

Fall 2012

The Department of Electrical and Computer Engineering

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THE DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

FALL 2012



Dr. Guru Subramanyam

Chair's Corner

We had an exciting start to the new academic year as we welcomed our 102nd batch of first-year students, one of the largest in our recent history. Dr. Michael Wicks, a world-renowned expert in radar and signal processing, joined our department as the Ohio Research Scholar Endowed Chair in Sensor Exploitation and Fusion.

Over the summer, we were delighted to host a team including the chief technical officer of Agilent Technologies' component test division for potential research collaborations. Agilent also highlighted our department and yours truly in the faculty spotlight section of their website.

We are also in the middle of key changes to our undergraduate curricula, preparing for the

2013 Common Academic Program (CAP), which is replacing our existing general education program. As part of the curricular revisions, we plan to revise our integrated engineering core, as well as our concentration areas.

We are delighted to partner with GE Aviation's Electrical Power Integrated Systems Research and Development Center (EPISCENTER) in our curriculum development in the area of electrical energy systems. The EPISCENTER is scheduled to open in the spring of 2013. An electrical energy systems laboratory has been developed by professor Malcolm Daniels through funding received from The Dominion Foundation.

We continue to work with industry in our research with Cisco, Sony, Texas Instruments, Motoman

Robotics, L-3, Persistent Surveillance Systems, and GE, who are all actively involved with our department research activities.



We are also thankful for our alumni donations this year. I would like to especially thank the Vedig family for their generous donation of the state-of-the-art soldering station installed in the department. Future generations of ECE students appreciate your thoughtful gift. We invite our alumni to visit us and continue to be a part of the ECE family. These are exciting times in our department as we continue to grow in stature and reputation.

Calendar of Events

Thanksgiving Break

November 20-25, 2012

Christmas on Campus

December 7, 2012

Winter Graduation

December 15, 2012

Christmas Break

December 16, 2012–
January 13, 2013



Dr. Vorontsov Wins \$4.5 million AFOSR MURI Award

The electro-optics program has secured federal Multidisciplinary University Research Initiative (MURI) funds from the Air Force Office of Scientific Research (AFOSR), funding that will lead to new jobs at UD. The University will lead the \$4.5 million project, which includes the Air Force Institute of Technology (AFIT),

Michigan Technological University, North Carolina State University, New Mexico State University and the University of Miami. Currently, UD ranks 23rd nationally in sponsored engineering research and development. "The AFOSR MURI contract is significant. It also is great for Dayton because much of the funds--64 percent--and research will be at UD and AFIT," said Dr. Mikhail Vorontsov, principle investigator for the MURI.

Vorontsov's research has already spun off a new company, Optonicus, which is housed in the College Park Center, and employs 10 researchers and students. It is expected to hire more in the near future. Along with Optonicus, two other small businesses, Defense Engineering Corporation and UtopiaCompression, are collaborating with the electro-optics department.

Dr. Michael Wicks Inducted as Ohio Research Scholar Endowed Chair



Dr. Michael Wicks was inducted on September 28, 2012, as the Ohio Research Scholar Endowed Chair in sensor exploitation and fusion. In this role, he will be responsible for forging partnerships with industry, research centers and government labs, and advancing the regional, national and international stature of the University in this field.

Dr. Wicks received his M.S. and Ph.D. degrees in electrical and computer engineering from Syracuse University, followed by his M.A. in public administration, also from Syracuse University. Prior to his appointment at UD, Dr. Wicks worked for the Air Force Research Laboratory for more than 30 years as a research engineer, chief scientist, and senior scientist for sensors signal processing in the Sensors Directorate. While working as a

senior scientist he conducted, supervised and managed basic and applied research and development in sensor signal processing, specializing in the science and technology needed for superior air and space systems for intelligence, surveillance, reconnaissance, precision engagement and electronic warfare.

Dr. Wicks has pioneered the concept of knowledge-based radar signal processing and waveform diversity and has led national and international research teams in the design, development and fielding of novel algorithms, architecture and systems for remote sensing from space, air and surface platforms. He has also published more than 300 papers, reports, book chapters, books and U.S. patents.

