# DIMENSIONS

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May 2019


IOWA STATE UNIVERSITY
**Department of Mechanical Engineering**

# Message from the Chair

Dear alumni and friends,

I am excited to share the stories and achievements of our students, faculty, staff and alumni of the Department of Mechanical Engineering at Iowa State University.

This issue includes stories about:

- Our graduate program has climbed up 11 spots compared to last year in the most recent U.S. News and World Report rankings;
- ME professor Jim Oliver has been named the inaugural director for the Student Innovation Center;
- ME assistant professor Soumik Sarkar is a 2019 winner of the NSF CAREER award…he was among three in the entire College of Engineering to earn this honor this year;
- ME associate professor Nicole Hashemi has developed a "placenta-on-a-chip" to study ways that caffeine is passed from the mother to her fetus during pregnancy;
- ME professor Xinwei Wang will study film thickness using Raman spectroscopy thanks to funding from the U.S. Department of Defense;
- Two ME students discuss how they manage their time between the ME curriculum and their participation on Iowa State's club soccer team;
- An ME alum has started a business where he repurposes old lobster traps by turning them into bicycle baskets and bird feeders.
- Longtime ME faculty member Judy Vance retired at the end of the 2018-19 school year, read a feature about her and all of her great accomplishments during her career including a new scholarship named in her honor.

This year, 2019, marks the 150th anniversary of the first class of students entering Iowa State, which included ME's first alum Edgar Stanton. To commemorate this event, we will publish a book which tells our department's history. We expect to publish the book later this summer, so stay tuned for details on how to order your copy.

Our alumni are vital to the growth and success of mechanical engineering and industry in the U.S. and abroad. We enjoy hearing about your accomplishments. Please feel free to reach out and share your story. You can contact us at mealumni@iastate.edu.

Regards,

Caroline Hayes
Department Chair
Lynn Gleason Professor of Interdisciplinary Engineering

## On the cover

*Sarah Bentil, an ME Assistant Professor and William March Scholar in Mechanical Engineering, discusses a ruptured diaphragm after running a shock tube experiment in her lab with Ling Zhang, a PhD Candidate in ME. Dr. Bentil and her Soft Tissue and Biomaterial Mechanics lab, also known as The Bentil Group, utilizes the shock tube to conduct research that will increase our understanding of blast-induced traumatic brain injury (TBI) mechanisms.*

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**Prepared by Engineering College Relations, collegerelations@iastate.edu**

# Student Team Updates

## Cardinal Space Mining Club

Cardinal Space Mining Club (CSM) at Iowa State University is a diverse team of students that incorporates a variety of ideas, backgrounds, and personalities. Team members range from different majors including Engineering, Liberal Arts, Agriculture, Business and Design. Each year, CSM designs and builds a specialized rover to compete in NASA's Robotic Mining Competition at the Kennedy Space Center Visitors Center. The competition consists of around 50 teams working to collect the most simulated Martian material in two 10-minute trials. Teams compete to win the Joe Kosmo Award for Excellence, which is awarded to the team showing the best all-around performance. Included in the competition is community outreach. Club activities have had a positive impact on the community by promoting STEM and will continue until the end of the academic year.

Since last year, the team has gone over three major design reviews and is currently in the process of manufacturing the robot. NASA had to make the competition virtual this year due to impacts from the government shutdown. The University of Alabama (UA) has graciously arranged the Robotic Mining Challenge to be held during the same week as the NASA RMC. CSM has decided to take part in the Robotic Mining Challenge at UA. While the mechanical team is busy with manufacturing, the controls team is wrapping up the power and software of the robot. Autonomous operation is one of the major goals for this year and the team is working hard to finish the software and hardware implementation before testing it on the robot.

So far, all NASA deadlines have been met and the team is in good shape to compete in May at UA and NASA.

Submitted by CSM



*Engineers Without Borders*

## Engineering Without Borders

Engineers Without Borders at Iowa State University has been up to incredible things this year. Over the past winter break seven of our club members traveled to a small village in the Upper West region of Ghana called Ullo. There, they took the design plans created by the eighty member organization and implemented a water distribution system five years in the making. This system now delivers water from a borehole, similar to a well, approximately 1.6 kilometers away to the boarding school located in Ullo. Due to this system, students no longer have to walk through the night and wait in lines to get the necessary amount of water to survive a single day. The students are now able to access the water from this system through three different distribution points at the girls dorm, boys dorm, and the school kitchen.

Now that this project has been completed the club is looking ahead with ambitious plans to execute: three assessments of the viability of future projects; one implementation of an improved school kitchen space; one pilot program of a rainwater catchment system for growing tomatoes; and to monitor the water distribution system.

Submitted by EWB

## SAE International

Aero had an exciting 3rd year as a team. At the Aero Design West Competition in Los Angeles, California, the Aero team had their first successful flight at a competition. Aero plans on taking what they have learned from the competition and applying it to building a more competitive plane for next season.

Baja has competed at four different competitions over the fall and spring semesters, and they are set to compete again in both May and June. At the first official competition in Tennessee, the Baja team placed 23rd overall. The second official competition will take place in California in May, and the third official competition will take place in Rochester, New York in June.

Clean Snowmobile Challenge competed in the International Clean Snowmobile Challenge in Houghton, Michigan this year. The team placed 1st in the subjective handling event, 3rd in the acceleration event, and tied for 3rd in the objective handling event. The team placed 8th overall in the "spark ignited" (gasoline) class of snowmobiles.

The Formula team is currently preparing for their competitions in Barrie, ON at the end of May, and Lincoln, Nebraska at the end of June. Some new things for the CR-24 include a custom display with gear indicator, and a redesigned front wing to position flow around the front wheels.

Supermileage will be competing at competition this spring, and will be reusing the same vehicle as last year with some improvements made. Last year at competition, the Supermileage team was able to achieve over 400 mpg and will be looking to further improve this at competition this year.

Submitted by SAE International

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# Oliver named director for Student Innovation Center

*Student Innovation Center director Jim Oliver during a Jan. 9 tour of the construction site. Photo courtesy of Amy Vinchattle.*

James Oliver has been named the first director of the Student Innovation Center. Oliver began the full-time appointment Jan. 1.

"Jim is a proven innovator in his teaching, research and technology transfer," said senior vice president and provost Jonathan Wickert. "He has built programs and relationships across campus -- exactly the culture that will be enhanced by the Student Innovation Center."

Oliver, University Professor and Larry and Pam Pithan Professor of Mechanical Engineering, has directed the Virtual Reality Applications Center since 2004, and the university's interdisciplinary graduate program in human computer interaction since 2003. Both programs combine faculty expertise in diverse areas such as psychology, biology, graphic design, architecture, English, computer science, music, engineering and education. Oliver also teaches a course on technology and global culture with the department of world languages and cultures.

"I look forward to the opportunity to lead this facility and the investment it represents in Iowa State's future," Oliver said. "The Student Innovation Center will foster innovation in teaching and learning, research and economic development, as well as outreach and community engagement."

Oliver earned a bachelor's degree from Union College, Schenectady, New York, and master's and doctoral degrees from Michigan State University, East Lansing, all in mechanical engineering. He held faculty roles at Michigan State and the State University of New York, Buffalo, before joining the Iowa State faculty in 1991.

In addition to his Iowa State responsibilities, Oliver cofounded BodyViz, a technology startup focused on low-cost, easy-to-use medical visualization with sales in the medical, education, veterinary and legal markets; and formerly headed product development for Engineering Animation Inc.

The Student Innovation Center, under construction on the west side of campus, will be completed in 2020. Oliver will provide overall leadership, vision and direction for the facility -- including planning and implementing academic programming -- and foster engagement among students and external stakeholders.

Contributed by the Office of the Senior Vice President and Provost

# Iowa State's ME grad program climbs 11 points in 2020 rankings

Iowa State University's graduate program in mechanical engineering climbed 11 points from last year, according to the latest rankings from U.S. News and World Report.

The 2020 Best Graduate School Rankings ranked Iowa State's ME graduate program 37th, tied with the University of California-Davis, University of California-Irvine, the University of Notre Dame and North Carolina State University.

One hundred eighty-one ME programs were surveyed in the 2020 rankings which were based solely on peer assessments by ME department heads across the nation.

