

## STEM Teachers Attend Sustainable Energy Summer School

Students aren't the only ones who attend summer school. In June, thirty-five middle and high school teachers in the science, technology, engineering and math disciplines traveled to Ohio State to learn about topics ranging from smart lighting to clean coal to the future power grid during a sustainable energy workshop. The two and one-half day workshop included hands-on engineering activities and tours, and equipped participating teachers to bring those activities and newly acquired knowledge back to their classrooms.

"We wanted to educate high school teachers about energy and the engineering process and, while doing so, we also hope to change their perception of engineering," said Betty Lise Anderson, professor of electrical and computer engineering at Ohio State and workshop coordinator. "After all, K-12 teachers are one of the most important factors in developing the needed science and technology workforce of the future."

ECE faculty and researchers from American Electric Power, among others, covered electric power basics, the smart grid, photovoltaic, wind and clean coal technologies; smart lighting and the future power grid. Workshop participants also toured several campus and AEP labs, including Ohio State's High Voltage and Power Electronics Laboratory, and the Clean Coal Research Facility.

Participating teachers represented schools from all corners of the state, including high-need schools such as Linden-McKinley 7-12 STEM in Columbus and Rosemore

Middle School in Whitehall.

The workshop—which was sponsored by the Department of Electrical and Computer Engineering and American Electric Power, under a grant from the US Department of Energy—received high marks from teachers.

"[The workshop] was what I expected and more. Each day was very high energy and exciting," wrote one participant in the workshop evaluation. "The knowledge download was overwhelming in a good way." •

*Written by Candice Clevenger  
Photos by Christopher Toothman*



*Above: Debra Cummons-Parker from Fairlawn High School in Sidney, OH, learns to build a DC motor. It's a project that she can take back to her classroom and show students how to build themselves. Left: At the new west campus substation, Prof. Don Kasten explains to the STEM teachers the process by which electricity comes to the substations and is 'stepped down' before it can be directed out to the end users at a safe level.*



## Attention Job Hunters & Employers

Introducing ECE Jobline: We recently launched ECE Jobline, a free service connecting ECE alumni and student job seekers with employers who are seeking experienced employees for positions in the field of electrical and computer engineering. View current openings and post positions free of charge at <http://ece.osu.edu/alumni/ecejobline>.

Find us on Facebook:  
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## Remaining at the Frontiers of Education and Technology



*Prof. Robert Lee*

This year has been one of great apprehension in the department as we waited to hear how state budget cuts would affect the university. I spent a great deal of my time making sure that the financial health of the department remains as strong as possible in preparation for any budget cuts. I also developed contingency plans for all possible levels of budget cuts to protect our core mission of educating students and performing research. Fortunately, the budget cuts were not nearly as bad as they could have been, and I would like to thank Governor Kasich for recognizing the importance of Ohio's universities as an economic engine for the state. Many of the high technology jobs that exist in the state and the nation are a result of the ingenuity and hard work of the outstanding department alumni and faculty of the past century. Although many of our students do remain in Ohio and are actively involved in job creation either through entrepreneurship or corporate expansion, we do not consider improving the state and national economy to be one of the department's missions; however, we should begin to think

about and determine the implications, both positive and negative, of such a mission.

The first offering of our new sophomore course sequence has been a great success (see related article). Prof. Furrukh Khan received the College of Engineering Boyer Award for educational innovation and the MacQuigg Award for teaching excellence from the students for his efforts. Learning technology played a major role in the successful offering of these courses, and it is becoming very clear that this technology will become an important complement to the standard approach of a professor lecturing in the front of a class. The curriculum revision of the sophomore sequence is not an isolated event, but rather a jumping off point for the revitalization of the entire core undergraduate program. The lessons we learned in redoing the sophomore courses will be used to dramatically change how we teach microprocessors, sustainable energy systems, and embedded systems. The development of these courses will be completed this coming year.

