EXEMPLAR

WAYNE STATE
College of Engineering

FALL/WINTER 2015

SUPPORTING STUDENT SUCCESS

ENGAGING LOCAL COMMUNITY

ENHANCING QUALITY OF LIFE

Exemplar is published for alumni and friends of the College of Engineering.

Wayne State University College of Engineering
5050 Anthony Wayne Drive
Detroit, MI 48202
engineering.wayne.edu

College of Engineering Board of Visitors

Follow us on social media

facebook.com/WayneStateEng

@WayneStateEng

Wayne State University College of Engineering Group

Wayne State University (Engineering Albums)

EXEMPLAR

CONTENTS

GREETINGS FROM THE DEAN

I deeply enjoy talking about the Wayne State University College of Engineering. Our students are energetic and determined. Our faculty and alumni improve the quality of life in Detroit and around the globe through research, teaching and innovation. Here in Midtown, we have the luxury of finding inspiration everywhere we turn, and our students have limitless opportunities to do, see, learn, change and grow.

President M. Roy Wilson recently unveiled "Distinctively Wayne State University," a five-year strategic plan that rests on a foundation of core values and seven strategic focus areas. The College of Engineering's strategic plan lays out a list of priorities that are aligned with the president's vision for Wayne State to become one of the nation's pre-eminent, public, urban research institutions.

With the advice and counsel of the college's Board of Visitors and the generosity of our donors to the Pivotal Moments campaign, we have already begun implementing new programs and initiatives to promote student success, diversity and inclusion, entrepreneurship, and community engagement.

Inspiration is precisely what a university like ours can instill in our students. Through the College of Engineering's five high-impact practices, which you will read about in the following pages, we are in line with the university's goal of inspiring students toward a lifetime of success. We know that the experiences our students have today will influence their lives — and the lives of future generations. Delivering these high-impact practices is our core promise to our students, driving every decision and activity we undertake. We will continue to broaden and expand these activities each year in order to engage and inspire students.

Please enjoy this edition of *Exemplar*. In addition to highlighting our five high-impact practices, you'll read about transformative, first-year initiatives by the James and Patricia Anderson Engineering Ventures Institute, which was made possible thanks to a transformational gift by alumnus James Anderson and his wife, Patricia, to help the college serve as beacon of Detroit's entrepreneurial spirit. You'll also learn about another record-breaking year of enrollment at the college, new faculty members, faculty accomplishments, innovative research, community partnerships and more.

Thank you for your continued support and inspiration.

Sincerely,

Dean Farshad Fotouhi

HIGH-IMPACT PRACTICES

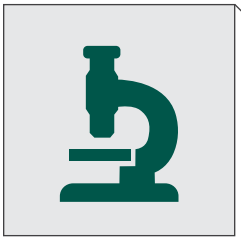
A major objective of the College of Engineering's strategic plan is to sustain a vibrant culture of learning and discovery so that every student gains the technical and personal skills needed to embark on a successful career. To achieve this, Dean Fotouhi introduced the High-Impact Practices of Student Success. They are:

HANDS-ON EXPERIENCE

Our students apply lessons learned in the classroom to team-based simulations. They research, incorporate design fundamentals and procedures, test and retest solutions, and learn how to succeed — and sometimes fail — in a safe, productive learning environment.

GLOBAL PERSPECTIVE

American companies have traditionally held a competitive advantage around the globe. Today, that dominance is in question. Engineers must be prepared to navigate their way in diverse cultures around the globe. The college recently established partnerships with engineering and computer science schools in China, the United Arab Emirates and Nigeria to benefit our students. Research, internship and study abroad opportunities are also increasing annually.



UNDERGRADUATE RESEARCH

Engineers must address challenges of daunting complexity, such as developing steady sources of renewable energy, rebuilding cities with sustainable methods and materials, jump-starting the economy with new technology and products, and finding new ways to diagnose and treat major diseases. In the College of Engineering, undergraduate students tackle these challenges through multidisciplinary and translational research, learning principles and theories in the classroom, and applying that knowledge in the laboratory under the guidance of a faculty advisor.

CO-OPS AND INTERNSHIPS

In this rapidly changing era, engineers now work as interdisciplinary teams defined by diverse and evolving environments. It's critical for engineering students to understand how to succeed on the job from day one. We encourage every student to gain real-world experience through co-ops and internships with some of the most well-known corporations and institutions in the world. Our proximity to firms with global headquarters in Southeast Michigan and across the state gives students a competitive advantage for engineering and computer science careers.

COMMUNITY ENGAGEMENT

Engineers play a pivotal role in revitalizing and sustaining their communities through research and innovation. College of Engineering students lead in their community by introducing local children to career opportunities in science and technology fields. They are involved in a variety of K-12 programs, such as the Detroit-Area Pre-College Engineering Program and the Department of Computer Science's summer camps.

HANDS-ON EXPERIENCE

SAE WARRIOR RACING RANKED TOP TEAM FROM MICHIGAN

The Wayne State University College of Engineering's SAE Warrior Racing team took home 12th place overall in June's Formula West Competition in Lincoln, Nebraska, earning the top ranking for Michigan teams.

Formula SAE is a competition in which teams design, build and test prototype race cars. The competition gives students a taste of the challenges awaiting them in the auto industry — lessons that Adam Niner, who graduated in December with a degree in mechanical engineering, is now putting to good use as an advanced vehicle development architecture engineer with General Motors.

"Our team put a lot of time and effort into making this success possible. Road Warrior 9 (RW9) — aka Lily — is a clear example of how far Warrior Racing has come," says Niner, the team's business director. "We worked hard to break program records and achieve our goals, and it paid off in full at Formula West."

"WE WORKED HARD TO BREAK PROGRAM RECORDS AND ACHIEVE OUR GOALS, AND IT PAID OFF IN FULL AT FORMULA WEST."

— Adam Niner, Warrior Racing business director

The team succeeded despite encountering several obstacles. On the first day of the competition, they had to quickly swap an engine because RW9's was compromised a week earlier. The team rallied, and was able to tear down and rebuild the engine moments before technical inspection.

The team later overcame a noise-test issue through quick and innovative thinking. In the last two days of the competition, they competed in every run of every event — a feat accomplished by only 14 of the 80 competing teams. Ultimately, the team broke all of their previous program records, setting the bar high for the next competition.

"Our Warrior Racing Team is a great model for student organizations on campus. They mix hard work with community service and team collaboration," says Farshad Fotouhi, dean of the college of engineering. "I am extremely proud of their accomplishments this year."

HACKWSU HOSTS STUDENTS FOR 24-HOUR TECH INNOVATION BLITZ


Niranjan Jadhav

In May, Wayne State University's College of Engineering and Blackstone LaunchPad hosted HackWSU, a 24-hour hackathon for high school and college students. During the event, university and high school students worked in teams to write Web-based software, create mobile apps or design computer programs addressing a need or innovation of their choice.

"This event was a great opportunity for students to strut their stuff and compete, all while being in a terrific environment for educational growth and creativity," says Aubrey Agee, Blackstone LaunchPad's senior program administrator. Second-year computer science graduate student Niranjan Jadhav says the event is a great way to expose students to the challenges they'll face following graduation.

"The event may only last for a day, but these 24 hours of hard work and interaction with industry contacts helps students realize their entrepreneurial skills, helps young innovators flex their creative muscles and gives them confidence to achieve something," Jadhav says. "It also has potential to contribute directly to the revitalization of Detroit."

"THIS EVENT WAS A GREAT OPPORTUNITY FOR STUDENTS TO STRUT THEIR STUFF AND COMPETE, ALL WHILE BEING IN A TERRIFIC ENVIRONMENT FOR EDUCATIONAL GROWTH AND CREATIVITY."

— Aubrey Agee, Blackstone LaunchPad

Jadhav, who has competed in similar hackathons in India, played an important role during the event, helping participants as they encountered difficulties with coding and brainstorming. He was also instrumental in creating awareness of the event through Wayne State's international student community.

Jadhav's role during HackWSU is just part of his efforts to help students develop their coding skills and prepare for their careers. Later this year, he will help lead Black Girls Code, a coding camp for high school students that will introduce them to coding using various technologies. After graduation, he hopes to work in a technology firm innovating data-oriented solutions.

HackWSU sponsors included Bizdom, Grand Circus, Absopure, Detroit Labs and New Horizons Learning Centers.

ETSO encourages **collaboration, innovation and connection**

Because the Wayne State University College of Engineering's Division of Engineering Technology is uniquely designed to accept transfer students with associate degrees and nontraditional students already in their careers, many students commute to campus and risk missing out on the benefits of the college community. The Engineering Technology Student Organization (ETSO) exists to offset that concern, providing a social framework to help students enhance their sociocultural activities while offering an environment to build their leadership skills.

Founded in 1987, ETSO currently consists of about 20 members. "We're a small, close-knit group," says current president Jasmine George. "The students work together, create opportunities and provide support systems."

The organization serves as a connection point between engineering technology (ET) students and faculty, alumni and fellow ET majors. "These connections can become important networks that can be used in my career as a professional engineer," notes ETSO member Chris Aquino.

In recent years, the group has offered student tutoring, hosted study groups, organized company tours, sponsored engineering

Jasmine George

speakers and conducted fundraisers on campus. "ETSO also provides real-world experience in project fabrication and teamwork through our Formula Hybrid SAE program," Aquino adds. The organization even constructed an award-winning float for WSU's annual Homecoming parade. There is no membership fee to join.

ETSO actively recruits new members through word of mouth, email blasts and regular meetings. The group is open to students in all College of Engineering departments. "We encourage other organizations to reach out to us with projects, and participate in Warrior Innovations workshops," she says.

For more information on ETSO and to download a membership form, visit **engineering.wayne.edu/students/etso.php.**

AIChE student chapter has strong showing in Chem-E-Car competition

Wayne State's student chapter of the American Institute of Chemical Engineering (AIChE) made its first appearance in the organization's Chem-E-Car competition during the AIChE's North Regional Conference in February. As part of the competition, teams spent several months building a model car no bigger than a shoebox. Powered by a chemical reaction, the cars had two minutes to carry water along a 30-meter track.

Although Wayne State's team was roughly half the size of competing chapters' teams, it placed ninth out of 15, besting teams from many well-known universities. "It feels great to represent Wayne State, and I am very fortunate to have been able to start the Chem-E-Car competition team at the university. I look forward to witnessing the team's success in the coming years," reports Wayne State AIChE Student President Alex Bokatzian.

"I LOOK FORWARD TO WITNESSING THE TEAM'S SUCCESS IN THE COMING YEARS."

— Alex Bokatzian

Travel to the competition was supported by the Hank and Joy Kuchta Undergraduate Research Fund. Hank Kuchta (B.S. '80) is an alumnus from the chemical engineering and materials science department, and he and his wife have been supporters of the department for years. The team's faculty advisors include Assistant Professor Eranda Nikolla, Professor Charles Manke, Professor Howard Matthew, part-time faculty member James Lenn, and instructor Kristina Lenn.

"This competition is a great experience for our students because they learn how to work in teams and apply the principles of chemical reactions to design energy conversion, storage and generation systems," says Nikolla.

Speed mentoring supports women in engineering

Despite recent gains, *U.S. News and World Report* reveals that men still outnumber women three to one in STEM fields.

Recognizing the importance of increasing female representation, the Wayne State chapter of the Society of Women Engineers (SWE) hosted a "speed mentoring" event that connected engineering students with a diverse group of local female professionals.

At the event, students sat at a table across from a mentor. They had three minutes to ask questions about their careers — including promotion, work-life balance and more; when time was up, the mentors rotated. More than 20 mentors and 20 students participated.

"This gave students experiences they can't get in a classroom, including firsthand accounts of what to expect in their careers and the opportunity to ask candid questions to a diverse group of female engineers from a variety of majors, industries and career stages," explains Rachel Kast, assistant professor of research in biomedical engineering and WSU SWE faculty advisor. "For many, this may have been their first opportunity to introduce themselves, shake hands and speak to a stranger in a business-like setting."

Mentor Ashley Lesser, PE MSCE '11, is an engineer with Testing Engineers and Consultants in Troy, Michigan. She said networking opportunities like these are vital for preparing students for their careers.

"Speed mentoring has been invaluable for myself and other undergrad students," she says. "The connections made greatly strengthened our SWE section."

Concrete canoe project builds valuable skills, lasting friendships

Justin Kietur, civil and environmental engineering student, was one of 15 College of Engineering students who attended the 2015 ASCE North Central Regional Conference Concrete Canoe Competition in April.

The team began its journey in fall 2014, learning how to paddle a canoe at Newburgh Lake in Livonia, Michigan. In November, the team began the design process and, by the end of the fall semester, had their Styrofoam mold prepared and ready to be filled. In the winter semester, the team worked on pouring, painting and sanding the canoe for competition. They also wrote a paper explaining the design and created a display for the canoe.

"We put a lot of time and energy into this team throughout the year, but it is completely worth it," he says. "The project is fun and unique. It builds our skill set and understanding of engineering concepts, and allows us all to develop strong friendships in a way that's not typically possible in the classroom."

Although they didn't place in the contest this year, Kietur and his team remain focused and optimistic for another shot in 2016.

Co-ops and internships

A SOLID foundation

Civil engineering student goes on the job and around the world

Vittoria Veltri was a Wayne State University freshman when geotech consulting firm Soil and Material Engineers Inc. (SME) asked her to help test the concrete foundations for the new Sea Life Aquarium in Auburn Hills, Michigan. The call came as the result of Veltri attending the College of Engineering's career fair. There, she networked with SME's recruiter and was inspired to apply for a summer position.

Veltri began an internship with the firm at the end of her freshman year and spent the next fall testing the stability of soil, durability of asphalt and mixing of construction site concrete. She became so essential

> *"I can't wait to see what I can do next."*
>
> — Vittoria Veltri

to the team that construction projects often could not continue until Veltri and SME decided the tests were acceptable.

"I hadn't yet taken a class on some of these things, so I learned on the job, which I think is the best way to learn," said Veltri. "It will help me in my classes and in future careers."

Veltri also learned how to communicate her engineering knowledge with contractors, forepersons and laborers who were often older and more experienced. Those workers also helped Veltri learn how to read plans and blueprints.

Now a junior, Veltri is complementing her vast experience with the firm by traveling to Tanzania this fall to do research on water purification. After she graduates, she hopes to work in Detroit on structures or water purification systems.

"I've had access to so many opportunities at Wayne State," Veltri says. "I can't wait to see what I can do next."

Energizing Detroit and beyond

Electrical engineering student helps DTE Energy energize Southeast Michigan

DTE Energy believes Albert Jose is full of bright ideas. The junior in electrical engineering at the Wayne State University College of Engineering impressed leaders at Detroit's electric utility and earned a co-op position this fall after completing a summer internship.

Jose, a Michigan native, is interning in the company's Advanced Metering Infrastructure (AFI) division, under the umbrella of the Major Enterprise Project Unit. AFI manages the metering system that the utility uses in every home and business in Southeast Michigan, and seeks innovations to improve their effectiveness.

Currently, DTE runs a one-way radio frequency into businesses and residences, but does not receive electronic feedback to see how much electricity is actually being used. Jose has been working on hardware to test energy load control devices. "Albert is a creative young engineer helping DTE Energy energize Southeast Michigan with the advanced electrical metering system," says his supervisor — and WSU alum — Brian Moccia.