"It is gratifying to see that the substantial investments which we have made into our program are recognized and appreciated by our peers," said Caroline Hayes, Chair of Mechanical Engineering at Iowa State and Lynn Gleason Professor of Interdisciplinary Engineering. "We have invested in many excellent faculty, and cutting-edge laboratory facilities so as to provide our students with the best possible education and research experiences. Anything that benefits our students is worth the hard work."

Iowa State's overall College of Engineering rank climbed from tied for 43rd in 2019 to tied for 41st in 2020.

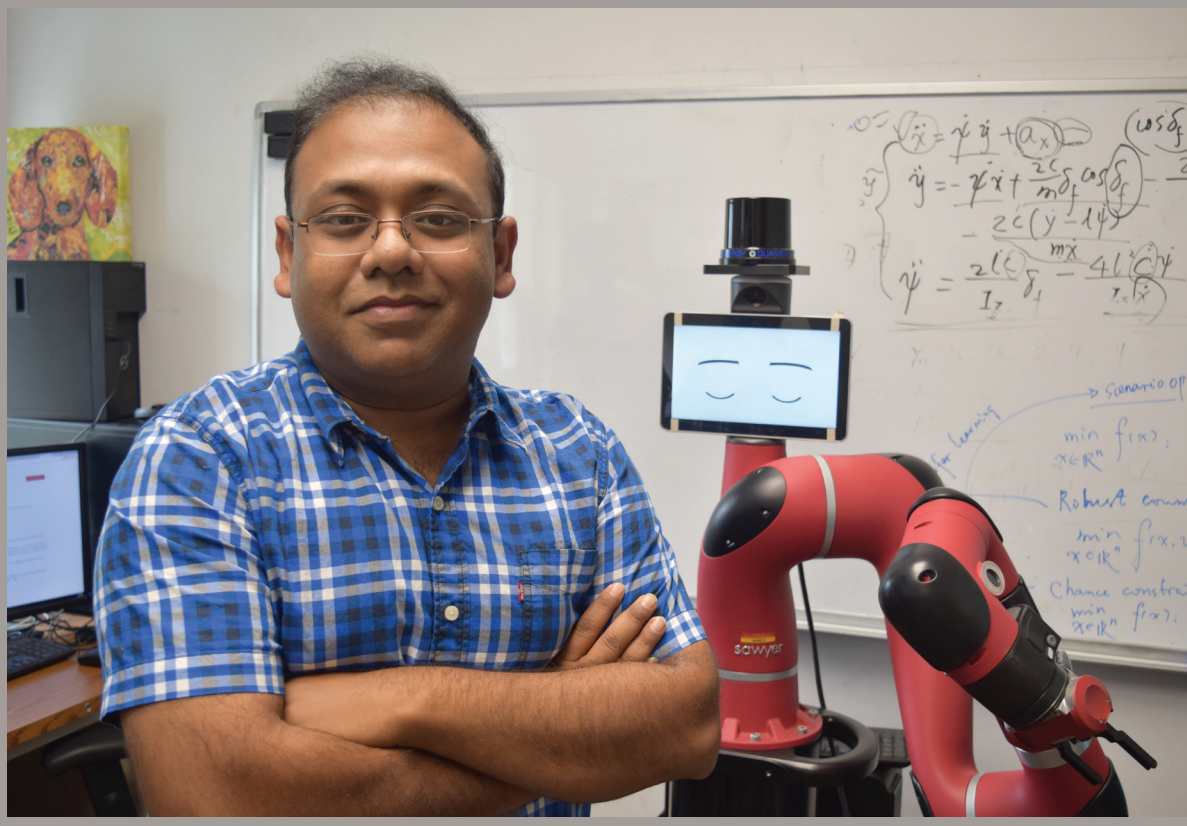
*ME Associate Professor Nicole N. Hashemi (right) supervises a student using a using an integrated microfluidic system for cell culture and characterization.*

# Sarkar wins 2019 NSF CAREER Award

Three Iowa State University Cyclone Engineers have been selected for 2019 National Science Foundation's Faculty Early Career Development Program (CAREER), and ME assistant professor Soumik Sarkar is among this year's recipients.

CAREER awards are the NSF's most prestigious awards given to early-career faculty. The program aims to build a firm foundation for leadership in integrating research and education.

Sarkar's award will support his current research project entitled "Robustifying Machine Learning for Cyber-Physical Systems." For this he will build computational techniques to detect and mitigate risk in using machine learning and artificial intelligence for cyber-physical systems, such as self-driving cars. His framework and algorithms will help deep learning models better address "edge cases" where the real-life situation isn't represented well in the training data set – and to fend off adversarial attacks on machine learning based decision systems. Algorithms will be validated on experimental self-driving cars and robotics test beds.



*ME Assistant Professor Soumik Sarkar poses with a Sawyer Robotic platform in his Self-aware Complex Systems Lab inside the Laboratory of Mechanics building on the Iowa State campus.*

Sarkar will also develop new curriculum, research experiences, and other outreach activities for high school students and teachers in the critical interdisciplinary area of system theory and data science.

Contributed by Breehan Gerleman/Engineering College Relations

# ME professor leads work to study caffeine transport from mother to fetus

Engineers have used microfluidic technology to create a "placenta-on-a-chip" that models how compounds can be passed from a mother to a fetus.

"I am interested in microfluidics and I've been excited about using the technology to understand what happens in the cellular environment and within the body," said Nicole Hashemi, an associate professor of mechanical engineering at Iowa State University and the leader of this project. "We looked at different organs and decided on developing a placenta model because there aren't many studies on this important temporary organ."

The placenta develops inside a woman's uterus during pregnancy. Through the umbilical cord, it provides oxygen and nutrients to the fetus and removes waste from the fetal bloodstream.

Animal models of the placenta don't translate well to human health, Hashemi said. And because of the temporary nature of the placenta, there haven't been a lot of human studies. Those that have been done have shown inconsistent results.

The engineers' placenta model is described in a paper just released online by the scientific journal Global Challenges published by John Wiley & Sons Inc. Hashemi is the corresponding author. Co-authors are Rajeendra Pemathilaka and Saurabh Aykar, Iowa State graduate students in mechanical engineering; Jeremy Caplin, a former Iowa State graduate student now at Georgia Tech; and Reza Montazami, an Iowa State associate professor of mechanical engineering.

The paper will also be featured on the cover of a print edition of the journal.

A grant from the Office of Naval Research and a Young Researcher Prize to Caplin from the Lush company supported development of the placenta model.

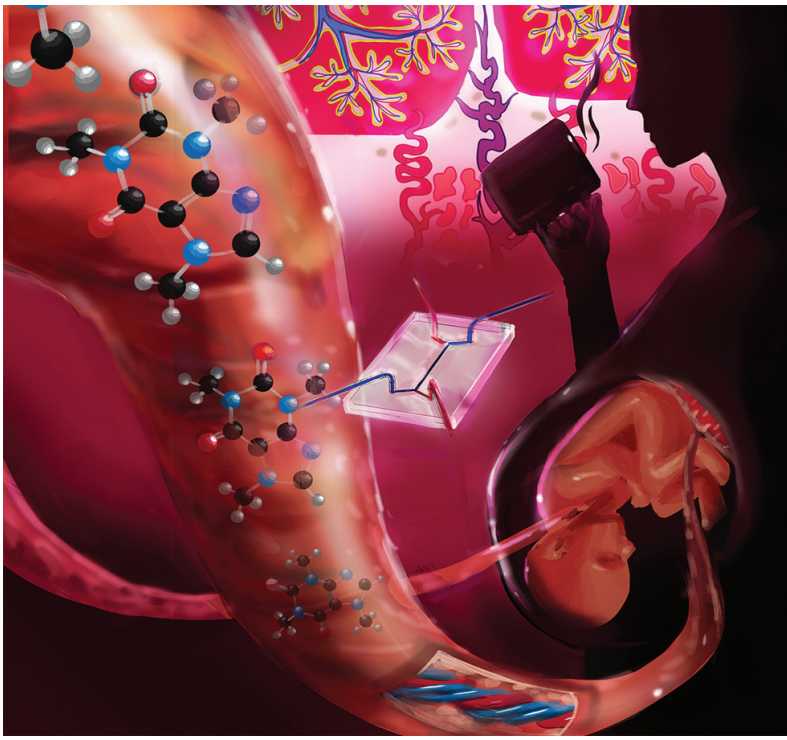
Hashemi said it took four years of challenging work to come up with a working model. First, the engineers had to design the microfluidics – they ultimately decided on a model featuring two microchannels just 100 millionths of a meter high and 400 millionths of a meter wide. Then they had to figure out how to effectively grow cells on either side of a porous, biocompatible membrane that would separate the two channels and represent the placental barrier. They also had to identify the right compound to test using the model so they could understand transport from the maternal side to the fetal side.

