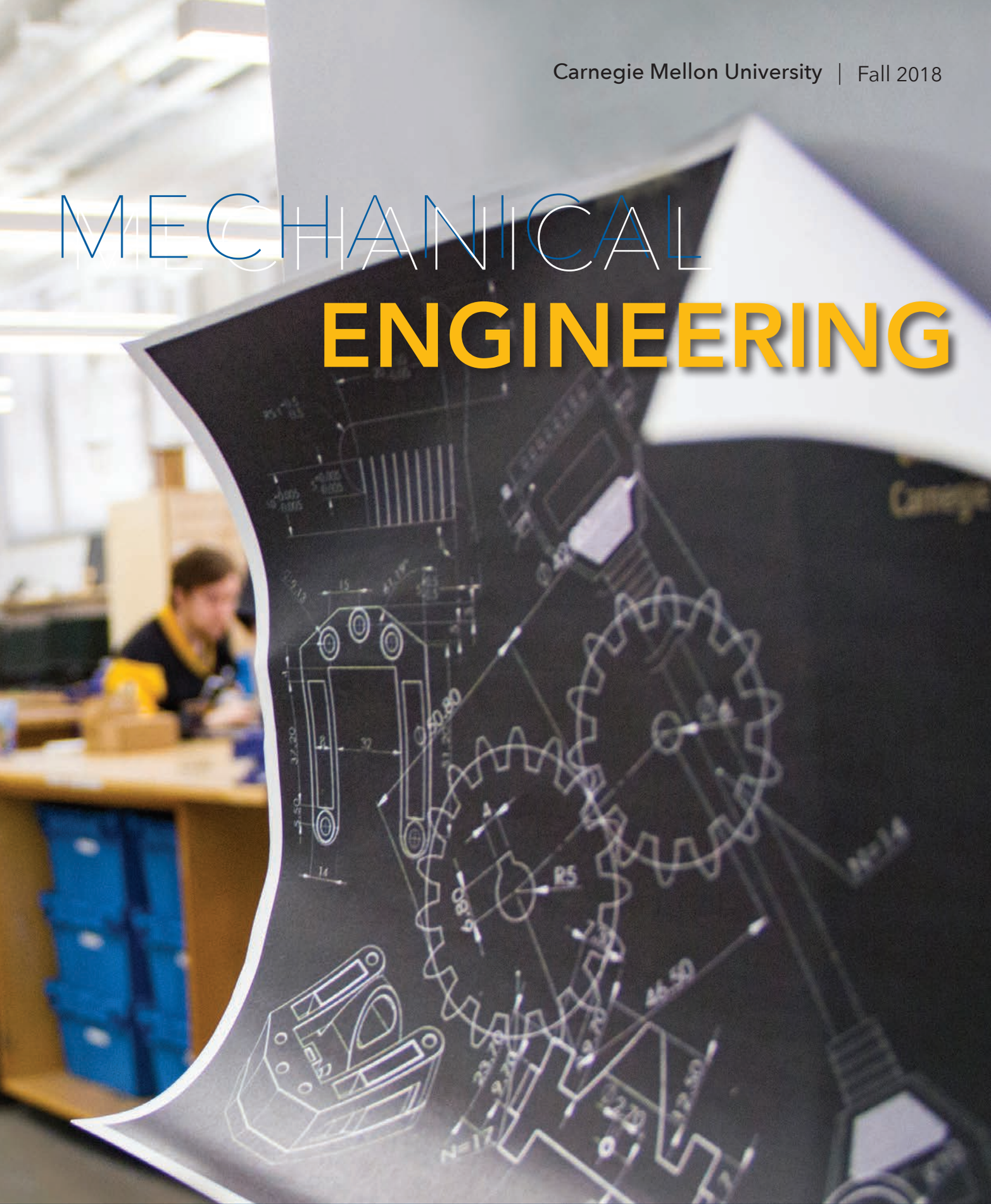
Carnegie Mellon University | Fall 2018

MECHANICAL ENGINEERING



MAKER SPACES MAKE A DIFFERENCE

IDEAS TRANSFORMED: THE NEW TECH SPARK

TAKING DOWN THE HEAT

ZIPPER INVENTOR'S LEGACY

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THE TECH SPARK'S INTEGRATED MAKER SPACES ENABLE STUDENT ACTIVITIES, RESEARCH, AND INVENTIVE HANDS-ON LEARNING. SEE PAGES 2-5.

