senior Member, IEEE
 » 2008 BU Office of Technology Development Ignition Award
 » 2009 BU College of Eng. Dean's Catalyst Award

Ioannis Paschalidis

Associate Professor
Systems and control; networking; applied probability; optimization; operations research; computational biology; and bioinformatics

 » PhD, Massachusetts Institute of Technology, 1996
 » Senior Member, IEEE
 » National Science Foundation CAREER Award, 2000
 » 2nd Prize, George E. Nicholson paper competition
 » Guest Editor, Special Issue on Wireless Sensor & Actuator Networks, *IEEE Transactions on Automatic Control*
 » Assoc. Editor, *SIAM Journal on Control & Optimization*
 » Past Assoc. Editor, *IEEE Transactions on Automatic Control* and *Operations Research Letters*
 » Elected Full Member of Sigma Xi, 1996
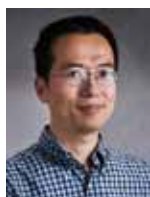
Wei Qin
Assistant Professor
Tools, methods and architectures for embedded systems; synthesis and verification of programmable processors; design languages for electronic systems

» PhD, Princeton University, 2004
» 2006 ECE Award for Excellence in Teaching

Siddharth Ramachandran
Associate Professor
Optical physics of guided waves; micro- and nano-structured optical fibers; high-power fiber lasers/sensors; biomedical imaging and microscopy with optical fibers

» PhD, University of Illinois, Urbana-Champaign, 1998
» Fellow, Optical Society of America (OSA)
» Distinguished Member of Technical Staff, OFS Laboratories, 2003
» Topical Editor, *Optics Letters*
» Book editor, Springer-Verlag
» Guest Editor, *IEEE-JSTQE*

Michael Ruane
Professor
Resonant cavity imaging system; micro-magnetics modeling; optical systems; AFRL Loss Cone Imager DSX Satellite

» PhD, Massachusetts Institute of Technology, 1980
» Senior Member, IEEE
» 2010 ENG Faculty Service Award
» 2004 ASEE Outstanding Teacher Award
» 1999 ECE Award for Excellence in Teaching
» 1991 College of Engineering Faculty Service Award

Venkatesh Saligrama
Associate Professor
Information and control theory; statistical signal processing; applications to sensor networks

» PhD, Massachusetts Institute of Technology, 1997
» 2005 NSF CAREER Award
» 2003 ONR Presidential Early Career Award
» 2002 ONR Young Investigator Award

Joshua Semeter
Associate Professor
Ionospheric and space plasma physics; spectroscopy of atmospheric airglow and the aurora borealis; image processing; radar systems and radar signal processing

» PhD, Boston University, 1997
» 2004 SRI Presidential Achievement Award
» 2000 Prize Lecture, NSF Cedar Workshop
» Associate Editor, *Journal of Geophysical Research*
» 2006 NSF CAREER Award
» 2009 ECE Award for Excellence in Teaching
» Associate Director, BU Center for Space Physics

Alexander Sergienko
Professor
Correlation spectroscopy, field optical microscopy and spectroscopy of semiconductor materials and devices; quantum communications; remote laser sensing; laser physics; nonlinear optics; quantum optics, including quantum radiometry and metrology

» PhD, Moscow State University, 1987
» 1999 NSF CAREER Award
» Fellow, Optical Society of America
» 2001 ECE Award for Excellence in Teaching

Thomas Skinner
Associate Professor
Microprocessors; computer networks; operating systems; distributed systems

» PhD, Boston University, 1982
» 2003 Microsoft Most Valuable Professional Award
» 1997 College of Engineering Award for Excellence in Teaching

David Starobinski
Associate Professor
Wireless networking; QoS and traffic engineering; network economics; cyber security

» PhD, Technion, Israel Institute of Technology, 1999
» 2010 ECE Faculty Teaching Award
» 2009 EPFL Visiting Professor Fellowship
» 2004 Department of Energy Early Career Award
» 2002 NSF CAREER Award

Anna Swan
Associate Professor
Development of nanoscale optical self-interference microscopy; optical properties of carbon nanotubes

» PhD, Boston University, 1993
» Senior Member, IEEE

Alexander Taubin
Associate Professor
Asynchronous circuit; logic design; computer architecture; CAD; attack resistant hardware

» PhD, Electrotechnical University of St. Petersburg, 1981
» Senior Member, IEEE

Malvin Teich
Professor
Quantum optics and imaging; photonics; fractal stochastic processes; information transmission in biological sensory systems

» PhD, Cornell University, 1966
» Fellow, IEEE, American Physical Society, Acoustical Society of America, American Association for the Advancement of Science, John Simon Guggenheim Foundation, Optical Society of America
» 1997 IEEE Morris E. Leeds Award, 1992 Palacky University Memorial Gold Medal, 1969 IEEE Browder J. Thompson Memorial Prize
» IEEE EMBS Distinguished Lecturer
» OSA Traveling Lecturer
» Editorial Advisor, Photonics and Physical Electronics, *Physics Today*

Ari Trachtenberg
Associate Professor
Error correcting codes; data synchronization (especially for PDAs and mobile networks); sensor-based location detection; algorithms

- » PhD, University of Illinois, Urbana-Champaign, 2000
- » 2002 NSF CAREER Award
- » 2003 ECE Award for Excellence in Teaching
- » Senior Member, IEEE
- » BU Innovative Engineering Education Faculty Fellow

Selim Ünlü
Professor and Associate Dean for Research and Graduate Programs
Photodetectors; nano-optics: high-resolution and solid immersion lens microscopy; subsurface imaging of semiconductor devices and circuits; biophotonics: biosensor fabrication and biological imaging techniques

- » PhD, University of Illinois, Urbana-Champaign, 1992
- » 1996 NSF CAREER Award
- » 1996 ONR Young Investigator Award
- » 2008 TUBITAK Special Award
- » 2002 ECE Award for Excellence in Teaching
- » Fellow, IEEE
- » Associate Editor, *IEEE Journal of Quantum Electronics*
- » 2006 College of Engineering Service Award
- » 2007 Dean's Catalyst Award
- » 2007 ARCNN Distinguished Lecturer
- » 2005-2007 IEEE/LEOS Distinguished Lecturer

Research Faculty

Malay Mazumder
Research Professor
Particle technology; material engineering; electrostatic engineering

Tommaso Toffoli
Research Professor
Fundamental connections between physics and computation; fine-grained modeling of physics-like systems technology (cellular automata machines) and methodology (programmable matter); personal knowledge structuring

Affiliated Faculty

John Bailleul
Professor, Mechanical Engineering
Robotics; control of mechanical systems; mathematical system theory

Supriya Chakrabarti
Professor, Astronomy
Space experimentation; ultraviolet spectroscopy

Carlo De Luca
Professor, Biomedical Engineering
Motor control of normal and abnormal muscles; objective evaluation of muscle fatigue in humans; objective assessment of functional activities in humans; advanced technology for detecting and applying biosignals

Solomon Eisenberg
Professor and Chair, Biomedical Engineering
Electrically mediated phenomena in tissues and biopolymers

Farouk El-Baz
Research Professor and Director, Center for Remote Sensing
Remote sensing with emphasis on arid lands; surface features of solar system planets as part of comparative planetology

Theodore Fritz
Professor, Astronomy
Space plasma and magnetospheric physics; magneto sphere-ionosphere coupling; substorms; charged particles and compositions; rocket and satellite experiments

Bennett Goldberg
Professor, Physics
Room- and low-temperature, near-field microscopy of semiconductors and biological systems; magneto-optics and magneto-transport of two- and one-dimensional electron fields

William Klein
Professor, Physics
Kinetics of phase transitions, the physics of earthquakes and the study of damage in materials

MICHAEL MENDILLO
Professor, Astronomy
Low-light level optical instrumentation; signal processing in space physics; planetary atmospheres; GPS satellite communications; space plasmas in the solar system

ERIC SCHWARTZ
Professor, Cognitive & Neural Systems
Computational neural science; machine vision; neural anatomy; neural modeling

JEROME MERTZ
Professor, Biomedical Engineering
Development and applications of novel optical microscopy techniques for biological imaging

WILLIAM SKOCPOL
Professor and Faculty Director, Physics

Emeritus Faculty

JOHN BRACKETT
Professor Emeritus
Software engineering; software requirements definition; object-oriented testing; rapid prototyping of embedded systems
» PhD, Purdue University, 1963

BAHAA E.A. SALEH
Professor Emeritus
Quantum optics; nonlinear optics; image processing
» PhD, Johns Hopkins University, 1971

THOMAS KINCAID
Professor Emeritus
Signal and image processing; neurodynamics; non-destructive testing
» PhD, Massachusetts Institute of Technology, 1965

RICHARD VIDALE
Professor Emeritus
Modeling and simulation, software engineering
» PhD, University of Wisconsin-Madison, 1964

DAVID PERREAULT
Professor Emeritus
Nonlinear networks; computer-aided design; microprocessors; distributed digital networks
» PhD, Purdue University, 1968

Adjunct Faculty

JOHN BRACKETT
EC728 (Fall 2009) & EC518 (Spring 2010)
» PhD, Purdue University, 1963

BABAK KIA MONTAZAM
EC327 (Fall 2009)
» MS, Boston University, 1996

VLADIMIR KLEPTSYN
EC578 (Fall 2009)
» PhD, Moscow Lomonosov's Institute of Fine Chemical Technology, 1983

ALAN PISANO
SC463 (Fall 2009) & SC402 (Spring 2010)
» PhD, Northeastern University, 1974

In Memoriam

It was with great sadness that the Department of Electrical & Computer Engineering mourned the passing of two outstanding colleagues this year. We are grateful for the years of service, scholarship, and friendship these professors graced us with.

Franco Cerrina

Though it had only been two years since Professor Franco Cerrina joined ECE as Chair, his impact will be long-lasting.

Cerrina passed away Monday, July 12, and he will be remembered for his commitment to showing a new generation of students how exciting engineering could be.

At BU, Cerrina started the Nano-DNA lab in hopes of integrating bio-molecules like DNA, RNA and proteins into existing nanotechnology. He worked with students like Anu Thubagere (ECE '12), who said that her professor always encouraged outside collaborations and was extremely approachable.

"Above all else, he was a tower of support for all of us in the lab," Thubagere said. "He treated us as an extension of his family."

Cerrina joined the department at a critical time as the College of Engineering was undergoing major restructuring. He recruited four young faculty members to BU, helping rejuvenate the computer engineering program, and led the ECE department through a successful reaccreditation last year.

Over the years, Cerrina received over $45 million in grants, wrote more than 300 reviewed publications and was a fellow of the American Physical Society, the Optical Society of America and the Institute of Electrical and Electronics Engineers (IEEE).

Before joining the BU faculty, he spent 24 years at the University of Wisconsin-Madison. There, he was director of the university's Center for NanoTechnology.

Alexander "Sasha" Taubin

Sasha Taubin joined the Department in January 2002. He was an excellent teacher who was active in computer systems research. Prior to ECE, he held academic and professional positions in industry and universities in Japan, Russia, and the United States.

He was a devoted teacher who placed an emphasis on providing a solid education to both graduate and undergraduate students.

His research interests included asynchronous circuits, logic design, computer architecture, CAD, and attack-resistant hardware. He co-authored three books, published more than 60 journal and conference papers and was a senior member of the IEEE.

His contributions and dedicated service to the ECE Department, College of Engineering, and Boston University will be greatly missed.

Staff

Administrative Staff

WAYNE RENNIE
Director

CARLY MARCHIONI
Assistant Director

JULIE GUTHRIE
Academic Programs Manager

AUSTIN ALEXANDER
Senior Programs Coordinator

BECKY BELL
Assistant to the Chair

RYAN FLAMENT
Financial Administrator

DAVID DELAKAS
Grants Administrator

RACHEL HARRINGTON
Publications, New Media, and Promotions Administrator

GORDON RYAN
Marketing Communications Consultant

JAMES GOEBEL
Manager, Systems Support, ENG

ILYAS HAMDI
Manager, Instruction Labs

ALEXEY NIKIFOROV
MBE Laboratory Manager

VLADIMIR KLEPSTYN
Electronic/Circuits Lab Manager

Research Staff

Name	Title	Advisor
Bertazzi, Francesco	Visiting Researcher	Bellotti
Boriskina, Svetlana	Research Associate	Dal Negro
Borogovac, Tarek	Research Associate	Carruthers
Boura, Jihad	Visiting Researcher	Hubbard
Chen, Kai	Post-Doctoral Associate	Altug
Chivas, Robert	Post-Doctoral Associate	Morse
Chu, Larry	Visiting Researcher	Cerrina
De Groot, Jack	Research Fellow	Ünlü
Di Martino, Giuliana	Visiting Researcher	Dal Negro
Do, Synho	Visiting Researcher	Karl
Freedman, David	Post-Doctoral Associate	Ünlü
Goto, Maso	Visiting Researcher	Ramachandran
Jiang, Fan	Research Associate	Cerrina
Johnsen, Magnar	Visiting Researcher	Semeter
Koklu, Hakan	Post-Doctoral Associate	Ünlü
Koseoglu, Mehmet	Visiting Researcher	Alanyali
Laifenfeld, Moshe	Visiting Researcher	Trachtenberg
Li, Keyong	Post-Doctoral Associate	Paschalidis
Lopez, Carlos	Research Associate	Ünlü
Minnisale, Salvatore	Post-Doctoral Associate	Dal Negro
Mohan, Nishant	Visiting Researcher	Teich
Mustafa, Mehmet	Visiting Scholar	Karpovsky
Nasr, Magued	Visiting Scholar	Teich
Park, Jin	Visiting Researcher	Hubbard
Rykalova, Yelena	Visiting Scholar	Levitin
Shubochkin, Roman	Senior PostDoc Associate	Morse
Thomidis, Christos	Research Fellow	Moustakas
Turkman, Mustafa	Visiting Researcher	Altug
Vedula, Rahul	Research Fellow	Ünlü
Vegni, Anna Maria	Visiting Researcher	Little
Yalcin, Ayca	Post-Doctoral Associate	Ünlü
Yanik, Ahmet Ali	Research Associate	Altug

Department Administration and Committees

Franco Cerrina   Department Chair (through reporting period)
David Castañón   Department Chair *ad interim* (current)
Jeffrey Carruthers   Associate Chair for Undergraduate Studies
Thomas Little   Associate Chair for Graduate Studies
Wayne Rennie   Department Director

The **Operations and Scheduling Committee** directs strategic planning and is involved in all strategic decisions for the Department. It plans the annual ECE Day and ECE Retreat and also recommends the scheduling of courses and the assignments of instructors. The Committee is composed of three research area coordinators, the Associate Chairs for undergraduate and graduate programs, the Department Chair, and a representative from the College of Engineering (ENG). *Cerrina (Chair), Little (Associate Chair, Grad), Carruthers (Associate Chair, Undergrad), Herbordt (CSE), Castañón (ISS), Sergienko (EP), Rennie (Director), Ünlü (ENG), Marchioni, Bell*

The **Undergraduate Committee** is responsible for all aspects of the undergraduate program, including program and curricular changes; new courses; evaluation of instruction and student advising; and recommendations for fellowships, scholarships, and awards. It is in charge of closing the ABET planning feedback loop and preparing for the ABET visit. A subcommittee makes recommendations for the ECE Teaching Excellence Award. *Carruthers (Chair), Castañón, Horenstein, Ishwar, Ruane, Semeter, Guthrie, Alexander*

The **Graduate Committee** is responsible for all aspects of the graduate programs, including program and curricular changes; new courses; recruitment of new graduate students; making recommendations for fellowships, scholarships, and awards; evaluating Graduate Teaching Fellows; assignment of theses committees; and coordination of poster presentations on ECE Day. *Little (Chair), Alanyali, Altug, Bellotti, Coskun, Dal Negro, Ishwar, Joshi, Swan, Taubin, Trachtenberg, Guthrie, Alexander*

The **Search Committee** is responsible for the recruitment of new faculty. It coordinates advertisements, interviews of candidates, and makes recommendations to the faculty for new appointments. *Cerrina (Chair), Herbordt, Karl, Saligrama, Swan, Trachtenberg, Rennie, Bell*

The **APT Committee** makes recommendations on appointments of tenure-track, non-tenure-track, and affiliate faculty; promotion and tenure of tenure-track faculty; and promotion to Full Professor. *Cerrina (Chair), Alanyali, Brower, Karl, Levitin, Paiella, Sergienko, Rennie, Bell*

The **Publicity, Special Events, and Seminars Committee** makes strategic recommendations for the Department's website, brochures, reports, exhibits, and all media events aimed at promoting the Department and enhancing its visibility at the local, national and international level. It is also in charge of the ECE Distinguished Lectures, Colloquiums, Seminars, and other ad hoc research talks. *Konrad (Chair), Dal Negro, Joshi, Kotiuga, Little, Moustakas, Paschalidis, Rennie*

The **Industrial and Alumni Relations Committee** is in charge of promoting relations to local and national industry, recruitment of members of the Industrial Advisory Council (IAC), and planning IAC meetings. It helps promote strong relations to alumni by coordinating alumni visits on special events such as ECE Day and others. *Cerrina (Chair), Horenstein, Hubbard, Knepper, Little, Pisano, Ruane, Rennie, Marchioni, Bell*

The **Information Technology Committee** is tasked with maintaining, upgrading, and improving the information technology infrastructure of the Department. *Starobinski (Chair), Altug, Brower, Hubbard, Ishwar, Konrad, Semeter, Rennie, Goebel, Hamdi*

The **Awards Committee** is responsible for researching awards and other recognition opportunities for department faculty members and developing strategies to strengthen the candidacies of faculty who are considered for recognition. *Teich (Chair), Bigio, Brower, Cassandras, Castañón, Giles, Levitin, Moustakas*

Undergraduate Program

The Department of Electrical & Computer Engineering continues to pride itself on developing a strong laboratory curriculum to complement our classroom teaching for undergraduates. Our labs are stocked with up-to-date equipment and we encourage undergraduates to become involved with research and development efforts through UROP (Undergraduate Research Opportunity Program), work study, and student employment. Engineering is an applied science, and we believe it is important to start applying what is learned in the classroom as soon as possible.

Central to this philosophy, the capstone design project provides our graduating seniors with real engineering experience and the student projects have continued to be outstanding, with several projects receiving awards.

We are dedicated to improving our undergraduate programs and this year exemplified that commitment. Through careful examination of student surveys, student feedback forums, and faculty review of courses and outcomes, ECE has implemented a number of curriculum changes aimed at enhancing the undergraduate experience.

Fall 2009 Enrollment

	Electrical	Computer Systems	Computer**	Total
Freshmen*	17		13	30
Sophomores*	23	17	3	43
Juniors	37	16	4	57
Seniors	33	11	11	55
Total	**110**	**44**	**31**	**185**

*ENG Students are not required to declare a major until their Junior year.
** "Computer Systems Engineering" has been renamed "Computer Engineering." For current students, the degree name change is optional, but all new declared majors will be Computer Engineering.

Undergraduate Degrees Awarded

Major	Degree Recipients
Computer Engineering	13
Computer Systems Engineering	8
Electrical Engineering	30
Total	**51**

Course and Program Development

The focus for this academic year were the dual visits of the ABET program review and the Departmental Visiting Committee. Both visits were productive and thought provoking. The Department anticipates continued evolution of our programs in the coming years based on this feedback, discussions among the faculty, as well as feedback from students and alumni.

In the spring of 2010, we streamlined the college's double major requirements. Previously, between 168 and 184 credits would be required depending on the two programs chosen. The new double-major requirements allow for the completion of a single capstone design experience and 162 total credits.

Finally, as part of the OneBU project, we are now allowing students to complete their 24 credit general education requirement through the College of Arts and Sciences Core Curriculum program.

Undergraduate Courses

Course Number	Course Title	Fall '09	Spring '10	Summer '10
EC311	INTRO TO LOGIC DESIGN	Karpovsky	Taubin Karpovsky	
EC327	INTRO TO SOFTWARE ENGINEERING	Montazam	Trachtenberg	
EC330	APPLIED ALGORITHMS FOR ENGINEERS		Brower	
EC381	PROBABILITY THEORY IN ELECTRICAL AND COMPUTER ENGINEERING	Alanyali	Alanyali	
EC401	SIGNALS AND SYSTEMS	Ishwar	Karl	Carruthers
EC402	CONTROL SYSTEMS		Pisano	
EC410	INTRO TO ELECTRONICS	Unlu Bellotti Dal Negro	Lee	Kleptsyn
EC412	ANALOG ELECTRONICS		Sergienko	
EC413	COMPUTER ORGANIZATION	Herbordt		
EC415	COMMUNICATION SYSTEMS	Carruthers		
EC416	INTRO TO DIGITAL SYSTEMS		Konrad	
EC440	INTRO TO OPERATING SYSTEMS		Van Court	
EC441	INTRO TO COMPUTER NETWORKING	Starobinski		
EC447	SOFTWARE DESIGN	Skinner		
EC450	MICROPROCESSORS	Giles	Giles	
EC455	ELECTROMAGNETIC SYSTEMS I	Lee		Lee
EC456	ELECTROMAGNETIC SYSTEMS II		Kotuiga	
EC463	SENIOR DESIGN PROJECT I	Ruane/Pisano		
EC464	SENIOR DESIGN PROJECT II		Ruane/Knepper	
EC471	PHYSICS OF SEMICONDUCTOR DE-VICES		Moustakas	
EC481	FUNDAMENTALS OF NANOMATERIALS AND NANOTECHNOLOGY	Altug/Swan		
EC500	SPECIAL TOPICS IN ELECTRICAL AND COMPUTER ENGINEERING		Herbordt	
EC501	STATE SPACE CONTROL	Li		
EC504	ADVANCED DATA STRUCTURES	Trachtenberg		
EC505	STOCHASTIC PROCESSES	Karl	Saligrama	
EC512	ENTERPRISE CLIENT-SERVER SOFTWARE SYSTEMS DESIGN		Skinner	
EC513	COMPUTER ARCHITECTURE	Herbordt		
EC514	SIMULATION	Vakili		
EC515	DIGITAL COMMUNICATION	Saligrama		
EC516	DIGITAL SIGNAL PROCESSING		Nawab	
EC517	INTRO TO INFORMATION THEORY		Ishwar	

Course Number	Course Title	Fall '09	Spring '10	Summer '10
EC518	SOFTWARE PROJECT MANAGEMENT		Brackett	
EC520	DIGITAL IMAGE PROCESSING AND COMMUNICATION	Konrad		
EC524	OPTIMAZATION THEORY AND METHODS	Paschalidis		
EC533	ADVANCED DISCRETE MATHEMATICS	Levitin		
EC535	INTRO TO EMBEDDED SYSTEMS		Coskun	
EC541	COMPUTER COMMUNICATIONS AND NETWORKS		Alanyali	
EC543	SUSTAINABLE POWER SYSTEMS: PLANNING, OPERATION AND MARKETS		Caramanis	
EC544	NETWORKING THE PHYSICAL WORLD	Little		
EC551	ADVANCED DIGITAL DESIGN WITH VERILOG AND FPGA	Taubin		
EC560	INTRO TO PHOTONICS	Teich	Paiella	
EC561	ERROR CONTROL CODES		Karpovsky	
EC570	LASERS		Teich	
EC571	VLSI PRINCIPLES AND APPLICATIONS	Hubbard	Joshi	
EC573	SOLAR ENERGY SYSTEMS		Mazumder	
EC574	SOLID STATE DEVICES	Bellotti	Bellotti	
EC575	SEMICONDUCTOR DEVICES		Bellotti	
EC577	ELECTRICAL, OPTICAL, AND MAGNETIC PROPERTIES OF MATERIALS	Moustakas		
EC578	FABRICATION TECHNOLOGY FOR INTEGRATED CIRCUITS	Kleptsyn		
EC579	MICROELECTRIC DEVICE MANUFACTURING		Cole	
EC580	MODERN ACTIVE CIRCUIT DESIGN	Knepper		
EC582	RF/ANALOG IC DESIGN FUNDAMENTALS		Knepper	
EC591	SPECIAL TOPICS LAB	Paiella		
EK131/132	INTRODUCTION TO ENGINEERING	Ruane	Starobinski	
		Toffoli	Altug	
		Giles	Kotuiga	
		Swan/Altug	Ruane	
EK307	ELECTRIC CIRCUIT THEORY	Horenstein	Paiella	Carruthers
			Horenstein	
			Sergienko	
EK 500	PROBABILITY WITH STATISTICAL APPLICATIONS	Cassandras		
EK501	MATHEMATICAL METHODS I	Kotiuga		
MET EK317	ELECTRIC CIRCUIT THEORY I	Horenstein		
MET EK318	ELECTRIC CIRCUIT THEORY II		Lee	

Instructional Laboratories

Control Systems Laboratory

Faculty: Pisano

This laboratory houses four ECP model 220 Industrial Plant Emulators for studying the control of practical systems. These systems consist of an electromechanical apparatus including an adjustable mechanical mechanism with actuators and sensors. Various types of controllers (PID, State Feedback, LQR) can be designed and implemented in either continuous or discrete time formulations using a DSP-based real-time controller with a graphical interface. Non-ideal conditions that are often present in real-world applications can be studied. Integrated with the systems are MATLAB and SIMULINK design tools, which can be used to design control systems that can then be implemented in the hardware. Analytical models of both the "plant" and the "controller" can be validated with actual hardware responses.

Electronic Design Automation/VLSI Laboratory

Faculty: Herbordt, Hubbard, Joshi, Knepper, Taubin

The VLSI Laboratory is involved in almost all aspects of digital design. It has a wide range of CAD tools available for student use, including Cadence, Synopsys, and the NCSU Design Toolkit.

Electronics Teaching Laboratory

Faculty: Carruthers, Horenstein, Knepper, Lee, Ruane, Sergienko

The Electronics Teaching Laboratory supports the laboratory component of the core courses EK307 – Electric Circuit Theory, EC410 – Introduction to Electronics, and EC412 – Analog Electronics. In addition, several modules of EK 131/132 – Introduction to Engineering - make use of the facility. Staffed by a full-time technician, each of the 36 lab benches includes fully digital, PC-linked oscilloscopes, power supplies, multimeters, and function generators. Each networked PC is loaded with OrCAD, PSpice, schematic capture, PCB layout, and LabView software. Some stations are equipped with National Instruments data acquisition hardware. A variety of common electronic parts are available for sale at the equipment window. When not in use by scheduled lab sections, the facility is available for open use by all ECE students. A handicapped-accessible lab station is available.

High Performance Computing Laboratory

Faculty: Brower, Giles

The High Performance Computing Laboratory was created with support from the National Science Foundation to support development of undergraduate courses in parallel and high performance computing. The courses offered at Boston University serve as a national model for computational science education. The lab features a network of multimedia graphics workstations linked to supercomputers at the Center for Computational Science and the Scientific Computing and Visualization Lab.

High Tech Tools and Toys Laboratory

Faculty: Ruane

HTTTL is the instructional laboratory associated with Boston University's NSF-funded Engineering Research Center for Subsurface Sensing and Imaging Systems (CenSSIS). The laboratory houses a variety of PC-based imaging camera systems, machine vision systems, and acoustic imaging systems. Software for imaging includes MATLAB, Image Processing Toolbox, Image Builder, ENVI, and LabVIEW. The HTTTL supports freshman EK131/132 modules in imaging and subsurface imaging, senior design capstone projects in imaging, and experiments in senior level electives related to imaging. The lab also hosts summer research through UROP, REU, RET, and High School Honors programs. Some undergrads are supported during the academic year to work on improving stations in the HTTTL.

Microprocessor and PC Laboratory

Faculty: Giles, Skinner, Taubin, Toffoli

This lab features instruction in the programming and interfacing of microcomputers and digital controllers. Higher-level courses emphasize the design of systems using microprocessors. Various simulators, and analysis packages are available.

Senior Project Laboratory

Faculty: Knepper, Pisano, Ruane

This lab supports our senior design teams, serving real-world customers such as NASA, Analog Devices, Boston public schools, social service agencies, artists, and small businesses, as well as faculty and staff across the University. Each team has twenty-four hour access to a permanent bench setup with a networked PC, benchtop GPIB-based HP test equipment, and software for schematic design, simulation, and PCB layout. Electronics and shop support is provided. Shared tools include high speed scopes, logic analyzers, spectrum analyzers, E-prom, PLA and FPGA burners, and various compilers and crosscompilers for DSP, and micro-controller development. Software from MS-DNAA is available for all teams.

Signals and Networks (SIGNET) Laboratory

Faculty: Carruthers, Konrad, Nawab

This laboratory provides instructional facilities for courses in the areas of signal processing and communication networks. The lab houses numerous workstations for digital signal processing, image processing, and various real-time applications covering the complete audio frequency spectrum. Equipment includes Linux-based workstations, microphones, DSP boards, speakers, amplifiers, digital cameras, and software packages such as MATLAB and Hyperception. The courses served by this laboratory include EC401 (Signals and Systems), EC415 (Communication Systems), EC416 (Intro to Digital Signal Processing), EC 516 (Digital Signal Processing), and some ECE modules in EK131/132 (Introduction to Engineering). On the communications side, experiments involving data communication links, local-area networks, and wide-area networks are supported. Powerful computer-based simulation and analysis tools are available to compare and evaluate network designs. Facilities are also provided for experimentation with local-area network switching and routing hardware.

