Spring 2015

The Circuit, Spring 2015

Department of Electrical and Computer Engineering, Michigan Technological University

Michigan Tech
Create the Future

The Circuit

Electrical and Computer Engineering

Spring 2015

Standing Tall

Upgraded Facilities, Exciting Research, and Academic Excellence Rule the Day in ECE

From the Chair

Dan Fuhrmann, Chair
Department of Electrical and Computer Engineering

Greetings from Houghton and the snow-covered campus of Michigan Tech. As I write these words, Winter Carnival is in full swing; I can look out my office window to see the snow sculptures and, in the distance, Mont Ripley. It's a great time to be a Husky!

I am delighted once again to bring you the latest edition of the ECE alumni newsletter, *The Circuit*, and to convey along with it the best wishes of the faculty, staff, and students of the ECE department. The department continues to push forward in fulfilling its twin missions of engineering education and research. This past year, we adopted a set of 3-year strategic goals for the period 2014–2017, which calls for continued excellence in undergraduate and graduate teaching, growth in the size and productivity of our research programs, and diversification of our student population. We have every reason to believe we can achieve our goals and continue to be the department you can be proud to call your own.

As the U.S. economy continues to pick up speed, the demand for our graduates has become extraordinary. The Fall Career Fair had 341 participating companies and organizations, a Michigan Tech record by a large margin. Fully 2/3 of those companies were seeking electrical and/or computer engineers, among others, for full-time jobs, co-ops, and internships. The demand is coming from a wide range of industry sectors, going well beyond the traditional areas of power, communication, and defense; control engineering is particularly hot right now. The challenge is to make the opportunities in electrical and computer engineering known to a wider audience, and attract a larger and more diverse student population to Michigan Tech. At the same time, we have to recognize that these things can be cyclical, and therefore we must remain true to our core values of excellence in engineering education, with emphasis on individual skills, breadth in the fundamentals, and teamwork, collaboration, and entrepreneurship in upper-level capstone projects.

As part of our effort to show that electrical engineering has a broad reach, and to encourage some students to expand their views on what it is that electrical engineers do, we have introduced two new concentrations within the standard BSEE degree: a concentration in Biomedical Applications, and a concentration in Environmental Applications. Students in these concentrations will take additional courses in biomedical engineering and environmental engineering, respectively, supplementing their core and elective courses in electrical engineering. The new program begins in fall 2015. We are eager to see how students and potential students respond.

This year we said goodbye to two of our faculty members. Ashok Goel, an expert in VLSI interconnects who taught courses in circuits, devices, and electronics for many years, retired in November. Zhi (Gerry) Tian developed a strong national and international reputation for her work in communication theory and statistical signal processing, and served three terms as a program director for the National Science Foundation; she has now taken a position at George Mason University. We will miss them both.

In this newsletter, you will find a number of stories about the success of our faculty, students, and alumni. Particularly noteworthy is that Shiyan Hu and Zhuo Feng were recipients of the prestigious National Science Foundation CAREER award, given to the top echelon of promising assistant professors nationwide. We are proud of their accomplishments and happy for them. Last year Hu was promoted to the rank of associate professor, with tenure, and both are continuing to build exciting and forward-looking research programs.

Once again I want to remind you that this is your Department of Electrical and Computer Engineering. Your opinions, your service, and your support are always welcome. Feel free to get in touch anytime—you know where to find us!

On the Cover

ECE faculty, staff, and advisory board students pose by the new bronze husky statue in front of the EERC.

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Keranen Gift Funds Modern Lecture Hall

A special thank you goes to ECE alumnus Leroy Keranen, BSEE '61, who has helped turn a well-worn teaching and learning space into a modern, comfortable, user-friendly lecture hall. The ECE department received a substantial gift from Keranen in August 2014 to improve the learning environment of the students, and the department had just the project in mind.

EERC L100 is an 80-seat lecture hall used heavily by the ECE department and available to all academic units on campus. It had served the Michigan Tech community well but was showing its age and in need of renovation to bring it up to modern standards.

The EERC L100 renovation and acoustic remediation project added distance-learning capabilities and upgraded the lecture-capture, audio, and display technologies in the room. The space also had acoustic problems stemming from an air conditioning unit on the roof directly overhead, associated plumbing in the back of the hall, and poor acoustic design in general.

These items will be addressed with on-going improvements to the space. For the faculty preparing online courses and for students taking such online classes, the space has been upgraded to include state-of-the-art Michigan Tech lecture-capture capabilities. For students attending lecture in the hall, the enhanced audio and display technology has vastly improved the educational experience. Both objectives are consistent with the strategic goal of providing the best possible educational experience to a wide audience, on and off campus.

