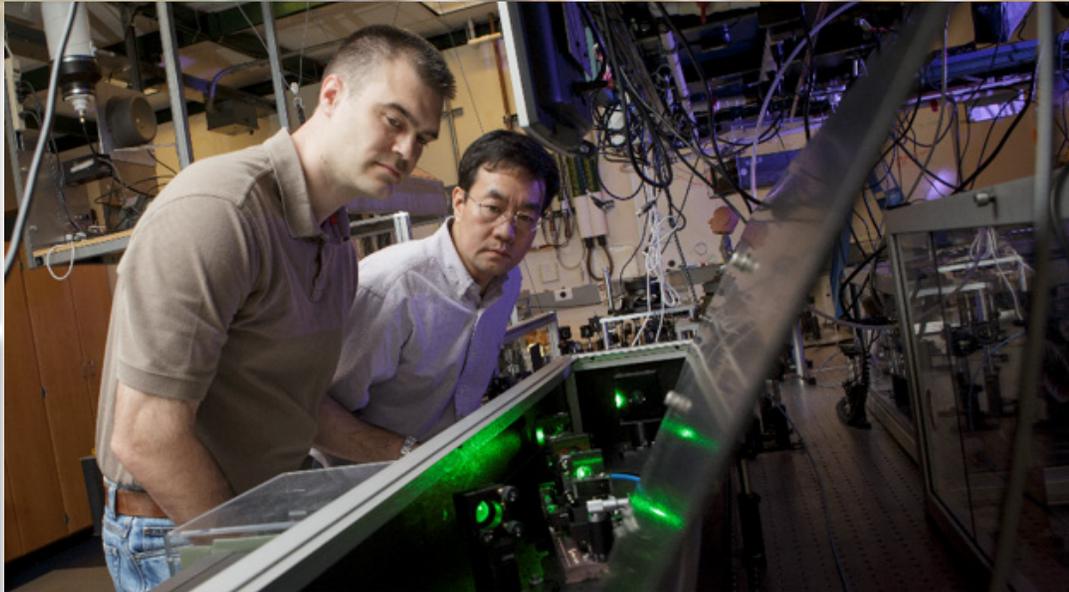
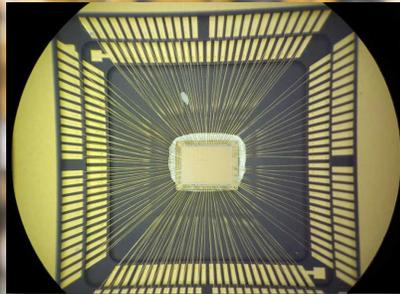
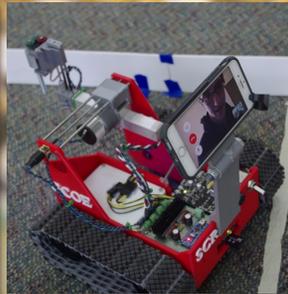


ECE NETWORKS

2017 | ELECTRICAL & COMPUTER ENGINEERING



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LETTER FROM THE DEPARTMENT HEAD

WELCOME!

The 2017 edition of *ECE Networks* highlights another rewarding and productive year in the School of Electrical and Computer Engineering. Our school actively fulfilled its mission of educating about 550 undergraduate and graduate students, and engaged in state-of-the-art, relevant research. This edition highlights many of our accomplishments in the context of that mission. Please take a few minutes to read the fascinating articles about our students, alumni and faculty.

We are quite proud of our students and have dedicated the first few pages of *Networks* to tell their stories. Several of our students participate in the CEAT Ambassadors program to assist us with recruiting and outreach efforts. Others have been awarded CEAT Scholarships, which recognize students who have high academic achievements, a global perspective, and leadership potential. Our students have received Wentz Research grants and best paper awards. Most of our students are strongly active in our local student branch of IEEE.

One validation of the value of our programs is discovered in the biographical profiles of our alumni who have had distinguished careers. Four such people featured in *ECE Networks* are Dr.Carolyn Hart, Mr. Jack Graham, Legand Burge and Dr. William Hogan. Our goal going forward is to graduate students in the mold of these highly accomplished and capable individuals.

We are very excited to have hired Dr. John O'Hara as a new assistant, tenure track professor. Dr. O'Hara has research expertise in the area of THz (Terahertz) metamaterial devices and propagation phenomenon. He will be outfitting our existing THz and optical labs with high powered lasers and amplifiers to investigate complex channel characteristics and to create compact THz sources (the Holy Grail of THz research). He has had an extensive research career at Las Alamos laboratories and is ready to educate the next generation of THz engineers. We give a hearty welcome to Dr. O'Hara.

Two of our senior professors, Drs. George Scheets and Martin Hagan, announced their retirements in 2017. Both Dr. Scheets and Dr. Hagan have left an indelible mark in the hearts and minds of ECE students during the past 30 years or so. The School extends our gratitude for their dedication to the mission of the School and their research contributions to their respective fields of electrical engineering. We wish them each a satisfying and enjoyable retirement.

In this edition we have chosen to feature three of our most distinguished professors—Dr. Subhash Kak, Dr. Gary Yen, and Dr. Rama Ramakumar—all of whom bear the honorary title of OSU Regents Professor. These scholars are internationally recognized for their pioneering research and are equally engaged in the classroom, providing enriching educational experiences to our students. We are most fortunate to have them in the School.

We are likewise fortunate to have faculty who have advanced

the technologies of electrical and computer engineering in electric drives, power electronics, electromagnetic susceptibility, mixed-signal VLSI, and three-dimensional metamaterials. Short abstracts of the research being conducted by Drs. Nishantha Ekneligoda, James West, Charles Bunting, Chris Hutchens, and Weili Zhang are shared in this edition of *Networks*.

Since I have been at OSU I have shared Dean Paul Tikalsky's vision of building a new interdisciplinary facility exclusively for undergraduate laboratory education. That vision is now reality and the new building is named Endeavor. As I write this introduction, the cement has been poured, the iron has been erected, and the roof has been constructed to form the shell of this \$30M, 70,000 building. We plan to take occupancy of the building in August 2018. Within this space will be wind tunnels, flumes, process control apparatuses, and instrumentation laboratories. ECE will certainly be using the new Mechatronics Laboratory, Sensors Laboratory, and the RF/Communications Laboratory. This latter lab will be equipped with state-of-the-art vector and spectrum analyzers to prepare students for the fast-paced, rapidly growing wireless communication industries. We are very excited about the new opportunities Endeavor will provide for our ECE students.

This past year was another robust year for financial awards to students. There is no question that ECE is a leader in the college by offering scholarships to freshman, sophomores, juniors, and seniors. Such scholarships are possible by the generous support of friends and alumni of the School. Thank you to all of our donors for making ECE education more affordable for our students.

In closing, I wish to express my heartfelt thankfulness to the ECE Publicity Committee, who spends countless hours each year to publish *ECE Networks* and to sponsor the ECE Distinguished Seminar series.

Sincerely,
Jeffrey L. Young
ECE Professor and Head



P.S. Your financial gifts to support our programs and students are ever so much appreciated. Please turn to the back cover of *ECE Networks* to learn more about giving opportunities.

CEAT AMBASSADORS

The School of Electrical Computer Engineering wishes to acknowledge the important contributions of its three CEAT Student Ambassadors: Zach Brundage, James Hood, and Connor Bergansky. These Ambassadors are the external student “face” of ECE. They meet with prospective students, give tours, participate in recruiting fairs, and talk with alumni and

other friends of ECE. More than that, they conduct themselves with the highest level of professionalism, engage ECE guests, and exude confidence in all that they do. They are ever so friendly and personable. We in ECE appreciate the outstanding work of our Ambassadors.



Connor Bergansky

My absolute favorite aspect of getting to be a CEAT Ambassador is getting to meet new people. The concept of community has been a prevalent value that has guided me through OSU thus far. The genuine excitement people show when I interact with them always lightens my day.

I would sum up my experience as a CEAT Ambassador with the word “spontaneous”. When you are sitting back at the desk, waiting for the next tour, you never know what kind of talent could come through the door. It is our job to enlighten and nourish that talent, and it’s always enjoyable to see how, as an individual, you can help build the university.



Zachary Brundage

My favorite part of being an ambassador for the college are the new opportunities that come my way and the additional people I get to meet and work with. All of the ambassadors are like a big family; we have inside jokes, help each other out, share stories, and just have a blast anytime we get together. In addition, being the face of the college allows me to meet interesting people I would never have met on my own.

Our number one job as a CEAT ambassador is to recruit high school students and encourage them to apply to CEAT. We give presentations, tours, and share our experiences that we have had. As ambassadors we also assist the faculty in the college with various events. These can be alumni or company events, or outreach activities to the students on campus. The best experience is talking with prospective students about the many opportunities CEAT has to offer. I can tell that many of our visitors start the day a little shy and are not sure if they will like OSU, but by the end of the tour they start to come out of their shell and leave thinking that OSU could be their home away from home for the next four years.



James Hood

My favorite part of being an Ambassador is being able to show a prospective student something cool related to their intended field of study—the wind tunnel for Aerospace Engineering, the electrical labs for Electrical Engineering, and so on. It’s a great time because when they’re really passionate about it, their face lights up in awe about what they’re seeing and hearing. It’s those moments that make my job fun and rewarding!