Software Engineering Laboratory

Faculty: Brackett, Herbordt, Skinner, Taubin, Toffoli, Trachtenberg

An instructional and research lab, the Software Engineering Laboratory (SEL) supports courses and research on the economical design of reliable software for large-scale and embedded computer-based systems. The lab is comprised of more than 25 networked workstations, four Motorola embedded computer development systems, and state-of-the art development and modeling tools for the design, implementation, and testing of distributed software systems.

INSTRUCTIONAL LAB EXPENDITURES	
	Approx. Cost
Microprocessor and Software Engineering Labs	$10,195.65
VLSI and Signals/Networks Lab	$17,170.82
Electronics Lab	$22,234.15
Senior Projects Lab	$4,353.57
Other (includes materials and equipment for courses not assigned to a specific lab)	$11,596.07
Total	**$65,550.26**

2010 ECE Award for Excellence in Teaching

Professor **DAVID STAROBINSKI** was the winner of the 2010 ECE Award for Excellence in Teaching. He received the award for his outstanding record of teaching and developing courses in computer networks: from an introduction to engineering module EK131 on wireless networks to a core computer networking course EC441, in addition to graduate courses in the field.

The Department instituted this award during the 1997-98 academic year to recognize innovation and excellence in teaching among its faculty. The award, based on nominations from College of Engineering students, faculty, and staff, carries with it a $1,000 prize to be used toward instructional activities. A committee of ECE professors and students evaluate the nominees, using teaching statements, classroom material, and student comments.

IEEE Student Branch

The ECE supported BU student chapter of the IEEE had another year of intense activity, under the direction of President Clara De Paolis, Vice President Joshua Mendez, and Secretary and Webmaster Juan Jhong (see blogs.bu.edu/ieee). Key events in 2009-10 included the following:

» Student Groups Fair, September 18, 2009, Photonics Building.
» Soldering tutorial, November 6, 2009, Electronics Lab.
» IEEE Humanitarian workshop, co-hosted with IEEE GOLD, November 18, 2009.

» ECE information session for undecided students, March 4, 2010. Guest speakers: George Matthews (ECE '07), Michael Mole (ECE '05).

The IEEE officers have also teamed with a group of undergraduate students from the Earth Sciences Department to form the BU Near Space Program (BUNSP), dedicated to environmental remote sensing through the use of instruments launched on high-altitude balloons.

Senior Design

All ECE seniors complete a team-based, two semester capstone senior design project. Teams must design and prototype a product, electronic device, or software system for real-life customers, who are drawn from industry, small businesses, community groups, and faculty and staff. Students learn design methods, project management, team dynamics, communication skills, and legal and ethical standards for design. A substantial first-deliverable milestone and oral presentation complete the first semester.

The second semester is spent in the Senior Project Laboratory. Students must make presentations to their customer, write inter- and intra-office memos, design their project to meet customer specifications, manage the project budget, and deliver

their working prototype, including a detailed instruction manual. Project records are maintained in personal design logbooks. Teams have 24/7 access to their dedicated, fully-equipped laboratory bench, and can use professional CAD and prototyping tools for circuits, embedded systems, and software development. The year culminates in student project presentations on ECE Day to faculty, industry representatives, and fellow students. On May 3, 2010, ten teams presented their projects and a Best Presentation award was presented at a luncheon for faculty, customers, and seniors. The PT Hsu Award for best project was awarded at commencement.

Notable Senior Design Projects

nanoTrack

It's not every day that an international company leading in engineering development asks five seniors to not only test out software but develop new hardware, too.

But Altium Limited, an Australian based software company that creates PC-based electronics design software for engineers, asked seniors Tunde Agboola (CE), Schuyler Eldridge (EE), Nickvash Kani (CE), Mohammed Rahbini (EE), and Daniel Ryan (EE) to do just that as part of their senior project.

Specifically, the team was asked to develop a peripheral board for Altium's line of NanoBoards which are used to enhance an engineer's ability to design, implement, and debug an entire FPGA (field programmable gate array)-based system design. At Altium's request, the new peripheral board also had to perform some basic video and image processing.

"The project really required a broad skillset," said Eldridge. "Individually, we probably wouldn't have been able to complete the task—it definitely taught us how to work as a team."

To demonstrate their work, the seniors developed an object tracking system that used color thresholding.

By the end of the semester, Team nanoTRACK had completed their task and ultimately expanded upon the functionality of Altium's NanoBoard. Additionally, they showed the effectiveness of Altium's software and hardware when confronted with real world engineering challenges.

Trafflack

What if cars could talk to each other?

That is to say, what if they could communicate with each other, letting drivers know about upcoming traffic or icy roads?

That was the idea behind Trafflack, the senior project of Matt Figueroa (CE), Aaron Ganick (EE), Jonathan Lobo (EE), Travis Rich (EE), and Peter Schimitsch (CE).

Working with Professor Thomas Little, Team Trafflack created an in-car observation and collaborative system that lets vehicles exchange valuable information that can cause a driver's experience to be more safe and convenient.

As opposed to radio frequency (RF) communication, which can be unreliable during traffic jams or any other time when there is a high density of cars in one area, the seniors decided to use light from headlights and tail lights to enable the cars' "conversations." The plan came about after several of them worked together in the Smart Lighting Engineering Research Center.

"We had made a light bulb that could essentially talk," Rich said. "From there we thought, why couldn't we use that same technology to make cars communicate?"

They used four transceivers per car, or node, and matching software that could collect data not just from the car immediately in front but from cars down the road, too.

Their hard work paid off. Not only did the team win at ECE Day, they also took away the MobiSys 2010 Best Poster award in San Francisco.

NightHawk NVS

Driving on Comm Ave. late at night is a perilous business. A driver must avoid hitting other drivers, as well as bicyclists who think black is an appropriate color for night riding, pedestrians who don't look (or hesitate) before stepping from the curb, and the occasional skateboarder who subscribes to no rules of the road. But now, that drive and many others may become much safer, thanks to the work of some recent College of Engineering alums.

The group has designed a night vision driver assistance program that displays "threats," such as pedestrians, obstacles and road signs on a dashboard-mounted touch screen, and warns drivers of their presence with a beep. Called NightHawk NVS, the system was developed as an electrical and computer engineering senior design project by Luis Carrasco (ENG'10,'11), Sehrish Abid (ENG'10), Andrew Sarratori (ENG'10), York Chan (ENG'10), and Wesley Griswold (ENG'10).

The idea of building such a system came from Mikhail Gurevich (ENG'07), an entrepreneur and director of ZepFrog, an internet startup. Rather than trying to build the system himself, Gurevich turned the idea over to the department of electrical and computer engineering students, hoping they could bring it to fruition.

"Many engineering students have tried to do this project," says Carrasco. "This year, we succeeded. Our system was both accurate enough and fast enough to be helpful, whereas teams in the past could not do this."

Central to the system is a high-quality night vision camera mounted on the outside of the car. The camera collects real-time information about objects that have a high likelihood of entering a vehicle's path. The system is intended to run at 30 miles per hour and has been successfully tested at 70 miles per hour. The project took over 1,000 hours to complete, and 2,500 lines of code were written to program it.

"Integrated with a GPS, the system could serve as an augmented reality navigation system," says Carrasco, who imagines that a future iteration will use infrared cameras and will display visual information on a car's windshield.

At this point, the system exists only on one laptop, but Carrasco says at least one company has expressed interest in taking it to market. He estimates that the system would cost about $500 to manufacture and could be an option in new cars for as much as $3,000. He has heard that GM, Ford, and Audi are working on similar programs, but he says their products were tested on unrealistically perfect roadways.

"We tested our system on the craziest roads in America," he says. "In Boston."

Graduate Program

Recruitment

For the Fall 2009 cycle, one new PhD student was awarded the Dean's Fellowship (DF) and matriculated. Twelve PhD students matriculated with Graduate Teaching Fellowships (GTFs) in the same period; ten of these students were picked up as Research Assistantships (RAs) for the Fall 2010 semester.

For the Fall 2010 cycle, we received 810 applications for Fall matriculation, up from 565 in Fall 2009, and up from 650 in Fall 2008. We offered admission to a total of 491 students; 443 of which were to the MS program (154 of these applied for the post-BS PhD program). Twenty-six students were offered admission as post-BS PhDs and 22 as post-MS PhDs. This is in com-

parison to Fall 2009, which had a total of 300 admits with 249 for the MS (84 of these applied for the post-BS PhD program), 34 for the post-BS PhD, and 17 for the post-MS PhD.

With respect to financial aid offers, we recruited 28 new funded graduate students: five Dean's Fellows, 20 GTFs and three RAs for Fall 2010 matriculation.

These numbers indicate a significant increase in the number of applicants, yield on fellowship offers, and the overall quality of the fall matriculants. This continues the trend of securing a class of funded students of increasing quality amidst a growing pool of candidates interested in our degree programs in ECE.

New Matriculants 2009–2010

		Male	Female	FT	PT	GTF	RA	Fellow	DF
MS	US	15	4	17	2	0	2	0	0
	Intl.	18	8	26	0	0	0	0	0
PHD	US	4	0	4	0	2	2	0	0
	Intl.	12	1	13	0	10	1	1	1
Total		**49**	**13**	**60**	**2**	**12**	**5**	**1**	**1**

Fall 2009 Mean GRE Scores

		Verbal	%	Quantitative	%	An. Writing	%
MS	US	519	64	726	78	4.19	47
	Intl.	454	47	773	88	3.46	22
PHD	US	535	68	740	81	4.43	54
	Intl.	468	51	783	90	3.6	28
Mean		**472**	**52**	**772**	**88**	**3.68**	**29**

Spring 2010 Mean GRE Scores

		Verbal	%	Quantitative	%	An. Writing	%
MS	US	470	54	735	79	4.5	61
	Intl.	400	34	752	83	3	13
PHD	US	502	62	752	83	4	32
	Intl.	409	35	764	86	3	22
Mean		**415**	**38**	**754**	**84**	**3**	**19**

Graduate Enrollment

MS Degree Enrollment

Program	Enrollment
Computer Engineering	54
Electrical Engineering	28
Photonics	4
Total	**86**

PhD Degree Enrollment

Program	Enrollment
Computer Engineering	14
Electrical Engineering	87
Systems Engineering	2
Total	**103**

Graduate Degrees

MS Degrees Awarded

Program	Degrees
Computer Engineering	11
Computer Systems Engineering	15
Electrical Engineering	37
Photonics	2
Total	**65**

PhD Degrees Awarded

Program	Degrees
Computer Engineering	2
Electrical Engineering	13
Systems Engineering	1
Total	**16**

Course and Program Development

The ECE Department continues to refine the graduate curriculum. In 2009 a new curriculum was developed and proposed leading to the Master of Engineering degree in Electrical Engineering, Computer Engineering, and Photonics (described below). This proposal has been approved by the department and college and is pending review by the provost. In Spring 2010, one new course was developed and offered: EC500 - High Performance Programming with Multicore GPUs and FPGAs by Prof. Martin Herbordt.

Proposed Master's of Engineering

Focus of program: The new Master's of Engineering program targets students that wish to pursue practical application of an advanced graduate degree in contrast to the more research oriented focus of the existing MS program in the department. Students pursuing the Master's of Engineering, typically students in local industry, will gain valuable training to enhance their careers as practitioners. Courses included in the new curriculum will enhance their engineering discipline with topics including entrepreneurship, project management, leadership, and finance. In addition, students will be provided greater flexibility to enroll in complementary courses in other departments (e.g., computer science) and will be provided an opportunity to complete their degrees more quickly to minimize time away from full time employment.

Need for Program: Under the existing degree program there is a significant gap in the ability to serve the large population of students wishing to augment their training at the gradu-

ate level without continuation toward the PhD. With a strong focus on PhD education and research outcomes the department has downplayed a focus on this population. Under the proposed Master's of Engineering, the department expects to serve this community, create and sustain a targeted curriculum based on their needs, and significantly grow the new population as supported by the vibrant local high tech industry in the Boston area. The proposed Master's of Engineering also provides an immediate option for existing BU students to contemplate a finishing program prior to seeking employment in industry.

Relation to Existing Programs: The Department of Electrical and Computer Engineering currently has Master's of Science (MS) degrees in Electrical Engineering, Computer Engineering, and Photonics. These degrees are largely designed as pathways to the PhD and have a strong research flavor. They're designed to train students toward careers in academic and industrial research. The proposed Master's of Engineering is designed as a terminal degree program intended to produce and finish practitioners that come from, or are immediately employed by, industry. The benefits to such a program are in career enhancement and the development of world-class engineers. The creation of the Master's of Engineering for Electrical, Computer, and Photonics is consistent with the efforts of the College of Engineering to provide equivalent degrees in each department.

PhD Student Progress

The number of PhD graduates per year is an important measure of the strength of the graduate programs. In prior years, we saw the results of the procedural improvements to keep the progress of the PhD students on track. Our requirement that students must pass the PhD prospectus within two years of PhD candidacy is intended to guide the students to identify dissertation topics, focus on their research, and reach their degrees in a timely manner. The chart below shows the number of PhD students achieving candidacy, completing their prospectus defense, and graduating over the last eight academic years.
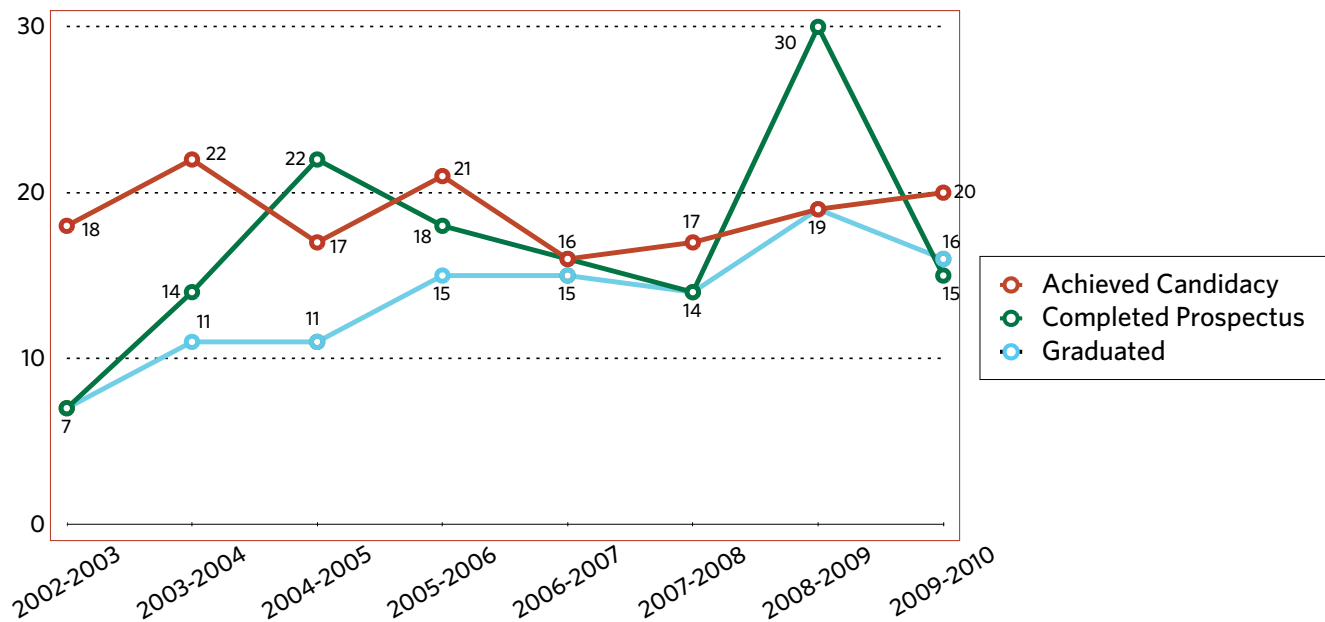
Graduate Teaching Fellows and Research Assistants

	Summer 2009	Fall 2009	Spring 2010	Total
Graduate Teaching Fellows	3	18	18	**39**
Research Assistants	83	102	88	**273**

PhD Dissertations

Student Name	Dissertation Advisor	Dissertation Title
David Voss	Theodore Fritz	A novel spacecraft standard for a modular nanosatellite bus in an operationally responsive space environment
David Freedman	Allyn Hubbard	Matched Mixed-Mode Circuits and Tools for use in Auditory Bio-Mimetic Systems
Konstantin Aizikov	Peter O'Conner	Novel Computational and Instrumentation Methodologies for Biological Fourier-Transform Ion Cyclotron Resonance Mass Spectrometric (FT-ICR MS) Imaging
Ashraf Al Daoud	Murat Alanyali	On Revenue from Secondary Spectrum Use in Wireless Cellular Networks
Weiyao Xiao	David Starobinski	Reliable Data Dissemination in Dense Wireless Networks
Danilo D'Orogna	Enrico Bellotti	Numerical Simulation Models and Stress Measurements for HgCdTe Infrared Detectors
Erhan Ermis	Venkatesh Saligrama	Geometry Independence in Information Processing for Heterogeneous Camera Networks
Huseyin Mutlu	David Starobinski	Spot Pricing of Secondary Access to Wireless Spectrum
Ashwin Gopinath	Luca Dal Negro	Electromagnetic field enhancement and light localization in aperiodic nanostructures
Douglas Carssow	Allyn Hubbard	Design of a Space Flight Qualified Data Processing Unit and the Simulation of Single Event Transients on its Logic Circuitry
Fatih Hakan Koklu	Selim Unlu	High Numerical Aperture Subsurface Imaging
Marianne Nourzad	Allyn Hubbard	An Adaptive Digital Implementation of a Biomimetic Processing Scheme for Sound Source Localization and Characterization
Rui Li	Luca Dal Negro	Energy Transfer Phenomena and Radiative Processes in Sinx-Based Materials for On-Chip Photonics Applications
Ashish Agarwal	Thomas Little	Multihop Communications in Vehicular Networks
Karen Jenkins	David Castañón	Adaptive Sensor Management for Feature-Based Classification
Darin Hitchings	David Castañón	Adaptive Multi-Platform Search and Exploitation
Yitao Liao	Theodore Moustakas	Development of Efficient Deep Ultraviolet Light Emitting Diodes

Graduate Courses

Course Number and Title		Fall '09	Spring '10	Summer '10
EC500	SPECIAL TOPICS IN ELECTRICAL AND COMPUTER ENGINEERING		Herbordt	
EC501	STATE SPACE CONTROL	Li		
EC504	ADVANCED DATA STRUCTURES	Trachtenberg		
EC505	STOCHASTIC PROCESSES	Karl	Saligrama	
EC512	ENTERPRISE CLIENT-SERVER SOFTWARE SYSTEMS DESIGN		Skinner	
EC513	COMPUTER ARCHITECTURE	Herbordt		
EC514	SIMULATION	Vakili		
EC515	DIGITAL COMMUNICATION	Saligrama		
EC516	DIGITAL SIGNAL PROCESSING		Nawab	
EC517	INTRODUCTION OF INFORMATION THEORY		Ishwar	
EC518	SOFTWARE PROJECT MANAGEMENT		Brackett	
EC520	DIGITAL IMAGE PROCESSING AND COMMUNICATION	Konrad		
EC524	OPTIMIZATION THEORY AND METHODS	Paschalidis		
EC533	ADVANCED DISCRETE MATHEMATICS	Levitin		
EC535	INTRODUCTION TO EMBEDDED SYSTEMS		Coskun	
EC541	COMPUTER COMMUNICATION NETWORKS		Alanyali	
EC543	SUSTAINABLE POWER SYSTEMS: PLANNING, OPERATION, AND MARKETS		Caramanis	
EC544	NETWORKING THE PHYSICAL WORLD	Little		
EC551	ADVANCED DIGITAL DESIGN WITH VERILOG AND FPGA	Taubin		
EC560	INTRODUCTION TO PHOTONICS	Teich	Paiella	
EC561	ERROR-CONTROL CODES		Karpovsky	
EC570	LASERS		Teich	
EC571	VLSI PRINCIPLES AND APPLICATIONS	Hubbard	Joshi	
EC573	SOLAR ENERGY SYSTEMS		Mazumder	
EC574	PHYSICS AND SEMICONDUCTOR MATERIALS	Bellotti	Bellotti	
EC575	SEMICONDUCTOR DEVICES			
EC577	ELECTRICAL, OPTICAL, AND MAGNETIC PROPERTIES OF MATERIALS	Moustakas		
EC578	FABRICATION TECHNOLOGY FOR INTEGRATED CIRCUITS	Kleptsyn		
EC579	MICROELECTRONIC DEVICE MANUFACTURING		Cole	
EC580	MODERN ACTIVE CIRCUIT DESIGN	Knepper		
EC582	RF/ANALOG IC DESIGN FUNDAMENTALS		Knepper	
EC591	PHOTONICS LAB I	Paiella		

Course Number and Title		Fall '09	Spring '10	Summer '10
EC701	OPTIMAL AND ROBUST CONTROL	Anderson		
EC702	RECURSIVE ESTIMATION AND OPTIMAL FILTERING	Castañón		
EC707	RADAR REMOTE SENSING	Semeter		
EC710	DYNAMIC PROGRAMMING AND STOCHASTIC CONTROL		Caramanis	
EC715	WIRELESS COMMUNICATIONS		Carruthers	
EC720	DIGITAL VIDEO PROCESSING		Konrad	
EC725	QUEUEING SYSTEMS	Perkins		
EC726	PERSONAL KNOWLEDGE ENGINEERING		Toffoli	
EC728	DESIGN AND TESTING FOR DISTRIBUTED SOFTWARE: INTENSIVE SYSTEMS	Brackett		
EC730	INFORMATION-THEORETICAL DESIGN OF ALGORITHMS		Levitin	
EC732	COMBINATORIAL OPTIMIZATION		Castañón	
EC733	DISCRETE EVENT AND HYBRID SYSTEMS		Cassandras	
EC741	RANDOMIZED NETWORK ALGORITHMS		Starobinski	
EC751	DESIGN OF ASYNCHRONOUS CIRCUIT AND SYSTEMS		Taubin	
EC757	ADVANCED MICROPROCESSOR DESIGN			Van Court
EC761	INFORMATION THEORY AND CODING	Levitin		
EC762	QUANTUM OPTICS	Sergienko		
EC764	OPTICAL MEASUREMENT		Swan	
EC770	GUIDED-WAVE OPTICELECTRONICS		Dal Negro	
EC773	ADVANCED OPTICAL MICROSCOPY AND BIOLOGICAL IMAGING		Mertz	
EC782	RF/ANALOG IC DESIGN ADVANCED APPLICATIONS	Knepper		
EK 500	PROBABILITY WITH STATISTICAL APPLICATIONS	Cassandras		
EK501	MATHEMATICAL METHODS I	Kotiuga		
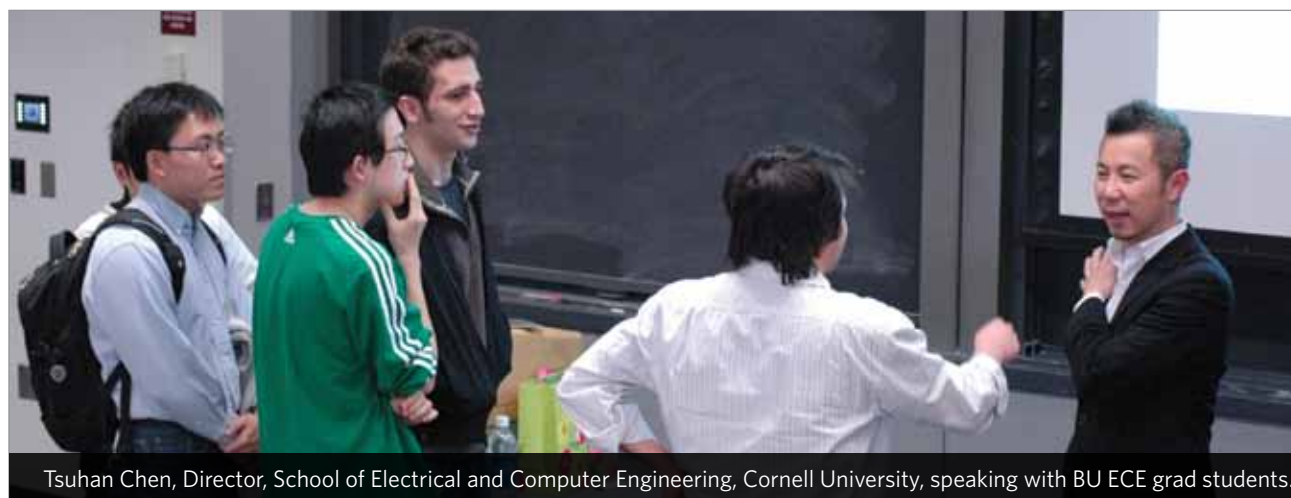
Tsuhan Chen, Director, School of Electrical and Computer Engineering, Cornell University, speaking with BU ECE grad students.

Instructional Laboratories

IMSIP Instructional Laboratory

Faculty: Karl, Konrad, Nawab, Oliver

This laboratory serves the graduate instructional needs of the Department in the areas of multidimensional signal processing (including image and video processing), statistical signal processing, pattern recognition, and earth and space sciences. The laboratory provides advanced computational resources and associated software packages. Fast, dual-processor workstations connected through a gigabit network form a computational backbone, while high-capacity printers serve the hardcopy needs. State-of-the-art processing and optimization software is available. This laboratory was developed with funds from the National Science Foundation, and is currently being upgraded with departmental funds.

Photonics Laboratory

Faculty: Bigio, Morse, Paiella, Ruane, Teich, Ünlü

This lab supports introductory and intermediate level courses in the MS in Photonics program. Four stations have vibration isolated optical tables, HeNe and semiconductor lasers, fiber components and systems, electronic test equipment, and GPIB-connected PCs for LabVIEW data logging and instrument control. Shared equipment exists for experiments and demonstrations in interferometry, spectrometry, diffraction, holography, acoustic and electro-optic modulation, and optical spectrum analysis. A secure annex room houses two additional isolated tables, electronics, and optical equipment to support thesis and senior design projects that require long-term setup of apparatus.

RF Measurements Lab

Faculty: Knepper

The RF Measurements Lab provides an opportunity to train students in advanced radio frequency experimental techniques. The lab contains up-to-date high frequency equipment for testing RF printed circuit boards, MMICs, and other high frequency components in the frequency range 100 MHz to 26 GHz. The lab is used for both undergraduate and graduate instruction for courses SC580 and SC582, as well as for research in coupled electrical substrate noise effects in RF/mixed-signal IC technology. Included in the RF Measurements Lab are recent Agilent high frequency tools: a 26 GHz vector network analyzer, 26 GHz spectrum analyzer, high frequency oscilloscope, and RF signal generator. Students use the equipment to learn the basics of S-parameter measurements, as well as characterization of RF mixers, VCOs, amplifiers, and other components.

Colloquia & Seminars

The Colloquium and Seminar series continued for another successful year. This year we also introduced a high-profile **Distinguished Lecture Series** (noted in **bold**). Prominent speakers from inside and outside the University delivered engaging research talks on current issues to graduate students, faculty, and other students and guests from the greater Boston area.

