Greetings to all once again from the faculty, staff, and students in the Department of Electrical and Computer Engineering at Michigan Tech, and welcome to another edition of The Circuit, our annual alumni newsletter. This edition covers our activities and accomplishments in calendar year 2016. This was a year that many people across the US were happy to see come to an end, but in the ECE Department we kept our nose to the grindstone in continued pursuit of excellence in teaching, research, and service. We look forward to a productive and rewarding 2017, and I wish the same for you.

The Department’s lifeblood is its faculty, of course. The continued renewal and rejuvenation of the Department comes from a healthy, active, and enthusiastic cadre of assistant professors, those faculty who are in the early stages of their careers and bring a fresh perspective to all that we do. It has been a banner year for the young faculty in the ECE Department. Three of our seven assistant professors as of a year ago—Durdu Guney, Timothy Havens, and Chee-Wooi Ten—were promoted to the rank of associate professor, with tenure, in the spring of 2016. The remaining four assistant professors had quite a year as well. Lucia Gauchia and Zhaohui Wang are recipients of National Science Foundation CAREER awards, prestigious five-year awards given to early-career researchers at American universities with the best ideas and the most promise. Jeremy Bos was awarded an equivalent early-career award from the Air Force Young Investigator Program. Meanwhile, Sumit Paudyal is proving himself one of the most valuable faculty members through his large graduate classes in power system optimization and control, with excellent student course evaluations, and his active externally funded research program.

The initiative at the top of my list for this past year was the growth of ECE programs in robotics, control, and automation. This is an area where Michigan Tech and the ECE Department can make significant contributions to economic development in the state of Michigan and the larger Great Lakes region, especially as this part of the country maintains its quest for leadership in advanced manufacturing and mobility. It is also an area that generates a great deal of interest among prospective high school students—in fact, I believe it is no accident that our 8 percent increase in undergraduate enrollment, the largest percentage increase in the College of Engineering, coincides with the highly visible roll-out of new robotics activity. One poll showed that Mechatronics, Robotics, and Automation Engineering topped the list of starting salaries across all disciplines in the US with four-year BS degrees.

We were fortunate to receive two substantial alumni gifts from James and Marlene Fugere in support of this initiative, one at the end of 2015 and another at the end of 2016. Through the generosity of the Fugeres we were able to outfit the Department with a fleet of Clearpath robots that will be central to the activity of Robotic Systems Enterprise, now hosted by the ECE Department and housed in 1,200 square feet of renovated space on the eighth floor of the EERC. Assistant Professor Jeremy Bos has taken a leadership role in defining a departmental strategy in robotics that spans activity all the way from faculty-led research, to graduate and undergraduate instruction, to pre-college outreach.

There is much more to report, which is why my words occupy just one of many pages you have in your hand. I hope you find something here that piques your interest and makes you proud to be a Husky! Please stay in touch with the Department through our social media outlets (@mtuECE and facebook.com/ECEDeptMTU), and if you like you can follow more of my random musings in the weekly Fridays with Fuhrmann blog on our Department website. Stay safe and happy everybody!

Dan Fuhrmann
Early Career Awards

Lucia Gauchia

Lucia Gauchia received a five-year, $500,000 NSF CAREER Award to research how ecological systems can inspire better battery design and scalability. Gauchia, the Richard and Elizabeth Henes Assistant Professor of Energy Storage, who holds a joint appointment in ECE and Mechanical Engineering-Engineering Mechanics, studies what is called a battery's second life—when it is repurposed for a new use after it has been drained.

According to Gauchia, testing a battery is like studying a fish in a pond. "In engineering, we take the fish out of the pond and expect to be able to tell how it's going to live in the pond; ecologists do not extract their subjects from their environment."

Gauchia plans to test a number of batteries in first- and second-life stages under a variety of conditions. She will then use Bayesian networks to inform ecology-based methods to discern patterns in the data; with those patterns, she can do cross-level testing to see what holds true from batteries to packs to modules. The analyses should help better predict when a battery might fail in any of its life stages, which could lead to improved energy storage and longer battery life.

ZhaoHui Wang

ZhaoHui Wang, an assistant professor of electrical and computer engineering, received an NSF Career Award to improve underwater acoustics networks to maximize information delivery.

A major challenge in any communication system is getting a signal from a transmitting node to a receiving node. "For communications, what really matters is the signal power to noise power ratio," Wang says, explaining that maximizing the ratio underwater depends on two other factors.

First, bodies of water are not serene or static; they're landscapes rich with sound. The ambient soundscapes of the ocean floor or Lake Superior are full of background noise, which can interfere with an acoustic signal, or a signal can interfere with natural sound, such as whale whistles. Also, underwater environments change seasonally, daily or even hourly, which can also alter a signal's strength by the time it reaches the receiver.