How to be a Rockstar without Playing an Instrument

Recently, the University of Dayton magazine interviewed electrical and engineering department graduate, David Bradley '71 who helped invent IBM's first personal computer. His claim to fame is the invention of the three-key shortcut to restart a computer — control-alt-delete. It's made him a keyboard rock star in the computer world, where he's befriended fellow computer whizzes like Bill Gates and regularly signs autographs. He offers tips on achieving technological fame.

1. Give it your all, all the time While working on the System/23 Datamaster, IBM approached him to help develop the PC. "You never know when the best opportunity is going to come along, so always make sure you're doing your best."

2. Take shortcuts Bradley was fed up with restarting the personal computer every time it malfunctioned, and so control-alt-delete was born. "It took all of about nine steps and five to 10 minutes to code." Initially meant for programmers, the keystroke caught on with the public.

3. Bring a Sharpie Bradley prefers Sharpies — both black and silver — for autographing computer keyboards for his fans. "A guy from IBM has me sign 10 of them at a time that they give away as prizes during patent contests." Students also request his autograph.

4. Spread your knowledge In the last 30 years, Bradley has taught at Florida Atlantic University and North Carolina State University, and his daughter, Sara Higgins, is carrying on the Bradley legacy as an electrical engineer at IBM.

5. Reward yourself Bradley took an early retirement from IBM in 2006 and has been traveling the world with his wife since, but play was always a priority. "I would take three to four weeks off for trips every year. I like to think I struck a reasonable balance between work and family."



Fall 2012 ECE Centennial Distinguished Speakers



George Barbastathis (Fellow, OSA) joined MIT in 1999 and is a professor of mechanical engineering. He was educated at the National Technical University of Athens and Caltech and has worked with as a visiting scholar at the University of Illinois at Urbana-Champaign, Harvard University, the Singapore-MIT Alliance for Research and Technology (SMART) Centre and the National University of Singapore. His research interests are 3-D and spectral imaging, phase estimation, and gradient index optics theory and implementation with subwavelength patterned dielectrics.



Shoji Tominaga (Fellow, IEEE, IS&T, SPIE) is a professor and dean at the Graduate School of Advanced Integration Science, Chiba University, Japan. He received his B.E., M.S., and Ph.D. degrees in electrical engineering from Osaka University, Japan, in 1970, 1972 and 1975, respectively. From 1976 to 2006, he was at Osaka Electro-Communication University, Japan. He was a visiting scholar at the psychology department at Stanford University from 1987 to 1988. In 2006, he joined Chiba University. His research interests include digital color imaging, visual information processing, multispectral imaging and color image rendering. He is now an editorial board member of *Color Research & Application*, an associate editor of the *Journal of Electronic Imaging*, and co-chair of the Computational Color Imaging Workshop.



Rajesh R. Naik (Fellow, AFRL, SPIE) is currently the biotechnology research team leader for the Materials and Manufacturing Directorate at the Air Force Research Laboratory (AFRL). He received his Ph.D. in molecular and cellular biology at Carnegie Mellon University in 1998 and was a Howard Hughes Fellow at the Center for Advanced Biotechnology and Medicine at Rutgers (1998-1999). His research group focuses on biomimetic materials, sensors and bionanotechnology. Dr. Naik has authored more than 160 peer-reviewed publications and has several patents. His awards include the Vince Russo Award for Leadership Excellence, 2007 Air Force Outstanding Scientist, Air Force Office of Scientific Research Star Team (2005, 2009, 2011) and the John L. McClucas Basic Research Award (2012).

2012 Faculty Award in Scholarship Given to Dr. Banerjee



Dr. Partha Banerjee has been awarded the 2012 Faculty Award in Scholarship, which is given to only two faculty members who have made distinguished contributions to scholarship and teaching. Dr. Banerjee is an outstanding and

highly productive faculty member in the department of electrical and computer engineering and the electro-optics program. He joined the University of Dayton in 2000, serving as chair of the ECE department from 2000 to 2005.

