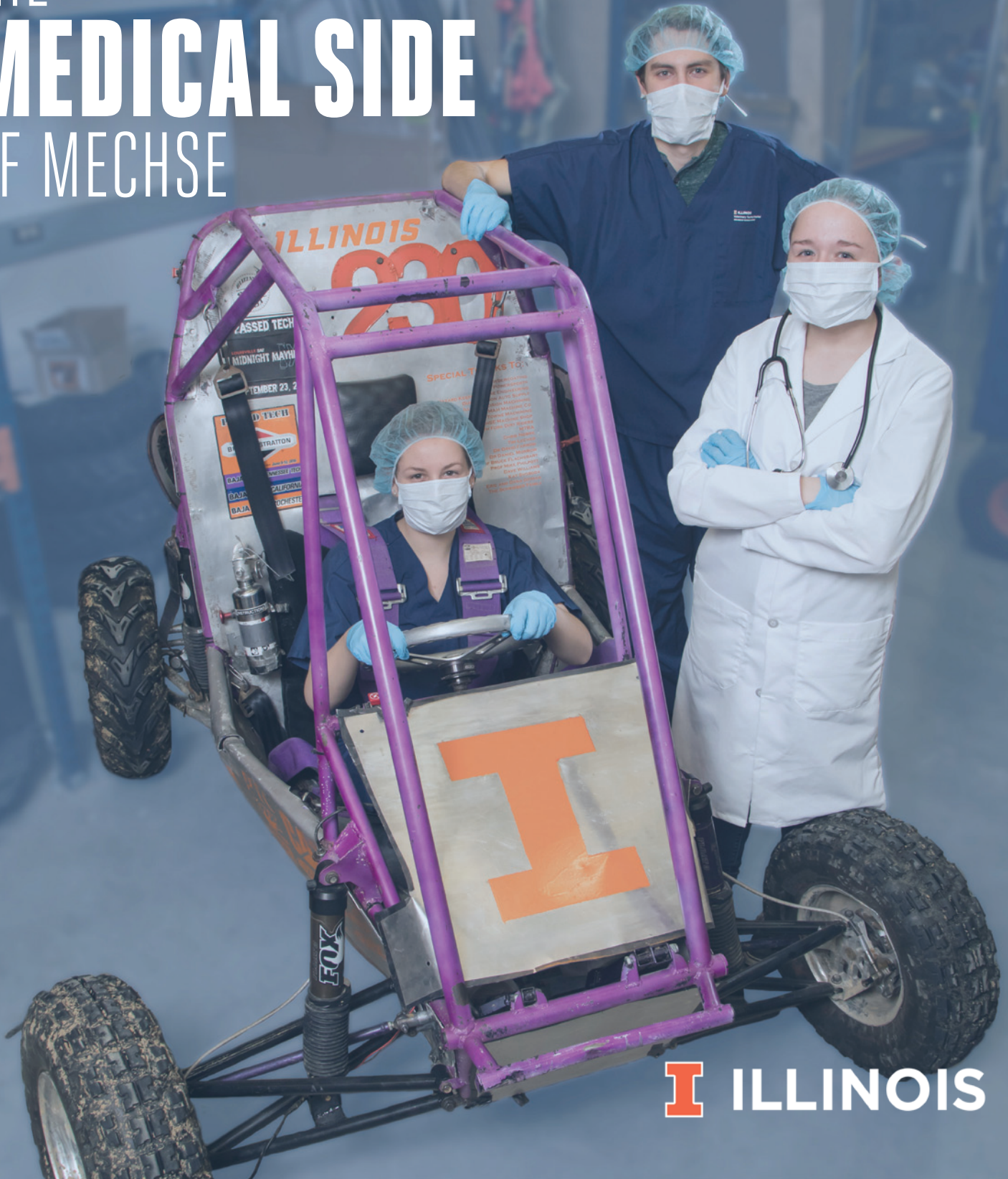


MECHANICAL SCIENCE AND ENGINEERING / SPRING 2018

MechSE



THE MEDICAL SIDE OF MECHSE



I ILLINOIS

Sargent & Lundy joins the Campaign to Transform MEB



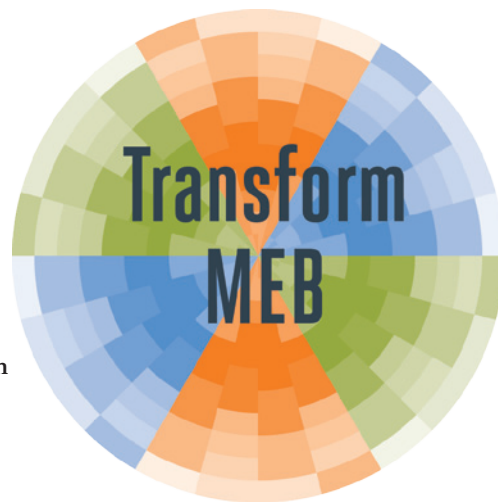
MechSE Department Head Tony Jacobi (center) visited Sargent & Lundy's Chicago headquarters in January 2018. S&L executives shown are (from left): Mark Santschi, Steve Raupp, Dave Wright, CEO Tom White, Joe DiCola, and Terry Sopkin. Not pictured: Roger Coppel, Paul Predick, and Shivan Sulkar.

Chicago-based Sargent & Lundy has employed many MechSE graduates in its long history. Nine S&L executives recently joined together to give a \$500,000 gift toward MechSE's Transform MEB campaign. This campaign will provide a new state-of-the-art facility for student education, innovation, and community.

The nine are CEO **Tom White**, **Roger Coppel**, **Joe DiCola**, **Paul Predick**, **Steve Raupp**, **Mark Santschi**, **Terry Sopkin**, **Shivan Sulkar**, and **Dave Wright**, who also serves as vice president of MechSE's alumni advisory board. They shared their thoughts on why they were inspired to give to help transform the Mechanical Engineering Building.

Joe DiCola (BSME '84): "The engineering education really prepares you for anything. Even though I'm not in engineering at this point in my career, I thought it was important to support the program."

Steve Raupp (BSCEE '78): "One of the reasons I wanted to get engaged with supporting this ME initiative is we all realize the fruit that comes out of Illinois helps this company regenerate itself continuously, and there's quite a bit of value in supporting that. The other reason I'm fond of doing this is it gives us internally an opportunity to kind of pass the torch. We're not going to be around forever."



Mark Santschi (BSME '86): "The incidence of leadership coming from our Illinois grads at Sargent & Lundy is significant. There's a sense that we need to give back to the educational infrastructure of our country, and there is none greater than the University of Illinois in terms of the relationship between us."

Terry Sopkin (BSME '82): "My father went to Illinois and played football. He started

there in '51. I ended up going and my two brothers did as well. All three boys went there. Both of my boys are at Illinois. I go there all the time. We spend a lot of time and have a lot of history. It is a great school and I'd love to see it keep going."

Tom White (BSMTL '81): "The university has the best students, and it's the best engineering school in the country, why not have the best facilities? So it was an easy decision to support the addition to the Mechanical Engineering Building."

Dave Wright (BSME '82): "It was a tremendous experience and really exposed me to the best education, the greatest amount of competition, collaboration with intelligent people, and really is the foundation from which I've been able to build a career. I'll be eternally grateful for that forever. It's hard when you're in school and when you recently graduate, to appreciate what you have from the university. As you age and get older, you begin to appreciate it more and more."

Paul Predick, not at the meeting, is a retired owner of S&L and remains an active supporter of MechSE.

Sargent & Lundy LLC

For more than 125 years, Sargent & Lundy has provided comprehensive services for complex power generation and power transmission projects. S&L has an established record of accomplishments, including the design of 958 power plants for clients in public and private sectors worldwide.

From the Department Head



Spring greetings from MechSE, where the season of rebirth and growth is in full swing. As I look around the department this spring, I am struck by new ideas and fresh initiatives that will change our world. Springtime in MechSE is inspiring!

One of our most exciting new undertakings is playfully depicted on the front cover of this magazine; it's the creation of a formalized pre-med track in MechSE. Engineering plays a powerful role in helping people live healthier, longer lives. It is only fitting that our students with strong health/bio interests be offered a direct path to medical school. Because our students are among the best and brightest in the world, having some of them lead new advances in human health should be comforting to us all.

MechSE students completing the pre-med track will be prepared for any medical school, including the new Carle Illinois College of Medicine (CICOM). Called "the world's first engineering-based college of medicine," CICOM has created teaching opportunities and research collaborations for MechSE faculty. Starting on page 12, you can read more about MechSE's health/bio research, the new college, and the new pre-med track.

As for growth, MechSE now has nearly 1,500 students, with roughly 500 graduate students and 70 faculty. The number of our students and faculty engaged in learning and discovery is the largest and most diverse in our history, with funding for our research also at an all-time high. Our growth and transformation are steered by an abiding respect for departmental traditions and a focus on scholarship. I hope all of you, our nearly 14,000 alumni, are inspired by the students and faculty of MechSE!

On a broader scale, the campus recently launched *With Illinois: The Campaign for Illinois*, its most ambitious philanthropic campaign ever. The College of Engineering set our campaign priorities as: Engineering Visionary Scholarships, tackling the toughest challenges, aggressively driving the economy, and reimagining engineering education. MechSE stands firmly with these priorities. We are making continued progress toward meeting our financial needs for the Campaign to Transform MEB, thanks to gifts like the one from our alumni at Sargent & Lundy described on the opposite page. Giving back now will have a magnified effect, because the Grainger Foundation is generously matching scholarship endowments dollar for dollar through 2019. It is impossible for me to express just how much the support of our friends and alumni means to MechSE.

I hope you enjoy this magazine and catching up on news from around MechSE.