Hashemi

The engineers decided on caffeine for their initial study.

It's a relevant medical question: Because of unknown effects from maternal caffeine intake on the fetus, health authorities such as the World Health Organization have recommended restricting caffeine intake during pregnancy.

It's also an important question to Hashemi: "I drink a lot of tea," she explained, a cup of tea sitting on her office desk. "This is personal to me."



*This illustration shows how Nicole Hashemi and a team of Iowa State researchers are using a "placenta-on-a-chip" to study the transport of caffeine molecules from a mother to a fetus. Larger image. Illustration by Lasitha Kurukula Arachchi for the Hashemi Lab.*

And does caffeine from mother's tea or coffee make it into baby's bloodstream? Tests with the model say some of it does.

The engineers introduced a caffeine concentration of 0.25 milligrams per milliliter – a concentration deemed safe by U.S. Food and Drug Administration guidelines – to the maternal side of the model for an hour and then monitored changes over 7.5 hours, according to the paper. At six and a half hours, the maternal side reached a steady caffeine concentration of 0.1513 milligrams per milliliter and the fetal side reached a steady concentration of 0.0033 after five hours.

Now that they've demonstrated their technology, Hashemi said the model is being used with research partners at Ohio State University's College of Medicine to study how different drugs move through the placental barrier.

There has also been interest in studying how environmental toxins are transported from mother to fetus, she said. Future studies could include personalizing the technology – actually tuning the model with cells from a mother or fetus to help prescribe medicines or dosages. And maybe one day researchers could study the effects of placental transport of chemicals and compounds on individual cells.

"We are trying to model the real placenta," Hashemi said. "Now that we have this placenta-on-a-chip technology in place, we can collaborate with researchers working on all kinds of projects."

Contributed by Mike Krapfl/ISU News Service

# ME grad student receives industry award

A mechanical engineering graduate student has been recognized by an international optical component manufacturer for his research on microplastic contamination in water.

**LoCurto**

Anthony LoCurto, a Ph.D. candidate in ME, is a recipient of Edmund Optics' (EO) 2018 Education Award. The "award is given in recognition of outstanding undergraduate and graduate optics programs in science, technology, engineering, and mathematics at nonprofit colleges and universities worldwide." The EO Educational Award committee narrowed the hundreds of applicants down to 20 finalists across the globe.

LoCurto won the bronze award in the Americas region. He will receive $5000 in EO products for "the development of a fluorescence microscope setup to detect microplastic levels for different water samples." This research aims to study issues caused by microplastic contamination in water which if left untreated can have detrimental effects on human health and the environment.

"Most of my work deals with laser diagnostics in combustion environments, so measuring microplastics in water is a new area for me," said LoCurto. "I hope to be able to quantify the microplastic levels in water sources from around the nation so that the public can get a better understanding of the state of our infrastructure. Generally my work is tailored to defense and transportation; it is nice to be able to impact the more general public with a project like this."

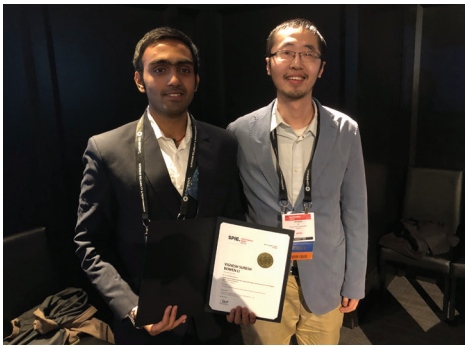
LoCurto works in the lab of ME Assistant Professor James Michael and plans to complete his degree in the spring of 2022.

# ME grad student wins award at SPIE Photonics West Conference

A mechanical engineering graduate student was recognized at one of the largest conferences for optics and photonics for his research in the field.

Vignesh Suresh, a Ph.D. student in mechanical engineering, won the "Best Student Paper Award" in the OPTO (Optoelectronics, Photonic Materials and Devices) category at the SPIE Photonics West 2019 Conference in San Francisco in February. The paper is entitled "High-speed high dynamic range 3D shape measurement with digital micro-mirror device."

"In the optics community, one of the most challenging issues is to perform dimensional metrology for objects with highly reflective surfaces such as metals. It becomes even more complicated when the object is moving at high speeds. This paper proposed an innovative solution to overcome the two issues simultaneously," said Vignesh. "I was so happy on receiving this award. I am glad that I got recognition for this work at one of the largest conferences organized by the optics community."



*Vignesh Suresh (left), a Ph.D. student in mechanical engineering, poses with his dissertation adviser, Beiwen Li, an assistant professor of mechanical engineering, after winning the "Best Student Paper Award" at the SPIE Photonics West 2019 Conference.*

Vignesh completed his M.S. in mechanical engineering at Iowa State last month and is now working on his Ph.D. He works in ME Assistant Professor Beiwen Li's Analytical 3D Optical Sensing Laboratory (3DAOS), which focuses on superfast (kHz) 3D imaging, multi-scale 3D optical metrology and machine vision.

"This research has enabled the measurements for highly reflective surfaces at kilohertz speeds, which is a big breakthrough in optical metrology," Li said. "This novel technology developed in research can also benefit high-speed mechanics testing for metal materials."

Vignesh tentatively plans to complete his Ph.D. in Fall 2021 and hopes to work in the field of machine vision after graduation.

## Faculty and staff honors

**Robert C. Brown, Distinguished Professor**
*ISU 35-Year Service Award*

**Jim Heise, Senior Lecturer**
*Outstanding Engineering Faculty of the Year from the Engineering Student Council*

**Greg Maxwell, Associate Professor**
*Honors Parks Award from the ISU Honors Program*

**Alyssa Mittleider, Academic Adviser**
*Outstanding Academic Adviser of the Year from the Engineering Student Council*

**Owen Kolstad, Senior Lecturer**
*Student Organization Adviser of the Year from the Engineering Student Council*

**Gloria Starns, Senior Lecturer**
*Professor of the Year from Pi Tau Sigma*

## Graduate student honors

**Spring 2019 Research Excellence Awards**
Onur Bingol,
Ridong Wang
Bowei Zhang

**Spring 2019 Teaching Excellence Awards**
Meghana Akella
Makrand Khanwale
Marilyn McNamara

**Bowei Zhang, PhD Student/Candidate**
*2019 ISU Graduate and Professional Student Senate Research Award*

## Undergraduate student honors

**Courtney Beringer,** named Outstanding Senior for Spring 2019 commencement

**Elizabeth Olsen,** named Student Community Advocate of the Year by the Engineering Student Council

**ME 324L Undergraduate Teaching Assistant CYtation Award**
Ryan Bedford
Joe Broberg
Jack Herstowski
Colin Morabito
Max Newman
Elizabeth Olson
Kaleb Troyer
Andrew Yadlosky
Nermin Zec

# ME team takes 2nd place


*Taylor Goodness (left) and Nick Muehlbauer*

A team of ME students took second place during February's Engineering Pitch Competition.

Seniors Taylor Goodness and Nick Muehlbauer won $250 for their product which aims to improve the at-home beer drinking experience.

"We are developing a system to give beer Growlers a longer shelf life as well as a way to instantly customize the temperature at which the beer is served," said Muehlbauer, a native of Woodbury, Minnesota. "The user will be able to have a variety of beers and easily switch between them. We are working to create a higher level of customizability while improving ease of use."

The ME duo took market research and competitive analysis techniques from their IE 434X Entrepreneurial Product Development Engineering class to develop the idea. They also applied concepts that they learned in the ME curriculum to the project.