The research expenditures for the 2010-2011 academic year increased dramatically compared to the previous year from \$16 million to \$24.7 million. This increase was expected because of the large research awards won in the previous two years. The funding was not only for direct research work, but also for research infrastructure, which will be critical as we look to expand the department's research activity in the future.

*"...we do not consider improving the state and national economy to be one of the department's missions; however, we should begin to think about and determine the implications, both positive and negative, of such a mission."*

There are many research and education activities going on in the department; too many to describe here, so I will just mention three education/research initiatives that will have significant impact on technology innovation in this country.

The first is our effort to make our power program among the best in the nation. Professors Longya Xu and Jin Wang are spearheading this effort. They, along with other faculty, recently received \$3 million from the state of Ohio to create the Center for High Performance Power Electronics (CHPPE) and \$2.5 million from the

Department of Energy to establish an innovative undergraduate and graduate curriculum in smart grid technology. Second, Prof. John Volakis led an effort to win \$8.5 million from the state of Ohio to establish an endowed professorship in sensing and to improve infrastructure in

ECE. These funds were used to provide partial funding for the new Electro-Science Lab building and renovate a floor of Dreese Lab for sensor-related research. This funding allowed us to hire Professor Chris Baker to lead our research and education initiatives in radar systems, and we will soon establish a master's degree concentration focused on radar systems. The third initiative is on terahertz sensing. Prof. Volakis was able to win \$3 million from the state to develop a terahertz center within ECE. This center has already paid dividends, allowing a multi-university team (with OSU's team led by Prof. Siddharth Rajan) to win the \$5 million prestigious Department of Defense Multi-disciplinary University Research Initiative award in terahertz sensing.

These are exciting times for the department as we continue our efforts to remain at the frontiers of education and technology. •

### Did You Know?

In the 2010-2011 academic year, the Department of Electrical and Computer Engineering granted 124 BSECE degrees (95 electrical engineering and 29 computer engineering), 72 MS degrees, and 40 PhDs.

*Written by Robert Lee, ECE Chair*

## ECE Retirees Recognized for Many Years of Service



*Prof. Emeritus Donald Kasten*

Don Kasten came to OSU in 1976 as the Battelle Visiting Assistant Professor in the area of power systems, later becoming Associate Professor in 1982.

In addition to mentoring students, conducting research, and teaching power courses, Don was in charge of the Electric Machinery Lab and the Power Systems Relaying Lab. Before retiring in June 2011, he also spent many hours as the department's transfer credit evaluator.

Don has traveled to Honduras numerous times to work with missionary friends, doing tasks such as wiring a school and building a dam for a small hydroelectric.



*Prof. Emeritus Charles Klein*

Chuck Klein came to OSU in Autumn 1976. He has done research for DARPA, NSF, and the Cray Corporation in topics spanning the range of antenna design, underwater acoustics, walking machines and kinematically redundant robots. He primarily teaches in the computer area but has also taught circuits and robotics classes. Many of the papers with his MS and PhD students are well-cited in the literature.

Chuck retired from the full professor position at the end of Spring 2011 and will be returning to the department this autumn to teach as an emeritus professor.



*Prof. Emeritus Steven Yurkovich*

Steve Yurkovich came to OSU in 1984 where he taught, conducted research, and mentored graduate students. He is the author of more than 250 technical publications in journals, edited volumes, and conference proceedings on the theory and applications of control systems. A fellow of the IEEE, he was the Director of the Honda-OSU Partnership at OSU from 2003-2011, and was Acting Director of the Center for Automotive Research in 2007.

Steve and his wife, Patricia, now live in Texas where he is the Systems Engineering Program Head and the Louis Beecherl Jr. Distinguished Chair in Engineering, University of Texas at Dallas.

## In Memoriam: Professor Emeritus Robert Kouyoumjian, 1923-2011

Robert G. Kouyoumjian, professor emeritus of electrical engineering at The Ohio State University and an expert in his field, passed away on January 3, 2011. He was 87.