Date	Speaker	Title
9/9/2009	Prakash Ishwar Electrical & Computer Engineering Boston University	An Information Processing Tour of Sensor Networks
9/10/2009	Anna Swan Electrical & Computer Engineering Boston University	Carbon: World's oldest and newest material
9/15/2009	Alberto Sangiovanni Vincentelli Electrical Engineering University of California at Berkeley	Collaboration for Innovation in Electronic System Design
9/16/2009	Charles A. Bouman Electrical and Computer Engineering Purdue University	Model Based Imaging: In Search of the Free Lunch[1]
10/13/2009	Andrei Khrennikov Applied Mathematics University of Vaxjo, Sweden	Can Fluctuations of Classical Random Field Produce Quantum Correlation?
10/14/2009	Michael Goldstein Senior Principal Physicist Intel Corporation	Nanolithography: Optics and Adjacent Research Opportunities
10/21/2009	Farzad Kamalabadi Electrical and Computer Engineering University of Illinois at Urbana-Champaign	Spatiotemporal Image Reconstruction: A Computationally Efficient State Space Approach
11/6/2009	Gennady Shvets Physics University of Texas at Austin	Negative Index Metamaterials and Their Applications to Sub-diffraction Imaging and Infrared Light Harvesting
11/30/2009	Samarjit Chakraborty Institute for Real-Time Computer Systems TU Munich, Germany	Multimedia Power Management on a Platter: From Audio, to Video and Games
12/1/2009	Stefan Maier Centre for Plasmonics & Metamaterials Imperial College London	New Concepts in Nanoplasmonics & Plasmonic Metamaterials
12/3/2009	Stephen K. Doorn Physical Chemistry and Spectroscopy Group Los Alamos National Laboratory	Raman Studies of Exciton Behavior in Single-Walled Carbon Nanotubes
2/1/2010	Douglas Densmore Synthetic Biology Engineering Research Center UC Berkeley	Platform-Based Design: From Cruise Control to Cancer Killer
2/3/2010	Alex Sherman Computer Science Columbia University	Improving Performance in P2P File-Sharing and Streaming Systems Through Fairness
2/17/2010	Walter R. Buchwald Air Force Research Laboratory Hanscom AFB	Active and Passive Plasmonic Components for Advanced Sensing and Photonic Applications

Date	Speaker	Title
2/24/2010	**Susie Wee** **Chief Technology Officer** **HP**	**Experiences, Devices, Services, and the Cloud**
2/26/2010	Junshan Zhang School of ECEE Arizona State University	Fundamental Tradeoffs between Probing and Channel-Aware Scheduling in Future Wireless Networks
3/3/2010	Alexander M. Wyglinski Electrical and Computer Engineering Worcester Polytechnic Institute	Cognitive Radio: Enabling Agility in Modern Wireless Communication Systems[1]
3/4/2010	Ivan Celanovic Institute for Soldier Nanotechnologies Massachusetts Institute of Technology	Towards efficient solid state energy conversion
3/15/2010	Sam Hasinoff Computer Science and Artificial Intelligence Laboratory Massachusetts Institute of Technology	Rich Photography on a Budget
3/19/2010	Lorenzo Pavesi Nanoscience Laboratory, Department of Physics University of Trento, Italy	Nanosilicon Photonics
3/22/2010	Xiaotong Zhuang T.J. Watson Research Center IBM	Code Optimizations in the Heterogeneous Multicore Era
3/23/2010	Vinod Prabhakaran Coordinated Science Laboratory University of Illinois at Urbana-Champaign	Information Theory in the Crowd: Interference and Privacy
3/24/2010	**Tsuhan Chen** **School of Electrical and Computer Engineering** **Cornell University**	**Beyond Face Recognition: Understanding Images of People Using Social Context**
3/25/2010	Bobak Nazer Elecrical and Computer Engineering University of Wisconsin, Madison	Harnessing Interference for Reliable Computation and Communication
3/26/2010	Damian Schimpf Institute of Applied Physics Friedrich Schiller University of Jena, Germany	Recent developments in femtosecond fiber lasers: Opening up new directions in science and technology
3/29/2010	Satish Korada Electrical Engineering Stanford University	Polar Codes: A New Paradigm for Coding
4/1/2010	Paolo Minero Electrical and Computer Engineering University of California at San Diego	Large wireless networks: fundamental limits and design issues
4/5/2010	Andreas Savvides Electrical Engineering Yale University	Estimating Consumption Breakdowns through Binary Sensing of ON/OFF States
4/7/2010	Venu Veeravalli Electrical and Computer Engineering University of Illinios at Urbana-Champaign	Understanding and Managing Interference in Wireless Networks[1]
4/8/2010	Sewoong Oh Electrical Engineering Stanford University	Matrix completion: Learning matrices from incomplete data

Date	Speaker	Title
4/15/2010	David Choffnes Electrical Engineering and Computer Science Northwestern University	Crowdsourcing Network Event Monitoring
4/21/2010	**Douglas Stone** **Applied Physics** **Yale University**	**What is a Laser Anyway? Do We Really Understand Them After Fifty Years of Trying?**
4/22/2010	J. Nicholas Laneman Electrical Engineering University of Notre Dame	Sequence Detection Algorithms for Spectrum Sensing in Wireless Networks with Dynamic Spectrum Access
4/26/2010	Lee E. Goldstein Biomedical Engineering and School of Medicine Boston University	Laser-Based Molecular Diagnostic Technology for Early Detection of Alzheimer's Disease
4/28/2010	John P. Kaufhold Technology and Advanced Systems Business SAIC	Automated neuroanatomical microvessel segmentation, vectorization, nuclei labeling, and geometric computations with 3D two photon laser scanning microscopy
5/5/2010	Luca Dal Negro Electrical & Computer Engineering Boston University	Engineering Aperiodic Order In Nanophotonics Past Present and Future Opportunities
5/18/2010	David Atienza Embedded Systems Laboratory EPFL, Switzerland	Thermal Modeling and Active Cooling Management for 3D MPSoCs
5/19/2010	Leon Chua Electrical Engineering UC Berkeley	Memristor: Past, Present, and Future[1]
5/20/2010	Markus A. Schmidt Max Planck Institute University Erlangen-Nuremberg, Germany	From Plasmonics to Supercontinuum Generation – Nanoscale Devices Based on Hybrid Photonic Crystal Fibers

[1] *ECE Colloquium Series*

Susie Wee, Chief Technology Officer, HP

Research

ECE is a multidisciplinary department with a strong systems perspective. There are three overlapping areas of research and instruction: Electro-Physics, which includes photonics, solid state materials and devices, and electromagnetics and space physics; Information Systems and Sciences, which includes signal and image processing, control and communication systems, and networks; and Computer Systems Engineering, which includes hardware, software applications, and computer networks.

The faculty has collegial ties to a number of important BU research centers, which are detailed at the end of this section. ECE also has strong links with several other departments at the University. Many faculty members pursue collaborative cross-disciplinary research with faculty in other departments and have strong extramural ties in larger centers, multi-university initiatives, and industry collaboratives.
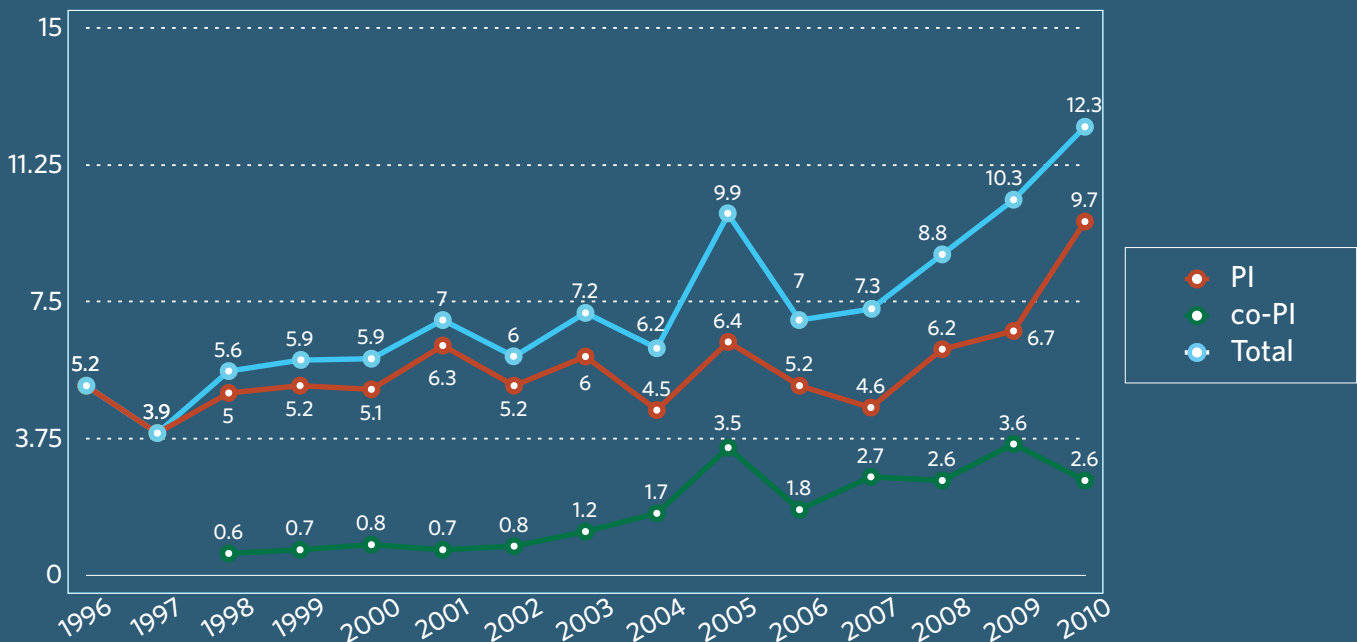
External Research Funding

Research funding has grown significantly in the last decade. Total annual new research funding in the last five years averaged to approximately $9.1M, compared to $7.3M in the 2001-2005 period, and $5.3M in 1996-2000.

The following tables delineate the new and continuing grants awarded over the 2009 fiscal year. The funding level for

new grants, where an ECE faculty member is the Principal Investigator (PI) is approximately $9.7M. ECE faculty members were also Co-PIs on grants with PIs from other departments, as noted in the table. Their share of the funding for new grants awarded is approximately $2.6M. The total of new grants is therefore approximately $12.3M.

History of External Research Funding (millions of dollars)

New Grants with ECE Principal Investigators

Recipient	Title of Award	Source	Begin	End	Amount
Altug, Hatice	CAREER: Nano-Plasmonic Resonances for Bio-Detection Systems (In Conjunction with the Center for Nanoscience and Nanobiotechnology)	NSF	2/15/10	1/31/15	$399,869
Altug, Hatice	High-Performance NanoPlasmonic Sensors for Biological Warfare Detection	DoD/Navy	5/1/10	4/30/13	$60,780
Altug, Hatice	Development of Multiplexed, Ultra-Sensitive, Label-Free and Rapid Biosensing Technologies for Proteomics and Virus Detection Applications	MA Life Sciences Center	9/1/09	8/31/10	$91,082
Bellotti, Enrico	Photon-Trap Structures for Quantum Advanced Detectors (PT-SQUAD) (In Conjunction with Photonics Center)	DoD/DARPA/ BAE Systems	8/18/09	9/30/10	$82,820
Cassandras, Christos	Real-Time Optimization in Complex Stochastic Environment (In Conjunction with the Center for Information and Systems Engineering)	DoD/Air Force	12/1/09	11/30/10	$122,792
Castañón, David	MANERVA: Mission Assessment of Non-Manned Entities for Rating the Validation of Autonomy	DoD/Army/ Charles River Analytics	5/10/10	10/10/10	$30,000
Castañón, David Karl, W. Clement Saligrama, Venkatesh	ALERT: Awareness and Location of Explosive-Related Threats (In Conjunction with the Center for Information and Systems Engineering) ($275,000)	DHS/NEU	7/1/09	6/30/10	$91,667 $91,667 $91,667
Castañón, David Ruane, Michael Sergienko, Alexander Teich, Malvin Barbone, Paul Cleveland, Robin O. Murray, Todd Roy, Ronald	CenSSIS Program - Year 10 ($314,518)	NSF/NEU	9/1/09	8/31/10	$39,315 $39,315 $39,315 $39,315 $39,315 $39,315 $39,315 $39,315
Castañón, David Karl, W. Clement	MURI: Fusion and Sensor Management for Automatic Target Exploitation ($249,999)	DoD/Air Force-OSU	10/1/09	9/30/10	$124,999.50 $124,999.50
Cerrina, Franco	Table Top EUV Holography: A New Approach for Versatile Nanolithography	NSF/CSU	7/1/09	6/30/12	$138,435
Dal Negro, Luca	Deterministic Aperiodic Structures for On-Chip Nanophotonics and Nanoplasmonics Device Applications	DoD/Air Force	10/1/09	11/30/09	$26,500
Dal Negro, Luca	Deterministic Aperiodic Structures for On-Chip Nanophotonics and Nanoplasmonics Device Applications	DoD/Air Force	12/1/09	11/30/10	$159,999
Dal Negro, Luca	DURIP - 1.54 mm Optical Gain in Si and Ge-Based Structures for Optical Amplification and Electrically Pumped Lasers	Dod/AFOSR	6/1/10	5/31/11	$237,995
Dal Negro, Luca Karl, W. Clement	Silk Based Optical Food Sensors ($100,000)	DoD/Tufts University	3/1/10	2/28/11	$50,000 $50,000
Dal Negro, Luca	Biodegradable Communications System	DoD/DARPA/ Tufts University	1/1/08	1/31/11	$149,539

Recipient	Title of Award	Source	Begin	End	Amount
Dal Negro, Luca	CAREER: Combined Light and Carrier Localization in High-Refractive Index Silicon Nanocrystal Structures - A Novel Approach for Si-based Lasers (In Conjunction with the Center for Nanoscience and Nanobio-technology)	NSF	8/1/09	7/31/14	$400,000
Dal Negro, Luca	Aperiodic Photonic-Plasmonic Structures with Broadband Field Enhancement for Optical Limiting Applications	DoD/Army/Batelle	5/29/09	5/28/10	$88,474
Dal Negro, Luca	MURI: Electrically-Pumped, Silicon- Based Lasers for Chip-Scale Nanophotonic Systems (In Conjunction with the Center for Information and Systems Engineering)	DoD/Air Force/MIT	7/1/06	11/30/10	$100,000
Herbordt, Martin	FPGA-Based High-Performance Computing	PHS/NIH/NCRR	8/13/09	8/12/10	$202,649
Horenstein, Mark	Compact Low-Power Driver for Deformable Mirror Systems	NASA/Boston Micromachines Corp.	1/28/10	7/28/10	$30,028
Ishwar, Prakash	CAREER: Information-Scaling Laws, "Bit-Conservation" Principles, and Robust Coding Architectures in Sensor Networks (In Conjunction with the Center for Information and Systems Engineering)	NSF	12/1/09	11/30/10	$83,571
Karl, W. Clement	Lincoln Scholars Program (Katherine Pegors) (In Conjunction with the Center for Information and Systems Engineering)	DoD/Air Force/MIT Lincoln Laboratory	1/10/10	4/30/12	$16,071
Karl, W. Clement	Graduate Student Support (Zachary Sun) (In Conjunction with the Center for Information and Systems Engineering)	DoD/Air Force/MIT Lincoln Laboratory	10/1/09	5/31/10	$6,000
Karl, W. Clement	Graduate Student Support (Zachary Sun) (In Conjunction with the Center for Information and Systems Engineering)	DoD/Air Force/MIT Lincoln Laboratory	10/1/09	5/31/10	$3,500
Karl, W. Clement	A Biomedical Imaging Acceleration Testbed (In Conjunction with the Center for Information and Systems Engineering)	NSF/Northeastern University	12/15/09	11/30/10	$34,044
Konrad, Janusz	Lincoln Scholars Program (Elena Zorn)	DoD/Air Force/MIT Lincoln Laboratory	1/1/10	4/30/10	$16,071
Lee, Min-Chang	Investigation of Ionospheric Turbulence and Whistler Wave Interactions with Space Plasmas	DoD/Air Force	12/1/09	11/30/10	$200,872
Little, Thomas Altug, Hatice Carruthers, Jeffrey Ünlü, M. Selim	NSF Engineering Research Center for Smart Lighting - Administration ($495,092)	NSF/Rensselaer Polytechnic Institute	9/1/08	8/31/10	$123,773 $123,773 $123,773 $123,773
Little, Thomas Ishwar, Prakash Konrad, Janusz	NeTS-NOSS: Localized Computation and Network Path Formation to Enable Pervasive Video Sensing (REU Supplement) (In Conjunction with Center for Information and Systems Engineering) ($16,000)	NSF	5/1/08	8/31/10	$5,333 $5,333 $5,333
Mazumder, Malay	Electrostatic Dry Powder Inhaler for Constant Dose Respiratory Drug Delivery	DoD/Army/MGH	1/1/10	9/30/10	$36,022
Mazumder, Malay	Electrostatic Dry Powder Inhaler for Constant Dose Respiratory Drug Delivery	DoD/Army/MGH	1/1/10	9/30/10	$19,978

Recipient	Title of Award	Source	Begin	End	Amount
Morse, Theodore	Double Clad Fiber with Single Mode Core	PHS/NIH/NCI / MGH	12/1/09	7/31/10	$12,462
Morse, Theodore	Double Clad Fiber with Single Mode Core	PHS/NIH/NCI / MGH	12/1/09	7/31/10	$12,462
Morse, Theodore	Higher Order Mode (HOM) Fibers for Blue Laser Application	DoD/Navy	3/1/10	10/1/10	$11,764
Morse, Theodore	Higher Order Mode (HOM) Fibers for Blue Laser Application	DoD/Navy	3/1/10	10/1/10	$36,505
Morse, Theodore	A New Approach to High-Power, Eye-Safe, Laser Technology Applications (In Conjunction with the Center for Nanoscience and Nanobiotechnology)	DoD/Navy	6/1/07	8/31/10	$250,000
Moustakas, Theodore	Development of an Electron Beam Injected Laser Structure at 235nm Based on AIGaN/AIN Multiple Quantum Wells on SiC Substrates (In Conjunction with the Photonics Center)	NASA/Photon Systems, Inc.	1/15/10	1/15/12	$150,000
Oliver, William Martinez, Carlos	CEDAR: Comprehensive Use of Incoherent Scatter Radar Data to Study the Equatorial Midnight Plasma and Neutral Temperature Maxima (MTM) (In Conjunction with the Center for Space Physics) ($104,500)	NSF	1/1/10	12/31/10	$52,250 $52,250
Paiella, Roberto	Plasmonic Nanostructures Integrated with Semiconductor Light Emitting Materials for Enhanced Efficiency and Functionality	DOE	1/1/10	12/31/10	$155,000
Paiella, Roberto	Collaborative Research: Quantum-Cascade-Laser Active Materials Based on Silicon-Germanium Nanomembranes	NSF	7/1/09	6/30/10	$78,270
Paschalidis, Ioannis Kozakov, Dmytro	Refinement Methods for Protein Docking Based on Exploring Multi-Dimensional Energy Funnels (In Conjunction with the Center for Information and Systems Engineering) ($309,416)	PHS/NIH/ NIGMS	4/1/10	3/31/11	$154,708 $154,708
Paschalidis, Ioannis Cassandras, Christos	Distributed Wireless Sensor Networks for Long-Term Deployments (In Conjunction with the Center for Information and Systems Engineering) ($360,000)	DOE	9/1/09	8/31/11	$180,000 $180,000
Paschalidis, Ioannis	Statistical Techniques for Detecting Internet Traffic Anomalies (In Conjunction with the Center for Information and Systems Engineering)	DoD/Army	9/15/09	6/14/10	$50,000
Qin, Wei	Rendezvous Finite State Machine: Where TLM Meets RTL	Semiconductor Research Corp.	8/1/07	8/31/09	$60,000
Ruane, Michael Swan, Anna	REU Site: Research Experience for Undergraduates in Photonics ($12,681)	NSF	5/1/09	10/31/09	$6,341 $6,341
Saligrama, Venkatesh	CPS-Medium: Collaborative Research: The Foundations of Implicit and Explicit Communication in Cyberphysical Systems	NSF	9/15/09	8/31/12	$433,430
Saligrama, Venkatesh Konrad, Janusz	Video Analytics: An Event Based Statistical Approach ($299,998)	DoD/National Geospatial Intelligence Agency	9/23/09	9/22/11	$149,999 $149,999
Saligrama, Venkatesh	Smart Distributed Sensor Fields	DoD/Navy	1/11/10	1/10/13	$100,000

Recipient	Title of Award	Source	Begin	End	Amount
Saligrama, Venkatesh Konrad, Janusz	From Frames to Events: A Statistical Approach to Activity Analysis in Multi-Camera Systems (In Conjunction with the Center for Information and Systems Engineering) ($507,364)	NSF	7/15/09	6/30/12	$253,682 $253,682
Saligrama, Venkatesh	CAREER: A Systems Approach to Networked Decision Making in Uncertain Environments (In Conjunction with the Center for Information and Systems Engineering)	NSF	6/1/09	5/31/10	$80,000
Semeter, Joshua	Investigation of Phase Coherence in Elemental Auroral Structure (In Conjunction with the Center for Space Physics)	NSF	10/1/09	9/30/12	$260,114
Semeter, Joshua	CAREER: Magnetosphere-Ionosphere Coupling Through Multi-Sensor Data Fusion	NSF	5/1/09	4/30/10	$44,600
Semeter, Joshua	CAREER: Magnetosphere-Ionosphere Coupling Through Multi-Sensor Data Fusion	NSF	5/1/09	4/30/11	$83,972
Semeter, Joshua Karl, W. Clement	MR-R2I: Development of Next-Generation Imaging Spectrometer Based on a Tunable Liquid Crystal Filter (In Conjunction with the Center for Space Physics) ($775,000)	NSF	6/1/10	5/31/13	$387,500 $387,500
Starobinski, David Trachtenberg, Ari	CIF: Small: Large-Scale Software Dissemination in Stochastic Wireless Networks (In Conjunction with the Center for Information and Systems Engineering) ($456,731)	NSF	9/1/09	8/31/12	$228,381 $228,381
Swan, Anna Altug, Hatice Smith, Michael Andersson, Sean Porter, Tyrone	NUE: Undergraduate Laboratory Experiences in Nanotechnology Devices and Systems (U-LENS) (In Conjunction with the Center for Nanoscience and Nanobiotechnology and Photonics Center) ($200,000)	NSF	9/1/09	8/31/11	$40,000 $40,000 $40,000 $40,000 $40,000
Teich, Malvin	Quantum Optical Coherence Tomography (CenSSIS Supplement)	NSF/Northeastern University	2/1/03	8/31/10	$35,000
Teich, Malvin Saleh, Bahaa Sergienko, Alexander	Quantum Imaging: New Methods and Applications (MURI) (In Conjunction with the Photonics Center) ($40,000)	DoD/Army/University of Rochester	5/1/05	9/30/10	$13,333 $13,333 $13,333
Teich, Malvin Saleh, Bahaa Sergienko, Alexander	Quantum Imaging: New Methods and Applications (MURI) (In Conjunction with the Photonics Center) ($19,086)	DoD/Army/University of Rochester	5/1/05	9/30/10	$6,362 $6,362 $6,362
Trachtenberg, Ari Starobinski, David	Faust: Finite-Field Algebra for Unbeatable Situational-Awareness in Tactical-Networks ($6,000)	DoD/Scientific Systems Co.	5/10/10	9/17/10	$3,000 $3,000
Trachtenberg, Ari Starobinski, David	Secure and Efficient Data Distribution in Varying-Topology Networks (In Conjunction with the Center for Information and Systems Engineering) ($55,518)	Deutsche Telekom AG (Germany)	7/1/09	8/31/10	$27,759 $27,759
Ünlü, M. Selim	Floating Light-Activated Micro-Electrical Stimulators for Neural Prosthetics	PHS/NIH/NIBIB-NJIT	8/1/09	5/31/10	$152,971
Ünlü, M. Selim	Research Agreement (In Conjunction with the Center for Nanoscience and Nanobiotechnology and Photonics Center)	Mitre International	10/1/09	9/30/10	$80,000
Ünlü, M. Selim Goldberg, Bennett	Research Agreement ($5,500)	The Mitre Corp.	6/1/09	9/30/09	$2,750 $2,750

Recipient	Title of Award	Source	Begin	End	Amount
Ünlü, M. Selim	Label-Free Multiplexed Immunoassay Platform for Diagnosing Liver Disease	PHS/NIH/NIDDK /Zoiray Technologies, Inc.	7/1/09	3/31/10	$51,127
Ünlü, M. Selim DeLisi, Charles Goldberg, Bennett Irani, Rostem	High Throughput Quantification of Conformation and Kinetics of DNA-Protein Complexes (In Conjunction with the Center for Nanoscience and Nanobiotechnology) ($110,000)	NSF	9/15/09	8/31/10	$27,500 $27,500 $27,500 $27,500
Unlu, M. Selim Ruane, Michael Goldberg, Bennett Zaman, Muhammad Porter, Tyrone	GAANN: Fellowships in Nanobiotechnology ($131,265)	DoED	8/16/10	8/15/11	$26,253 $26,253 $26,253 $26,253 $26,253
Subtotal	**Grants With ECE PIs**				**$9,718,436**

New Grants with ECE co-PIs

Recipient	Title of Award	Source	Begin	End	Amount
Altug, Hatice Connor, John	RESONANT Optical Virus Reader (ROVR) Phase II ($350,000)	ARL	7/1/10	6/30/11	$175,000 $175,000
Brower, Richard Rebbi, Claudio	Intelligent Software: The Interface Between Algorithms and Machines (Workshop) ($5,670)	NSF	9/1/09	8/31/10	$2,835 $2,835
Brower, Richard Rebbi, Claudio	Intelligent Software: The Interface Between Algorithms and Machines - Participant Support Costs (Workshop) ($39,000)	NSF	9/1/09	8/31/10	$19,500 $19,500
Brower, Richard Rebbi, Claudio	Collaborative Research: National Computational Infrastructure for Lattice Gauge Theory ($198,000)	DOE	3/15/09	3/14/10	$99,000 $99,000
Belta, Calin **Cassandras, Christos**	MURI - Smart Adaptive Reliable Teams for Persistent Surveillance ($96,000)	DoD/Navy/ MIT	6/1/09	12/31/09	$48,000 $48,000
Belta, Calin **Cassandras, Christos**	MURI - Smart Adaptive Reliable Teams for Persistent Surveillance ($290,000)	DoD/Navy/ MIT	6/1/09	12/31/09	$145,000 $145,000
Baillieul, John **Castañón, David**	Behavioral Dynamics in the Cooperative Control of Mixed Human/Robotic Teams (MURI-07) ($727,744)	PHS/NIH/ NCI	3/1/09	2/28/10	$363,872 $363,872
Ballieul, John **Castañón, David**	Behavioral Dynamics in the Cooperative Control of Mixed Human/Robotic Teams (MURI-07) ($814,562)	DoD/Air Force	7/1/10	11/30/10	$407,281 $407,281
Dal Negro, Luca Reinhard, Bjorn M.	Chemically Enhanced Photonic - Plasmonic Crystals for Explosive Vapor Detection Phase II ($260,000)	ARL	7/1/10	6/30/11	$130,000 $130,000
Reinhard, Bjorn **Dal Negro, Luca**	Rationally Designed Plasmonic Nanostructures for Rapid Bacteria Detection and Identification ($180,700)	NSF	6/1/09	5/31/11	$90,350 $90,350
Holmes, Raquell **Giles, Roscoe**	Collaborative Research: BPC-AE Strengthening and Expanding the Empowering Leadership Alliance	NSF	2/1/10	1/31/12	$45,204 $45,204

Recipient	Title of Award	Source	Begin	End	Amount
Campbell, David **Horenstein, Mark**	No Longer a Dream Deferred: Greater Minority STEM Participation Through Academic and Institutional Change ($151,915)	NSF - University of MA, Amherst	3/1/06	2/28/11	$75,958 $75,958
Mountain, David **Hubbard, Allyn** Cotanche, Douglas	Active Filtering in the Cochlea ($717,322)	PHS/NIH/NIDCD	6/3/09	8/31/10	$239,107 $239,107 $239,107
Wagenaar, Robert **Little, Thomas**	Continuous Monitoring of Functional Activities in the Home and Community Based Setting ($73,125)	PHS/NIH/NIA	6/1/09	5/31/10	$36,563 $36,563
Moustakas, Theodore	Development of packaged UV LED and lamps emitting at 266 nm for Water-Air Purification and surface sterilization	ARL	7/1/10	6/30/11	$250,000
De Luca, Carlo Roy, Serge **Nawab, S. Hamid** Jabre, Joe	Wearable-Sensor System for Monitoring Motor Function ($652,788)	PHS/NIH/NIBIB	9/1/09	8/31/10	$163,197 $163,197 $163,197 $163,197
De Luca, Carlo Roy, Serge **Nawab, S. Hamid** Adam, Alexander	Harnessing Moto-Neuron Activity: From Lab to Clinic ($563,762)	PHS/NIH/NICHD	6/1/09	5/31/11	$140,941 $140,941 $140,941 $140,941
Ramachandran, Siddharth Averitt, Richard	A Flexible, Lightweight, Remotely-Accessible THz Source and Detector ($250,000)	ARL	7/1/10	6/30/11	$125,000 $125,000
Semeter, Joshua **Karl, W. Clement**	RBSP-ECT - Radiation Belt Storm Probes - Energetic Particle Composition, and Thermal Plasma - Graduate Student Support	NASA/University of NH	4/1/10	5/31/10	$16,247
Subtotal	**Grants With ECE co-PIs**				**$2,573,053**
Grand Total					**$12,291,489**

Continuing Grants

Recipient	Title of Award	Source	Begin	End
Bellotti, Enrico	Theoretical Investigation Of Optoelectronic Devices Based On The ZNO Material System	NSF	6/1/09	5/31/12
Bellotti, Enrico	CAREER: Theoretical Investigation Of Single Photon Detection For Quantum Technology: A Nano-Structure Devices Approach ($400,000)	NSF	5/1/05	4/30/11
Castañón, David Cassandras, Christos	Distributed Mission Control For Unmanned Air Vehicles In Stochastic Environments ($461,717)	DoD/Air Force	7/1/07	7/31/10
Cassandras, Christos Bestavros, Azer Paschalidis, Yannis	EFRI-ARESCI: Event-Driven Sensing For Enterprise Reconfigurability And Optimization ($1,980,349.04)	NSF	11/1/07	10/31/10
Dal Negro, Luca	Nanoarray-Assisted Wavelength Shifting Films For Solar Applications	Lightwave Power, Inc.	2/1/09	7/31/10
Herbordt, Martin	FPGA-Based High Performance Computing	PHS/NIH/NCRR	7/1/07	4/30/11
Ishwar, Prakash	CIF: Small: Collaborative Research: Towards A Paradigm Shift In Distributed Information Processing: Harnessing Group-Structure	NSF	7/1/09	6/30/12

Recipient	Title of Award	Source	Begin	End
Little, Thomas Conrad, Janusz	NETS-NOSS: Localized Computation And Network Path Formation To Enable Pervasive Video Sensing ($450,000)	NSF	9/1/07	8/31/10
Morse, Theodore	Miniature Laser Therapy Endoscope	PHS/NIH/NIBIB	8/1/07	7/31/10
Moustakas, Theodore Paiella, Roberto	Ultraviolet Electroabsorption Modular Based On III-Nitride Quantum Wells ($294,337)	NSF	9/1/07	8/31/10
Paiella, Roberto Bellotti, Enrico	GAN-Based Quantum-Structure Devices For THz Light Emission And Photodetection ($399,967)	NSF	9/1/08	8/31/11
Paiella, Roberto Moustakas, Theodore	Intersubband All-Optical Switching And Optically-Pumped Light Emmission With III-Nitride Quantum Wells ($270,000)	NSF	9/1/06	8/31/10
Semeter, Joshua	Phase Coherence In Elemental Auroral Structure	nsf	10/1/09	9/30/12
Starobinski, David Alanyali, Murat	WN: Collaborative Research: Management Of Secondary Markets In Deregulated Wireless Network ($200,000)	NSF	7/1/07	8/31/10
Starobinski, David	Self-Forming Extensible Lunar Extravehicular Activity Network (SELENE)	NASA/Scientific Systems, Inc.	3/18/09	2/11/11
Starobinski, David Trachtenberg, Ari	CIF: Small: Large-Scale Software Dissemination In Stochastic Wireless Networks ($456,731)	NSF	9/1/09	8/31/12
Swan, Anna	Vibrational And Electronic Aspects Of Carbon Nanotubes And Their Interactions	NSF	9/1/07	8/31/10
Swan, Anna	REU Supplement: Vibrational And Electronic Aspects Of Carbon Nanotubes And Their Interactions	NSF	10/14/08	5/31/10
Trachtenberg, Ari Starobinski, David	A Theory Of Monitoring Based On Identifying Codes And Their Variants ($280,000)	NSF	10/1/07	9/30/10
Trachtenberg, Ari Starobinski, David	A Theory Of Monitoring Based On Identifying Codes And Their Variants REU Supplement ($12,000)	NSF	5/1/09	9/30/10
Ünlü, M. Selim	High Speed Diagnostic Of Temperature And Intensity Variation Of Diode-Laser Facets	Science Research Laboratory, Inc.	10/15/08	7/31/10
Ünlü, M. Selim Swan, Anna	IRES: US-Turkey-Switzerland Collaboration On Resonant Structures For Biosensing And Imaging ($15,120)	NSF	5/1/06	8/31/10
Ünlü, M. Selim Swan, Anna	IRES: US-Turkey-Switzerland Collaborationon Resonant Structures For Biosensing And Imaging. Participant Support ($134,880)	NSF	5/1/06	8/31/11

Gifts

Recipient	Source	Amount
Coskun, Ayse	Sun Microsystems	$45,000
Ramachandran, Siddharth	Japanese Patent Office	$37,500
Sergienko, Alexander	Capella Photonics, Inc.	$10,000
Total Gifts		**$92,500**

Faculty Publications

Books

P. R. KOTIUGA, (editor), *A Celebration of the Mathematical Legacy of Raoul Bott*, CRM, Proceedings and Lecture Notes, vol. 50, American Mathematical Society, 2010.