One of my favorite tours was when there was only one student who was dead set on electrical engineering. Because it was just him, we got to focus on only the electrical engineering highlights of our presentations and tours, which made it really fun. We definitely geeked out together over EE. On the opposite side, I also love large tours because they’re so lively. I have taken up to 40 people on a single tour! Outside of tours, I’ve worked great events like the beam signing ceremony for ENDEAVOR, the new undergraduate research lab, and events for donors, which are also very fun.

STUDENTS & FACULTY

ECE SCHOLARS

The School of Electrical and Computer Engineering is proud of Daniel Bothwell, Zachary Brundage, Kyle Linzy, Kyle Bennett, Blake Giles, Victoria Bauer, James Hood, Cameron Jump, Lauren Brown, Ryan Horton, Olivia Long, and Brenden Martin, all of whom are designated as CEAT ECE Scholars. The CEAT Scholars Program provides \$15,000 in financial support to each scholar. The program engages mentors, creates global awareness, and develops leaders through a unique set of enrichment activities in the categories of cultural, professional development, industry tours, and community service. In addition to these experiences, students included in the CEAT Scholars Program participate in summer tours in the United States and abroad.

Thirty scholars in all CEAT schools are selected each year into this prestigious program after attending the CEAT Scholars Interview Day. To be invited to CEAT Scholars Interview Day, students must meet the minimum qualifications of 31 ACT or 1420 SAT, and 3.75 GPA. During the interview, students must demonstrate leadership skills, a commitment to service, and engagement in non-academic, life-broadening activities (e.g., high school band, theater, sports, choir, clubs, etc.) Students leaving the program are prepared to be leaders in their field of study, ready to take on the significant engineering and cultural challenges of society.



Kyle Bennet

Being a part of the CEAT Scholars Program has provided me with the opportunity to grow in more ways than one. Through the program I have been able to go on various industry tours, get involved with multiple community service events, and see our nation's Capitol. Some of my favorite events include the tour of the Kicker facility in Stillwater, experiencing the art of glass blowing, and volunteering for Habitat for Humanity. I greatly appreciate the relationships that I have made through the program. Going through the enrichment activities with my fellow scholars has been very rewarding and I am very thankful that I was selected to be a part of this prestigious program. Next summer I will have the opportunity to go on a trip abroad with the rest of my CEAT Scholars class, and I cannot wait to experience the different cultures, languages, and adventures that will come with it.



Cameron Jump

The CEAT Scholars program has been fantastically enriching. I have had the opportunity to attend cultural events (like the musicals "Sound of Music" and "Shipwrecked") and to serve my community. My favorite event was ScienceFest. With a group of CEAT Scholars, I drove to Oklahoma City for STEM outreach to elementary age students. I love STEM outreach because I know that these kids are our future and I can empower them to see their ability to pursue something as extraordinarily rewarding such as engineering.



Blake Giles

I have enjoyed the professional development activities of the CEAT Scholars Program. I think that the opportunity to attend well-structured and advanced professional development activities is one of the more unique things about being a CEAT scholar. The CEAT scholars professional development activities take the scope of professionalism past the usual college focuses of parliamentary procedure and networking, and focus instead on how to properly behave in real-world business scenarios, such as company dinners, interviews, and other work-related functions. I now feel very well prepared for real-world situations that I previously did not even know that I needed to prepare for.

Every CEAT Scholars class takes a two week trip to an international destination the summer after their junior year in an effort to learn about other cultures and their solutions to problems of engineering. The CEAT scholars are given some freedom and responsibility in the planning of the trip, and as such, it is important for every scholar to do research on their own. My group is still in the planning stages of this trip, but the research I have done for the trip has already broadened my cultural horizons. I am now having to take the time to read about individual destinations, demographics, cultures, and restaurants within countries that I previously only knew the geographical locations of the capitols.



Victoria Bauer

One of the activities that I have enjoyed the most was getting to directly meet with companies and do industry tours. It's nice to be able to ask questions about different career opportunities and to learn about what we could possibly be doing after graduation. In addition to that, the companies that host us are always so welcoming and it's a great place to make connections for internships as well as potential career opportunities. During these tours and events, we learn about business etiquette and how to make yourself stand out among a sea of applicants.

As I am a part of the sophomore class, we have yet to travel, but in May we will be heading to Washington D.C. which will be super fun. We will have the opportunity to meet with all different kinds of people as well as touring companies and the Capitol itself.

STUDENTS & FACULTY

ECE STUDENT AWARDS & SCHOLARSHIPS



Connor Begansky

Connor Begansky received a Wentz Research Grant to conduct research under the supervision of Dr. Weihua Sheng. Originating from the Lew Wentz Foundation, the Wentz Research Grant has provided OSU undergraduate students with opportunity to conduct research in various

fields, including electrical and computer engineering. Begansky has conducted research this past year under the supervision of Dr. Sheng in the field of learning using neural networks. Through his Wentz Research Grant, Begansky will be researching machine learning in nondeterministic gaming. This research has great impact on both Begansky's career and the overall field of engineering.

"The Wentz Research Grant is my opportunity to explore the depths of electrical engineering," Begansky said. "Being able to learn about artificial intelligence is something that I do not think I would otherwise have been able to do, so this grant has allowed me to put my foot in the door."

Rahul Bakore



Pictured left to right at the EMC award presentation are Dr. Chuck Bunting (member of Rahul's advisory committee), Dr. Rahul Bakore, Dr. Jim West (dissertation advisor) and Frank Sabath, President of the IEEE EMC Society

Rahul Bakore, May 2017 Ph.D. graduate, received the Best Student Paper Award at the 2017 IEEE International Symposium on Electromagnetic Compatibility in National Harbor, Maryland, for the paper "Experimental Validation of a Discrete Spectral Representation of the Electromagnetic Field Within an Ideal Reverberation Chamber" by R. Bakore, J. C. West, and C. F. Bunting.

In addition to his research and academic career, Begansky is active within the College of Engineering, Architecture and Technology, serving as a CEAT Ambassador and as an active member of IEEE. He also contributes time to the SGA Sustainability Committee.

"The OSU community has been the single entity that has impacted me the most," Begansky said. "Through that community, I always have a family to fall back on and someone to drive me forward." After graduation, Begansky hopes to find a career in private industry, although he's also considering graduate school.

"By being involved in artificial intelligence, my hope is to integrate human interaction with machine assistance," Begansky said. "Humans have always been amazing at deciphering pattern recognition, but not always so great with computing large data; I want to create a harmonistic and accessible relationship between the two through my research."

"Winning this award is a great achievement," Bakore said. "I thank the IEEE Electromagnetic Compatibility Society for honoring me with this award. This award means a lot to me as it motivates me further to continue my research work in the area of electromagnetics."

Dr. Bakore started his career as a civilian electronics engineer at the Tinker Air Force Base. He has career aspirations of joining a research laboratory to pursue research in RF design and electromagnetics. Dr. Bakore feels that his experiences at OSU and in ECE prepared him well for the workplace.

"At OSU, I used various software tools and programming languages for simulating real-world problems. I also gained extensive background knowledge in the core subjects of electrical engineering, like antenna design, computational electromagnetics, stochastic systems, digital signal processing, and image processing," Bakore said. "My experience at OSU was excellent."



Xun Lin

Xun Lin, ECE undergraduate student, won the 2016-2017 Wentz Research Scholar Award. The Wentz Research Award funds undergraduates to conduct independent academic research with a faculty mentor. Lin earned this award for his research on “An Indoor Public Place

Guide Robot Based on ROS”.

“The Wentz Grant is a great motivation for my research,” Lin said. “The award also gives me financial freedom to go further down my professional road.”

His advisor, Dr. Guoliang Fan, is a professor in the School of Electrical and Computer Engineering. Lin's project aims to develop an autonomous robot with a camera on it to navigate in large, unknown and dynamic spaces, such as airports or hospitals, and guide people to their destinations. The robot will analyze camera data by intelligent algorithms that will build a surrounding map and plan an optimal path that avoids obstacles.

Upon graduation, Lin plans to continue his education and apply to graduate school.

“Although my undergraduate education provides me a big scope of my major, it is not enough for me to solve many practical problems,” Lin said. “I want to have a deeper understanding of my field before my career starts in industry.”

His career goal is to become an expert in automation and robotization, and he hopes to create intelligent devices that will make life easier.

As a Chinese exchange student, Lin is enjoying the learning experience and the people he is encountering at OSU.

“Learning new things makes my day joyful and meaningful,” Lin said. “During my stay at OSU, I have met a lot of people with the same discipline and professional interests as mine. I feel so excited to study and work with them. They help me get a clearer understanding of my major and my career path.”



Mahdi Yazdanpour

Mahdi Yazdanpour, ECE Ph.D. candidate, has been awarded the Creativity, Innovation, and Entrepreneurship (CIE) Scholarship for the 2017-2018 academic year. The CIE Scholars Program is a distinguished initiative developed by Spears School

of Business to recognize and engage the top graduate students at Oklahoma State University. The CIE Scholars are chosen based on previous academic performance, scholarly achievements, leadership experiences, extra-curricular activities, and community engagement.

“I am very proud of my achievements; it enables me to pursue my future career,” Yazdanpour said. “This scholarship empowers me to approach my education with more confidence, focus on my research, and write my dissertation and journal publications.”

Yazdanpour is conducting research on “Indoor Scene 3D Reconstruction” under the guidance of Dr. Guoliang Fan. Upon graduation, he plans to be a faculty member at a university, where he hopes to continue to contribute to the field of electrical engineering and focus on research and teaching as a member of academe.