Prof. Kouyoumjian was born in Cleveland in 1923 and received his undergraduate education at Harvard, MIT and The Ohio State University. After having received his PhD in physics from Ohio State in 1953, he taught electrical engineering at OSU for over 40 years and conducted research at the ElectroScience Laboratory.

World-renowned in his field, Prof. Kouyoumjian was inducted into the National Academy of Engineering in 1995 for his work on the Uniform Geometrical Theory of Diffraction. He also received the Centennial and the Third Millennium Awards from the Institute of Electrical and Electronic Engineers.

Prof. Kouyoumjian also served in World War II as a captain in the Air Force.

He is survived by a daughter, son, stepson and four grandsons. His wife Beatrice passed away in April 2010.



*Prof. Robert Kouyoumjian*

# Spotlight on Alums

## Mona Hella, 2001

Mona Mostafa Hella received the BSc and master's degrees with Honors from Ain-Shams University, Cairo, Egypt, in 1993 and 1996, and the PhD degree in 2001, from The Ohio State University, all in electrical engineering.

Both at Ain-Shams and OSU, she worked as a teaching and research assistant where she won Micrys and Texas Instrument fellowships. She was with the Helsinki University of Technology, Espoo, Finland as a visiting scholar in 1998, and with the analog group at Intel Corporation, Chandler, AZ the following year. Next, she became a senior designer at Spirea AB in Stockholm, Sweden working on CMOS power amplifiers and then moved on to become senior designer at RFMD Inc, Billerica, MA working on optical communication systems and silicon-based wireless systems. She joined the Electrical, Computer and Systems Engineering department at Rensselaer Polytechnic Institute in 2004, where she is now an associate professor. Her research interests include RFIC, sub THz circuits for communications and biomedical applications.



*Mona Hella*

## Robert Speers, 1963 and 1966



*Robert Speers on Escort I at the Jet 14 Nationals in Sandusky Bay*

Robert Speers received an MS degree (1963) and a PhD (1966), both in electrical engineering at Ohio State, a leader in the field of semiconductor devices and circuits. During his research at OSU, Bob was mentored by Professor Marlin Thurston who introduced him to early research in neutron damage in long base silicon diodes, GaAs diode thermometers and LEDs.

During his last year at OSU, Bob taught introductory EE courses (from an EE and physics perspective). At that time, he also worked at Phylatron, using the OSU Van de Graff while completing his dissertation. Upon graduation he, his wife and newborn daughter moved to Princeton, NJ where he held his first full-time position at RCA Laboratories.

Bob and his family returned to Ohio in 1973 where his love of both teaching and research earned him an assistant professor position at Bowling Green State University, where he was again on the forefront of the use of new semiconductor devices, bringing Physics Day at Cedar Point to education in Ohio, Michigan and surrounding states. He achieved emeritus status (in physics) in 1998.

In "retirement," he has been a member of the Elder College board at Firelands College and an associate member of the Emeritus College of Arizona State University. His areas of interest have expanded to literature study of global climate change, weather and boating safety on Lake Erie, the science of modern medicine and Rotary activities for scholarships and help in evolving economies.

## Michael Swartz, 1984

Michael S. Swartz is currently the President and CEO of Lake Shore Cryotronics, Inc., a position he assumed in 2003. He holds a Bachelor of Science Degree in Electrical Engineering from OSU (1984) and an MBA from OSU's Fisher School of Business (1989). Michael joined Lake Shore Cryotronics, Inc. in 1986 as an engineer, followed by management positions in manufacturing, product development, sales and marketing. He previously worked as an engineer at Mound Labs in Miamisburg, Ohio.

Michael served as president of the School Advisory Board at St. Paul School in Westerville and is a current and founding member of the Westerville Sunrise Rotary Club. In 2011, he was appointed and continues to serve in a position on the "President's Export Council Subcommittee on Export Administration" (PECSEA).