A. SERGIENKO, Saverio Pascazio, and Paolo Villoresi (editors), *Quantum Communication and Quantum Networking*, Springer, New York, 2009.

Book Chapters

R. Reif and I. BIGIO, "Elastic-scattering spectroscopy for optical biopsy: probe designs and analytical methods for clinical applications," in *Biomedical Applications of Light Scattering,* Backman, Wax (editors), McGraw-Hill, January 2010.

R. BROWER, "The Hadronic Origins of String Theory," in *The Birth of String Theory,* Andrea Cappelli, Elena Castellani, Filippo Colomo, Paolo Di Vecchia (editors) in press for Cambridge University, 2010.

T. VanCourt and M. HERBORDT, "Elements of High Performance Reconfigurable Computing," in *Advances in Computers*, vol. 75, pp. 113-157, Marvin Zelkowitz (editor), Elsevier, Inc., 2009.

S. Lu, D. Mountain, and A. HUBBARD, "Is stereocilia velocity or displacement feedback used in the cochlear amplifier?" in *Concepts and Challenges in the Biophysics of Hearing*, p. 297, NP Cooper and DT Kemp (editors), World Scientific, London, 2009.

A. HUBBARD, "Conjoined cochlear models: The TWAMP and the Sandwich," in *Concepts and Challenges in the Biophysics of Hearing*, p. 357, NP Cooper and DT Kemp (editors), World Scientific, London, 2009.

R. S. Stankovic, M. KARPOVSKY, and C. Moraga, "Remarks on Codes, Spectral Transforms, and Decision Diagrams," pp. 226-246, I. Tabush, K. Egiazarian, and M. Gabouj (editors), July 2009.

J. KONRAD, "Motion detection and estimation," in *The Essential Guide to Video Processing*, chapter 3, A. Bovik (editor), Academic Press, 2009.

P. R. KOTIUGA, "Iron Rings, Doctor Honoris Causa Raoul Bott, Carl Herz, and a Hidden Hand," in *A Celebration of the Mathematical Legacy of Raoul Bott (CRM Proceedings and Lecture Notes)*, P. R. Kotiuga (editor), vol. 50, AMS, 2010.

L. LEVITIN and T. TOFFOLI, "A unified bound on the rate of quantum dynamics," in *Quantum Communication, Measurement and Computing*, pp. 13-16, A. Lvovsky (editor), American Institute of Physics, Melville, N.Y., 2009.

A. Agarwal and T. LITTLE, "Opportunistic Networking in Delay Tolerant Vehicular Ad Hoc Networks," in *Advances in Vehicular Ad-Hoc Networks: Developments and Challenges*, M. Watfa (editor), IGI Global, 2009.

S. Guo and T. LITTLE, "Video Delivery in Wireless Sensor Networks," in *Streaming Media Architectures, Techniques, and Applications: Recent Advances*, IGI Global, 2009.

I. PASCHALIDIS, K. Li, and D. Guo, "Model-Free Probabilistic Localization of Wireless Sensor Network Nodes in Indoor Environments," Lecture Notes in *Computer Science*, vol. 5801 (MELT), pp. 66-78, R. Fuller and X. D. Koutsoukos (editors), Springer, 2009.

S. Ray, W. Lai, D. Guo, and I. PASCHALIDIS, "Statistical Location Detection," in *Localization Algorithms and Strategies for Wireless Sensor Networks: Monitoring and Surveillance Techniques for Target Tracking*, pp. 230-257, Guoqiang Mao and Baris Fidan (editors), IGI Global, 2009.

E. Ermis, V. SALIGRAMA, and P. Jodoin, "Information Fusion and

Anomaly Detection with Uncalibrated Cameras" in *Surveillance in Multimedia Information Extraction*, M. Maybury (editor), MIT Press, 2010.

Y. Benezeth, P. Jodoin, and **V. SALIGRAMA**, *"Modeling Patterns of Activity and Detecting Abnormal Events with Low Level Co-Occurrence of Activity,"* in *Distributed Video Sensor Networks,* Bir Bhanu et. al. (editors), Springer, 2010.

Moshe Laifenfeld, **A. TRACHTENBERG**, and **D. STAROBINSKI**, "Robust Localization Using Identifying Codes," in *Localization Algo-rithms and Strategies for Wireless Sensor Networks: Monitoring and Surveillance Techniques for Target Tracking*, Guoqiang Mao and Baris Fidan (editors), 2009.

T. TOFFOLI, "Probability is a lot of logic at once (or, if you don't know which one to pick, take 'em all)," in *Randomness through Computation*, H. Zenil (editor), World Scientific, Spring 2010.

T. TOFFOLI, Foreword to *Simulating Complex Systems by Cellular Automata* (Alfons Hoekstra et al., ed.), Springer, Spring 2010.

Journal Articles

M. ALANYALI, "A Note on Adjusted Replicator Dynamics in Iterated Games," *Journal of Mathematical Economics*, vol. 46, no. 1, pp. 86-98, January 2010.

S. K. Agarwal, M. Laifenfeld, A. Hagedorn, A. Trachtenberg, and **M. ALANYALI**, "Fair and distributed peer-to-peer allocation of a common, refillable resource," *Journal of Parallel and Distributed Computing*, vol. 69, no. 12, pp. 974-988, December 2009.

H. Mutlu, **M. ALANYALI**, and D. Starobinski, "Spot Pricing of Secondary Spectrum Access in Wireless Cellular Networks," *IEEE/ACM Transactions on Networking*, vol. 17, no. 6, pp. 1794-1804, December 2009.

A. A. Yanik, M. Huang, A. Artar, T. Chang, and **H. ALTUG**, "Integrated Nanoplasmonics-Nanofluidics Biosensor with Targeted Delivery of Analyte," *Applied Physics Letters*, vol. 96, article no. 021101, 2010.

S. Aksu, A. Yanik, R. Adato, A. Artar, M. Huang, and **H. ALTUG**, "High-throughput Nanofabrication of Plasmonic Infrared Nano-Antenna Arrays for Vibrational Nanospectroscopy," *Nano Letters*, June 2010.

R. Adato, A. A. Yanik, C-H Wu, G. Shvets, and **H. ALTUG**, "Radiative Engineering of Plasmon Lifetimes in Embedded Nanoantenna Arrays," *Optics Express*, vol. 18, pp. 4526-4537, June 21, 2010.

A. A. Yanik, R. Adato, and **H. ALTUG**, "Design Principles for Optoelectronic Application of Extraordinary Light Transmission Effect in Plasmonic NanoAperture," *Journal of Nanoscience and Nanotechnology*, vol. 10, no. 3, pp. 1713-1718, March 2010.

M. Huang, A. A. Yanik, T. Chang, and **H. ALTUG**, "Sub-wavelength Nanofluidics in Photonic Crystal Sensors" *Optics Express*, vol. 17, no. 26, pp.24224-24233, December 21, 2009.

A. A. Yanik, R. Adato, S. Erramilli, and **H. ALTUG**, "Hybridized Nanocavities as Single-Polarized Plasmonic Antenna," *Optics Express*, vol. 17, no. 23, pp. 20900-20910, November 9, 2009.

A. Artar, A. A. Yanik, and **H. ALTUG** "Fabry-Perot Nanocavities in 3D Plasmonic Crystals for Enhanced Biosensing," *Applied Physics Letters*, vol. 95, article no. 051105, August 6, 2009.

F. Bertazzi, M. Moresco, and **E. BELLOTTI**, "Theory of high field carrier transport and impact ionization in wurtzite GaN Part I: A full band Monte Carlo model," *Journal of Applied Physics*, vol. 106, no. 6, article no. 063718, September 15, 2009.

F. Bertazzi, **E. BELLOTTI**, E. Furno, and M. Goano, "Experimental Electron Mobility in ZnO: A Reassessment Through Monte Carlo Simulation," *Journal of Electronic Materials*, vol. 3, no. 8, pp. 1677-1683, August 2009.

D. D'Orsogna, P. Lamarre, **E. BELLOTTI**, P. E. Barbone, F. Smith, C. Fulk, P. Lovecchio, M. B. Reine, S. P. Tobin, and J. Markunas, "A Novel Stress Characterization Technique for the Development of Low-Stress Ohmic Contacts to HgCdTe," *Journal of Electronic Materials*, vol. 38, no. 8, pp. 1698-1706, August 2009.

M. Penna, A. Marnetto, F. Bertazzi, **E. BELLOTTI**, and M. Goano, "Empirical Pseudopotential and Full-Brillouin-Zone k center dot p Electronic Structure of CdTe, HgTe, and Hg1-xCdxTe," *Journal of Electronic Materials*, vol. 38, no. 8, pp. 1717-1725, August 2009.

P. Lamarre, C. Fulk, D. D'Orsogna, **E. BELLOTTI**, F. Smith, P. LoVecchio, M.B. Reine, T. Parodos, J. Marciniec, S.P. Tobin, and J. Markunas, "Characterization of Dislocations in HgCdTe Heteroepitaxial Layers Using a New Substrate Removal Technique," *Journal of Electronic Materials*, vol. 38, no. 8, pp. 1746-1754, August 2009.

C. Hopper, **I. BIGIO**, et al., "Head & Neck Optical Diagnostics: Vision of the Future of Surgery," *Head and Neck Oncology*, vol. 1, no. 25, July 2009.

Y. Zhu, T. Fearn, G. Mackenzie, B. Clark, J. M. Dunn, **I. BIGIO**, S. G. Bown, and L. B. Lovat, "Elastic scattering spectroscopy for detection of cancer risk in Barrett's esophagus: experimental and clinical validation of error removal by orthogonal subtraction (EROS) for increasing the accuracy," *Journal of Biomedical Optics*, vol. 14, no. 4, article no. 044022, August 11, 2009.

C. S. Mulvey, C. A. Sherwood, and **I. BIGIO**, "Wavelength-dependent backscattering measurements for quantitative real-time monitoring of apoptosis in living cells," *Journal of Biomedical Optics*, vol. 14, no. 6, article no. 064013, November 16, 2009.

M. R. S. Keshtgar, D. W. Chicken, M. R. Austwick, S. K. Somasundaram, C. A. Mosse, Y. Zhu, **I. BIGIO**, and S. G. Bown, "Optical scanning for rapid intraoperative diagnosis of sentinel node metastases in breast cancer," *British Journal of Surgery*, vol. 97, no. 7095, June 2010.

R. BROWER, Marko Djuri, and Chung-I Tan, "Odderon in Gauge/String Duality," *Journal of High Energy Physics,* vol. JHEP 07 (2009), no. 063, July 17, 2009.

R. BROWER, Horatiu Nastase, Howard J. Schnitzer, and Chung-I Tan. "Analyticity for Multi-Regge Limits of the Bern-Dixon-Smirnov Amplitudes," *Nuclear Physics B*, vol. 822, no. 1-2, pp. 301-347, November 21, 2009.

M. A. Clark, R. Babich, K. Barros, **R. BROWER**, and C. Rebbi, "Solving Lattice QCD systems of equations using mixed precision solvers on GPUs," *Computer Physics Communications*, December 21, 2009.

Thomas Appelquist, Adam Avakian, Ron Babich, **R. BROWER**, Michael Cheng, Michael A. Clark, Saul D. Cohen, George T. Fleming, Joseph Kiskis, Ethan T. Neil, James C. Osborn, Claudio Rebbi, David Schaich, and Pavlos Vranas, "Toward TeV Conformality," *Physical Review Letters*, vol. 104, no. 7, article no. 071601, February 19, 2010.

S. Keene and **J. CARRUTHERS**, "Collision and Fade Localization within Packets for Wireless LANs," *Wireless Personal Communications*, Springer, August 2009.

J. Mao and **C. CASSANDRAS**, "On-line Optimal Control of a Class of Discrete Event Systems with Real-Time Constraints," *Journal of Discrete Event Dynamic Systems*, vol. 20, no. 2, pp. 187-213, 2010.

C. CASSANDRAS, "The Lighter Side of Reviewing, Editing, and Research in General," *IEEE Transactions on Automatic Control*, vol. 54, no. 12, pp. 2729-2731, December 2009.

D. CASTAÑÓN and J. Wohletz, "Model Predictive Control for Stochastic Resource Allocation," *IEEE Transactions on Automatic Control*, vol. 54, no. 8, pp. 1739-1750, August 2009.

A. Isoyan, F. Jiang, Y. C. Cheng, **F. CERRINA**, P. Wachulak, L. Urbanski, J. Rocca, C. Menoni, and M. Marconi, "Talbot lithography: Self-imaging of complex structures," *Journal of Vacuum Science & Technology B*, vol. 27, pp. 2931-2937, November 2009.

O. D. Negrete, M. S. Onses, P. F. Nealy, and **F. CERRINA**, "In situ synthesis and direct immobilization of ssDNA on electron beam patterned hydrogen silsesquioxane," *Journal of Vacuum Science & Technology B*, vol. 27, pp. 3082-3087, November 2009.

A. COSKUN, Tajana Simunic Rosing, and Kenny Gross. "Utilizing Predictors for Efficient Thermal Management in Multiprocessor SoCs," *IEEE Transactions on Computer Aided Design*, vol. 28, no. 10, pp. 1503-1516, October 2009.

S. Yerci, R. Li, S. O. Kucheyev, T. van Buuren, S. N. Basu, and **L. DAL NEGRO**, "Energy transfer and 1.54 μm emission in amorphous silicon nitride films," *Applied Physics Letters*, vol. 95, article no. 031107, July 22, 2009.

R. Li, S. Yerci, and **L. DAL NEGRO**, "Temperature dependence of the energy transfer from amorphous silicon nitride to Er ions," *Applied Physics Letters*, vol. 95, article no. 041111, July 29, 2009.

A. Gopinath, S. Boriskina, R. Presamiri, L. Ziegler, B.M. Reihard, and **L. DAL NEGRO**, "Plasmonic nanogalaxies: multi-scale aperiodic arrays for Surface enhanced Raman sensing," *Nano Letters*, vol. 9, no. 11, pp. 3922-3929, September 15, 2009.

C. Forestiere, G.F. Walsh, G. Miano, and **L. DAL NEGRO**, "Nano-plasmonics of prime number arrays," *Optics Express*, vol. 17, no. 26, pp. 24288-24303, December 21, 2009.

C. Forestiere, M. Donelli, G.F. Walsh, E. Zeni, G. Miano, and **L. DAL NEGRO**, "Particle-swarm optimization of broadband nano-plasmonic arrays," *Optics Letters*, vol. 35, no. 2, pp. 133-135, January 15, 2010.

Y. Gong, S. Yerci, R. Li, **L. DAL NEGRO**, and J. Vuckovic, "Enhanced light emission from Erbium doped silicon nitride in plasmonic metal-insulator-metal structures," *Optics Express*, vol. 17, no. 23, pp. 20642-20650, October 26, 2009.

J. Amsden, H. Perry, S. Boriskina, A. Gopinath, D. Kaplan, **L. DAL NEGRO**, and F. Omenetto, "Spectral analysis of induced color change on periodically nanopatterned silk films," *Optics Express*, vol. 17, no. 23, pp. 21271-21279, November 6, 2009.

J. Amsden, P. Domachuk, A. Gopinath, R. White, **L. DAL NEGRO**, D. Kaplan, and F. Omenetto, "Rapid nanoimprinting of silk fibroins films for biophotonic applications," *Advanced Materials,* vol. 22, no. 15, April 18, 2010.

M. Makarova, Y. Gong, S. Cheng, Y. Nishi, S. Yerci, R. Li, **L. DAL NEGRO**, and J. Vuckovic, "Photonic crystal and plasmonic silicon based light sources," *IEEE Journal of Quantum Electronics*, vol. 16, no. 1, pp. 132-140, January/February 2010.

S. Yerci, R. Li, S. O. Kucheyev, A. Van Buuren, S. N. Basu, and **L. DAL NEGRO**, "Visible and 1.54 mm emission from amorphous silicon nitride films by reactive co-sputtering," *IEEE Journal of Quantum Electronics*, vol. 16, no. 1, pp. 114-123, January/February 2010.

S. Boriskina and **L. DAL NEGRO**, "Multiple-wavelength plasmonic nano-antennas," *Optics Letters*, vol. 35, no. 4, pp. 538-540, February 11, 2010.

A. Gopinath, S. V. Boriskina, S. Selcuk, R. Li, and **L. DAL NEGRO**, "Enhancement of the 1.55μm Erbium3+ emission from quasi-periodic plasmonic arrays," *Applied Physics Letters*, vol. 96, no. 7, article no. 071113, February 19, 2010.

Y. Gong, M. Makarova, S. Yerci, R. Li, M. J. Stevens, B. Baek, S. W. Nam, R. H. Hadfield, S. N. Dorenbos, V.l Zwiller, J. Vuckovic, and **L. DAL NEGRO**, "Linewidth narrowing and Purcell enhancement in photonic crystal cavities on an Er-doped silicon nitride platform," *Optics Express,* vol. 18, no. 3, pp. 2601-2612, January 25, 2010.

G. Shambat, Y. Gong, J. Lu, S. Yerci, R. Li, **L. DAL NEGRO**, and J. Vuckovic, "Coupled fiber taper extraction of 1.53μm photoluminescence from erbium doped silicon nitride photonic crystals cavities," *Optics Express*, vol. 18, no. 6, pp. 5964-5973, March 10, 2010.

Y. Gong, M. Makarova, S. Yerci, R. Li, M. J. Stevens, B. Baek, S. Woo Nam, **L. DAL NEGRO**, and J. Vuckovic, "Observation of Transparency of Erbium-doped Silicon nitride in photonic crystal nanobeam cavities," *Optics Express*, vol. 18, no. 13, pp. 13863-13873, June 14, 2010.

B. Sukhwani and **M. HERBORDT**, "FPGA Acceleration of Rigid Molecule Docking Codes," *IET Computers and Digital Techniques*, vol. 4, no. 3, pp. 184-195, 2010.

Z. Li, **P. ISHWAR**, and **J. KONRAD**, "Video condensation by ribbon carving," *IEEE Transactions on Image Processing*, vol. 18, pp. 2572-2583, November 2009.

E. Masry and **P. ISHWAR**, "Field Estimation from Randomly Located, Binary Noisy Sensors," *IEEE Transactions on Information Theory,* vol. 55, no. 11, pp. 5197-5210, November 2009.

A. Kumar, **P. ISHWAR**, and K. Ramchandran, "Dithered A/D Conversion of Smooth Non-Bandlimited Signals," *IEEE Transactions on Signal Processing*, vol. 58, no. 5, pp. 2654-2666.

I. Stojanovic and **W. C. KARL**, "Imaging of moving targets with multistatic SAR using an overcomplete dictionary," *Journal of Selected Topics in Signal Processing*, vol. 4, no. 1, pp. 164-176, February 2010.

L. He, B. Orten, S. Do, **W. C. KARL**, A. Kambadakone, D. Sahani, and H. Pien, "A Spatio-Temporal Deconvolution Method to Improve Perfusion CT Quantification," *IEEE Transactions on Medical Imaging*, vol. 29, no. 5, pp. 1182-1191, May 2010.

Z. Li, P. Ishwar, and **J. KONRAD**, "Video condensation by ribbon carving," *IEEE Transactions on Image Processing*, vol. 18, no. 11, pp. 2572-2583, November 2009.

P. R. KOTIUGA, "A dictionary for defining key concepts in plasma physics in terms of Clebsch charts in contact geometry," *American Mathematical Society*, abstract no. 1056-57-1313, September 21, 2009.

Y. Rykalova, **L. LEVITIN**, and R. Brower, "Critical phenomena in

discrete-time interconnection networks," *Physica A: Statistical Mechanics and its Applications*, June 28, 2010.

L. LEVITIN and T. Toffoli, "Fundamental Limit on the Rate of Quantum Dynamics: The Unified Bound Is Tight," *Physical Review Letters*, vol. 103, no. 16, article no. 160502, October 13, 2009.

M. MAZUMDER, P. K. Srirama, R. Sharma, A. S. Biris, I. Hidetaka, S. Trigwell, and M. Horenstein, "Lunar and Martian Dust Dynamics: Electrostatic, Thermal and Gravitational Transport Mechanisms," *IEEE/IAS Magazine*, June 2010.

Hidetaka Ishihara, Jacob P. Bock, Rajesh Sharma, Franklin Hardcastle, Ganesh K. Kannarpady, and **M. MAZUMDER**, "Electrochemical Synthesis of Titania Nanostructural Arrays and their Surface Modification for Enhanced Photoelectrochemical Hydrogen Production," *Chemical Physics Letters*, vol. 489, no. 1-3, April 1, 2010.

R. S. Quimby, R. L. Shubochkin, and **T. MORSE**, "High quantum efficiency of near-infrared emission in bismuth doped AlGeP-silica fiber," *Optics Letters*, vol. 34, no. 20, October 15, 2009.

R. S. Quimby, R. L. Shubochkin, and **T. MORSE**, "Highly efficient 1300 nm emission in bismuth doped AlGeP- silica fiber," *Advances in Optical Materials, OSA Technical Digest,* paper no. AThD4, October 11, 2009.

Spilios Riyopoulos and **T. MOUSTAKAS**, "One-dimensional carrier localization and effective quantum wire behavior in two-dimensional quantum wedges," *Journal of Applied Physics*, vol. 106, no. 4, article no. 044303, August 19, 2009.

J. Henson, J. C. Heckel, E. Dimakis, J. Abell, A. Bhattacharyya, G. Chumanov, **T. MOUSTAKAS**, and R. Paiella, "Plasmon Enhanced Light Emission from InGaN Quantum Wells via Coupling to Chemically Synthesized Silver Nanoparticles," *Applied Physics Letters*, vol. 95, no. 15, article no. 151109, October 15, 2009.

Y. Liao, C. Thomidis, C-k Kao, A. Moldawer, W. Zhang, Yi-Chung Chang, A. Yu Nikiforov, E. Bellotti, and **T. MOUSTAKAS**, "Milliwatt power AlGaN-based deep ultraviolet LEDs by plasma-assisted MBE," *Physica Status Solidi - Rapid Research Letters*, vol. 4, no. 1-2, pp. 49-51, February 2010.

S. H. Roy, M. S. Cheng, S. S. Chang, J. Moore, G. De Luca, **S. H. NAWAB**, and C. J. De Luca, "A combined sEMG and accelerometer system for monitoring functional activity in stroke," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 17, no. 6, pp. 585-594, December 31, 2009.

S. H. NAWAB, S. S. Chang, and C. J. De Luca, "High-yield decomposition of surface EMG signals," *Clinical Neurophysiology*, December 2009.

M. Zettergren, J. Semeter, B. Burnett, C. Heinselman, P. L. Blelly, **W. OLIVER**, and M. Diaz, "Dynamic variability in F-region ionospheric composition at auroral boundaries," *Annales Geophysicae*, vol. 28, article no. 651664, February 25, 2010.

J. Yin and **R. PAIELLA**, "Multiple-Junction Quantum Cascade Photodetectors for Thermophotovoltaic Energy Conversion," *Optics Express*, vol. 18, no. 2, pp. 1618-1629, January 13, 2010.

J. Henson, J. DiMaria, and **R. PAIELLA**, "Influence of Nanoparticle Height on Plasmonic Resonance Wavelength and Electromagnetic Field Enhancement in Two-Dimensional Arrays," *Journal of Applied Physics*, vol. 106, no. 9, article no. 093111, November 13, 2009.

J. Henson, J. C. Heckel, E. Dimakis, J. Abell, A. Bhattacharyya, G. Chumanov, T. Moustakas, and **R. PAIELLA**, "Plasmon Enhanced Light Emission from InGaN Quantum Wells via Coupling to Chemically Synthesized Silver Nanoparticles," *Applied Physics Letters*, vol. 95, no. 15, article no. 151109, October 15, 2009.

P. Pennesi and **I. PASCHALIDIS**, "A Distributed Actor-Critic Algorithm and Applications to Mobile Sensor Network Coordination Problems," *IEEE Transactions on Automatic Control*, vol. 55, no. 2, pp. 492-497, February 2010.

I. PASCHALIDIS, W. Lai, and X. Song, "Optimized Scheduled Multiple Access Control for Wireless Sensor Networks," I*EEE Transactions on Automatic Control*, vol. 54, no. 11, pp. 2573-2585, November 2009.

I. PASCHALIDIS and D. Guo, "Robust and Distributed Stochastic Localization in Sensor Networks: Theory and Experimental Results," *ACM Transactions on Sensor Networks*, vol. 5, no. 4, pp. 34:1-34:22, November 2009.

J. W. Nicholson, J. M. Fini, A. M. DeSantolo, E. Monberg, F. DiMarcello, J. Fleming, C. Headley, D. J. DiGiovanni, S. Ghalmi, and **S. RAMACHANDRAN**, *Optics Express*, vol. 18, no. 17, p. 17651-17657, August 2, 2010.

S. RAMACHANDRAN, P. Kristensen, and M. F. Yan, "Generation and propagation of radially polarized beams in optical fibers," *Optics Letters*, vol. 34, no. 16, p. 2525-2527, August 14, 2009.

E. Ermis and **V. SALIGRAMA**, "Distributed Detection for Multi-Modal Limited Range Sensors," *IEEE Transactions on Signal Processing*, vol. 58, no. 2, February 2010.