“My academic performance is a good reflection of my motivation and powerful desire to succeed,” Yazdanpour said. “A successful researcher is expected to contribute to their profession. As a Ph.D. candidate and a researcher in the field of electrical and computer engineering, I truly believe that my strengths and personal qualities will help me to devote myself to the two complementary occupations of teaching and research in the field of ECE.”

Yazdanpour is proud to be a part of the OSU and ECE family and to have had valuable experiences that will prepare him for a successful career in academe.

STUDENTS & FACULTY

ECE STUDENT AWARDS & SCHOLARSHIPS (CONT.)



Hisham Abuella

Hisham Abuella, a Ph.D. student in ECE, has received the Green Student Initiative (GSI) award for \$2,100 for his project named “A Focus on Enhancing Energy Conservation through Occupancy Estimation”. The objective of this project is to develop a control system

that measures light intensity to estimate occupancy in an area of interest, and to regulate a building’s heating, ventilation, air conditioning (HVAC) and lightings to improve sustainability and energy efficiency.

Abuella had no prior proposal writing experience and winning the award was a nice surprise in the early part of his Ph.D. career.

“I submitted the project proposal during my first semester at OSU in Spring 2017,” Abuella said. “Receiving an award for my first proposal is a great feeling and experience. It has had a very positive impact on my career, as this award not only encouraged me but also gave me a confidence about my research effort during my Ph.D. journey.”

Abuella received a B.Sc. degree in Communications and Electronics Engineering from Ain Shams University, Cairo, Egypt, in 2013. He worked as a Digital System Design Engineer in Varkon Semiconductor Company, Cairo, Egypt for one year. In Fall 2014, he joined Istanbul Sehir University as a Research Assistant for his M.Sc. degree in Electronics and Computer Engineering at Istanbul, Turkey. His career goals include developing innovations for wireless communication systems. He has particular interest in visible light and high speed data transfer applications. Ultimately, he would like to become a faculty member at a university.

“I like the freedom of working on new projects and I never stop learning,” Abuella said. “My first year at OSU has been an enriching and motivating experience.”

Although early in his doctoral career, Abuella already has a publication record, including a conference paper, two provisional patent applications, a poster presentation, three proposals, and a preliminary research report.

“I believe I am on the right track of a Ph.D. student who is improving his research, writing, and presentation skills,” Abuella said.

SCHOOL OF ELECTRICAL AND COMPUTER ENGINEERING SCHOLARSHIPS

Did you know that 170 ECE students were offered scholarships from ECE and the College of Engineering, Architecture and Technology (CEAT)? In fact, a total of \$318,900 in scholarships were offered for the 2017/2018 academic year to 52 freshman, 35 sophomores, 43 juniors, 38 seniors, and 2 MSEE students from 24 different scholarship funds. Both merit and need-based scholarships were offered to promote excellence and a diverse study body. Six scholarships for study abroad experiences in Japan, Italy, Spain, Puerto Rico or Mexico were also awarded.

The School is extremely thankful to the alumni and friends of ECE who have donated to our various

scholarship programs. Because of their generosity, ECE is a scholarship leader in the college. Furthermore, higher education is made more affordable for our ECE students, thus assisting them to pursue their dreams and passions.

To learn more about the ECE and CEAT scholarship programs, visit <http://ceat.okstate.edu/scholarships>. Please consider giving to one of our scholarship funds to help us to recruit the best and brightest students to ECE. Information on the inside, back cover of this newsletter is provided to identify the appropriate funds.

THE OSU STUDENT BRANCH OF THE IEEE

The Institute of Electrical and Electronics Engineers (IEEE) exists to serve professionals involved in all aspects of the electrical, electronic, and computing disciplines, and the related areas of science and technology that underlie modern civilization.

IEEE's roots go back to 1884 when electricity began to become a major influence in society. The current organization of IEEE was formed officially on January 1, 1963 with the merger of the American Institute of Electrical Engineers and the Institute of Radio Engineers. IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

Here are a few quick facts about IEEE:

- More than 423,000 members from about 160 countries; roughly 50% of the members live in countries outside of the United States
- More than 117,000 student members
- 334 sections in ten geographic regions worldwide
- 2,116 chapters that unite local members with similar technical interests
- 3,005 student branches at colleges and universities in over 100 countries
- 1,481 student branch chapters of IEEE technical societies
- 486 affinity groups



Student branches provide an opportunity for IEEE student members to begin networking in their areas of interest and future profession. In the 2016-2017 academic year, more than 53 undergraduate students among ECE's 200 professional students became a member of OSU-IEEE.

OSU-IEEE holds the Annual ECE Fall Picnic in the middle of September to kick-start the year-long organizational activities by engaging the students and faculty of ECE at the Phillips 66 Plaza. OSU-IEEE also holds monthly general meetings during the last Wednesday of September, October, November, and during the following months of January, February and March. An outside speaker from industry or national laboratories is invited to provide a general view of the "real world" or to share his/her experiences of solving a challenging technical problem in industry. OSU-IEEE closes the year with the Annual Spring Banquet in April, when alumni and corporate sponsors are invited to celebrate the many awards, scholarships, and recognitions presented by the School to the undergraduate and graduate student members of IEEE.



*Daqing Piao, Professor
Advisor of OSU-IEEE*

STUDENTS & FACULTY

MERCURY ROBOTICS

An OSU ECE Student Robotic Organization

By Jana Johnson, Bookkeeper of Mercury Robotics

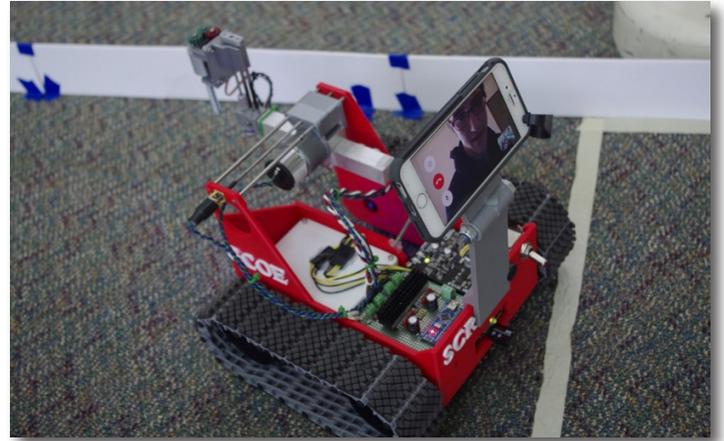
Mercury Robotics Club was created in 2012 under the leadership of Lee Easton, an OSU EE undergraduate. Mercury Robotics Club welcomes students from all disciplines and supports the annual Mercury Remote Robot Challenge (MRRC). The Club designs the competition, T-shirt artwork, awards, and track. It is also responsible for running the annual challenge, including providing food. The 8th International Mercury Remote Robot Challenge was held on April 22, 2017 at the OSU Stillwater Campus. This year two Columbia teams won first and second place; OSU came in third. There were a total of 26 teams from 10 different universities from the USA, Brazil, Colombia, and Mexico.

The 2017 competition involved navigating a track, traversing a see-saw, picking up a lag bolt, dropping it off in one of three different sized holes, and then finishing with a 40 foot sprint, all while driving the robot remotely from a minimum distance of 50 miles away. The competition has significantly evolved since the first event in 2010, where there were only six robots with the objective to run a simple course. It is now a popular international event where robots are semi-autonomous. This growth was made possible in part by financial support from organizations like ABB, Chesapeake Energy Corporation, OSU ECE, and individual contributors. Every year the challenge is modified to attract more competitors and to encourage innovative designs.

Mercury Robotics encourages yearlong involvement from students in order to be prepared for the competition. In the fall semester they attend weekly meetings to start their teams and to get some experience with wiring and software development. Lectures are provided to introduce engineering design tools and to help students with the preliminary phases of their designs. After the initial lecture series, it is up to the teams to prepare for the competition. Students are encouraged to attend monthly meetings for assistance and to get answers to their questions.



*Carl Latino, Associate Professor
Advisor of Mercury Robotics*



One of the 26 competing robots at the 2017 MRRC

In addition to ECE's big competition here in Stillwater, the Unified National Corporation of Higher Education (CUN) from Bogota Columbia began hosting the exact same competition, called Mercury Remote Robot Challenge Latinoamerica in 2016. Mercury Robotics' faculty advisor, Dr. Carl Latino, attended both the 2016 and 2017 events in Bogota, Colombia and was very impressed with their setup and enthusiasm. They expanded the event to include a high school mini-Mercury challenge. Mercury Robotics is pleased that other universities are taking initiative to copy and expand the OSU competition. The bar has been raised and Mercury Robotics is preparing for the 2018 challenge.

This past year, Mercury Robotics was also proud to team with Eta Kappa Nu, the ECE honor society, to bring forty Stillwater Middle School students to OSU for a day to build and compete in a boat race. The event was held on March 21, 2017. The competition was to build and race a motorized "air" boat. The motor was controlled by an electronic switch and a light sensor. The winner was determined by the fastest time to cross a 10 foot moat. The students showed a high enthusiasm for the project and enjoyed the friendly competition.

ECE BOASTS THREE REGENTS PROFESSORS

The honorary title of Regents Professor was first introduced on July 1, 1971. The title was established to acknowledge extraordinary scholarship at the university level. A Regents Professor is chosen based on a candidate's national and international stature, and letters of support documenting continuous productivity in research, creative expression, and scholarship that exceeds the level that is typically expected of an individual holding the rank of professor.