Jose, who previously landed an engineering design co-op at Takata in Auburn Hills, Michigan, says the work culture and supportive mentors have been the favorite parts of his DTE Energy experience. He also has been able to hone his presentation skills before senior management, improve his time management skills and emulate the hardware testing he learned in the College of Engineering. "I was able to do it for real, especially with the load control devices we worked on in circuits class," he says. "It's great that Wayne State helps students obtain internships and co-ops."

In his spare time, Jose recently founded the campus organization Detroit Drone, committed to providing WSU students with a better understanding of drones and their manifold uses. "We want to change the perceptions of what drones can do," he says. "They're not all for spying and weapons."

Erin Rook

Students get CONNECTED

Career Resource Center brings employers and students together

Erin Rook is on a mission to connect more Wayne State University College of Engineering students and alumni with employers. As the college's new Career Resource Center (CRC) program coordinator, she is tasked with providing services to more than 3,000 engineering and computer science students.

"Our students receive an excellent education from their professors in the classroom and lab," Rook says. "Our goal is to complement that experience by helping students develop the skills to find and keep an internship, co-op or job."

Rook, who joined the college in July and most recently served as an employment and internship coordinator under the Michigan Coalition of Advanced Manufacturing Grant (M-CAM) at Schoolcraft College, already has achieved great success in her efforts.

Andrew Joseph of the Fuel Economy and GHG planning group at Fiat Chrysler Automotive is one of many industry contacts working closely with Rook and the CRC to identify and recruit promising talent. In October, he represented his company at the college's annual Engineering and IT Career Fair.

"I was very impressed with the organization from the Career Resource Center during the career fair," he says. "Our recruiting team saw a very large turnout of WSU students, and we are planning on filling a number of internship and full-time positions from the candidates we met. We look forward to coming back next year."

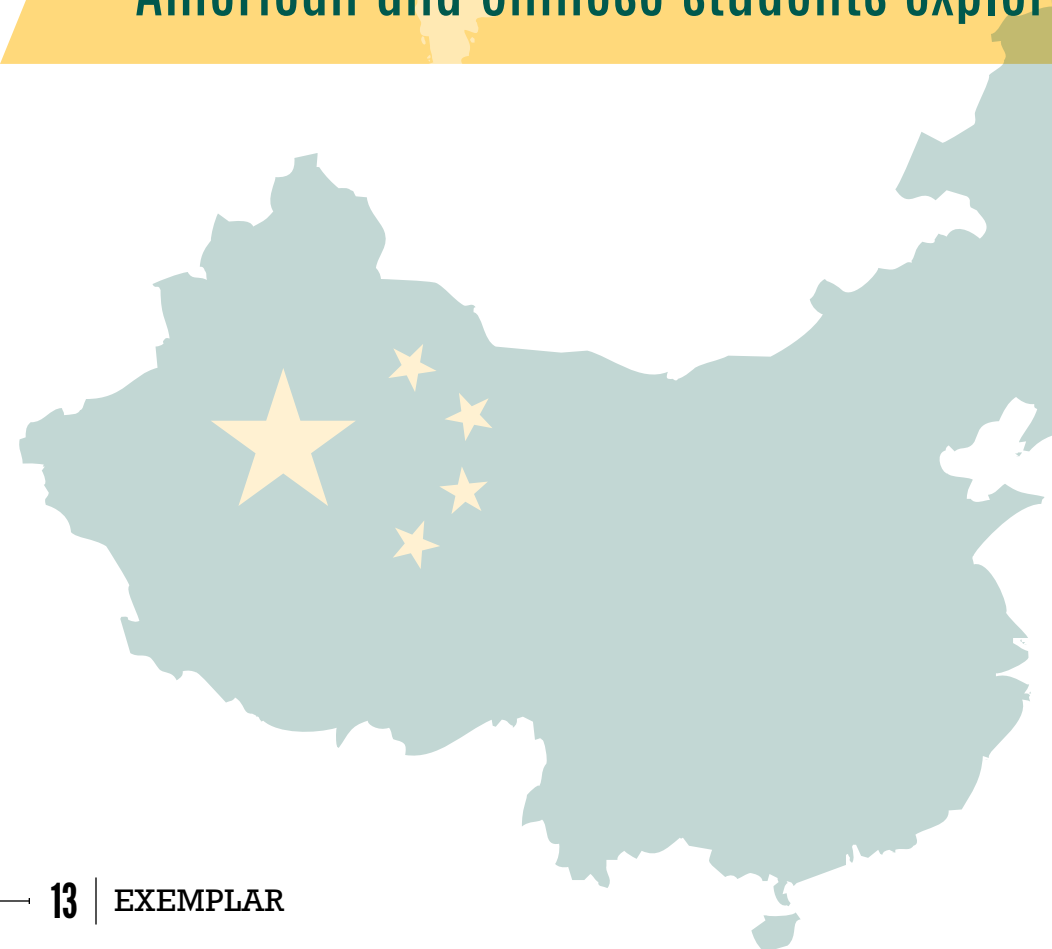
Joseph was one of more than 80 multi-industry employers seeking interns, co-op students, and part- and full-time employees at the fair, which was attended by more than 900 students and alumni. The signature event was such a success this year that the college had to institute a waiting list for interested employers.

"We were pleased to bring so many employers back to campus and welcome first-time recruiters such as BAE Systems, LG and the Environmental Protection Agency. The only challenge was finding the space to accommodate everyone," Rook says. "We received nothing but positive feedback from participating employers regarding our students' preparedness and professionalism. Many employers are already committed to returning next year."

The CRC prepared students for the fair by teaming with employers to host nine workshops and information sessions. Companies like Google led résumé-building and interview preparation workshops, for which the average attendance was 100 students — a record for the college.

Worldwide Warriors

American and Chinese students explore global engineering



Just two summers in existence, a new global engineering program at the Wayne State University College of Engineering has proved an international success, sending 13 WSU engineering students to China, welcoming seven Chinese students to the college and prompting a site visit by Volvo China.

Facilitated by Chin-An Tan, professor of mechanical engineering, the study abroad program may be the only one in the United States dedicated to training America's global workforce in engineering at the undergraduate

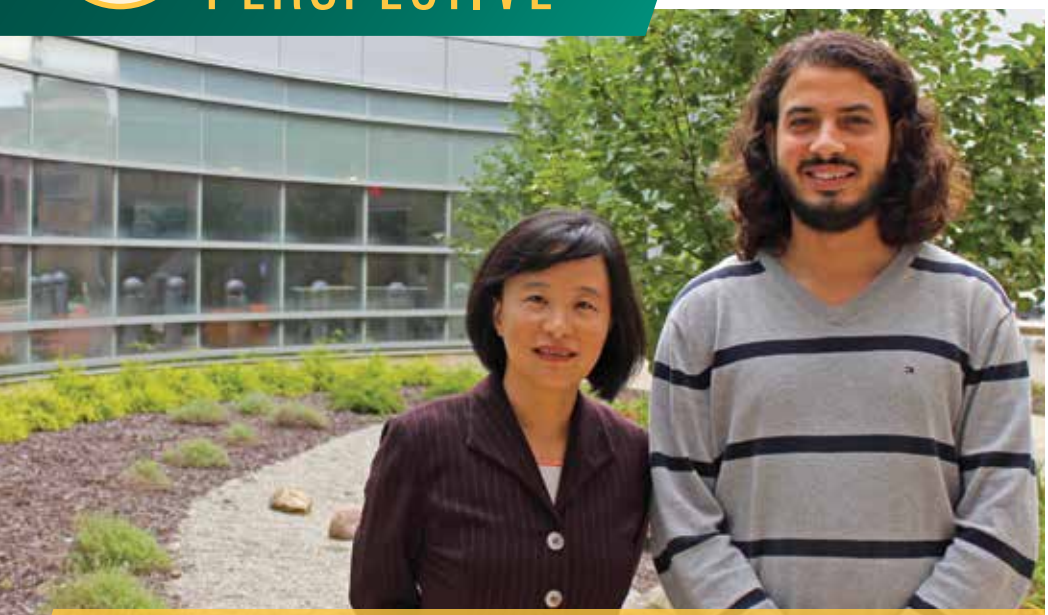
and master's levels. "The purpose is to help students understand the concept of 'global' in engineering involving multiple disciplines and engineers all over the world," explains Tan.

The initiative launched with a five-week, four-credit course titled Cross-Cultural Engineering Problem Solving, taught at Zhejiang University of Technology (ZJUT) in Hangzhou, China. The course brought 21 ZJUT students and 13 WSU College of Engineering students together to explore the implementation of sustainable transportation systems across the globe.

A major objective of the program is to integrate co-op, internships and other beneficial work opportunities for Wayne State students in China. "We visited five global corporations in China: Volvo, TRW, Alibaba, Ford (Nanjing) and Wanxiang/A123 Battery Systems," says Tan. Beyond coursework and corporate tours, students spent significant time learning Chinese language and culture.

In turn, seven Chinese students came to study at WSU in the summer. "Our program creates a strong bi-directional cultural exchange," Tan says. Subsequently, Volvo China came to campus to explore further collaborative opportunities in terms of Wayne State's student internships, summer program and research. The program now has expanded to include students from Scotland, primarily from the University of Dundee.

For more information on the Global Engineering Program, contact Tan at **tan@wayne.edu**.



Fulbright Scholar joins chemical engineering program

This fall, the College of Engineering is home to students from 37 nations — its largest international enrollment in recent history.

One of those students is Mohamed Kilani, a resident of Tunisia who chose to pursue his second master's at Wayne State as part of the Fulbright Foreign Student Program.

Kilani received his bachelor's from the National Engineering School of Sousse in Tunisia in 2011, and continued on to earn his master's in mechanics and systems engineering. "I love technology. I've loved to manufacture things by myself since I was a boy," Kilani said.

> "It's like a little world here; I find many different nationalities — from China, from Saudi Arabia — many different people."
>
> — Mohamed Kilani

Kilani is one of 4,000 students worldwide to receive the Fulbright grant. The Fulbright Foreign Student Program enables graduate students, young professionals and artists from abroad to study and conduct research in the United States. It is part of the Fulbright program, the U.S. government's flagship international educational exchange program, designed to increase mutual understanding between the people of the United States and the people of other countries.

At Wayne State, Kilani will pursue his master's in materials science and engineering and conduct research on nanomaterials.

"The department is excited to welcome Mohamed to study in our multidisciplinary materials science graduate program," said Guangzhao Mao, chair of the Department of Chemical Engineering and Materials Science. "As a 'Fulbrighter' myself, I am confident that Mohamed will have the same enriching experience as I did years ago."

Kilani says he chose Wayne State because of its high rate of productive research, especially in engineering. He also made his decision based on the publications produced by Wayne State faculty members.

So far, Kilani's favorite aspect about Wayne State's campus is the diversity. "It's like a little world here; I find many different nationalities — from China, from Saudi Arabia — many different people."

Mechanical engineering professor receives Fulbright Award, goes 'home' to Latvia

Associate Professor of Mechanical Engineering Marcis Jansons was recently awarded the Fulbright Award, which was designed to increase mutual understanding between the people of the United States and their counterparts in other countries. As part of the Fulbright program, Jansons began teaching at Riga Technical University (RTU) in Latvia in August.

It's a homecoming of sorts for Jansons, whose grandparents emigrated from Latvia during World War II. He grew up speaking, reading and writing Latvian.

Jansons has worked with RTU since 2011, when he hosted a series of visits to Wayne State by RTU administrators that resulted in a "3-2 program" in electrical engineering, which allows RTU students to earn a B.S. from RTU and an M.S. from Wayne State in five years.

Jansons' expertise is in the development of experimental engine laboratories and the application of optical combustion diagnostic techniques. Half of his students are NATO cadets from the National Defense Academy of Latvia, putting them in prime position to apply the skills they learned in service of their country.

"Professor Jansons' courses will be well-integrated into our program," says Leonids Ribickis, RTU rector (chancellor). "I am glad to see cooperation between our institutions continue."

"Marcis represents the collaborative and global spirit of our faculty," says Farshad Fotouhi, dean of the College of Engineering. "I know that he will make amazing contributions on behalf of the Fulbright program and Wayne State."

Mechanical Engineering senior dedicates summer to research in Austria

Maria Guido, a mechanical engineering senior and former president of the Engineering Student Faculty Board, was the only College of Engineering student to take advantage of the six-week Austria: Global Engineering program at the University of Graz, Austria's second-largest university. The research abroad opportunity was offered for the second year in 2015.

"I went completely alone," Guido says. "I didn't know anybody, and every single thing I did I had to plan

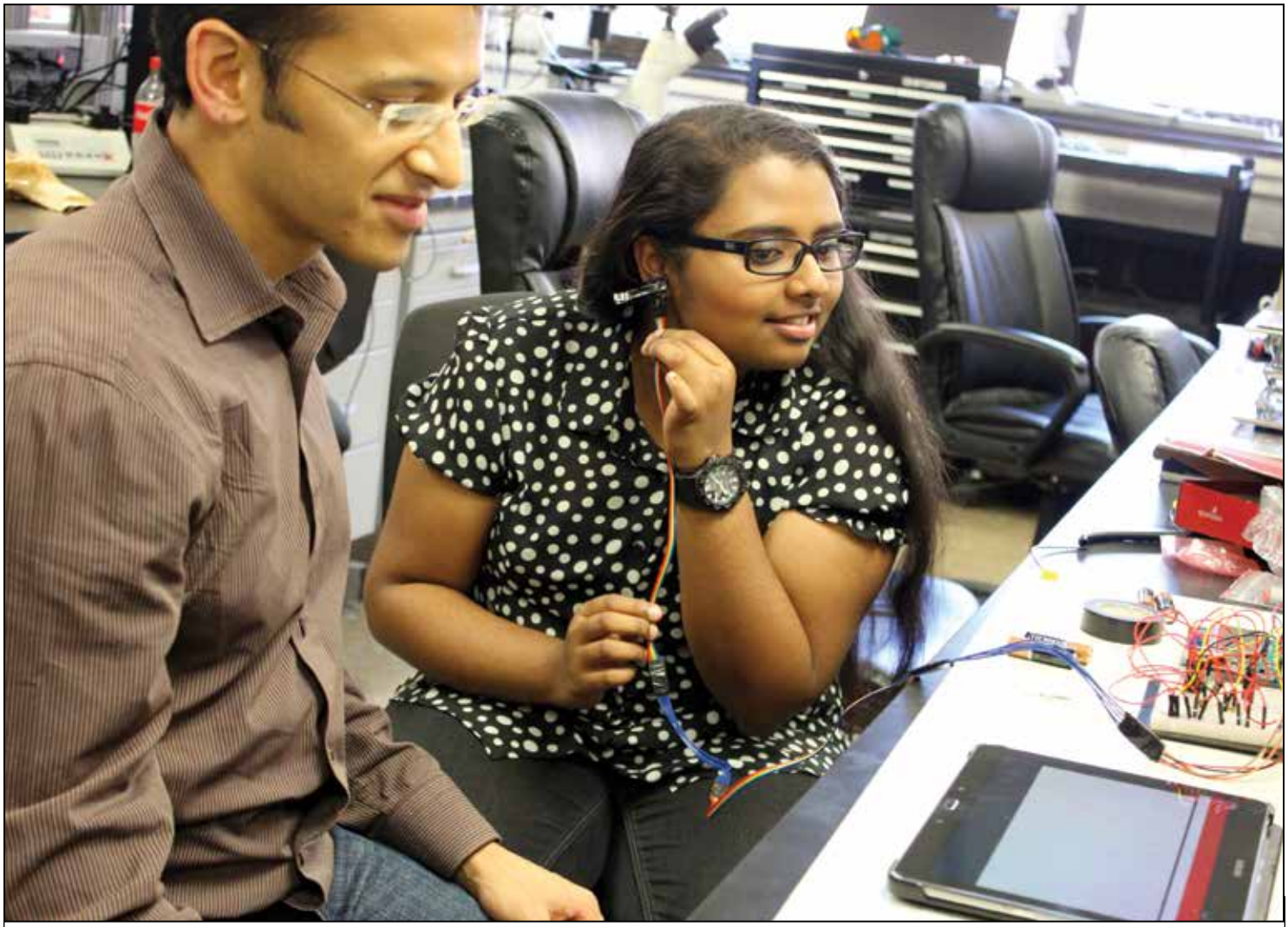
out on my own. It was like nothing I'd done before. I definitely wouldn't trade it."