Wang's goal is not only to improve node-to-node communication but to create an adaptive network that learns its underwater environment.

Jeremy Bos

Jeremy Bos is a 2016 recipient of a Young Investigator Program (YIP) award through the Air Force Office of Scientific Research (AFOSR). Bos, an assistant professor of electrical engineering who studies atmospheric optics, will use this three-year grant to piece together images affected by anisoplanatism—when parts of an image are distorted differently—over long distances.

"Receiving the YIP is a great honor and underscores the importance of basic imaging research in the area of extreme anisoplanatism," Bos says. "The objective is to see better and farther." His work will also improve long-range optical communication systems and "defend against threats using laser light."

The YIP is open to scientists and engineers at research institutions across the United States who received PhD or equivalent degrees in the last five years and who show exceptional ability and promise for conducting basic research. In 2016, AFOSR received more than 230 proposals for the prestigious award.
Faculty News

Promotion and Tenure

Durdu Guney, Timothy Havens, and Chee-Wooi Ten were promoted from assistant professor to associate professor with tenure. The ECE Department congratulates Professors Guney, Havens, and Ten on this accomplishment, and on all their achievements in research and teaching.

Awards

Jeremy Bos was promoted to Senior Member of SPIE, the international society for optics and photonics.

Bo Chen and her student Yang Li received Best Student Paper at the 2016 IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications, in Auckland, New Zealand in August 2016, for “Development of Integrated Rule-Based Control and Equivalent Consumption Minimization Strategy for HEV Energy Management.”

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

Lucia Gauchia was recognized by the University for her exceptional teaching during spring semester 2016 based on student evaluation scores. She was also selected as a Props for Profs weekly winner, sponsored by the Jackson Center for Teaching and Learning.

Joshua Pearce was selected as a Fulbright Scholar, Aalto University Distinguished Chair, for academic year 2017-18.

Zhaohui Wang was awarded Outstanding Reviewer of 2016 by the editorial board of the IEEE Journal of Oceanic Engineering.

Professional Service

Glen Archer was appointed to serve as an Accreditation Board for Engineering and Technology (ABET) Engineering Accreditation Commission (EAC) evaluator and completed the required training.

Paul Bergstrom continues to serve as a faculty fellow for strategic planning and budget in the Vice President for Research Office at Michigan Tech for the 2016-17 academic year. His focus is on the development of Michigan Tech’s core facilities framework.

Leonard Bohmann was reelected Treasurer of the IEEE Education Society and serves on the board of governors. He is also a member of ABET EAC and a member of the finance committee of the Women in Engineering ProActive Network (WEPAN).

Jeremy Bos was appointed Chair of the SPIE scholarship committee. He was also selected as conference chair of “Laser Communication and Propagation through the Atmosphere and Oceans VI,” to be held at the SPIE Optics and Photonics Conference in August 2017 in San Diego, California.

Bo Chen serves as associate editor of the IEEE Transactions on Intelligent Transportation Systems.

Durdu Guney serves on the editorial board of Nanomaterials and Nanotechnology as Associate Editor for Nanodevices.

Tim Havens serves as Associate Editor of IEEE Transactions on Fuzzy Systems.

Shiyan Hu was appointed Editor in Chief for IET Cyber-Physical Systems: Theory & Applications. He serves as associate editor for IEEE Transactions on Computer-Aided Design, IEEE Transactions on Industrial Informatics, and IEEE Transactions on Circuits and Systems. He was technical program committee co-chair for IEEE CPSDA and CPSS for 2016.

Chris Middlebrook was named Senior Member of the Optical Society of America and was appointed to the optical interconnections program committee for the SPIE Photonics West Conference held in San Francisco in January 2017.

Bruce Mork is Chairman of the IEEE transmission and distribution committee working group on ferroresonance in power systems, and chairman of the IEEE transmission and distribution committee working group for power globe.

Aurenice Oliveira serves on the international review board for the International Association of Journals and Conferences. She was selected to serve as a reviewer for the 2017 ASEE Annual Conference and Exposition in Columbus, Ohio, and on the program committee for the Workshop on Information and Communication Technologies for Development to take place in May 2017 in Belem, Brazil. She also served as panelist for the 2016 National Defense Science and Engineering Graduate Fellowship Program.

Sumit Paudyal serves as a member of the IEEE PES smart buildings, loads, and customer systems committee.

Chee-Wooi Ten is a member of the editorial boards for the IEEE Transactions on Smart Grids and Sustainable Energy, Grids, and Networks.