Dr. Subhash Kak

Dr. Subhash Kak, born in Kashmir, India, is a Regents Professor with a broad spectrum of accomplishments and interests. He received his B.E. in electrical engineering at the National Institute of Technology, Srinagar and his Ph.D. from the Indian Institute of Technology, New Delhi. After getting married

in 1979, he and his wife moved to the United States to teach in the electrical and computer engineering department at Louisiana State University. In 2007, he accepted an offer to be the head of computer science at OSU. Having completed two terms as head, Dr. Kak transferred to the School of Electrical and Computer Engineering. After only three years of teaching at OSU, Dr. Kak was honored in 2010 as a Regents Professor for his extensive research and contributions in artificial intelligence, social networks, information theory, quantum computing, and cryptography. .

His interest with artificial intelligence is not limited to just the technology but also the impact that machines have on society. He was part of a group that met recently in Cambridge, England and in the San Francisco Bay area to brainstorm the limits of artificial intelligence and the possibilities of machines becoming conscious.

Oklahoma State University currently recognizes 77 Regents Professors campus-wide. The School of Electrical and Computer Engineering is proud to employ not one, but three Regents Professors, which is a rarity in the various schools of the college. (Our fourth Regents Professor also has Emeritus status.) These three professors come from various countries, have different backgrounds, and contribute to vastly different areas of research. Each one provides a unique perspective to the School and the University, and each one has immensely contributed to their respective fields in electrical engineering.

“There are some people in the field who think it is possible that machines will have consciousness like humans do,” Dr. Kak said. “Personally, I am a skeptic.”

Dr. Kak is interested in not only how technology works, but also how it affects people and the way people go about their daily lives. He has developed models that estimate the impact that technology has on people and social organizations. His societal studies are not limited to just current events, however. Dr. Kak's involvement extends to archeoastronomical research as well. Archeoastronomy is the study of how people in past societies understood phenomena in the sky, how they used that understanding in their technology, and what role the sky played in their cultures.

Dr. Kak has visited places such as Peru and Stonehenge on trips pertaining to his archeoastronomical studies. In addition to traveling for research, he also enjoys traveling for leisure with his wife and writes a travel blog. He is the author of over 20 published books that include his autobiography, *The Circle of Memory*, which was published in 2016.

Dr. Kak has a wide array of interests in his personal and professional life. From his work in cryptography and artificial intelligence, to his knowledge of ancient civilizations, his research and personal accomplishments make him a valued member of the School of Electrical and Computer Engineering.

STUDENTS & FACULTY

REGENTS PROFESSORS (CONT.)



Dr. Gary Yen

Dr. Gary Yen received his undergraduate degree in electrical and computer engineering in Taiwan. Because of his yearning for education and the vast options of opportunities in the United States, Dr. Yen later pursued his Ph.D. from the University of Notre Dame and received his degree in 1992.

After Notre Dame, Dr. Yen began his career at the Air Force Research Laboratory in Albuquerque, New Mexico before coming to Oklahoma State University. In December of 1996, he joined OSU and has been a faculty member in the School of Electrical and Computer Engineering since then.

He was honored as a Regents Professor in 2014 for his research contributions in intelligent control, computational intelligence, signal processing, and conditional health monitoring.

His work in conditional health monitoring has been funded by state and federal sources. This research has assisted the medical field by developing technology to monitor a person's vital signs and to model developing health issues with organs.

His work in computational intelligence uses biological functions and processes to program computers to learn and to become more intelligent, thus allowing machines to learn in much the same way as a biological organism. Dr. Yen feels that "deep learning" or

"computational intelligence" are more accurate terms to describe these functions than the layman term of "artificial intelligence".

Dr. Yen's passion to contribute to the engineering community stems from his inspiration from and admiration of his previous mentor, Anthony Michel. Dr. Michel was a professor at the University of Notre Dame while Dr. Yen was a PhD candidate. Dr. Yen admired Dr. Michel's attitude toward research as a volunteering opportunity to give back to the engineering community. This has shaped his own attitude and driven him to accomplish what he has.

Dr. Yen is a Fellow of the Institute of Electrical and Electronics Engineers. He is the founding Editor-in-Chief of the *IEEE Computational Intelligence Magazine*, as well as an associate editor for the *IEEE Transactions on Evolutionary Computation* and *International Journal of Swarm Intelligence Research*.

Dr. Yen has also served as the President of the IEEE Computational Intelligence Society in 2010 and 2011.

Dr. Yen enjoys mentoring students and has always been touched by the drive and intelligence students embody in their studies. He has mentored multiple students over the years and always enjoys sitting and speaking with them. His door is always open.



Dr. Rama Ramakumar

Dr. Rama Ramakumar is a Regents Professor with an impressive history of accomplishments. So impressive and note-worthy, that his CV reads more like a book that documents his life-long academic career.

Dr. Ramakumar was born in India and received his undergraduate degree in 1956 at the age of 19. He finished top of his class and went on to finish his master's degree a year later. He immediately began teaching at the university at age 20, but later left to pursue a Ph.D at Cornell University on a technical cooperation mission scholarship. After three years in that program, he traveled back to India to continue teaching. In 1967 he was offered a position at Oklahoma State University. What started as a 16 month appointment turned into 50 years of success at OSU for Dr. Ramakumar.

In 1976 he was promoted to full professor, and in 1987 he was appointed Director of the OSU Engineering Energy Laboratory. Since 1991 he has occupied the PSO/Albrecht Naeter Professor of Electrical and Computer Engineering. After a host of other positions and honors, Dr. Ramakumar was honored as a Regents Professor in 2008 for his academic accomplishments and contributions to the renewable energy and energy conservation fields.

Dr. Ramakumar's 50 years at OSU have resulted in many successes and a great amount of influence in his field. Dr. Ramakumar has dedicated his life's work to renewable energy, alternate energy sources, and energy conversion, storage and reliability. He has mentored nearly 20 Ph.D. students. He has been the keynote speaker at multiple international conferences such as the 2011 International Conference on Smart Technologies in Chennai, India, and the 2012 International Conference on Renewable Energy Utilization in Coimbatore, India. He has published over 200 technical papers in multiple journals and

conference proceedings, is the co-awardee on four U.S. patents, and has authored the textbook entitled *Engineering Reliability: Fundamentals and Applications*.

Dr. Ramakumar continues to serve as Director of the OSU Engineering Energy Laboratory. He has been an active member of the Institute of Electrical and Electronics Engineers (IEEE) for 55 years and is presently a Life Fellow. During this time, he has served as Chairman of the Awards Committee for the IEEE Power and Energy Society's Technical Council, the Chairman of the Energy Development Subcommittee of the Energy Development and Power Generation Committee, and a member of the Power Engineering Education Committee. Dr. Ramakumar established the IEEE Power and Energy Society Ramakumar Family Renewable Energy Excellence Award in 2011. This award is given annually to an outstanding member of the IEEE community who is dedicated to renewable energy. Dr. Ramakumar also received the Distinguished Service Award from the Tulsa Section of IEEE in October 2016.

Dr. Ramakumar hosts the Frontiers of Power Conference that takes place each year at OSU. The conference's 50th year golden jubilee celebration was in October 2017 with OSU President Burns Hargis giving the welcoming message. The conference brings together academics and practicing engineers from around the world to discuss challenges and solutions for the electric utility industry.

In 2010 Dr. Ramakumar established the The Ramakumar Family Energy Scholarship which is awarded to an ECE student who is passionate about renewable energy and will dedicate his or her work to the advancement of the energy industry. With all of the activities of his 50 years of academic accomplishments, Dr. Ramakumar's favorite activity in life is to work with and learn from students.

STUDENTS & FACULTY

US-ASIA EXCHANGE PROGRAM

The Oklahoma State University School of Electrical and Computer Engineering has been working with the Office of International Students and Scholars (ISS) to promote the exchange of students between OSU and the universities in Asia since 2011. Three vibrant programs exist with Tianjin University (China), Southwest Jiaotong University (China), and Thainguyen University of Technology (Vietnam).

ECE Professor Weili Zhang and Vivian Wang, Manager of International Outreach Programs at ISS, have been working together for the last four years to expand the international collaboration between OSU and Tianjin University in China.

ECE works directly with Tianjin University, which is considered one of the best engineering schools in China. The short summer exchange program is designed to maximize student experiences at OSU in one month. OSU Welcome Week contributes to this experience, which offers numerous programs and activities available for students.

Approximately 20 Chinese students participate in the program each year. The students live on campus, usually in IBA Hall. The focus of the program is on cultural exchange and to observe the interactions between OSU faculty and students. Not only do the students get to visit OSU classrooms and research laboratories, but they also get to explore the culture of Oklahoma. The students attend a series of seminars to help enhance their knowledge of American culture and engage in leadership development seminars.

On the weekends, students visit Oklahoma City and Tulsa to experience another side of Oklahoma. When there is a home football game the students attend a seminar to learn the rules and intricacies of football. That way, when the students attend a game they can feel more connected with the history of the sport and why it is so important to American culture.

The program also benefits OSU students. By having international visitors in the classroom, OSU students are more globally aware and are encouraged by the faculty to visit Tianjin University for a study abroad experience.

ECE also has a degree-seeking program called the 2+2 program with Southwest Jiaotong University. Chinese



Fangyao Liu conducts research on a driving simulator in the ASCC Lab

students spend two years in China, then come to OSU for two additional years. As a result, they earn two degrees: one from Southwest Jiaotong University and one from OSU. Since 2011, Southwest Jiaotong University has sent more than 20 students to OSU. Among them, more than half are in the 2+2 program with ECE and the rest are in the regular exchange program.