"We have applied knowledge from thermodynamics and heat transfer classes to help identify possibilities for refrigeration methods that we can apply to our system," said Goodness, a native of Lakeville, Minnesota. "We have also applied design experience from Senior Capstone (M E 415) and Sophomore Design (M E 270) to develop the physical prototype. Finally, we used skills from Mechanical Component Design (M E 325) to aide in the manufacturing of this prototype."

There were 17 entries in this year's competition.

# Bai partners with industry to develop sustainable, low-cost carbon fiber

**Bai**

A mechanical engineering professor is collaborating with industry on a research project that aims to develop the technology to produce environmentally sustainable, low-cost carbon fiber using lignin.

Xianglan Bai, an assistant professor of mechanical engineering, is working with Attis Industries, a diversified innovation and technology holding company based in Milton, Georgia, on a project with applications ranging from agriculture to wind energy. The research team – which consists of scientists from Attis as well as Dr. Wandga Qu, a postdoc in Bai's lab and Yixin Luo, a Ph.D. student in Bai's lab – will use a high-purity lignin stream produced in Attis biorefineries using their proprietary process to develop a new carbon fiber material.

"In our preliminary study, we found that their lignin, which is derived from softwood biomass, is quite unique compared to other conventional lignin in terms of its melt-spinnability, thermal and rheological properties," said Bai. "Based on initial mechanical property testing of the resulting carbon fiber, both Attis and we agreed that it is worthwhile to further evaluate their lignin-based carbon fiber."

The research team will apply multiple strategies to refine or modify Attis lignin and further fabricate carbon fiber out of it. Lignin can be a particularly difficult feedstock with which to work because it does not have well-defined molecular structures of the polymers that are used for fiber processing.

This project builds upon past research Bai has conducted in developing lignin-based carbon fiber. The National Science Foundation, the United States Department of Agriculture and Iowa State University College of Engineering's Exploratory Research Project have supported these past projects. Through this past research, Bai and her team found ways to not only fabricate carbon fiber but also identify requirements for preparing ideal precursor out of lignin. Bai said the current project with Attis would shed new light in the field since the lignin produced by Attis is composed of unique properties not studied in her past research.

This research will involve a broad range of science and engineering aspects from feedstock pretreatments to fiber fabrication to product characterizations.

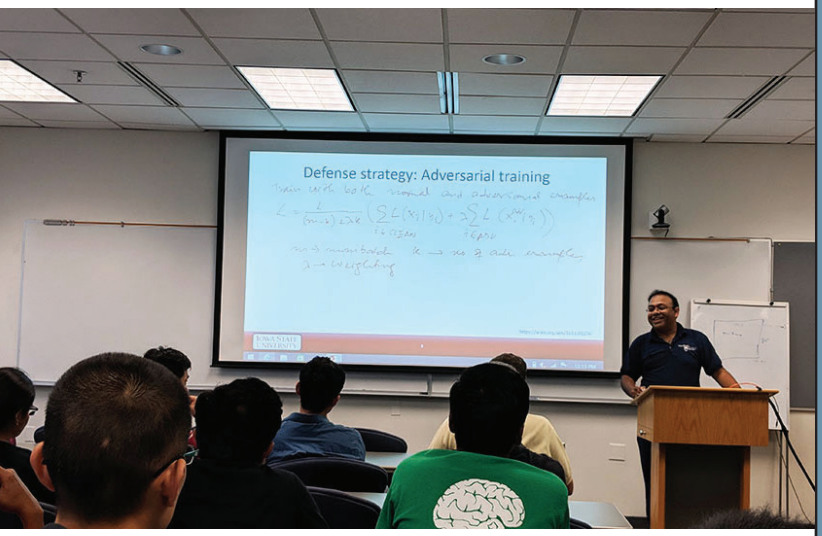
"In order to reach our research goal we have to understand different aspects of the properties that directly or indirectly affect the performances of our feedstock and fiber products, such as their thermal, chemical, rheological and mechanical properties. Elucidating interrelationships among the properties is also essential," Bai said.

This research can have applications here in Iowa, particularly in the agriculture and biofuel sectors. Since lignin is a byproduct of biofuel refinement, it offers a way to utilize a material that would otherwise be burned in boilers. The carbon fiber developed can also apply to manufacturing industries in Iowa from the production of agricultural equipment and other heavy machinery to wind turbines.

Bai said this public-private partnership between Iowa State University and Attis provides opportunities that would not be available if she was just working with other researchers on campus. The study heavily focuses on developing a transformative technology that will result in a marketable product.

"As an engineer, it is very exciting when technologies developed in university labs can be applied in industries to benefit the society," said Bai. "The company will be adjusting their process of lignin isolation in-house based on the feedback we are going to provide. Such a collaborative work will improve the success rate of the work because we can start with the feedstock that is better suited for carbon fiber processing."

# Emerging edge: Targeted lecture series encourages collaboration, innovation




*Soumik Sarkar, assistant professor of mechanical engineering, leads a talk on machine learning in a new College of Engineering faculty-led lecture series. The lectures are designed to support continuous learning and collaboration in new, fast-moving areas of research.*

Cyclone Engineers are staying at the forefront of emerging, cross-disciplinary areas of research with the help of a new faculty-led lecture series.

Launched last fall, Iowa State engineering faculty, post docs and grad students are coming together to exchange expertise focused on fast-moving areas of engineering. The initial lecture series topic was machine learning.

"The 'short course' idea was sparked by a recent explosion in discoveries in the area of robust machine learning," said Soumik Sarkar, assistant professor of mechanical engineering, who organized the lectures with Chinmay Hegde, assistant professor of electrical and computer engineering. "There is just so much new and exciting that the best way for us to explore the topic was to divide and conquer – and come back together and learn from each other."

Different faculty lectured on different aspects of new papers in the field, drawing a large, cross-department audience.

"We thought maybe 10 people would show up, but we have more than 50 show up at each lecture," said Sarkar. "It was a great mix of people, with a lot of 'regulars' that attended all the sessions."

According to Sriram Sundararajan, associate dean for academic affairs, the lecture participants' outstanding engagement is perhaps as valuable as the content itself.

"This grassroots-driven effort is evidence of our Cyclone Engineering culture of collaboration and continuous learning," said Sriram. "New ideas and new research partnerships are sure to come from this type of exchange of ideas."

Contributed by Breehan Gerleman/ Engineering College Relations

# Wang to study film thickness with defense department grant

**Wang**

A mechanical engineering professor has received funding from the Department of Defense to study film thickness using Raman spectroscopy.

The Defense MicroElectronics Activity division of the Department of Defense awarded ME Professor Xinwei Wang a $315,000 grant to develop a new technology that can measure film thickness at the nanometer (nm) level.

"There could be a stack of films that are made of different materials, and we are targeting to measure all of them simultaneously," said Wang. "This is extremely challenging considering the extremely small thickness and the multi-film structure."

Wang and his research team will use a technique known as Raman spectroscopy to study molecular and chemical structures. Past research by Wang has used Raman spectroscopy to measure temperature and thermal conductivity and diffusivity of nm-level materials

"We have developed several completely new and advanced menologies for time-domain and frequency-domain Raman control down to the picosecond level. This project significantly extends our Raman application to new areas," he said.

Findings from this research will be used to target monitoring and control of wafer processing in sensors that are used for military applications. These findings can also be applied to non-military purposes that involve film deposition and electronics fabrication.

For this project, Wang will collaborate with Advanced Cooling Technologies, Inc., a cooling technologies design and manufacturing company based in Lancaster, Penn. Nathan Van Velson, who graded from Iowa State with his M.S. in ME and is a former student of Wang's, will serve as Advanced Cooling Technologies' lead for the project.

"Nathan has been very successful in his career. I am so glad to see our collaborations go well and are productive," Wang said.

Wang and his team completed Phase I of this project last year, and this recent grant supports Phrase II. Research on Phrase II started in October 2018 and will be funded through September 2020.

# ME students manage time with club soccer

*Two juniors in mechanical engineering, Jacob Koutas and Scott Zmuda, play soccer with the ISU Men's Soccer Club. Their time management skills lead to success both in the classroom and on the field.*

**Q:** Tell me a bit about yourself.

**Jacob Koutas:** I am from Rolling Meadows, Illinois. I chose to attend Iowa State because of its great engineering program and the beautiful campus. I decided on mechanical engineering because my brother and I are very similar and we both thought mechanical engineering was a very good fit for us.