A similar gift from Keranen was received during the 2012–2013 academic year, which provided new chalkboards for all of the classrooms and lecture halls in the EERC. This was also met with great appreciation from faculty and students alike.

Nucor Funds New Industrial Control and Automation Lab

This fall saw the completion of the new Nucor Industrial Control and Automation Laboratory housed in the Electrical Energy Resources Center. The state-of-the-art facility was made possible by a $255,000 gift from Nucor Corporation, the largest manufacturer of steel products in North America.

The laboratory is a collaborative effort of the program in electrical engineering technology in the School of Technology and the Department of Electrical and Computer Engineering.

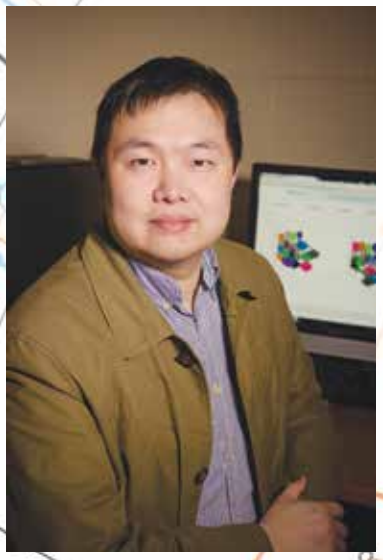
The lab consists of eight portable Amatrol Programmable Logic Controller (PLC) Learning Systems, equipped with Allen-Bradley CompactLogix 5300 PLCs and Human Machine Interface (HMI). These trainers enhance the teaching of PLC concepts and HMI programming using the latest generation of PLCs. The new technology also includes a fluid-flow Process Control Learning System equipped with a Honeywell PID controller and four mechatronic stations fully integrated with a Fanuc Robotics System that allow for teaching advanced concepts of PLC programming and overall system troubleshooting skills.

PLCs are an integral part of nearly all industrial processes today. A PLC is a digital computer used for the automation of a variety of electromechanical processes, including temperature ranges, immunity to electrical noise, and resistance to vibration and impact. PLCs are often integrated with robotic technology.

"Knowledge and experience in control systems has been the single most sought-after skill set from our corporate recruiters looking to hire electrical engineering graduates for the past several years," says Dan Fuhrmann. "With the Nucor Laboratory we will take a major step forward in meeting the demands of industry and open up opportunities for our students."

"Nucor recruits technical talent and future leaders at Michigan Tech because Tech graduates have proven to be successful Nucor teammates," says Dave Davolt, electrical supervisor at the company. "Nucor's relationship and involvement with Michigan Tech has grown stronger over the years. This is evident with Nucor's investment in technology relevant to today's manufacturing industry. With these investments and partnerships, Nucor hopes to better equip students for post-graduation opportunities, opportunities we hope they seek with Nucor."

CATCHING UP WITH SHIYAN HU



If you ask Shiyan Hu what he's been up to lately, make sure you have enough time to hear it all.

"Where would you like to start?"

We can start with his research into smart appliances and their security. Or his NSF CAREER award. Or maybe his recent conversation with Memorial Sloan Kettering Cancer Center, a leader in cancer research, on deploying his biochip in their clinics. Or maybe his being named a Fellow of the Institute of Engineering and Technology (IET, formerly known as IEE).

Where to start indeed.

Hu's research into smart homes has garnered a lot of press recently, with the prospect of zombie appliances capturing the imagination. There are real benefits beyond just programming your thermostat from your tablet or setting a timer for lights on a phone.

"In addition to convenience, smart-home technology also reduces your electricity bill," he explains. "Many cities and utility companies in the US have already adopted dynamic pricing, with different electricity prices at different times."

The weakness may be in the convenience: if the controller is hacked, then the entire home is at someone else's fingertips. While no one's microwave is going to come alive and eat them—well, probably not—the lack of security on many elements of the so-called Internet of Things is a real concern. Every digital link between smart appliances and you, Hu says, is a pathway for hackers to take over your house, maybe even your community. And as all aspects of life become more digitally connected, we increase the risk of serious hacking threats.

"Since all home appliances are operated by this one controller—which is typically implemented in an ARM chip-based architecture—you could potentially lose control of the entire house if that controller is hacked," says Hu. "In fact, there are already multiple media reports on this, including hacking a refrigerator to send spam emails."

