Improving Our Programs

If you graduated from one of our undergraduate electrical and computer engineering programs during the years 2006–2009, we want to hear from you. Continued improvement in all facets of the programs, including curriculum, facilities and laboratories is the number one objective of our programs. Your review and critique of your educational experience at Florida Tech, and how it prepared you for your career will greatly assist us in the continual improvement process. We have identified 20 items that can be used as measures 3–5 years after graduation to determine how well we are meeting our Educational Objectives. Please take the brief online survey at:

http://my.fit.edu/~vkepuska/ECESurvey/ECESurvey.html

Dr. Kepuska Developing Speech Recognition Toolkit for the National Science Foundation

Dr. Kepuska is developing speech recognition software that "triggers" required and necessary action from a computing system, using only speech instead of "push-to-talk buttons". Although speech recognition software is widely available, this technology, Wake-up-Word Speech Recognition software, has the potential to advance the industry as a whole, and help people in general achieve their immediate goals much more

Faculty Spotlight
Dr. Sam Kozaitis

Dr. Sam Kozaitis received a Ph.D. in Electrical Engineering from Wayne State University in 1986. He worked for General Motors Research Laboratory, Wayne State University, and Digital Optics Inc. before coming to the Florida Institute of Technology in 1988, where he is currently a professor and Head of the Department of Electrical and Computer Engineering. From 1988–1997, he spent summers at the U.S. Air Force Photonics Center at Rome Laboratory performing research in optical processing. He also spent the summers of 1998–1999 and 2000–2001 at NASA, Kennedy Space Center developing the groundwork for tracking launch vehicles with satellites. Dr. Kozaitis has been a member of several conference organizing committees for scientific societies including SPIE and IASTED. He also served in a consultant or reviewer capacity for several government agencies including those from Austria and South Africa, as well as over 20 professional journals. He has served on editorial boards worldwide, including the Journal of Engineering Research, the Journal of Signal and Image Processing, and on the board of trustees of the Kurdistan University of Science and Technology. He was a guest editor for
This Wake-Up-Word speech recognition tool-kit has the potential to make an impact in helping directly or indirectly impaired users such as quadriplegics, surgeons, operators wearing HAZMAT suits, remotely operated robotic vehicles, etc., where the same operation would be very difficult, and/or very expensive to perform, or not possible at all.

The world is slowly being controlled by voice activation and speech recognition, and usually it requires a physical trigger or button press which seems to undercut the power of voice control. But that distinction is fading away as we get more sophisticated technology that allows devices to recognize more voice commands without a physical prompt. The NSF i-Corps program provides the opportunity to approach commercialization of the technology methodically, with guidance and mentoring.

Research in Optical Antennas Funded by NSF

Dr. Lail is a co-principal investigator on the NSF-funded research project titled “Design of Impedance Matched Infrared Antennas Using Optical Vector Near-field Mapping”, a collaborative effort between Dr. Glenn Boreman of the University of North Carolina at Charlotte, Dr. Markus Raschke of the University of Colorado at Boulder, and Florida Tech. The goal of the proposed research is to increase the IR sensitivity and collection efficiency of antenna-coupled detectors. First, by gaining a practical understanding of the relevant design parameters in the nanoscale regime, and subsequently designing impedance matched infrared antennas and antenna-sensor combinations. Extension of the antenna concept from the rf into the 9-orders-of-magnitude higher frequency optical regime, in particular the infrared (IR) spectral range, has recently recaptured the imagination of many practitioners in the field. With the potential for optical antenna-coupled sensors to have spectral and polarization responses tailored by the antenna design, optical antennas have been proposed for a wide range of novel photonic applications, including chemical, and thermal sensors, near-field microscopy, nanoscale photodetectors, waveguides, and other plasmonic devices. Employing the novel technique of scattering-Scanning Near-Field Optical Microscopy (s-SNOM), the research team has for the first time probed the vector electric-field distribution (amplitude and phase) of an infrared antenna with nanometer spatial resolution in three dimensions. This enables them to determine the impedance at IR frequencies at each location on the antenna and sensor. This quantitative information, in combination with IR antenna fabrication and performance characterization, complemented by computational electromagnetic modeling allows us to systematically design impedance matched optical antennas with enhanced collection efficiencies, including modification of sensor geometries or materials, and design of impedance-matching networks.