Dr. Banerjee has been internationally recognized for his work in acousto-optics, photorefractives, nonlinear optics, holography and metamaterials. Dr. Banerjee organized the Optical Society of America's international meeting on digital holography in 2010 and has been on its technical advisory committee since its inception. His work with digital holography has been funded by the Air Force and Army and

opened the door to extensive collaboration with LOCI, which works on LIDAR or laser radars.

The first negative index material working in blue light using binary co-sputtered nanoparticles, funded by DARPA, was recently developed and tested at UD. This is a wonderful example of a collaboration with researchers from electro-optics, physics, electrical and computer engineering, materials and UDRI. Within the last six years alone, Dr. Banerjee has brought in grants and projects totaling in more than \$2.5 million. Dr. Banerjee received the Sigma Xi excellence in research award in 2003. To date, he has published five textbooks, more than 120 refereed journal papers and more than 150 conference papers and presentations. He also holds one patent. He serves on many technical committees and is a topical editor of *Applied Optics*. Dr. Banerjee recently was named a Fellow of the Institute of Physics, a prestigious scientific society. He also was recently chosen to receive the best researcher award from the Affiliate Societies Council of Dayton. Dr. Banerjee discusses his work in a video at youtube.com/watch?v=R3mCSVf-u3c.

Beloved Professor Gauder Passes Away



It was with great sadness that Dr. Saliba shared the news of Professor Charles (Chuck) Gauder's passing on Friday, August 3, 2012. Professor Gauder began his career in 1956 in the United States Air Force and then entered into civilian services for more than 30 years at WPAFB. He came to the University of Dayton in 1985 as an associate professor in electrical engineering. Following retirement in 2005, he continued to teach part time until 2012. While at UD, professor Gauder set up the advanced ham radio laboratory, which was used by many students. He was loved by many students and voted "favorite professor" numerous times.

He was one of the pioneers responsible for making soccer popular in the Dayton area. Chuck always volunteered his time to UD and the soccer community. He was one of the first to honor Bernie Schmidt with a donation to the Bernhard M. Schmidt Electrical Engineering scholarship fund. Professor Gauder will truly be missed at the University of Dayton, but his legacy and contributions live on.

NSF Nanotechnology Undergrad Education

The University of Dayton and Sinclair Community College are collaborating to encourage young adults to pursue careers in the engineering field. The National Science Foundation has given the two schools \$200,000 grants for the next two years to raise awareness among undergraduates and high school students about career opportunities in the nanoscience industry.

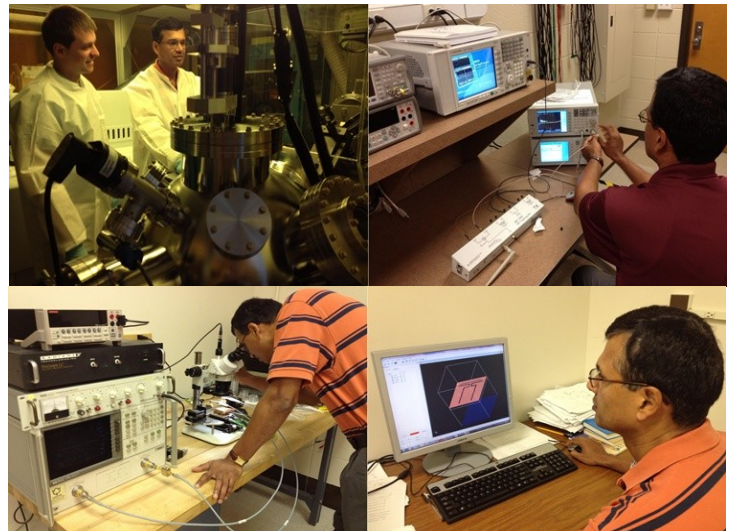
Andrew Sarangan, associate director of UD's electro-optics program, and Surinder Jain, coordinator of Sinclair's engineering university transfer program, will develop a program to connect high school students with industry partners. They will offer learning activities that include interactive laboratory and clean room experiences, provide workshops for high school science teachers and create nanotechnology internship opportunities. For the first time ever, the School of Engineering is offering an introductory course in nanotechnology, something the faculty see as a great addition to the engineering courses offered. Sarangan's participation in UD's electro-optics program has attracted nearly \$2.58 million in research and three new companies to the area in the past year.