**Scott Zmuda:** I'm from Coal Valley, Illinois. I chose to attend Iowa State because I had heard good things about its engineering department, and it was also fairly close to home. I chose mechanical engineering because I enjoy solving problems, and by some definitions that's exactly what engineering is.

**Q:** When did you first start playing soccer, and what position do you play?

**JK:** I started playing soccer in leagues when I was three, in a five-year-old division. I play CF, or center forward.

**SZ:** I first started playing soccer in 1st or 2nd grade. I currently play center mid.

**Q:** Tell me about your team's trip to Alabama.

**SZ:** The Iowa State Soccer Club went to Gulf Shores, Alabama, to play in the NIRSA national club tournament. The team played well and we were able to win against Carnegie Melon as well as Xavier. Our final match was against UCLA, and although we played a good game, we did not win.

**Q:** What was ISU's record at the end of the season?

**JK:** Our record for the regular season was 9-3 and our record with our tournaments, (Invitational, Regionals, Nationals) has us at 14-7-1.

**Q:** What are your thoughts on the season?

**JK:** I thought we became stronger as a team, and this strength carried over into our games and we finished as strong as we possibly could. The hard games we won were very rewarding, and our play showed that we were a team most people did not want to play.

**SZ:** We had a successful season in 2018. I was most impressed with our team's ability to improve as the year progressed. We had some tactical shortcoming at the beginning of the season and had some players step up by changing their role on the team. Those changes made a big difference and the team was able to end the season at nationals on a high note.

**Q:** Are you involved with any other student groups/clubs other than soccer?

**SZ:** Besides the soccer club, I am also involved in a student ministry called Salt Company.

**Q:** What advice would you offer to other students on how to effectively manage your time?

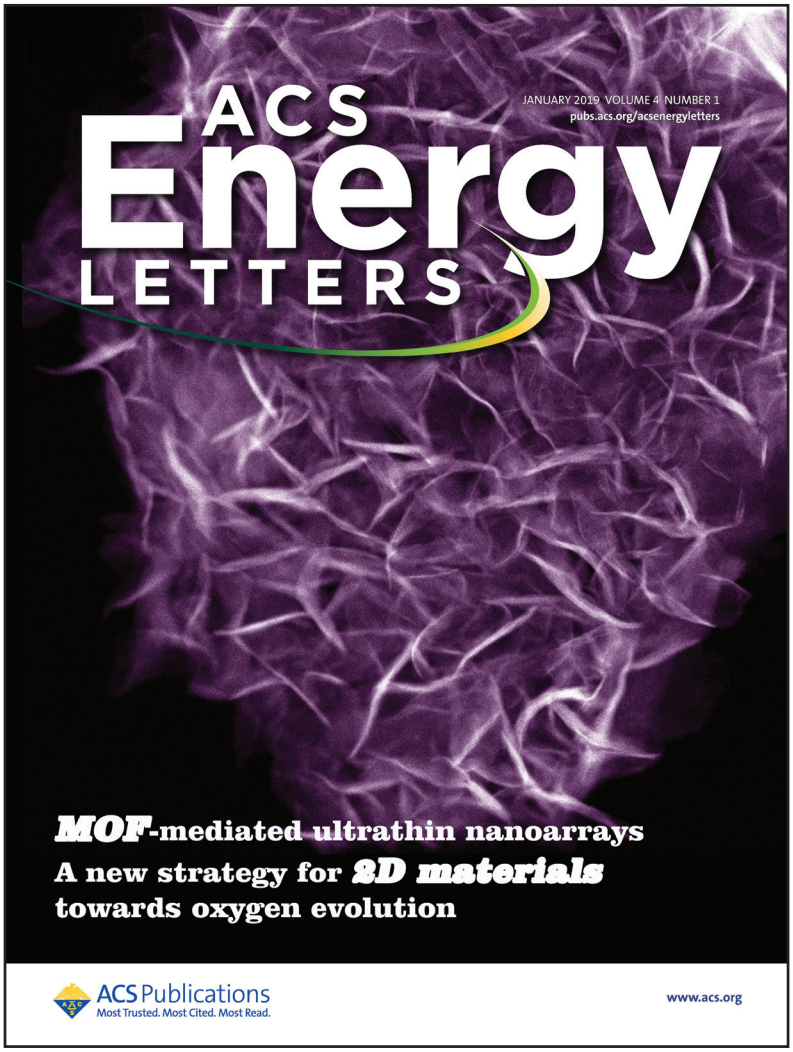
**JK:** It's important to set your schedule straight and set priorities where they need to be. I only allow myself to take 16 credits while in season to complete my degree but also to prioritize my time to soccer when needed and school when tests come around.

Contributed by Madison Davies/Engineering College Relations

# Hu develops low-cost, energy efficient method for separating hydrogen from water

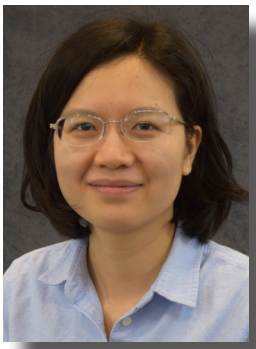
Hydrogen is a promising future fuel source for cars and this could become even more feasible because of a new, low-cost hydrogen procurement technique developed by a mechanical engineering researcher.

Shan Hu, an assistant professor of mechanical engineering, and a team of Iowa State University researchers have developed a new catalyst to drive the separation of the hydrogen and oxygen molecules in water by altering the material properties of a compound called metal organic framework. Their findings were published as the cover article for the January issue of the journal ACS Energy Letters, which was one of the journal's most-read articles for that month.




"For electrocatalyst, a catalyst that participates in electrochemical reactions, state-of-the-art research has shown that defects can drastically improve its catalytic activity. Hence, intentionally introducing defects into material structures could potentially lead to the discovery of novel catalysts with unprecedented performances," Hu said.

Hu and her research team started with the metal organic framework (MOF), a material with a structure that resembles a scaffold with organic linkers being the bars of the scaffold and metal atoms being the connection points. The researchers then developed a room-temperature etching method to dismantle the MOF by removing the linkers and at the same time inducing a hydrolysis process to re-assemble the metal atoms into metal hydroxides.


Hu

"These as-obtained metal hydroxides are defect-rich and demonstrate exceptional activity as catalysts for an oxygen evolution reaction, a key half reaction for hydrogen generation via water splitting, where two water molecules are split into two hydrogen and one oxygen molecules," Hu said.

These defect-rich metal hydroxides are difficult to obtain by conventional methods, such as hydrothermal growth and electrochemical deposition. Hu and her team's method offers a less expensive, less energy intensive alternative to these conventional approaches.

With its high energy density and CO2-emission free combustion, hydrogen has become a very promising alternative fuel, according to Hu. She cited the Toyota Mirai, the Hyundai Nexo, and the Honda Clarity as examples of hydrogen-powered cars currently on the market and said that the hydrogen procurement method that she and her team developed can lower the cost of hydrogen fuel cell vehicles and make them more market-competitive.

Other researchers involved in this project include Bowei Zhang, a Ph.D. candidate in mechanical engineering supported by the Catron Fellowship, who developed the method to synthesize the defect-rich metal hydroxide from the MOF and then discovered its exceptional activity as a catalyst. Wenyu Huang, an associate professor of chemistry at Iowa State with a research focus on MOF, and his student Zhiyuan Qi, a Ph.D. student in Chemistry, provided expertise in synthesis pathway for the end materials. Lin Zhou, an associate science at Ames Lab and an adjunct faculty member in materials science engineering, and her postdoctoral research associate Tae-Hoon Kim provided microscopic studies of the material to reveal its defect-rich structure and provide a structural explanation for the observed high activity.


Zhou

Work on this project started in spring 2018 and concluded in fall 2018. This research was partially supported by the National Science Foundation.

# What a ride: Cyclone Engineer Jim Huebener follows career path from guarding nuclear weapons to lobstering to designing bicycle baskets

Jim Huebener ('78 mech engr) finds many interests in his small community of Cape Elizabeth, Maine. In 2012, Huebener started Kettle Cove Enterprises, repurposing old lobster traps into bicycle baskets and bird feeders. An avid lobsterman and cyclist himself, Huebener used his creativity and engineering skills to bring two worlds together.