J. SEMETER, M. Zettergren, B. Burnett, C. Heinselman, P. L. Blelly, W. Oliver, and M. Diaz, "Dynamic variability in F-region ionospheric composition at auroral arc boundaries," *Annales Geophysicae*, vol. 28, article no. 651664, February 25, 2010.

T. W. Butler, **J. SEMETER**, C. J. Heinselman, and M. J. Nicolls, "Imaging F-region drifts using monostatic phased-array incoherent scatter radar," *Radio Science*, vol. 45, June 21, 2010.

D. S. Simon and **A. SERGIENKO**, "The Correlated Confocal Microscope," *Optics Express* vol. 18, no. 10, pp. 9765-9779, April 26, 2010.

D. S. Simon and **A. SERGIENKO**, "Spatial Dispersion Cancellation in Quantum Interferometry," *Physical Review A*, vol. 80, no. 5, article no. 053813, November 10, 2009.

N. Mohan, O. Minaeva, G. N. Goltsman, M. F. Saleh, M. B. Nasr, **A. SERGIENKO**, B. E. A. Saleh, and M. Teich, "Ultra-Broadband Coherence-Domain Imaging Using Parametric Downconversion and Superconducting Single-Photon Detectors at 1064 nm," *Applied Optics*, vol. 48, no. 20, pp. 4009-4017, July 8, 2009.

H. Mutlu, M. Alanyali, and **D. STAROBINSKI**, "Spot Pricing of Secondary Spectrum Access in Wireless Cellular Networks," *IEEE/ACM Transactions on Networking*, vol. 17, no. 6, pp. 1794-1804, December 2009.

R. Cohen, N. Fazlollahi, and **D. STAROBINSKI**, "Path Switching and Grading Algorithms for Advanced Channel Reservation Architectures," *IEEE/ACM Transactions on Networking*, vol. 17, no. 5, pp. 1684-1695, October 2009.

M. Laifenfeld, A. Trachtenberg, R. Cohen, and **D. STAROBINSKI**, "Joint Monitoring and Routing in Wireless Sensor Networks using Robust Identifying Codes," *Springer Journal on Mobile Networks and Applications (MONET),* vol. 14, no. 4, pp. 415-432, August 2009.

D. STAROBINSKI and W. Xiao, "Asymptotically Optimal Data Dissemination in Multichannel Wireless Sensor Networks: Single Radios Suffice," *IEEE/ACM Transactions on Networking*, vol. 18, no. 3, pp. 695-707, June 2010.

C. Metzger, S. C. Remi, M. Liu, S. V. Kusminskiy, A. H. Castro-Neto, **A. SWAN**, and B. B. Goldberg, "Biaxial Strain in Graphene Adhered to Shallow Depressions," *Nano Letters*, vol. 10, no. 1, pp. 6-10, 2010.

J. Carmona, J. Cortadella, M. Kishinevsky, and **A. TAUBIN**, "Elastic Circuits (Keynote Paper)," *IEEE Transactions Computer-Aided Design of Integrated Circuits and Systems*, vol. 28, no. 10, pp. 1437-1455, October 2009.

J. Cortadella and **A. TAUBIN**, "Guest Editorial: Special Section on Asynchronous Circuit and Systems," *IEEE Transactions on Very Large Scale Integration (VLSI) System*, vol. 17, no. 7, July 2009.

N. Mohan, O. Minaeva, G. N. Goltsman, M. F. Saleh, M. B. Nasr, A. V. Sergienko, B. E. A. Saleh, and **M. TEICH**, "Ultrabroadband coherence-domain imaging using parametric downconversion and superconducting single-photon detectors at 1064 nm," *Applied Optics*, vol. 48, no. 20, pp. 4009-4017, July 8, 2009.

N. Mohan, I. Stojanovic, W. C. Karl, B. E. A. Saleh, and **M. TEICH**, "Compressed Sensing in Optical Coherence Tomography," *SPIE Proceedings Vol. 7570 (Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XVII)*, edited by J. A. Conchello, C. J. Cogswell, T. Wilson, and T. G. Brown, article no. 75700L, February 24, 2010.

T. TOFFOLI, "Lattice-gas vs cellular automata: the whole story at last," *Journal of Cellular Automata*, vol. 4, no. 4, pp. 267-292, July/August 2009.

B. L. Levitan and **T. TOFFOLI**, "The fundamental limit on the rate of quantum dynamics: the unified bound is tight," *Physics Review Letters*, vol. 103, article no. 160502, October 16, 2009.

S. Capobianco and **T. TOFFOLI**, "Dissipative CA computation without power sources?" *Journal of Cellular Automata*, vol. 5, no. 3, pp. 169-183, 2010.

T. TOFFOLI, "Conceptual background for the QUAD Prize", *Journal of Cellular Automata*, vol. 5, no. 4/5, pp. 409-414, 2010.

T. TOFFOLI, Postscript to "Challenges in cellular automata theo-

ry," *Journal of Cellular Automata*, Andrew Adamatzky et al, vol. 5, no. 4/5, pp. 405-407, 2010.

Moshe Laifenfeld, **A. TRACHTENBERG**, Reuven Cohen, and D. Starobinski, "Joint Monitoring and Routing in Wireless Sensor Networks using Robust Identifying Codes," *Springer Journal on Mobile Networks and Applications (MONET)*, vol. 14, no. 4, pp. 415-432, August 2009.

S. Agarwal, M. Laifenfeld, A. Hagedorn, **A. TRACHTENBERG**, and M. Alanyali, "Fair and distributed peer-to-peer allocation of a common, refillable resource," *Journal of Parallel and Distributed Computing*, vol. 69, no. 12, December 2009.

F. H. Koklu and **M. S. ÜNLÜ**, "Subsurface microscopy of interconnect layers of an integrated circuit," *Optics Letters*, vol. 35, no. 2, p. 184, January 15, 2010.

E. Ozkumur, C. Lopez, A. Yalcin, J. H. Connor, M. Chiari, and **M. S. ÜNLÜ**, "Spectral Reflectance Imaging for a Multiplexed, High-Throughput, Label-Free, and Dynamic Biosensing Platform," *IEEE Journal of Selected Topics in Quantum Electronics*, vol. 16, no. 3, pp. 635-636, May/June 2010.

E. Ozkumur, S. Ahn, A. Yalcin, C. Lopez, E. Cevik, R. Irani, C. DeLisi, M. Chiari, and **M. S. ÜNLÜ**, "Label-free microarray imaging for direct detection of DNA hybridization and single-nucleotide mismatches," *Biosensors and Bioelectronics*, vol. 25, no. 7, pp. 1789-1795, March 15, 2010.

E. Ozkumur, A. Yalcin, M. Cretich, C. Lopez, D. A. Bergstein, B. B. Goldberg, M. Chiari, and **M. S. ÜNLÜ**, "Quantification of DNA and protein adsorption by optical phase shift," *Biosensors and Bioelectronics*, vol. 25, pp. 167-172, September 2009.

C. Joo, E. Ozkumur, **M. S. ÜNLÜ**, and J. F. de Boer, "Spectral-domain optical coherence phase microscopy for label-free multiplexed protein microarray assay," *Biosensors and Bioelectronics*, vol. 25, no. 2, pp. 275-281, October 15, 2009.

Conference Papers

M. ALANYALI and M. Dashouk, "On fair sharing of spectrum via CSMA," *47th Allerton Conference on Communications, Control and Computing*, September 2009.

A. Al Daoud, **M. ALANYALI**, and D. Starobinski, "Reservation Policies for Revenue Maximization from Secondary Spectrum Access in Wireless Cellular Networks," *4th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks*, June 2010.

R. Adato, A. A. Yanik, J. Amsden, D. Kaplan, F. Omenetto, M. Hong, S. Erramilli, and **H. ALTUG**, "Ultrasensitive vibrational spectroscopy of proteins with Plasmonics," *Gordon Research Conference Plasmonics*, June 2010.

A. A. Yanik, M. Huang, A. Artar, and **H. ALTUG**, "Overcoming mass transport limitation with integrated nanoplasmonics-nanofluidics biosensors," *Gordon Research Conference Plasmonics*, June 2010.

H. ALTUG, A. A. Yanik, M. Huang, and A. Artar. "Lift-off Free Nanofabrication of Suspended Plasmonic Nanohole Arrays To Overcome Mass-Transport Limitations in Biosensors," *Electron, Ion and Photon Beam Technology and Nanofabrication Conference* (EIPBN), June 2010.

H. ALTUG, R. Adato, and A. A. Yanik. "Zeptomol Level Vibrational Spectroscopy of Proteins in Lithographically Engineered Plasmonic Nano-antenna Arrays," *Electron, Ion and Photon Beam Technology and Nanofabrication Conference* (EIPBN), June 2010.

A. A. Yanik, M. Huang, A. Artar, T-Y Chang, and **H. ALTUG**, "On-Chip Nanoplasmonic-Nanofluidic Biosensors Overcoming Mass Transport Limitations," *Conference on Lasers and Electro-Optics* (CLEO), May 2010.

M. Huang, A. A. Yanik, T-Y Chang, and **H. ALTUG**, "Sub-wavelength nano-fluidics on suspended photonic crystal sensors," *Conference on Lasers and Electro-Optics* (CLEO), May 2010.

R. Adato, A. A. Yanik, J. Amsden, D. Kaplan, F. Omenetto, M. Hong, S. Erramilli, and **H. ALTUG**, "Ultra-sensitive Infrared Spectroscopy of Proteins with Collective Excitations of Nanoplasmonic Arrays," *Conference on Lasers and Electro-Optics* (CLEO), May 2010.

A. Artar, A. A. Yanik, and **H. ALTUG**, "Light Tunneling in Multi-Layered Photonic-Plasmonic Nanostructures," *Conference on Lasers and Electro-Optics* (CLEO), May 2010.

H. ALTUG, R. Adato, and A. A. Yanik, "A New Plasmonic Tool for

Bimolecular Analysis: Collectively Enhanced Infrared Absorption Spectroscopy," *Functionalized Plasmonic Nanostructures for Biosensing Workshop* organized by ETH, April 2010.

A. A. Yanik, R. Adato, S. Erramilli, and **H. ALTUG**, "Hybridized Plasmonic Excitations in Complex Nanocavities and Development of An Single-Polarized Antenna Array," *Materials Research Society* (MRS), April 2010.

R. Adato, A. A. Yanik, J. Amsden, D. Kaplan, F. Omenetto, M. Hong, S. Erramilli, and **H. ALTUG**, "Surface Enhanced Vibrational Spectroscopy of Proteins with Plasmonic Nanoantenna Arrays," *Materials Research Society* (MRS), April 2010.

A. Artar, A. A. Yanik, and **H. ALTUG**, "Plasmonic Couplings in Multi-Layered Nanohole and Nanoparticle Arrays," *Materials Research Society* (MRS), April 2010.

A. A. Yanik, M. Huang, A. Artar, T-Y Chang, and **H. ALTUG**, "On-Chip Nanoplasmonic Biosensors with Actively Controlled Nanofluidic Surface Delivery," *American Physics Society* (APS), March 2010.

R. Adato, A. A. Yanik, J. Amsden, D. Kaplan, F. Omenetto, M. Hong, S. Erramilli, and **H. ALTUG**, "Plasmonic nanoantenna arrays for surface enhanced vibrational spectroscopy of proteins," *American Physics Society* (APS), March 2010.

A. Artar, A. A. Yanik, and **H. ALTUG**, "Plasmonic Biosensors based on Multi-Layered Metallodielectric Nanostructures," *American Physics Society* (APS), March 2010.

S. Erramilli, R. Adato, A. Gabel, A. A. Yanik, **H. ALTUG**, and M. Hong, "Nonlinear nonlocal infrared plasmonic arrays for pump-probe studies on protein monolayers," *American Physics Society* (APS), March 2010.

S. Aksu and **H. ALTUG**, "Optical Transmission through Optically Thin and Thick Sub-wavelength Hole Arrays," *Materials Research Society Symposium Proceedings Volume 1208E 1208-O18-28*, November-December 2009.

R. Adato, A. A. Yanik, J. J. Amsden, D. L. Kaplan, F. G. Omenetto, M. K. Hong, S. Erramilli, and **H. ALTUG**, "Ultra-sensitive Vibrational Spectroscopy of Protein Monolayers with Plasmonic Nanoantenna Arrays," *Proceedings of the National Academy of Sci-ences of the United States of America*, vol. 106, no. 46, pp. 19227-19232, October 30, 2009.

A. Artar, A. Yanik, and **H. ALTUG**, "Fabry-Perot Nanocavities in Multi-Layered Plasmonic Crystals for Enhanced Biosensing," *Materials Research Society* (MRS), December 2009.

A. Artar, A. A. Yanik, and **H. ALTUG**, "Fabry-Perot Nanocavities in 3-D Plasmonic Crystals," *Frontiers In Optics (FiO) Optical Society of America*, October 2009.

A. A. Yanik, R. Adato, S. Erramilli, and **H. ALTUG**, "Creation of Hybridized Plasmonic Excitations in Nanocavities through Surface Propagating Plasmons," *Frontiers In Optics (FiO) Optical Society of America*, October 2009.

A. A. Yanik, R. Adato, and **H. ALTUG**, "Surface Excitation of Hybridized Plasmons In Metallic Nanocavities," *IEEE Photonics Conference*, October 2009.

R. Adato, A. A. Yanik, and **H. ALTUG**, "Sharp Plasmon Resonances in Periodic Arrays of Embedded Nanorods," *IEEE Photonics Conference*, October 2009.

A. Artar, A. A. Yanik and **H. ALTUG**, "Fabry-Perot Nanocavities in Multi-layered Plasmonic Crystals," *IEEE Photonics Conference*, October 2009.

A. A. Yanik, R. Adato, S. Erramilli, and **H. ALTUG**, "Plasmon hybridization in nanoapertures for development of an efficient nanoantenna array," *SPIE NanoScience + Engineering Conference*, August 2009.

M. Moresco, M. Penna, F. Bertazzi, M. Goano, and **E. BELLOTTI**, "Full-Band Monte Carlo Simulation of HgCdTe APDs," *Proceedings of the 2009 U.S. Workshop on the Physics and Chemistry of II-VI Materials*, October 2009.

M. Moresco, A. Zononi, D. D'Orsogna, P. Lamarre, and **E. BELLOTTI**, "Proceedings of the 3-D Numerical Analysis of HgCdTe Planar Pixel Arrays," *2009 U.S. Workshop on the Physics and Chemistry of II-VI Materials*, October 2009.

E. Furno, M. Penna, S. Chiaria, M. Goano, and **E. BELLOTTI**, "Electronic and Optical Properties of ZnO/MgxZn1-xO and ZnO/BexZn1-xO Quantum Wells," *2009 U.S. Workshop on the Physics and Chemistry of II-VI Materials*, October 2009.

E. BELLOTTI and R. Paiella, "Numerical Simulation of ZnO-Based Terahertz Quantum Cascade Lasers," *Proceedings of the 2009 U.S. Workshop on the Physics and Chemistry of II-VI Materials*, October 2009.

Y. Liao, C. Thomidis, C. Kao, **E. BELLOTTI**, and T. Moustakas, "Deep Ultraviolet LEDs based on AlGaN alloys by Plasma-assisted Molecular Beam Epitaxy," *IEEE Conference on Lasers and Electro-Optics*, May 2010.

S. Joshi, A. Ergin, M. Wang, and **I. BIGIO**, "Optical Detection and Quantification of Blood Brain Barrier Disruption In-Vivo," *Digest: Annual Meeting of the American Society of Anesthesiologists*, October 2009.

M. Austwick, J. Woodhams, C. A. Mosse, Y. Jiao, V. Chalau, A. J. MacRobert, **I. BIGIO**, and S. G. Bown, "Measurements of clinically relevant in-vivo concentration of a photosensitizer using Optical Pharmacokinetics and correlations with PDT necrosis," *Proceedings of SPIE 7577*, January 2010.

J. E. Rosen, H. Suh, O. A'amar, and **I. BIGIO**, "Design, conduct and challenges of a clinical trial utilizing elastic light scattering spectroscopy in thyroid lesions," *Proceedings of SPIE 7577*, January 2010.

J. Y. Zhang, A. Ergina, K. L. Andkena, C. Shengb, and **I. BIGIO**, "Design of a Dynamic Optical Tissue Phantom to Model Extravasation Pharmacokinetics," *Proceedings of SPIE 7567-18*, January 2010.

K. J. Schoener, L. Cervia, and **I. BIGIO**, "Novel Cooled Sliding Chamber Elucidates Origins of Action Potential Modulated Birefringence," *Digest OSA Topical Meeting Biomedical Optics,* April 2010.

A. Ergin, M. Wang, J. Zhang, S. Joshi**,** and **I. BIGIO**, "Improved methods for optical determination of uptake of dye in vivo rabbit brain and in vitro tissue phantoms," *Digest OSA Topical Meeting Biomedical Optics,* April 2010.

R. Babich, J. Brannick, **R. BROWER**, M. Clark, S. Cohen, J. Osborn, and C. Rebbi, "The role of multigrid algorithms for LQCD," *XVII International Symposium on Lattice Field Theory*, July 2009.

M. Di Pierro, M. Clark, C. Jun, J. Osborn, J. Negele , **R. BROWER**, S. Gottlieb, and Y. Zhong, "Visualization as a tool for understanding QCD evolution algorithms," *Journal of Physics Conference Series*, 2009.

T. Appelquist, A. Avakian, R. Babich, **R. BROWER**, M. Cheng, M. Clark, S. Cohen, G. Fleming, J. Kiskis, E. Neil, J. Osborn, C. Rebbi, D. Schaich, and P. Vranas, "Lattice study of ChPT beyond QCD," *6th International Workshop on Chiral Dynamics*, 2009.

R. BROWER, M. Djuric, and C. Tan, "Elastic and Diffractive Scattering after AdS/CFT," *13th International Conference on Elastic and Diffractive Scattering (Blois Workshop) - Moving Forward into the LHC Era,* July 2009.

C. Yao and **C. CASSANDRAS**, "Perturbation Analysis and Resource Contention Games in Multiclass Stochastic Fluid Models," *3rd IFAC Conference on Analysis and Design of Hybrid Systems*, September 2009.

C. CASSANDRAS, "Sensor Networks and Cyber-Physical Systems," *IEEE CSS-UAE Workshop*, November 2009.

I. Paschalidis and **C. CASSANDRAS**, "Wireless Sensor Networks for Localization and Coverage Control," *DOE NNSA University and Industry Technical Interchange Review Meeting*, December 2009.

M. Zhong and **C. CASSANDRAS**, "Asynchronous Distributed Optimization with Minimal Communication and Connectivity Preservation," *Proceedings of the 48th IEEE Conference on Decision and Control*, December 2009.

X. Ning and **C. CASSANDRAS**, "On Maximum Lifetime Routing in Wireless Sensor Networks," *Proceedings of the 48th IEEE Conference on Decision and Control*, December 2009.

C. Yao and **C. CASSANDRAS**, "Perturbation Analysis and Optimization of Multiclass Multiobjective Stochastic Flow Models," *Proceedings of the 48th IEEE Conference on Decision and Control*, December 2009.

A. Kebarighotbi and **C. CASSANDRAS**, "Revisiting the Optimality of the c-rule with Stochastic Flow Models," *Proceedings of the 48th IEEE Conference on Decision and Control*, December 2009.

K. Rohloff, P. Pal, M. Atighetchi, R. Schantz, K. Trivedi, and **C. CASSANDRAS**, "Approaches to Modeling and Simulation for Dynamic, Distributed Cyber-Physical Systems," *Proceedings of the Workshop on Grand Challenges in Modeling, Simulation, and Analysis for Homeland Security*, March 2010.

M. C. Caramanis, **C. CASSANDRAS,** T. Little, and I. Paschalidis, "The Cyber-Physical Electric Power Generation-Delivery-Consumption Platform: Research Challenges for Optimal Investment Tradeoffs Between the Platform's Cyber and Physical Components," *Proceedings of the NSF-DOE-NIST Workshop on the Smart Grid,* June 2010.

C. CASSANDRAS, "Cooperative Control and Optimization in an Uncertain Asynchronous Wireless Networked World," *18th IEEE Mediterranean Conference on Control and Automation*, June 2010.

D. CASTAÑÓN and E. Rodriguez Diaz, "Support Vector Machine Classifiers for Sequential Decision Problems," *Proceedings of the 2009 Conference on Decision and Control*, December 2009.

E. Rodriguez Diaz, I. Bigio, S. Singh, and **D. CASTAÑÓN**, "Spectroscopically-Guided Forceps for Real-Time Classification of Colonic Polyps," *Digestive Disease Week*, May 2010.

D. Hitchings and **D. CASTAÑÓN**, "Receding Horizon Stochastic Control Algorithms for Sensor Management," *2010 American Control Conference*, June 2010.

R. Kumar and **D. CASTAÑÓN**, "Modeling and Tracking of Public Transit in Urban Environments," *2010 American Control Conference*, June 2010.

A. COSKUN, David Atienza, Tajana Rosing, Thomas Brunschwiler, and Bruno Michel. "Energy-Efficient Variable-Flow Liquid Cooling in 3D Stacked Architectures," *Proceedings of Design Automation and Test in Europe* (DATE), March 2010.

Priti Aghera, Dilip Krishnaswamy, Diana Fang, **A. COSKUN**, and Tajana Rosing, "DynAHeal: Dynamic Energy Efficient Task Assignment for Wireless Healthcare Systems," in *Proceedings of Design Automation and Test in Europe* (DATE), March 2010.

Shervin Sharifi, **A. COSKUN**, and Tajana Simunic Rosing, "Hybrid Dynamic Energy and Thermal Management in Heterogeneous Embedded Multiprocessors," *Proceedings of IEEE Asia South Pacific Design Automation Conference* (ASPDAC), January 2010.

A. COSKUN, Tajana Simunic Rosing, Jose Ayala, and David Atienza, "Modeling and Dynamic Management of 3D Multicore Systems with Liquid Cooling," in *Proceedings of the IFIP/IEEE International Conference on Very Large Scale Integration* (VLSI-SoC), October 2009.

Francesco Zanini, **A. COSKUN**, David Atienza and Giovanni De Micheli, "Optimal Multi-Processor SoC Thermal Simulation via Adaptive Differential Equation Solvers," in *Proceedings of the IFIP/IEEE International Conference on Very Large Scale Integration* (VLSI-SoC), October 2009.

A. COSKUN, Andrew B. Kahng, and Tajana Rosing, "Temperature- and Cost-Aware Design of 3D Multiprocessor Architectures," in *Euromicro Conference on Digital System Design* (DSD), August 2009.

L. DAL NEGRO, "Light scattering and trapping in aperiodic deterministic environments," *5th Workshop on numerical methods for optical nanostructures, ETH*, July 2009.

L. DAL NEGRO, "Aperiodic Plasmonics," *The 9th International Conference on Nanotechnology, IEEE Nano 2009*, July 2009.

L. DAL NEGRO, "Understanding localized fields," *International Conference on Electromagnetics in Advanced Applications*, September 2009.

L. DAL NEGRO, "Light localization on a chip," *LEOS topical meeting on Optical Microsystems*, September 2009.

L. DAL NEGRO, "Si-based nanoplasmonics," *2009 Frontiers in Optics Conference/OSA Annual Meeting OSA FiO/LS 2009 Photonics Division*, October 2009.

L. DAL NEGRO, "Novel concepts in plasmonic sensing," *SPIE BiOS: Biomedical Optics*, January 2010.

L. DAL NEGRO, "Engineering Aperiodic Order for Nanophotonics Applications," *International Symposium on Photonic Crystal Structures*, March 2010.

L. DAL NEGRO, "Deterministic Aperiodic Structures for Nanophotonics and Nanoplasmonics on-chip Applications," *MRS Spring Meeting*, April 2010.

L. DAL NEGRO, "Si-based nitride nanostructures: towards optically and electrically pumped lasers," *EMRS Spring Meeting*, June 2010.

A. Mahram and **M. HERBORDT**, "Fast and Accurate NCBI BLASTP: Acceleration with Multiphase FPGA-Based Prefiltering," *Proceedings of the 24th International Conference on Supercomputing*, June 2010.

J. Park, Y. Qui, and **M. HERBORDT**, "CAAD BLASTn: Accelerated NCBI BLASTn with FPGA Prefiltering," I*EEE International Symposium on Circuits and Systems*, June 2010.

B. Sukhwani and **M. HERBORDT**, "Fast Binding Site Mapping using GPUs and CUDA," *High Performance Computational Biology*, April 2010.

B. Sukhwani and **M. HERBORDT**, "FPGA-Acceleration of Free Energy Minimization," *High Performance Reconfigurable Computing Technologies and Applications*, November 2009.

B. Sukhwani, M. Chiu, M. A. Khan, and **M. HERBORDT**, "Effective Floating Point Applications on FPGAs: Examples from Molecular Modeling," *Proceedings of High Performance Embedded Computing*, September 2009.

M. Chiu and **M. HERBORDT**, "Efficient Particle-Pair Filtering for Acceleration of Molecular Dynamics Simulation," *Proceedings of the IEEE Conference on Field Programmable Logic and Applications*, August 2009.

B. Sukhwani and **M. HERBORDT**, "Accelerating Free Energy Minimization Using GPUs," *Symposium on Application Accelerators for High Performance Computing*, July 2009.

M. HERBORDT, B. Sukhwani, M. Chiu, and M.A. Khan, "Production Floating Point Applications on FPGAs," *Symposium on Application Accelerators for High Performance Computing*, July 2009.

M. HERBORDT, M. A. Khan, and T. Dean, "Parallel Discrete Event Simulation of Molecular Dynamics Through Event-Based Decomposition," *20th IEEE International Conference on Application-Specific Systems, Architectures, and Processors*, July 2009.

M. HORENSTEIN, S. Cornelissen, J. Stewart, and D. Freedman, "Low-Power Electrostatic MEMS System for Remote Sensor Applications," *Electrostatics 2009: Joint Conference of the IEEE, Electrostatics Society of America, Institute of Electrostatics Japan, and the International Electrostatics Assembly*.

J. B. Stewart, D. Freedman, S. Cornelissen, **M. HORENSTEIN**, P. Woskov, and J. Tang, "Low power MEMS modulating retroreflectors for optical communication," *Proceedings of the SPIE - The International Society for Optical Engineering*, 2010.

A. HUBBARD, "Joining the TWAMP and Sandwich models of the cochlea, Abstracts of the 32nd Midwinter," *Meeting of the Association for Research in Otolaryngology*, vol. 32, p. 88, February 2009.

Y. Pu and **A. HUBBARD**, "Sound classification and localization algorithms for a biomimetic auditory nerve model," *The International CCN Society*, 2009.

D. B. Carssow, J. D. Sullivan, D. L. Voss, C. W. Parker, A. Mavretic, T. A. Fritz, **A. HUBBARD**, and J. A. Fennelly, "Loss Cone Imager digital system design," *SPIE International Symposium on Optical Engineering and Applications,* August 2009.

N. Ma, **P. ISHWAR**, and P. Gupta, "Information-Theoretic Bounds for Multiround Function Computation in Collocated Networks," *IEEE International Symposium on Information Theory* (ISIT), June-July 2009.

Y. Wang and **P. ISHWAR**, "Bootstrapped Oblivious Transfer and Secure Two-Party Function Computation," *IEEE International Symposium on Information Theory* (ISIT), June-July 2009.

K. Guo, **P. ISHWAR**, and J. Konrad, "Action Recognition in Video by Covariance Matching of Silhouette Tunnels," *XXII Brazilian Symposium on Computer Graphics and Image Processing* (Sibgrapi), October 2009.

N. Ma and **P. ISHWAR**, "Infinite-Message Distributed Source Coding for Two-Terminal Interactive Computing," invited paper in the Special Session on Multiterminal Source Coding, *47th Annual Allerton Conference on Communication, Control, and Computing*, September-October 2009.

K. Guo, **P. ISHWAR**, and J. Konrad, "Action Change Detection in Video by Covariance Matching of Silhouette Tunnels," *IEEE International Conference on Acoustics Speech and Signal Processing* (ICASSP), March 2010.

N. Ma and **P. ISHWAR**, "Interaction Strictly Improves the Wyner-Ziv Rate-distortion Function," *IEEE International Symposium on Information Theory* (ISIT), June 2010.

N. Ma and **P. ISHWAR**, "Infinite-message Interactive Function Computation in Collocated Networks," *Proceedings of the IEEE International Symposium on Information Theory* (ISIT), June 2010.

A. JOSHI, C. Batten, Y. Kwon, S. Beamer, I. Shamim, K. Asanovic, and V. Stojanovic, "Designing Manycore Processor Networks us-

ing Silicon Photonics," *Proceedings of the IEEE/Photonics Society Annual Meeting,* October 2009.