Agilent Technologies Highlights Dr. Guru Subramanyam and our ECE Laboratories

Agilent Technologies has honored professor Guru Subramanyam with a faculty spotlight article featured on their website. The article also brought attention to the outstanding ECE Department. The University of Dayton's undergraduate ECE program has five fully functional laboratories that would be the envy of any engineering program. Each lab supports a specific course, including circuits and devices, electrical systems, digital systems, communications and robotics. These labs are also equipped with the latest test and measurement equipment from Agilent. The digital systems lab, for example, features Agilent oscilloscopes, logic analyzers, arbitrary function generators, power supplies and multimeters.

UD was one of the first Agilent customers to purchase the Agilent Series InfiniiVision 2000 and 3000 X-Series MSO oscilloscopes when they were introduced in 2011 and were installed in the communications lab. "Visitors to our laboratories see right away that we have a strong partnership with Agilent," states Dr. Guru Subramanyam, professor and chair of the electrical and computer engineering department. Dr. John Loomis, an associate professor in the ECE department adds, "We've used Agilent equipment (and Hewlett-Packard before Agilent was spun off in 1999) for as long as I can remember. "

"Not surprisingly, our labs are a popular place for UD ECE students", Dr. Loomis adds. Approximately 230 undergraduate electrical and computer engineering students make use of the labs, getting excellent hands-on experience. In addition, the USB connectivity feature on most Agilent equipment enables students to access measurement data via their laptop. "We were one of the first schools to deploy this learning model over 10 years ago," notes Dr. Subramanyam. Approximately 100 master's students and 50 Ph.D. candidates round out the program.



CPE Student Isolde Hannan Named A10's Offensive and Defensive Player of the Week

The Atlantic 10 conference honored sophomore Isolde Hannan with both the Offensive and Defensive Player of the Week titles. Hannan is also a computer engineering major who excels in the classroom and on the volleyball court. This marks only the second time in conference history that the same person was named both Offensive and Defensive player of the week. She totaled a team high 25 kills and a .676 hitting percentage, earning her the Offensive Player of the Week Award. The Dublin, Ohio, native captured the defensive award by recording 14 total blocks for a per-set average of 2.33. She had a season high of 11 blocks against Temple, recording a double-double in kills and blocks to keep Dayton tied for first place in the league standings.



Happy Retirement Marilyn Knisley!

Marilyn Knisley retired from the ECE department June 30, 2012, after almost 25 years of service within the School of Engineering. She joined UD in 1987 as a technical secretary for the Research Institute. In 1993, she became the administrative assistant to the associate dean of graduate engineering and research, and from 2007 to 2012, she served as the administrative assistant in the ECE department. In retirement, Marilyn is spending more time doing what she enjoys: reading, hiking, biking, traveling and, most of all, spending quality time caring for her beloved family.

Welcome Nancy Striebich to the ECE Dept.

ECE's new administrative assistant is Nancy Striebich, who joined the department on July 2, 2012. She has been at the University since 2007, serving as a part-time administrative assistant in the mechanical and aerospace engineering department. Nancy is a UD grad herself and has three children following in her footsteps at UD, with a 2011 grad and future 2013 and 2016 grads. When not at work, she enjoys cooking, gardening, hiking and spending time with family and friends. We are thankful for the 25 years of service that Marilyn provided and are grateful to have Nancy as a new addition to our department!

Passing of Professor Emeritus Reinhold Kubach

Born in Germany in 1919, Mr. Reinhold Kubach received a bachelor's degree in electrical engineering from the Staatliche Ingenieurschule Esslingen in Germany and came to the U.S. in 1950. He earned a master's degree in engineering from UD in 1966. Initially he worked with the University of Dayton Research Institute and later became a faculty member in electrical engineering. Professor Kubach started at UD in 1958 and retired 31 years later, in 1989.

According to Dr. Moon, "He was truly an 'old school' teacher who demanded that his students strive for perfection in his electronics classes. Students tended to think of him as an extremely hard task master as they were going through his classes; however, we always received feedback after their graduation that his tasking served them well as graduate design engineers."