Founded in 1968, Lake Shore manufactures a broad range of sensors and instruments for both measuring and controlling cryogenic temperatures and magnet fields, as well as metrology systems for characterizing novel material properties. Markets served include academia, government labs, research institutes, aerospace contractors and industry.



*Michael Swartz*

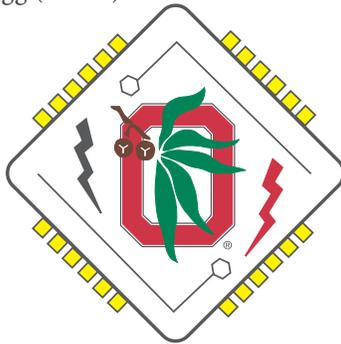
# EE/ECE Alumni Society

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## Announcements

- The Society is proud to announce that for the 2010-2011 academic year, it awarded four scholarships totaling \$1,750 to undergraduate Ohio residents, and 2 scholarships totaling \$850 to undergraduate nonresidents.

While this may not sound like a lot of money in the grand scheme of things, you can be sure these scholarships mattered to these students. Thank you to everyone who has contributed, but remember, the funds that are distributed don't get replenished without your continued support. To donate to any of the EE/ECE Alumni Society scholarships, please visit <http://ece.osu.edu/alumni/support/scholarships>.

- We are looking for several alums of the department who would like to serve on one or more of the following committees to help move the society forward: Meetings and Programs, Membership, Networking & Career Development, Student Relations, and Website & On-line Social Networking. If interested, please contact Bradley Clymer at [clymer.1@osu.edu](mailto:clymer.1@osu.edu).

## Upcoming Events

- The 4th Annual Alumni Society Hockey Night will be held the evening of Friday, January 13th. Mark your calendar because spaces are limited! It's a great event for the entire family. If interested, contact Carol at [duhigg.2@osu.edu](mailto:duhigg.2@osu.edu).

## Coming Full Circle with OSU

Written by Robert Borel, EE class of 1965



Bob Borel

“the seasons pass, the years will roll...”, in my case it's hard to believe over 35 years have “rolled” since I graduated from OSU! Although I have worked with the College of Engineering in several ways over those years, including assisting on various strategic planning projects and a Dean of Engineering search committee, it is truly satisfying to now work directly with the ECE department where my “roots” began. Of course 35 years ago it was nearly all electrical engineering, with much less computer engineering.

As we work through the EE/ECE Alumni Society board to reconnect with our alumni base, I am constantly reminded of the valuable common heritage that we all have—our excellent broadbased engineering education at Ohio State which prepares us for a multitude of careers and productive citizenship. In my case, it enabled me to transition effectively from design engineering to technical management, and on to general business management positions. And now, 35 years later, I've come full circle to practicing entrepreneurial skills with focus in the medical device manufacturing industry.

Of course our professional careers are but one dimension of life. Our families, community and general societal activities, as well as the multitude of other organizations which touch our lives, serve to round out the people we are and the larger purposes we serve. I hope that through the various ECE outreach activities (this newsletter for one), we are able to reconnect with you, share your life story, and perhaps stimulate your own reflection on years gone by as we affirm thy friendship—O-HI-O! •

*Robert Borel graduated from The Ohio State University with a BSEE, MSc in 1965 and an MBA in Finance from the University of Rochester in 1974. He is currently the CEO of BeamAlloy Technologies, LLC and lives in Naples, FL with his wife, Lynn.*

## ECE Welcomes Newest Faculty



### **Chris Baker**, *Ohio Research Scholar in Integrated Sensor Systems, Endowed Professor*

Doctoral Institution: University of Hull, Hull, UK

Chris was the dean and director of the College of Engineering and Computer Science at the Australian National University (ANU). Prior to this appointment he held the Thales-Royal Academy of Engineering Chair of intelligent radar systems based at University College London. His research interests include coherent radar techniques, radar signal processing, radar signal interpretation, electronically scanned radar systems, natural echo locating systems and radar imaging. Chris is the recipient of the IEE Mountbatten premium (twice), the IEE Institute premium and is a Fellow of the IET. He is a visiting professor at the University of Cape Town, Cranfield University, University College London and Adelaide University.