Best regards,

Anthony Jacobi
Department Head
Richard W. Kritzer Distinguished Professor

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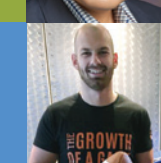
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MechSE

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ON THE COVER
MechSE undergraduate students (from left) Jaycie Ackerman, Milos Popovic, and Veronica Holloway pose with the Baja SAE car at the Engineering Student Project Lab (ESPL).



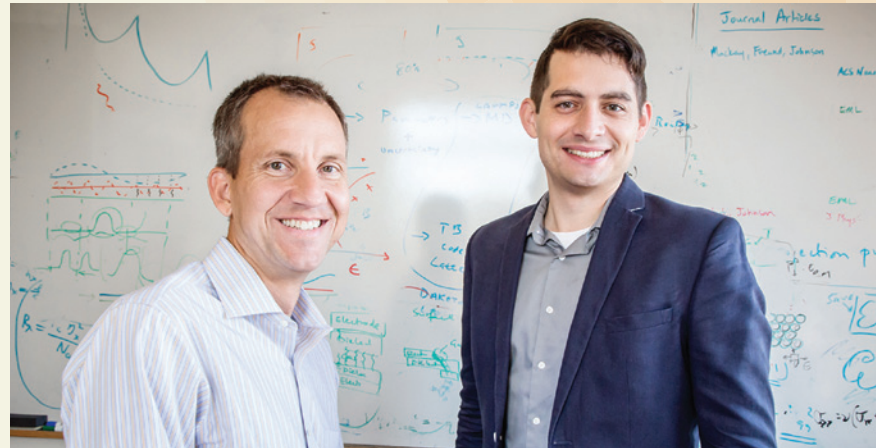
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MechSE



Basu makes Crain's 40 Under 40

Alumnus **Pat Basu** (BSME '00) has been named to the *Crain's Chicago Business* "40 Under 40" list for 2017. Basu, who went on to earn MBA and MD degrees at the University of Chicago, is a radiologist-turned-entrepreneur and co-founder of the Google-backed Doctor on Demand startup. "We do (things) in health care that take 59 steps and should take five," Basu said. "We make things so overly complex that it leads to more costs and frustrations." Now in Chicago at Optum, an arm of UnitedHealth Group and sibling to health insurance giant UnitedHealthcare, Basu is charged with financially incentivizing doctors to keep patients healthy and thus lower costs. Basu is also serving as the inaugural chair of the newly founded Illinois Alumni Association, which serves as the advisory board for the Urbana-Champaign campus as part of the larger University of Illinois Alumni Alliance, formerly the University of Illinois Alumni Association. (Photo from *Crain's Chicago Business*.)



Johnson looks to patterns to envision new engineering field

Researchers led by Professor **Harley Johnson** (shown with co-author and PhD candidate **Brian McGuigan**) have made startling discoveries involving the phenomenon that forms interference patterns on television displays when a camera focuses on a pattern like a person wearing stripes. When these "moire" patterns occur at the atomic level, arrangements of electrons are locked into place by atomic forces to form nanoscale wires capable of transmitting electricity. "The moire emerges as atoms form linear areas of high electron density," Johnson said. "The resulting lines create what is essentially an extremely thin wire." This realization opened the door to what Johnson's group refers to as moire engineering—what could lead to a new way to manufacture the smallest, lightest, and fastest electronics.



Stephani showcases work to NASA officials, lawmakers on Capitol Hill

Assistant Professor **Kelly Stephani** had the opportunity to put MechSE in the national spotlight and show off her impactful work to some of the highest officials in NASA on Capitol Hill. She attended "NASA Technology Day on the Hill," the sixth annual event in which the space agency showcases its own work as well as university-partnered projects and new technologies developed in academia and industry. Stephani presented her work directly to NASA administrators and was covered by NASA TV. "When we reenter the atmosphere, the gas and the vehicle get hot and we need to find ways to protect the vehicle," she said to *The Hill*. "We work on modeling that system, that whole process."



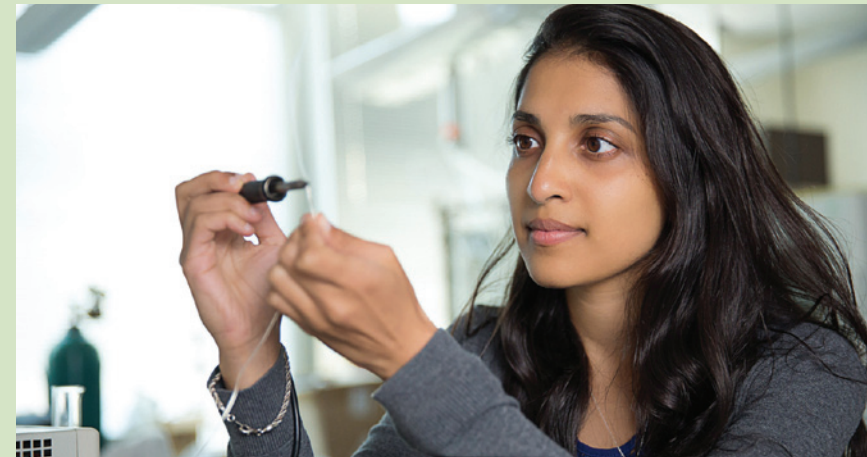
Koric research named Top Supercomputing Achievement

MechSE research associate professor **Seid Koric** won Top Supercomputing Achievement in the annual *HPCwire* Editors' Choice Awards, at the 2017 International Conference for High Performance Computing, Networking, Storage and Analysis. "High-performance computing is a multi-billion dollar global industry with a very large number of research activities and projects worldwide," Koric said. "We were particularly humbled to be chosen for the Top Supercomputing Achievement this year in a tough competition." Koric's research demonstrated for the first time that multi-frontal sparse factorization algorithm with hybrid parallelization can scale efficiently in today's large-scale computers. Koric utilizes the Blue Waters supercomputer for his work and is highly involved with the National Center for Supercomputing Applications.



LaViers' startup wins Chicago award for manufacturing innovation

AE Machines, a startup co-founded by Assistant Professor **Amy LaViers** (above, second from left), received the Product Design of the Year Award at the Fourth Revolution Awards in Chicago. The company was one of just seven leaders, companies, and industrial initiatives in the state to be honored. AE Machines is working to empower small manufacturers to program and reprogram simple automated systems in-house. The program allows users to design their own automated system by building from either the software side or the hardware side of the program. The first AE Machines product, AE Design Tool, was developed with a grant from the National Science Foundation. Illinois Governor Bruce Rauner (above, far right) was on hand to recognize the winners.



Raman named to Forbes 30 Under 30

Alumna **Ritu Raman** (MSME '13, PhDME '16) was named to Forbes' annual "30 Under 30" list recognizing young "visionaries" in a variety of categories. Raman, a postdoctoral fellow at MIT, earned a spot in the Science category. Forbes describes her work as "applying new materials and technologies, like 3D bio-printers, to build muscle-powered robots." The focus of her current research is on the design of new smart materials that dynamically respond and adapt to their environment—with the goal of more reliably delivering medication to people through a long-lasting pill device. She was also recently named a L'Oreal Women in Science Fellow. (Photo from L'Oreal.)



"We hope you will support our vision, hopes, and aspirations for the future. As we embark on this campaign, I'm excited to see what we will accomplish together."

—Chancellor Robert Jones

In October 2017, the University of Illinois kicked off its most ambitious philanthropic campaign ever—**With Illinois: The Campaign for Illinois**—to raise \$2.25 billion through 2022.

"We change lives at Illinois. We expose our students to new ideas and different cultures. We encourage them to ask difficult questions. We ask them to use their skills and talents to make a measurable impact on the world," said **Robert Jones**, Chancellor at Illinois. "Our university was founded 150 years ago with these values in mind, and today we continue to have the courage to take risks on new ideas and new endeavors. Illinois researchers are consistently doing innovative work that addresses our greatest needs, from engineering medicine to feeding the world."

So far, the College of Engineering has raised nearly \$300 million toward its \$550 million portion of the campaign goal—thanks to the help of alumni and friends like you! There are numerous ways to give. Contact us to find out how you can help support the next generation of Illini engineers.

Engineering campaign priorities



From the MechSE Advancement Office

We are happy to announce a new addition to our staff! **Kendra Wolf** joined the department's Advancement Office alongside **Betsy Rodriguez**. Previously, Kendra was a Learning Solutions Representative with Pearson Higher Education. She is a life-long Illini fan, having grown up in the Champaign-Urbana area.

Betsy and Kendra look forward to meeting more of you, our alumni and friends, in the year to come! To learn more about how you can be *With Illinois* and help MechSE contribute to building a brighter future, please contact us!



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Impact Philanthropy: Engineering Visionary Scholarships

The Engineering Visionary Scholarship (EVS) Initiative is one of the major fundraising priorities for the College of Engineering. The EVS program aims to make an Illinois education accessible to the most-deserving and highest-achieving students. And now, through the end of 2019, The Grainger Foundation is generously matching donations to College of Engineering scholarship endowments, up to \$25 million. These scholarships enable amazing students to become incredible engineers.

Meet just a few of the MechSE students whose lives have been impacted by your gifts to the EVS Fund:



CHRISTIAN WILLIAMS

"I was interested in pursuing an engineering degree because I have had a love for cars since I was a kid. After graduation, I hope to work in the automotive industry working on design safety or fuel efficiency. Thank you to the donors who made this scholarship possible because it means you believe in me and my potential to do great things in the future."



EDGAR MEJIA

"I am really grateful for my scholarship support. I can assure you that I will do my best to show my gratitude and eventually give back to the community. I know that someday I will help students like myself who do not have all the resources, but are highly motivated."



