



## CALENDAR OF EVENTS

Winter Break  
December 14 – January 10

Spring Semester Classes  
Begin  
January 13, 2014

Martin Luther King Jr. Day -  
No Classes  
January 20, 2014

Midterm Break  
March 5-10, 2014

ECE Industrial Advisory  
Committee Meeting  
April 2014

Bro. Joseph W. Stander  
Symposium-Alternate Day  
of Learning  
April 9, 2014

Easter Recess  
April 17-21, 2014

Doctoral/Graduate  
Commencement Exercises  
May 3, 2014

Undergraduate  
Commencement Exercises  
May 4, 2014

## THE DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

FALL 2013

### CHAIR'S CORNER *Dr. Guru Subramanyam*

It's my pleasure to update you on some of the exciting things that are happening in our department. This academic year started with our own Michael Wicks receiving the IEEE Dennis J. Picard Medal for his contributions in radar and radar applications. Wicks and his team are working very hard in making the new Center of Excellence in Distributed Sensing a reality in the Mumma Radio Lab. Our enrollment continues to grow, with 270 total undergraduates and 210 graduate students — including a record 60 Ph.D. students — enrolled this fall term. In August, a paper presented by our Ph.D. student Chris Yakopcic won the best paper award in the IEEE International Joint Conference on Neural Networks (IJCNN) held in Dallas. This is an outstanding achievement, as we competed against close to 400 papers in the premier international conference

organized jointly by the IEEE Computational Intelligence Society and the International Neural Network Society. Four of our faculty members, Keigo Hirakawa, Andrew Sarangan, Vijayan Asari and Tarek Taha, received three-year NSF awards, which started this year. Several of our faculty members were recognized by professional societies as fellows this year, including Peter Powers and Qiwen Zhan, who were recognized by the Optical Society. We also welcomed Weisong Wang to our department, specifically for the new Center of Excellence for Thin-Film Research and Surface Engineering (CETRASE). Wang comes with several years of industry experience. He will support our research activities in CETRASE and support our industry-funded capstone design courses in the Innovation Center.

We are proud to report



that our department had 100 percent placement this year, making it the fourth year in a row. Our students went to graduate schools including the University of Michigan; University of California, San Diego; Johns Hopkins; Ohio State; Arizona; The University of Texas; and of course our own department. We are also thankful for our alumni donations this year, and future generations of ECE students appreciate your thoughtful gifts. 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 recognition around the world.

### IEEE S-PAC EVENT BRINGS TOGETHER STUDENTS AND LOCAL PROFESSIONALS

On October 30, the University of Dayton IEEE student section hosted a Mini S-PAC (Student Professional Awareness Conference) in collaboration with the IEEE Dayton PEAL Society. The event brought together both students and local professionals for an evening lecture on the topic of professional networking. The speaker for the event, Jim Watson, P.E., gave his presentation titled "In Search of Diamonds," which focused on the importance

of networking and nontechnical skills for professional development. Additionally, a panel discussion was held during the event featuring panelists from local companies including GE, Motoman and UDRI. More than 50 people — including students from the University of Dayton and Cedarville University — attended the event. A practice networking session was held at the end of

the event to give all students in attendance a chance to network with each other as well as the panelists and other professionals from the Dayton area.



## UD VISION LAB DEVELOPS PIPELINE MONITORING SYSTEM



With more than 2 million miles of pipelines spanning the U.S. — impacting virtually every community — the need for advanced technologies to ensure safe operation is essential. Vijay Asari, Ohio Research Scholar in

Wide-Area Surveillance at the University of Dayton, and researchers in his Vision Lab are working on an automated monitoring system to quickly identify threats or damage to pipelines and relay information to pipeline operators and first responders. “Since none of the area through which pipelines run are to be used for other construction activities, it needs to be monitored whether the right of way of the pipeline is encroached upon at any point in time,” Asari explained.

Although rapid advancements have been made in the areas of camera and sensor technology, there is still work to be done. The main objective behind Asari’s work is to enhance pipeline images to help workers better monitor them. Prevention of pipeline leaks will help save surrounding habitats from devastation. In addition to habitat destruction, “losses worth several million dollars are incurred by pipeline companies when pipeline leaks or damages occur, due to the intrusion of heavy equipment and machinery on the pipeline right-of-way,” Asari said.

The Vision Lab is also currently developing algorithms for real-time applications in numerous fields with the hopes of attracting large companies interested in the project that will ultimately create new jobs. Asari said, “Simultaneously, we are also planning to develop oil leak detection, pipeline damage detection and natural resources damage detection techniques for the protection of our natural resources and to provide safety to our people and facilities.”