Reza Zekavat served as Workshop Chair and delivered a tutorial on space solar power at the IEEE WiSEE Conference in Aachen, Germany in September 2016. He also served as a steering committee member for IEEE WiSEE 2016 and IEEE ISMICT 2016. He serves on the editorial board of the Springer International Journal on Wireless Information Networks.
Spotlighting: Leonard Bohmann

Associate Dean of Academic Affairs, College of Engineering, and Professor, Electrical and Computer Engineering

Hometown: Cincinnati, Ohio

“I went to college in Dayton and graduate school in Madison. I just kept moving north until I ran into water—Lake Superior—and then I stopped.”

Family: Wife, Janeen, and son, Nick

Number of times he has snowshoed to and from work: "Countless."

First impressions of Michigan Tech and the Keweenaw:

The year was 1989, early October. "My wife Janeen and I decided to make the long drive to Houghton to see what it was like at Michigan Tech. When we arrived in town, we stopped to get some gas and saw students in dirty, tattered clothes. They all jumped into an old jalopy and took off. We weren’t sure what to think."

But then the Bohmanns went camping at McLain State Park.

"When we got up in the morning, we looked out of the tent, saw snowflakes in the air, and the rest is history. We came up here to be in the great north woods by Lake Superior. This August, we’ll have been here for 28 years!"

And those grubby students? Bohmann later found out they were heading to the Michigan Tech Homecoming Hobo Parade.

It’s good to be Associate Dean:

Bohmann was the ECE Department’s interim chair when the associate dean position opened up. “I like the administrative side of things, so I applied for the job,” he says.

Being a dean has provided Bohmann more opportunities to engage in professional service. This includes volunteering as a program evaluator for the Accreditation Board for Engineering and Technology (ABET), a non-profit organization that accredits 3,709 college and university programs (including Michigan Tech) in the disciplines of applied science, computing, engineering, and engineering technology.

“The best part is talking with other program evaluators and being part of a team that visits other colleges and schools of engineering. We talk with educators face-to-face about their problems and how they’ve solved them. I often think, ‘How can I bring what I’m learning back to Michigan Tech?’ I’ve especially enjoyed traveling overseas to universities in India and Colombia and seeing how another country’s educational system is different from our own."

Bohmann has worked with ABET for more than 10 years and became a team chair, or commissioner, last year.

Most rewarding aspect of his job?

“Realizing that I have an impact on students all across the college. Although I might be removed from the day-to-day, I have a chance to make sure they’re getting a great education. If it wasn’t for the students, why are we here?”

Current goals?

“A successful ABET visit for Michigan Tech. I am coordinating our entire visit for Fall 2017, including 11 engineering programs, plus the School of Technology.”

Advice for new students?

“It is important to study hard, but also important to play hard. If you are going to come to Michigan Tech, you need to embrace the outdoors—because it’s here.”

Visiting Faculty

Christian Wagner, PhD

Christian Wagner joins the ECE Department as a visiting professor for 2016-17. He is a member of the Center for Data Sciences in the Institute of Computing and Cybersystems (ICC).

Wagner’s research focuses on modeling and handling of uncertain data from both qualitative and quantitative sources, decision support systems, and data-driven policy design. He is an associate professor in the School of Computer Science at the University of Nottingham.

Zhi Zheng, PhD

Zhi (Jenny) Zheng joins the ECE Department as a research assistant professor. She is a member of ICC’s Center for Human-Centered Computing.

Zheng’s wide-ranging research interests include human-robot interaction, human-computer interaction, computer vision, machine learning, and developmental psychology. She earned her PhD in Electrical Engineering in 2016 at Vanderbilt University, where she also obtained her certification in college teaching.
Bridging Past and Future Through Automation
What does an award-winning researcher in atmospheric optics do in his spare time? Play with robots.

For many, robotics and automation are the way of the future. For ECE Assistant Professor Jeremy Bos ‘00 ’12, they’re also an important part of the past.

“My dad ran a turnkey industrial robotics business,” Bos says. “My first job was working for him. And even though I’ve pursued other research interests over the years, I’ve always wanted to find a way to advance industrial controls and automation. I’ve spent a lot of time thinking about the electrical engineering and design portions of it. I want to see industrial automation move up to the next level.”

The opportunity to do just that arrived when the Department received a generous gift from ECE alumnus Jim Fugere and his wife Marlene. The funds were used to purchase seven unmanned ground vehicles from Clearpath Robotics—five Jackals and two Huskies. With the new technology, Bos is developing new techniques to improve the capability of autonomous vehicles operating in hazardous weather—especially snow, sleet, and ice.

“For some,” Bos says, “the idea of an autonomous vehicle that works in Houghton is beyond the pale.”

