

The Wire

The Holcombe Department of Electrical and Computer Engineering

ECE welcomes new faculty in optoelectronics

The Holcombe Department of Electrical and Computer Engineering is pleased to announce the addition of two new faculty to COMSET and the Department of Electrical and Computer Engineering in the area of Optoelectronics. The department welcomes Dr. Lin Zhu from Caltech, and Dr. Sung-O Kim from National Chiao Tung University.

Lin Zhu received his Ph.D. in Electrical Engineering from Caltech in June 2008. He worked in the research groups of Professors Amnon Yariv and Axel Scherer. He received the MS degree in Electrical Engineering from Caltech in 2004, as well as the MS and BS degrees in electrical engineering from Tsinghua University in 2000 and 2003, respectively. He was the recipient of the 2007 IEEE LEOS Graduate Student Fellowship Award and the 2007 China National Award for Outstanding Overseas Students.

Lin Zhu's research interests include semiconductor lasers, periodic photonic structures, optical resonators and the hybrid integration of optical systems with microfluidic systems.

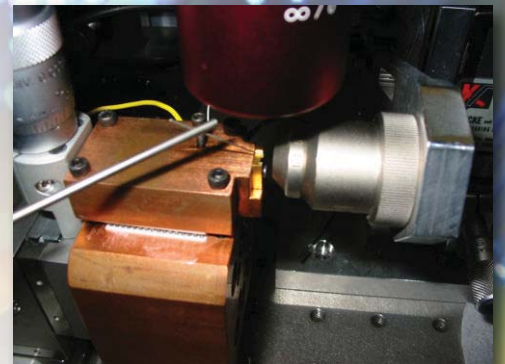


Dr. Sung-O Kim received the BS in electrical engineering from Howon University in 1996, and received the MS (with the presidential award) in 1998 and the Ph.D. in electrical engineering from Inha University in 2000.

After graduating from Inha University, he worked at Samsung SDI as a Technical Manager (2000-2001). During this time, he worked on thin films for plasma display panels while serving as an Assistant Professor at Howon University. From 2001 to 2004, he was a Postdoctoral Research Fellow at the University of Illinois at Urbana-Champaign (UIUC).

At UIUC, he worked on the development of micro-plasma and plasma display panels. In August 2004, he began to serve as an Assistant Professor in the Department of Photonics and Display Institute, National Chiao Tung University (NCTU).

His research interests include flat panel displays, micro-plasma devices, micro-fuel cells, flexible electronics, and plasma polymerization.



Above, a laser undergoes testing in Dr. Zhu's lab.

Two new Centers of Economic Excellence approved at Clemson

Clemson University received \$4 million from the South Carolina Endowed Chairs Review Board for two new Centers of Economic Excellence with endowed chairs for each of the programs. The state funding must be matched with private funds for a total value of \$8 million.

The Cyber-Institute Center of Economic Excellence at Clemson University combines faculty expertise in computer and electrical engineering with Clemson's growing computing power to create a strong research program, industrial partnerships and technology-transfer opportunities.

The center will enhance the university's competitiveness in research areas that rely on storage, processing and transmitting large amounts of data. Clemson expects the center to provide rapid computational prototyping

and to serve as an educational and testing facility.

The new endowed chair will be a faculty member in the department of electrical and computer engineering and will work collaboratively with Clemson Computing and Information Technology personnel. This collaboration between the academic department and the university's computer infrastructure was noted by the review board as a positive factor in the potential for success.

The Center of Economic Excellence in Optoelectronics will strengthen Clemson's photonics research program that exists in the Center for Optical Materials Science and Engineering Technologies. The proposed chair in electrical and computer engineering will lead the department's initiative in hiring additional optoelectronics faculty members.

The addition of a \$4 million chair to an internationally reputable program will enable Clemson to recruit a world-class faculty leader to the state and to the collaborative research environment that the review board noted as a particular strength of Clemson's proposal.