SAMANTHA MORAN

As a little girl, Samantha grew up playing doctor by treating her stuffed animal patients with make-believe machines to cure their various ailments. Later in life, she decided that going into medicine was not for her, but her fascination with medical devices and technology remained. This interest led her to pursue an education in mechanical engineering with a biomechanics focus.



ROBERT MAUGE

"My goal in life is to help others and solve some of the major problems facing our world. The generosity of this scholarship motivates me to accomplish just that. In the long run, I hope to utilize my knowledge and skills learned during my time here at Illinois to improve the world."

Paying it Forward



The gift of one MechSE alumnus, **Bill Vavrik** (BSME '57), to establish the William and Marie Vavrik MechSE Engineering Visionary Scholarship Fund, will have a direct impact on society because it enables future engineers to fuse their talent and passion with the education and skills they need to solve the world's greatest challenges. Plus, his gift has been doubled in size and impact—thanks to The Grainger Engineering Foundation Matching Challenge.

"I worked my way through college. All the money came from my own pocket, working part-time jobs and through summer," Vavrik said. "There were a lot of other students who were getting scholarships, but I didn't qualify for one. So I thought that was one avenue where I had wished I had support, and I hoped someday I would be able to support a student in a similar financial situation as I had been."

Vavrik, whose son **Steven Vavrik** is also an alumnus of MechSE (BSME '90, MSME '91), said he owes an incredible debt to the university.

"All I had to do was tell people I was a graduate of the University of Illinois College of Engineering and doors were wide open. This is my way of repaying Illinois."

The Illini Solar Car team and its vehicle, Argo, saw all of their hard work come to fruition in October 2017, completing a 1,800-mile trek across Australia at the Bridgestone World Solar Challenge. It was a return to competition for Illinois after a 20-year hiatus.

The team boasts about 50 active members from 10 areas of study and was one of seven teams from the U.S. at Bridgestone.

The Illinois car arrived in Australia via boat in early September, and the competition began October 8. The endurance challenge included teams from 21 countries, each squad wanting to test its vehicle against the sometimes brutal conditions of the Australian Outback.

Twelve Illini team members made the trip, including **Jenny Chu**, **Naman Jindal**, **Jye Sze Lee**, **Gulai Shen**, and **Chee Sim Tan**, all from MechSE. Those remaining stateside were already focused on making the required design changes for the American Solar Challenge coming this summer, according to **Mike Philpott**, associate professor emeritus in MechSE. The next challenge will give other team members who didn't make it to Australia a chance to gain race experience.

Strong endurance—on the part of the car, the driver, and the rest of the crew—was key to reaching each stage of Argo's journey.



Solar car team makes rousing return after 20 years

Two Illini drivers handled all of the driving, switching out every few hours. When the race ended each day at 5 p.m., the team camped and rested, preparing to re-energize and start fresh the next day.

"The rules actually restrict the hours that each driver can drive continuously to prevent fatigue," Lee said. "It is also very hot in the car as Argo doesn't have A/C, to save weight."

The team was extremely busy before the race even started, traveling 2,500 miles driving from Melbourne to Darwin before the competition even began.

Being its first competition this millennium, the Illinois team drove in the less competitive Adventure Class, which allowed teams meeting exact safety standards but not necessarily all the latest requirements. But that hardly made the seven-day journey from Darwin to Adelaide less daunting.

"There were clouds, rain, and sometimes thunderstorms for the first half of the challenge," said team member **Byron Hopps** (ECE).

Toward the end of the race, there was a separation of the car's latch, which held the bottom and

top shells of the car together, resulting from a combination of crosswinds and "road trains." Lee described the latter as massive vehicles that are the equivalent of three-to-four semi-tractor trailers in length and traveling at 75 miles per hour.

"Thankfully, we were already pretty close to the finish line, which has less road trains and gentler weather," said Lee. "We were able to use an alternate way to hold the top and bottom shells together to drive the last leg of the journey."

Finally crossing the finish line was nothing short of surreal, Lee said.

"There was one aspect we couldn't have prepared for, the feeling of finishing."

Though pleased that their car survived the Outback's harsh

elements and did well for its first run, Lee believes there is much potential for improvement.

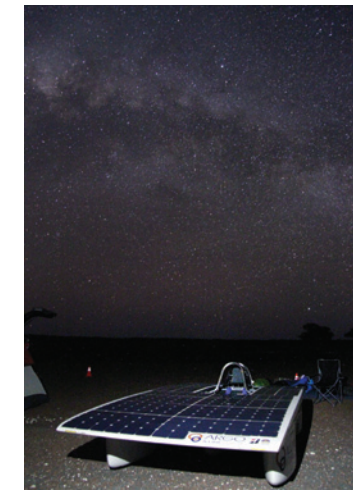
"We recognize that had we been able to put more time in practicing

aspects, like race strategy, we could have performed significantly better."

Team member **Amalia Dungey** (ECE) said looking at the top teams' cars and their strategies from this challenge is one way to focus on improving Argo.

"We've learned that while our team may not have been a competitor in this race, we have the resources, manpower, and drive to put the U of I on the map for solar racing in future years."

For the students, this has been a long process. Lee and



Argo at rest.

Tan were freshmen when they approached Philpott and first discussed resurrecting the solar car program, back in the fall of 2014. The undergrads learned there hadn't been a solar car team on campus since 1997.

"Undeterred, they ended up starting a new team with a goal of being ready to compete within a couple of years," Philpott said. "Starting from scratch, the design of a new solar car racer began along with the huge task of fundraising and team formation."

Challenges aside, Lee wouldn't have it any other way. She said learning how to raise funds and resources, working with Illinois students and faculty to build Argo, and finally bringing the solar car to Australia made the experience worth it.

"I can't think of anything else that is more rewarding."

A grant from Ameren Illinois helped get Argo to Australia. MechSE alumnus **Jason Schripsema** (BSME '95) and his company, SolarBOS, generously supported the Solar Car Team in its infancy.



Argo being passed by a "road train."



Garrow reaches SWE competition finals

MSME candidate **Sarah Garrow** was a finalist in the Graduate Student Rapid Fire Competition at the Society of Women Engineers (SWE) WE17 Conference. Garrow presented on “Dynamic Modeling for Battery Electric Vehicle Thermal Management Systems,” research funded by the POETS Center, which is directed by Professor **Andrew Alleyne**. Garrow is developing a controls-oriented dynamic model that captures the thermal and electrical behavior of a transcritical vapor compression system, enabling rapid design and testing of a BEV thermal management and control system.



Ding paper recognized at major robotics conference

Yanran Ding, a master’s degree candidate in mechanical engineering, was named a Best Student Paper Award Finalist at the 2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) in Vancouver, Canada. The conference publication from Ding and his advisor, Assistant Professor **Hae-Won Park**, titled “Design and Experimental Implementation of a Quasi-Direct-Drive Leg for Optimized Jumping,” was one of just four to receive the honor. The IROS conference is one of the major international conferences in robotics and intelligent systems.



Bhaduria submission named top article

Recent mechanical engineering PhD graduate **Ravi Bhaduria**’s paper, “A multiscale transport model for non-classical nanochannel electro-osmosis,” was named a top article by the *Journal of Chemical Physics*. “The presented multiscale transport model is orders of magnitude faster than MD, tractable, and captures essential surface physics at the liquid-solid interface. It is a significant step in the direction of understanding nanopore electroosmosis, even under extreme conditions such as flow reversal,” said Bhaduria. He worked in Professor **Narayana Aluru**’s research group.



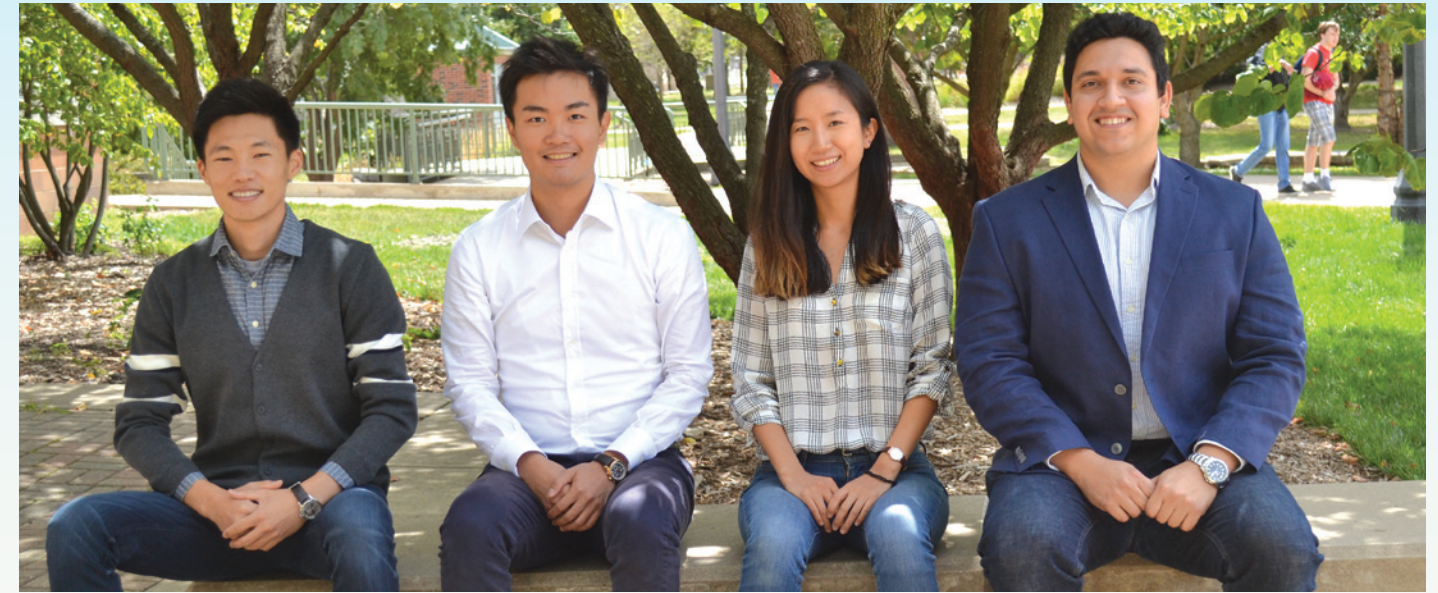
Choi receives Baxter award for nanomaterials work

Mechanical engineering PhD candidate **Jonghyun Choi** received a Baxter Young Investigator Award for his work in applying the unique properties of 2D nanomaterials to further bio-sensing systems. Choi works in Assistant Professor **SungWoo Nam**’s group, researching graphene characterization and functionalization. “Jonghyun’s research has been focused on establishing a unique approach to generate controlled deformation (‘architecting’) of 2D materials for advanced biomedical sensors and multi-functional coatings,” Nam said. “I am delighted to see his scientific contribution being recognized by the Baxter Young Investigator Awards.”