He’s also exploring how autonomous vehicles can share information about road conditions via vehicle-to-vehicle and vehicle-to-infrastructure communications. But his use of the robots isn’t limited to his own research. Bos has developed a full-circle concept that will put the vehicles to use in the ECE undergraduate and graduate student curricula, as well as in outreach efforts like Summer Youth Programs and Pre-College Outreach.

“We’ve purchased the capability,” Bos says. “Now we’re focused on interested, capable students.” Including the robots acquired with the Fugeres’ gift, the Department has a total of five Jackals, six Huskies, and more than a dozen legacy robots that students can make operational, along with other smaller robots and some sensors. During a spring 2017 graduate course in robotics, students learned about algorithms by programming the Jackals.

“A lot of what electrical engineers do is becoming less visible,” Bos says. “It’s algorithm development—things that you can’t touch or feel because they’re happening on computers. The Jackals fill that hands-on component. By working with the robots, students are learning things I would normally have to teach through a simulation on a computer screen.”

Some ECE students will get the opportunity to put this newly gained knowledge to work right away—Michigan Tech has been selected as one of eight universities in North America to participate in the GM/SAE AutoDrive Challenge. The collegiate competition, sponsored jointly by General Motors (GM) and the Society of Automotive Engineers (SAE), challenges students to design, build, and test a fully autonomous vehicle. Over a period of three years, students will outfit a Chevy Bolt—donated by GM—with sensors, processing, and control strategies to make it autonomous.
Electrical and Computer Engineering

Robotic Systems Enterprise

Competition activity will take place in the Robotic Systems Enterprise, which is hosted in the ECE Department and includes membership from other campus departments, most notably ME-EM and Computer Science. Bos led the Michigan Tech team that prepared the winning proposal, working closely with Darrell Robinette from ME-EM and Rick Berkey of the Pavlis Honors College, who oversees much of the Michigan Tech Enterprise Program. Bos will take over as faculty advisor for Robotic Systems Enterprise next year, and AutoDrive will comprise a major portion of his teaching assignment.

“The AutoDrive competition brings three departments together,” Bos says. “It’s also part of a virtuous cycle. As industry money flows back into the robotics program, it allows us to do more outreach and acquire or build more robots.”

Bos hopes to eventually expand his research to include functional safety for autonomous vehicles. He’s also set a goal to develop a car-like platform—possibly a remote-controlled car—that replicates an autonomous vehicle and costs less than $500. By keeping costs low, the Department could offer an undergraduate course where students can build and use the remote-controlled vehicle and utilize it in other projects once the course ends.

“My hope—and it’s shared by the Department—is that having these platforms and seeing the vehicles do cool things will make people want to be involved and explore what’s possible.”

Many ECE faculty are involved in robotics, control, and automation, including Jeff Burl, Bo Chen, Lucia Gauchia, Steve Goldsmith, Tim Havens, Shiyan Hu, John Lukowski, Aurenice Oliveira, and Wayne Weaver. Details of their work will be highlighted in the ECE Annual Report 2017, due out this fall.
Inspiring the Next Generation

Outreach. Community engagement. Giving back. They’re common concepts not commonly associated with undergraduates. But for ECE’s Blue Marble Security Enterprise (BMSE), Robotic Systems Enterprise (RSE), and SPIE Student Chapter teams, outreach is a top priority.

According to ECE Associate Chair Glen Archer, faculty advisor for both BMSE and RSE, students run the outreach efforts of all three groups.

“The intent at the beginning,” Archer says, “was to create a group of students who were really good at translating technical activities into fun events and exercises for young people. And the students have done a wonderful job.”

For BMSE, community engagement takes the form of heart rate monitors and Christmas trees. Throughout the semester, BMSE invites younger audiences to campus—like students from Houghton Middle School—to give them a taste of life as a Michigan Tech ECE student. The experience is never passive—every participant walks away with a heart rate monitor that he or she helped create.

BMSE also travels to other communities—such as the Keweenaw Bay Ojibwa Community College—carrying with them everything needed to put the monitors together.

Outreach continues over the summer. Summer Youth Programs enrollees who tour the ECE Department can submit their mailing addresses to receive a light-up Christmas tree circuit board that BMSE students put together in assembly line fashion. ECE sent out 77 circuit boards last year and is currently working on a lighter, more robust model for 2017.

RSE’s outreach extends off campus. Students go to local schools—most recently, Hancock Middle School—to teach short classes on the basics of coding and conditional testing.

The highlight of RSE’s outreach is the hackbot, a black and gold robot with a microcontroller on its head. Pre-college students learn the basics of programming by coding their robots to do a choreographed dance to the Michigan Tech fight song.

Archer notes that ECE student outreach started with the SPIE Student Chapter, advised by ECE Associate Professor Chris Middlebrook.