Guido researched heat transfer and laser doppler anemometry (LDA), a method of measuring the velocity profile of free-stream jets of air using a laser. Her work assisted a professor who is writing a book on LDA techniques. Guido says the research itself was not unlike what she has performed at Wayne State, except that "everybody had a different level of speaking and understanding English. You had to figure out ways to explain what you wanted to say. It taught me how to work with other people, and I can apply that here."

Undergraduate
Research

Student creates app for wearable **heart rate sensor**

You've got to have heart. Under the guidance of a Wayne State University College of Engineering faculty member, Shiby George, an undergraduate electrical engineering major, became a valuable member of a research team developing a wearable heart rate sensor for Remote Patient Monitoring (RPM) of cardiac patients. George created the Android smartphone application that connects to the sensor.

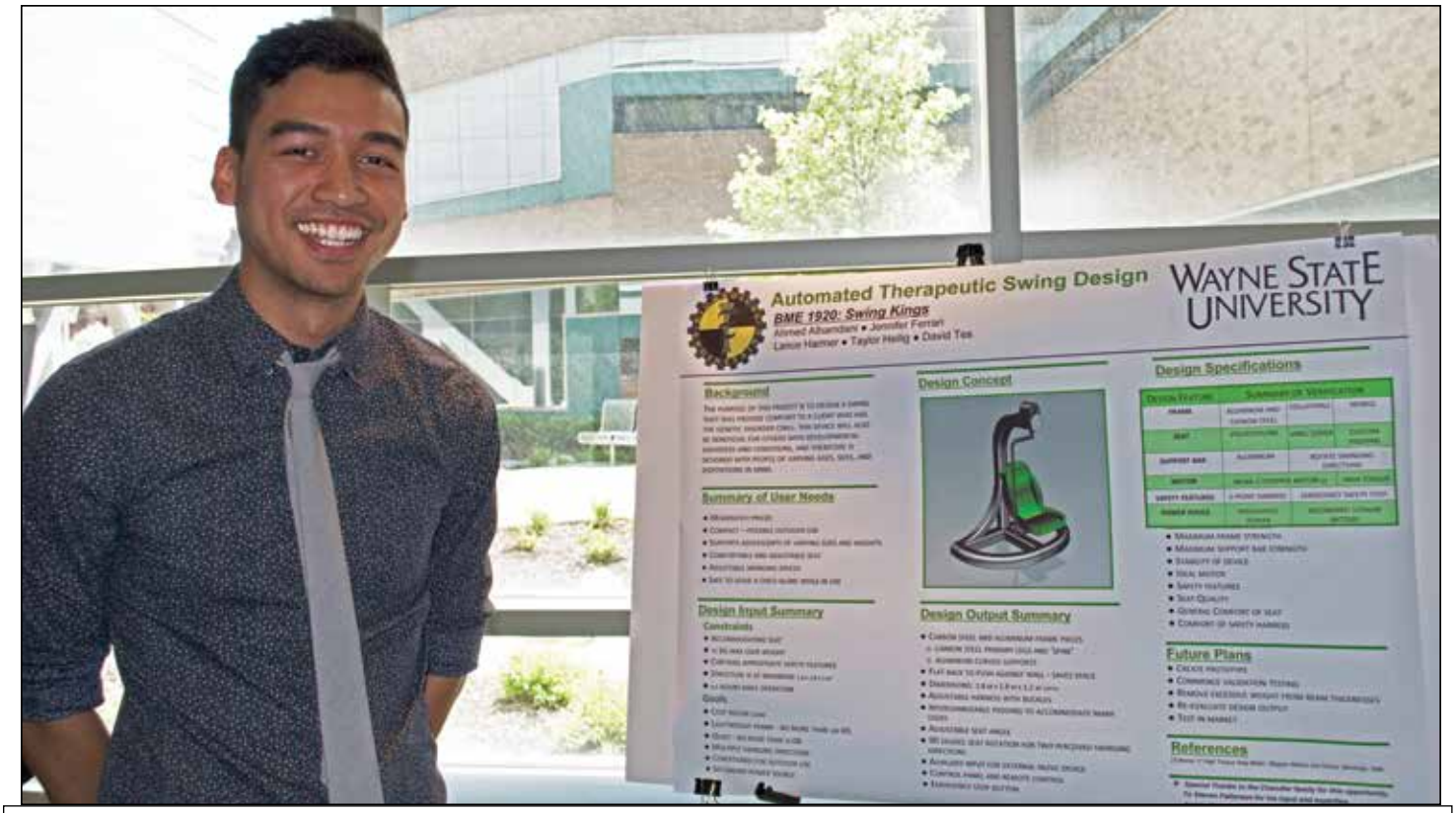


"When Shiby joined my lab, she had virtually no experience in Android programming," says Amar Basu, associate professor of electrical engineering and biomedical engineering. "Yet she agreed to build an app for our heart rate sensor. I am impressed with how she managed to learn Android programming on her own, including Bluetooth wireless, scrolling displays, material design and fundamental concepts. It's a great example of how hard work and diligence pay off."

Born in India and raised in Kuwait, George says her decision to attend Wayne State was a family matter. "When we became Michigan residents in 2012, I made up my mind to study in the United States," she says. "My cousins went to Wayne State for their undergraduate degrees and they were like my peer mentors during my first semester here. They told me that Wayne State has a wonderful community of in-state and international students, and they talked highly about its undergraduate research."

George, who recently began working as a peer leader at the Academic Success Center and is also involved with Campus Crusade for Christ International, credits Basu for being "patient enough to give me six months of his time" while she learned Android app development.

Her goal now is to enter graduate school and pursue a concentration in engineering in the health care industry. "Being a minority gender in this field, I hope to inspire more women into research in engineering," she says.



Student-designed swing could benefit ailing child

A group of College of Engineering students recently collaborated to help a family in need.

Ahmed Alhamdani, David Tes, Lance Harmer, Taylor Hellig, Jennifer Ferrari and Steven Patterson designed a swing for Dustin and Amy Chandler of Inverness, Alabama. The Chandlers' 4-year-old daughter, Carly, suffers from a genetic disorder that makes it impossible for her to use a traditional playground swing.

Carly's current swing has a weight limit of 25 pounds, and the Chandlers feared that one of her simple pleasures would soon be lost. Their worries were put to rest when Patterson, an industrial design major, connected them with Associate Professor of Biomedical Engineering Michele Grimm. Grimm and the students set to work researching a new design.

"We looked at park swings used by special-needs children to better understand the necessary safety aspects," says Ferrari. "We also looked at exercise swings to research structures intended to support a lot of weight. Finally, we explored different motorized infant swings for structure ideas and seat design."

The new design features a carbon steel frame that can support up to 200 pounds, along with a five-point harness to keep Carly safe and comfortable.

The group was awarded first place at Wayne States's Biomedical Engineering Design Day in May. Their 3D printout was also presented at the university's Student Design and Innovation Day.

The team is working with faculty advisors and the Anderson Institute to build a life-size prototype that they hope to present to the Chandlers in December. When completed, the swing will be able to oscilate from side to side and rotate 180 degrees.

"This taught how engineering serves the community. We were given the opportunity to work on a real-life device with people who will be affected by it," says Harmer. "The ability to implement this knowledge immediately not only reinforces it, but gives it purpose."

First place at conference leads to dream job

Industrial engineering student Marcela Sanchez took first place at the Great Lakes Regional Institute of Industrial Engineers (IIE) Conference, held in February at Purdue University.

Sanchez's paper, "Comparing the trade-offs between disassembly sequencing and buy-back incentives for high- and low-value end-of-life products," was based on research conducted under the supervision of Assistant Professor of Industrial Engineering Jeremy Rickli. Its results could help product and closed-loop supply chain designers consider the acquisition phase of a product's life cycle based on its impact on remanufacturing operations.

"The research was complex, but I kept working on it with the support of Professor Rickli," says Sanchez. "I am proud to have represented Wayne State well with my peers."

Several Wayne State students participated in the IIE Conference, a premier event for industrial engineering students in the Midwest. In addition to various competitions, attendees can network with and listen to speakers from industry, take plant tours to learn about processes and potential employers, and start forming their own professional networks with other up-and-coming students.

Sanchez, who graduated in August, went on to present her research paper at the Annual IIE Conference and Expo in Nashville in May. While there, she networked with representatives from Qorvo in Dallas; those connections eventually landed her a job with the semiconductor manufacturing company, which she began shortly after graduation. Sanchez credits her WSU research with landing her a job she loves.

"I was only invited to this banquet because I was presenting my research," she says. "I definitely would not have my dream job if I didn't do my research project."

Industrial engineering student Marcela Sanchez and Leslie Monplaisir, chair, industrial and systems engineering at Wayne State.


Marcela Sanchez with other ISE students at the IIE conference at Purdue University.

First of its kind

Summer academy in sustainable manufacturing

Two Wayne State University College of Engineering faculty members have received more than $370,000 from the National Science Foundation (NSF) to provide extraordinary research opportunities for undergraduate students in the burgeoning field of sustainability in advanced manufacturing. This is the first award of its kind from the NSF in this area.

Jeremy Rickli, assistant professor of industrial and systems engineering, and Yinlun Huang, professor of chemical engineering and materials science, earned a Research Experiences for Undergraduates (REU) site grant to develop a summer academy in sustainable manufacturing.

"This site will contribute to establishing WSU as a leader in undergraduate research on sustainable manufacturing and provide national recognition for WSU's innovative sustainable manufacturing research," says Rickli. "The site guarantees one slot for a Wayne County Community College student and at least one slot for a Wayne State student per summer as a commitment to nurturing local talent as well as the nation's top undergraduate students interested in sustainable manufacturing."

"Establishment of such a program is timely," the grant proposal reads, "as advanced manufacturing and industrial sustainability become crucial to the national economy."

The 10-week summer academy — which is scheduled to begin in 2016 for three consecutive summers — will bring 10 leading undergraduate researchers from across the country to the College of Engineering to perform cutting-edge experiments in the following areas:

- Nanocoating and lightweight materials and manufacturing
- Energy storage materials, batteries and inversion devices
- Remanufacturing and sustainability assessment
- Chemical-energy-water nexus

Preparation to create the academy's infrastructure will begin in November, conducted by a multidisciplinary team of 12 Wayne State faculty members from six different departments: industrial and systems engineering, chemical engineering and materials science, mechanical engineering, civil and environmental engineering, electrical and computer engineering, and economics.

"In addition to research activities," the proposal pledges, "the REU students will be exposed to a dynamic training environment for developing skills in self-learning, teamwork, communication and networking. The thoughtfully designed activities will excite participants to the future of sustainable manufacturing and drive them to become the next generation of the United States' manufacturing workforce."

Awards support **undergraduate research**

Wayne State University is committed to supporting student research. To that end, the university created the Undergraduate Research and Creative Projects (UROP) awards, designed to enhance opportunities for students to participate in research and creative activities under faculty guidance.

The grants provide up to $3,050 in funding for the student to conduct their research with a faculty advisor. This year, 11 student projects from the College of Engineering received UROP awards; 11 additional students received $1,000 in renewable awards from the College of Engineering.

"In 2012, the college put five high-impact practices into place to enhance the student experience. The expansion of undergraduate research opportunities was one practice, and these awards reflect the success of our initiatives," says College of Engineering Dean Farshad Fotouhi.

Awarded projects from the College of Engineering include research on diesel injection processes, optical intrinsic signal imaging, and algorithm enhancement for application to big data analytics and genomics.

Assistant Professor of Biomedical Engineering Mohammad Avanaki is the faculty mentor for several of the projects. "Working with such talented students allows me to help them get the feeling that comes from finishing a project and producing knowledge," Avanaki explains. "Hopefully, I am doing my part to inspire the next generation of researchers."

To be considered, students submitted a project proposal sponsored by a faculty member with whom they would like to collaborate. For a list of recipients, visit **go.wayne.edu/engur**.

SUMMER CAMP sets record attendance

This summer, the Wayne State University College of Engineering engaged more than 500 K-12 students at its annual summer camp program.

The college has sponsored educational camps for students through high school age for more than 30 years. However, according to the newly created Office of Community Engagement and Educational Outreach, between June and August the college hosted 312 students in nine camps – including the new Rube Goldberg Tinker and Maker Camp — and another 225 in partner camps it helped to administer — an all-time program record.

Tech toys, robotics and animation are among the camps' themes. This was the second year for the college's Biomedical Engineering Sports Injury Camp, which was so well received last year that it was divided into separate sessions for middle school and high school students in 2015. Traumatic brain injury research was also added to the camp. "Students segmented MRI images on the computer, printed 3D model brains and learned the importance of helmet safety," says Jasmine Roberson, director of community engagement.

The camps have proved an invaluable pipeline for heightening interest in engineering among young people, who often return to Wayne State or other institutions to pursue degrees.

Grant helps TACKLE COMMUNITY CHALLENGES using engineering principles

"Instead of wasting resources guessing what the community wants, we involve members of the community every step of the way so they can tell us what they need."

— Jasmine Roberson

The Wayne State University College of Engineering's Office of Community Engagement and Educational Outreach, led by alumna Jasmine Roberson, is gathering STEAM in its mission to positively affect Detroit youngsters and their families.

In October, the Ford Motor Company Fund, a philanthropic arm of the auto giant, gave Wayne State a $25,000 Ford College Community Challenge (Ford C3) grant to help implement an ambitious College of Engineering initiative, the "Ford Warrior Saturday STEAM (Science, Technology, Engineering, Arts, Math) Challenge."

In the program, 100 Detroit K-12 students and their families will be invited to WSU for six consecutive Saturdays. Each week, participants will be given a problem to solve using their STEAM skills to improve their community.

Engineering-based challenges will take into consideration such aspects as human services, access and abilities, education and outreach, and the environment. Family teams will be advised by Wayne State College of Engineering faculty and staff, engineers from local corporations, and graduate students.

The college will work with its contacts in Detroit schools as well as a wide cross-section of community partners to promote and build excitement for the program, which is scheduled to begin in March.

The Saturday Challenge is intended to help students recognize their potential to affect change in their urban environment. For example, students may learn how to create smartphone apps that could manage volunteer days, work with 3D printing and Google Sketch to develop more sustainable housing, and envision their own mock tech startup.