Rajagopal places first at MRL Fall Conference

MechSE PhD candidate **Manjunath Rajagopal** earned first place in the presentation competition at the 2017 MRL Fall Conference. Rajagopal’s presentation was titled, “Microscale Probe for Intracellular Thermometry.” He is currently working with Associate Professor **Sanjiv Sinha**. “We make intracellular thermometry feasible by having just a micron thick silicon nitride supported probes with a 5 micron tip that has an accuracy of 54 mK,” Rajagopal said. “We measured intracellular temperature changes in Aplysia slug’s neuron for various electrical and chemical stimuli.”



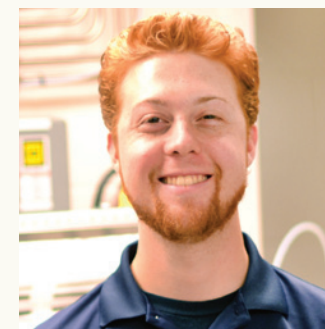
From left: Hyeongyun Cha, Anthony Fan, Hyun Jin Kim, and Mohamed Elhebeary

Four MechSE students selected for Mavis Future Faculty Fellowship

MechSE graduate students **Hyeongyun Cha**, **Mohamed Elhebeary**, **Anthony Fan**, and **Hyun Jin Kim** have been named Mavis Future Faculty Fellows. The Mavis Future Faculty Fellowship program, through the College of Engineering at Illinois, helps develop future generations of engineering professors. With this fellowship comes opportunities, such as seminars and workshops on teaching, as well as the responsibility of mentoring an undergraduate or junior graduate student.

The intention of the program is to assist talented, motivated, and ambitious graduate students from the college in their transition into academia. Cha’s advisor is Assistant Professor **Nenad Miljkovic**; Elhebeary and Fan work with Professor **Taher Saif**, and Kim’s advisor is Professor **Tony Jacobi**. “At Illinois, we’ve been trained to be good researchers and I know some people try to talk a lot about their research on this application, but I think this one is more about the vision,” Kim said.

Robertson wins competitive DoD fellowship



Matt Robertson, a PhD candidate in mechanical engineering, recently won a SMART (Science, Mathematics And Research for Transformation) Fellowship from the U.S. Department of Defense.

He works with Assistant Professor **Sam Tawfick**’s

Kinetic Materials Research Group. As part of the fellowship, he will work this summer at the Naval Surface Warfare Center, Crane Division, in Indiana. Many of Robertson’s projects in Tawfick’s lab have focused on carbon nanomaterials, and his current research focuses on synthesis of graphene on transition metals.

Cho named NASA Space Technology Research Fellow



Chullhee (Chace) Cho, a PhD candidate in MechSE, was selected as a 2017 NASA Space Technology Research Fellow (NSTRF). Cho, who conducts research in Assistant Professor **SungWoo Nam**’s lab, will collaborate with top researchers at NASA’s Langley Research Center. Cho’s proposal, “Frequency

Tunable Piezoelectric Energy Harvester based on Crumpled MoS₂ and Graphene,” focuses on a new type of ambient energy harvester for long-term space missions, some of which are conducted entirely remotely, making issues in power generation crucial.

Health/Bio in MechSE

While health/bio has been one of MechSE's impact areas for many years, it now represents perhaps the fastest-growing field within our faculty research and educational focus.

The creation of the Carle Illinois College of Medicine—which welcomes its first cohort of students in Fall 2018—has put the spotlight on the incredible opportunities existing at the intersection of engineering and medicine. Riding the momentum of this unique new college, the MechSE Department has aligned a pre-med undergraduate track for students wishing to gain a firm engineering education as undergrads before pursuing careers as MDs—a sequence rarely followed in the not-so-distant past.

And from inside the body at the cellular level to orthotics and medical devices, MechSE professors are exploring a wide range of ground-breaking health/bio research areas that have potential for incredible impact. Several of their research projects and applications are highlighted here.



"Not only are mechanical engineering and engineering mechanics essential for maintaining human health and well-being, they are critical elements of the Carle Illinois College of Medicine's Progenerative Medicine™ initiative, which focuses on the prospective design of human health."

—Dr. King Li, inaugural dean of the Carle Illinois College of Medicine

Four MechSE professors among College of Medicine inaugural faculty

The Carle Illinois College of Medicine (CICOM) will be accepting its first class of students to begin classes in July 2018. The college will offer a medical curriculum blended with engineering principles and will admit students who have already completed their undergraduate degrees.

The new college provides both teaching and research opportunities for faculty. Among its inaugural course directors are MechSE professors **Elizabeth Hsiao-Wecksler**, **Iwona Jasiuk**, and **Amy Wagoner Johnson**. **Kimani Toussaint** has joined the research advisory board and has a research-related appointment.

For education, the professors are working with teams that include basic scientists and clinicians to develop curricula and case studies for different courses in the college:

- Wagoner Johnson is developing an Obstetrics course, which will have a problem-based, active learning approach.
- Jasiuk's development focuses on Women's Health, a course that will discuss topics related to vasomotor and pelvic pain conditions.
- Hsiao-Wecksler is on the faculty developing the Clinical Neuroscience course, collaborating on a team that includes MD-PhD neurologists with appointments at both Illinois and Carle.

In terms of research, CICOM provides health/bio faculty with opportunities to work on many more locally based projects than they could before. Hsiao-Wecksler said this aspect is a game-changer for researchers looking to make significant impact in the field.



MechSE/CICOM faculty members (from left): Elizabeth Hsiao-Wecksler, Iwona Jasiuk, Kimani Toussaint, and Amy Wagoner Johnson.

MechSE establishes pre-med track as new College of Medicine launches



Mechanical engineering and engineering mechanics undergraduate students will soon be able to follow a prescribed track of traditional MechSE courses and newly recommended courses to qualify for medical school.

"The idea behind the pre-medicine track is to allow our students to have an opportunity to stay within the established curriculum, but also have a tailored program to help them go into medicine if they want to go to medical school," said Professor **Elizabeth Hsiao-Wecksler**, who is MechSE's associate head for undergraduate programs and has multiple research projects in the health/bio space. "This new track is largely driven by the new Carle Illinois College of Medicine (CICOM)."

Called the world's first engineering-based college of medicine, CICOM plans to leverage advanced technology to train physician-innovators who will deliver better, more compassionate and accessible care to patients worldwide. Engaging creative minds through a problem-based, active learning approach with day-one clinical immersion is one way it hopes to set a new bar for medical education.

While MechSE's pre-med track will be designed so students can qualify for practically any medical school, the first priority has been examining the CICOM requirements.

"We've held conversations with the College of Medicine's admissions office and pre-med advisors in the university's Career Center. They said that not only do students need to do well in courses, but they also need to have a lot of experiences and soft skills related to the healthcare profession," Hsiao-Wecksler said. "MechSE's undergraduate curriculum already emphasizes teamwork and strong communication skills. To ensure that our students have experiences that will make them competitive in medical schools, we need to provide additional healthcare-centered opportunities, such as medicine-focused senior design and undergraduate research projects."

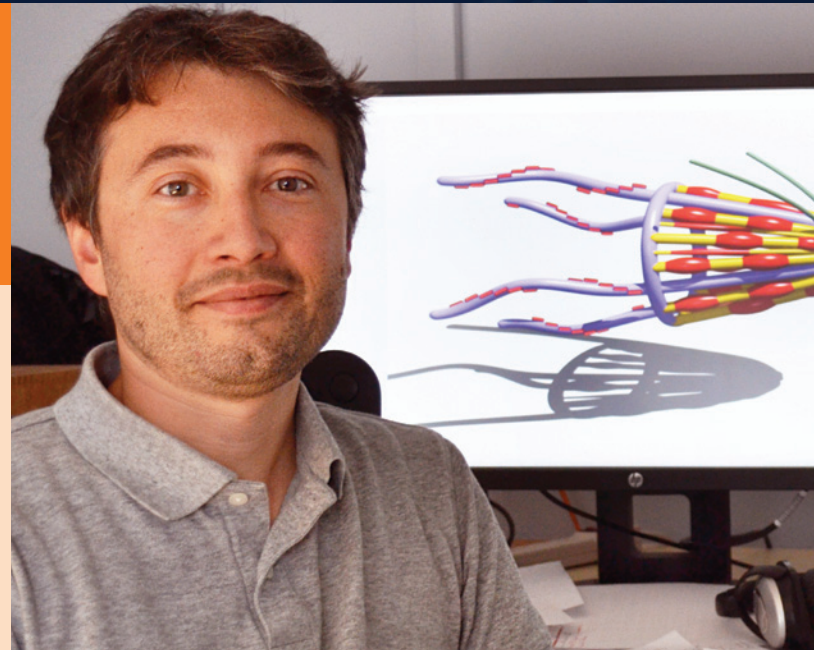
MechSE's undergraduate programs office will provide special advising for students interested in pre-med, as MD careers are vastly different than most engineering careers and often demand interpersonal skill sets not always necessary for engineers.