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MECHANICAL ENGINEERING

Dear Alumni and Friends,

We've had another amazing year in MechE and I'm delighted to share highlights from 2018 with you in our latest magazine.

In this issue, we share the excitement of the new student maker spaces in the Tech Spark—a place where ideas are transformed. We celebrate student accolades, alumni newsmakers, and faculty awards. We bid a fond farewell to retirees Professor Shi-Chune Yao and Machine Shop Manager Jim Dillinger.

On pages 14 to 17, we introduce you to new faculty members Sarah Bergbreiter, Diana Haidar, Rahul Panat, and Victoria Webster-Wood. Their expertise spans the fields of microrobotics, design and fabrication, 3D aerosol printing, and biohybrid robotics. Three additional faculty members with backgrounds in machine learning, biomechanics, and autonomous vehicles also joined us this fall: Amir Barati Farimani, Eni Halilaj, and Ding Zhao. Look for their stories in the fall 2019 issue of this magazine.

In other department news, we've had the largest entering class of 47 Ph.D. students in our history, progress is steady on the new ANSYS Hall, and I've been reappointed as department head. Mechanical Engineering remains strong and poised for a healthy future thanks to the tremendous support of alumni and friends like you.

I look forward to connecting with you at Spring Carnival 2019 (April 11-13).

Sincerely,

Allen L. Robinson,
Department Head, Mechanical Engineering

"In addition to creating many exciting hands on learning opportunities to reinforce engineering fundamentals, my goal is to use the Tech Spark to rapidly accelerate multidisciplinary education across the college."

Allen Robinson, Professor and Head, Department of Mechanical Engineering

MAKER SPACES MAKE A DIFFERENCE

THE NEW TECH SPARK IS A PLACE WHERE IDEAS ARE TRANSFORMED

Walk through this space and you'll hear a buzz, or perhaps a bang. You'll see students taking apart skateboards and building mousetrap cars. Or 3D printing parts for a capstone project prototype. You'll bump into them as they bustle through the hallway, sharing their latest ideas with classmates. You will feel the energy of this revitalized space.

Hamerschlag Hall has experienced a metamorphosis. What started as a vision for an integrated learning, making, and research environment has become a collaborative, multidisciplinary cornerstone of the College of Engineering's maker ecosystem.

Although the renovated wing is now bright and open where it once was dim and crowded, the transformation was about much more than a facelift.

"This new space will encourage the kind of spontaneous interactions that foster innovative thinking and creative problem-solving," said Allen Robinson, head of the Department of Mechanical Engineering.

The integrated collection of maker spaces on C-level—newly named the Tech Spark—is enabling student activities, research, and inventive hands-on learning. It includes a design workshop, electronic fabrication and rapid prototyping facilities, a student machine and teaching shop, a professional shop, laser cutters, 3D printers, computational design software, and more. With the completion of the new ANSYS Hall in 2019, the Tech Spark will also extend into a large open bay facility.

"The Tech Spark will allow students to immerse themselves into the college's learning-by-making culture. The state-of-the-art facilities will enable new manufacturing technologies, creative processes, and innovative solutions that will stretch beyond our collective imaginations into the future," said Robinson.

After completing the appropriate training, students from every discipline may use the Tech Spark to transform their ideas into tangible results—for coursework, clubs, entrepreneurship, and fun.

One of the features is a series of large windows that flank the C-level hallway, connecting classroom and community. The next time you are on campus, walk by to see the next generation of hands-on learning and real-world problem solving in action.