V. Stojanovic, **A. JOSHI**., C. Batten, Y. J. Kwon, S. Beamer, S. Chen, and K. Asanovic, "Design-space exploration for CMOS photonic processor networks," *Optical Fiber Communication (OFC), collocated National Fiber Optic Engineers Conference, 2010 Conference on (OFC/NFOEC)*, 2010.

V. Stojanovic, **A. JOSHI**., C. Batten, Y. J. Kwon, S. Beamer, S. Chen, and K. Asanovic, "CMOS photonic processor-memory networks," *Photonics Society Winter Topicals Meeting Series (WTM), 2010 IEEE*, 2010.

A. JOSHI, B. Kim, and V. Stojanovic, "Designing Energy-efficient Low-Diameter On-chip Networks with Equalized Interconnects," *Proceedings of the IEEE Symposium on High-Performance Interconnects*, August 2009.

A. JOSHI, C. Batten, Y. Kwon, S. Beamer, I. Shamim, K. Asanovic, and V. Stojanovic, "Limits and Opportunities for Designing Manycore Processor-to-Memory Networks using Monolithic Silicon Photonics," *Workshop on Photonic Interconnects & Computer Architecture. Held in Conjunction with 42nd Annual ACM/IEEE International Symposium on Microarchitecture, MICRO-42*, December 2009.

S. Beamer, C. Sun, Y. Kwon, **A. JOSHI**, C. Batten, V. Stojanovic, and K. Asanovic, "Re-Architecting a DRAM Memory Channel with Monolithically Integrated Silicon Photonics," *International Symposium on Computer Architecture*, June 2010.

N. Mohan, I. Stojanovic, **W. C. KARL**, B. E. A. Saleh, and M. Teich, "Compressed Sensing in Optical Coherence Tomography," *Conference on Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XVII*, January 2010.

Z. Wang,, M. Karpovsky, B. Sunar, and **A. JOSHI**, "Design of Reliable and Secure Multipliers by Multilinear Arithmetic Codes," *Conference on Information, Communications and Signal Processing*, December 2009.

Z. Wang, M. Karpovsky, and **A. JOSHI**, "Reliable MLC NAND Flash Memories Based on nonlinear t-Error-Correcting Codes," *40th Annual IEEE/IFIP International Conference on Dependable Systems and Networks* (DSN), June 2010.

A. JOSHI, B. Kim, and V. Stojanovic, "Designing Energy-efficient Low-Diameter On-chip Networks with Equalized Interconnects," *IEEE Symposium on High-Performance Interconnects*, August 2009.

A. JOSHI, C. Batten, Y. J. Kwon, S. Beamer, I. Shamim, K. Asanovic, and V. Stojanovic, "Designing Manycore Processor Networks using Silicon Photonics," *IEEE/Photonics Society Annual Meeting*, October 2009.

A. JOSHI, C. Batten, Y. Kwon, S. Beamer, I. Shamim, K. Asanovic, and V. Stojanovic, "Limits and Opportunities for Designing Manycore Processor-to-Memory Networks using Monolithic Silicon Photonics," *Workshop on Photonic Interconnects & Computer Architecture. Held in Conjunction with 42nd Annual ACM/IEEE International Symposium on Microarchitecture*, MICRO-42, December 2009.

S. Do, S. Cho, **W. C. KARL**, M. Kalra, T. Brady, and H. Pien, "CT system response models in iterative reconstruction algorithms for low-dose imaging," *10th International Meeting on Fully 3D Image Reconstruction in Radiology and Nuclear Medicine*, 2009.

N. Mohan, I. Stojanovic, **W. C. KARL**, B. E. A. Saleh, and **M. TEICH**, "Compressed sensing in optical coherence tomography," *SPIE Photonics West*, January 2010.

S. Do, **W. C. KARL**, M. K. Kalra, T. J. Brady, and H. Pien, "Low dose CT image reconstruction based on high-order total variation technique in clinical scanner," *Proceedings of SPIE, vol. 7622*, 2010.

S. Do, **W. C. KARL**, M. Kalra, T. Brady, and H. Pien, "Clinical low dose CT image reconstruction using high-order total variation techniques," *SPIE*, 2010.

S. Do, **W. C. KARL**, M. Kalra, T. Brady, and H. Pien, "A variational approach for reconstructing low dose images in clinical helical CT," *2010 IEEE International Symposium on Biomedical Imaging*, 2010.

Z. Wang, **M. KARPOVSKY**, and K. Kulikowski, "Replacing Linear Hamming Codes by Robust Nonlinear Codes Results in Reliability Improvement for Memories," *International Symposium Dependable Computing*, July 2009.

Z. Wang, **M. KARPOVSKY**, B. Sunar, and A. Joshi, "Design of Reliable and Secure Multipliers by Multilinear Arithmetic Codes," *International Conference on Information, Communications Security*, December 2009.

Z. Wang and **M. KARPOVSKY**, "Robust FSMs for Cryptographic Devices Resilient to Strong Fault Injection Attacks," *International Symposium on Online Testing*, July 2010.

K. Guo, P. Ishwar, and **J. KONRAD**, "Action change detection in video by covariance matching of silhouette tunnels," *IEEE International Conference on Acoustics Speech Signal Processing*, March 2010.

K. Guo, P. Ishwar, and **J. KONRAD**, "Action recognition from video by covariance matching of silhouette tunnels," *Proceedings of the Brazilian Symposium on Computer Graphics and Image Processing*, October 2009.

M. Ristivojevic and **J. KONRAD**, "Multi-frame motion detection for active/unstable cameras," *Brazilian Symposium on Computer Graphics and Image Processing*, October 2009.

P. M. Jodoin, V. Saligrama, and **J. KONRAD**, "Implicit active-contouring with MRF," *International Conference on Image Analysis and Recognition*, July 2009.

P. R. KOTIUGA, "A dictionary for defining key concepts in plasma physics in terms of Clebsch charts in contact geometry," *AMS Session on Geometry and Topology, II, Annual Joint Mathematical Meeting*, January 2010.

P. R. KOTIUGA, "The Electric Guitar as a Gateway to Electroacoustics," *Boston University Instructional Innovation Conference*, March 2010.

R. Pradipta, J. A. Cohen, **M. C. LEE**, S. P. Kuo, and W. T. Cheng, "Correlation analyses of simultaneously excited large-scale ionospheric plasma turbulence and magnetic field fluctuations produced by a high-frequency heater at Gakona, Alaska," *Turbulent Mixing and Beyond International Conference and Advanced School*, July-August 2009.

M. C. LEE, "Controlled study of ionospheric plasma turbulence in radio-wave injection experiments," *Turbulent Mixing and Beyond International Conference and Advanced School*, July-August 2009.

L. LEVITIN and T. Toffoli, "The unified bound on the rate of quantum dynamics," *Quantum Communication Measurement and Computing (Proceedings CMC'08), American Institute of Physics*, 2010.

L. LEVITIN and T. Toffoli, "Heat-to-work conversion by exploiting

quantum correlations," *The 10th Conference on Quantum Structures,* June 2010.

A. Clausen, T. Durkin, A. Ganick, J. Harris, **T. LITTLE**, K. Murphy, and J. Wilinski, "Coastal Underwater Field Observer with Remote IP Access," *Conference on Coastal Environmental Sensing Networks*, July 2009.

A. Agarwal and **T. LITTLE**, "Impact of Asymmetric Traffic Densities on Delay Tolerant Vehicular Networks," *IEEE Vehicular Networking Conference*, October 2009.

A. M. Vegni, C. Vegni, and **T. LITTLE**, "Opportunistic Vehicular Networks by Satellite Links for Safety Applications," *The Fully Networked Car Workshop*, March 2010.

M. MAZUMDER, M. Horenstein, P. K. Srirama, A. S. Biris, and R. Sharma, "Surface Engineered Fine Powders for Respiratory Drug delivery using Dry Powder Inhalers," *Annual Meeting of the American Association for Aerosol Research, Drug Delivery Symposium*, October 2009.

M. MAZUMDER, M. Horenstein, P. K. Srirama, and R. S. Sharma, "Development of Surface Engineered Low Cohesivity Fine Powders for Respriratory Drug delivery using Dry Powder inhalers," *Seventh International Symposium on Polymer Surface Modification,* July 2009.

T. MOUSTAKAS and A. Bhattacharyya, "AlGaN Quantum Wells emitting below 250 nm with Internal Quantum Efficiency as high as 50%," *North America Molecular Beam Epitaxy meeting*, August 2009.

T. MOUSTAKAS, A. Bhattacharyya, L. Zhou, D. J. Smith, and W. Hug, "AlGaN Quantum Wells emitting below 250 nm with Internal Quantum Efficiency as high as 50%," *36th International Symposium on Compound Semiconductors*, August-September 2009.

K. Driscoll, Y. Liao, A. Bhattacharyya, **T. MOUSTAKAS**, R. Paiella, L. Zhou, and D. Smith, "Optical and structural characterization of GaN/AlGaN quantum wells for intersubband device applications," *36th International Symposium on Compound Semiconductors*, August-September 2009.

K. Driscoll, Y. Liao, A. Bhattacharyya, **T. MOUSTAKAS**, R. Paiella, L. Zhou, and D. J. Smith, "Optically Pumped Intersubband Light Emission near 2μm from GaN/AlN Quantum Wells," *IEEE Lasers and Electro-Optics Society Annual Meeting*, October 2009.

J. Henson, J. C. Heckel, E. Dimakis, J. Abell, G. Chumanov, **T. MOUSTAKAS**, and R. Paiella, "Plasmon-Enhanced Light Emission from InGaN Quantum Wells Using Chemically Synthesized Silver Nanoparticles," *Frontiers in Optics/Laser Science Conference*, October 2009.

Y. Liao, C. Thomidis, A. Bhattacharyya, C. Kao, A. Moldawer, W. Zhang, and **T. MOUSTAKAS**, "Development of milliwatt power AlGaN-based deep UV-LEDs by Plasma-assisted MBE," *Proceedings of the Materials Research Society Symposium*, December 2009.

F. Sudradjat, K. Driscoll, Y. Liao, A. Bhattacharyya, C. Thomidis, L. Zhou, D..J. Smith, **T. MOUSTAKAS**, and R. Paiella, "Experimental Observation of Sequential Tunneling Transport in GaN/AlGaN Coupled Quantum Wells grown on Free-Standing GaN," *Proceedings of the Materials Research Society Symposium*, December 2009.

R. Paiella, K. Driscoll, Y. Liao, A. Bhattacharyya, L. Zhou, D. J. Smith, and **T. MOUSTAKAS**, "Short-Wavelength Intersubband Light Emission from Optically Pumped GaN/AlN Quantum Wells," *Proceedings of the Materials Research Society Symposium*, December 2009.

M. Wrabacka, G. A. Garretta, H. Shena, A. Bhattacharyyab, and **T. MOUSTAKAS**, "Time- Resolved Photoluminescence Studies of Al0.72Ga0.28N films with Incommensurate Chemical Ordering," December 2009.

R. Paiella, K. Driscoll, Y. Li, Y. Liao, A. Bhattacharyya, C. Thomidis, L. Zhou, D. J. Smith, E. Bellotti, and **T. MOUSTAKAS**, "Intersubband Device Applications of Nitride Quantum Structures," *Photonics West*, January 2010.

T. MOUSTAKAS, "Fundamental Issues in Green and UV LEDs," *SEMI New England Forum on High Brightness LEDs*, March 2010.

Yitao Liao, Christos Thomidis, and **T. MOUSTAKAS**, "Recent Advances of High Efficiency Deep UV-LEDs by plasma-assisted Molecular Beam Epitaxy," *ISSLED 2010*, May 17, 2010.

David Smith, Lin Zhou, and **T. MOUSTAKAS**, "Structural Characterization of III-Nitride Heterostructures: Some Recent Studies," *ISSLED 2010*, May 17, 2010.

J. Henson, E. Dimakis, J. DiMaria, **T. MOUSTAKAS**, and R. Paiella, "Plasmon-Enhanced Light Emission from InGaN Quantum Wells Using Lithographically Defined Nanoparticle Arrays," *IEEE Conference on Lasers and Electro-Optics*, May 2010.

Yitao Liao, Christos Thomidis, Chen-kai Kao, Enrico Bellotti, and **T. MOUSTAKAS**, "Deep Ultraviolet LEDs based on AlGaN alloys by Plasma-assisted Molecular Beam Epitaxy," *IEEE Conference on Lasers and Electro-Optics*, May 2010.

S. H. NAWAB, S. Chang, and C. De Luca, "Surface EMG Signal Decomposition Using Empirically Sustainable BioSignal Separation Principles," *The 31st Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, September 2009.

A. Y. Boisvert, B. E. Saleh, and **S. H. NAWAB**, "Web-Based Tool for Learning an Integrated View of Engineering," *2010 ASEE Northeast Section Conference*, May 2010.

E. Hostage, **S. H. NAWAB**, and C. J. De Luca, "Control properties of motor units: unique to muscle, common to subjects," *Society for Neuroscience*, October 2009.

S. H. NAWAB, S. Chang, and C. J. De Luca, "High-yield decomposition of surface EMG signals," *Society for Neuroscience*, Chicago, Ill., October 2009.

J. Henson, E. Dimakis, J. DiMaria, T. D. Moustakas, and **R. PAIELLA**, "Plasmon-Enhanced Light Emission from InGaN Quantum Wells Using Lithographically Defined Nanoparticle Arrays," *IEEE Conference on Lasers and Electro-Optics*, May 2010.

J. Yin and **R. PAIELLA**, "Intersubband Thermophotovoltaic Detectors," *IEEE Conference on Lasers and Electro-Optics*, May 2010.

R. PAIELLA, K. Driscoll, Y. Li, Y. Liao, A. Bhattacharyya, C. Thomidis, L. Zhou, D. J. Smith, E. Bellotti, and T. Moustakas, "Intersubband Device Applications of Nitride Quantum Structures," *Photonics West*, January 2010.

R. PAIELLA, K. Driscoll, Y. Liao, A. Bhattacharyya, L. Zhou, D. J. Smith, and T. Moustakas, "Short-Wavelength Intersubband Light Emission from Optically Pumped GaN/AlN Quantum Wells," *MRS Fall Meeting*, December 2009.

F. Sudradjat, K. Driscoll, Y. Liao, A. Bhattacharyya, C. Thomidis, L. Zhou, D. J. Smith, T. D. Moustakas, and **R. PAIELLA**,, "Experimental Observation of Sequential Tunneling Transport in GaN/AlGaN Coupled Quantum Wells Grown on a Free-Standing GaN Substrate," *MRS Fall Meeting*, December 2009.

J. Henson, J. C. Heckel, E. Dimakis, J. Abell, G. Chumanov, T. Moustakas, and **R. PAIELLA**,, "Plasmon-Enhanced Light Emission from InGaN Quantum Wells Using Chemically Synthesized Silver Nanoparticles," *Frontiers in Optics/Laser Science Conference*, October 2009.

J. Henson, J. DiMaria, and **R. PAIELLA**, "Tunable Plasmonic Resonances in Two-Dimensional Arrays via Nanoparticle Height Control," *Frontiers in Optics/Laser Science Conference*, October 2009.

K. Driscoll, Y. Liao, A. Bhattacharyya, T. Moustakas, **R. PAIELLA**, L. Zhou, and D. J. Smith, "Optically Pumped Intersubband Light Emission near 2 μm from GaN/AlN Quantum Wells," *IEEE Lasers and Electro-Optics Society Annual Meeting*, October 2009.

E. Bellotti and **R. PAIELLA**, "Numerical Simulation of ZnO-Based Terahertz Quantum Cascade Lasers," *US Workshop on the Physics & Chemistry of II-VI Materials*, October 2009.

R. PAIELLA, "Plasmonic Dispersion Engineering for Light-Emission Efficiency Enhancement," *2009 Synthesis and Processing Contractors' Meeting*, October 2009.

R. PAIELLA, K. Driscoll, Y. Liao, A. Bhattacharyya, T. Moustakas, L. Zhou, and D. J. Smith, "Optical and structural characterization of GaN/AlGaN quantum wells for intersubband device applications," *International Symposium on Compound Semiconductors*, September 2009.

I. PASCHALIDIS and B. Li, "On Energy Optimized Averaging in Wireless Sensor Networks," *48th IEEE Conference on Decision and Control*, December 2009.

I. PASCHALIDIS and C. Cassandras, "Wireless Sensor Networks for Localization and Coverage Control," *DOE NNSA University and Industry Technical Interchange Review Meeting*, December 2009.

I. PASCHALIDIS, K. Li, and R. Moazzez-Estanjini, "An Actor-Critic Method Using Least Squares Temporal Difference Learning with an Application to Warehouse Management," *48th IEEE Conference on Decision and Control*, December 2009.

M. C. Caramanis, C. C. Wu, and **I. PASCHALIDIS**, "Production Planning and Quality of Service Allocation Across the Supply Chain in a Dynamic Lead Time Model," *48th IEEE Conference on Decision and Control*, December 2009.

I. PASCHALIDIS and B. Li, "On Energy Optimized Averaging in Wireless Sensor Networks," *48th IEEE Conference on Decision and Control*, December 2009.

I. PASCHALIDIS, K. Li, and R. Moazzez-Estanjini, "An Actor-Critic Method Using Least Squares Temporal Difference Learning with an Application to Warehouse Management," *48th IEEE Conference on Decision and Control*, December 2009.

I. PASCHALIDIS and C. Cassandras, "Wireless Sensor Networks for Localization and Coverage Control," *University and Industry Technical Interchange Review Meeting,* December 2009.

M. Shultz, D. Wandt, U. Morgner, **S. RAMACHANDRAN**, S. Ghalmi, D. Kracht, and J. Neumann, "Sub-90-fs ytterbium all-fiber laser," *Conference Lasers & Electro-optics*, 2009.

J.H. Lee, C. Xu, S. Ghalmi, and **S. RAMACHANDRAN**, "Dispersion Engineered Higher-Order Mode Fibers for Wavelength-Tunable Femtosecond Pulses,*" Conference on Lasers & Electro-Optics*, 2009.

J. W. Nicholson, A. M. DeSantolo, S. Ghalmi, J. M. Fini, J. Fleming, E. Monberg, F. Dimarcello, and **S. RAMACHANDRAN**, "Nanosecond Pulse Amplification in a Higher-Order Mode Er-Doped Fiber Amplifier," *Conference on Lasers & Electro-Optics*, 2010.

C. Smith, P. Balling, P. Kristensen, and **S. RAMACHANDRAN**, "Nonlinear Frequency Generation of High-Power Polarisation Vortices in Optical Fibers," *Conference on Lasers & Electro-Optics*, 2010.

C. Smith, S. Ghalmi, P. Balling, **S. RAMACHANDRAN**, and J. W. Nicholson, "Enhanced Resolution in Nonlinear Microscopy Using the LP02 mode of an optical fiber," *Conference on Lasers & Electro-Optics*, 2010.

S. RAMACHANDRAN, C. Smith, P. Balling, and P. Kristensen, "Multi-colour vortex beam generation by cascaded Raman processes in optical fibers," *Photonics West*, 2010.

S. RAMACHANDRAN, "Structured light in optical fibers: Beams that can do what Gaussians cannot," *European Conference on Optical Communications*, 2009.

M. Cheraghchi, A. Karbasi, S. Mohajer, and **V. SALIGRAMA**, "Graph Constrained Group Testing," *International Symposium on Information Theory*, 2010.

Yannick Benezeth, Pierre-Marc Jodoin, **V. SALIGRAMA**, and

Christophe Rosenberger, "Abnormal Events Detection Based on Spatio-Temporal Co-occurences," *IEEE Conference on Computer Vision and Pattern Recognition*, 2009.

P. M. Jodoin, **V. SALGRAMA**, and J. Konrad, "Implicit Active-Contouring with MRF," *Proceedings of the International Conference on Image Analysis and Recognition*, July 2009.

V. SALIGRAMA and M. Zhao, "Compressed sensing of an Autoregressive process," *SPIE Compressed Sensing and its Applications,* August 2009.

M. Zhao and **V. SALIGRAMA**, "Outlier Detection Via Localized P-Value Estimation," *Allerton Conference on Communication, Control, and Computing*, 2009.

M. Zhao and **V. SALIGRAMA**, "Compressed Blind Deconvolution," *IEEE International Conference on Acoustics, Speech and Signal Processing,* 2010.

S. Aeron, S. Bose, H. P. Valero, and **V. SALIGRAMA**, "Sparsity Penalized Reconstruction Framework for Broadband Dispersion Extraction," *IEEE International Conference on Acoustics, Speech and Signal Processing,* 2010.

M. Zhao and **V. SALIGRAMA**, "Anomaly Detection with Score Functions on K Nearest Neighbor Graphs," *Neural Information Processing Systems,* 2009.

G. Atia and **V. SALIGRAMA**, "Information Theoretic Approach to Noisy Group Testing," *Allerton Conference on Communication, Control, and Computing,* 2009.

E. Ermis, P. Clarot, P. M. Jodoin, and **V. SALIGRAMA**, "Unsupervised Camera Network Structure Estimation Based on Activity," *ACM/IEEE International Conference on Distributed Smart Cameras,* 2009.

J. SEMETER, "Three-dimensional ionospheric imaging with PFISR: implications for auroral research," *Workshop PFISR: Science Results and Future Plans*, March 2010.

J. SEMETER, T. Butler, M. Zettergren, M. Nicolls, and C. Heinselman, "Composite imaging of auroral forms and convective flows during a substorm cycle," *Fall Meet. Suppl.*, December 2009.

J. Noto, S. Watchorn, R. Kerr, J. Riccobono, M. Migliozzi, and **J.**

SEMETER, "A portable solid-state high-spectral resolution hyperspectral imager," *SPIE Imaging Spectrometry XIV,* August 2009.

A. SERGIENKO, "Œ[11]Ghost[1] imaging with aberration cancellation[11]," *5th Workshop Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons*, INRIM, May 2010.

A. SERGIENKO, D. S. Simon, O. Minaeva, B. E. A. Saleh, and C. Bonato, "Dispersion Cancellation in Quantum Interferometry and Quantum Imaging," *Workshop on Single and Entangled Photons: Sources, Detectors, Components, and Applications, NIST*, November 2009.

N. Mohan, **A. SERGIENKO**, O. Minaeva, G. N. Golítsman, M. B. Nasr, B. E. A. Saleh, and M. Teich, "Photon-counting optical coherence tomography using superconducting single-photon detectors," *Workshop on Single and Entangled Photons: Sources, Detectors, Components, and Applications, NIST*, November 2009.

A. Al Daoud, M. Alanyali, and **D. STAROBINSKI**, "Reservation Policies for Revenue Maximization from Secondary Spectrum Access in Wireless Cellular Networks," *4th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks*, June 2010.

N. Fazlollahi and **D. STAROBINSKI**, "Distributed Advance Network Reservation with Delay Guarantees," *IEEE IPDPS,* April 2010.

W. Xiao, S. Agarwal, **D. STAROBINSKI**, and A. Trachtenberg, "Reliable Wireless Broadcasting with Near-Zero Feedback," *IEEE INFOCOM 2010*, March 2010.

H. Mutlu, M. Alanyali, and **D. STAROBINSKI**, "On-line Pricing of Secondary Spectrum Access with Unknown Demand Function and Call Length Distribution," *IEEE INFOCOM 2010*, March 2010.

A. Aziz, **D. STAROBINSKI**, P. Thiran, and A. El Fawal, "EZ-Flow: Removing Turbulence in IEEE 802.11 Wireless Mesh Networks without Message Passing," *ACM CoNEXT 2009*, December 2009.

Hang Chen and **A. SWAN**, "4-level model in Resonant Raman excitation profiles of species separated Carbon nanotubes," *NanoTube 10: 11th annual carbon nanotube conference*, Montreal, June 2010.

Mark Harrah and **A. SWAN**, "Monte Carlo dynamic study of ex-

citon diffusion in carbon nanotubes," *NanoTube 10: 11th annual carbon nanotube conference*, June 2010.

Jude Schneck, A. G Walsh, A. Green, M. Hersam, L. Ziegler, and **A. SWAN**, "Exciton dynamics in carbon nanotubes," *NanoTube 10: 11th annual carbon nanotube conference*, June 2010.

Hang Chen and **A. SWAN**, "Raman Measurement of Stress in High Aspect Ratio Double- and Single-Clamped Silicon Nanowires," *American Physical Society Meeting,* March 2010.

Alex Kitt, Benjamin Feldman, Sebastian Remi, Jens Martin, **A. SWAN**, Amir Yacobi, and Bennett Goldberg, "Raman spectroscopy of suspended mono and bilayer graphene," *American Physical Society Meeting*, March 2010.

Juan Duque, Hang Chen, **A. SWAN**, Xiamin Tu, Ming Chen, and Stephen Doorn, "Resonant Raman Spectroscopy of Chirality-Enriched Semiconducting Single Walled Carbon Nanotubes," *American Physical Society Meeting*, March 2010.

M. Harrah and **A. SWAN**, "Non-radiative Exciton Decay in Single-walled Carbon Nanotubes," *American Physical Society Meeting*, March 2010.

A. SWAN, "Barometric Studies of suspended graphene," *BACON – 2nd Annual Boston Area Carbon Conference*, June 2010.

A. SWAN, "Fundamentals of Optical Properties of Carbon nanotubes," *Nanotube 10: 11th annual conference on carbon nanotubes*, June 2010.

A. SWAN, "Saturation effects and exciton dynamics in a pump-probe study of carbon nanotubes," *Electrochemical Society - Spring National Meeting*, April 2010.

A. SWAN, "Coherence effects in femto-second pump-probe study of carbon nanotubes exciton dynamics," *American Chemical Society - Fall National Meeting,* August 2009.

A. SWAN, "Momentum constrained exciton dynamics in carbon nanotubes," *SPIE NanoScience and Engineering Conference*, October 2009.

M. F. Saleh, B. E. A. Saleh, and **M. TEICH**, "Modal, Spectral, and Polarization Entanglement in Guided-Wave Parametric Down-Conversion," *Frontiers in Optics/Laser Science XXV Conference*, October 2009.

N. Mohan and **M. TEICH**, "Photon-Counting Coherence-Domain Imaging in the 1m Wavelength Range," *Poster, Research and Industrial Collaboration Conference*, October 2009.

N. Mohan, I. Stojanovic, W. C. Karl, B. E. A. Saleh, and **M. TEICH**, "Compressed Sensing in Optical Coherence Tomography," *Conference on Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XVII*, January 2010.

L. B. Levitin and **T. TOFFOLI,** "The unified bound on the rate of quantum dynamics," *Quantum Communation Measurement and Computing*, 2010.

M. S. ÜNLÜ, M. Chiari, and U. Rant, "Optical Interference: Nanoscale Biological Imaging, Label-free Protein Microarrays, and Single Pathogen Detection," *ICTON (Microresonators & Photonic Molecules)*, June 2010.

M. S. ÜNLÜ, "Interferometric Reflectance Imaging: Nanoscale Biological Imaging, Label-free Protein and Single Pathogen Detection," *Nano-TR*, June 2010.

R. Irani, E. Ozkumur, S. Ahn, A. Yalcin, **M. S. ÜNLÜ**, and C. DeLisi, "Label-free, high-throughput DNA-protein interaction studies: Re-evaluating Eukaryotic Transcription," *Pittcon 2010*, March 2010.

G. G. Daaboul, R. S. Vedula, A. Reddington, E. Ozkumur, C. Lopez, J. H. Connor, H. Fawcett, and **M. S. ÜNLÜ**, "LED-based spectral reflectance imaging biosensor for label-free high-throughput multi-analyte and single-pathogen detection," *SPIE Photonics West 2010 - BIOS*, January-February 2010.

P. S. Spuhler, J. Knezevic, A. Yalcin, Q. Bao, P. Droge, U. Rant, and **M. S. ÜNLÜ**, "Real-Time Kinetics Measurements of Protein Induced Conformational Changes in DNA," *Proceedings of IEEE Photonics Society 2009 Annual Meeting*, October 2009.

P. S. Spuhler, J. Knezevic, A. Yalcin, Q. Bao, P. Droge, and **M. S. ÜNLÜ**, "A Platform for in situ Real-Time Measurement of Protein Induced Conformational Changes of DNA," *IEEE Photonics Society 2009 Annual Meeting*, October 2009.

F. H. Koklu and **M. S. ÜNLÜ** "Subsurface Microscopy of Multi-layered Integrated Circuits," *IEEE Photonics Society 2009 Annual Meeting*, October 2009.

F. H. Koklu and **M. S. ÜNLÜ**, "Focusing Anomalies in the Vicin-

ity of Dielectric Interfaces," *Proceedings of IEEE Photonics Society 2009 Annual Meeting*, October 2009.

E. Ozkumur, A. Yalcin, M. Cretich, F. Damin, C. Lopez, D. A. Bergstein, B. B. Goldberg, M. Chiari, and **M. S. ÜNLÜ**, "Optical Phase to Biological Mass Conversion for Label-free Interferometric Sensing Methods," *Proceedings of IEEE Photonics Society 2009 Annual Meeting,* October 2009.