"Could there be something where we don't attack the cancer cells like chemotherapy, but something where the cancer cells are not getting what they need to be invasive?"

—Taher Saif

Saif takes novel approach to cancer treatment

Professor **Taher Saif** is investigating the mechanics of cancer and why tumors stiffen over time. Saif's group is researching the possibility that this stiffness is necessary to make cancer cells aggressive. Collaborating with Carle Hospital, the University of Illinois Hospital & Health Sciences System in Chicago, and the Mayo Clinic, the team "interrogates" the cells taken from cancer patient biopsies to gain information on what makes them metastasize. The motive behind this research is to both answer questions on cancer's spread and induce a paradigm shift away from chemotherapy in cancer treatment. Saif hopes his research will take the approach away from attacking cancer cells to instead limiting their ability to prosper. "It's almost like those who are more prone to a stroke take aspirin," Saif said. "Could there be something where we don't attack the cancer cells like chemotherapy, but something where the cancer cells are not getting what they need to be invasive." Saif is also working with the Carle Illinois College of Medicine to develop a tissue-mimicking design lab that could test various treatments on models of the patients' tumors. Still in planning, the lab would be available around the world electronically.



Gazzola's micro-bots revolutionizing future of medical treatment

Assistant Professor **Mattia Gazzola** and Professor **Taher Saif** are collaborating with Illinois bioengineers to create a new discipline of robots known as bio-bots. These robots are modeled to emulate the geometries of flexible-bodied "swimmers" and use synchronized, beating heart cells to create waves and propel through fluid. Traveling through an individual's circulatory system, these robots have massive potential for delivering internal medicine. "In creatures, even simple creatures, it's hard to isolate what mechanisms are doing what and how they interact," Gazzola said. Medicine involves a lot of surprises because of the human body's often unpredictable responses, but bio-bots are man-made, providing doctors and patients with further certainty and an increased level of control. "It's like a LEGO," Gazzola said. "You know exactly what you're putting in there so you can build knowledge and know how it is connected. If you understand how living architectures work, how control is implemented there, and how they make use of compliant surfaces and parts of the body, then you can come up with new design paradigms that can be useful in anything."



Wang impacting cell functions through mechanical force

In his studies of cell mechanics, Professor **Ning Wang** is particularly interested in the ways that force mechanics can control the gene expression of a cell. Wang's research has shown that cells can change their internal response depending on the speed at which external forces are applied. "The cell is actually actively moving around or sensing its environment just like a human being," Wang said. "Our lab works on understanding how cells respond to forces and use these mechanical cues to dictate their functions." Wang's research is based out of the Bioimaging Science and Technology Lab in the Beckman Institute. His group has shown that forces applied to the cell's surface go directly to the nucleus, stretching the DNA inside and thus changing the gene expression. "This is the first time anywhere in the world where we've shown that the force has a direct impact," Wang said. His research is especially significant for understanding differences between force mechanics and chemical methods with respect to controlling gene expression. "Speed, magnitude, direction—all of these we believe are fundamental to understanding why the cells of the same DNA sequence have different gene expression patterns, make different proteins, and have different functions," Wang said.

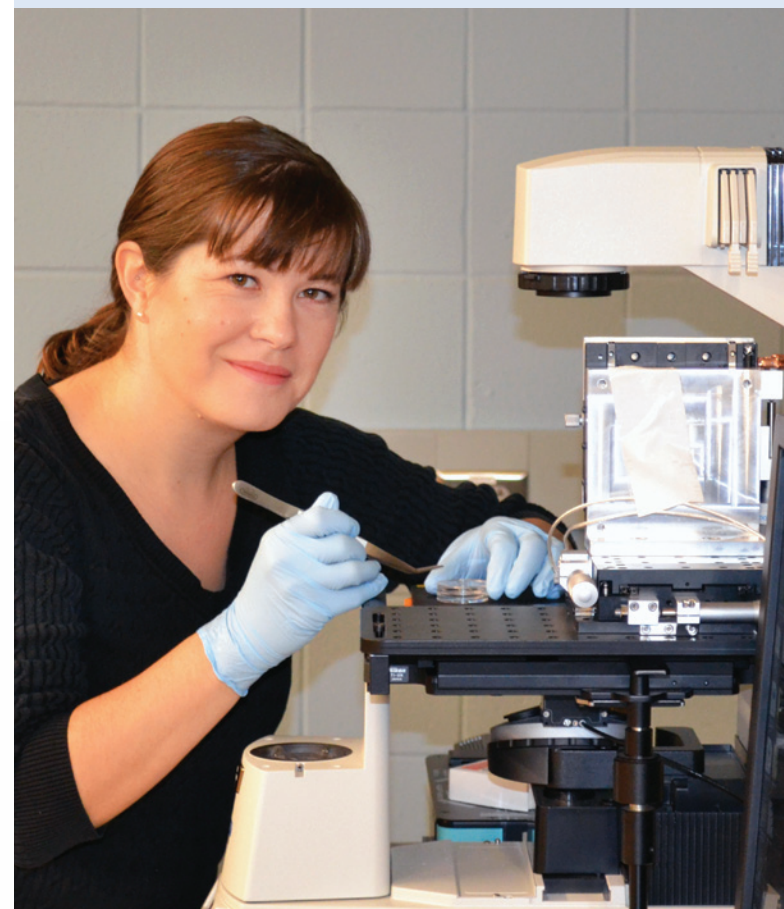
"Speed, magnitude, direction—all of these we believe are fundamental to understanding why the cells of the same DNA sequence have different gene expression patterns, make different proteins, and have different functions."

—Ning Wang



Dunn developing improved hydrogels for bio surfaces

Assistant Professor **Alison Dunn** studies applications of hydrogels with her research group, Materials Tribology Laboratory. Hydrogels are biocompatible and used in medical applications such as catheter coatings and contact lenses. Dunn is specifically interested in slip-surface interfaces, such as knee cartilage, that occur in the body. "We use synthetic gel to mimic those interfaces to try to better understand their behavior," Dunn said. Most hydrogels are limited to short-term medical use because their long-term behavior is difficult to predict. Dunn researches how the gels respond to applied wear in an effort to prolong their lifespan. "If the gels have a sliding interface, there's the risk of material degradation and wear," Dunn said. "We're using micro-friction experiments and applying wear to gel surfaces and then seeing how they change over time." By studying the performance of the gels as well as how their friction changes, the group hopes to determine whether the gels can retain the same lubrication properties after experiencing loading and wear. "We're adding a dimension to biomaterial surfaces design," Dunn said. "The dimension is robust slip performance over time."





Jasiuk develops models of bone fractures for clinical applications

Professor **Iwona Jasiuk** researches bone as both a structural and biological material, as well as bone adaptation and regeneration. Her longest-running project examines what makes a bone break, determined by critically observing mechanical properties from nanoscale to macroscale. Her lab uses electro-microscopy to observe animal bone slices and utilizes a new, non-invasive technique called “reference point indentation” to gain information by denting a patient’s bone. Jasiuk works with the National Center for Supercomputing Applications (NCSA) to create multiscale models of bone fractures using inputs from her experiments, and she works with the Mayo Clinic to apply her work to clinical settings. Another component of Jasiuk’s research is studying the materials and architectures of scaffolds used to regenerate bones that are missing due to cancer or other trauma. The scaffolds being developed are using additive manufacturing to create triply minimal surface architectures designed to be smooth and compatible with cells. Illinois has acquired a 3D bio plotter, called Envision, that can be found at the Institute for Genomic Biology and provides Jasiuk the capability to print in up to five different materials, which can include both collagen and hydroxyapatite—two main parts of bone composition.

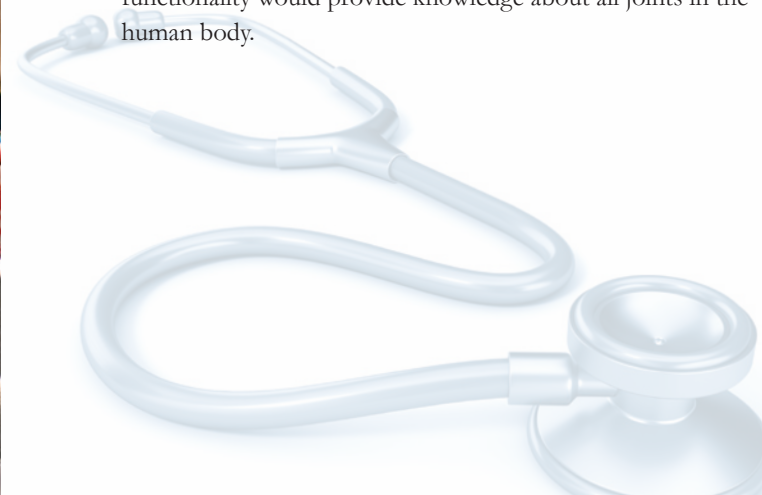
Wagoner Johnson efforts aiding bone regeneration, pre-term birth

Associate Professor **Amy Wagoner Johnson** has focused the majority of her interdisciplinary research on bone tissue engineering and the regeneration of bone. She was the first to identify the physical mechanism by which micro-pores in tissue engineering scaffolds—used in bone regeneration— increase bone growth. She is known worldwide for her discovery of the surface-energy effect in bone scaffolds, a phenomenon that prompts the invasion of cells into a scaffold to promote bone healing. She is currently working to develop and validate the first framework to model how bone adapts within the bone-scaffold system, hoping to design a scaffold that will better integrate with the bone while also being manufacturable. Wagoner Johnson also is working with Associate Professor **Kimani Toussaint** to understand pre-term birth—a global problem that affects 15 million babies each year—from a biomechanical perspective. In contrast to most studies that characterize cervical tissue in relation to gestational age, she found that the circumference is more relevant in studying cervical tissue’s structure and function. And her approach to modeling the uterine-cervix as a system to better understand pregnancy is itself a unique digression from existing studies of the mechanics of cervical tissue.