Dr. Kozaitis’s research has focused mostly on optical signal processing, which involves the use of magnetooptic and ferroelectric materials to spatially modulate light. He developed system architectures using spatial light modulators and coherent imaging to automatically identify objects. Much of this work led to the development of advanced signal processing algorithms and, more recently, wavelet-based processing and higher-order correlations to recover features from heavily degraded signals corrupted by noise. His current research emphasis is on the development of algorithms to reduce noise in medical imaging and the fusion of different sensor imagery.

Notable News

Microwave Photonics Seminar Presented as Part of ECE Seminar Series

On February 26 the Series of Electrical and Computer Engineering Seminars (SECES) hosted Dr. Charles F. Middleton, Principal Investigator in Photonics at Harris Corporation. In his presentation, Microwave Photonics, Dr. Middleton described research and development efforts which merge microwave engineering with photonics. Microwave engineering plays an important role in modern information and electronic technology, and as the electromagnetic spectrum becomes increasingly crowded at RF and microwave frequencies, new tools are emerging at the higher end of the spectrum with the potential to overcome challenges such as bandwidth demand, and improve overall system performance. Photonics—the study of light and its interaction with electronics—enables many such tools. Lasers, optical fiber, advanced electro-optic modulators, filters, photodetectors and other photonic components can operate
Preparing for “The Internet of Things”

It is predicted that in the near future, internet traffic will be mainly machine-machine communication. This will be due to many devices, consumer products, and other things that will be connected to the internet. A majority are expected to have microprocessors, operating systems, and substantial computing capability. To prepare students for the future we are introducing more hardware in our sophomore level courses ECE 2551 and ECE 2552. ECE 2551 is required by both computer and electrical engineering students, and ECE 2552 is required by only computer. The classes are being designed to push the assembly and architectural programming used in x86 processors and will prepare student to use Intel Atom-like processors with a 32-bit operating system connected to the internet in place of microcontrollers. Plans are to address such topics such as low-power communications, multi-threading, graphics, and power management. We have experienced outstanding results from students new to programming in our first semester of this approach.

IEEE Students Win Honorable Mention Award in IBM/IEEE Competition

The project “Smarter Energy Saving System,” submitted by three electrical engineering students, Anderw Raharjo, Shiyu Zhao, and Amit Bedi, and a business administration student, Dan Zhao, has been awarded honorable mention status and $500 in the “IBM/IEEE Smarter Planet Challenge: Student Projects Changing the World,” competition. Their project received high marks in all of the evaluation criteria and reflects well on the professional skills of the team. Through their efforts, future students will have the opportunity to experience the challenge of applying their knowledge and skills in order to solve a problem that betters humanity. We wish them all continued success in their future educational and professional endeavors.

Dr. Kostanic Offers Cellular Systems Course Through Continuing Education

Dr. Kostanic will offer course entitled “Cellular System Overview,” through Continuing Education. The intended class audience is technical professionals that are relatively new to the field of cellular system engineering. Some basic understanding of radio signal propagation and communication technologies is desirable but not necessary. The course is instructor led and highly interactive and therefore, instruction is capable of delving into topics of interest that are related to the presentation material to meet the needs of the student.