By researching security vulnerabilities, Hu is attempting to prevent not just tricks related to electricity pricing, but also the potential for large-scale manipulation of demand, causing a cascade effect that could lead to a blackout.

"We cannot have perfect security for smart devices," Hu says. "But we can make improvements."

For individuals, this means following some common-sense procedures, including upgrading devices when notified by the manufacturer, securing wireless technology, and otherwise keeping vigilant to protect your infrastructure.

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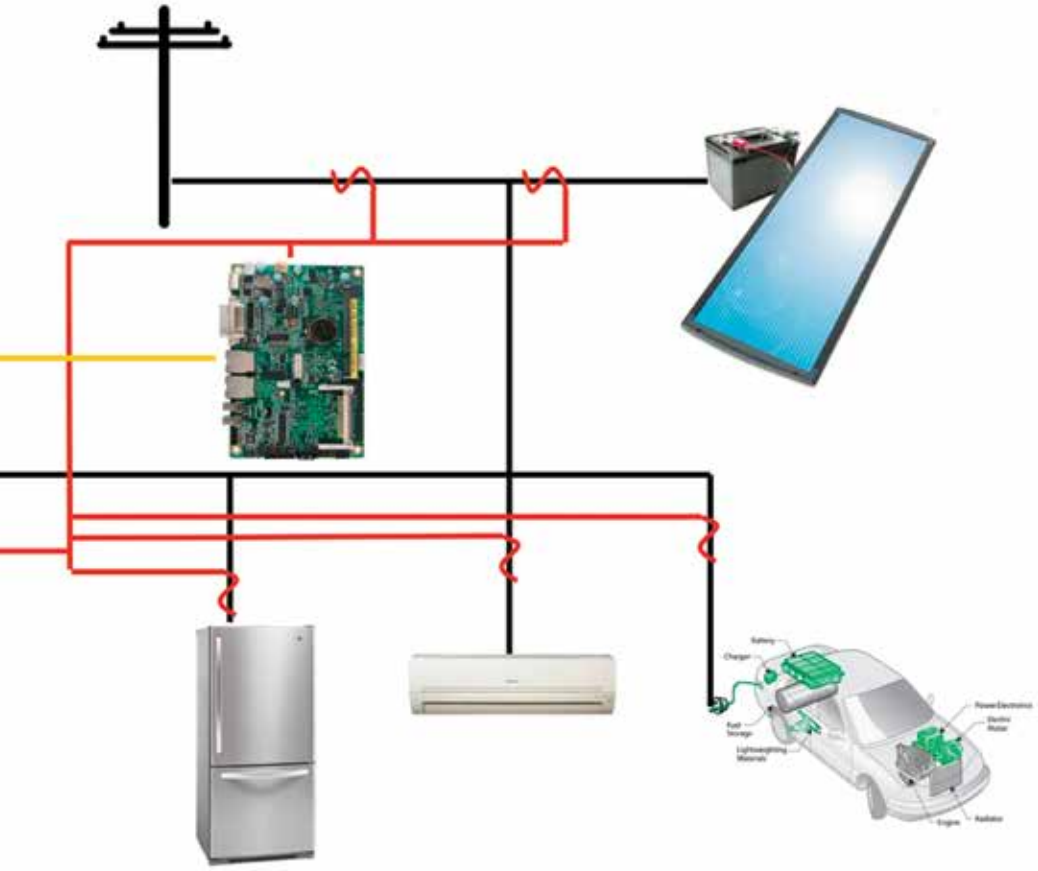
Some of Hu's other research is protecting a different kind of infrastructure: he's aiming to improve health and save lives. His innovation can be found on a biochip, a small device that can quickly and accurately test for a multitude of conditions with a single vial of blood.



"It used to be that you would need a great deal of blood for diagnosis," Hu explains. "It wasn't a fast process, and it wasn't easy on the patient. With this technology, the results come in much faster and with better accuracy—and using far less blood."

This research has been making waves in both the engineering and medical fields. The biochip was featured on the cover of *IEEE Transactions on Nanobiosciences* last March, and was also highlighted in *IEEE Spectrum, Science Daily*, and more than 30 others.

It has also caught the attention of the clinicians at Memorial Sloan Kettering Cancer Center in New York. Hu's research could mean a great deal more comfort and improved care for seriously ill cancer patients, something that makes this technology very real.

"That's what makes this research so important," Hu explains. "It makes a very real difference in people's lives."

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All of this time spent on the cutting-edge has meant recognition for Hu. He was awarded a prestigious NSF CAREER award, given to outstanding researchers early in their careers. He has also been named a Fellow of the Institute of Engineering and Technology, the largest professional engineering society in Europe and the second-largest in the world.