Much of SPIE’s outreach takes place within the photonics lab. Students work with middle and high schoolers to create holograms. The young participants receive kits that allow them to illuminate an object with coherent light. The interference patterns are recorded on film. When the participants look at the film with light that’s about the same wave length, they see a 3-D image of an object. Each participant goes home with a hologram.

“Light is naturally a great medium for outreach, as it allows us to communicate science in a way that participants can easily visualize and relate to the world around them,” says Derek Burrell, vice president (2016-17) of the SPIE Student Chapter at Michigan Tech.

The efforts of BMSE, RSE, and SPIE come together on Women in Computing (WIC) Day. The three groups join forces with colleagues in Michigan Tech’s Department of Computer Science to provide a day full of programming and engineering for pre-college young women who are interested in the STEM fields.

WIC has had great success—of the 19 young women who attended in fall 2015, 11 enrolled at Michigan Tech the following fall. And outreach efforts don’t stop once a student matriculates. ECE also hosts exercises and activities for the on-campus Women in Engineering and Women in Computer Science learning communities.

“It’s Michigan Tech students who are doing this. It’s the students who are putting it all together,” says Archer. “I can’t stress enough how much it all depends on the enthusiasm, energy, and resourcefulness of the young people who are working on this stuff. It couldn’t happen without them.”

"The Robotic Systems Enterprise Outreach Program strives to excite middle school, high school, and Michigan Tech students regarding robotics and STEM. We enjoy providing the next generation of engineers with opportunities to spark their interests."

—Jennifer Lyng, RSE Outreach Program Director
Tech Team Wins Team Tech

Michigan Tech teamed up with Caterpillar Inc. to win first place in the SWE Team Tech competition at WE16, the world’s largest conference for women in engineering and technology. Both Tech and Caterpillar were rookies in the Boeing-sponsored design contest, which launched in 1992 to emphasize the key roles of teamwork and industry interface in engineering education.

Team Tech calls for collegiate teams of four to 12 members from at least three different engineering disciplines to work with an industry partner to solve an engineering design problem. The team submitted progress reports and design documents to Boeing, ultimately qualifying to present at the SWE annual conference in Philadelphia this past October. Eleven teams total competed in the event. The winning project was entitled, “Wheel Tractor Scraper Bowl Optimization System.”

Michigan Tech’s team partnered with Caterpillar to create a solution to inefficient filling on Caterpillar’s wheel tractor scraper (WTS) machines. The team conceived, designed, prototyped, and tested an ultrasonic sensing system that can accurately determine the height of dirt within the WTS bowl. Team members also devised a method for relaying that information to the operator, along with a video feed that looks into the bowl. Perhaps most importantly, the team designed and developed a scale-model test rig that provides proof of concept without costly on-machine testing.

The winning team was composed of members from two Enterprise programs within the Pavlis Honors College—Blue Marble Security (ECE), advised by Glen Archer, and Consumer Product Manufacturing (Chemical Engineering), advised by Tony Rogers. Team members included Electrical and Computer Engineering students Ester Buhl (team leader), Derek Chopp, Sandra Cvetanovic, and Alexis Dani; Mechanical Engineering-Engineering Mechanics students Brianne Anderson, Jennifer Dzurka, and Jonathan Quinn; and Chemical Engineering’s Anna Marchesano.

Buhl, Chopp, and Marchesano represented the team at WE16. Caterpillar engineers and Michigan Tech alumni Brent Woodard ‘11 and Britta Jost ’02 ’04 mentored the team and provided technical advice. WE16 provided inspiring and invaluable ways to connect, discover career opportunities, and pursue professional development. The global gathering—hosted by SWE and corporate sponsors—included more than 9,000 attendees at all stages of their engineering careers.

Dreyer Honored

ECE alumna Liz (Cloos) Dreyer ’12 received the Outstanding Collegiate Member Award from the Society of Women Engineers (SWE) for “leadership and innovative efforts to grow SWE’s presence on campus, particularly among graduate students, and for advancing the overall interests of women in STEM fields across the globe.” Each year, the Society honors 10 collegiate members who have made an outstanding contribution to SWE, the engineering community, and their campuses.

This acknowledges Dreyer’s role as SWE’s Graduate Member Coordinator, as well as her outreach efforts for women engineers in Liberia. She is currently pursuing her PhD in Electrical Engineering at the University of Michigan in Ann Arbor.
Ramping Up Automotive Controls

The average modern automobile comes with a variety of control systems—cruise control, anti-lock brakes, and optimal fuel control, to name a few. For the modern automotive engineer, experience with these control systems is critical.