Kersh uses musculoskeletal modeling to study failures in bone and soft tissue

Assistant Professor **Mariana Kersh** is developing advanced musculoskeletal modeling to build a greater understanding of the injury and healing processes of both bone and soft tissues. Her bone research focuses on the architecture and structure of bone during the growth phase, seeking to shed light on how it becomes a strong, load-resistant material. Kersh’s work has attracted the attention of the National Basketball Association (NBA), which has given her research group a grant to study bone fatigue and causes of stress fractures in basketball players. When it comes to soft tissue research, Kersh has focused on the human shoulder, studying both its motion and problems within it, and looking at how different tissues combine to keep the shoulder joint stable. “My lab is working at understanding the mechanical properties of these tissues so we can understand how they work together in a particular joint,” Kersh said. The upper body is often understudied, and measuring the mechanics of its tissues and understanding the joint system’s functionality would provide knowledge about all joints in the human body.



Freund's bio research utilizing zebra fish, shockwaves

One of Professor **Jonathan Freund**’s research projects is studying the fluid mechanics of red blood cells, modeling their motion in small blood vessels. “One study involves the transport of particles that are magnetically responsive,” Freund said. “You can apply a field and push them to the margin of the vessel, where they can deliver drugs to specific targets.” Freund also collaborates with a team located in France that studies the development of zebra fish embryos. In their earliest form, the embryos are completely clear, allowing for the flow of circulatory fluid to be seen under a microscope, such as in the developing heart. He has studied how stresses trigger heart valve formation. Also, the blood vessel development is significant for improvements in cancer treatment. He also models how tissue is affected by lithotripsy, a process in which strong acoustic pulses are used to break up kidney stones. Some patients have shown tissue damage as a result of the shockwaves. The project is based out of the University of Washington and has collaborators at Indiana University, Caltech, and Oxford University. One possible solution is to use bursts of sound, rather than shocks, to break stones with less pain and collateral damage to tissue.

“You can apply a field and push them to the margin of the vessel, where they can deliver drugs to specific targets.”

—Jonathan Freund



Hsiao-Weckler advancing various biomedical devices

Professor **Elizabeth Hsiao-Weckler**'s recent work has been supported by the NSF, NIH, and U.S. Department of Homeland Security. She is co-founder of IntelliWheels, Inc., a Champaign start-up that developed novel multi-gear wheels for manual wheelchairs to improve propulsion biomechanics and reduce shoulder loading. In the last decade, there has been an explosion of biomedical devices being developed in academia and industry to help improve the human condition. Many of these devices utilize recent advances in mechatronics or intelligent actuation to provide previously unavailable assistance for people with disabilities. Examples include therapeutic robots to help with patient rehabilitation, lower limb exoskeletons to allow paralyzed wheelchair users to walk, or bionic prosthetic limbs. However, substantial technological advancements are still necessary to allow for smaller mobile devices to help even more people. Hsiao-Weckler's research group, the Human Dynamics and Controls Lab, uses methods from design, control theory, mechatronics, fluid power, soft robotics, and musculoskeletal biomechanics to investigate and improve movement control and function. The team's recent projects include the Portable Powered Ankle-Foot Orthosis, the IntelliWheels geared wheel for wheelchairs, passive hydraulic forearm simulator for training healthcare professionals, Fiber Reinforced Elastomeric Enclosure pneumatic sleeve orthosis for Lofstrand crutch users, and Soft Modular Architecture Lightweight Layered Exoskeleton (SMALL Exo).

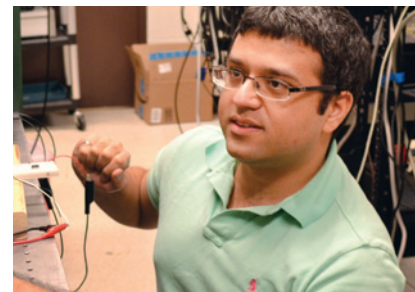


Ostoj-Starzewski developing model for predicting brain trauma impact

In cases of brain trauma, the area of direct impact is not always what is the most affected. Professor **Martin Ostoja-Starzewski** is developing a computer model

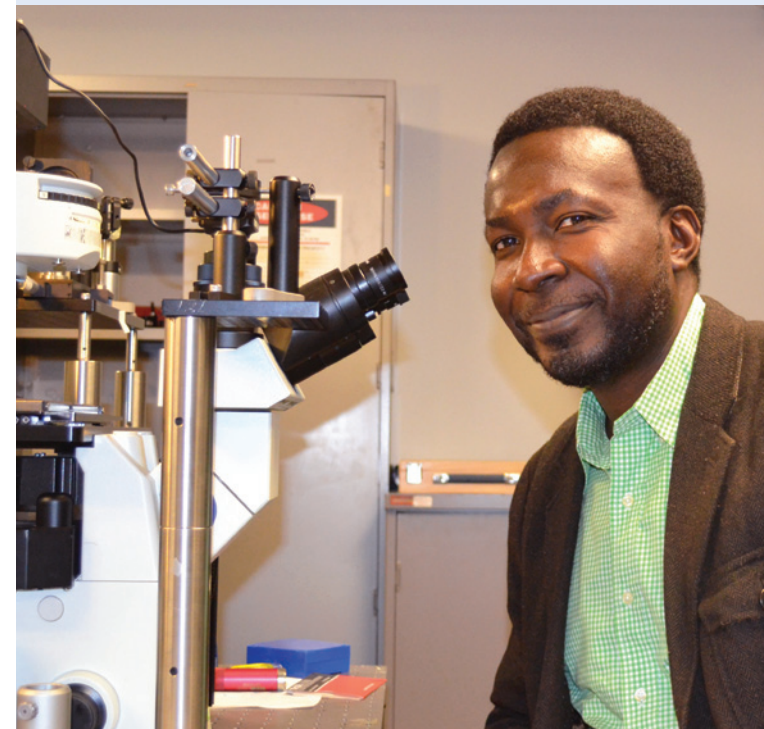
that analyzes specific vectors of impact onto the brain and produces the resulting stress waves to predict what was most affected. After head trauma, the brain experiences two types of waves: a quick-moving pressure wave and a potentially more dangerous, slow-moving shear wave. Ostoja-Starzewski's models are progressively becoming more powerful at predicting the effects of both types of waves. A finite element model, it uses information from MRIs and a 3D voxel map to simulate impacts on the brain. The model has been validated by low-impact data retrieved during an MRI, in which an individual's head was dropped onto a table from a height of two centimeters. This collision resulted in a two to three millimeter displacement of tissue in the brain's center. Ostoja-Starzewski said, "If from such a weak drop it is moving two or three millimeters then it only makes you wonder, what about in boxing?" His research is assisting in the understanding of the brain, creation of effective head gear, and the prediction of cerebral consequences of accidents.

Bahl illuminates new way for high-speed particle identification



Assistant Professor **Gaurav Bahl** utilizes concepts from nonlinear optics to create label-free, high-speed tools for mechanically identifying and sorting particles. Biology labs today

use flow cytometers to identify chemical properties of biologically relevant particles through an optical tag, at speeds of several thousands of particles per second. Although this technology is very powerful, it has been discovered that particles can sometimes appear to be chemically equivalent, and hence show the same cytometer signature, while having different mechanical properties. The mechanical characteristics of a cell can depend heavily on their ambient environment or disease states; therefore, being able to identify mechanical properties of single cells (compressibility, mass, size) could also reveal new, previously hidden information on diseases. Bahl's team was able to create an opto-mechanical device that uses light to detect incredibly small mechanical vibrations and extract the mechanical properties of single particles, at speeds up to 50,000 particles per second. Bahl said the device could one day be added as a new component to flow cytometers to enable new diagnostic capabilities. "We've shown all the bits and pieces of the puzzle, so now it's a matter of making something that's robust and reliable," he said.

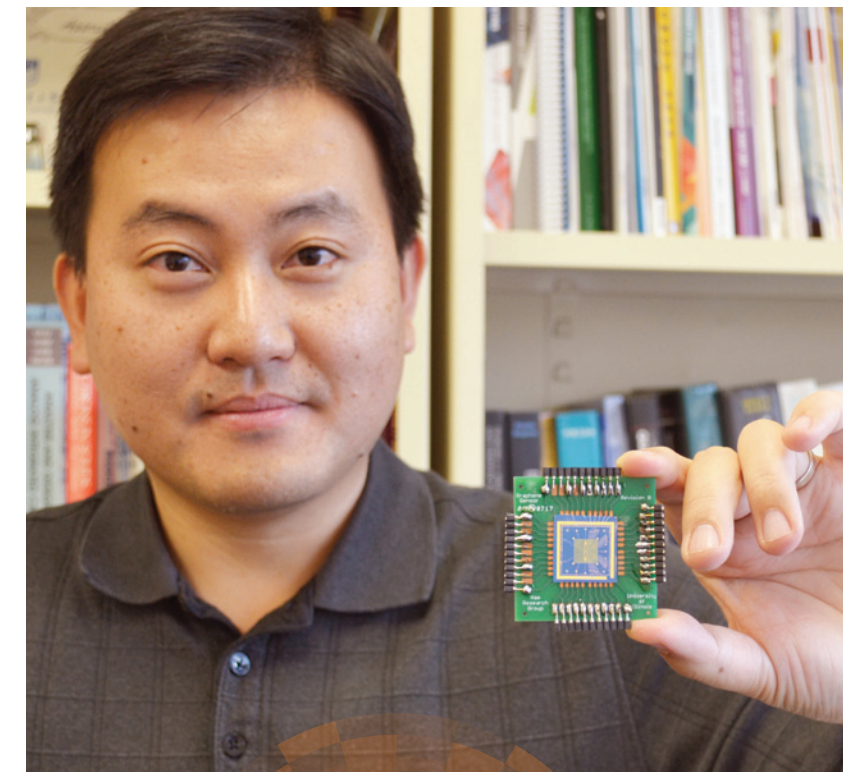


Toussaint using optical microscopy to examine causes of pre-term birth

Associate Professor **Kimani Toussaint** is applying his expertise in optical imaging to the issue of pre-term birth, working in collaboration with Associate Professor **Amy Wagoner Johnson** and Professor Barbara McFarlin at UIC. Their work is funded by the Burroughs Wellcome Foundation. Toussaint examines collagenous cervical tissues through the use of second harmonic generation microscopy. This particular type of optical microscopy is significant because it allows the researcher to obtain an image of both high resolution and high contrast without requiring any physical slicing or coloring of the sample. "In collagenous fibers, it is especially important to alter the sample as little as possible. We try to assess their structural organization and quantify it because if you can do that it's easier to compare different stages of where that particular sample is," Toussaint said. His research gives McFarlin the understanding of the microstructural organization of collagen fibers that she needs to get closer to the reason for pre-term birth and closer to preventing it.