“Honestly speaking, when I started the 2+2 program, I was worried that I was not academically mature enough to adjust to the program properly,” Ye Xiang, ECE graduate said. “However, my adviser was very good at giving advice and calming me down. She walked me through every detail of the program.” Several other students in the 2+2 program, including Chiheng Liu and Jia Yang, expressed similar feelings.

The students also get opportunities to do research under the guidance of ECE faculty members. “When I first came to OSU, I became Professor Weihua Sheng’s undergraduate research assistant in his lab,” Lin said. “I had the chance to get my hands on different kinds of interesting, cutting-edge projects like Smart Home, License Plate Recognition, etc., which really improved my ability and skills.”

Another student, Fangyao Liu, worked on a project that involved vehicle-to-vehicle communication. He also enjoyed the experience of being an undergraduate research student.

ECE is looking forward to seeing more international students in our programs and enjoying their time at OSU.

In recent years, OSU Professor Keith Teague developed a relationship with the President of

Thainguyen University of Technology in Vietnam. The President wanted to establish relationships abroad, particularly in the United States.

Together they initiated a program sponsored by the Vietnam Ministry of Education and Training called the Advanced Program. The goal of the program is to infuse the curriculum developed at US institutions into universities across Vietnam. The courses would be taught in Vietnam by English-speaking faculty at Thainguyen University of Technology. There was a period of about four years where 20 faculty members from Thainguyen University of Technology came to OSU for one to three months and attended OSU-ECE classes.

The goals of these faculty members from Vietnam were to observe teaching styles, advance in the English language, determine what cultural differences existed, and apply their knowledge and experiences back in Vietnam. Most of the participants in the Advanced Program plan to become faculty members at universities or will contribute to research in industry. Vietnam wants to raise its universities to a new level so that they can be more competitive in education.

Last year, Teague received a grant from the Vietnam education foundation to be a US faculty scholar in which he lectured from Stillwater to students in Vietnam. He taught at 7 p.m. while the students were taking the class at 7 a.m.

All of these programs have one common goal: to give international students the opportunity to learn and understand what we do in our American educational programs.

“These programs are very valuable for both the faculty and students that visit us and the faculty and students of ECE,” ECE Department Head Jeffrey Young said. “It is very gratifying to have these very successful international activities in our School”.



Jia Yang and his friends at an OSU Graduation Ceremony



Chiheng Liu and his friend at an OSU Graduation Ceremony



Fangyao Liu and his friends at an OSU Graduation Ceremony

RESEARCH HIGHLIGHTS



AIRPORT TAXIWAY SYSTEM

Dr. Nishantha Ekneligoda

Automating airplane movement over the airport taxiway system.

Professor Nishantha Ekneligoda received a grant from Airplane Transportation Systems (ATS) for building an airport taxiway control system. The concepts developed by this project will support automating and optimizing airplane movement along an airport taxiway. This is an interdisciplinary project conducted at Oklahoma State University (OSU) with the support of the New Product Development Center (NPDC), and the schools of Mechanical and Aerospace Engineering (MAE), Electrical and Computer Engineering (ECE),

Civil and Environmental Engineering (CIVE), and Industrial Engineering and Management (IEM). The principal objective of this research is to develop preliminary and feasible technologies that will validate the practicability of the proposed taxiway control system.

Dr. Nishantha Ekneligoda and his graduate students will specify electric motors, design drive system controls, and develop power system modeling.



Power converter control: Graduate student Anushka Dissanayake tests a developed converter control algorithm

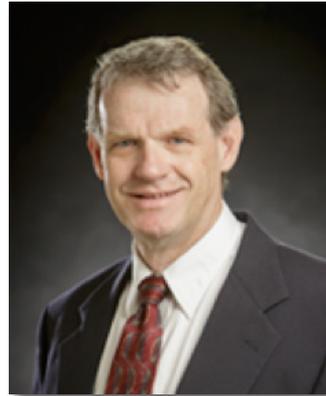


Dr. Ekneligoda with his graduate students, Amali Dehigolla Gedara and Anushka Dissanayake

PROTECTION OF SPACECRAFT SYSTEMS

Dr. Chuck Bunting & Dr. James West

Professors Chuck Bunting and James West are working with NASA to protect satellite systems from electromagnetic interference during launch.



Orbital and interplanetary satellites have complicated electrical systems that must be protected from damage during all phases of flight. Most satellites carry multiple instruments for diverse tasks, such as telemetry, ground communication, navigation, and imaging. They are also capable of passive measurement of physical phenomena such as lightning, cosmic rays, magnetic fields, or micrometeor impacts. Each instrument also radiates electromagnetic energy, sometimes unintentionally, that can potentially interfere with the operation of other instruments and, in extreme cases, can cause damage. One of the riskiest stages of flight is the launch phase when the spacecraft is enclosed by an aerodynamic fairing that reflects the radiated signals back to the spacecraft's instruments, greatly increasing the chances of damage. The complicated shape of the fairing and of the spacecraft itself prevents an exact prediction of the electric field exposure and risks to the instruments.

ECE Professors Chuck Bunting and James West are working with NASA researchers to develop methods to minimize the susceptibility of satellite systems from electromagnetic interference during launch. The Robust Electromagnetic Field Testing and Simulation (REFTAS) Laboratory's electromagnetic reverberation test chamber is being used to simulate the random electromagnetic environment that is encountered within the fairing. Test devices that model satellite systems are placed within the reverberation chamber and the currents induced on their wires by random fields are measured. Changes in the shielding structure

are being studied to determine the structure's effect on the induced currents.

West's and Bunting's research approach combines analytical, experimental, and numerical techniques, along with sophisticated models, to obtain a clear understanding of the random electromagnetic environment. The overall goal of the research is to aid NASA in developing methods to design shielding enclosures that will protect satellite systems from unknown electromagnetic interference that may occur during launch.



OSU REFTAS graduate research assistants James Dixon and Neda Nourshamsi prepare a model satellite system enclosure for electromagnetic testing

RESEARCH HIGHLIGHTS

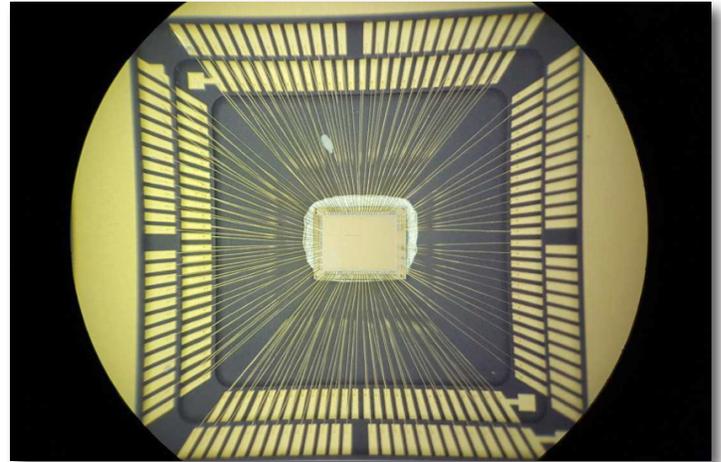


MIXED SIGNAL VLSI GROUP INVESTIGATION OF HfO₂ BASED EEPROM FEASIBILITY

Dr. Chris Hutchens

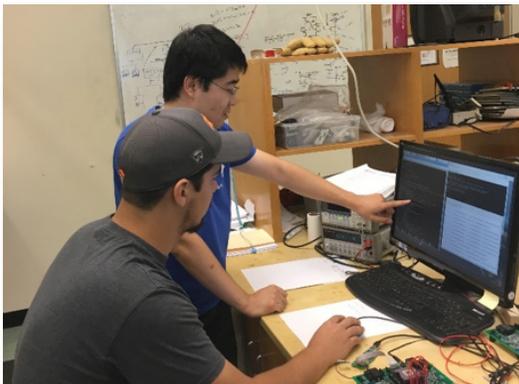
Dr. Hutchens recently received a grant from the Air Force Research Laboratory (AFRL) to develop novel EEPROMs, based on HfO₂ trapping at the CMOS interface. The Mixed Signal VLSI (MSVLSI) group led by Dr. Chris Hutchens investigates power, temperature, and radiation extremes. Devices developed by his group include ultralow RFIDs, which must operate on tens of microwatts of power, and radiation tolerant EEPROM memories.

MSVLSI's most recently completed project was a demonstration of the viability of an implantable RFID device for neural spike detection. The inductively coupled, RF power harvested system used a low power, two stage bandpass neural amplifier with a frequency range of 450 Hz to 8 kHz, while consuming only 3.19 microwatts of power on less than 1 V. This new result has been presented at the 2017 IEEE 17th International Conference on Bioinformatics and Bioengineering. The objective of the neural RFID is to transmit 8-bit neural data at a 200 kps rate along with an optical pulse indicating the detection of a neural spike. Fabrication was carried out in UMC 180nm CMOS.