"It gives the community a voice," Roberson says. "Instead of wasting resources guessing what the community wants, we involve members of the community every step of the way so they can tell us what they need."

GO-GIRL
inspires Detroit-area girls to consider STEM

The College of Engineering hosted the Gaining Options – Girls Investigate Real Life (GO-GIRL) program's Keeping in Touch (KIT) Workshop, "Material Girls Get Energetic," on May 16. The event was led by Eranda Nikolla, assistant professor of chemical engineering and materials science; Harini Sundararaghavan, assistant professor of biomedical engineering; Guangzhao Mao, professor of chemical engineering and materials science; Stephanie Brock, professor of chemistry (College of Liberal Arts and Sciences); and Sally Roberts, assistant professor of education (College of Education).

"These events are essential for bringing more diversity to the future of engineering and promoting the great possibilities of the field," says Nikolla.

GO-GIRLs KIT is designed to encourage Detroit-area girls to consider STEM education and careers. Forty-five middle school and high school girls attended the event. The workshop began with a presentation on energy systems, followed by a hands-on lab activity where

students built their own electrolytic cell to power an LED. In the afternoon, students attended demonstrations on materials design for other applications. Students learned how batteries in series could power a car and how to design biomaterials to control cell behavior and provide cells with "energy" for migration.

PREPARING OUR STUDENTS
and impacting the community

Wayne State University College of Engineering doctoral student Nariman Ammar and undergraduate computer science student Amney Iskandar are changing the lives of eight Detroit high school students.

Thanks to a new partnership with the Cristo Rey High School, students are now able to earn college credit by taking a 1200-level course at Wayne State focused on programming and creating a robot. Tuition for the course is covered by the College of Engineering and a generous donor.

Nariman teaches the class and Amney serves as a mentor.

"I think it's safe to say that everyone is gaining a great deal from this partnership," Nariman says. "As Wayne State students, it allows us to hone our leadership skills and share the knowledge we've gained in the classroom and lab while introducing concepts and disciplines that may be new to some of these students."

Jeffrey Potoff, professor of chemical engineering, and Jasmine Roberson, director of community engagement, worked with the university's educational outreach office to create the program. They are pleased with its rollout thus far.

"We're increasingly focused on how we can best prepare our students while simultaneously impacting our community," Potoff says. "This partnership really is a wonderful addition to our programming efforts."

Cristo Rey students who complete the program will earn three college credits in engineering to use toward their degree. It's the first engineering program of its kind at the Catholic high school, which last year had a 100 percent college acceptance rate.


Haley Montesinos


Jacqueline Perez

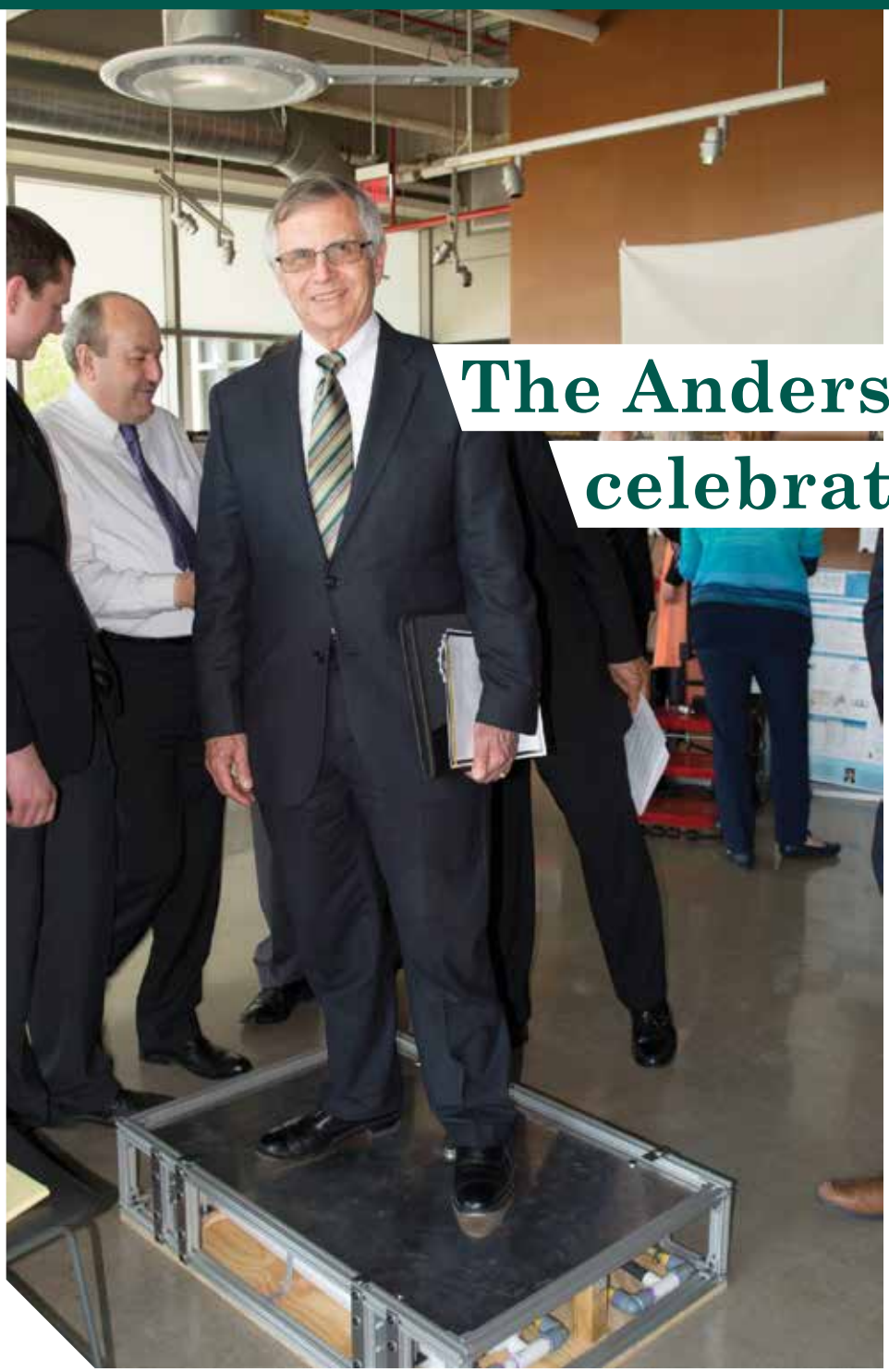
"This partnership really is a wonderful addition to our programming efforts."

— Jeffrey Potoff, professor, chemical engineering


Heavenly Johnson


Wendy Montesinos

Entrepreneurship



The Anderson Institute celebrates first year

When the "Swing Kings" (*see story on page 22*) completed their design project — a motorized swing for people with brain disorders or injuries — and won the College of Education's Biomedical Engineering Undergraduate Research Competition, they agreed on one thing: they wanted to see their design become a reality. Their first stop was the college's James and Patricia Anderson Engineering Ventures Institute.

"We felt passionately about our idea and we wanted to see our patient actually use it, but we didn't know how to go about making it a reality," says biomedical engineering student David Tes. "Associate Dean for Innovation and Entrepreneurship Sorin Draghici met with us and outlined a very clear path from our idea to a prototype, market research and, hopefully, wider adoption."

Jim Anderson (center) and Sorin Draghici (right), director of the Anderson Institute, view a student project during Student Design and Innovation Day.

College of Engineering Dean Farshad Fotouhi (center) and Anderson speak with a student during Student Design and Innovation Day.

Helping students and faculty members take their ideas to the real world is precisely the goal of the institute, according to alumnus and entrepreneur James Anderson. He and his wife, Patricia, gifted the college with $25 million in October 2014 to establish the Anderson Institute to encourage Wayne State entrepreneurship and help Detroit grow.

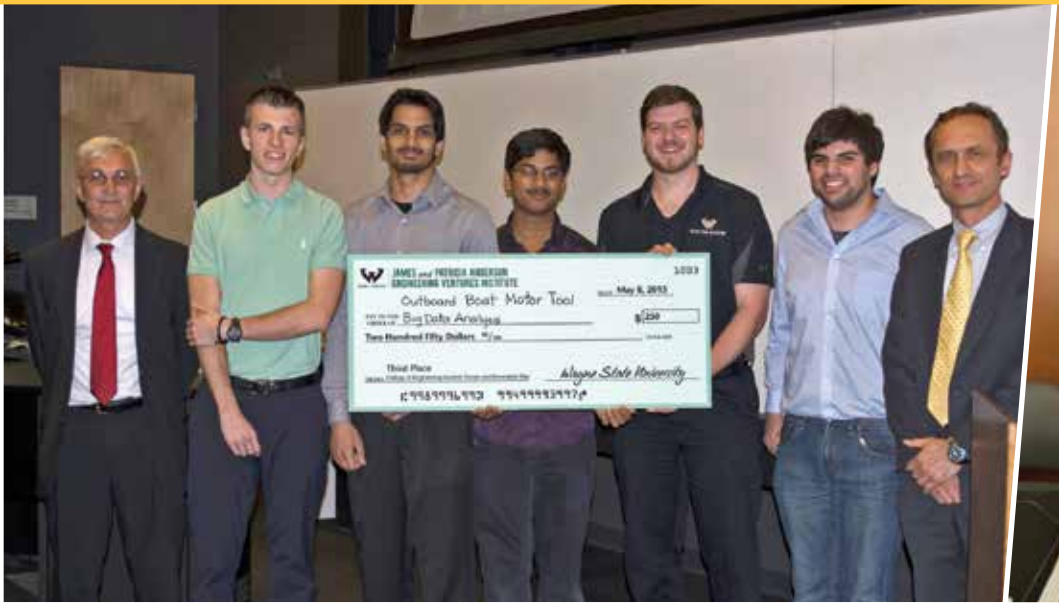
Tes' team provides just one example. The institute has provided assistance to faculty members and students on novel technologies ranging from advanced imaging technologies for targeted drug delivery to an exoskeleton to help disabled people and much more.

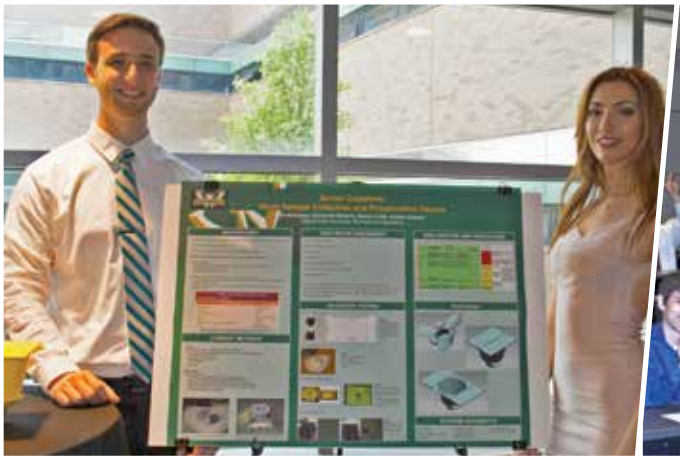
In fact, in its initial year, the Anderson Institute has made significant strides in helping faculty and students move commercially viable technology from the laboratory to the marketplace, establishing a better relationship between the college and the business community in Southeast Michigan, and contributing to the area's economic development.

In winter 2015, for example, the Anderson Institute collaborated with Blackstone LaunchPad, the WSU Technology Commercialization Office and the University of Michigan Center for Entrepreneurship I-Corps team to host an Innovation Corps workshop and training program that brought together six teams of faculty members and students around six technologies.

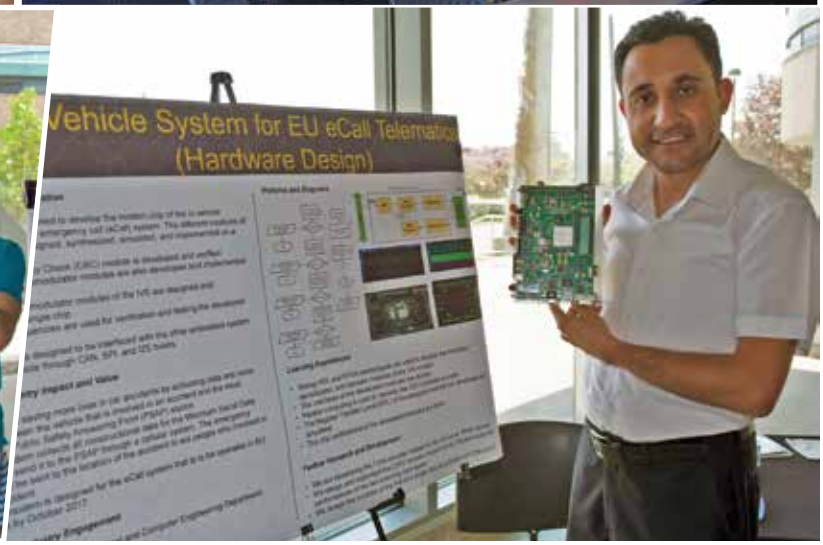
According to Draghici, other institute highlights include the restoration of the college's Collegiate Entrepreneurs Organization, the creation of an Innovation and Entrepreneurship Student Learning Community, and the implementation of a Student Design and Innovation Day (*featured on the next page*).

"We've had a very successful year, and we're just getting started," Draghici says. "We will soon have the first meeting of the External Advisory Board for the institute, taking a closer look at how we might better work with industry on areas of expertise and address potential IP challenges, as well as how we might create and sustain a culture of entrepreneurship in the college. We also identified a number of mechanisms of support — including funding sources — for faculty and students interested in creating spin-off companies."


JAMES and PATRICIA ANDERSON
ENGINEERING VENTURES INSTITUTE
1003
May 8, 2015
Outboard Boat Motor Tool
Big Data Analysis
$250
Two Hundred Fifty Dollars
Third Place
Wayne State University




Jacobian matrix and singularity for
FDDF Fanuc RMate200ic robot


Vehicle System for EU eCall Telematics
(Hardware Design)

Student Design and Innovation Day

Robert Magee, executive director of the Engineering Society of Detroit, expected to be impressed and maybe even a little enlightened by student projects at this spring's James and Patricia Anderson Engineering Ventures Institute's Student Design and Innovation Day. But Magee, a colon cancer survivor, didn't anticipate being moved by one student's project.

"There were so many great innovations on display," says Magee, one of 20 industry judges at the inaugural event. "One project in particular — the sample collection device — was very personal to me. It would provide a marked improvement in a colon cancer patient's quality of life."

The project — a device that provides a simple and safe method to collect and preserve stool samples for gastrointestinal disease testing — by biomedical engineering students Scott Anteau, Zecheriah Bielecki, Nathan Cobb and Amelia Zelenak, was one of nearly 50 senior capstone, research, and industry- and community-based group projects showcased by more than 100 engineering and computer science students. Additional projects ranged from robots used to aid surgeons and physical prototypes of swings for children with special needs to advanced software applications and concepts for safer roads.

Sponsored by the Anderson Institute and attended by community and industry guests and local high school students, the event offered cash prizes of up to $1,000 to top projects. Judges evaluated the exhibits and asked students to describe the impacts their projects might have on their disciplines and in society.

Many of the interdisciplinary and cross-institutional projects were sponsored by industry or government entities such as Urban Science, the U.S. Department of Transportation and New Center Stamping Inc.