Nam's graphene biosensor could measure stress level and detect diseases

Assistant Professor **SungWoo Nam**, in collaboration with ECE professor **Nam Sung Kim**, is developing a high-sensitivity sensor that detects varying levels of specific molecules in samples of biofluid. The sensor's main component is the multifunctional nanomaterial graphene, which acts as a surface for selective binding and simultaneous detection of target molecules. After the binding, change in resistance of graphene is measured, and then the amount of the molecule within the sample can be calculated. The chip itself has numerous potential applications. For example, an elevated cortisol count has been said to indicate a high level of stress. Nam measures the level of cortisol production from a sweat sample placed on the graphene surface. This allows for the quantification of stress in certain situations and opens a new door for anxiety disorder research. In addition, Nam uses the chip to test the effect that toxins have on neuromuscular junctions in collaboration with bioengineering professor **Rashid Bashir**. Culturing neurons and cardiomyocytes (heart cells) together, the junction is introduced to the chip and exposed to toxins. The data collected gives insight into how toxins affect the human body. Nam's work with graphene sensors and their applications interests many members of industry, including Intel and Baxter.





Andrew Alleyne received the Advocating Women in Engineering Award from the Society of Women Engineers. The POETS Center (Power Optimization of Electro-Thermal Systems), directed by Alleyne, received a National Science Foundation (NSF) REU grant to help guide students towards a meaningful future in advanced STEM careers. Alleyne was named the 2017 winner of the Yasundo Takahashi Education Award by ASME. He was also elected a 2018 Fellow of IEEE.



Narayana Aluru is part of a faculty team working on launching the country's first computational node aimed at developing nanomanufacturing simulation tools, thanks to a five-year grant from the NSF. He is part of the new Computational Molecular Science Group established at the Beckman Institute. Aluru is part of a new interdisciplinary research group, "Active Interfaces and Highly Deformable Nano-Materials." He also was named a Fellow of the American Physical Society (APS), and he received the J. Tinsley Oden Medal from the U.S. Association for Computational Mechanics.



Gaurav Bahl is leading a team of engineers that aims to develop mechanically enabled ultra-low frequency transmitters for digital communications in the 100 Hz to 1 kHz frequency range as part of the proposal "Magnetic Communicator via Resonant Oscillating Bar-magnets with Energy Recovery" alongside MechSE's **Sameh Tawfick**. He won a 2018 Dean's Award for Excellence in Research from the College of Engineering. Bahl also demonstrated that sound waves can be used to produce optical isolators, ultraminiature diodes that are tiny enough to fit onto a computer chip.



Leo Chamorro's research on flow control, turbulence-structure interaction, and wind energy was recently published in the *Proc. of the National Academy of Sciences*, *Physical Review E* and four times in the *Journal of Fluid Mechanics*.



Harry Dankowicz was among 150 selected to attend the final conference of the National Academies Keck Futures Initiative. He has published a new release of the

software package COCO, including extensive documentation and unique support for general-purpose constrained design optimization. He was appointed to a second five-year term as editor of the ASME flagship journal *Applied Mechanics Reviews*. He co-authored the paper "Automated Monitoring of Behavior Reveals Bursty Interaction Patterns and Rapid Spreading Dynamics in Honey Bee Social Networks," published in the *Proceedings of the National Academy of Sciences*.



Alison Dunn co-authored research on the method click beetles use to right themselves when they tip over, presented at Living Machines 2017 at Stanford University. This research also won second place in a student and faculty competition at the international BIOMinnovate Challenge in Paris, France.



Stefan Elbel wrote a guest column, "Ejectors: Solution to the CO₂-Equator Conundrum," for *Accelerate America*.



Elif Ertekin is part of a faculty team working on launching the country's first computational node aimed at developing nanomanufacturing simulation tools, thanks to a five-year grant from the NSF. She received an NSF Division of Materials Research grant, titled "Accelerating Thermoelectric Materials Discovery via Dopability Predictions." She also is part of a new interdisciplinary research group, "Active Interfaces and Highly Deformable Nano-Materials."



Randy Ewoldt was awarded the 2018 Collins Award for Innovative Teaching from the College of Engineering.



Placid Ferreira is part of a faculty team working on launching the country's first computational node aimed at developing nanomanufacturing simulation tools, thanks to a five-year grant from the NSF.



Jonathan Freund is co-director of the Center for Exascale Simulation of Plasma-coupled Combustion (XPACC), which received an extension to continue its work on developing

a way for plasma technology to improve combustion into a sixth year.



Naira Hovakimyan's aerial imagery analytics company, IntelinAir, received a 2016 AgFunder Innovation Award and was recognized as one of five agriculture technology companies for the "Most Innovative U.S. Pre-Series A Startups" and also as a "Tech Start-Up to Watch" by Agriculture.com. *Ag Funder* featured IntelinAir, Inc. among other agricultural companies leading the way in utilizing remote sensing. Hovakimyan received a three-year NSF grant to develop unified cyber-physical security systems. She was named a 2017 Fellow of IEEE. Hovakimyan also was honored with the 2018 Award for Technical Excellence in Aerospace Control for IEEE Control Systems Society.



Harley Johnson was named as the inaugural chair of a new Advisory Committee on Diversity and Inclusion in the College of Engineering. He began an appointment as the first OVCR Faculty Fellow, working with the Office of the Vice Chancellor for Research on special projects. Johnson also has been named a Fellow of the President's Executive Leadership Program, for faculty and administrators across the University of Illinois System.



Mariana Kersh was one of eight faculty identified as a spotlight "young investigator" by the *Journal of Biomechanical Engineering*. She also was a recipient of a Burroughs Wellcome Fund International Grant to investigate cellular regulation of bone biomechanics with collaborators in Denmark.



Seok Kim demonstrated a consumer product-like dry adhesive made of his shape memory polymer and published it in *International Journal of Adhesion and Adhesives*. He also designed magnetically responsive nanostructured silicon surfaces for novel digital microfluidic and camouflage applications. This work was published and highlighted as the inside front cover in *Small*.



Amy LaViers assisted in the Paper 2 Tree outreach program's educational activities (see back cover). She was awarded an EARly-concept Grant for Exploratory Research (EAGER) from the NSF for her collaborative project "Center-of-Mass Control for Expressive Effective Movement in Bipedal Robots" with **Hae-Won Park**.



Moshe Matalon was awarded the Numa Manson Medal from the Institute for the Dynamics of Explosions and Reacting Systems. He also was elected to the inaugural class of Fellows of the Combustion Institute for his contributions to numerous areas of combustion science.



Kathryn Matlack published "Designing Perturbative Metamaterials from Discrete Models" in *Nature Materials*. She also was granted a University Research Program award from Ford Motor Company on using additive manufacturing to enhance functional attributes of powertrain components.



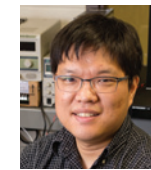
Nenad Miljkovic was awarded a UK Distinguished Visiting Fellowship from the Royal Academy of Engineering for his project "Scalable and durable next generation nanoengineered coatings." He also was named a U.S. National Academy of Sciences' Arab-American Frontiers Fellow.



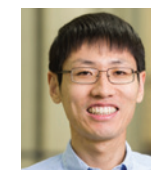
SungWoo Nam has developed a more environmentally friendly method to isolate graphene using carbon dioxide in the form of carbonic acid as the electrolyte solution. The findings were published in the *Journal of Materials Chemistry C*. He received an NSF Division of Materials Research (DMR) Electronic and Photonic Materials (EPM) grant for his work in studying how electrical doping affects surface energy and reactivity of graphene. Nam is part of a new interdisciplinary research group, "Active Interfaces and Highly Deformable Nano-Materials." He was named a 2018 Early Career Faculty Fellow by The Minerals, Metals, and Materials Society, and also won a 2018 Rose Award for Teaching Excellence from the College of Engineering.



Martin Ostoja-Starzewski became the editor of *Acta Mechanica*, a leading journal in the field of theoretical and applied mechanics. He has joined the editorial boards of *Fractal and Fractional* and *Applied Sciences*. His joint paper "Tunneling-percolation model of multicomponent nanocomposites" was featured on the cover of *Journal of Applied Physics*.



Hae-Won Park was awarded an EARly-concept Grant for Exploratory Research (EAGER) grant from the NSF for his collaborative project "Center-of-Mass Control for Expressive Effective Movement in Bipedal Robots" with **Amy LaViers**.