"Taken individually, these centers and associated chairs represent significant advancement in research strength for Clemson University," President James F. Barker said. "Together they show the kind of synergy we have come to expect from our interdisciplinary approach and an efficiency in combining our research strengths with the objectives and needs of the public and private sectors. We are very grateful that the review board saw the strength of these proposals, and we are eager to move forward with what they will enable us to do at Clemson."

Howle family establishes computing research chairs at Clemson



The C. Tycho Howle family has made a gift of \$2.5 million to Clemson University to establish two endowed chairs that will benefit computing research.

C. Tycho Howle is founder, chairman and CEO of nuBridges, LLC, a leading provider of software and managed services that protect sensitive data and enable digital information exchange.

The first chair is the hf (Howle family) Flagship Director of the School of Computing and the second is the hf Flagship Chair in Human Centered Computing within the Department of Electrical and Computer Engineering.

Holcombes give \$1 million gift to ECE

Milton W. and Betty Holcombe have added \$1 million to their support for electrical and computer engineering at Clemson. That boosts to \$6 million their total giving for the Milton W. Holcombe Electrical and Computer Engineering Department.

This latest gift establishes the Milton W. and Betty M. Holcombe Fund for Excellence to provide for programs such as undergraduate research for seniors and improved graduate education.



Faculty join ECE Department through joint appointment collaborations

ECE welcomes four new faculty who have joined the department through joint academic appointments with their home departments at Clemson.



Before joining Clemson University in fall of 2008, **Guigen Zhang** was an Associate Professor at the University of Georgia where he pioneered a bio-micro/nanotechnology program. Zhang has recently been appointed as deputy director of the Institute for Biological Interfaces of Engineering (IBIOE) at Clemson University. His research focuses on the development of new devices that combine microscale and nanoscale structures for use in tomorrow's sensors, testing systems and diagnostic

devices, as well as other applications.

Prior to coming to Clemson in 2007, **Jill Gemmill** spent over 25 years in scientific computation and visualization, real-time programming, internet network technology, middleware and e-security. As Executive Director of Cyberinfrastructure Technology Integration (CITI) she leads initiatives that enable new discoveries in research, teaching and service through integration of domain expertise with cyberinfrastructure.



Before joining the CITI group at Clemson University, **Barr von Oehsen** was employed by the Center for Advanced Engineering Fibers and Films, an NSF funded engineering research center, where he oversaw the research and development of finite element software for modeling polymer processes. As Director of Computational Science for CITI, he is responsible for directing and implementing High Performance Computing and High Throughput Computing application support and research.



David White's environmental research has focused on the effects of land-based activities and the relation to changes in biological communities. In his current position as Director of Data Management for CITI, Dr. White is continuing to focus on the development of advanced cyberinfrastructure to support scientific data collection and visualization. His most recent efforts are focused on the development of automated statistical-based modeling to perform quality assurance on real-time environmental data to identify sensor drift and outliers.



Xiao-bang Xu receives NSF Grant

Electrical and Computer Engineering Professor Xiao-Bang Xu has been awarded a National Science Foundation grant to study the electromagnetic scattering of 3-D objects buried in stratified earth. The \$283,814 grant resulted from a proposal to the Electrical, Communications and Cyber Systems division of NSF.

Dr. Xu's goal is to develop and then employ an efficient hybrid numerical technique based on pseudospectral time-domain (PSTD) method with Monte-Carlo simulation to investigate the scattering of an object buried in a stratified earth with multiple random rough interfaces.

This research may benefit society through a number of potential applications, including:

- geophysical exploration of mineral deposit, petroleum, and alternative energy resources such as geothermal spots;
- locating buried hazardous waste for environment protection;
- detection of subsurface targets such as landmines for protection of our troops;
- nondestructive testing of underground pipes and other underground facilities;
- microwave imaging of abnormal area embedded in multi-layer biological structures for detection of cancers;
- modeling of indoor wave propagation through multi-layer walls for wireless internet planning.