WSU computer science students Michael Simons, Mary Desjarlais and Mahmoud Eraqi, in partnership with College for Creative Studies students Scott Kreutzkamp and Horacio Hall, took first place for "Project Porta," an augmented reality motion comic book.

"The broad scope of engineering, especially as it relates to solving problems and improving the quality of life for our friends in Detroit and around the world, was truly on display during Student Design and Innovation Day," said Farshad Fotouhi, dean of the WSU College of Engineering.

Added Simons, team lead for Project Porta, "I'm very grateful to have participated in this event. In addition to receiving seed money, we made immeasurable connections with industry professionals who provided us with input on how we might refine our projects for even greater impact."

The Anderson Institute, which is housed in the College of Engineering and plans to host this event each year, was established through a gift from Wayne State civil engineering alumnus and CEO of Urban Science James Anderson and his wife, Patricia. Its goal is to serve as a beacon of Detroit's entrepreneurial spirit by investing in ideas that become marketable technologies that change the world.

Additional event photos, along with project and team information, are available at **go.wayne.edu/design-day**.

Wayne State imaging research may lead to BREAKTHROUGH IN BREAST CANCER, other diagnoses

New Wayne State University biomedical imaging research may soon lead to a less invasive breast cancer detection technique and earlier diagnoses for patients worldwide.

Funded by a one-time WSU President's Research Enhancement Program (PREP) grant, the research would allow doctors to obtain precise images of early-stage tumors, thanks to the combination of a simple PET (positron emission tomography) scan and a relatively harmless injection of a new radiolabeled compound that selectively binds to cancer cells.


Juri Gelovani

Led by Dr. Juri Gelovani, WSU professor of biomedical engineering and pioneer of molecular-genetic in vivo imaging, the group's goal was to effectively detect and diagnose small areas of cancer cells, or micrometastes, quicker than conventional technologies like CT scans, ultrasound and MRIs with less body stress and pain for the patient.

"In the absence of images of tumor location required for biopsy guidance, a biopsy needle is typically inserted in several sites of the tumor-containing organ to increase chances of hitting the tumor target," Gelovani says. "With cancer, early detection is key, but we want to do it noninvasively, accurately and comfortably for the patient."

Gelovani and fellow researchers Dr. Andres Cisneros, assistant professor of chemistry; Dr. Antony Shields, professor of oncology; and Dr. Avraham Raz, professor of oncology, turned to specific proteins called galectins — specifically, how galectins facilitate the spread of cancer. Their research project, "Diagnostic PET/CT imaging and therapy of cancers with novel galectin-3 targeted ligands," was supported by a WSU PREP award. The awards contribute toward developing research that is consistent with the university's urban mission to positively impact local and global communities.

"We know that tumor cells tend to grab onto surrounding cells and intercellular matrix in order to move during invasion and metastasis. Technically, galectin proteins — which are the proteins implicated in the development of cancer and others illnesses such as heart failure and pulmonary fibrosis — are produced and coat the malignant cells," Gelovani explains. "If you remove or block galectins, the ability of cancer cells to move, invade or metastasize will be significantly impaired. Yet imaging agents and methods for detection and assessment of distribution of these important galectins in malignant tissues are lacking."

Gelovani's research team looked closely at galectin-3 — one of 15 galectins found in mammals — which is overexpressed in many cancers. In doing so, they were able to create a novel radiolabeled molecule that binds to galectin-3 and can be used to image the presence of galectin-3 in tumors such as carcinomas of breast, prostate, liver and thyroid.

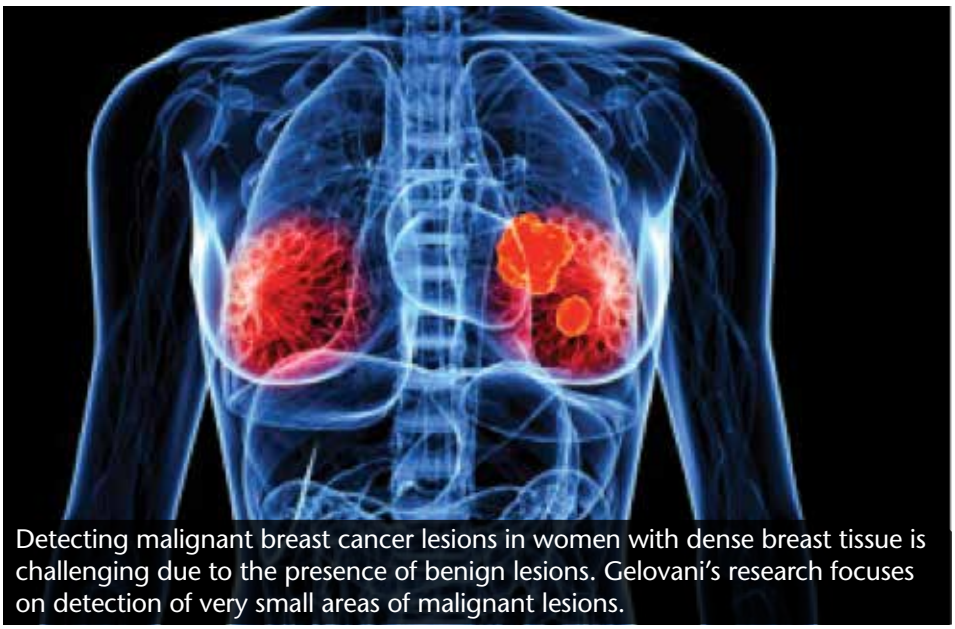
"There is a significantly higher magnitude of galectin-3 expression in malignant tumors compared to benign lesions," Gelovani states. "By imaging the galectin-3, we can see the crab leg-like formations of cancerous tissue coming out of much smaller, three-to-four-millimeter lesions."

PET/CT 3D imaging is one of the most valuable medical imaging tools today.

According to Gelovani, the team developed and tested several novel radiolabeled compounds that served as galectin-3 receptor ligands and could be further developed into PET imaging agents for diagnosis of different tumors, as well as for various uses associated with chronic inflammation and fibrosis. These PET imaging-enabling compounds contain radioactive fluoride isotope (F-18), with radiation doses that are just 20 percent of conventional doses from a whole body CT scan. As a result, an invention disclosure for one version of the compound, termed 18F-FPTDG, has been filed and a provisional patent granted. The patent covers the way the compound is labeled and produced, and the method of use in diagnostic imaging.

Although they're not the first research group to look into galectin-3 and cancer — a research group in Sweden recently patented a similar compound, termed TD139, which, when inhaled, demonstrated a significant ability to block galectin-3 in an animal model of lung fibrosis — Gelovani's research team is the first with an imaging-centered approach using a similar radiolabeled molecule as an imaging agent.

Currently, Phase Ib/II clinical studies are being conducted in patients with idiopathic pulmonary fibrosis. "The TD139 is a drug for treatment, not a diagnostic imaging agent," Gelovani says. "That said, it has potential for treating patients with idiopathic pulmonary fibrosis, an incurable disease, and possibly other lung diseases like COPD. We hope to be able to use the TD139 clinical trial data in our efforts to translate PET/CT imaging with 18F-FPTDG into the clinic."



Detecting malignant breast cancer lesions in women with dense breast tissue is challenging due to the presence of benign lesions. Gelovani's research focuses on detection of very small areas of malignant lesions.

In fact, due to the similarities between 18F-FPTDG and TD139, Gelovani's newly formed company, Galima Biotech Inc. (galectin imaging), can use the data from the Phase I clinical trial for TD139, when it becomes available to bring 18F-FPTDG into the clinic much faster than is usually possible. Gelovani is currently setting up institutional trials to assess the potential side effects of the compound and determine exact radiation doses to the whole body and individual organs. He is confident that any side effects will be miniscule because the anticipated doses of the agent will be several thousandfold less than a single dose of TD139 used in the ongoing therapeutic clinical trials.

"This compound has great promise and the potential for much more than just breast cancer diagnoses," Gelovani says. "By tweaking the imaging method, we can apply it to detection of prostate, hepatocellular, pancreatic, liver, lung, thyroid and other cancers."

New labs push boundaries for skin cancer detection and point-of-care diagnostic techniques

Thanks to the College of Engineering's new Optical Imaging Lab and Ultrasound Imaging and Therapeutic Research Lab, the Department of Biomedical Engineering is well on its way to becoming a national leader in biomedical imaging research and technology.


Mohammad Avanaki


Mohammad Mehrmohammadi

In addition to hiring two promising new faculty members — Mohammad Avanaki and Mohammad Mehrmohammadi, both experts in optical, ultrasound and photoacoustic imaging — the department also received support from Michelson Diagnostics Inc. to study skin abnormalities using the VivoSight optical coherence tomography (OCT) system, which is similar to ultrasound.

Avanaki, assistant professor of biomedical engineering and lab director, focuses on optical imaging instrumentation and novel methods for diagnosis and treatment. He is applying three imaging modalities¬ — fluorescent spectroscopy, optical coherence tomography (OCT) and photoacoustic imaging — to study and diagnose diseases in the eye, skin and brain.

"It's an exciting time to be in imaging and instrumentation," Avanaki says. "It's a new track that is quickly gaining prominence because of the role it can play in developing medical imaging and research capabilities to assist with diagnostic care."

Avanaki is developing a fluorescent spectroscopy technique that will be used to diagnose Alzheimer's disease through retinal imaging, which will make the current diagnostic method — which uses OCT — much more specific. His main focus, however, is skin imaging using OCT. He and a group of students are using the OCT system to develop hardware and advanced image processing algorithms to identify the three-dimensional border of skin tumors, which would help dermatologists make better diagnoses and save time in Mohs surgery, a precise surgical technique used to treat skin cancer. The team is also extracting the optical properties of tissue to enhance the OCT images and facilitate tissue characterization, along with working on needle-tracking using OCT to make the skin biopsy more accurate.

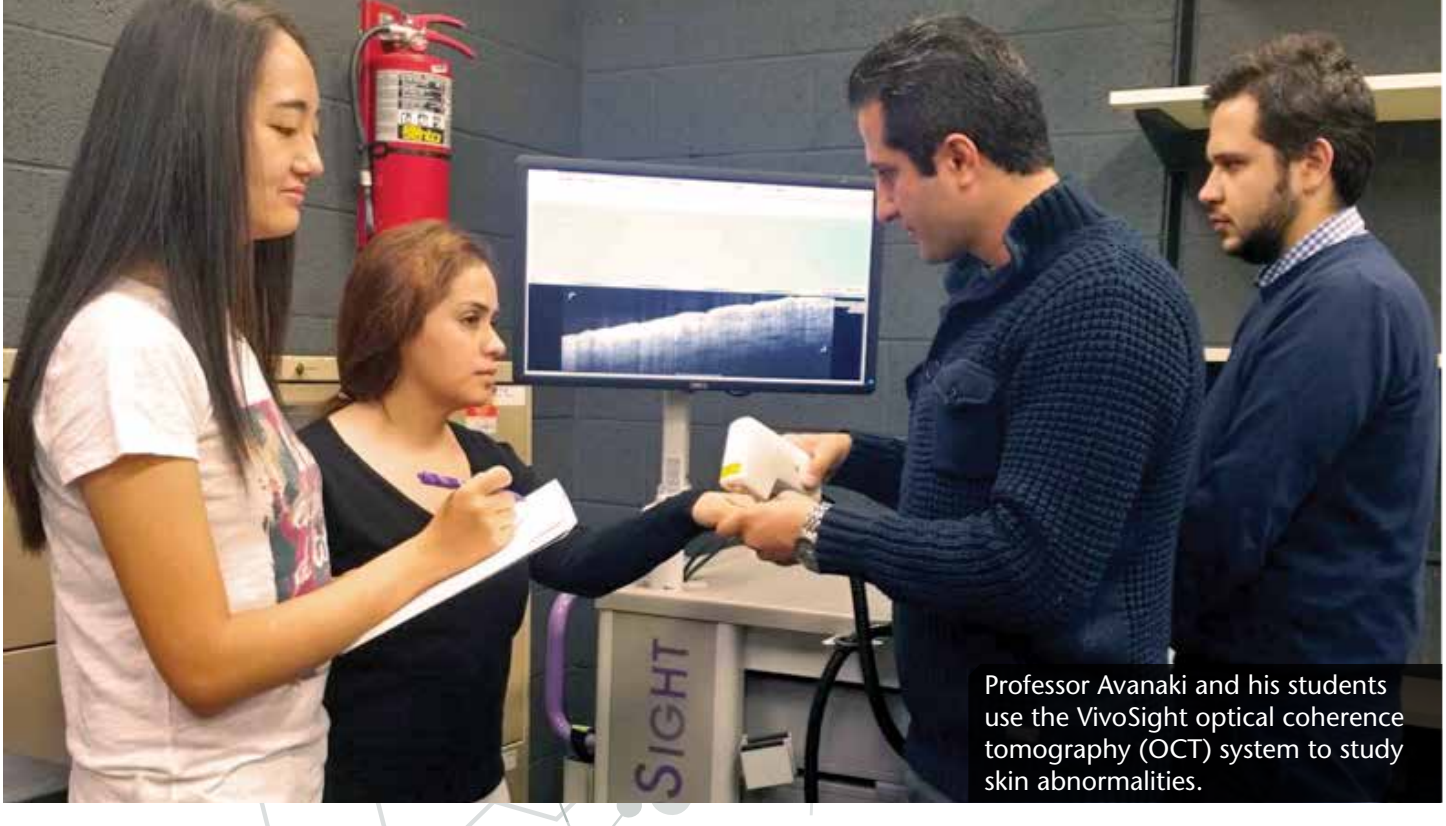
Another focus of Avanaki's lab is small animal brain imaging using both tomography and microscopy. He is mainly interested in studying resting-state functional connectivity as a novel neuroscientific principle to monitor the health of the brain and diagnose different brain diseases, such as epilepsy and Alzheimer's.

"My lab focuses on optical imaging because many scientists agree that it is the future imaging technique since it is nonionizing (safer) and noninvasive," he says.

Mehrmohammadi, also an assistant professor of biomedical engineering and lab director, primarily focuses on developing novel, hybrid, ultrasound-based diagnostic methods and defining their clinical utility as it applies to detection, diagnosis and therapy of various pathologies.

"Our ultimate goal is to help physicians and patients by providing more accurate and multiparametric information about diseases that can help detect pathologies like cancer at their early stages of development, more accurately locate the diseased tissue, better plan for individualized therapy and monitor the outcome of the therapeutic procedures," says Mehrmohammadi.

According to Mehrmohammadi, ultrasound imaging (also known as sonography) is the most widely available medical imaging modality in clinical practice due to its notable advantages, including using nonionizing energy source, providing real-time information, portability and lower cost compared to other major imaging modalities. "Almost everything we do somewhat involves ultrasound or acoustic waves; however, we are trying to expand the scope of traditional ultrasound



Professor Avanaki and his students use the VivoSight optical coherence tomography (OCT) system to study skin abnormalities.

imaging, which is limited to imaging tissue morphology and structure, and enabling it to provide more information, including functional information as well as cellular and molecular information of disease."

Mehrmohammadi is combining ultrasound and a relatively new imaging modality called photoacoustic imaging, which can provide complementary functional and molecular information to morphological images obtained from ultrasound.