E. Ozkumur, A. Yalcin, S. Ahn, B. B. Goldberg, M. Chiari, and **M. S. ÜNLÜ**, "Spectral Reflectance Imaging Biosensor for high-throughput and label-free detection of biomolecular interactions," *Proceedings of IEEE Photonics Society 2009 Annual Meeting*, October 2009.

R. Audet, S. A. Clasussen, E. H. Edwards, S. Ren, R. K. Schaevitz, E. Tasyurek, O. I. Dosunmu, **M. S. ÜNLÜ**, and D. A. Miller, "Surface-Normal Ge/SiGe Quantum-Confined Stark Effect Electroabsorption Modulators," *2009 International Nano-Optoelectronics Workshop*, August 2009.

P. S. Spuhler, J. Knezevic, A. Yalcin, Q. Bao, P. Droge, **M. S. ÜNLÜ,** and U. Rant, "Real-Time Kinetics Measurements of Protein Induced Conformational Changes in DNA," *Proceedings of IEEE Photonics Society 2009 Annual Meeting*, October 2009

P. S. Spuhler, J. Knezevic, A. Yalcin, Q. Bao, P. Droge, U. Rant, and **M. S. ÜNLÜ**, "A Platform for in situ Real-Time Measurement of Protein Induced Conformational Changes of DNA," *Proceedings of IEEE Photonics Society 2009 Annual Meeting*, October 2009.

F. H. Koklu and **M. S. ÜNLÜ**, "Subsurface Microscopy of Multi-layered Integrated Circuits," *Proceedings of IEEE Photonics Society 2009 Annual Meeting*, October 2009.

F. H. Koklu and **M. S. ÜNLÜ**, "Focusing Anomalies in the Vicinity of Dielectric Interfaces," *Proceedings of IEEE Photonics Society 2009 Annual Meeting*, October 2009.

E. Ozkumur, A. Yalcin, M. Cretich, F. Damin, C. Lopez, D. A. Bergstein, B. B. Goldberg, M. Chiari, and **M. S. ÜNLÜ**, "Optical Phase to Biological Mass Conversion for Label-free Interferometric Sensing Methods," *Proceedings of IEEE Photonics Society 2009 Annual Meeting*, October 2009.

E. Ozkumur, A. Yalcin, S. Ahn, B. B. Goldberg, M. Chiari, and **M. S. ÜNLÜ**, "Spectral Reflectance Imaging Biosensor for high-throughput and label-free detection of biomolecular interac-

tions," *Proceedings of IEEE Photonics Society 2009 Annual Meeting*, October 2009.

R. Audet, S. A. Clasussen, E. H. Edwards, S. Ren, R. K. Schaevitz, E. Tasyurek, O. I. Dosunmu, **M. S. ÜNLÜ**, and D. A. Miller, "Surface-Normal Ge/SiGe Quantum-Confined Stark Effect Electroabsorption Modulators," *2009 International Nano-Optoelectronics Workshop*, August 2-15, 2009.

P. S. Spuhler, J. Knezevic, A. Yalcin, Q. Bao, E. Pringsheim, P. Dröge, U. Rant, and **M. S. ÜNLÜ**, "Platform for in situ real-time measurement of protein-induced conformational changes of DNA," *Proceedings of the National Academy of Science*, January 2010.

Invited Lectures

H. ALTUG, "Nanoplasmonics For Ultrasensitive Vibrational Spectroscopy And Bimolecular Detection," *ONR Physiology/Biophysics Program*, May 2010.

H. ALTUG, "Nanoplasmonics For Ultrasensitive Vibrational Spectroscopy And Bimolecular Detection," *CIMIT Forum*, April 2010.

H. ALTUG, "On-Chip Nanoplasmonic-Nanofluidic Biosensors Overcoming Mass Transport Limitations," *DARPA/MTO Workshop on Chip-Scale Photonic Resonance for Biological Detection,* March 2010.

H. ALTUG, "Nanophotonics for high-performance bio-sensing," *Massachusetts Life Science Center*, January 2010.

E. BELLOTTI, "First-principle simulation of GaN material and devices: An application to GaN APDs," *Army Research Laboratory*, December 2009.

I. BIGIO, "Elastic Light Scattering Spectroscopy for the Detection of Early Cancer and Pre-Cancer," *IEEE Photonics Society Annual Meeting*, October 2009.

I. BIGIO, "Elastic scattering spectroscopy reveals early apoptosis pathways," *SPIE Photonics West*, January 2010.

I. BIGIO, "Skipping the Light Fantastic: Detecting Cancer and Things that Precede Cancer with Scattered Light," *Boston University,* March 2010.

I. BIGIO, "Scattering spectroscopy monitors cellular and tissue changes before they can be seen microscopically," April 2010.

I. BIGIO, "Can Scattering Spectroscopy Detect Disease Earlier than Histopathology?" *OSA Conference on Biomedical Optics,* April 2010.

I. BIGIO, "Using Elastic Scattering Spectroscopy to Reveal Early Stages of Apoptosis in Viable Cells," June 2010.

I. BIGIO, "Optical Design and Testing Workshop: Biomedical Optics," *Instituto Nacional de Astrofisica, Optica y Electronica*, June 2010.

R. BROWER, "The SciDAC QCD API: Living on borrowed time?" *NSF-NAIS Workshop*, October 2009.

R. BROWER, "The role of Multigrid Algorithms for QCD," *The XXVII International Symposium on Lattice Field Theory,* July 2009.

R. BROWER, "Technicolor and the QCD String, Numerical approaches to AdS/CFT, large N and gravity," *Imperial College*, September-October 2009.

C. CASSANDRAS, "Sensor Networks and Cyber-Physical Systems," *IEEE CSS-UAE Workshop,* November 2009.

C. CASSANDRAS, "Five Decades of Ho-ntrol and Ho-ptimization," December 2009.

C. CASSANDRAS, "Designing Better Control Systems With Computational Models," December 2009.

C. CASSANDRAS, "Real-Time Optimization for Stochastic Hybrid Systems and Resource Contention Games," *AFOSR Program Meeting*, April 2010.

C. CASSANDRAS and D. Castañón, "Mission Optimization for Teams of Unmanned Vehicles," *AFOSR Program Meeting*, April 2010.

C. CASSANDRAS, "Perturbation Analysis and Optimization of Stochastic Hybrid Systems and Resource Contention Games," *Politecnico di Torino*, May 2010.

C. CASSANDRAS, "Cooperative Control and Optimization in an Uncertain Asynchronous Wireless Networked World," *18th IEEE Mediterranean Conference on Control and Automation, Plenary Address*, June 2010.

F. CERRINA, "Patterning at the Nanoscale: From Silicon to DNA," *Integrated Photonics and Nanophotonics Research and Application (IPNRA) OSA Optics & Photonics Congress,* July 2009.

F. CERRINA, "Patterning at the Nanoscale: From Silicon to DNA," *Distinguished Lecture at Colorado State University's ISTeC (Information Science & Technology Center),* October 2009.

A. COSKUN, "3D Thermal Control Techniques," *Tutorial at D43D: 2nd Design for 3D Silicon Integration Workshop,* May 2010.

A. COSKUN, "Energy-Efficient Temperature Management Techniques for High Performance Multiprocessor Systems," *Brown University,* April 2010.

A. COSKUN, David Atienza, and Jose Ayala, "Thermal Modeling and Management for 2D and 3D Multiprocessor System-on-Chip," *Tutorial at International Conference on VLSI Design,* January 2010.

A. COSKUN, "Efficient Thermal Management for Multiprocessors and 3D Stacked Architectures," *Sabanci University, Faculty of Engineering and Natural Sciences*, December 2009.

A. COSKUN, "Efficient Evaluation and Management of Temperature for Multiprocessor Systems," *Sun Microsystems (Oracle),* November 2009.

A. COSKUN, "Proactive Thermal Management for Multiprocessor Systems," *Sun Microsystems (Oracle)*, October 2009.

L. DAL NEGRO, "Engineering aperiodic order in nanophotonics: past, present and future opportunities," *Max Planck Institute*, May 2010.

L. DAL NEGRO, "Engineering optical interactions in complex photonic-plasmonic nanostructures," *Wesleyan University*, February 2010.

L. DAL NEGRO, "Engineering Light Waves in Aperiodic Media," Lectio Magistralis, *University of Trento*, January 2010.

L. DAL NEGRO, "Engineering aperiodic structures: from algorithmic botany to light localization," *Tufts University*, October 2009.

L. DAL NEGRO, "Engineering Aperiodic Structures for on-chip nanophotonics applications," *Stanford University,* October 2009.

L. DAL NEGRO, "Light in aperiodic systems," *Harvard University*, October 2009.

L. DAL NEGRO, "Light in deterministic aperiodic media," *Queens College*, October 2009.

L. DAL NEGRO, "Deterministic aperiodic nanostructures for nanophotonics applications," *VTT Technical Research Center of Finland*, September 2009.

M. HERBORDT, "High Performance Computing using GPUs: Examples from Computational Biology," *Launch Workshop for the NSF-funded Experimental GPU Cluster for Fundamental Physics*, November 2009.

P. ISHWAR, "An Information Processing Tour of Sensor Networks: Field-Estimation, Interactive-Computing, and Visual-Analytics," *Boston University tenure talk in the ECE Department Seminar Series*, September 2009.

P. ISHWAR, "Condensing Video and Recognizing Actions," *Boston University, invited talk in the Image and Video Computing Weekly Symposium, Department of Computer Science*, October 2009.

P. ISHWAR, "Kaspi's Two-Way Source Coding Question Resolved," *University of California, San Diego: invited talk in the 5th IEEE International Workshop on Information Theory and its Applications (ITA)*, January-February 2010.

A. JOSHI, C. Batten, Y. J. Kwon, S. Beamer, I. Shamim, K. Asanovic, and V. Stojanovic, "Designing Manycore Processor Networks using Silicon Photonics," *Proceedings of the IEEE/Photonics Society Annual Meeting,* October 2009.

M. KARPOVSKY, "Design of cryptographic devices resistant to side-channel attacks," *Tel-Aviv University.*

M. KARPOVSKY, "Nonlinear Codes for Detection and Correction of Errors in Computer Memories," *Bar-Ilan University*.

M. KARPOVSKY, "New Error Detecting Codes for design of reliable and secure cryptographic devices," *ECNST*.

J. KONRAD, "Videopsy: Enabling technology for networked video surveillance," *invited plenary lecture at XXII Brazilian Symposium on Computer Graphics and Image Processing (SIBGRAPI 2009)*, October 2009.

M. C. LEE, "Turbulent Mixing and Beyond, Second International Conference and Advanced School," *The Abdus Salam International Centre for Theoretical Physics*, July-August 2009.

L. LEVITIN, "Fundamental physical limitations in computation," *Universita "La Sapienza,"* 2009.

T. LITTLE, "VLC Activities in the NSF Smart Lighting Center," *Visible Light Communications Consortium*, November 2009.

T. LITTLE, "LED Lighting for Ubiquitous Communications," *Solid-State Lighting (R-SSL) and Materials Science Central Research and Service Laboratory (CRSL), Osram Sylvania*, November 2009.

A. M. Vegni, C. Vegni, and **T. LITTLE**, "Opportunistic Vehicular Networks by Satellite Links for Safety Applications," *The Fully Networked Car Workshop, Geneva International Motor Show*, March 2010.

T. MOUSTAKAS, "AlGaN Quantum Wells Emitting below 250 nm with Internal Quantum Efficiency as high as 50%," *2009 Fall MRS Symposium III-Nitride Materials for Sensing, Energy Conversion and Controlled Light-Matter Interaction,* November-December 2009.

T. MOUSTAKAS, "Fundamental Issues in Green and UV LEDs," *SEMI New England Forum on High Brightness LEDs, Teradyne Inc.*, March 2010.

T. MOUSTAKAS, "Recent Advances of High Efficiency Deep UV-LEDs by plasma-assisted Molecular Beam Epitaxy," *ISSLED 2010*, May 2010.

David Smith, Lin Zhou, and **T. MOUSTAKAS**, "Structural Characterization of III-Nitride Heterostructures: Some Recent Studies," *ISSLED 2010*, May 2010.

R. PAIELLA, "Intersubband Device Applications of Wide-Band-gap Nitride Semiconductors," *University of Massachusetts*, March 2010.

R. PAIELLA, K. Driscoll, Y. Li, Y. Liao, A. Bhattacharyya, C. Thomidis, L. Zhou, D. J. Smith, E. Bellotti, and **T. MOUSTAKAS**, "Intersubband Device Applications of Nitride Quantum Structures," *SPIE Photonics West*, January 2010.

R. PAIELLA, "Physics and Device Applications of Intersubband Transitions in Wide-Bandgap Nitride Semiconductors," *University of Massachusetts*, December 2009.

R. PAIELLA, "Intersubband All-Optical Switching and Light Emission with Nitride Quantum Wells," *International Conference on Intersubband Transitions in Quantum Wells*, September 2009.

I. PASCHALIDIS, "Detection and Optimization Problems in Wireless Sensor Networks," *Operations Research Center, Massachusetts Institute of Technology*, February 2010.

I. PASCHALIDIS, "Design and Optimization of Wireless Sensor Networks," *Department of Electrical and Computer Engineering, National Technical University of Athens,* January 2010.

I. PASCHALIDIS, "On Energy Management in Sensor Networks," *Ember Inc.-Boston University Meeting*, May 2010.

I. PASCHALIDIS, "On Statistical Anomaly Detection of Cyber-Security Threats," *Army Research Laboratory*, October 2009.

S. RAMACHANDRAN, "Structured light in optical fibers: Beams that can do what Gaussians cannot," *European Conference on Optical Communications (ECOC),* September 2009.

K. Rottwitt and **S. RAMACHANDRAN**, "Spontaneous emission from saturated parametric amplifiers," *ICTON*, July 2009.

S. RAMACHANDRAN, "Spatially and Vectorially Structured Light in Optical Fibers," *University of Jena*, September 2009.

S. RAMACHANDRAN, "Dispersion in optical systems," *Indian Institute of Technology*, November 2009.

S. RAMACHANDRAN, "High-power fiber lasers," *Centre for Advanced Technologies, Indore, India*, December 2009.

S. RAMACHANDRAN, "Non-zero-order light: Beams that can do what a Gaussian cannot," *Swiss Federal Institute of Technology (ETH), Zurich,* June 2010.

S. RAMACHANDRAN, "Fiber devices drive the optical network," *Indian Institute of Technology*, November 2009.

V. SALIGRAMA, "Graph Constrained Group Testing, NSF Workshop on Frontiers on Network Science, Controls and Games," *UT Austin*, February 2010.

V. SALIGRAMA, "Compressed Blind De-Convolution, Information Theory & Applications," *UCSD*, February 2010.

V. SALIGRAMA, "Video Sensor Networks, NSF Workshop on Distributed Processing over Cognitive Networks," *UCLA*, November 2009.

V. SALIGRAMA, "Compressed Sensing of AR Processes," *International Symposium on Mathematical Programming,* 2009.

J. SEMETER, "Phased-array ISR: A New Tool for Substorm Research," *14th International EISCAT Workshop*, August 2009.

J. SEMETER, "Observations and Modeling of Field-aligned Transport in the Auroral Ionosphere," *NASA Living With a Star Focus Group Meeting on Ionospheric-Magnetospheric Plasma Redistribution During Storms: Causes and Consequences*, September 2009.

J. SEMETER, "Anatomy of a magnetospheric flux tube," *Boston University Center for Space Physics (CSP) Seminar Series*, September 2009.

D. STAROBINSKI, "Large-Scale Software Dissemination in Stochastic Wireless Networks," *Technion, Israel Institute of Technology*, December 2009.

A. SWAN, "Barometric Studies of suspended graphene," *BACON –2nd Annual Boston Area Carbon Conference*, June 2010.

A. SWAN, "Fundamentals of Optical Properties of Carbon nanotubes," *Nanotube 10: 11th annual conference on carbon nanotubes*, June 2010.

A. SWAN, "Saturation effects and exciton dynamics in a pump-probe study of carbon nanotubes," *Electrochemical Society- Spring National Meeting*, April 2010.

A. SWAN, "Coherence effects in femto-second pump-probe study of carbon nanotubes exciton dynamics," *American Chemical Society - Fall National Meeting,* August 2009.

A. SWAN, "Optics of carbon nanotubes," *Dresden Technical University, Workshop on Nanoelectronics*, October 2009.

M. TEICH, "When Can Quantum Imaging Benefit from Entangled Photons," *Army Research Office MURI Meeting*, November 2009.

M. TEICH, "Multi-Photon and Entangled-Photon Imaging and Li-

thography," *Physical Chemistry Seminar, Department of Chemistry, Boston University*, September 2009.

M. TEICH, "Multi-Photon and Entangled-Photon Imaging and Lithography," *Electrical Engineering & Computer Science/Research Laboratory of Electronics Seminar Series on Optics and Quantum Electronics, Massachusetts Institute of Technology*, April 2010.

M. TEICH, "Can Quantum Imaging Benefit from Entangled Photons?" *Annual Meeting of the MIT Center for Integrated Photonic Systems (CIPS), Massachusetts Institute of Technology*, June 2010.

M. S. ÜNLÜ, "Optical Interference: Biological Imaging and Label-Free Protein Microarrays," *Milan Polytechnic University Colloquium*, November 2009.

M. S. ÜNLÜ, "Optical Interference: Biological Imaging and Label-Free Protein Microarrays," *TUBITAK Marmara Research Center, Genetics and Microbiology Department Seminar,* December 2009.

M. S. ÜNLÜ, "Compact Biosensors and optical diagnostics based on Optical Interference," *Symposium on Translational research in Lifesciences and Health Technologies, Bogazici University*, December 2009.

Patents and Patent Disclosures

A. A. Yanik, M. Huang, A. Artar, and **H. ALTUG**, "Overcoming Mass Transport Limitations of On-Chip Biosensors with Actively Controlled Surface Targeted Nanofluidics," Boston University, November 2009.

H. ALTUG, A. A. Yanik, R. Adato, and S. Erramilli, "Ultra-sensitive vibrational spectroscopy of protein monolayers with plasmonic nanoantenna arrays," Boston University, October 2009.

A. COSKUN, Aleksey M. Urmanov, Kenny Gross, and Keith Whisnant, "Workload Scheduling in Multi-Core Processors," case no. SUN080116, U. S. patent no: 7,716,006, May 2010.

M. HERBORDT, "Structure for Efficient Ungapped Sequence Alignment with Applications in Accelerating BLAST Codes," 2009.

Z. Liang, **W. C. KARL**, H. Pien, and T. Brady, "A method for super resolution processing and degradation artifact removal from medical images," U. S. patent no. 7,689,017, March 2010.

S. Do, H. Pien, **W. C. KARL**, and M. Kalra, "LARA: low amperage, reduced angle for low-dose CT imaging," June 2010.

T. MOUSTAKAS, Adam Moldawer, Anirban Bhattacharyya, and Joshua Abell, "Optical Devices Featuring Non-polar Textured Semiconductor Layer," PCT international application no. PCT/US2009/036554, international publication no.: WO 2009/111790 A1, September 2009.

T. MOUSTAKAS, "Semiconductor Device having Group-III Nitride Buffer Layer and Growth Layers," U. S. patent no. 7,663,157, February 2010.

Yitao Liao and **T. MOUSTAKAS**, "Method of growing an AlGaN layer with band structure potential fluctuations and manufacturing ultraviolet light emitting devices containing the same," U. S. patent no. 61/329,947, April 2010.

G. Leuchs, N. Lindlein, and **S. RAMACHANDRAN**, "Achieving gaussian outputs from large-mode-area-higher-order mode fibers," U. S. Patent No. 7672552.

J. W. Nicholson and **S. RAMACHANDRAN**, "Compression Of Generated Optical Continuum Utilizing Higher-Order-Mode Fiber," August 2009.

S. RAMACHANDRAN, "Measuring modal content of multi-moded fibers," U. S. patent no. 20090185171, July 2009.

S. RAMACHANDRAN, "Systems and Techniques for Generating Cylindrical Vector Beams," U. S. patent no. 20090202191, August 2009.

S. RAMACHANDRAN, "Systems and Techniques for Generating Bessel Beams," U. S. patent no. 20090257711, October 2009.

S. RAMACHANDRAN, "Pumping In A Higher-Order Mode That Is Different From A Signal Mode," U. S. patent no. 20100002992, January 2010.

S. RAMACHANDRAN, "Segmented Gain-Doping Of An Optical Fiber," U. S. patent no. 20100008633, January 2010.

S. RAMACHANDRAN, "Preventing Dielectric Breakdown In Optical Fibers," U. S. patent no. 20100008664, January 2010.

S. RAMACHANDRAN, "Optical fibers and optical fiber devices with total dispersion greater than material dispersion," U. S. patent no. 20100014820, January 2010.

S. RAMACHANDRAN, "Sequentially Increasing Effective Area In Higher-Order Mode (HOM) Signal Propagation," U. S. patent no. 20100034500, February 2010.

S. RAMACHANDRAN, "Production of optical pulses at a desired wavelength utilizing higher-order-mode (HOM) fiber," U. S. patent no. 20100054661, March 2010.

S. RAMACHANDRAN, "Selectively Pumping A Gain-Doped Region Of An Optical Fiber," U. S. patent no. 20100103959, April 2010.

S. Aeron, S. Bose, H. P. Valero, and **V. SALIGRAMA**, "Automatic Dispersion Extraction of Multiple Time Overlapped Acoustic Signals," December 2009.

M. S. ÜNLÜ, D. Bergstein, M. Ruane, and B. Goldberg, "Resonant cavity biosensor," U. S. patent no. 7,695,680, April 2010.

M. S. ÜNLÜ, et al., "High Magnification Spectral Reflectance Biosensing with Discrete Light Sources," Int. Appl. No. PCT/US10/33397, NP Ref. No.: 701586-064971-PCT, May 2010.

Prof . Michael Ruane discusses research results at a MS symposium.

Research Areas and Laboratories

The ECE Department has three overlapping areas of research:

- » **Electrophysics**: photonics, solid state materials and devices, and electromagnetics and space physics;
- » **Information Systems & Sciences**: signal and image processing, and control and communication systems;
- » **Computer Systems Engineering**: hardware, software applications, and computer and communication networks.

Applied Electromagnetics

Horenstein, Mazumder

This laboratory is devoted to problems in experimental electromagnetics with a primary focus on medical and industrial electrostatics, micro-electromechanical systems (MEMS), and sensors. Current projects include transdermal injection of medicinal nanoparticles via pulsed electric fields, development of a passive laser communication node using a MEMS retro-reflective mirror, the design of a "smart-joint" variable-stiffness endoscope, the use of an electrodynamic screen to remove dust particles from solar electric installations, and the development of a new type of electrostatic-based, dry power inhaler.

Biological Sensing and Imaging

Ruane, Ünlü

The Biological Sensing and Imaging Laboratory develops optical, electrical, and computational methods to study biological problems. Researchers develop sensing and imaging devices that emphasize label-free, high throughput data collection on extremely small quantities of biomaterials. Applications include disease and biohazard detection, drug discovery, and equipment development. Projects include the Resonant Cavity Imaging Biosensor which applies hyperspectral IR imaging of transmissive and reflective resonant optical cavities for DNA and protein measurements; the Fabricator—a mask-free optical synthesizer for bio-arrays (the "Fabricator" project) used in RCIB and other biochip systems, and self-interference microscopy. The group is interdisciplinary, with engineers, physicists, chemists, and biologists, and encourages undergraduate researchers.

Biomedical Optics and Biophotonics

Bigio

The focus of research in the Biomedical Optics and Biophotonics Laboratory is the development of minimally-invasive diagnostics and therapeutics based on optical and photonic technologies. Faculty often collaborate with clinical researchers who test the new technologies on animals or human subjects. With noninva-sive optical measurements, there is minimal risk to the patient, but significant medical benefits are possible. Some of the ongoing projects include:

- » "Optical biopsy": development of fiber-optic probes that perform spectroscopic measurements on tissue in vivo and noninvasively to instantly diagnose cancer and other pathologies in specific organ areas.
- » "Optical pharmacokinetics": fiber-optic probes designed to measure drug concentrations in tissue, dramatically reducing the number of animals required for drug studies. This can also be used to determine the optimum type and dosage of novel (light-activated) chemotherapy agents for individual patients.
- » Sensors to monitor the response of tumors to specific treatments.
- » Optical methods for noninvasive imaging of neuronal activation and brain function.
- » Optical methods for identifying different types of infectious agents.

Broadband Wireless Communications

Carruthers

This laboratory supports research projects on the design, theory, and prototyping of broadband wireless communication systems. The major focus is on the use of light as the transmission medium for high-datarate indoor wireless local-area networks. The laboratory includes facilities for the fabrication and testing of experimental prototypes as well as computing resources for system design and analysis.

Complex BioSignal Processing

Nawab

Complex Signal Processing is an umbrella term used to describe processes that act upon signals in order to achieve desired objectives. The term is purposely meant to subsume what is traditionally meant by signal processing, signal analysis, signal modeling, signal classification, and signal recognition, but it is also meant to be inclusive of signal interpretation, signal understanding, signal data mining, signal forensics, signal visualization, etc. Complex signal processing research at ECE encompasses the conceptualization, formalization, implementation, and evaluation of signal computing with an emphasis on applied artificial intelligence and biosignal applications.

Computational Electronics
Bellotti

The Computational Electronics group develops software to study semiconductor materials and to perform electronics and optoelectronics device simulation. The group also uses commercial simulation software to simulate for technologically mature semiconductor devices. The laboratory is equipped with state-of-the-art computing and software tools, including two computer clusters, one SGI ALTIX 350 (16 CPUs, 64GB of memory and 1TB disk array) running Red Hat Linux, and an AMD Opteron Cluster (32 CPUs and a 6TB disk array) running Gentoo Linux. The lab also operates high performance PCs and printers.

Computer Architecture and Automated Design
Herbordt, Coskun

Work focuses on experimental computer architecture, particularly on the application of emerging technology to computationally intensive applications. Projects include developing design tools for application specific coprocessors, designing MPP router switches, vision computers, and the application of configurable computing to bioinformatics.

Control of Discrete Event Systems
Cassandras

The Control of Discrete Event Systems (CODES) Laboratory involves faculty and graduate students from the Division of Systems Engineering and operates within the Center for Information and Systems Engineering (CISE). Members of CODES conduct research on modeling, design, analysis, performance evaluation, control, and optimization of a variety of discrete event and hybrid systems including communication and sensor networks, manufacturing, transportation, and command/control. CODES research activities cover a wide spectrum, from basic research to the development of software tools. These activities include:

» Design and real-time control of communication and sensor networks, manufacturing systems, and transportation systems
» Decision support systems for quality-of-service guarantees or optimal performance
» Software testing and verification
» Strategic planning: getting information to decision makers fast and in a comprehensive form
» Developing a new generation of concurrent and parallel simulation tools
» New methods for cooperative control of wirelessly networked devices
» Autonomously reconfigurable systems

Embedded and Cyberphysical Systems
Coskun, Little

Research in embedded and cyberphysical systems covers low power design, energy and thermal management, performance analysis and improvement methods, real time operating systems, vehicular automation, and wireless sensor networks topics such as wireless healthcare, safety, and environmental monitoring applications.

Functorial Electromagnetic Analysis
Kotiuga

The Functorial Electromagnetic Analysis laboratory considers the difficulties encountered in the finite element analysis of three-dimensional electromagnetic fields that cannot be anticipated through experience with two-dimensional simulations. The lab has focused its efforts in the development of Whitney form techniques, homology calculations, algorithms for total magnetic scalar potentials in multiply-connected regions, helicity functional techniques, and data structures based on semi-simplicial objects. Torsion invariants of complexes and rational homotopy theory are currently being exploited in the context of direct and inverse three-dimensional problems such as impedance tomography and magnetic field synthesis.

Imaging Science
Mendillo, Semeter

Affiliated with the Boston University Center for Space Physics, the ISL applies state-of-the-art optical imaging technology to the study of the earth, moon, planets, and comets. Activities include equipment design and fabrication, field campaigns to observe sites worldwide, and digital signal processing.

Integrated Circuits and Systems Lab
Joshi

Our research focuses on various aspects (power, performance, area, and reliability) of designing modern-day VLSI systems. We adopt a level-transparent approach, where we jointly optimize across the various levels in the design hierarchy. In particular, at the device level our group is exploring novel carbon-based and plasmonics-based devices. At the circuit level, we are investigating both digital and analog circuit design techniques, while at the system level we are focused on developing many-core system architectures.

Integrated Nanophotonics and Biosensing Systems
Altug

The capability to confine and manipulate photons at nanometer-

length scales can open up unprecedented opportunities in both the fields of classical and quantum information processing, as well as in fundamental life sciences. The Integrated Nanophotonics and Biosensing group is developing nanophotonic devices for optical communications and on-chip biosensing. For communication applications, researchers are developing ultrafast lasers, ultra-efficient light emitting diodes and photonic crystal devices that can slow down light. For biotechnology applications, plasmonic nanostructures and photonic crystal cavities are being used for realization of high-throughput, ultra sensitive, and label free biosensors. To accomplish the group's goals, new computational modeling and advanced nanofabrication techniques are being developed, including nano/bio-patterning and microfluidics. Its biosafety level-2 lab is capable of cell culturing and includes a modified AFM for surface functionalization. The lab also houses state-of-the-art optical measurement equipment and computational clusters.