Chenhui Shao assisted in the Paper 2 Tree outreach program's educational activities (see back cover).



Kyle Smith is leading researchers in developing a saltwater desalination process that could prove to be cheaper than reverse osmosis by experimenting with battery technology and focusing on new materials that could make the process economically desirable and energy efficient.



Kelly Stephani was elected to the 2018 class of Associate Fellows for the American Institute of Aeronautics and Astronautics.



Scott Stewart was elected to the inaugural class of Fellows of the Combustion Institute for his research with advanced modeling and computational modeling of complex flows for combustion and shock physics systems.



Sameh Tawfick is leading a team of engineers that aims to develop mechanically enabled ultra-low frequency transmitters for digital communications in the 100 Hz to 1 kHz frequency range as part of the

proposal "Magnetic Communicator via Resonant Oscillating Bar-magnets with Energy Recovery" alongside **Gaurav Bahl**.



Kimani Toussaint is leading a faculty team in establishing the country's first computational node aimed at developing nanomanufacturing simulation tools, thanks to a five-year grant from the NSF. He was also among 150 people selected by the National Academies Keck Futures Initiative (NAKFI) to attend the final conference hosted by the program, and one of nine attendees asked to give a keynote presentation. Toussaint was recently elected Fellow of the SPIE, the international society for optics and photonics, as well as Fellow of the Optical Society of America.



Arend van der Zande is co-leading an interdisciplinary research group, "Active Interfaces and Highly Deformable Nano-Materials."



Surya Pratap Vanka was named a 2017 Fellow of the American Physical Society (APS). He was selected by APS' Division of Fluid Dynamics for "pioneering development of multigrid algorithms used to compute incompressible flows, and lasting contributions to simulation of complex laminar and turbulent flows."



Amy Wagoner Johnson was awarded an NSF grant to further her leading-edge research on synthetic bone scaffolds. Wagoner Johnson also won a 2018 College of Engineering Dean's Award for Excellence in Research. She was a featured speaker at the Share the Vision Innovation and Start-up Showcase at the 2017 Pygmalion Festival.



Aimy Wissa co-authored research on the method click beetles use to right themselves when they tip over, presented at Living Machines 2017 at Stanford University. This research also won second place in a student and faculty competition at the international BIOMinnovate Challenge in Paris, France. She assisted in the Paper 2 Tree outreach program's educational activities (see back cover).



Bill Anderson (BSME '86) has joined Ameda as vice president of engineering. Anderson started his career with Baxter, spending 17 years in various engineering

and product development positions before joining Excelsior as vice president of business development and new products. He earned an MBA, Strategy and New Products, from Northwestern University.



Eric Anderson (PhDME '09) was distinguished as one of the 2017 MechSE Outstanding Young Alumni. Since 2013, Anderson has worked at Los Alamos National

Laboratory in New Mexico, where he is a laboratory scientist.



Eric N. Brown (BSME '98, MSTAM '01, PhDTAM '03) won the 2017 A.J. Durelli Award from the Society for Experimental Mechanics (SEM). He was also

inducted as a Fellow of SEM. The Durelli Award is bestowed to individuals who have introduced an innovative approach or method early in their careers. Brown is the division leader for Explosive Science and Shock Physics at Los Alamos National Laboratory.



Braj Bhushan Jain (MSME '64) passed away in January 2018. "He was a very ethical, hard-working type of man and engineer, who was also intelligent and kind,"

said his son Dr. **Sanjiv Jain**, a physician at Carle Hospital. "He worked for many decades in the field and also brought up two U of I engineering graduates."



Michael Kessler (MSTAM '98, PhDTAM '02) joined the North Dakota State University College of Engineering as its new dean in July 2017. He had been the

chief academic and administrative officer for the School of Mechanical and Materials Engineering at Washington State University.



Seichi "Bud" Konzo (MSME '29) was inducted as a 2018 honoree in the ASHRAE Hall of Fame for his life-long service to and research in the field. The award honors

deceased members who have made milestone contributions to the growth of ASHRAE-related technology. From 1960 to 1962, Konzo was Head of the Mechanical and Industrial Engineering Department.



Robert W. Lally (MSME '49) passed away in January 2018. In 1955, he and associates from Bell formed Kistler Instrument Co. to manufacture the precision measurement

devices developed by Kistler at Bell. In 1967, he and his younger brother, James, founded PCB Piezotronics, eventually growing the company to more than 1,000 employees.



John Marshall (BSME '95) has been named vice president and general manager of Brock Grain Systems. Part of the CTB, Inc. family of companies, Brock is a global provider

of grain storage, handling, conditioning, and structural systems.



Lance Martin (BSME '84) joined MBO America in the newly created position of vice president of national accounts. Martin will oversee all of MBO America's national

accounts and OEM partnerships.



Clay Nesler (BSME '82, MSME '83), VP of Global Sustainability and Industry Initiatives at Johnson Controls, was recognized as a leader in the green building movement by the

U.S. Green Building Council. Nesler received the organization's Leadership Award, an annual recognition of the outstanding individuals and organizations at the forefront of the green building movement.



Ritu Raman (MSME '13, PhDME '16) was named one of only five recipients of the 2017 For Women in Science Fellowship, which honors female scientists at a critical stage

in their careers with \$60,000 grants to advance their postdoctoral research. Currently at MIT, Raman's research focuses on the design of new smart materials that dynamically respond and adapt to their environment.



Bobby Reifman (BSME '03) has been promoted to managing director at Lincoln International, a leading global mid-market investment bank. Reifman has worked at Lincoln

since 2008, the same year he received his MBA from the University of Chicago Booth School of Business.



John W. Sanders (MSTAM '13, PhDTAM '17) joined Cal State Fullerton in Fall 2017 as an assistant professor of mechanical engineering, specializing in developing

"clean energy" technologies. In the Spring 2017 semester, Sanders was awarded the Robert Miller Teaching Excellence Award in MechSE.



Karen Thole (BSME '82, MSME '84), distinguished professor and department head of mechanical and nuclear engineering at Penn State, was selected as a recipient of the 2017

ABET Claire L. Felbinger Award for Diversity. She also was chosen as a governor-nominee of The American Society of Mechanical Engineers Board of Governors.



Adam Tilton (BSME '10) was honored as one of the 2017 MechSE Outstanding Young Alumni for his entrepreneurial accomplishments as a

young professional. Tilton is currently involved in a Chicago software startup called Ocient, which is responsible for high-velocity analytics and machine applications on large data sets.



Jeyandran Venugopal (MSME '00) was hired by Flipkart-owned fashion e-tailer Myntra as its chief technology officer. Venugopal is the founder and CEO of Eclinic247,

a consumer healthcare startup. He previously served as vice president of technology for Yahoo! and as a senior manager for Amazon.



Gary Walters (BSME '84) joined Trace Gains as vice president of customer success. Walters has more than two decades of experience serving technology companies in

service, product, sales, and marketing functions, as well as building customer success services in companies ranging in size from startups to Fortune 500s.

Podgorny goes deep (into Europe), joins football start-up



As an undergraduate in MechSE, **D.J. Podgorny** (BSME '15) won some of the College of Engineering's top honors—being named a Knight of St. Patrick and winning the impressive Stanley H. Pierce Student Award. He was a genuine leader among his peers, serving on Engineering Council, the Engineering Information Bureau, Pi Tau Sigma honor society, and as Head Engineering Learning Assistant. He also founded the MechSE Advancement Student Committee (MASC) to foster better engagement between students and alumni.

Now, his ability to lead can be seen in his new role as Director of Football Operations for The Growth of a

Game, a startup that serves as a community for football advocates across Europe.

"American football is the fastest growing sport in Europe, due to a host of factors, and our goal is to help foster that growth to even higher levels. We accomplish that by importing and selling American football equipment to European teams, hosting skills camps across Europe, and creating content featuring teams, best practices, and the overall promotion of the sport abroad. We're still a young company and we have plans to expand our influence beyond these core pillars in the near term," Podgorny said.

With a full-time assignment in Brussels, Podgorny's primary responsibility is in business development—mainly in the Scandinavian region—as well as website content management. He also helps manage operations of the company's camps—with more than a dozen scheduled already this year across Europe—at which players and coaches work on improving their American football skills.

"I have a great view of the entire business from my vantage point," Podgorny said. "Through our camps, website, and blog, we are aiming to create a community of American football advocates across the world, and we have plans to increase our focus on this area more as the business grows."

Football has been part of Podgorny's life for years. He played the sport through his own high school career, was a coach for a high school in Monticello, Illinois, and worked as a manager for the University of Illinois' football program.

"People always laugh when I tell them I have wanted to be the General Manager of the Indianapolis Colts since I was ten years old. While I would still love to be in that position someday, my dream has certainly evolved as I have traveled and gained working experience," Podgorny said. "With The Growth of a Game, I am excited about raising awareness for the sport I love dearly and bringing it to new areas. It would blow your mind how many passionate football fans there are all across Europe. I want to continue to bring smiles to players' faces and give more players the opportunity to learn about the sport as well as the resources to play it. Developing skills working in international markets is also of prime importance to me as sports become more and more globalized."

Gazzola's Paper 2 Tree program connects university, community, environment



Assistant Professor Mattia Gazzola's Paper 2 Tree is a new outreach program that aims to create a stronger connection between researchers at Illinois and the Champaign-Urbana community and environment. It encourages anyone who publishes a scientific paper to donate a tree to be planted—a tree that will grow along with the scientific reach of the research. The kickoff event in Fall 2017 was attended by 100 area school children, along with faculty, local government and park district officials, and several media outlets. The students helped plant trees in Urbana and Champaign parks. "It's great to have more trees that are part of our community, and I love the idea that as the research grows, the tree grows," said Champaign mayor Deborah Frank Feinen.