He is currently involved in two major research projects. The first is the design and development of an endocavity ultrasound/photoacoustic/elasticity imaging for imaging cervix abnormalities (including cancer) and detecting fetal hypoxia during complicated delivery. The second is focused on development of a prototype ultrasound/photoacoustic tomography system that can be initially used for whole-body small animal imaging but with an ultimate goal of 3D ultrasound and photoacoustic tomography.

His research team works closely with the Wayne State School of Medicine and the Barbara Ann Karmanos Cancer Institute. "This collaboration has helped us better identify the real clinical need and direct our efforts to overcome clinical limitations," says Mehrmohammadi. Additionally, his lab works closely with companies such as Verasonics and Siemens Healthcare to implement imaging technologies on existing clinical devices.

These are just a few ways the department, long known for its strengths in biomechanics, is expanding its biomedical imaging research program. Researchers across the program focus on developing novel imaging agents and approaches that can be utilized in applications such as monitoring drug distribution in the body; identification of tissue biomarkers of cancer; and the selection, individualization, and therapy monitoring.

"We've had great strength in imaging techniques and instruments such as positron emission computer tomography, magnetic resonance imaging, computer-assisted X-ray tomography, ultrasound and optical imaging modalities, especially due to the efforts of Dr. Juri Gelovani," says Farshad Fotouhi, dean of the College of Engineering. "But the addition of advanced instrumentation in optical and ultrasound imaging raises our program to the top tier nationally and internationally."

According to Fotouhi, the perks of welcoming Avanaki and Mehrmohammadi to Wayne State go well beyond supporting the process of medical imaging research, development and commercialization.

"Their addition to our college ensures future students have the opportunity to study these innovative techniques and instruments," Fotouhi says. "As a result, we already have received more applications from students interested in specializing in biomedical instrumentation."

UWERG plays key role in keeping Michigan's greatest treasures pristine

The Urban Watershed Environmental Research Group (UWERG) — formed by researchers from various Wayne State schools and colleges, including the College of Engineering — is playing a crucial role in protecting and enriching lives throughout the Great Lakes region.

Established in 2009, UWERG's vision includes research, education and community outreach centered on urban watershed systems and their components — including humans. As such, establishing a network of water-related research — especially as it relates to the Detroit region of the Great Lakes — at Wayne State requires a collective, grass-roots effort throughout many colleges, including the College of Engineering, School of Medicine, College of Liberal Arts and Sciences, Eugene Applebaum College of Pharmacy and Health Sciences, Institute of Environmental Health Sciences, College of Education and the Law School.

"It has been very important that our group maintain a cross-disciplinary and holistic approach because, like water, the research is very fluid and crosses many boundaries. Water can be an economic, energy and public health issue all at the same time," explains Carol Miller, UWERG co-director and professor of civil and environmental engineering.

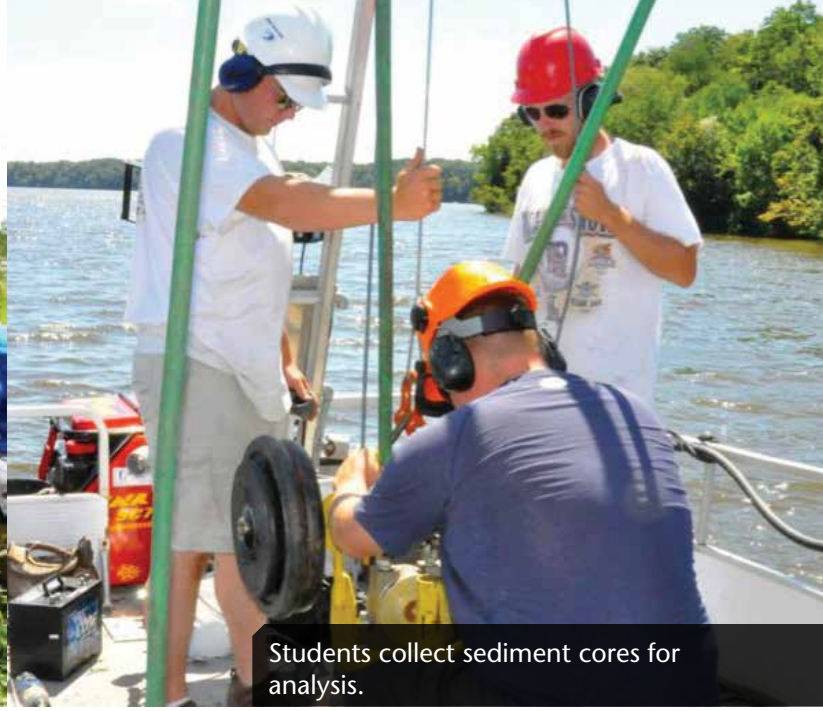
Since its creation, UWERG, which is funded by public and private grants, has had a broad research and education portfolio. Members have developed technologies to predict electricity generation-based emissions in the Great Lakes region, improve the accuracy and relevance of beach health advisories, trace sources of water-borne pathogen contaminants, and optimize control strategies for large-scale water distribution systems — including the Detroit system, which provides drinking water for more than 3 million metropolitan residents. They have also worked to implement these research advances locally and globally.

Current focus areas include enhanced understanding of and protection against excessive nutrient loading to Great Lakes waters and evaluation of emerging contaminants — including pharmaceuticals and personal care products — in the Huron to Erie corridor. These efforts are buoyed through a recent award of $650,000 from the Erb Family Foundation for the university's Healthy Urban Waters initiative, which is being led by Miller.

Other funds for UWERG research have come from the National Science Foundation, Michigan Sea Grant, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers (USACE), the Great Lakes Protection Fund, DTE Energy, U.S. Department of State and the Michigan Department of Transportation.

One of UWERG's current research projects, a joint effort with USACE, involves the study of sediment buildup behind dams in the Great Lakes watershed. Sediment movement is of great significance to USACE, which is tasked with maintaining more than 100 federal harbors in the Great Lakes watershed.

UWERG researchers and students conduct field research on location.



Students collect sediment cores for analysis.

As precipitation falls on land areas of the Great Lakes watershed, it erodes soil that ultimately discharges to rivers, streams and lakes. Certain areas are especially prone to buildup of these soils and sediments – particularly in "quiet" pools behind dams and at the interface between the rivers and the Great Lakes. This can have a devastating impact on harbors and navigation channels, as well as limiting or removing the drinking water supply provided by many of these reservoirs and the aquatic habitat. In addition, some of the sediment includes adsorbed contaminants that may originate from agricultural practices and/or urban industries and wastewater effluent.

"The U.S. Army Corps of Engineers spends more than $40 million annually in dredging up to 4 million cubic yards of sediment from navigation channels," states Miller, the lead WSU researcher in this project. "This is both a key economic and environmental issue for our region."

To address these issues, Miller and her team — which includes several undergraduate and graduate students, as well as Mark Baskaran, professor of geology — are developing predictive models for sediment buildup under various conditions. The team has created digital models that simulate the process that occurs during rainfall as sediment is picked up and moved toward a river and beyond.

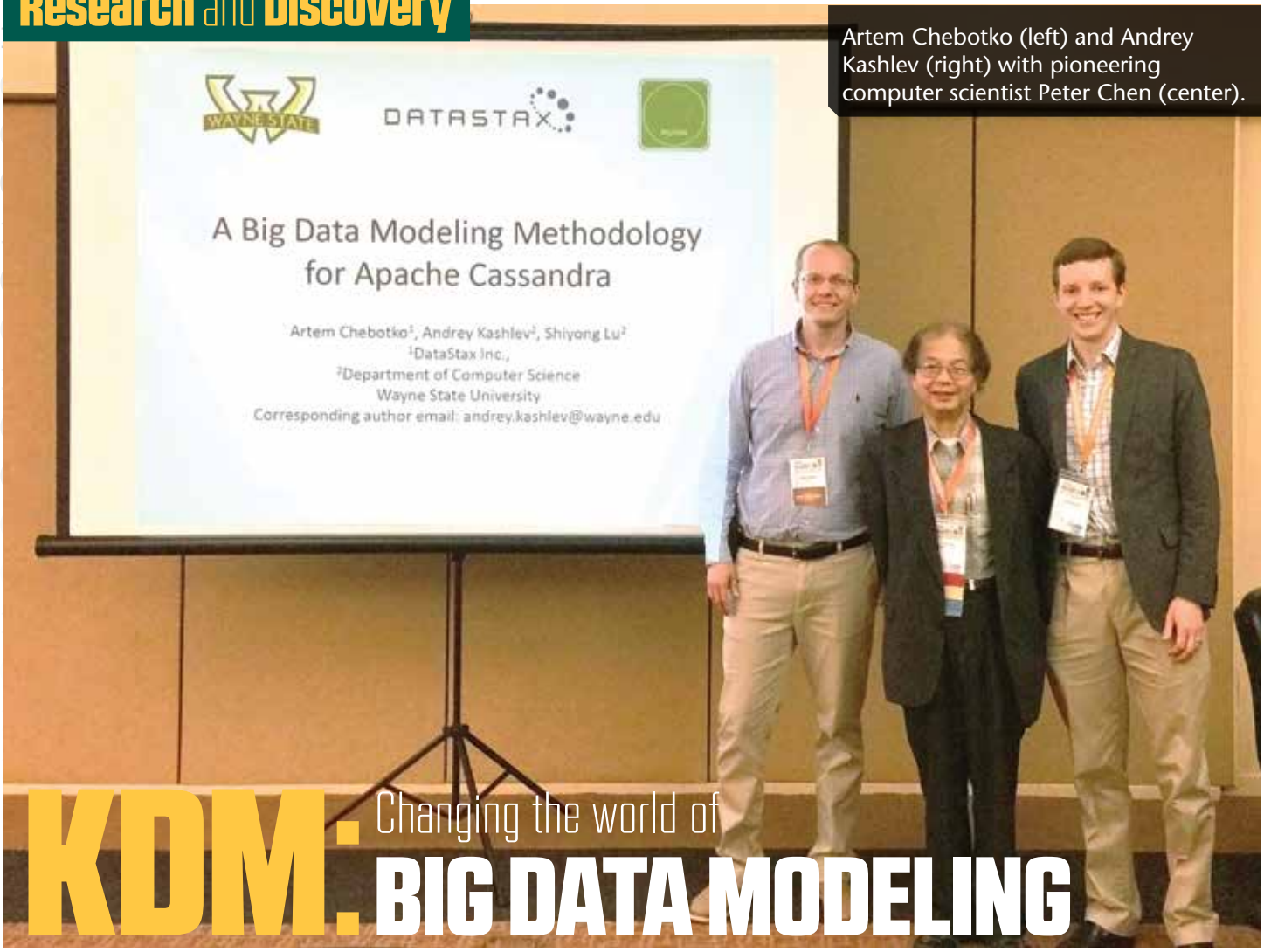
According to Miller, these models will show what types of land use or changes in the landscape are better than others for reducing the amount of sediment buildup in navigation channels, harbors and reservoirs.

This project also requires fieldwork and collaboration with researchers from Wayne State's geology department. Miller and her team navigate the waterways in pontoon-type boats with vibracore sampling technology. Sediment cores are retrieved and analyzed using radionuclide dating in Baskaran's laboratory. "By looking at the age of multiple horizons of sediment, we can learn how rapidly different materials have been deposited, then cross-reference the dates with historical information that we gathered," she says.

Miller's research, which will conclude in July 2016, will assist USACE with building budgets more than 20 years into the future. "We are delivering models, predictive equations and scenario analyses that will help the federal government prepare for any situation; but perhaps more importantly, we are helping spread the word on best land use so we can avoid worst-case scenarios," Miller says.

Another deliverable of this project is the development and dissemination of best management practices (BMP) for agricultural and urban land use. "If we can educate farmers or urban landscapers and have them implement BMP, in some areas we can have can have a dramatic impact in sediment load reduction," she continues.

The team is already expanding this work into other international regions, including Brazil, through the efforts of recent alumnus Calvin Creech, Ph.D.CEE '14, and into Turkey, through the efforts of visiting professor Omer Bilhan.



Artem Chebotko (left) and Andrey Kashlev (right) with pioneering computer scientist Peter Chen (center).

KDM: Changing the world of BIG DATA MODELING

You pick up your laptop, go to Netflix and search for a movie. You grab your smartphone, open Pandora and browse through millions of songs. You visit the website of your favorite store to shop for a new jacket. All of these simple everyday activities, multiplied by millions of consumers, generate what is known as "big data" — massive amounts of valuable digital information.

"To keep applications running smoothly, thousands of organizations across all industries manage their large datasets using one of the leading open-source database systems — Apache Cassandra — which can run across tens of thousands of machines and deliver high read-and-write performance," says Andrey Kashlev, Ph.D. candidate in the Department of Computer Science.

Databases like Cassandra store all of their information in numerous tables that support queries powering the various actions that the application performs. "In Netflix, for example, one query may list all films in a particular genre," says Kashlev.

The set of tables supporting queries for an application constitute a data model. Thus far, data models have been created manually. That presents a major challenge.

"Thousands of data architects — the experts behind applications like Netflix — must create tables by manually applying multiple design rules by hand. Big data modeling is still a tedious and error-prone process that requires specialized training and experience. Data models can take an expert anywhere from hours to weeks to create, and a single error at any stage of the design could result in the entire application not running," says Kashlev. "For companies like Netflix, application downtime means unhappy consumers and, often, loss of revenue."

"We want to use KDM and big data to make things smarter and better for society."

— Andrey Kashlev

Kashlev set out to address this problem and, as a result, may have solved one of the biggest challenges in big data management.


Shiyong Lu

Working with his advisor, Shiyong Lu, associate professor of computer science, and alumnus Artem Chebotko, PhDCS'08 MACS'05, a solution architect and data modeling expert with big data company DataStax, Kashlev invented a method to automate big data modeling.

"Using our knowledge of Cassandra and expertise in data modeling, we developed an innovative software tool — the Kashlev Data Modeler (KDM) — that automates the most complex and time-consuming data modeling tasks and ensures error-free Cassandra database design," says Lu. Instead of requiring data architects to build query after query by hand, KDM builds intelligent big data models in seconds.

"Our tool automatically produces data models that efficiently sort and partition large sets of data and ultimately help drive efficiency and accuracy," says Kashlev.

The team developed an intuitive, user-friendly graphical interface for KDM and released it publicly at no cost. The software was presented through major forums like IEEE BigData Congress 2015, the highly visible Planet Cassandra blog and social media. Just four months after its initial release, KDM attracted more than 500 registered users from 15 universities and more than 200 companies in more than 58 countries.

"Our users include professors, researchers, students, entrepreneurs and developers, who have successfully used KDM to generate hundreds of big data models in a variety of fields, including health care, education, Internet of Things, investment markets, transportation, retail, security and many more," says Lu. KDM is also being used as an educational tool to teach NoSQL and Cassandra.

"The creation of KDM is an exciting milestone in big data research," says Lu. "A breakthrough with such immediate impact in industry is quite significant for a Ph.D. student. I am very proud of Andrey."

Kashlev says the best validation of KDM is the number of users and the scope of its application. "Practitioners, expert data architects from major organizations, are not only using the tool, but reaching out to us to request collaboration," he says.

The team, which is working under Lu's Big Data Research Laboratory, looks forward to continuing the development and deployment of KDM, specifically in areas most related to quality of life, such as health care and safety. "We want to use KDM and big data to make things smarter and better for society," says Kashlev.