"It's been an honor receiving this attention," he says.

ECE Co-Founds the Alliance for Computing, Information, and Automation

Technological advancements in recent decades, many of them the result of the efforts of electrical engineers, have forever connected the fields of computing, robotics, networking, and security. For example, industrial control systems make factories safer and more efficient; consumers can operate home appliances from their phones; real-time health monitoring gives doctors a comprehensive view of their patients' medical conditions. We are moving into a world in which all the objects, devices, and engineered systems in our lives can be sensed, networked, and controlled in a vast Internet of Everything.

In response to this new paradigm, ECE has joined with the Department of Computer Science and the School of Technology to form the Alliance for Computing, Information, and Automation. The Alliance will strive to put the needs of Michigan Tech, our students, our partners, and our research sponsors above the agendas of individual academic units.

The Alliance will encourage interaction among six computing- and automation-based undergraduate degree programs at Tech, and its academic advisor will work with prospective and current students to make sure they find a major that fits their skills and interests. The Alliance will also establish a new University research center, the Institute for Computing and Cybersystems. The founding director of the ICC is Min Song, chair of the Department of Computer Science, who will lead efforts that will increase collaborative, multidisciplinary research among Tech faculty and with partnering institutions.

In Focus: Glen Archer

It can be tough to catch up with Glen Archer. There are, after all, only so many hours in the day, and he seems to have all of them packed.

You can start in the hallways of the ECE department. The principal lecturer and associate chair came to Houghton after nearly 30 years of experience as an officer in the US Air Force, serving as a cryptographic linguist among other duties, including the space program.

Much of what happens in the ECE hallways and classrooms is choreographed by Archer.

The planning and logistics that goes into ECE lab assignments can feel like rocket science. “We have 61 lab sections with 21 TAs and 14 courses,” Archer explains. With the assembly of each semester’s schedule comes the challenge of fitting all of the pieces together, while best serving the needs of students.

“Keeping track of which TA is good at what can be a challenge, but it’s important because in a lot of ways that determines what the student experience is like.”

That experience—hands-on learning while working through real-world problems—is what Archer credits for enduring student success. “We’ve earned our reputation, and we re-earn it every day in the classroom and lab,” he says. “Hands-on experience in the laboratory prepares students to be successful in Enterprise and in their careers.”

The Enterprise experience for ECE students can start as early as the second semester of their first year. The advantages go beyond working on industry problems: these students have consistent contact with faculty and their fellow students for multiple semesters. “The transformation these students undergo is just breathtaking,” he says. “It’s a real privilege to be a part of.”

Archer also works to bring the principles of a technology-rich education to a younger audience: each year, he helps with the Women in Engineering and Engineering Scholars Program in Summer Youth Programs. Each summer, hundreds of young students come to Houghton and cultivate their interest in STEM fields.

Archer’s personal research is in image processing. He pulls up a sample image, then shows what its sharpness would be when viewed from ten kilometers away. An algorithm he’s continually adjusting then takes that blurry image—atmospheric turbulence takes its toll over that kind of distance—corrects for error and recreates the magnified image to be closer to the original. “It’s fun to do,” Archer says while adjusting a few lines of code. “It’s amazing what these algorithms can do.”

Somehow, the departmental veteran still manages to have down time outside of the classrooms, labs, Enterprise meetings, student organizations, and research. Even then, when he’s free to do his own thing, there is still an element of service: as an avid cross-country skier, Archer helps to maintain the Maasto Hiihto and Churning Rapids trail systems in Hancock.

Curriculum Updates

In addition to upgraded facilities and fresh research, the Department of Electrical and Computer Engineering is undertaking several initiatives for students to expand their educational opportunities.

Two New Concentrations in Electrical Engineering

The ECE department is excited to announce two new concentrations within the Bachelor of Science in Electrical Engineering degree beginning in the 2015–2016 academic year. The field of electrical engineering is expanding across a wide range of industry sectors, including the environment and healthcare, while remaining strong in traditional areas such as power, communications, and defense. By adding to our existing concentration in Photonics, the ECE department looks forward to attracting a larger and more diverse population of students by offering these two concentrations.

The new concentration in **Environmental Applications** is intended for those students whose primary interest is in electrical engineering, but who seek to apply their skills in environmental quality assurance and remediation. Examples of such applications include environmental remote sensing, water treatment, and industrial controls for manufacturing and energy generation.