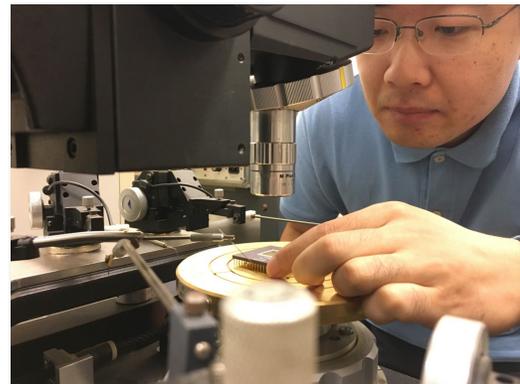


Wire-bonded EEROM test chip with assistance from Dimation, Burnsville, MN

To eliminate physical and eavesdropping hacker attacks on computers and computer networks, engineers must embed EEPROM memories within computer chips, peripheral I/O, and RFID sensors. With the availability of single chip silicon, where CPU's reside side-by-side, EEPROM data and code become non-observable, thus eliminating susceptibility to eavesdropping hacker attacks. The goal of Hutchens' new research effort is to investigate and document the stochastics of electron trapping and detrapping at the silicon SiO₂/HfO₂ interface layer, and to apply this knowledge to the development of a single EEPROM storage cell. These results are then extended to develop a 10 kB EEPROM standard cell.



PhD student Cheng Hao (back) and undergraduate student Juan Salinas (front) debugging JTAG code



PhD student Cheng Hao preparing to probe SOI-CMOS die on the Alessi probe station

NSF COLLABORATIVE RESEARCH: MANIPULATING TERAHERTZ WAVES USING THREE-DIMENSIONAL METAMATERIALS

Dr. Weili Zhang & Dr. John O'Hara



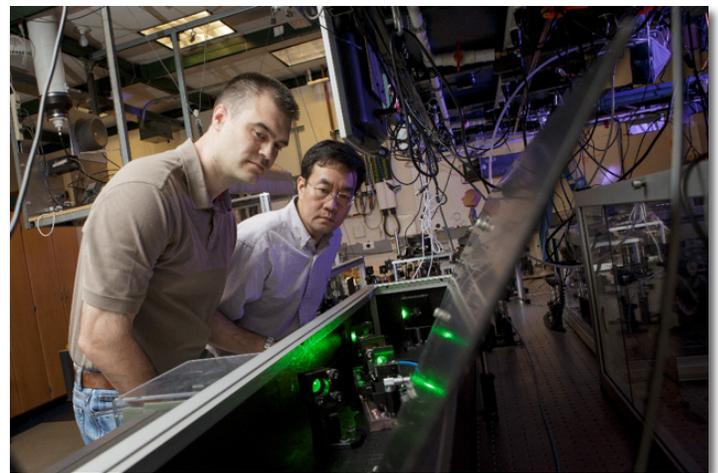
Prof. Weili Zhang and Prof. John O'Hara (Co-PI) were awarded a collaborative research project along with Dr. Cheng Sun (professor at Northeastern University) from the National Science Foundation to carry out investigations of three-dimensional metamaterials functioning at terahertz frequencies.

This project focused on the development of a synergetic approach that incorporated transformation optical theory, metamaterial design using the effective media approximation, and scalable three-dimensional fabrication technologies. It also focused on a method of experimental validation to explore a range of novel terahertz optical components, including a transformation-optics-enabled, aberration-free terahertz, Luneburg lens, and an integrated terahertz spectroscopy platform.

The proposed terahertz, three-dimensional metamaterials concept and integrated research protocol can be further extended to the broad electromagnetic wave spectrum for stealth technology, advanced communication systems, medical imaging, and remote sensing. Some of Zhang's and O'Hara's results were highlighted in various media sources, such as Terahertz Science and Technology Network, MRS News, Phys.org, and technology.org. Their research accomplishments performed during the course of this project have resulted in 76 invited and contributed papers in high-impact journals, such as *Nature Communications*, *Science Advances*, *Advanced Materials*, *Optica*, and *Physical Review Letters*. In

addition to their journal publications, 22 plenary, keynote or invited talks, 20 contributed conference talks, and 15 university colloquia were also delivered.

Zhang's group initiated their research in terahertz metamaterials at OSU in 2003 and has pioneered the use of terahertz time-domain spectroscopy for characterizing the electromagnetic properties of unique composite structures. Prof. Zhang and colleagues are also responsible for the first experimental demonstration of terahertz cloaking, metamaterial-induced terahertz transparency, negative terahertz index of refraction, and near-field mapping of plasmonic terahertz surface waves.



Prof. Weili Zhang (right) and Prof. John O'Hara (left) in the Ultrafast THz Optoelectronic Laboratory

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OSU PREPARES FIRST FEMALE GRADUATE STUDENT FOR SUCCESSFUL NATIONAL SECURITY CAREER



Dr. Carolyne M. Hart was a Vice President and Chief Engineer at Sandia National Laboratories, a U.S. Department of Energy engineering and science laboratory for national security and technology innovation. Even though Hart is officially retired, she continues to share her engineering and leadership knowledge as a part-time consultant for various engineering and national security organizations.

After completing a B.A. degree in mathematics with a minor in biology at Howard Payne University, Hart was awarded a National Science Foundation scholarship for graduate studies at Oklahoma State University, becoming the first female graduate student in the School of Electrical Engineering at OSU. She received her M.S. and Ph.D. degrees in electrical engineering from OSU in 1976 and 1978, respectively.

“My years at OSU were formative,” Hart said. “OSU provided an incredibly rich and supportive growth environment, both for me personally and as an independent researcher.”

The curriculum was initially outside of Hart’s comfort zone. Her studies in the OSU ECE program gave her a significant amount of experience in the field, as she was allowed to continue to advance her knowledge of mathematics and biosciences as part of her degree plan. Hart’s graduate school research experiences also nurtured her problem solving and critical thinking skills, which she found to be especially useful in her positions at Sandia.

“I loved studying math and science, but I am the first to admit that as an undergraduate student I didn’t see how it all fit together,” Hart said. “OSU graduate school

experiences taught me to integrate and extend that subject matter knowledge.”

Hart knows the value of collaborative research. Through collaborations with her adviser, other professors, and peer graduate students she learned that she could be more successful by surrounding herself with diverse and intelligent people.

“I left OSU as a believer in diverse teams, a passion that has stayed with me throughout my career,” Hart said. “If everyone thinks the exact same way and has the exact same background, you end up with narrow solutions and an increased likelihood of strategic blind spots.”

Shaping the future inspires Hart. She likes learning new and different things and then collaborating with her diverse team to see if there are innovative and positive discoveries that might come from that newfound information.

“The most rewarding and memorable times in my career involved leading a diverse, high-performing team to discover innovative, high-impact solutions, and hearing the next generation leaders enthusiastically say, ‘can you believe what we just did?’” Hart said.

Through Hart’s experiences she is able to give advice to current students. “Participate in CEAT and ECE activities, and get to know the other students, as they will always be your colleagues,” Hart said. “Some might be your future bosses or even future customers. Building effective and trusting professional relationships throughout your career is essential to your success.”

Hart’s Oklahoma State University engineering education laid the foundation to hold one of the top engineering jobs in the world, and it paved the way for her to excel in that position. Hart’s journey at OSU has motivated her career and prepared her to embrace the challenges of exploring the frontiers of science, technology, and engineering.

ALUMNI

OSU ALUMNUS IN AMERICA'S SPACE RACE



Mr. Jack H. Graham is the owner of Graham and Associates Professional Consulting Engineers in Yukon, Oklahoma. Graduating from Oklahoma Agricultural and Mechanical College, now Oklahoma State University, in 1959 with a Bachelor of Science in Electrical Engineering, Graham entered engineering at a time of major advancement in aerospace technology and worked on numerous ground-breaking projects in the middle of the US-USSR Space Race.

Graham was born March 16, 1937 and was raised on a dairy farm just outside of Oklahoma City as the youngest of four brothers. Graham's oldest brother attended OSU and graduated with an engineering degree after serving in World War II. "He didn't have to milk cows and that looked so promising that all four of us boys went to OSU," says Graham. "I haven't milked a cow since."

Graham attended OSU while supporting his wife and two children. He worked for the university's physical plant as an electrician's helper. He graduated from OSU in 1959, finishing his B.S.E.E. in only three and half years.

After graduating, Graham went to work for Sperry Gyroscope in New York City where he participated in the development of electronic counter measures designed to render the B52 bomber invisible to Soviet radar systems. This technology was brand new, and Graham was on the front line of its design. "We didn't know a lot about transistors or solid state electronics back in those days, but when I went to New York, that's all we were doing, the very latest solid state electronics," says Graham.

Graham worked for Sperry for four years, during which time he was given the opportunity to move to Salt Lake City and work on the surface-to-surface missile system called Sergeant. After leaving Sperry, Graham went

to work for Boeing in Alabama. Working with rocket scientist Wernher von Braun, he contributed to the first stage of the Saturn 5 system, the missile system that would later put man on the moon.

"I was a little cog in the great big wheel that put a man on the moon," says Graham, one of thousands of people involved in the project. "That was the single most extensive effort of mankind," he says. "It had more people and more money invested in it than any other effort in history. It was very exciting."

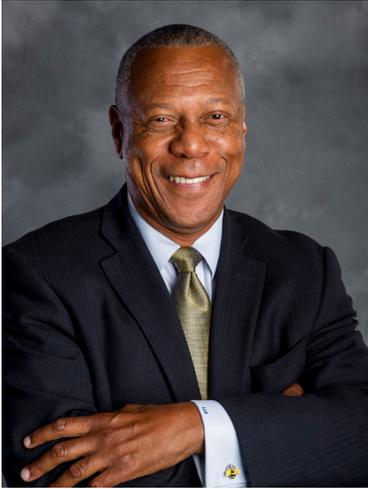
Once the Saturn 5 system was running, Graham left Boeing to work for Ling-Temco-Vought in Grand Prairie, Texas. "We were working on what you might say was a Star Wars project," says Graham. The project was a satellite system that could shoot down Soviet intercontinental ballistic missiles.