The graduate and undergraduate students working on this project will gain experience in the area of modeling and computer simulation and the development of numerical techniques. The research will also enhance three graduate courses.

Faculty and Staff News

Professor Ian Walker received the 2008 Alumni Award for Outstanding Achievement in Research.

The award is given annually by the Clemson Alumni Association to a faculty member who demonstrates outstanding ability and commitment to research.

Professor Walker, who joined the Clemson faculty in 1997, researches robotic manipulator systems. These systems include "trunk-like" and "snake-like" manipulators that can help robots navigate rough terrain, such as in search and rescue situations.



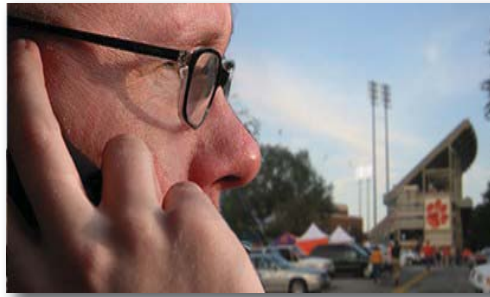
Pursley receives \$620,000 to research cognitive radio

Clemson Professor Michael Pursley, holder of the Milton and Betty Holcombe Endowed Chair in Electrical and Computer Engineering, has been awarded basic research grants totaling approximately \$620,000 from the Army Research Office and the Office of Naval Research to support long-term basic research in cognitive radio and dynamic spectrum access communications. Additional support for the research is being provided by MIT Lincoln Laboratory.

Many who have attempted to use a cell phone within or near a college football stadium during a game have experienced the frustration of repeated busy signals or dropped calls, which are two undesirable consequences of having too many communications devices attempting to use the same frequency spectrum at the same time.

Overcrowded frequency spectrum is also responsible for disruptions in wireless connections for laptop computers. An article in the Washington Post a few years ago described the frequent loss of internet access by laptop users in some urban neighborhoods, which proved to be caused by too many Wi-Fi access points in close proximity. The problems are even more complicated for Wi-Fi than for cell phones because Wi-Fi frequency spectrum is shared with Bluetooth devices, cordless telephones, bar scanners, and microwave ovens.

The consequences of overcrowded spectrum are more serious for U.S. forces engaged in peacekeeping operations in foreign countries. Not only is it critical for



The research in cognitive radio at Clemson University could lead to more reliable and efficient wireless communications.

our troops to communicate promptly and reliably among themselves, they must also communicate with allied units from other nations. Coalition forces from other countries may use frequencies that conflict with U.S. equipment, and civilian communications in the host country may interfere with U.S. communications devices.

The solutions being pursued for future commercial and military communications rely on intelligent communications devices, known as cognitive radios, that choose their own frequency bands rather than use the fixed allocations of spectrum that have existed since the early days of radio.

In the new paradigm, a cognitive radio is permitted to search for unused spectrum instead of being confined to a set frequency band. Unused spectrum exists, for example, as a result of broadcast TV channels that are idle in many parts of the country. Because different channels may be idle in different regions, a cognitive radio must locate the idle channels in its neighborhood and then use them without disturbing other communications

receivers.

Each cognitive radio will be able to gather information about its environment, modify its operation in response to the information, and share what it has learned with other cognitive radios. These smart communications devices are required to make intelligent decisions and learn from the consequences of their past behavior. In many situations, a cognitive radio will be required to detect the emergence of a new signal in the frequency band it is using and then vacate the band if the signal has higher priority.

The Army is sponsoring investigations of new techniques that will enable a cognitive radio to automatically adjust its communication signal as the radio's operating frequency is changed and then, while the radio is transmitting, adapt the signals to overcome increases in propagation loss and interference that often occur during a communications session. The Army funded research will also devise methods by which a radio will learn from its past experience and communicate in ways that preserve scarce communications resources for use by other devices.