### **Chi-Chih Chen**, *Research Associate Professor*

Doctoral Institution: The Ohio State University

Chi-Chih has been conducting research in various capacities with the ElectroScience Laboratory (ESL) since 1993. His research interests include ground penetrating radar technology, novel radar systems, buried target detection/classification, UWB antenna designs, UWB dual-polarization feed/probe antenna designs for antenna and RCS ranges, compact/low-profile antenna designs for communication and navigation systems. Chi-Chih is a Fellow of AMTA and a Senior Member of IEEE.



### **Mahesh Illindala**, *Assistant Professor*

Doctoral Institution: University of Wisconsin-Madison

Mahesh's research interests include power electronics and controls for smart grids, microgrids, distributed energy resources, electrical energy conversion and storage, and advanced electric drive transportation systems. He has been recognized for contributions in electric power quality and reliability and has more than eight years of industry experience.



### **Keith Redmill**, *Assistant Professor of Practice*

Doctoral Institution: The Ohio State University

Keith has been a research scientist with OSU since 1999, working primarily with the Control and Intelligent Transportation Research Lab and the Center for Automotive Research. His research activities include control theory, sensing and sensor fusion, wireless communication, intelligent transportation systems, and autonomous ground and air vehicles. He has also greatly contributed to teams participating in the Multi Autonomous Ground Robotic International Competition, DARPA Urban Challenge and DARPA Grand Challenge. He is a member of SIAM and a senior member of IEEE.



### **Xiaorui Wang**, *Associate Professor*

Doctoral Institution: Washington University

Office of Naval Research Young Investigator Award recipient and NSF CAREER Award winner, Xiaorui's research focuses on power-aware computer systems and architecture, real-time embedded systems, wireless sensor networks and cyber-physical systems. He is the author or coauthor of more than 60 refereed publications and was previously an assistant professor at the University of Tennessee, Knoxville.



### **Wei Zhang**, *Assistant Professor*

Doctoral Institution: Purdue University

Wei's research explores control and estimation of hybrid dynamical systems, game theory, stochastic analysis and their applications in various engineering fields (especially power systems), air transportation systems and robotics. He was previously a post-doctoral researcher in the Electrical Engineering and Computer Sciences Department at the University of California, Berkeley.

**R**obert Garbacz, professor emeritus of electrical and computer engineering, credits his 56-year academic career to a series of lucky choices.

As a young child, Garbacz turned his bedroom closet into a laboratory where he would conduct experiments. That early love of electronics led him to choose electrical engineering for a major when he arrived at the University of Buffalo.

"My father was probably a big influence on me," explained Garbacz. "He was born in 1903 and would build his own radios; this was during the introduction of radio."

As the first member of his extended family to attend college, being a professor never occurred to him, Garbacz said. It was one of his professors, an Ohio State alumnus, who first suggested he go to graduate school and consider attending Ohio State.

"I looked at Ohio State and other schools, including Michigan, but I decided on Ohio State - luckiest decision I ever made in my life," Garbacz said.

After coming to Ohio State, Garbacz received a graduate research assistant position at the ElectroScience Laboratory. There, his advisor suggested he get a PhD and later his ESL colleagues urged him to consider becoming a professor.



*Prof. Emeritus Robert Garbacz and Maxwell*

"And that's the story of how a poor little Polish boy from Buffalo became an electrical engineering professor at The Ohio State University," joked Garbacz.

"The best part of being a professor is definitely the students," Garbacz said.