## ADVANCED PHOTOVOLTAICS CLASS VISITS SOLAR FARM



Students taking ECE 583 Advanced Photovoltaics decided that sunny weather in early October was too nice to spend the day in a classroom and chose instead to continue learning about renewables on a farm. A solar farm, that is. Together with their professor, Elena Gulianti, graduate students visited the largest solar facility in Southwest Ohio, a 1.1-megawatt solar array with 9,120 solar panels that are made of amorphous silicon. Dayton Power & Light’s \$5 million project is housed on 7 acres near the Yankee Street substation in Washington Township. As state energy legislation calls for 25 percent of all energy consumed by Ohioans to be from alternative energy by 2025, incorporation of renewable energy studies in the ECE curriculum becomes more important. The class also had a full tour of the power substation, thanks to Michael McKinney, DP&L engineer and ECE graduate student.



## SUPPORTING CRITICAL ENERGY

First-year electrical engineering major William Sember worked over the summer for a power-electronics company outside of Milwaukee, Wis. The company makes equipment that provides backup power for hospitals and houses and stabilizes power from wind farms, Sember said. One of Sember’s major accomplishments was to create a computer program that helped automate the company’s testing procedure to make sure the equipment was working correctly.

“After I had been working for a while,” Sember said, “I found out that some of the company’s equipment was providing backup power for antennas NASA is using to communicate with

the latest Mars rover. My program isn’t involved in testing those units, but it may be involved in testing similar things in the future. The revelation really excited me.”

Sember said that despite the fact that he had to learn an extensive amount about a computer programming language without much guidance from his superiors, he learned an invaluable lesson about trusting his instincts and making decisions on the spot.

“We don’t know what we can achieve until we are thrown into completely new situations that toss us around, test us forwards and backwards, shake us a bit, encourage us and leave us surprised at the talents God has given us.”



## MICHAEL WICKS AWARDED IEEE DENNIS J. PICARD MEDAL

Michael C. Wicks, professor and Ohio Research Scholar Endowed Chair in Sensor Exploitation and Fusion at the University of Dayton, was awarded the IEEE Dennis J. Picard Medal for Radar Technologies and Applications. His pioneering signal processing techniques changed the face of modern radar engineering, enabling advanced air and space radar systems for intelligence, surveillance and reconnaissance important to national security. An innovator of many new radar signal processing techniques, Wicks is most well-known for development of knowledge-based space-time adaptive processing (STAP). STAP improves target detection in environments where interference such as clutter and jamming exists. To overcome the limitations of traditional STAP, Wicks developed algorithms that can incorporate "prior knowledge" such as digital terrain maps and real-time and archival data to improve radar performance. He has also been a driving force in waveform diversity, which has provided the foundation for fully adaptive radar. Waveform diversity extends adaptivity to the transmit signal, where it can be

varied depending on the target and interference environment. He has also investigated problems in weak signal detection, distributed radar and detection of targets that are covered or concealed.



An IEEE fellow and U.S. Air Force Research Laboratory fellow, Wicks' many honors include the 2009 IEEE Warren D. White Award for Excellence in Radar Engineering. Wicks retired from the U.S. Air Force in 2011 as senior scientist for sensors signal processing at the Air Force Research Laboratory in Rome, N.Y.

## UD VISION LAB DEDICATED

By Shannon Miller

In the University's Vision Lab, faculty and students are developing new, cutting-edge software and hardware for real-time applications in signal processing; image processing; computer vision; pattern, facial and behavior recognition; artificial neural networks; and biomimetic object-vision recognition.

Located on the fourth floor of Kettering Laboratories, the Vision Lab held a blessing and dedication July 12 for its expanded space and its new designation as a Center of Excellence for Computer Vision and Wide Area Surveillance Research. During the event, attendees from the campus community toured the facility and watched as faculty and students explained their research.

Current projects include an automated monitoring system to quickly identify threats or damage to more than 2 million miles of pipeline in the United States and relay information to pipeline operators and first responders.

The Vision Lab employs seven faculty members and has 16 collaborating faculty from other UD departments and outside institutions. Fourteen doctoral students, eight master's degree students and seven undergraduates are completing work in the lab.

"The Vision Lab is truly a center of excellence," said Vijay Asari, Ohio Research Scholar in Wide-Area Surveillance and Vision Lab director. "It holds excellent opportunities in needed technologies to bring positive change to our campus."