Having registered as a professional engineer while in Alabama, Graham moved back to Oklahoma City and began working for a mechanical and electrical engineering consulting firm. Graham bought this firm from its founders in 1974 and changed its name to Graham and Associates Professional Consulting. Graham is also a past president of the Oklahoma Society of Professional Engineers and a Fellow of the National Society of Professional Engineers.

Graham credits his success in engineering to his education. "It was essential! Everything I've done as a professional engineer was based on my education in the engineering department at OSU," he says. He states that he received a good, if not better, education than many of the engineers whom he worked with when he first joined Sperry Gyroscope. "My education was as good as anyone else's there," he says. "I'm very proud of the education I got at OSU." Reflecting on his experiences in engineering, Graham says "An engineering degree is an outstanding degree. It enables you to go out and, through technology, help build your society."

Graham encourages current students not to take their educations for granted. "Pay attention to your professors. You're there for a purpose, and that purpose is to get educated. Don't waste that opportunity."

DR. LEGAND BURGE, JR. INDUCTED INTO CEAT HALL OF FAME



Engineer and academic administrator **Dr. Legand Burge, Jr.** earned his BSEE degree in 1971 and his MSEE degree in 1973, both from OSU. After four years of service at the Sunnyvale Air Force Base, Burge returned to Oklahoma State University to earn his Ph.D. in electrical engineering in 1979.

Burge's career has focused on information theory, coding theory, digital signal processing, and communications. Burge taught at the Air Force Academy before being selected to serve in the Intermediate Service School at the Air Command and Staff College. Shortly after, he was invited to work at the Pentagon under General Colin Powell. Burge was assigned to the research and development group of the air staff's international program. In 1987, Burge became a lead researcher at the National Security Agency and later returned to the Pentagon, working in financial evaluation for the defense secretary. Burge retired from the military in 1999 after having served as vice commander of the entire Air Force ROTC program and the Dean of the Acquisition Management School at the Defense Systems Management College. After leaving the Air Force, he was named a Professor of Electrical Engineering and Dean

of the College of Engineering, Architecture, and Physical Sciences at Tuskegee University, one of the oldest and largest historically black universities in America.

Burge has been recognized for his administrative leadership and research accomplishments throughout his career. He was elected to the American Society of Engineering Education Executive Board in 2005. He has also worked with his son to operate LL Burge & Associates, a consulting firm that addresses information technology challenges of the 21st Century.

For his contributions to his profession, the College of Engineering, Architecture and Technology (CEAT) proudly inducted Legand Burge Jr. into the CEAT Hall of Fame in October 2017.

DR. WILLIAM HOGAN INDUCTED INTO OSU DIVERSITY HALL OF FAME



The OSU Diversity Hall of Fame recently inducted **Dr. William Hogan**, an ECE alumnus. Hogan earned a bachelor's degree in electrical engineering at OSU in 1965. As an undergraduate, he served as president of the OSU Epsilon Epsilon Chapter of Alpha Phi Alpha Fraternity, Inc.

In 1969, he earned a master's degree in electrical engineering from Southern Methodist University. Hogan returned to OSU to complete his a doctoral degree in electrical engineering in 1973. In academia, Hogan served the University of Kansas as Associate Executive Vice Chancellor before working in industry as Vice President of World Operations at Honeywell Inc. and Vice President of Corporate Operations and Quality at Medtronic, Inc.

He has also served as a director on several company boards and educational organizations, including White House task forces on education.

NOTES AND NOTICES

ECE HOLDS ITS SECOND DISTINGUISHED SEMINAR SERIES

The second annual Distinguished Seminar Series featured five internationally recognized researchers. This seminar series is intended to provide an open platform for the faculty and students to have a dialog

with leading researchers in various fields of ECE and to build-up a dynamic and vibrant culture of research and academic exchange in the ECE department. All seminars are free and open to the public.



ENDOSCOPIC OPTICAL IMAGING FOR EARLY-STAGE CANCER DETECTION

3:20 - 4:20 p.m. Thursday, March 9 | ATRC 102

Dr. Jennifer Kehlet Barton - Professor, Interim Director, BIO5 Institute, Department of Biomedical Engineering, University of Arizona



SURVIVAL OF SOCIETY AFTER A SOLAR SUPERSTORM

3:20 - 4:20 p.m. Thursday, March 23 | ATRC 102

Dr. Daniel R. Grischkowsky - Emeritus Regents Professor and Bellmon Professor of Optoelectronics, School of Electrical and Computer Engineering, Oklahoma State University



BRIDGING DESIGN & TECHNOLOGY GAPS FOR FUTURE CHIP MANUFACTURABILITY, RELIABILITY, AND SECURITY

3:20 - 4:20 p.m. Thursday, April 20 | ATRC 102

Dr. David Z. Pan - Professor, Department of Electrical and Computer Engineering, The University of Texas, Austin



MAKING A DIFFERENCE WITH DATA

2 - 3 p.m. Monday, October 2 | ATRC 102

Dr. Chris White - Principal Researcher, Microsoft



BRIDGING THE TERAHERTZ GAP FOR EVERYDAY LIFE APPLICATIONS

2 - 3 p.m. Monday, November 6 | ATRC 102

Dr. Kenneth K. O - Professor of Electrical Engineering, Director of the Texas Analog Center of Excellence, and Texas Instruments Distinguished University Chair, University of Texas, Dallas

TWO ECE FACULTY MEMBERS NAMED ENDOWED PROFESSORSHIPS

ECE is proud to announce two named professorships. Dr. Bunting is recognized as the Bellmon Chair Professor, for his pioneering research in electromagnetic compatibility. Dr. Stine is recognized as the Earl and Carolyn Glimp Professor of Electrical Engineering for his scholarship in VLSI architectures. These honors communicate to our students and constituents that ECE professors such as Bunting and Stine are highly committed to excellence in the classroom and research laboratory. Congratulations to Dr. Bunting and Dr. Stine!



Dr. Charles Bunting
Bellmon Chair
Professor



Dr. James Stine
Earl and Carolyn
Glimp Professor

OSU/A&M REGENTS PROMOTE DR. DAQING PIAO

The School of Electrical and Computer Engineering is pleased to announce that Dr. Daqing Piao was promoted from associate professor to professor by the OSU/A&M Regents on Friday, June 16, 2017. This promotion recognizes Dr. Piao's commitment to excellence in both instruction and research. The School is proud to have Dr. Piao as a member and leader of the ECE team.



ECE WELCOMES DR. O'HARA

The School of Electrical and Computer Engineering welcomes Dr. John O'Hara to OSU as a tenure track assistant professor. Dr. O'Hara graduated from OSU with his PhD in 2003 after completing his research on the experimental study of a quasi-optic synthetic phased-array terahertz imaging systems. Upon graduation, he joined Los Alamos National Laboratory as a post-doctoral fellow and then member of the technical staff within the Center for Integrated Nanotechnologies. Dr. O'Hara has over 50 publications and has several patents. He managed approximately \$10M in research funding at Los Alamos.

He founded and is President of Wavetech, LLC, which specializes in robotics, controls and automation. Dr. O'Hara has served the School since 2011 as an adjunct professor with teaching and research responsibilities. He will continue to do so as a tenure track professor with primary research duties to rebuild and grow the School's THz laboratory facility and to provide outstanding educational experiences to our students.

The School is very excited that Dr. O'Hara agreed to join our team. He is student-focused and is highly committed to both teaching and research excellence.

NOTES AND NOTICES

CEAT'S NEW LAB BUILDING, ENDEAVOR WILL OFFER UNDERGRADUATES MORE HANDS-ON OPPORTUNITIES

By Pam Reynolds

ENDEAVOR is much more than just another undergraduate laboratory building. It provides the opportunity for a significant paradigm shift in education that affects every department in the College of Engineering, Architecture, and Technology (CEAT).

According to CEAT's Associate Dean of Academic Affairs, Randy Seitsinger, "In today's world, the nature of problem solving in engineering, architecture and technology is rapidly changing. Today's challenges are increasingly interconnected and complex and are most effectively solved within an interdisciplinary environment with collaboration between professionals with varied backgrounds and expertise. Endeavor will allow us to change our educational pedagogy to match this reality.

Traditionally, engineering education has mostly been structured within a silo-type environment, meaning the students gained most of their educational experience within their own departments without having significant interdisciplinary learning interactions with students from other departments. Now, ENDEAVOR has been developed with the idea that its hands-on labs do not belong to one school, but instead are designed around the needs

of interdisciplinary focus groups, breaking down potential silos across all disciplines.

Endeavor's focus areas include Mechatronics and Robotics, Instrumentation and Sensors, Energy and Power, Flow Systems, Materials and Sustainable Design, Process & Transport, Environmental Systems, and Digital Manufacturing. Industry Aligned Labs will provide flexible space for industry/student joint projects, and electronic and digital maker spaces will facilitate prototyping. A first floor test arena will facilitate the testing of autonomous vehicle prototypes, entrepreneurial projects and senior design projects.

Clinical faculty assigned specifically to ENDEAVOR will help students and other faculty engage and make connections among the schools and the college.