In 2016, Jeff Burl, an associate professor of electrical and computer engineering, developed Automotive Control Systems, a course for graduate students and engineers already working in the automotive industry. Students work through case studies of specific automotive control systems, using models and MATLAB Simulink software to simulate the systems and generate reports.

“We taught it for first time this fall and had a blast with it,” Burl says.

Although the fall course was filled with Michigan Tech students, Burl stresses that it was designed with automakers in mind. He expects the course to be popular with working automotive engineers in the coming fall semester.

“Automakers downstate expressed an interest in providing this kind of continuing education for their employees,” says Burl. “They’ll provide their engineers with the software, and we’ll take it from there.”

The course ties in well with Burl’s current area of research—he studies power-split control for hybrid electric vehicles, which are driven by both a gasoline engine and an electric motor. Burl’s goal is to design a system to select the source of power—gas tank or battery. A car designed to make that decision wisely could improve fuel economy significantly.

Intelligent Ground Vehicle Competition

Burl serves as faculty co-advisor, along with Glen Archer, to the Blue Marble Security Enterprise team that placed third in the Intelligent Ground Vehicle Design competition last June. To participate in the contest, each team designed, built, and tested an autonomous robot.

The competition requires participants to guide their autonomous robot through a course by using GPS points and following lines on the grass. Teams are scored on how well they keep their vehicles within the lines and avoid obstacles. Burl says participating in the competition prepares students for “the next big push” in vehicle technology—driverless cars.

“Automakers are looking for engineers who have experience with automotive control and intelligent ground vehicles,” Burl says. “It’s one of the hottest areas right now.”

According to Burl, every American has a 1 in 7,800 chance of dying in an automobile accident this year. Autonomous cars, if designed correctly, have the ability to greatly improve the safety record.

“Computers do a better job of dealing with safety,” he says.

Many auto manufacturers are setting up teams to work on driverless vehicles and want to have something field tested within the next five years. Thanks to the Enterprise program and Burl’s guidance, Michigan Tech students have the needed expertise to work on the cutting edge of vehicle technology.
Duane Bucheger has brought real-world experience to the ECE Senior Design Program, having worked in industry for more than 25 years before joining the ECE faculty as a Professor of Practice in fall 2010.

“I was hired to run the Senior Design program,” he says. “I developed a prototype lab stocked well enough with engineering hardware that students could actually see, touch, and test during their design process before ordering parts. The lab is now a place where discussions about technology and engineering occur daily—faculty mingle with students, both professionally and socially, for the benefit of everyone.”

Bucheger is pleased that students of all levels work together so that undergraduate students see what Senior Design projects—and engineering—are all about.

Bucheger stepped down from his ECE Professor of Practice position at the end of spring 2017. He wants to help Michigan Tech’s engineering departments work more closely together on interdisciplinary projects and has decided to pursue other avenues within the University to realize this goal. He feels that the University's solid engineering programs could use a champion to form closer relationships among departments.

“Senior Design and Enterprise would have a lot to gain if there was more collaboration,” he says. “My past experiences as a student, research engineer, and now a faculty member indicate there are some difficulties working across disciplines in different departments. I would like to help dissolve those differences by working with multiple departments on interdisciplinary projects.”

This spring Bucheger was honored as Professor of the Year by the Michigan Tech chapter of Eta Kappa Nu (HKN), the IEEE student honor society. He was selected by a vote of ECE students for all-around excellence in teaching.

The ECE Department thanks Duane for his many contributions to our teaching program and wishes him all the best for the future.

### 2016-17 Senior Design Projects

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Details regarding our Senior Design and Enterprise programs are located on the ECE website at: mtu.edu/ece/undergraduate/capstone
Ludwig Named University Innovation Fellow

Kyle Ludwig was among 169 students from 49 higher education institutions worldwide to be named University Innovation Fellow this past fall.

Since its creation, the University Innovation Fellows program—run by Stanford University’s Hasso Plattner Institute of Design—has trained 776 students at 164 institutions. The program empowers students to become agents of change at their schools. Fellows work to ensure that their peers gain the knowledge, skills, and attitudes required to compete in the economy of the future and make a positive impact on the world. To accomplish this, the Fellows advocate for lasting institutional change and create opportunities for students to engage with innovation, entrepreneurship, design thinking, and creativity at their schools.

Ludwig, a computer engineering major from Traverse City, Michigan, is involved in Michigan Tech’s Entrepreneurs Club, the Electrical and Computer Engineering Undergraduate Advisory Board, and the Pavlis Honors College. He would like to use his education in computer engineering, along with his passion for wellness and physical fitness, to improve health through technology.

Burrell Wins Scholarship

SPIE, the international society for optics and photonics, awarded undergraduate student Derek Burrell with a 2016 Optics and Photonics Education Scholarship for his potential contributions to optics, photonics, or a related field.