Beginning in 1968 he split his time equally between teaching and research. Then in 1983, at the request of then ECE Chairman Hsien C. Ko, Garbacz became Graduate Studies Chair. He set his research aside to assume the added administrative duties, but continued to teach.

"That's the purpose of a university, I think, to pass on what you know," said Garbacz. "I've had a happy life at OSU."

Garbacz has been awarded the Ohio State College of Engineering's MacQuigg Award for outstanding teaching twice, in 1987 and 2002. Yet his love of teaching is perhaps best illustrated by the fact that even after retiring in 1995, following 40 years at Ohio State, Garbacz has continued to teach undergraduate classes. Today, at age 77, he still spends 30 hours per week on campus and was recently awarded the 2011 H.C. Ko Meritorious Service Award for his dedicated service to the ECE department.

"It's what keeps me young," said Garbacz. "I love teaching. When I get up in the morning I want to go to work. Not a lot of people can say that."

Although teaching is his first love, Garbacz also had a successful research career.

"A normal person is lucky if he comes up with one good idea in his life. I feel that I did that," Garbacz explained. "The work I did in the mid- to late-1960s, in Characteristic Mode Theory, is the highpoint of my research. People didn't appreciate it at the time, but 40 years later researchers, such as Prof. Roberto Rojas, are working with it and carrying it further than I ever dreamed." •

*Written by Candice Clevenger  
Photo by Christopher Toothman*

## Did You Know?

The Department of Electrical and Computer Engineering, a leader in electrical and computer engineering education and research, is dedicated to providing an outstanding educational and research environment. Generous support from our alumni and friends is crucial to our continued success. Your gift can support a particular activity or area of interest, including:

- Supporting ECE students' educational expenses
- Enhancing overall program offerings
- Maintaining our education and research facilities

## WAYS TO GIVE

There are many ways to give to the department, including establishing an endowed or support fund, or contributing to the ECE fund of your choice. Visit <http://ece.osu.edu/alumni/support> to donate online to a particular activity, and to see a list of recent donors.

## The Integrated Sophomore Experience: “A Fantastic Opportunity”



Several years ago Ohio State developed its First-Year Experience (FYE) programs to ensure a successful transition into the university for all students. Following the same idea, the College of Engineering created a group of courses for first-year engineering students to provide a broad overview of engineering disciplines and help them narrow down and declare a major of their interest in the College of Engineering.

When Professor Robert Lee became Chair of the Department of Electrical and Computer Engineering in 2007, the efforts of the department to engage our students were largely geared towards those in the graduate program, leaving our new undergraduate student population wondering if electrical and computer engineering was really as exciting as it seemed to be during their FYE college program their freshman year. So, how do you engage and excite sophomores about electrical and computer engineering? By integrating technology into a sophomore lab that improves the way students gain knowledge and understanding.

Lee, knowing that ECE Professor Furrukh Khan was a leader in using learning technology to teach his students, charged Khan with the task of creating a novel sequence of integrated sophomore-level courses. Now known as the Integrated Sophomore Experience, these courses are designed to engage and excite sophomore students about electrical and computer engineering and the program at Ohio State. It includes an integrated learning environment in a space that is just for sophomores. There is space for learning, studying and socializing; modern, open labs that feature state-of-the-art equipment and software that are fully integrated with the lectures; and, challenging and fun lab projects, including building a recordable electronic keyboard, controlling a brushless DC motor, implementing digital filters on an FPGA (Field Programmable Gate Array), MP3 audio spectral analysis and other interesting projects.

The sequence ran as a pilot during 2010-2011 with high praise. One student reviewing the sequence said, “A fantastic opportunity. The labs were not only appropriate to what we were learning in lecture, but they also taught us about practices and tools used in the modern engineering industry.” The Integrated Sophomore Experience will begin running as permanent courses this fall. (Please visit: <http://www.youtube.com/watch?v=9gH6ur1FCK4> to view a brief video of the lab.)