Photo courtesy of Amanda Huebner

Huebener has always kept himself busy. While attending Iowa State, Huebener involved himself in Navy ROTC, Iowa State men's hockey and jazz band while studying mechanical engineering. While at Iowa State, Huebener met his wife, Elizabeth Steffens ('78 leisure services,) while living in Towers dorms. They've been married for 39 years.

After graduation, Huebener entered the US Marine Corps as an artillery officer. Huebener deployed onboard several different ships that traveled the Pacific Ocean, the Indian Ocean and the Mediterranean Sea. During the 1980 Iran hostage crisis, his unit was stationed off the coast of Iran, waiting to land. Eventually he was stationed in Maine, where Huebener was in charge of Marines guarding nuclear weapons.

"One day I was guarding an engineer who was designing modifications to the site. I asked, 'Are you guys hiring?' I got my first job while holding a rifle on him," said Huebener.

While in Maine, Huebener realized he never wanted to leave. After his contract with the Marine Corps ended, he stayed in Maine and started his engineering career. After bouncing to different jobs every few years at the beginning, Huebener eventually became an engineer and principal at Enterprise Engineering, Inc. With offices in both Maine and Alaska, Huebener traveled the world on different projects in the petroleum and nondestructive evaluation (NDE) fields. While in Alaska, Huebener remembers working on a project on the North Slope.

"We flew into Deadhorse, Alaska on a snow-covered runway, and there was no ramp to the airplane door. You had to walk down stairs and across the tarmac to the terminal. It was so cold, they could only let five people off the airplane at a time because if they left the door open too long, the plane interior would freeze," said Huebener. "The flight attendants made sure you entered the terminal before letting the next five people off the plane."

One thing Huebener can't forget is a poster inside the airport reading "Welcome to the Food Chain."

"We traveled across the tundra in a massive snow machine with 10-foot diameter tires," said Huebener. "Try writing notes outdoors and taking dimensions in 30 degrees below 0."

After all his travels in work and the Marine Corps, Huebener estimates he's visited over 15 countries.

"I've traveled so much I don't care if I get on an airplane ever again," said Huebener.

Outside of excellent preparation in engineering, Huebener credits his Iowa State education and Marine Corps experience with public speaking, writing and creative problem-solving skills he's used to succeed.

"Engineers need to be able to solve problems and be creative. People think engineers are rigid, but you need to be creative," said Huebener.

The idea for Kettle Cove Enterprises came to Huebener while he sat in traffic. A cyclist rode by with a plastic milk crate attached to his bike. Huebener mulled over the thought and decided to try to one-up it. Using lobster traps, an accessible find in Cape Elizabeth, he built a bicycle basket that detached from the bike, but still held everything he needed in place. The success of the business sparked interest from Kevin Harrington, an original Shark off the TV show Shark Tank, and the founder of the show "As Seen on TV." While Huebener felt honored by the idea, he rejected Harrington's offer because Huebener wanted to stay small, local and at the helm of Kettle Cove Enterprises.

At 63-years-old, Huebener keeps himself busy in retirement with his time split between family, lobstering, Kettle Cove Enterprises, playing saxophone in a quartet, playing guitar/bass in a rock band and at church and on the town planning board for Cape Elizabeth.

"I can sleep when I'm dead," said Huebener. "I want to do as much as I can while I can."

Contributed by Liz Jacavino/Engineering College Relations


Photo courtesy of Amanda Huebner

# ME researchers use AI to quicken the loop of scientific discovery

In science, there is always more to be learned. Scientists are often making new discoveries. But what would it be like if the time it took to discover these things was reduced by half?

Last December, engineers at Iowa State University received an award for a proposal furthering science through artificial intelligence (AI) granted from the Defense Advanced Research Projects Agency (DARPA), in the category of Artificial Intelligence Exploration (AIE).

Ganapathysubramanian

The goal of the DARPA project, led by Mechanical Engineering Assistant Professor Soumik Sarkar and Professor Baskar Ganapathysubramanian as well as the Electrical and Computer Engineering Professor Chinmay Hegde, is "to get AI to the level where it can enable humans to do research."

In the project, the team "will develop a new machine learning framework called Physics-Aware Learning for Microstructure Design (PALM)." The team specifically created the proposal for an application enabling the creation of new materials, like silicone or rubber, where the microscopic structure (or microstructure) plays an important part.

"We are trying to leverage advances in AI to discover new materials," Hegde said. "That is the motivation behind our project."

Sarkar

Their project will potentially enable the next wave of AI technologies.

"One of the key goals in engineering is to design systems (in this case materials) that achieve a desired property," Ganapathysubramanian and Sarkar said. "In this project, we integrate classical engineering approaches (i.e., physics models) with sophisticated concepts in machine learning to transform and accelerate such design exploration process."

Hegde explained that the process humans go through now when completing scientific research is similar to the way their AI will further scientific discoveries specifically related to materials.

"The idea that we are pursuing is to encode into AI the same principles that you would teach to a human scientist. AI would be able to learn and apply laws into the discovery process," Hegde said. "The AI will be able to tell the human scientist what kinds of knobs or experience will be need to be changed, therefore accelerating the process of scientific discovery."

This research project may not stretch far beyond the walls of the lab yet, but in the near future it could easily impact important aspects of the world, such as the environment and energy.

"The need for materials with optimized properties is universal," Sarkar said. "Specifically, our PALM project seeks to improve electronic properties of materials with long-term implications for the energy security of our nation, primarily in the area of renewable energy generation."

While the three engineers have been working together a lot on the research proposal, graduate students and postdocs have played a large role, Ganapathysubramanian and Sakar said.

"We have a very strong team of graduate students and postdocs involved in this project who are gaining multidisciplinary education and research experience crucial for the next generation workforce," Ganapathysubramanian and Sakar said.

The first phase of this project revolves around demonstrating proof-of-concept of the idea, which is in effect now. Once phase one is complete, the team plans to begin applying the research on a greater scale.

Discovering new laws, substances or methods in science is a lot of trial and error. But with AI, the errors could be made significantly less often.

"When you come up with new materials, you go to the lab, synthesize a material and test its properties and then make it stronger if it is too weak, for example. The experiment could work, or you could have to go tweak it again," Hegde said. "There is a scientific loop of discovery. The goal is to accelerate this loop, which we believe will be done by introducing AI. According to our proposal, AI will be matured to the level that it can enable humans to do better research."

Contributed by Sarah Hayes/ECpE

# ME alums share advice for success

## Q&A with Megan O'Leary ('99 BSME, '00 MSME)

*Photo courtesy of Megan O'Leary, far right.*

**Why did you choose Iowa State?**

My mom is a fellow Iowa State graduate ('68), and I fell in love with the beautiful buildings and manicured lawns on campus visit during a family trip when I was 14. I was intrigued by engineering, and I knew Iowa State had a fantastic engineering program, so it sounded like a great fit.

**How did you get involved on campus?**

As an undergraduate, I was a member of Society of Women Engineers, the Varsity Women's Soccer Team, and Alpha Phi Sorority.

**What advice do you have for current Iowa State mechanical engineering students?**

Ask a lot of questions! When I was a student, I was intimidated to admit if I didn't inherently know something, but now I realize I'm not supposed to know everything. Learning and figuring out new things is part of the fun! If someone is unable to effectively explain a new concept to you, it is most likely an indication that they don't understand the concept well themselves and not a sign that you cannot understand it.

**What do you do now?**

I work in the trial services division of FTI Consulting in Chicago, focusing on the creation of presentations for litigation disputes. Every project is an opportunity to problem solve and design a way to present complex issues, which aligns well with my engineering background. I'm a big fan of the Cubs and of traveling, especially to cheer on my beloved Cyclones in football and basketball.

Contributed by Madison Davies/ Engineering College Relations

## Q&A with Zack Schaaf ('11 BSME)

**Why did you choose Iowa State?**

I considered some schools out of the state, but for mechanical engineering, I knew Iowa State would be the perfect fit! Both my sister and brother graduated from Iowa State, so Iowa State is the family way!