The new concentration in **Biomedical Applications** is intended for those students whose primary interest is in electrical engineering, but who seek to apply their skills in healthcare. Examples of such applications include biomedical instrumentation, biomedical signal processing, and medical imaging.

Accelerated Master's Program

The ECE department offers accelerated master's programs in Computer Engineering and Electrical Engineering. Students completing their undergraduate degree in the ECE department can continue on with the accelerated master's program by double-counting up to six senior-level credits of ECE coursework toward their bachelor's and master's degrees, providing the opportunity for both degrees to be completed in 5 years. There is a growing demand in industry for graduates with an advanced degree in electrical or computer engineering. The accelerated master's program enables students to gain a competitive edge while starting their careers more quickly.

Online Learning

The College of Engineering's distance learning graduate engineering programs were ranked 40th in the nation in rankings announced on January 7, 2015 by *U.S. News and World Report*.

The rankings are based on five categories: student engagement, faculty credentials and training, student services and technology, peer reputation, and admissions selectivity. Currently the ECE department offers a Master of Science in Electrical Engineering with a focus on power systems, a certificate in Hybrid Electric Drive Vehicle Engineering, and a certificate in Advanced Electric Power Engineering. ECE also has several EE undergraduate and graduate courses available online as well as on-campus in a blended learning environment.

The ECE department is also considering an expansion of its online programs into signals and systems. Modeling after its successful power systems focus, the department will offer online versions of its popular core courses in communications, control, and signal processing.

"Online education is a way that Michigan Tech can reach out to students who are unable to experience our residential learning environment," says Jacqueline Huntoon, dean of the Graduate School. "It gives working people, parents of children, and others the opportunity to advance their learning and their careers. Our programs in engineering are helping us to improve the professional workforce, ultimately benefiting society as well as the individuals themselves."

Alumni Spotlight

Connecting the Upper and Lower Peninsula Power Grids

It's a Michigan Tech electrical engineer's dream: connect the Upper and Lower Peninsula power grids using the latest technology in a massive project, the first of its kind. A high-voltage, direct current (HVDC) device was installed near St. Ignace in the Upper Peninsula to control increased power transfers in the original—but updated—transmission system.

"It's the fourth generation of HVDC technology using voltage source converters," says Adam Manty, 2006 and 2008 Tech alumnus and special studies engineer for ATC. "It's the newest, latest, and greatest, and it's the first large-scale back-to-back configuration of its kind in the world."

American Transmission Co. (ATC), the company behind the HVDC project and Manty's employer, owns the bulk of transmission assets in the UP. Back-to-back means all the technology is contained in one substation—named Mackinac—and does not require a new transmission line to carry power between the two HVDC converters, simplifying the system for ATC. This configuration allows better use of the existing transmission lines instead of building new ones across the Upper Peninsula and elsewhere.

"The HVDC device allows for complete control of the power flow by converting the incoming alternating current (AC) power to direct current (DC) and then back to AC," he explains. "This conversion will allow accurate control of flows through the UP, which will aid in alleviating the system performance issues seen in recent years. The device is capable of transferring up to 200 megawatts of power."

The original transmission system was designed to handle local demand in the eastern UP, Manty says. But as the mix of power generation has changed over the years—including increasing transfers of power from cheaper, cleaner forms of energy—improvements were needed to enhance the grid's reliability.

Manty says this project warranted special concerns, Yooper style. "We've got some innovative control systems specific to the UP," he says. "They will ensure grid reliability is maintained when area transmission lines are forced out of service. This can be especially important given the severe weather that the UP can experience."

Asea Brown Boveri (ABB) is one of ATC's vendors, and ABB's chief engineer is alumnus Mike Bahrman, class of 1970 and a Chassell native. He stresses the unique nature of the undertaking. "You can readjust the power flow in the event of a transmission line outage to avoid overloading the remaining system," Bahrman says. "This ensures that the eastern UP continues to be supplied from two sources, the Upper and Lower Peninsulas."

Now that the HVDC device is operational, it has already made a difference in providing reliable service to Upper Peninsula customers.

"The HVDC device helped us avoid two near-certain outages since it began operation," says Paul Roehr, director of operations for ATC. In one instance, "an unplanned outage on transmission facilities in northern Wisconsin almost surely would have caused customers in the UP to lose service, but the HVDC device provided system support, maintaining reliability by allowing a continuous flow of power."

Thanks to these efforts, the Upper Peninsula's grid is more stable, and individuals and industries can keep getting things done.