## PRCI FEATURED AT OPENING CEREMONY FOR UNIVERSITY OF DAYTON VISION LABORATORY CENTER OF EXCELLENCE

Pipeline Research Council International (PRCI) President Cliff Johnson was invited as the featured speaker at the Vision Lab's opening ceremony held on July 12. PRCI has been working closely with the University for the past 12 months on the development of advanced algorithms for automated detection and identification of third-party damage threats on pipeline right-of-way (ROW) corridors and surrounding areas as part of the PRCI Right-of-way Automated Monitoring (RAM) Program.

PRCI's RAM Program team developed a structured data collection and analysis process in early 2013 and performed a number of flight tests with standard pipeline patrol aircraft and imagery capture systems using the process. The data collected using the technology systems were analyzed using the Vision Lab's automated threat detection algorithms and showed

improvements when compared with the analysis completed in 2012 using the same patrol technology systems.

The algorithms developed by UD are detecting more than 80 percent of threats staged on the pipeline ROW corridor, and these improvements are largely related to further development by the University on data classification screening applied by the algorithms to account for shadows and lighting variation.





**Algadey's certificate for his Newport Research Excellence Travel Award.**



**Almehmadi at the SPIE annual meeting and IEEE Photonics Conference.**



**Assistant Professor Eric Balster welcomed a beautiful baby girl, Abigail Ann Balster, born on Oct. 30, 2013, and weighing 7 pounds, 14 ounces.**



**The best paper award given to Yakopcic, Taha, Subramanyam and Pino.**

## AWARDS

- Tarig Algadey, a doctoral student working under Professor Monish Chatterjee, was awarded a Newport Research Excellence Travel Award. He was nominated for the award at SPIE's annual meeting. Algadey presented his paper and received his award at the IEEE Photonics Conference in Seattle, Wash.
- Fares Almehmadi, who personally presented two contributed papers at the SPIE annual meeting and the IEEE Photonics Conference, was also selected as a student volunteer to assist with technical and visual aid at the conference.
- Professor Andrew Sarangan received the Affiliate Societies Council of Dayton award for research in April 2013 and was also awarded a 2013 Faculty Excellence in Teaching Award from SOCHE, the Southwestern Ohio Council for Higher Education.
- Professor Qiwen Zhan was recently elected a fellow of The Optical Society. He is being recognized for "seminal contributions to the development of new optical polarization engineering techniques for controlling light-matter interactions on the nanometer scale." Zhan also recently became a fellow of SPIE. He is currently interested in utilizing modern fabrication tools to achieve subwavelength spatial engineering of light wave properties and subsequently manipulate the light-matter interactions on the nanometer scale for nanoscale imaging applications.
- Computer engineering major Ashley Demange is one of three members of UD's 2013 programming team for ACM's "So You Can Program?" regional contest. Demange is the first female and CPE major to represent UD.
- Ph.D. student Chris Yakopcic, Associate Professor Tarek Taha, Professor and Chair Guru Subramanyam, along with Robinson Pino of the Air Force Research Laboratory in Rome, N.Y., won the best paper award for "Memristor SPICE Model and Crossbar Simulation Based on Devices with Nano-second Switching Time" at the International Joint Conference on Neural Networks held Aug. 4-9, 2013, in Dallas, Texas. The conference is jointly organized by the IEEE Computational Intelligence Society and the International Neural Network Society.

## ECE GRADUATES: DECEMBER 2013

### B.S./B.E. DEGREES AWARDED

Danielle Bane  
Michael Barnard  
Robert Barnes  
Derek Bippus  
Rafael Cajigas  
Alex Court  
Brandon Gunn  
Anan He  
Kevin Krucki  
Kyle McBrady  
Rebecca Price  
Ryan Rossi  
Imani Sherman  
Sarah Struckman  
Yihao Tong  
Nina Varney  
Nicholas Wright  
Yuan Zhang

### M.S. DEGREES AWARDED

Tanner Adams  
Jason Cain  
Ruiwen Chen  
Thanigasalam Chettiyar  
Chinmay Dhavale  
Ouboti Djaneye-Boundjou  
Abdelbaset Elhangari  
Linan Feng  
Xiaoyuan Jia  
Thaddeus Marrara  
Nihal Pantangi  
Bhavinkumar Patel  
Jaya Chandra Ramadugu  
Ramya Sangam  
Chad Shaffer  
Damon Stachler  
Di Wang  
Daniel Whitehead

Xingsheng Xu  
Nikitha Yelimereti  
Ye Zhang

### PH.D. DEGREES AWARDED

Nilesh Powar  
Varun Santhaseelan