- Understand differences and similarities between cellular technologies
- Understand architectural elements of cellular networks
- Properties of various cellular standards
- Basic of cell phone hardware architecture
- Basic operational procedures in cellular systems

Dr. Kostanic joined Florida Tech in 2003 as an assistant professor. He teaches mostly graduate level courses in areas of RF propagation, Communication theory together to transport and manipulate analog signals with extremely low loss and tremendous bandwidth. But careful attention must be paid to the inherent noise and distortion that is introduced by the conversion of an analog signal to an optical signal and back. This talk examined the advantages and limitations of photonics in microwave systems. In particular, photonic-assisted microwave frequency conversion was presented as a solution for wideband down-conversion. In a traditional RF mixer, the combination of an RF signal with a local oscillator produces the desired IF, but it also produces undesired spurious signals that may fall in the IF bandwidth, causing a reduction in system dynamic range. The photonic approach provides an IF bandwidth with substantially reduced spurious products, and enables wideband frequency conversion with high dynamic range.
Farewell Luncheon for Visiting Professor Dr. Qiu

Dr. Ju Qiu recently returned to Jinan University, Zhuhai, China, after performing research related to smart grid power systems. Dr. Qiu was a visiting professor in the ECE Department for the past year.

ECE Student Selected as NASA Florida Space Consortium Ambassador for Florida Tech

Vincent Scotti will be holding a monumental role as a member of the first group of NASA Florida Space Grand Consortium (FSGC) Ambassadors. The Ambassadors’ primary mission will be to inform students at their home universities about opportunities available to them at NASA and the NASA FSGC. Their primary responsibilities involve communicating with space-related student organizations and participating in public outreach events. It is an exciting time for all of us in the state of Florida. With the advent of the commercialization of space, the boom in microgravity experimentation, and the evolving opportunities regarding space science for students, we are surely witness to a historical moment in human history.

ECE Students Competing in Cornell Cup Competition

The ECE department has a student team competing in the finals of the Cornell Cup robotics competition. The team consists of students, Robert Sheffield, Erica Tollett, Jamie Bales, Brandon Baxter, Josias Beaubrun, and faculty advisor, Dr. Kepuska. The team is developing a

and Wireless communication. Prior to joining FIT, Dr. Kostanic spent more than seven years working in wireless communication industry. He worked as a research engineer for Agilent Technologies, SAFCO Technologies and TEC Cellular.

The course starts May 6 and more information can be found at http://www.fit.edu/continuing-ed/course-listings/?cmd=course&id=PDP0590

ECE Faculty Present to Professional Development Workshop

Drs. Kozaitis and Kepuska presented half-day lectures on advanced signal processing, and speech processing in a professional development workshop at Florida Tech for a group of Chinese engineering faculty from Jiangxi Province, China. The group consisted of 30 faculty members from various universities in the province and one program coordinator. The faculty were here for three weeks and were selected due to their teaching and/or research accomplishments.

Dr. Syed Murshid Awarded Patent

Syed Murshid, professor of electrical and computer engineering at Florida Institute of Technology, was recently awarded a patent for his fiber optics system by the United States Patent & Trademark Office. The patent, titled, “Array of concentric CMOS (Complementary Metal-Oxide Semiconductor) photodiodes for detection and de-multiplexing of spatially modulated optical channels,” is the fifth awarded to Murshid in his distinguished career.

The process, dubbed spatial-domain multiplexing (SDM) by its developers, is believed to be a significant step for the future of fiber optics. The aim of the patented process is to improve the functionality of photodiodes which are used to convert light into electric current and adapt them to SDM applications. In 1997, Murshid earned his doctoral degree in electrical engineering from Florida Tech where he now teaches optical electronics, fiber optics, virtual instrumentation and electrical circuits courses. Prior to joining the Florida Tech faculty in 1999, Murshid worked for the
way to more efficiently search for life rafts or ships lost at sea. The project consists of designing an autonomous vehicle that will leave on a predetermined search pattern until a signal from an emergency beacon is received. Then, the vehicle will navigate to the target. When the source beacon is located, a home station will also be informed of the location of the beacon. The home station will send alerts to the search vehicle when it nearing its range limits or is entering dangerous territories.

More information on the Cornell Cup is at: http://www.systemseng.cornell.edu/intel/

The team’s blog can be found at: http://blogs.cornell.edu/cornellcup2013panther1/

Harbor Branch Oceanographic Research Institute on a research grant sponsored by the Office of Naval Research.

To learn more about Dr. Murshid’s research and patents visit www.fit.edu/faculty/profiles.