Have something interesting going on at your work? Or something else exciting in your life? Send us your stories—we'd love to know how you're doing! Drop us a line at www.mtu.edu/ece/department/contact

A number of Michigan Tech alumni have been involved in the Mackinac HVDC project with ATC.

- Adam Manty '06,'08—System Planning Special Studies and formerly Systems Operations lead engineer on the project
- Ken Jauquet '84—ATC Project Manager for the Mackinac HVDC project
- Steve Feak '85—Transmission Zone Planner for the project
- David Smith '85—Manager, Reliability Planning
- Tim Grunlund '00—Maintenance Engineer
- Derek Parker '98—Substation Engineer
- Brian Penny '82—Substation Services Engineer
- Sam Younk '97—Commissioning Engineer
- Kevin Demeny '07—Commissioning Engineer
- Andrew Paul '11—System Protection Engineer

ECE Academy, Class of 2014

After working for Underwriters Laboratories and Northrop Hallicrafters, **H. Paul Gay '70** moved to Silicon Valley, earned a graduate degree, and has become an advocate, leader, and innovator in microprocessing.

After earning an MBA in 1990, **Lyman Morikawa '71** went on to serve as manager and a principal of Morikawa and Associates LLC, a company working in utility-scale renewable energy.

Barry Van Veen '83 joined the faculty at the University of Wisconsin–Madison in 1987, where he is now the Lynn H. Matthias Professor. His research involves statistical signal processing and its applications.

Michael Whitens '85 has spent the majority of his career at Ford Motor Company in a number of body-engineering disciplines. On July 1, Mike was named global director for Ford's Vehicle and Enterprise Sciences.

from left to right: H. Paul Gay, Barry Van Veen, Michael Whitens, Lyman Morikawa

Larry Laurich 1943–2014

Lawrence (Larry) Laurich, inducted into the ECE Academy this past summer, passed away on October 26. Larry was born in Marquette in 1943, earning a BS and an MS from Michigan Tech. He began his engineering career in 1967 with IBM, spending more than a decade with the firm.

In 1978, Larry became vice president of engineering with Tandem Computers, a position he held for 19 years. In 1990, he enrolled in Stanford University's executive program, leading to his later career as CEO of five different startup companies.

In his spare time, Larry enjoyed golfing, running, biking, scuba diving, skiing, yoga, and was an instrument-rated pilot, activities he enjoyed with his wife of 21 years, Louise.

Nold Elected to the Presidential Council of Alumnae

Rebecca Nold received her BS in Electrical Engineering from Michigan Tech in 1985, later earning her MS in Electrical Power Engineering from Rensselaer Polytechnic Institute.

Upon leaving Tech, she accepted an engineering position with Sundstrand Corporation, an aerospace equipment manufacturer. In 1989 she began her career with General Electric as a senior design engineer.

At Tech, she was a member of Alpha Gamma Delta, the Eta Kappa Nu Society, and the IEEE Student Chapter. In addition, she was named Electrical Engineering Undergraduate Student of the Year in 1984.

Michigan Tech is a family affair as Nold's father, Steve Shetron, is a retired forestry professor, and her husband, Bob, is also a Tech alumnus—from the class of 1985 in electrical engineering. The couple has two children, Natalie and Andrew, and they make their home in Glenville, New York.

Nold remains connected to Tech as an Alumni Association Chapter Leader in Upstate New York. She and husband Bob are members of both the Presidents Society and the McNair Society at Tech.

Bunker Receives SWE Honors

The Society of Women Engineers (SWE) honored Michigan Tech alumna Kaitlyn Bunker at its annual conference as the 2014 Outstanding Collegiate Member.

Bunker, a recent PhD graduate in electrical engineering, was collegiate director of SWE and sat on its national board of directors. She was president of the Michigan Tech section for two years and served on a society-level committee focused on leadership coaching for SWE sections. Her award was for "superior academic achievement while advancing SWE's mission with forward-thinking leadership and enthusiastic engagement."

Bunker joined the Rocky Mountain Institute after completing her PhD at Tech. Her dissertation research focused on microgrids and optimizing control strategies for distributed renewable resources. At RMI, she has an interest in microgrids and distributed renewable resources. She is primarily involved with the Electricity Innovation Lab and RMI's initiatives to transform energy in the Caribbean islands.

Faculty News

Promotion and Tenure

Shiyan Hu was promoted from assistant professor to associate professor with tenure.

Joshua Pearce was promoted from associate professor to associate professor with tenure.

Faculty Awards and Recognition

Leonard Bohmann was elected Treasurer of the IEEE Education Society for calendar year 2015.