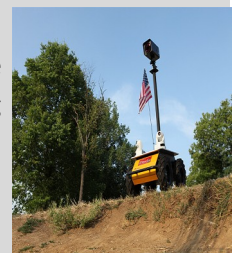
New First Responder

Sending medical first responders into battle may be getting a little safer thanks to research at the University of Dayton. Researchers are developing robots that possess facial-recognition capabilities that can be air-dropped into dangerous areas, reducing the danger to humans susceptible to ambush by enemies posing as wounded.

"There are a lot of wounded people on the field, but you want to bring home the right person. How do you know if they're on the right side? You don't want to send another soldier, but we can send a robot," said Vijayan Asari, Ohio Research Scholar in wide-area surveillance in the School of Engineering.

Asari said his group has been working on developing "sight" capabilities for robots to detect wounded individuals that will be later taken to medical facilities at Old Dominion University's Reidy Center for wound healing. They received \$1.6 million for the first phase of a project that started in 2009 for the Telemedicine & Advanced Technology Research Center. The center is part of the U.S. Army Medical Research and Materiel Command.

The machines would first remove all environmental distractions and then identify that the injured is indeed a human. "Once you have a clear picture of the face, recognition can happen in milliseconds," Asari said. If the robot identifies the soldier as the correct one by crosschecking his or her features with a database, the robot will go closer to assess whether it can evacuate the injured soldier or if a full rescue crew needs to be dispatched.



Awards, Honors, Promotions

Dr. Mikhail Vorontsov and his team in the electro-optics program received a Multidisciplinary University Research Initiative (MURI) grant award of \$4.5 million. The topic of the research is “*Wave Optics of Deep Atmospheric Turbulence: From Underlying Physics Towards Predictive Modeling, Mitigation and Exploitation.*”

Theus Aspiras and **Vijayan K. Asari** received the Best Paper Award at the International Conference on Information Processing held in Bangalore, India. The title of the paper was, “*Analysis of Blind Source Separation Techniques for Eye Artifact Removal*”.

The Dr. Krishna M. Pasala Memorial Scholarship fund has been established by IEEE for awards to our graduate students starting in the 2012-2013 academic year.

May and August 2012 ECE Doctoral Graduates (with dissertation)

Huthaifa A. Alissa - “Position-Adaptive Direction Finding for Multi-Platform RF Emitter Localization Using Extremum Seeking Control”

Mohammed A. Al-Saedi - “Examination of Acousto-Optic Chaos and Application to RF Signal Encryption and Recovery”

Alan L. Jennings - “Autonomous Motion Learning for Near Optimal Control”

Lewis Ross - “Automated Growing Rod for the Treatment of Juvenile Scoliosis”

Jian Zhu - “Access Control for Cross Organizational Collaboration”

ECE Graduates – May and August 2012

MS Degrees Awarded

Khalid Alharbi	John D. Reynolds
Abdulrahman Alturki	Kenneth Stapp
Theus Aspiras	Paul O. Sundlie
Wu Cheng	Siva Ramya Vasa
Tulasi Cherukuri	Jingxuan Wang
Michael Corwin	Yiyang Wang
Saiprasanth Devarakonda	Bo Wen
Shashika Enamanagandla	Sean C. Young
Karthik Kumar Gopalapuram	Chenhao Zhang
Abhinav Kundur	
Junchen Lu	
John McNichols	
Avinash Mukkala	
Sandeep Reddy Mukkisa	
Abhinav Peddi	

BS and BE Graduates

Tanner Adams	Cameron Lowe
Abdullah Almeqdad	David Malloy
Daniel Andres	Joseph O’ Brien
Andrew Beatty	Michael Rucci
Alex Beigh	Kyle Santho
Adam Clutter	Andrew Scherbauer
Joshua Dimauro	Joseph Silk
Matthew Donovan	Alan Smith
David Felix	Eric Stein
Alexandros Frangopoulos	Fangzhou Sun
Matthew Hagenbach	Ryan Taylor
Joseph Haglage	Michael Velker
Timothy Hartnett	John Wedig
Sara Helton	Tyler Wertz
Patrice Lalor	Daniel Whitehead
Jeffrey Layton	