Burrell is working toward a BS in electrical engineering with a concentration in photonics. His academic and industrial experience includes fabrication and testing of optical interconnects, design of photometric simulations, and creation of light-based models for virtual reality systems.

Burrell’s research interests include telecommunications, digital image processing, and materials characterization. He currently serves as president of the Michigan Technological University SPIE Student Chapter.

The SPIE scholarship provides $3,000 toward tuition and research funding for the 2016-17 academic year. Burrell was also selected by Michigan Space Grant Consortium (MSGC) for a $2,500 research fellowship that began this past fall and concentrates on free-space optical communications.

Derek plans to pursue an MS in optical engineering after graduation.

ECE Student Awards for 2016

Sakineh Yazdanparast
Jonathan Bara Award for Outstanding Graduate Teaching Assistant

Mohsen Jamalabdollahi
Matt Wolfe Award for Outstanding Graduate Research Assistant

Derek Gheller
ECE Departmental Scholar

Alexis Dani
Woman of Promise, Martha Sloan Scholarship Award

Ian Cummings
Carl J. Schjonberg Award for Outstanding Undergraduate Student
ECE Alumni Help Ford "Go Further"

In 2015, Ford Motor Company opened its Research and Innovation Center (RIC) in Palo Alto, California. The goal? To accelerate the company’s innovation in “connectivity, mobility, autonomous vehicles, customer experience, and big data.” ECE alumni David Kaminski ’89 and Michael Whitens ’85 are helping lead the charge.

Kaminski is RIC’s lab director. He sees the facility’s work—and work taking place at similar innovation hubs in Dearborn, Michigan, and Aachen, Germany—as a natural progression of Henry Ford’s original vision for the company he founded.

“The automotive industry is changing constantly, and Ford has been an innovator from the very beginning,” Kaminski says. “Social trends are what drive us. We’re paying attention to what’s happening on a global scale in urbanization, middle class growth, air quality, and consumer mindsets.”

Last year, Ford CEO Mark Fields said he would triple the company’s autonomous vehicle fleet and make it the largest in the industry. In the meantime, Ford’s developers are speeding up development by running countless simulations on specially designed software.

For Whitens, who serves as global director of vehicle and enterprise sciences at RIC, it makes perfect sense that Ford expanded its presence in Silicon Valley.

“This is one of—if not the most—innovative business cultures in the world,” he says. “And Ford is now one of its largest automotive research teams.”

Although Whitens’ work takes him around the world, he maintains close ties to Houghton. He currently serves on the College of Engineering Advisory Board and was a member of the ECE Academy Class of 2014.

From Husky Smart to Artificial Intelligence

Add the name of Josh Manela ’16 to the growing list of ECE alumni working on autonomous vehicle technology. Manela is a software engineer in machine learning for Argo AI, an artificial intelligence company based in Pittsburgh, Pennsylvania, with engineering hubs in southeastern Michigan and California’s Bay Area. Founded by former Uber and Google employees, Argo AI has partnered with Ford Motor Company to develop self-driving cars. Ford has invested $1 billion in the project.

Manela writes algorithms that aim to portray the world in a way that cars can efficiently understand. For him, the job is a once-in-a-lifetime opportunity. "How often are you given the chance to build and design a self-driving car? No matter how much I see behind the curtain, I’m still mystified that complex algorithms let a car understand the world and drive itself.”
ECE Academy Class of 2016

The purpose of the Academy is to honor outstanding graduates of the Department of Electrical and Computer Engineering at Michigan Tech. Election to the Academy is made by the executive committee of the faculty and recognizes excellence and leadership in the engineering profession and civic affairs. This induction honors some of the most successful of the more than 8,700 ECE alumni from Tech.

Richard J. Ford ‘77
Richard (Rich) Ford earned a BS in Electrical Engineering from Michigan Tech in 1977. Upon graduation, Rich joined Consumers Power Company, now Consumers Energy, in Jackson, Michigan. His 37-year career at Consumers included assignments as vice president of energy delivery, vice president of generation operations, and vice president of transmission. He is a licensed Professional Engineer in the state of Michigan and resides in Holland, Michigan, with his wife, Suzanne.

Charles W. Rogers ‘78
Charles W. Rogers earned a BS in Electrical Engineering from Michigan Tech in 1978. After graduating, he joined Consumers Power Company, now Consumers Energy, where he now serves as principal engineer, handling transmission system protection, the interconnection protection of distributed generators, and switching surge analysis. He has also served on numerous committees and task forces with the North America Electric Reliability Council (NERC). He and his wife, Lynn Conway, reside in Jackson, Michigan.