Bo Chen received the Best Survey Paper Award from *IEEE Transactions on Intelligent Transportation Systems.*

Christopher (Kit) Cischke was named the HKN Professor of the Year by the Michigan Tech chapter of Eta Kappa Nu, the student honor society of IEEE. He was selected for a second consecutive year by a vote of ECE students for all-around excellence in teaching.

Zhuo Feng received a National Science Foundation CAREER award for his research on "Leveraging Heterogeneous Manycore Systems for Scalable Modeling, Simulation and Verification of Nanoscale Integrated Circuits."

Shiyan Hu received a National Science Foundation CAREER award for his research on "Integrated Research and Education in Physical Design Automation for Nanotechnology and VLSI Technology Co-Design."

Shiyan Hu was among 62 researchers selected from the European Union and the United States to attend the EU–US Frontiers of Engineering Symposium of National Academy of Engineering held in Seattle in November 2014.

Sumit Paudyal was a finalist for the Michigan Tech Distinguished Teaching Award.

ECE Professor Emerita Martha Sloan was recognized by the Michigan Tech Alumni Association as an Honorary Alumna.

Zhaohui Wang received the Outstanding Senior Women Academic Achievement Award from the University of Connecticut.

Zhaohui Wang, with her forum advisor Shengli Zhou, University of Connecticut, co-authored the book *OFDM for Underwater Acoustic Communications*, John Wiley & Sons.

The Department of Electrical and Computer Engineering said goodbye to two faculty members this year.

Associate Professor Ashok Goel retired from Michigan Tech in November after 28 years of service to ECE and the University. His research activities focused on the design and development of nanotechnology circuits using nanoscale devices. Over the years, his research was supported by grants and contracts from the National Science Foundation, the US Army Research Office, the US Air Force Office of Scientific Research, General Motors Research Laboratory, and the Michigan Space Grants Consortium. Goel published more than 135 papers in international journals and conference proceedings. He also authored the book *High-Speed VLSI Interconnections* published by Wiley Interscience in 1994, with a second edition in 2007.

Professor Zhi (Gerry) Tian resigned from Michigan Tech in December after taking a position at George Mason University. Tian joined the ECE department in Fall 2000 after receiving her PhD from GMU. During her tenure at Michigan Tech she developed a strong national and international reputation for her work in communication theory and statistical signal processing, and served three terms as a program director for the National Science Foundation. Her research work has been funded by NSF, US Air Force Research Laboratory, Army CERDEC, Office of Naval Research, Sierra Nevada Corp., and others. She has published more than 130 journal and conference papers and several book chapters. Tian was named an IEEE Fellow in 2013 for her contributions to ultra-wideband wireless communications and localization.

We would like to thank Ashok and Gerry for their contributions in teaching, research, and service to ECE and Michigan Tech over their combined 42 years of service.

The department welcomed two familiar faces to the faculty for academic year 2014–2015.

Anand Kulkarni returned from retirement to teach two sections of our electronics course for the fall semester. Anand's 30+ years of teaching expertise in electronic materials and devices helped to fill a gap in our undergraduate program.

Don Moore, former president and CEO of AeroStream/CommRadio and ECE External Advisory Committee member, joined the faculty as professor of practice for a one-year term. Don has been an excellent addition to our Senior Design program, advising two teams. The students are learning first-hand what it takes to achieve a successful project right from a leader of industry. Don is also teaching Electric Circuits II, Electric Energy Systems, and Introduction to Communications Theory.

We are happy to have both Don and Anand as part of our faculty this year.

2014 ECE Student Group Activities

SPIE/OSA

The Michigan Tech SPIE/OSA chapter worked diligently during 2014 to promote interest in both Optics and Photonics as well as participation within the club. Over the academic year SPIE/OSA hosted two high level seminar guest speakers, Dave Brady from Duke University and Jon Arenberg, lead engineer for the James Webb Space telescope. The club also sponsored a photonics industrial outreach day where a large number of industry professionals were invited to campus for exposure to the photonics program. The event also provided students the opportunity to interact and network with working photonics professionals. Like us on Facebook: *on.fb.me/1glKoLT* or LinkedIn *Photonics at Michigan Tech.* SPIE/OSA is advised by Christopher Middlebrook.