Lu and Kashlev welcome feedback and collaboration. They can be contacted at shiyong@wayne.edu and andrey.kashlev@wayne.edu. To learn more about or register to use KDM, visit **kdm.dataview.org**.

ALUMNI UPDATES

I AM A WAYNE STATE ENGINEER.

WHAT DOES "WAYNE STATE ENGINEER" MEAN TO YOU?

We asked College of Engineering alumni what it means to be a Wayne State Engineer. If you would like to share your "I am a Wayne State Engineer" story, email **engineeringalumni@wayne.edu**.

If you would like to see more "I am a Wayne State Engineer" quotes, visit **go.wayne.edu/waynestateengineer**.

"Being a Wayne State engineer signifies a quality education balanced with practical experience, while our heritage, diversity and urban setting provide for a unique and solid foundation unattainable elsewhere."

Zachary Carr, BSCE '99, MSCE '01
FK Engineering

"I am proud that Detroit is recognized worldwide as a center of excellence for engineering. At the core of that recognition is Wayne State, the city's largest engineering school. To be a graduate of that institution is a great honor."

Steve Kurmas, BSChE '79, MSChE '83
President and COO, DTE Energy

"Wayne State gave me a can-do attitude. When others told Cadillac in the late 1970s that computer-drawn dot maps could not be done, I told them, 'it can.'"

Jim Anderson, BSCE '67, MSCE '70
President and CEO, Urban Science

"Wayne State Engineering gave me the tools early in my career both educationally and practically through co-ops and internships. It was because of this well-rounded undergraduate and master's experience that I was able to hit the ground running upon graduation."

Elizabeth Krear, BSME '88, MSME '90

"A WSU engineer is a catalyst of change, someone who does not settle down and who constantly strives for innovation to solve some of the world's toughest problems. Wayne State engineers are innovative critical thinkers."

Luke Popiel, BSEE '13
General Motors

"Wayne State taught skills that enabled me to measurably improve the safety of cars and trucks while generously allowing me to attend on full scholarship. As the daughter of an immigrant janitor and a high school secretary, and the first in my family to graduate college, I am forever grateful for the wonderful education, recruitment and lifelong friendship opportunities WSU provided."

Joan Scheske, BSME '89, MSME '93

"Wayne State welcomed me to the US and opened up incredible opportunities for me as an engineer."

Sandeep Johri, MSIE '85
CEO, Tricentis

Night of the Stars

On Sept. 24, 2015, the college held Night of the Stars — its signature annual event — at the Detroit Institute of Arts. This year's Hall of Fame honorees included Cynthia Bir, MSME '99, Ph.D. '00, professor in the Department of Emergency Medicine at the Keck School of Medicine of the University of Southern California and director of the university's Center for Trauma, Violence & Injury Prevention; Bruce Hettle, EMMP '97, vice president of North America manufacturing for Ford Motor Company; and Earl Shipp, BSChE '81, vice president of operations for the U.S. Gulf Coast at The Dow Chemical Company. Angela Barbee-Hatter, BSME '93, director of global design operations for General Motors, received the Industry Achievement Award.

ALUMNI UPDATES

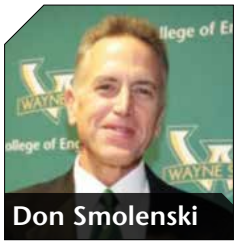
College of Engineering announces Engineering Alumni Council, new alumni volunteer programs

The College of Engineering recently introduced a new volunteer board to guide its plans to expand alumni programs and outreach.

At September's Night of the Stars — the signature event for the Engineering Alumni Association — the college introduced the inaugural members of the Engineering Alumni Council, which will serve as the advisory board for the Engineering Alumni Association. The goal of the council is to increase the value of a Wayne State engineering and computer science degree. The 24-person board will enable members of the Engineering Alumni Association to network individually as well as at university and college-hosted events and through social media. The council will also create opportunities for alumni to volunteer their time and expertise to help prepare students for successful careers.

"The College of Engineering's strategic plan calls for an increased investment in our alumni network," said Dean Farshad Fotouhi. "The council will play a key role in shaping the future of the Engineering Alumni Association. We want all of our alumni to know, whether you're beginning your career or enjoying the fruits of retirement, there's a place for you here."

The council includes three standing committees, which will be charged with leading a volunteer program for alumni to share their expertise with students and student organizations, an ambassador program for alumni at major companies to connect fellow alumni to the college, and dedicated events and community service projects for undergraduate alumni who have graduated in the past 10 years.


Don Smolenski

"Wayne State gave me an opportunity when I needed it most," said Don Smolenski, MSChE '79, PhDChE '90, inaugural chair of the council and OEM liaison manager for Evonik Oil Additives USA. "My goal for the Engineering Alumni Association is to leverage the talents of our alumni members to create those same kinds of opportunities for today's students."

Other officers are Russ Pogats, BSEE '92, vice chair; Brian Geraghty, MSME '72, Volunteer Committee chair; Julius Reeves, BSIE '86, Ambassador Committee chair; and Luke Popiel, BSEE '13, Recent Alumni Council chair.

For more information about the Engineering Alumni Council, please visit engineering.**wayne.edu/alumni/eac.php**.

Alumni Events

Last summer, the college hosted an Engineering Management Master's Program alumni breakfast at Ford Motor Company and a joint event for engineering and business alumni at DTE Energy.


DTE President and COO Steve Kurmas


Alumni Kian Huat Tan, Donna Bell, Paschal Aguwa, Lokesh Setti


Dean Ellis with alumni at DTE Energy


Professor Chelst with alumna Terri Desautels

College of Engineering welcomes new faculty members

The Wayne State University College of Engineering is pleased to announce the addition of seven outstanding scholars to its faculty: Yingxi Elaine Zhu, chemical engineering and materials science; Matthew Nokleby, electrical and computer engineering; Fengwei Zhang, computer science; Zichun Zhong, computer science; Stephen M. Remias, civil and environmental engineering; Saravanan Saran Venkatachalam, industrial and systems engineering; and Jimmy Ching-Ming Chen, engineering technology.

Professor Zhu's research interests are in the areas of polymers and colloids in solutions and under confinement, lipid biomembranes, surface and interfacial science, nanocollodial and supramolecular assembly, membrane separation, and energy materials. Zhu received her Ph.D. in materials science and engineering at the University of Illinois Urbana-Champaign in 2001.

Assistant Professor Nokleby's research interests include information theory, machine learning, statistical signal processing, wireless networks, and game and decision theory. He received his Ph.D. in electrical and computer engineering from Rice University in 2012.

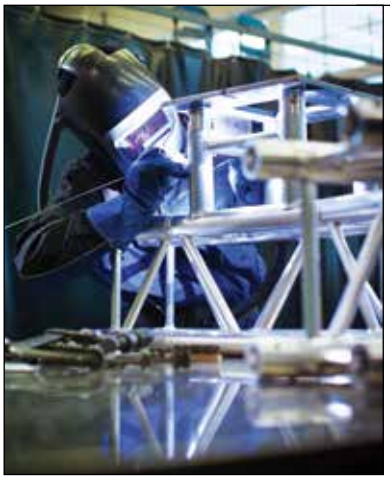
Assistant Professor Zhang's research interests include areas of cyber security with a focus on trustworthy execution, memory introspection, system integrity checking and transparent malware debugging. He received his Ph.D. in computer science from George Mason University in 2015.

Assistant Professor Zhong's research interests include computer graphics, geometric modeling, medical imaging processing, deformable image restoration, image reconstruction, computer animation, visualization, computer vision, game development, human-computer interaction, GPU algorithms, high-performance computing, mobile computing, data analytics, health informatics and biomedical informatics. Zhong received his Ph.D. in computer science from the University of Texas at Dallas in 2014.

Assistant Professor Remias' research interests are in traffic engineering, intelligent transportation systems, crowdsourced probe vehicle data and using large data sets to solve relevant transportation issues. Remias is a Detroit native. He received his Ph.D. in civil and infrastructure engineering from Purdue University in 2014.

Assistant Professor Venkatachalam's research interests include supply chain management, logistics and transportation, pricing and revenue management, and air traffic flow management. He received his Ph.D. in industrial and systems engineering from Texas A&M University in 2014.

Assistant Professor Chen's research interests are in silicon lithium-ion battery electrode development, 3D printing applications to fluid mechanics, biomorphism/biomimetics and biomedical engineering, mechatronics, and control systems of hybrid electric vehicles and robotics. He received his Ph.D. in physics from Texas A&M University in 2006.



DEPARTMENT NOTES

BIOMEDICAL ENGINEERING

- Associate Professor Michele Grimm was named a fellow of Executive Leadership in Academic Technology and Engineering, a one-of-a-kind professional development program for women in the academic STEM fields.
- Biomedical engineering doctoral student Armin Iraji, Ph.D., received the university's prestigious Garrett T. Heberlein Excellence in Teaching award for graduate students.
- Doctoral student Tonya Whitehead was the recipient of a scholarship from the Steel Market Development Institute in honor of alumna Elizabeth Krear, BSME '88, MSME '90, chief engineer of the Ram 1500 EcoDiesel.
- Wayne State partnered with East China Normal University to conduct an MRI research training program in biomedical engineering, physics and magnetic resonance imaging research. Faculty, researchers and students from both institutions are working with Siemens MR Equipment.
- Toyota and Wayne State have partnered to conduct research on whether riding in the front seat of a car is safer than riding in the back seat for two vulnerable groups — children between 9 and 12, and adults 55 and older.
- Associate Professor Richard Genik finished his 30-month project, "Measuring Human Capabilities: An Agenda for Basic Research on the Assessment of Individual and Group Performance Potential for Military Accession," as part of a blue-ribbon panel with the National Research Council of the National Academies of Science (NAS). The goal of the study was to improve the efficiency of selection of U.S. Army recruits. The final presentation of the report was a four-hour public event at the NAS Headquarters in Washington, D.C. He was chosen for his expertise in measuring brain function using fMRI and other technologies, his experience on National Research Council panels involving

neuroscience technology, and his reputation as an interdisciplinary communicator.

CHEMICAL ENGINEERING

- Professor Guangzhao Mao was named chair of Wayne State University Department of Chemical Engineering and Materials Science. Mao joined the college in 1995 as an assistant professor.
- The department welcomed Professor Yingxi Elaine Zhu. Her research interests are in the areas of polymers and colloids in solutions and under confinement, lipid biomembranes, surface and interfacial science, nanocollodial and supramolecular assembly, membrane separation, and energy materials.
- Eranda Nikolla, assistant professor, received a College of Engineering Faculty Research Excellence Award. Nikolla is a rising star in the field of heterogeneous catalysis.
- Doctoral student Juliana Silva Alves Carneiro received the Best Student Presentation award from the Michigan Catalysis Society at its May symposium — the first time a Wayne State student has done so in 18 years. The award recognized the research that Carneiro and a team of postdoctoral, graduate and undergraduate students are conducting under the guidance of Eranda Nikolla.
- Tracy Castle joined the department as an academic advisor. Tracy is an alumna of Michigan State University and Eastern Michigan University and was most recently an academic advisor in the Division of Engineering Technology at Wayne State.

CIVIL AND ENVIRONMENTAL ENGINEERING

- The department welcomed Assistant Professor Stephen M. Remias. Remias' research interests are in traffic engineering, intelligent transportation systems, crowdsourced probe vehicle data and using large data sets to solve relevant transportation issues. Remias is a Detroit native.
- Joseph Hummer, chair and professor, was interviewed by the Detroit Free Press on the state of Michigan's roads. Hummer was also interviewed by Wallethub for tips on safe travel. Hummer's tips: take a bus, train or plane; use freeways if you have to drive; and avoid left turns.
- A recently completed study by the Wayne State College of Engineering's Transportation Research Group (WSU TRG) led by Professor Tapan Datta shows that rumble strips are proving to be an effective and low-cost way to reduce crashes on Michigan's state highways.
- Faculty members Carol Miller, Shawn McElmurry and Yongli Zhang worked with four other university departments to host a workshop called "Integrative and Sustainable Food, Energy and Water (FEW) in Transitioning Urban Landscapes" in October 2015. More than 60 researchers and practitioners participated. The workshop was designed to promote interactive discussion and problem solving around the challenges faced by post-industrial urban areas for food, energy and water sustainability. The ideas generated will be the basis of a paper.
- Elizabeth Kondrat joined the department as academic advisor in March. Elizabeth came to WSU after completing her M.A. in counseling with a specialization in student affairs from Oakland University, where she also completed her undergraduate degree in history and secondary education.
- Undergraduate student Kate Kelley won third place in the 2015 National Daniel W. Mead Contest. Her essay, "Engineers Assuming Responsibility for Job-Site Safety: Possible and Honorable," was chosen by the Committee on Student Members of the American Society of Civil Engineers (ASCE) to be honored with this award.

COMPUTER SCIENCE

- The department welcomed Assistant Professor Fengwei Zhang. Zhang's research interests include areas of cyber security with a focus on trustworthy execution, memory introspection, system integrity checking and transparent malware debugging.
- The department also welcomed Assistant Professor Zichun Zhong. Zhong's research interests include computer graphics, geometric modeling, medical imaging processing, deformable image restoration, image reconstruction, computer animation, visualization, computer vision, game development, human-computer interaction, GPU algorithms, high-performance computing, mobile computing, data analytics, health informatics and biomedical informatics.
- Doctoral student Safraz F. Rampersaud received the 2015 IEEE IC2E Doctoral Symposium Best Presentation Runner-Up Award at the 3rd IEEE International Conference on Cloud Engineering (IC2E 2015) for his presentation, "Sharing-Aware Resource Management Algorithms for Virtual Computing Environments."
- Stephanie Chastain joined the department as an undergraduate academic advisor. Stephanie is an alumna of Eastern Michigan University and Wayne State University. Her previous position was at Eastern Michigan University.
- Doctoral graduate Lena Mashayekhy accepted a position as assistant professor of computer science at the University of Delaware.
- A team including Professor Jing Hua, Associate Professor Hongwei Zhang, Jayanthi Rao (Ford Research), WSU Deputy CIO Patrick Gossman, WSU Police Chief Anthony Holt, Chris Demos (WSU Public Safety), Gary Voight and their students won the Best Demo Award at the 23rd NSF GENI Engineering Conference for

their demo, "Symbiotic Evolution of Application and Networks of Connected and Automated Vehicles: A Case Study of Transportation and Public Safety." This is the second straight year that the team has received Best Demo at the GENI conference.

- Choudhry Malik, assistant professor, and student Nariman Ammar received the Best Student Paper Award at the IEEE International Conference on Web Services (ICWS) 2015 for the paper "K-Anonymity Based Approach For Privacy-Preserving Web Service Selection."
- Professor Xuewen Chen received a National Science Foundation award of $233,995 for two years with the project "EAGER: Large-Scale Distributed Learning of Noisy Labels for Images and Video."
- Undergraduate Arooba Javed was awarded a scholarship for his attendance to ASSETS 2015 in Lisbon, Portugal. The ASSETS conference explores the design, evaluation, and use of computing and information technologies to benefit people with disabilities and older adults.
- Intel has picked Wayne State University as one of its IoT Innovator Labs. The university will be able to receive donations of hardware components, including 3D printers and funds to support the innovative activities in Southeast Michigan.
- A paper co-authored by Associate Professor Daniel Grosu, former students Mahyar Nejad and Lena Mashayekhy, and Professor Ratna Babu Chinnam from the Department of Industrial and Systems Engineering was selected as a finalist for the IBM Research Service Science Best Student Paper Award competition at INFORMS. The paper was titled "Scheduling and Pricing Services for Online Electric Vehicle Charging."
- Doctoral student Jie Cao received the Best Student Paper Award at the 17th IEEE HealthCom conference for "MyPalmVein: A Palm Vein-based Low-cost Mobile Identification System For Wide Age Range."