**How did you get involved on campus?**

It's hard not to at Iowa State! I worked a summer for the College of Engineering, working with the camps for kids. I also joined Sigma Phi Epsilon and became very involved in the Greek community. I was also involved with the Blood Drive Committee and the Homecoming Central Committee.

**What advice do you have for current Iowa State mechanical engineering students?**

Study abroad: It's hard to find another chance after college to travel for several months, and there's no other experience like it. Do a co-op: Recruiters will look for this on your resume, and it will help you find out what you want (or don't want) to do. Above all, make sure you balance your studies with your out-of-the-classroom Iowa State experience.

**Schaaf**

**What do you do now?**

I work as a Sales Engineer for Schneider Electric, Global Leader in Energy Management in Minneapolis, Minnesota. I work with the contractors who install our equipment, and my first major project was US Bank Stadium, where the Minnesota Vikings play. I am currently working on the new soccer stadium, Allianz Field, for the Minnesota United team. In my spare time, I stay active and manage an adult kickball and dodgeball league that I first joined with a group of Iowa State alumni. I'm still a huge Iowa State football and basketball fan, it's a great chance to stay in touch with my friends and family that went to Iowa State!

Contributed by Madison Davies/ Engineering College Relations

Do you have story ideas for the next magazine?

*Email mecommunications@iastate.edu*

# Alum Sam Simons' journey to the automotive industry

Simons

Hands-on experience has been the key to Sam Simons' ('18 mech engr) success in the automotive industry. As a student at Iowa State, he studied abroad in Italy, did an internship at Nexteer and a co-op at BMW – turned into a full-time position with the automaker.

"I always had a passion for automobiles," said Simons. When Simons first came to Iowa State his dream job was to work in the automotive industry.

During his sophomore year, Simons studied abroad in Turin, Italy.

"One of the biggest lessons I took away from Italy, was how to handle myself being thrown into a new environment. I was the first student from Iowa State to attend the university, Politecnico di Torino. This entire experience gave me the upper hand in job searching because I truly understood the idea of being thrown into a complete new environment and still succeeding," said Simons.

Simons started his internship with Nexteer during the summer of 2016. He was in a development role supporting the future production of a column power steering unit. After his internship, Simons took a co-op with BMW. At BMW Manufacturing, he was supporting the product integration team. This team was responsible for the integration of the next generation vehicles into the plant.

"This was one of the most interesting work experience I had as a student. The job was extremely hands on and it was my dream job," said Simons.

Simons currently works at Mercedes Benz U.S. International in Vance, Alabama, as an interior specialist. Most of what Simons does on a daily basis, is very similar to his co-op, however, now he is a full-time engineer.

"I see an issue all the way through – from the finding of the issue, to the implementation of the short-term counter measure, to the root cause analysis study, and finally to the implementation of the long-term solution. I am responsible for the trunk compartment, carpets and sound dampening parts on all the GLE, GLS, GLE Coupe and all north American C class models," said Simons.

Simons said, "I don't think I would have my dream job had I not studied engineering at Iowa State. It all started from my first internship, then I only kept moving up. With the connections Iowa State had, I was able to get noticed by BMW Manufacturing for a co-op, then because of that co-op, I was able to get a full-time position at Mercedes Benz. It's all the team work and practical skills I learned at Iowa State, that have been the key to my success today."

Contributed by Olivia Benjamin/Engineering College Relations

# Student wins ISU Student Employee of the Year award

A mechanical engineering student has been recognized with a university-wide award for his contributions as a student employee.

Thomas Polzin, a senior in ME, received the 2019 Student Employee of the Year award during a ceremony on March 5 in the Memorial Union's Sun Room. In addition to the award certificate, Polzin also received a class ring as well as a pen and keychain set.

*Thomas Polzin, a senior in mechanical engineering, poses with his 2019 Student Employee of the Year award following a ceremony on March 5, 2019 in the Memorial Union Sun Room. Polzin is flanked by ME Academic Advisers Tessa Brow (left) and Aliza MacKenzie*

"I was excited when it was announced that I won the award. I am glad to have been able to give back to something that means so much to me," Polzin said.

As a student, Polzin served three years as a Peer Mentor for the Mechanical Engineering Learning Teams (MELT), including three semesters as Head Peer Mentor. During his time with MELT, he has worked with hundreds of first-year engineering students doing everything from planning events to assisting with the college transition to helping with classwork.

"Being a Peer Mentor has helped me build leadership, communication, and public speaking skills," said Polzin. "I had the opportunity to interact professionally with peers and students and I hope to use these experiences to guide me through starting my engineering career in industry."

In addition to his work with MELT, he's also been involved with Iowa State's Collegiate Wind Competition Team serving as the Turbine Team Lead, and also participated in a study abroad program in Valencia, Spain. The Mahtomedi, Minn. native also completed internships with Andersen Corporation and Viking Automatic Sprinkler Company. He will complete his B.S. in ME in May and will then work as an Associate Engineer for Andersen in Bayport, Minn.

"The ME curriculum gave me a lot of knowledge, but more importantly, it taught me how to be a problem solver. I may never use some of the material that I learned, but solving problems over the years on homework, labs, and exams, has helped me develop the skills that I will need to be a successful engineer at Andersen," Polzin said.

# ME's Judy Vance calls it a career after four decades

Judy Vance, professor of mechanical engineering, Joseph C. and Elizabeth A. Anderlik Professor of Engineering, and faculty fellow of the Virtual Reality Applications Center, is set to retire at the end of the semester. Vance has been an integral member of the Iowa State community since she became a student here in the fall of 1973.

*ME Professor Judy Vance (rights) works with John Kihonge, a M.S. student in ME.*

Vance left the university for a few years, then returned to earn her B.S. in mechanical engineering in 1980, her M.S. in 1987 and her Ph.D. in 1992. She began her career as a faculty member in the Freshmen Engineering Department, and became the first woman tenure-track faculty member in mechanical engineering in 1992. She was also the first woman department chair in the College of Engineering, serving from 2003 to 2006.

Vance's research, teaching, and service efforts have resulted in numerous publications and awards, including, but not limited to, the Design Automation Award, the National Science Foundation Director's Award for Collaborative Integration, and the College of Engineering Superior Teaching Award.

She has held leadership positions in the Department of Mechanical Engineering, NSF Engineering Directorate Advisory Committee, the American Society of Mechanical Engineers, the Society of Women Engineers and the Women in Engineering Leadership Institute.

When asked about changes she has seen on campus while she has been here, Vance mentioned the facility improvements and additions on campus, including Howe Hall, Hoover Hall, the Biorenewables Research Laboratory, Coover Hall, Sweeney Hall, Marston Hall, and many others.

"We have been fortunate to have leadership who understand the need for excellent facilities," Vance said.

Vance also talked about the modern use of technology, both for research and teaching purposes."I was on the college committee in the mid-80s that explored the move from mainframe computing to networked workstations," Vance said.

She is amazed at the progress in technology and has not forgotten the magnitude of its importance on campus.

"The broad and wide ranging access to information that students and faculty take for granted now has greatly improved our ability to perform research and impact student learning."

Vance said she will miss the excitement of her job the most.

"Iowa State is a unique place where life-long learning is built into the DNA of the workplace," Vance said. "I'll miss working with wonderful colleagues and extremely bright students who are growing and exploring their life choices."

Contributed by Madison Davies/Engineering College Relations

# New ME scholarship named for longtime faculty member

The Judith M. Vance Scholarship was established during the spring 2019 semester to honor ME alum and longtime faculty member Judy M. Vance. She holds a B.S., M.S., and Ph.D. all in mechanical engineering from Iowa State University. Vance, who is currently the Joseph C. and Elizabeth A. Anderlik Professor of Engineering and a Faculty Fellow of ISU's Virtual Reality Applications Center, joined Iowa State's engineering faculty in 1984.

Vance, a native of Fort Dodge, was a pioneer in her field in many ways. She was the first woman to achieve tenure in the department and the first woman at Iowa State to chair an engineering department. Throughout her career, Vance has been instrumental in recruiting and supporting female students and faculty in ME.

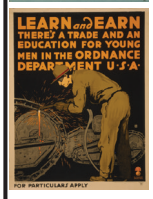
"I'm very proud and honored to have this scholarship in my name," said Vance. "I remember receiving various scholarships during my undergraduate studies and how important they were to funding my education. I'll always be thankful to the companies that established those scholarships for the help when I needed it."