Paul Fulton ‘84
Paul Fulton earned his BS in Computer Engineering from Michigan Tech in 1984. Paul has served in management positions for Compaq Computer and Texas Instruments, and cofounded a successful wireless communications product company. He was vice president and general manager of 3Com’s Wireless Division; executive in residence for venture capital firm Mayfield; and founder, president, and CEO of Orative Corporation. Paul joined Cisco as an executive when it acquired Orative. Until recently, Paul was CEO of Zentri, a company that focuses on changing the way product companies deliver secure mobile and cloud-connected products.

Shankar Mukherjee ‘86
Shankar Mukherjee earned an MS in Electrical Engineering from Michigan Tech in 1986. Over the course of his career, Shankar has developed several Ethernet devices for National Semiconductor, started the networking division and developed several fast Ethernet products at Enable Semiconductor, and served as director of LAN switching for Lucent’s Microelectronics Group. He founded Dhaani Systems, Inc. in 2008 to produce energy-saving technologies for electronic systems. He and his wife, Phila, reside in Cupertino, California.

ECE External Advisory Committee

The mission of the committee is to serve the Department of Electrical and Computer Engineering in an advisory capacity providing counsel to the department chair and the faculty from the viewpoint of industry. The aim of these activities is to improve the quality of electrical and computer engineering education at Michigan Tech and provide ECE graduates who are valuable assets to industry employers.

Current Members:
Dave Aho, Eaton Cooper Power Systems
Ellen M. Bauman, IBM
Keith Behnke, Stryker Instruments
Tony Champaign, Nexteer Automotive
Rob Cooke, GS Engineering
Jon Doane, MIT Lincoln Laboratory
Ben Galloway, Dematic Corporation
Brett Giem, Chrysler Corp.
Gordie Halt, ITC Holdings Corp.
Steve Kennell, retired
Brad Lebouef, Systems Control, a division of Northern Star Industries, Inc.
Bill Lepak, ArcelorMittal
Eric Larson, 3M
Ken Leisenring, Ford Motor Company
Steve Mathe, Harris Corporation
Dave Perry, retired
Matt Schroeder, General Motors
Nirmal Singh, Detroit Edison
Jeff Wells, Consumers Energy
Dhanjal Inducted into PCA

Smriti Gandhi Dhanjal ’92 was inducted into the Michigan Technological University Presidential Council of Alumnae in 2016. Dhanjal is a dealer systems portfolio manager at Ford Motor Company in Dearborn, Michigan. She has been with Ford for more than 20 years.

Dhanjal received her MS in Electrical Engineering, with emphases in electronics and computer engineering, from Michigan Tech in 1992, and her MBA at the Ross School of Business, University of Michigan, in 1998. Her professional achievements include a US patent, a certificate of merit from Career Communications Group for “Women Who Make a Difference in the Field of Science and Technology,” and eight awards at Ford, including two Manufacturing Engineering Excellence Awards.

At Michigan Tech, Dhanjal was a member of SWE, the Institute of Electronics and Telecommunication Engineers, and the International Club. She was also Vice President of the Indian Student Organization. Since leaving Tech, she’s been a member of the Presidents Club and the Ford Recruiting Team. She also led the establishment of the Ford Program Office (Project SISU), in partnership with the MTEC SmartZone.

Dhanjal lives with her husband and son in West Bloomfield, Michigan.

In Memoriam

Retired Michigan Tech professor Theodore “Ted” Grzelak passed away in November 2016 following a lengthy illness. He was 78.

Grzelak was born in Detroit and earned his BS in Electrical Engineering from Michigan Tech (then the Michigan College of Mining and Technology) in 1960. He received his MS and PhD from the University of Wisconsin-Madison.

Grzelak worked for Cornell Aeronautical Laboratory near Buffalo, New York, before accepting a position in the ECE Department. He taught here from September 1966 until his retirement in 2000. He was a coach for the Copper Country Junior Hockey Association, a member of the Copper Country Ski Club, and an official of the Central Division of the United States Ski Association. He was Dollar Bay’s Little League and Senior League baseball coach for several years. He was an active member of Gloria Dei Lutheran Church in Hancock, where he sang in the choir for nearly 40 years.

Grzelak is survived by his wife, Mildred, his three sons, and eight grandchildren.
Our daily non-motorized commuters: Joan Becker, Kit Cischke, Tim Schulz, and Leonard Bohmann

When ECE faculty and staff go to school, they walk several miles uphill in a snow storm, both ways! Well, actually just one way. And not all of them walk--some bike while others snowshoe. With the beautiful outdoors surrounding the Michigan Tech campus, many faculty, staff, and students choose non-motorized methods to get to campus and stay fit. Our four-season recreation is built right into our daily commute--the change in weather only means a change in gear.