ELECTRICAL AND COMPUTER ENGINEERING

- Professor Xiaoyan Han was named a fellow of Executive Leadership in Academic Technology and Engineering, a one-of-a-kind professional development program for women in the academic STEM fields.
- Professor Le Yi Wang received a College of Engineering Faculty Research Excellence Award. Professor Wang's research interests include electric vehicles and batteries.
- The department welcomed Assistant Professor Matthew Nokleby. Nokleby's research interests include information theory, machine learning, statistical signal processing, wireless networks, and game and decision theory.
- Emily Reetz joined the department as an academic advisor. Emily is an alumna of Michigan State University and recently worked at University of Detroit Mercy.
- Associate professors Amar Basu and Mark Ming-Cheng Cheng are working with researchers to develop "placenta-on-a-chip" technology to study the inner workings of placenta and its role in pregnancy.
- A team of researchers from Wayne State University was recently issued a U.S. patent (# 8,998,808) on a technology that will offer anesthesiologists better methods for monitoring and managing patients in the operating room. The team is made up of Le Yi Wang, professor of electrical and computer engineering; Hong Wang, professor of anesthesiology in the School of Medicine; and Gang George Yin, professor of mathematics in the College of Liberal Arts and Sciences.

ENGINEERING TECHNOLOGY

- The department welcomed assistant professor Jimmy Ching-Ming Chen. Chen's research interests are in silicon lithium-ion battery electrode development, 3D printing applications to fluid mechanics, biomorphism/biomimetics and biomedical engineering, mechatronics, and control systems of hybrid electric vehicles and robotics.
- Joyce Lien-Perich joined the division as an academic advisor in August. Joyce is an alumna of Wayne State University and mostly recently worked for the College of Engineering as a research assistant

INDUSTRIAL AND SYSTEMS ENGINEERING

- The department welcomed Assistant Professor Saravanan Saran Venkatachalam. Venkatachalam's research interests include supply chain management, logistics and transportation, pricing and revenue management, and air traffic flow management.
- The College of Engineering Big Data and Business Analytics Group's recent partnership with DataFactZ was featured by dbusiness.com. The feature highlights a $40,000 seed research grant from the DataFactZ. The grant will fund a Ph.D. student and support other Wayne State data scientists' theoretical research.
- Qingyu Yang, assistant professor of industrial and systems engineering, co-authored a paper with Nailong Zhang that was featured in the May edition of *IIE Transactions*, the IIE's industrial engineering magazine. The paper is titled, "Optimal maintenance planning for repairable multi-component systems subject to dependent competing risks."

ENGINEERING TECHNOLOGY

- Doctoral student Xin Yu received the Best Student Poster award from the U.S. Army's Automotive Research Center. The project is titled "Validation of JP-8 Surrogates in an Optical Engine," and explores a key element that enables the U.S. Army to apply high fidelity combustion simulation in the design of internal combustion engines.

FACULTY AND STAFF RETIREES

This spring, the College of Engineering recognized seven retirees who have given incredible dedication and service to the Wayne State University College of Engineering:

Dinu Taraza, Professor of Mechanical Engineering

Taraza joined the faculty in September 1995. An expert in internal combustion engines, he was instrumental in the creation of Wayne State's Center for Automotive Research, which has brought in millions in funding to the college.

Andrea Eisenberg, Academic Service Officer, Chemical Engineering and Materials Science

A dual alumna of Wayne State, Eisenberg began her career in a graduate assistant position advising in the Department of Chemical Engineering and Materials Science in 1989. Over the years, Eisenberg has advised thousands of students.

Mulchand Rathod, Professor of Engineering Technology

Rathod joined Wayne State as a professor in August 1987 after appointments at other institutions. In addition to his scholastic pursuits in areas such as cardiac pumps and heating and cooling, he has been an incredible advocate for engineering education for minority groups.

Walter Bryzik, Professor of Mechanical Engineering

Bryzik joined Wayne State in January 1979 as a full adjunct professor, all while building an exceptional career in research and development with the Department of Defense. In 2004, he received the Distinguished Presidential Rank Award.

Bob Erlandson, Professor of Electrical and Computer Engineering

Erlandson began teaching in April 1975. His research in areas such as accessible design, rehabilitation robotics and enabling technologies gives weight to the college's claim of enhancing quality of life. Through his labs and courses, he encouraged young engineers to explore design as it relates to individuals with special needs.

Trilochan Singh, Professor of Mechanical Engineering

Singh joined Wayne State in September 1970 soon after receiving his doctorate from UC Berkeley. In addition to Singh's research in areas such as combustion and thermodynamics, he leaves a legacy of kindness and service to his students, particularly as a graduate program officer.

Erhard Rothe, Professor of Chemical Engineering and Materials Science

Rothe joined Wayne State in June 1969 as a full professor. He has conducted and published a prolific amount of research in areas such as applications of high-powered lasers, machining of electronic chips and diagnostics of internal combustion.

Thank you for your combined 241 years and six months of service to our college, our university and our students.

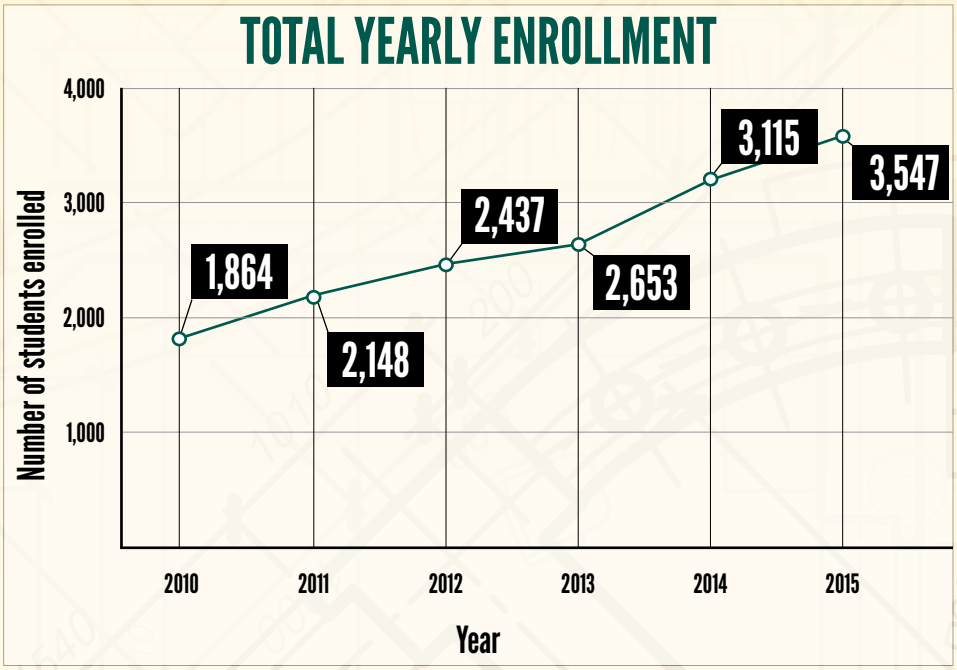
FACTS AND FIGURES

*All figures represent fall 2015 unless otherwise indicated

TOTAL ENROLLMENT

3,547

STUDENTS



Level

UNDERGRADUATE
2,113 students (59.6%)

GRADUATE
1,434 students (40.4%)

Full/part time

FULL TIME
2,575 students (72.6%)

PART TIME
972 students (27.4%)

Gender

MALE
2,838 students (80%)

FEMALE
709 students (20%)

Residency and level

IN-STATE UNDERGRADUATE 1,891 students	OUT-OF-STATE UNDERGRADUATE 222 students
IN-STATE GRADUATE 399 students	OUT-OF-STATE GRADUATE 1,035 students

Class level

Freshman: 437 (12.3%)

Sophomore: 286 (8.1%)

Junior: 463 (13.1%)

Senior: 800 (22.6%)

Undergraduate non-degree: 127 (3.6%)

Master's: 1,137 (32.1%)

Doctorate: 294 (8.4)

Graduate non-degree: 3 (.1%)

Countries represented by current students

37

Living alumni

26,660

Student organizations and teams

24

Faculty and staff

FULL-TIME FACULTY

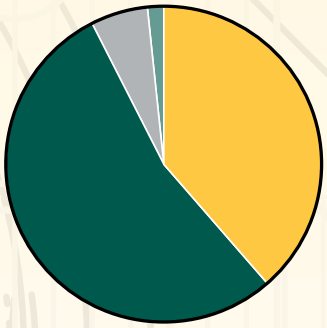
134

FULL-TIME STAFF

50

Degrees awarded 2015

- Bachelor's: 257
- Master's: 358
- Ph.D.: 39
- Certificate: 11



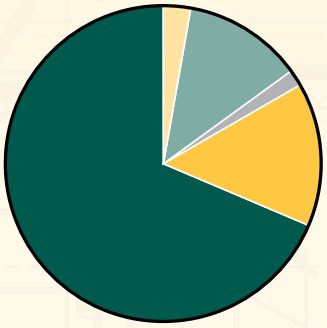
Research expenditures

2014 fiscal year

$21,524,000

By Source

- National Institutes of Health (NIH): $619,000
- National Science Foundation (NSF): $2,667,000
- Department of Energy: $357,000
- Department of Defense: $3,131,000
- All other fed/state/local agencies, private industry, etc.: $14,750,000



Class of 2015 placement data

94% Employed within six months post-graduation

90% Employed in field related to academic degree

86% Employed in Michigan

33% Plan to pursue additional academic studies within one year

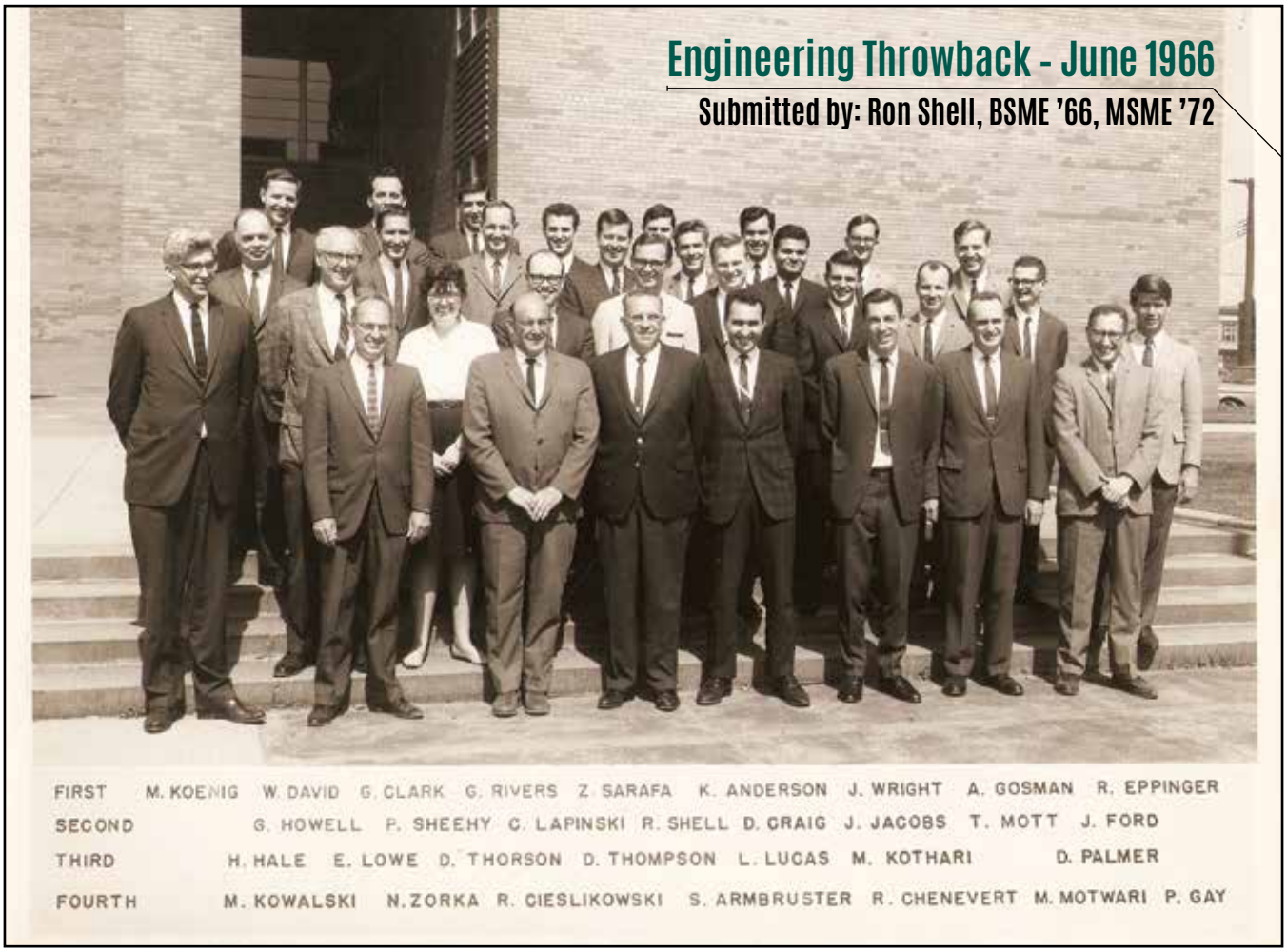
Top 10 employers of 2015 graduates

American Axle & Manufacturing
DENSO
DTE Energy
Fiat Chrysler Automobiles
Ford Motor Company
General Electric
General Motors
Johnson Controls
Lear Corporation
Marathon Petroleum Corporation

COLLEGE *of* ENGINEERING
5050 Anthony Wayne Drive
Detroit, MI 48202

Engineering Throwback - June 1966

Submitted by: Ron Shell, BSME '66, MSME '72



FIRST M. KOENIG W. DAVID G. CLARK G. RIVERS Z. SARAFA K. ANDERSON J. WRIGHT A. GOSMAN R. EPPINGER
SECOND G. HOWELL P. SHEEHY C. LAPINSKI R. SHELL D. CRAIG J. JACOBS T. MOTT J. FORD
THIRD H. HALE E. LOWE D. THORSON D. THOMPSON L. LUCAS M. KOTHARI D. PALMER
FOURTH M. KOWALSKI N. ZORKA R. CIESLIKOWSKI S. ARMBRUSTER R. CHENEVERT M. MOTWARI P. GAY

This photo features the College of Engineering mechanical engineering and industrial engineering graduating students and instructors in front of the Engineering Building. Next year will mark 50 years since their graduation.

Submit your College of Engineering throwback photo to **alumni@eng.wayne.edu** and be entered to win a college T-shirt. Photos will appear on our social media pages or in a future *Exemplar*. Please include a caption with description and names if possible.