Wireless Communications Enterprise

Students in the Wireless Communications Enterprise are working on a variety of projects this year including one for Funovation, a Colorado-based company run by Tech alumnus John Bonvallet, BSEE '78. Funovation designs laser mazes of all types and sizes. Funovation uses IR sensors to detect touches in the maze, but they want to replace them with capacitive sense—like current smartphone screens. The company also asked the students to write an app for an Android tablet to communicate and control the laser mazes. ECE students Neil Betham, Paul Bristol, Joel Ettinger, Jordan Grider, Michael Middleton, Nick Peterson, Andrew Schlosser, and Ran Sui have been involved in this project. Kit Cischke is the advisor.

Meet Bishop

The Blue Marble Security Enterprise Autobot team would like to introduce its Location and Obstacle Aware Robot, Bishop. Bishop has been designed and built to compete in the Intelligent Ground Vehicle Competition to be held at Oakland University in June 2015. The competition's goals are to design a robot that can navigate to a series of GPS locations, avoid obstacles, and stay within white lines.

The team was required to research, design, and build a robot to compete. To achieve this, the team is composed of mechanical, electrical, and computer engineers who follow an iterative design process that includes identifying issues, researching solutions, testing, and repeating.

According to the team, there could be an entire book written on the adventures of Bishop. Each problem presents the team with a new challenge and forces them to think of creative solutions using everything from duct tape to software updates. Autobot students Marissa Hintz, Derek Chopp, Phil Miller, Jake Kubisiak, Nikko Kolean, Brian Wilder, Myder Vang, Sandra Cvtanovic, John Klotz, and Haden Wasserbaech say they have developed a love/hate relationship with Bishop.

Blue Marble Security is advised by Glen Archer, and team Autobot by Jeff Burl.

Senior Design

This year's nine ECE Senior Design projects include the development of a smart grid home energy management application for Consumers Energy. Consumers Energy continues to deploy smart-metering infrastructure throughout its service regions. There is an opportunity to use smart metering infrastructure and mobile devices to benefit households in Consumers Energy's operating regions. Senior Design Team 8 is developing an app that provides Consumers Energy customers an interactive way to understand their home energy usage, providing statistics over a user-defined time period, usage by sources within the home, and energy savings goals and opportunities. SD-8 team members are Matthew Alessi, Benjamin Ginnow, Noah Hagman, Andrew Hanson, and Amanda Rueff. Team advisor is Don Moore.

The remaining eight projects are sponsored by American Transmission Company, Chrysler Corporation, DTE Energy, ITC Holdings Corporation, Union Pacific/NURail, Nexteer, and Kimberly-Clark.

2014 Student Awards

Undergraduate Student Awards:

ECE Departmental Scholar: **Maria Damiani**

ECE Woman of Promise/Martha Sloan Scholarship: **Myder Vang**

Carl S. Schjonberg Award for Outstanding ECE Undergraduate Student: **Chen Li**

EAC Industry Innovation Award:

Senior Design Team 1 for their project "Transmission System Guidelines for Line Commutated Motor Starting" sponsored by American Transmission Company. Advisor: Trever Hassell. SD-1 team members: **Connor Dziubinski, Jon Hohol, Andrew Martin, and Daniel Parent.**

Blue Marble Security team Blood Typing Device, sponsored by Adrienne Minerick, Chemical Engineering. Advisor: Glen Archer. BMS-1 team members: **Korbin Bickel, Gerry Chan, Matthew Gruber, Eman Jazayeri, and Mike Switala.**

Graduate Student Awards:

Jonathan Bara Award for Outstanding GTA: **Marco La Manna**
Jonathan Bara Award for Outstanding GTA: **Zagros Shahooei**

Matt Wolfe Award for Outstanding GRA: **Xiaohui Wang, PhD EE**

Details regarding the students and awards are located on the ECE website at **www.mtu.edu/ece/department/student-awards.**

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ECE Faculty Broaden Their Horizons

ECE faculty Jeff Burl and Warren Perger soar to new heights—literally. Both faculty are licensed private pilots and take to the skies whenever possible.

In addition to flying for transportation and pleasure, Burl volunteers to educate pilots-in-training with his years of experience.

Burl was also recognized in late 2013 by the Federal Aviation Administration with inclusion in the FAA Airmen Certification Database. This means Burl has met or exceeded the educational, licensing, and medical standards established by the FAA.

And thanks to Perger, more pilots are able to get the electronics support they need. Perger is the president of CMX Avionics, a company formed to provide reasonably priced solutions to electronics problems and needs for owners of general aviation aircraft.

He is also an instrument-rated pilot with a commercial license, using his experience overhauling his own aircraft to understand the necessity of easy installation and reliability. CMX Avionics is working to meet that need, while at the same time saving space and weight. That way more pilots can see more birds from their planes.