ENDEAVOR's lead clinical faculty member, Brad Rowland, describes ENDEAVOR as a "hands-on immersion experience where students will learn by doing and from observing how other students solve problems. ENDEAVOR will have a vast array of sophisticated equipment such as metal, plastic, and composite 3d printers, universal test machines, a wind tunnel, flume, and water tunnel, and of course – state-of-the-art laboratories such as a fully functioning analytical lab with high pressure liquid chromatography, gas chromatography, mass spectrometry, infrared spectrometers, and other instruments. In fact, the ENDEAVOR building itself is a learning tool for students that provides lessons in the mechanics of building structures, energy consumption, and the use of renewable energy. An outdoor energy deck will allow experiments with solar panels, a wind turbine, and a ground source heat pump system will be monitored in the first floor test arena."

After students go through training to know how to safely use the equipment, the equipment in



Concept art depicting a laboratory

ENDEAVOR will be available to them without the students having to be in a particular course.

“ENDEAVOR will be like a giant tool box of very sophisticated and expensive equipment available to CEAT students.” Seitsinger said. “It will provide them an outlet for their entrepreneurial creativity and curiosity, a venue for them to test, refine, and prototype their ideas. I would love to see companies launched out of ENDEAVOR by our undergraduate students!”

Civil Engineering School Head Norb Delatte said he is not only excited about better facilities for existing labs, but he is also enthused about being able to enhance courses that have been lecture only in the past with more of a hands-on lab focus. Of the 55 courses that ENDEAVOR will support, only half currently have existing laboratories. This 72,000 square foot facility will accommodate over 3,000 students per week.

“In a lot of the areas it’s going to be a substantial leap of opportunity”, said Delatte. “I don’t know very many civil engineering undergraduate programs that use a wind tunnel to look at wind effects on structures, but



Concept art of the test arena

now we will have that capability. ENDEAVOR will allow us to do things we haven’t even thought of yet.”

One of the requirements for a senior design project in ENDEAVOR is that the project will be interdisciplinary. “With the workspace and equipment, there’s really no limit on what a senior design project can include when you take an integrative approach,” said Rowland.

Another ENDEAVOR goal is to get students involved in hands-on design experiences much earlier in the curriculum than in their final senior design projects. “We want to start integrating those hands-on design experiences earlier in the curriculum so that by the time they get to senior design, they can approach an interdisciplinary project with confidence,” said Seitsinger.

The interdisciplinary focus of ENDEAVOR will make CEAT students more competitive. “In the real world, you typically have to work with groups of people from different educational backgrounds,” said Rowland. “So when our students are able to effectively do that, they will become more competitive and be head-and-shoulders ahead above their peers from other universities, because they will be able to constructively work in a team from day one.”



Concept art of an autonomous electric vehicle in a lab

NOTES AND NOTICES

ECE CELEBRATES PROFESSOR RAMA RAMAKUMAR'S 50 YEARS OF SERVICE WITH OSU

Dr. Ramakumar joined the School in 1967 and developed an international reputation in the area of renewable energy and power. Former and current students, professional colleagues, and School faculty honored him at a dinner celebration by telling stories and providing tributes.

ECE Regents Professor Subhash Kak was the Master of Ceremonies. Invited speakers included Dr. Karl Reid (Regents Professor, Mechanical and Aerospace Engineering, OSU), Dr. Ward Jewel (Professor, Electrical Engineering and Computer Science, Wichita State University), Dr. Keith Teague (Professor, School of Electrical and Computer Engineering, OSU), Dr. Dr. Imad Abouzah (Professor, Electrical Engineering Technology, OSU), Dr. Kaveh Ashenayi (Professor and Head, Electrical and Computer Engineering, University of Tulsa), Ms. Zeel Maheshwari (Ph.D Candidate, OSU), Mr. Abdulmunim Gawaeder (Ph.D. Candidate, OSU), Dr. Akram Gawedar (former student).

Dr. Young (Professor and Head, School of Electrical and Computer Engineering, OSU) presented Dr. Ramakumar a paver with the following inscription: "Dr R Ramakumar, 50 Years of Valued Service at OSU." The paver will be placed in the gardens in front of the OSU Student Union. The ceremony closed with a grateful speech from Dr. Ramakumar, a standing ovation, and dinner.

Dr. Ramakumar's commitment to ECE, OSU, and his profession is unquestioned. He exemplifies the true quintessential professor, a standard for all us to follow. We are grateful to have Dr. Ramakumar on the ECE team for the past 50 years.



LORY FERGUSON RECEIVES DISTINGUISHED SERVICE AWARD

Please join the School to congratulate Lory Ferguson for receiving the 2017 Staff Advisory Council Distinguished Service Award. This award along with a monetary gift was presented to Lory by President Hargis. The award recognizes her outstanding service to the School, CEAT, and OSU. This award is certainly well-deserved and is another reminder of why we should all be thankful that Lory is part of the ECE/CEAT team.

Congratulations to Lory!



DR. YEN RECOGNIZED WITH A DISTINGUISHED GUEST PROFESSORSHIP BY SHANGHAI JIAOTONG UNIVERSITY

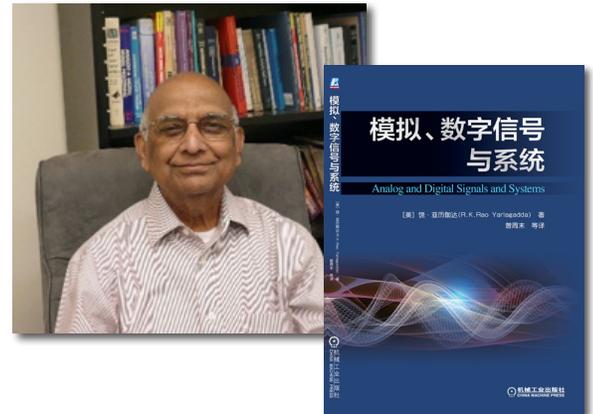


On March 16, 2017, ECE Regents Professor Gary G. Yen was recognized with a Distinguished Guest Professorship by the Shanghai Jiaotong University (SJTU) in Shanghai, China. SJTU is one of the first national institutions of higher learning in China, and renowned as one of the oldest, most prestigious, and selective universities in China. President Zong-Chin Lin, Academician of the Academy of Engineering, presided over the ceremony. After the award ceremony, Prof. Yen delivered an invited talk titled “Many-Objective Evolutionary Algorithms for Optimization” to over one hundred faculty and graduate student attendees from three different colleges.

DR. YARLAGADDA'S BOOK TRANSLATED INTO CHINESE

ECE Professor Emeritus, Rao Yarlagadda, just recently had his popular book, “Analog and Digital Signals and Systems” (Springer, 2010), an undergraduate ECE textbook, translated into Chinese and published by China Machine Press. This endeavor started from an initial contact made by ECE Prof. Weili Zhang with Prof. Zhoumo Zeng of Tujian University, a top engineering school in China. Both agreed that a Chinese version of Prof. Yarlagadda's book would be a great teaching resource for China's engineering students.

Congratulations to Dr. Yarlagadda!



OSU NATIONAL LAB DAY AT ECE



As part of OSU National Lab Day (NLD) 2017, Morrison High School students, under the guidance of their teacher Tammy Will, visited the ECE Wireless Communications Research Lab (WCRL) on May 16, 2017. NLD is a collaborative outreach effort between five colleges and is geared toward exposing Oklahoma high school students and their science teachers to Science, Technology, Engineering, and Math (STEM) education.

During their visit, lab director Dr. Sabit Ekin and his graduate students (Adithya Popuri, Surbhi Vishwakarma, Hisham Abuella, Habeeb Idrees, and Esad Oztemel) demonstrated their research projects on Internet of Things Based Livestock Monitoring, and Visible Light Communications and Health Monitoring. High school students volunteered to test the health monitoring project demonstration.

The event was organized by the College of Education. The WCRL team thanks Rachel Marie Potts from the College of Education for her endless hours invested in this event.

NOTES AND NOTICES

ELECTRICAL AND COMPUTER ENGINEERING PROFESSOR CHUCK BUNTING NAMED FELLOW OF IEEE



Electrical and Computer Engineering Professor and Associate Dean of Research of the College of Engineering, Architecture and Technology has just been named Fellow of the Institute of Electrical and Electronics Engineers (IEEE). “We in the School of Electrical

and Computer Engineering are delighted to announce that Dr. Chuck Bunting has been named a fellow of IEEE for educational contributions to electromagnetic compatibility and reverberation chambers” said department head Jeffrey Young. Per the IEEE, each year “following a rigorous evaluation procedure, the IEEE Fellow Committee recommends a select group of recipients for elevation to IEEE Fellow. Less than 0.1% of voting members are selected annually for this member grade elevation.”

Dr. Bunting was nominated by the IEEE Electromagnetic Compatibility Society (EMC), which is THE leading international organization in his field of research. It is quite the honor. IEEE is

the world’s largest technical organization with over 420,000 members worldwide. It is the number one organization for those who do electrical engineering or computer engineering related research.

The School currently has four IEEE Fellows, namely, Regents Professor Gary Yen, Regents Professor Rama Ramakumar, Professor Jeffrey Young, and Regents Emeritus Professor Daniel Grischkowsky. Counting Professor Bunting, about one out of every five faculty members in the School are IEEE Fellows, thus bearing credence to the importance and relevancy of the School’s internationally renowned research programs.

Bunting’s research interests include electromagnetic characterization and application of reverberation chambers, fundamental variational principles and computational electromagnetics, analysis of optical and microwave structures using numerical methods (including finite element techniques), antenna systems, and radio frequency (RF) design.

Congratulations to Chuck for this well deserved honor!

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