Research on rapid design and evaluation methods for cognitive radio protocols is being conducted under Navy sponsorship. Such methods will eliminate the need for time-consuming computer simulations of radio receivers. The Navy is also supporting research on novel techniques that will permit a cognitive radio to simultaneously communicate in a frequency band and search for higher priority signals in the band.

ECE staff members (L-R) **Wendy Howard, Gale Black, and Lane Swanson** received staff awards at the 2008 College of Engineering and Science Awards Luncheon.

Gale Black received the Hattie B. Wagener Award, which is the top administrative staff award in the College of Engineering and Science. This award was established in memory of Hattie Boone Wagener, a long-time ECE secretary at Clemson University, to recognize outstanding administrative staff within the College of Engineering and Science. This is the second consecutive year that a member of the ECE staff was chosen to receive the Hattie B. Wagener Award.

Lane Swanson and Wendy Howard both received a Dean's Exceptional Staff Award. These awards are given to six administrative staff members in CoES who consistently go above and beyond the call of duty.



New staff members join ECE department

ECE welcomes Ms. Lillian Burns, who joined the department as an Administrative Specialist II, providing support to ECE faculty in the Fluor Daniel Building. Prior to joining the department, Burns was employed by Honeywell Nylon in Anderson, SC.



David Moline has also joined the ECE department this year. Moline is the new Technician Supervisor to the technical staff. Prior to joining ECE, he worked with the Mechanical Engineering Department at Clemson.

Collins named Associate Dean

Professor E.R. "Randy" Collins has been named Associate Dean for Undergraduate and International Studies in the College of Engineering and Science at Clemson University. He replaces Steve Melsheimer, who has retired after 15 years in the role of Associate Dean and 39 total years of service to Clemson.

"Dr. Collins' leadership role within the department has been exemplary, and he will bring this same level of quality to his new role as Associate Dean," said Esin Gulari, dean of the College of Engineering and Science. "This position is a pivotal role in coordinating all undergraduate programs within the college as well as developing our international studies abroad and exchange programs, which have been very successful."

Alumni News



Luke Henry (B.S. 2001), left, recently completed certification in the management of whiplash injuries with the Spine Research Institute of San Diego. Henry is a licensed chiropractic physician in South Carolina and North Carolina.



ECE Student Achievement

Graduate Students

Steven Boyd, MIT Lincoln Laboratory Fellowship

Ryan Craven, Alan Griffith Stanford ECE Graduate Fellowship

Adam Schreiber, Science & Mathematics for Research Transformation Fellowship (SMART)

Jason Ellis, South Carolina Graduate Incentive Fellowship

Michael Frye, MIT Lincoln Laboratory Fellowship

Crystal Jackson, National Science Foundation Fellowship & COES Dean's Fellowship

JaWone Kennedy, Southern Regional Education Board Fellowship

Christopher May, ECE Santee Cooper ECE Graduate Fellowship

Rebekah Schloemann, National Science Foundation Fellowship

Chase Pettit, Milton W. and Betty M. Holcombe ECE Scholarship

Nan Maung, COES Dean's Fellowship & John T. Mundy ECE Graduate Fellowship

Kenneth Rice, South Carolina Graduate Incentive Fellowship, 2008 Harris Award for the Outstanding Graduate Researcher recipient

Trey Shirley, 2008 Harris Award for the Outstanding Graduate Laboratory Teaching Assistant recipient

Nahid Alam, 2008 Google Anita Borg Scholarship finalist

Undergraduate Students

Kristen Wallis, Society of Women Engineers (SWE) scholarship recipient

Scott Gibson won first place in this year's Piedmont Section of the IEEE paper contest. **Michael Juang** won second place.

Josh Pelkey was named most outstanding senior in CoES engineering for 2008.

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The Wire

The Holcombe Department of Electrical and Computer Engineering

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