Through her research, Vance has contributed greatly to the field of virtual reality (VR), particularly with a focus on using VR to improve product design and manufacturing. Outside of her accomplishments on campus, Vance has served in various roles for the National Science Foundation and the American Society of Mechanical Engineers (ASME) where she is a Fellow. She holds an honorary degree from Heriot-Watt University in Scotland.

During her career, Vance has advised nearly 50 graduate students and has served as a mentor for countless more undergraduates. Vance's 35 year career at ISU will conclude when she retires at the end of the 2018-19 school year.

"Students are the heart of the university. I've thoroughly enjoyed watching each student explore the potential of mechanical engineering as a career and I'm very honored to have this scholarship to support students in their educational efforts."

# New book celebrates 150 years of Mechanical Engineering at Iowa State

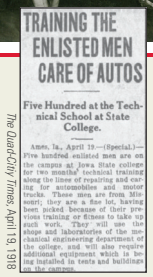


The engineering campus, circa 1919.


The Des Moines Register
EDGAR W. STANTON, AMES DEAN, DIES
The Des Moines Register, Sept. 13, 1920


A scene from a class focused on the care and repair of automobiles, around 1920.

Madison Case Settled
Proprietor of New London Pays Local Pulmber $100.
W. G. Madison, local plumber, claiming that he had been damaged in the amount of $250 thru humiliation, mental suffering, and exposure to public contempt and ridicule, because he had been denied service at the New London restaurant here, brought an action in district court to recover.
Ames Daily Tribune, Feb. 24, 1922


TRAINING THE ENLISTED MEN CARE OF AUTOS
Five Hundred at the Technical School at State College.
Ames, Ia., April 19.—(Special.)—Five hundred enlisted men are on the campus at Iowa State college for two months' technical training along the lines of repairing and caring for automobiles and motor trucks. These men are from Montezuma; they are a fine lot, having been picked because of their previous training or fitness to take up such work. They will use the shops and laboratories of the mechanical engineering department of the college, and will also require additional equipment which is being installed in tents and buildings on the campus.
The Quad-City Times, April 19, 1918

### April 1918
The training program begins for military auto mechanics, blacksmiths, and machinists as 500 soldiers come to campus. Though completely separate from the college's academic program, the training is led by ME Professor Warren Meeker. During World War I "[t]he work of every department was reorganized to render maximum service to the nation. Courses not directly connected with the war effort were dropped." To contribute to the war effort courses are added in radio communications, signal corps practice, telegraph and buzzer signaling, military reconnaissance, gas engines, machine shop, and more. Professor Meeker taught an eight-week course that provided roughly 500 enlisted men with "extensive training" in machine shop, auto mechanics, and repair processes. During this time ME alum Edgar Stanton was serving his fourth term as acting president (1917-18), filling in for President Raymond A. Pearson who took a leave of absence to serve in the U.S. Department of Agriculture as part of the war effort.

### 1919
Following the conclusion of World War I, ME enrollment hits 430, more than double the enrollment of the previous year.

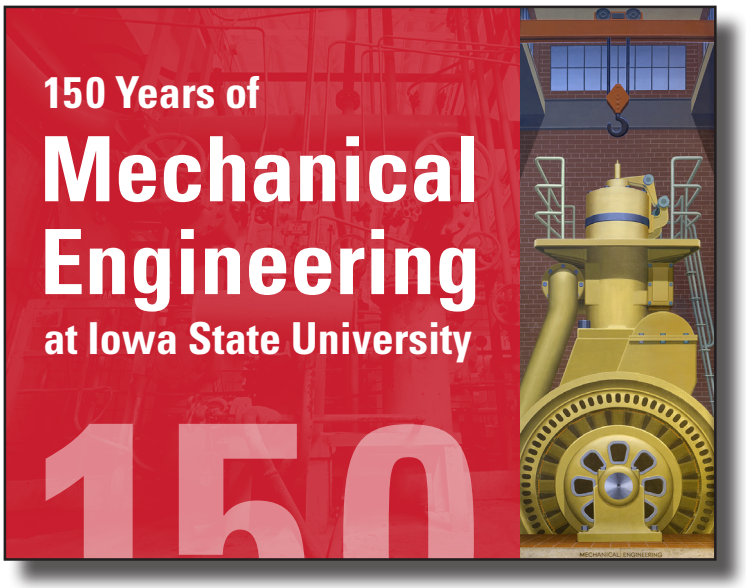
### Ca. 1920
By 1920, the engineering school at Iowa State had grown "from one small Department of Mechanic Arts with two instructors, a workshop and less than a score of students, into one of the largest engineering school west of the Mississippi River, with over one hundred instructors, eleven engineering buildings and over one thousand students of collegiate grade," according to department historical records.

### Sept. 12, 1920
Edgar Stanton, who served his alma mater for nearly half a century, dies. His death was attributed to a combination of the Spanish flu - which he contracted during the 1918 epidemic - and diabetes.

### Feb. 1, 1922
ME alum Walter Madison, the department's first African American alumnus, is denied service when he attempts to order lunch at the now-defunct New London restaurant in downtown Ames. Madison, who owned a heating and plumbing business in Ames, filed a lawsuit in Story County District Court against the restaurant's owner for the humiliation and mental anguish he experienced because of being denied service. The case was settled out of court in January 1923, and Madison was awarded $100. State law at the time forbade restaurants, hotels and other establishments open to the public to deny service based on race or color.

*Twenty-nineteen (2019) marks the 150th anniversary of the first class of students enrolling at Iowa State. In commemoration of this historic event we will publish a book about 150 years of mechanical engineering history at Iowa State. Mechanic Arts, which included mechanical engineering, was one of the original majors offered to students. The other was agriculture. Today our department has the largest undergraduate enrollment of any ME department in the nation.*

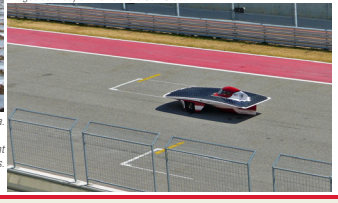
***Stay tuned for details on how your can order your copy***





***Above:*** *A shot from the 2015 trip to Nicaragua.*

***Right:*** *Team PrISUm's Phaëton races down the front straight of the Circuit of the Americas in Austin, Texas.*



*Images courtesy of the Formula Sun Grand Prix*



***Above:*** *In addition to her 2015 Big 12 Scholar-Athlete of the Year honors, Koree Willer was a three- time Academic All-Big 12 First Team selection (2014, 2015, 2016), All-Big 12 First Team selection (2015), and a Team Offensive MVP (2014).*

***Willer***


***Sundararajan***


### Summer 2014
Students in ME Senior Lecturer Gloria Starns's Human Centered Design service learning course travel to Nicaragua where they work with locals to collect information and then design products based on the needs of the individuals and the resources available. The students collaborate with the Nicaragua-based non-profit Emerging Opportunities for Sustainability which was founded by ME alum Wes Meier.

### December 2014
ME Professor Jonathan Wickert, who also serves as the ISU's Senior Vice President and Provost, becomes the first Iowa State faculty member inducted into the National Academy of Inventors.

### July 31, 2015
Iowa State's Team PrISUm car Phaëton takes first place at the 2015 Formula Sun Grand Prix in Austin, Texas. Phaëton racked up 223 laps for a total of 764 miles, well ahead of the second place team from École Polytechnique de Montréal with 192 laps for 658 miles. Phaëton also recorded the fastest lap time on the 3.426-mile, 20-turn track clocking in at 4:30.444, roughly 14 seconds ahead of the next closest team.

### December 2015
ME student Koree Willer is the first Cyclone soccer player named a Big 12 Scholar-Athlete of the Year. The forward from Ft. Collins, Colorado was recognized for her 3.90 GPA in the classroom and her six goals and three assists on the field.

### April 2016
Iowa State SAE (Society of Automotive Engineers) Baja team takes first place in endurance for the third time during a competition in Cookeville, Tenn

### July 1, 2016
ME professor Sriram Sundararajan begins his term as the College of Engineering's associate dean for academic affairs.

### Fall 2016
Iowa State University becomes the largest undergraduate ME program in the nation.

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Ames, IA 50011-2030

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