Lightwave Technology
Morse

One of the few university laboratories capable of designing, fabricating, and characterizing silica optical fibers, Lightwave Technology research focuses on developing new processing techniques for optical fibers, high-power optical fiber lasers, and a variety of optical fiber sensors. Researchers are developing a new technique for combining multimode pump radiation into double clad fibers. The facility consists of a fabrication laboratory with three glass lathes including a Nextrom MCVD system, an optical laboratory with numerous pump lasers for fiber lasers, five isolation tables, and an 8m optical fiber draw tower, outfitted with Nextrom widing and control equipment. In addition, there is a CVD laboratory for studies of thin films.

Multi-Dimensional Signal Processing
Karl

The MDSP lab conducts research in the areas of multidimensional and multiresolution signal and image processing and estimation, and geometric-based estimation. The applications that motivate this research include, but are not limited to, problems arising in automatic target detection and recognition, geophysical inverse problems (such as finding oil and analyzing the atmosphere), and medical estimation problems (such as tomography and MRI). The general goal is to develop efficient methods for the extraction of information from diverse data sources in the presence of uncertainty. The lab's approach is based on the development of statistical models for both observations, prior knowledge, and the subsequent use of these models for optimal or near-optimal processing.

Multimedia Communications
Little

The Multimedia Communications Laboratory (MCL) focuses on topics in ubiquitous distributed computing. Current research includes the investigation and development of low-power wireless video camera networks, applications in ecological monitoring using remote cameras, the exploitation of mobility in vehicular networks, visual light communications—communications using LED lighting as the network substrate, and body area networking using multi-tier networking components.

Nano-DNA
Cerrina

DNA is the molecule that encodes the "blueprint" of living organisms. Research in the Nano-DNA laboratory looks at the creation of synthetic DNA by using a combination of techniques from the semiconductor industry, chemistry, and biology. Thus, the work is highly interdisciplinary. Broadly speaking, researchers work in both Nanotechnology and Synthetic Biology. The DNA synthesized can be used to replace natural DNA entirely or in bits and pieces, to create altogether new biological functions and also to create novel nanostructures, where DNA can be used as "smart" construction material. Nanotechnology is based on the ability to fabricate smaller and smaller devices and structures, and the lab studies methods and techniques to push patterning (lithography) to the true nanometer region. For this, beams of electrons or X-rays are used, and the group collaborates closely with the semiconductor industry. Both experimental work (especially in the DNA area) and theoretical studies (in lithography) are conducted.

Nano-spectroscopy
Swan

Research in the Nano-spectroscopy Lab uses both elastic and inelastic light scattering to probe properties of nanoparticles, with the largest research effort focused on individual carbon nanotubes. Optical techniques include resonant Rayleigh scattering, interference techniques, resonant Raman scattering, and photo luminescence.

Nanostructured Fibers and Nonlinear Optics
Ramachandran

Light beams in free space travel at the "speed of light," and tend to diverge (diffract). Complex, nano-structured fibers and waveguides can be used to slow light (confine photons in time) and counteract diffraction (by confining photons in space). Some confinement geometries lead to spatially complex beams that possess intriguing properties such as the ability of optical vor-

tices to carry orbital angular momentum or the ability of Bessel beams to self-heal. Our group studies the myriad phenomena encountered by the manipulation of photons, with the aim of developing next generation applications of light, such as sensing, laser ranging and directed energy, imaging and microscopy, and quantum cryptography and communications.

Network Computing
Karpovsky

The Network Computing Laboratory studies interconnection network topologies; routing, network flow control, and deadlocks in multicomputer networks; multicast and broadcast fault-tolerance in interconnection networks; modules for realization (nodes and routers); performance metrics and scalability; message passing interference, protocols and programming, scalable coherent interface (SCI), and distributed shared memory; network of workstations (NOW); case studies of high performance scalable networks; and cluster computing.

Networking and Information Systems
Starobinski, Trachtenberg

This lab is involved in providing novel perspectives to modern networking with emphasis on scalability, heterogeneity, and performance. Its research roots into the mathematical fields of graph theory and algorithms, probability and stochastic processes, and coding theory with applications to content synchronization, network monitoring, wireless spectrum management, and advanced networking for scientific applications.

Network Optimization and Control
Cassandras, Paschalidis

Research deals with fundamental aspects of optimizing the design and operation of networks as well as designing control algorithms to regulate their operation. Networks are pervasive in a variety of application domains, from computer, communication, and sensor networks to supply chains, distribution networks, and biological networks like protein interaction and metabolic networks. Recent research topics include transmission scheduling in wireless networks, optimal deployment of networks of mobile agents, network routing, network anomaly detection, pricing and resource allocation, network simulation, intelligent warehouse management, protein docking, and optimization of metabolic networks.

Optical Characterization and Nanophotonics
Goldberg, Ünlü, Swan

Nanophotonics addresses a broad spectrum of optics on the nanometer scale covering technology and basic science. Compared to the behavior of isolated molecules or bulk materials, the behavior of nanostructures exhibit important physical properties not necessarily predictable from observations of either individual constituents or large ensembles. Researchers in this lab develop and apply advanced optical characterization techniques to the study of solid-state and biological phenomena at the nanoscale. Current projects include development of high-resolution subsurface imaging techniques based on numerical aperture increasing lens (NAIL) for the study of semiconductor devices and circuits and spectroscopy of quantum dots; micro resonant Raman and emission spectroscopy of individual carbon nanotubes; biosensors based on microring resonators; and development of new nanoscale microscopy techniques utilizing interference of excitation as well as emission from fluorescent molecules. In addition to microscopy, optical resonance is nearly ubiquitous in the research projects including development of resonant cavity enhanced photodetectors and imaging biosensors for DNA and protein arrays.

Quantum Communication and Measurement
Sergienko

Research in the Quantum Communication & Measurement (QCM) laboratory focuses on fundamentals of quantum optics and quantum information processing with the purpose of developing quantum-optical communication networks and engineering novel ultra-precise measurement techniques in nano-photonics and life sciences that outperform conventional solutions. Experimental projects include quantum cryptography in metropolitan network, super-resolution phase sensors based on quantum dispersion cancellation effect, quantum imaging and microscopy with spatial aberration cancellation, quantum spectroscopic ellipsometry for characterizing nanoscale devices in semiconductor industry and proteomics, and high-resolution fluorescent correlation spectroscopy and microscopy.

Research and development projects at QCM Laboratory concentrate on:

» Quantum optical device engineering using parametric amplification in specially designed periodically polled nonlinear structures, entanglement manipulation and processing on a chip, micro- and nano-photonics, and ultra-fast quantum optics

» High-performance single-photon detection and correlation measurement in a wide spectral range from ultraviolet to mid-infrared and terahertz

» Quantum information processing, quantum communication and cryptography, linear-optical quantum computing, quantum networks

» Quantum bio-photonics: characterization and diagnostic of biological materials and devices in life sciences, picosecond-resolution fluorescent correlation spectroscopy in the visible and in the infrared spectral range for early disease diagnostic

Quantum Photonics
Teich

Research studies in the Quantum Photonics Laboratory (QPL) focus on photonic systems that rely on the quantum properties of light. Experiments are carried out on single-photon detection; the photon-counting statistics of various sources of light; and the response of the human visual system to small numbers of quanta incident at the retina. Investigations are conducted on multi-photon and entangled-photon absorption, photoemission, microscopy, and lithography; as well as on nonlinear optical processes such as parametric down-conversion and second-harmonic generation. Research is carried out on quantum-imaging paradigms such as quantum optical coherence tomography (QOCT); photon-counting optical coherence tomography (PCOCT); and digital quantum imaging based on entangled-photonic qubits in spatial-parity space.

Radio Communications and Plasma
Lee, Semeter, Knepper

Field experiments are conducted in this lab using ground-based facilities and spacecraft-borne instruments to investigate radio-wave propagation and interactions with ionospheric plasmas, with applications to establishing artificial radio communication paths. Laboratory experiments with a large, toroidal plasma device are also conducted to study the microwave interactions with magnetoplasmas, simulating and crosschecking the results obtained in the field experiments.

Semiconductor Photonics
Paiella

Semiconductor Photonics research is aimed at the development of novel optoelectronic devices based on artificially-structured material systems, whose properties can be tailored by design to meet specific applications in a way that is not afforded by simply using bulk materials. One important example is that of semiconductor quantum structures, in which nanoscale layers (or wires or dots) of different semiconductor materials are assembled to create an energy landscape in which electrons behave in a markedly quantum-mechanical fashion. By controlling the di-

mensions and geometry of these structures, one can tune their most basic electronic and optical properties to enable entirely new device concepts—an approach that has become known as bandgap engineering. Heterostructures involving materials with different optical properties (e.g. metals and dielectrics) can also be designed in a similar manner, and used to control the flow of light and its interaction with the underlying matter in novel and often useful ways.

Using this general approach, researchers are investigating several device concepts to address a wide range of applications, literally spanning three orders of magnitude in optical wavelength. These include: light sources tunable by design over a broad portion of the mid- and far-infrared spectrum, including wavelengths currently not accessible with any other semiconductor technology; nonlinear all-optical switching devices for future ultrafast fiber-optic communications; high-efficiency surface-plasmon-enhanced visible LEDs for solid state lighting; and ultraviolet optical modulators based on the quantum confined Stark effect. Research in these areas involves both theoretical and experimental activities, including design and simulations (often based on the proverbial particle-in-a-box problem of quantum mechanics), device fabrication, and electrical and optical characterization.

Sensor Networks
Cassandras, Paschalidis

Sensor networks are formed by a typically large number of small battery-powered nodes that can sense their respective environments, process information, communicate (mostly wirelessly), and on occasion move in their physical environment. Sensor networks give rise to a rapidly expanding array of applications from building/industrial automation, environmental, agricultural, and wildlife monitoring, monitoring of critical infrastructure, and health monitoring. Research spans fundamental problems in the design, optimization, and control of these networks such as energy-aware routing, power management, multi-access control, and optimal coverage. Specific applications and protocols are also investigated including node localization, formation detection, and anomaly detection.

Testing, Reliable, and Secure Computing
Karpovsky, Levitin, Taubin

Members of the Reliable Computing Laboratory conduct research on a broad variety of topics, including the design of computer chips; efficient hardware testing at the chip, board, and system levels; functional software testing; efficient signal processing algorithms; coding and decoding; fault-tolerant message routing for multiprocessor systems; and the design of reliable

computer networks. In addition, research is conducted on architectures based on asynchronous circuits for computer security and side-channel attacks resistance.

Visual Information Processing
Konrad

The VIP Laboratory provides computational and visualization infrastructure for research in the area of next-generation visual information processing. The topics of interest are: retrieval, analysis, compression, and transmission of visual information, whether in the form of still images, video sequences, or 3-D data. Three research thrusts are currently pursued. Videopsy (video autopsy) is concerned with the analysis of streaming video data from networked cameras. Some of its goals are: segmentation and tracking of moving objects, action recognition, detection of abnormal events, and condensation of video into short summaries. The second thrust is concerned with the analysis of biomedical imagery, such as that resulting from colonoscopy exams or image-guided catheter ablation of atrial fibrillation. Issues currently studied are: detection, classification, and visualization. The third thrust focuses on the analysis, compression and visualization of stereoscopic and multiscopic (3-D) imagery. One application of this research is in the next-generation 3-D multimedia communications and entertainment, while another is in biomedical visualization. The VIP Laboratory is equipped with a network of state-of-the-art workstations to serve computational needs, while its visualization infrastructure includes 2-D and 3-D digital cameras and capture systems, as well as 3-D displays (shuttered and 9-view automultiscopic Synthagram).

VLSI and Neural Networks Systems
Hubbard

The VNNS group designs, builds, and tests innovative architectures that span a wide variety of VLSI applications in electrical, biomedical, and defense-related fields. Chips designed using digital and analog integrated circuit methodologies are built using CMOS technologies and tested in the lab. The group is equipped with a full suite of design tools and testing instrumentation for analog and digital systems. Applications include neural-net processing, single-chip large-molecule and DNA analyzers, and chips that emulate the functioning of the mammalian peripheral auditory system for the purpose of weapons classification and localization. Recent work has moved in the direction of algorithm development and FPGA implementations for event-based processing of signals from special-purpose hardware, the prototypes of which are originating in the VLSI lab. This hardware is now being advanced by a spun-out, local company started by former students, the second one of which the VNNS

Research Lab has produced.

Wide Band Gap Semiconductors
Moustakas

This laboratory investigates the growth, fabrication, and characterization of devices based on the family of III-Nitride semiconductors. The materials are grown by MBE, MOCVD, HVPE and Gas cluster Ion-beam deposition (GCIB). The current research focus is in the development of optical devices (blue, green, and UV-LEDs, UV-LDs, optical modulators, detectors), electronic devices (high power diodes, transistors, and thyristors) and electromechanical devices (SiC/III-Nitride MEMS sensors). Materials physics issues are also addressed and the group collaborates closely with Professor Enrico Bellotti in the area of theoretical modeling, Professor Karl Ludwig (Physics) in the area of materials structure, Professor Kevin Smith (Physics) in the area of electronic structure, and Professor Roberto Paiella in the area of devices based on intersubband transitions.

Affiliated Research Centers

Center for Computational Science

http://satchmo.bu.edu

The Boston University Center for Computational Science (CCS) was founded in 1990 to coordinate and promote computationally based research, to foster computational science education, and to provide for the expansion of computational resources and support.

CCS provides a forum for the multidisciplinary exchange of ideas among researchers, educators, and students. Regularly scheduled seminars as well as workshops and symposia are offered to highlight advances in computational science. CCS has acted to develop and facilitate the formulation of projects in computationally based research and education, working with scientists from 20 different departments and centers.

CCS works in close collaboration with the Office of Information Technology, in particular with its Scientific Computing and Visualization Group (SCV) group, in the development of resources to support computational science. The high performance computing and visualization systems at Boston University currently include the IBM Blue Gene, IBM pSeries 690, an IBM pSeries 655, an Intel Pentium III Linux Cluster, our Deep Vision Display Wall, the Access Grid Conference Facility, the Laboratory for Virtual Environments, and the Computer Graphics Laboratory.

CCS offers a Certificate in Computational Science to graduate students in engineering and science pursuing a PhD through a multidisciplinary training program, ACES (Advanced Computation in Engineering and Science).

Center for Space Physics

http://www.bu.edu/csp

The Center for Space Physics provides a focus for research and graduate training in space physics. It is a multidisciplinary center within the Graduate School of Arts and Sciences that includes faculty from the College of Engineering and the College of Arts and Sciences. The Center carries out a wide variety of research in many fields of space physics including space plasma physics; magnetospheric physics; ionospheric physics; atmospheric physics; and planetary and cometary atmospheric studies.

The mission of the Center is to promote and foster space physics research and to provide a central base for that research and for the teaching of space physics, especially at the graduate level. The Center seeks to fulfill this mission by creating an intellectual atmosphere conducive to research and to the exchange and exploration of new ideas. The Center organizes a seminar series in space physics as well as internal research discussion groups, and often hosts visits of scholars from the United States and abroad. Although the Center itself offers no degree program, graduate education is a major component of Center activities. Graduate students from programs in Astronomy, Applied Physics, and Engineering conduct their thesis research at the Center. The Center provides a formal link between research groups in the Colleges of Engineering and Arts and Sciences, allowing them to co-locate research students and post-doctoral associates to allow greater interaction to everyone's benefit. The Center also provides administrative support for research projects, particularly in the areas of grant management and proposal development.

Photonics Center

http://www.bu.edu/photonics

To help industry bridge the gap between basic research and practical application, Boston University launched the Photonics Center in 1994 with $29 million in seed funding from the federal government. The Center is now forging true business partnerships in which companies draw on the University's exceptional expertise and resources in engineering, science, medicine, and management to build actual product prototypes and spawn a growing stream of new companies.

The Photonics Center at Boston University is a bold new model for university-industry collaboration. It has been established to work directly with investors and industrial partners to turn emerging concepts in photonics technology into commercial products. The Center is staffed and equipped to help industry partners reduce the technical and financial risk involved in developing new ideas, refining them in the laboratory, building working prototypes, and starting up companies. To date the Center has forged joint ventures with a dozen companies to develop new products in data storage, environmental monitoring, optoelectronics, and biotechnology.

In 1997, the University completed the nine-story, 235,000 square-foot Photonics Building to house this ambitious initiative. The $85 million facility includes a full complement of state-of-the-art laboratories as well as meeting rooms, lecture halls, and an entire floor devoted to incubator space for start-up companies that complements its existing incubator at 1106 Commonwealth Avenue. Faculty affiliated with the Center have in-depth expertise in all aspects of photonics technology, including the core areas of opto-electronics, photonic materials, data storage, imaging systems, medical applications, and sensors.

Resources available to industry partners, government officials, faculty, and students through the Photonics Center support development and testing of ideas and products. These resources include several research and development laboratories: Scanning Infrared Near-Field Microscopy Laboratory, Optoelectronic Device Characterization Laboratory, Femtosecond Laser Facility, Photochemical Processes Laboratory, Photonic Systems Engineering Laboratory, Liquid Crystal Display Laboratory, Quantum Imaging Laboratory, Precision Optics Laboratory, Optoelectronic Materials Laboratory, Precision Measurement Laboratory, Optoelectronic Processing Facility, Laser Measurement and Fiber Optic Sensors Laboratory, Magnetic and Optical Devices Laboratory, Near-Field Scanning Optical Microscopy Laboratory, Picosecond Spectroscopy Laboratory, and the Advanced Electronic Materials and Devices Processing Research Laboratory.

Bernard M. Gordon Center for Subsurface Sensing and Imaging Systems (CenSSIS)

http://www.censsis.neu.edu
The Bernard M. Gordon Center for Subsurface Sensing and Imaging Systems (CenSSIS) is a National Science Foundation (NSF) Engineering Research Center (ERC), one of an elite group of only nineteen ERCs in the nation. It seeks to revolutionize the ability to detect and image objects that lie underground or underwater, or are embedded within cells, inside the human body, or within man-made structures. CenSSIS is a collaborative effort of four academic institutions: Boston University, Northeastern University, Rensselaer Polytechnic Institute, and the University of Puerto Rico at Mayagüez; and four strategic affiliates: Massachusetts General Hospital, Memorial Sloan-Kettering Cancer Center, Lawrence Livermore National Laboratory, and the Woods Hole Oceanographic Institution. Together, the CenSSIS partnership works with industrial partners who provide their insight into research challenges.

The Center's primary focus is on detecting, locating, and identifying objects obscured beneath a covering media, such as underground plumes, tumors under the skin or developmental defects in an embryo. Utilizing electromagnetic, photonic, or acoustic probes, CenSSIS will engage biomedical and environmental problems, developing techniques for sensing subsurface conditions. Projects integrate new methods of subsurface sensing and modeling, physics-based signal processing and image-understanding algorithms, and image and data information management methods. Research topics being addressed include: humanitarian de-mining, multilayer hyperspectral oceanography, 3-D subretinal visualization, nonlinear ultrasound medical imaging, subcellular biological imaging, electrical impedance tomography, acoustic diffraction tomography, and multi-sensor civil infrastructure assessment.

Overall, the CenSSIS program is a vehicle enabling substantial leverage of industrial investments because of the substantial level of funding available for basic research. In addition to research, the Center has established programs for education, industry collaboration, and technology transfer. An important outcome of this process is the education of students well-trained in these crucial fields for the future of public health and the preservation of the planet's physical resources.

Center for Information and Systems Engineering (CISE)

http://www.bu.edu/systems
The Center for Information and Systems Engineering (CISE) provides an interdepartmental home for faculty and students interested in research in information and control systems theory and its relevance to various application domains encompassing the analysis, design, and management of complex systems that have come to prominence as a result of the information, communication, and computation revolution.

Information and systems engineering research at Boston University is strong and accomplished. Approved by the Trustees in 2002, with management support added in Fall 2002, CISE has raised the visibility of that strength and fostered greater interactions among researchers.

The Center fosters interdisciplinary collaboration and research in emerging applications and the use of methodologies such as optimization methods, information theory, control theory, applied probability and statistics, simulation, and modeling. Primary application interests are in the areas of automation, robotics, and control; communication, networking and information systems; production, service and supply chain systems; and signal processing and pattern recognition.

As of June 2009, CISE has grown from 13 to 29 affiliated faculty from the Departments of Mechanical Engineering, Biomedical Engineering, and Electrical & Computer Engineering in the College of Engineering; the Departments of Computer Science and Mathematics & Statistics in the College of Arts and Sciences; and the Department of Operations Management in the School of Management. There are approximately 60 graduate students affiliated through these faculty. CISE maintains a searchable data base of academic "systems" publications authored by the affiliated faculty and their students.

As of November 2004, CISE launched the Sensor Network Consortium (SNC) to facilitate interactions among the academic community and industry participants who support the growth of the sensor network industry through focused research and de-

velopment activities. The SNC's goals are to develop, test and accelerate adoption of sensor network related technologies in strategic applications areas; develop strategic partnerships to access federal and regional research funding; and educate graduate students and facilitate their involvement with industry. Industry participation includes a diverse group of companies, start-ups, system integrators and adopters of sensor network technology that currently includes Arch Rock Corporation, BP International, Ember Corporation, The Hartford, Honeywell, IBM, Millennial Net, Mitre Corporation, SAP, Siemens Building Technologies, Sun Microsystems, and Textron Systems.

Electrical & Computer Engineering Department faculty affiliated with CISE are Professors Alanyali, Baillieul, Carruthers, Cassandras, Castañón, Ishwar, Karl, Levitin, Little, Paschalidis, Saligrama, Starobinski, and Trachtenberg. The application interests of their CISE related research include Automation, Robotics and Control; Communications, Networking and Information Systems; Production and Service Systems and Supply Chain Management; and Signal Processing and Pattern Recognition. Professors David Castañón and Ioannis Paschalidis currently serve as Co-Directors of the Center. Several ECE faculty also serve on the CISE Management Committee.

Center for Remote Sensing

http://www.bu.edu/remotesensing
The Center was established in 1986 as a facility for scientific research in the fields of archaeology, geography, and geology. The Center uses satellite images and other data from airborne and ground sensors to study the Earth and its resources, particularly groundwater. This includes the monitoring of environmental changes due to both natural processes and human activities. In 1997, the Center was selected by NASA as a "Center of Excellence in Remote Sensing."

Center for Nanoscience and Nanobiotechnology

http://nanoscience.bu.edu
Boston University formed the Center for Nanoscience and Nanobiotechnology (CNN) to advance academic and technological research and development by extending discoveries in nanoscale materials and platforms toward applications that examine and seek to understand and manipulate biological systems. The Center serves as a hub for nanoscience researchers from the Charles River and Medical Campuses and builds interdisciplinary research and training. The Center connects scientists and engineers from disparate disciplines with each other in seminars, meetings, joint visitors programs, interdisciplinary courses, industrial collaborations, and seeded projects.

CNN has three core functions: First, to develop interdisciplinary research and education in nanoscience and nanobiotechnology; second, to develop and run an industrial liaison program that partners researchers with external companies for mutual benefit; and third, to connect researchers to resources for technological commercialization. CNN and affiliated faculty are also involved in outreach activities, organizing hands-on activities, discussions, and panels on nanoscience for grade school students and local organizations and museums.

Smart Lighting Center

http://smartlighting.bu.edu
The Smart Lighting Center at Boston University (SLC/BU) is part of the National Science Foundation's Smart Lighting Engineering Research Center (ERC) established in September 2008 by Rensselaer Polytechnic Institute, the University of New Mexico, and Boston University.

The Center focuses on the creation and application of a new generation of smart light sources whose properties are fully controllable and tunable in terms of their spectral composition, color temperature, polarization, and spatial and modulation properties. These solid state light sources, adaptable to myriad requirements and environments, will result in tremendous benefits to society and humankind, including:
- » Reduced pollution and global warming through increased energy conservation
- » Novel modes of communication, networking, and sensing for enhanced privacy, security, and pervasive connectivity
- » Increased automobile safety. Localized directional communication provides active braking and collision avoidance
- » Fundamental advances in biotechnology including the rapid highly specific identification of cells
- » Displays with high efficiency and large color gamut enabled by polarized emitters
- » Reduced dependency on sleep-inducing pharmaceuticals, reduced risk of cancer, and better support of the natural circadian rhythm, thereby enabling higher productivity and a better quality of life

These benefits are enabled through the systematic exploration and development of smart-lighting principles in three vertically integrated research thrusts: (i) novel materials, (ii) device technology, and (iii) system applications and impacts.

In addition to these research thrusts, other key components of the Center include an Industrial Advisory Board, to drive industry requirements and technology commercialization; and a network of educational outreach partners, to foster the development of a new, globally competitive science and technology workforce.
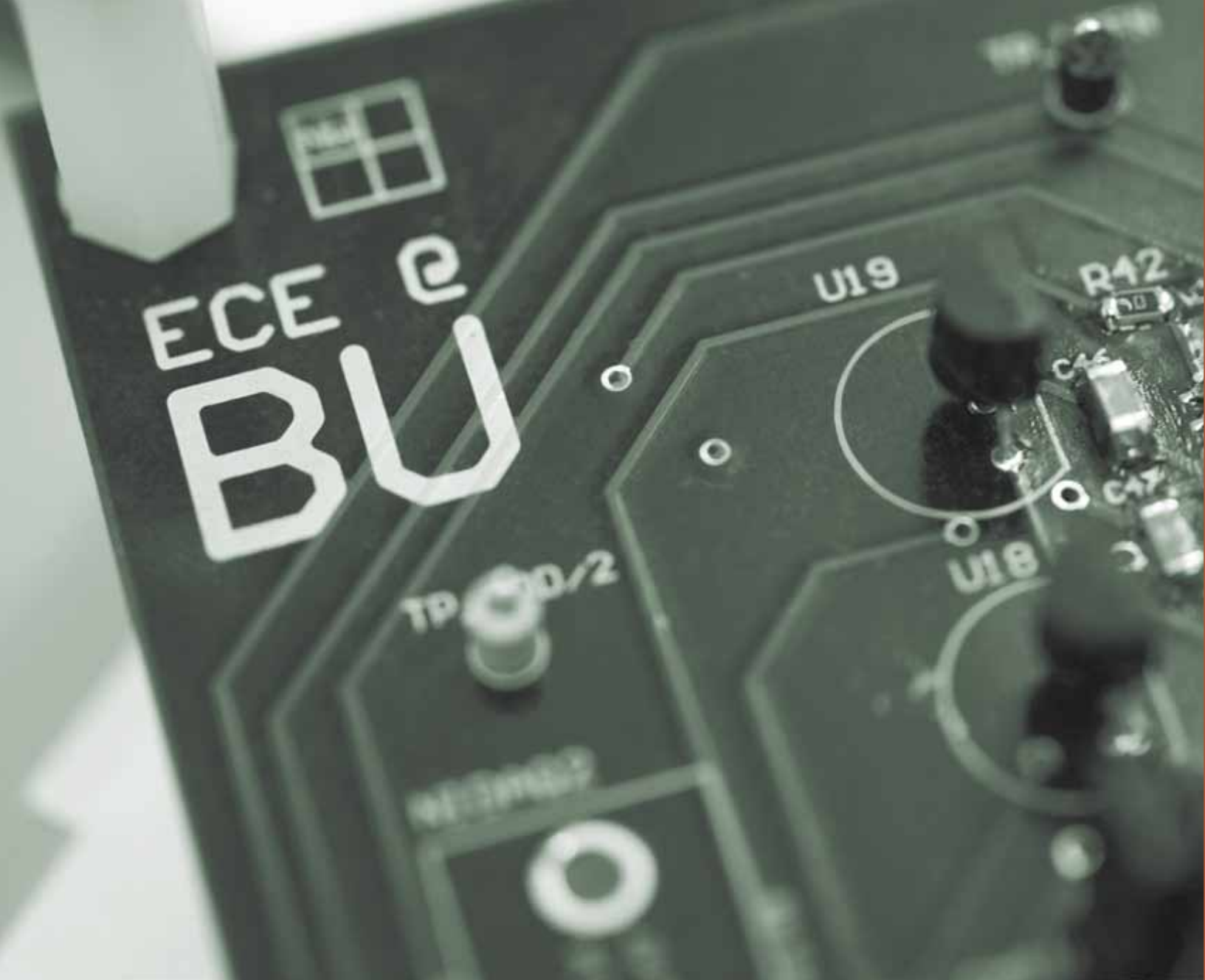
Boston University College of Engineering
Department of Electrical & Computer Engineering

8 Saint Mary's Street, Room 324
Boston, MA 02215

617-353-2811
ece@bu.edu
www.bu.edu/ece