MORE THAN MACHINES

Beyond access to equipment, the Tech Spark also offers innovative programming to inspire creative problem-solving. Here are two examples:

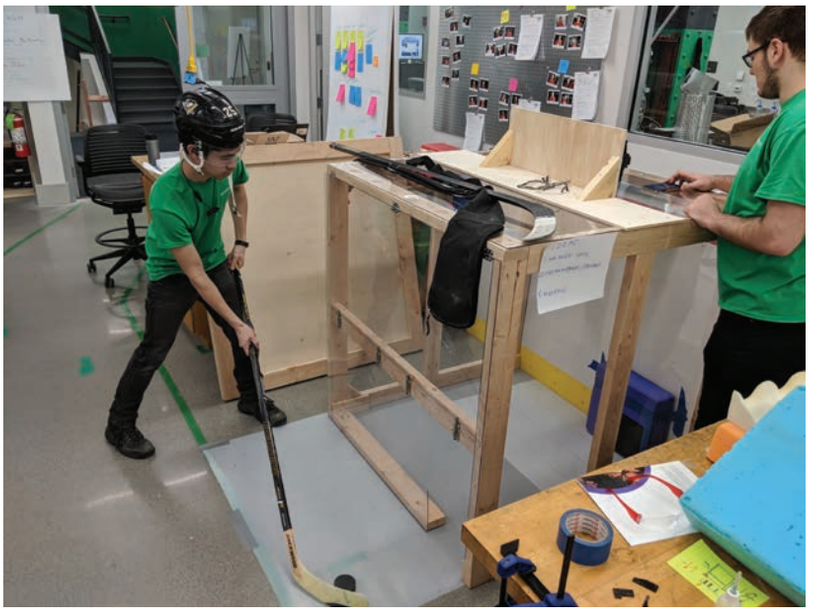
MANUFACTURING IN STEELTOWN

In a new project-based course named Modern Manufacturing in Steeltown, students explored materials and manufacturing from a Pittsburgh perspective through site visits to local manufacturers and in-class activities and competitions.

During one of the course's hands-on learning experiences, students perfected the process of making duct tape wallets. During another course project, student teams formed assembly lines to dismantle and re-assemble skateboards.

Assistant Professor of Mechanical Engineering **Rebecca Taylor** worked with four undergraduate students to develop the course: **Shivang Chordia** ('18), **Jade Crockem** ('18), **Sarah Karp**, and **Kelly Underwood**.

Modern **Manufacturing in Steeltown** was developed with support from the Donald L. and Rhonda Struminger Faculty Fellowship in Mechanical Engineering.



RETHINKING A SAFER RINK

Last spring, the Pittsburgh Penguins and Covestro teamed up with College of Engineering students to develop prototypes for hockey rink boards to decrease injuries among hockey players without changing the play of the puck.

The "Rethink the Rink" initiative started with a make-a-thon in the new Tech Spark maker spaces during the week of Spring Break. Twenty-five Carnegie Mellon students from every engineering department and several science disciplines formed five multidisciplinary teams. Participants ranged from first-year students to Ph.D. candidates.

After briefings from the experts, and with coaching throughout the process, the teams each developed a unique design and prototype. They then pitched their solutions to the Penguins and Covestro on the ice at the UPMC Lemieux Sports Complex.

Both organizations were pleased with the results. Covestro offered paid internships to MechE's junior **Ian Suzuki** and recent integrated master's/bachelor's graduate **Alexander Duncan** ('17,'18) to develop the next stage of prototypes over the summer. The new dasher board prototypes will be installed in the Penguins' practice facility this year.

"Our students are uniquely driven to overcome obstacles," said Diana Haidar, assistant teaching professor of mechanical engineering and the Tech Spark faculty director who led the make-a-thon. "'Rethink the Rink' was an opportunity for students to tackle a real-world challenge."

Read about the Tech Spark's faculty director, **Diana Haidar**, on page 14.

ANSYS HALL

The opening of ANSYS Hall is the next important milestone on our journey to enable every student to transform their ideas.

Images courtesy of Bohlin Cywinski Jackson

Far from kilns or furnaces, Edgar Mendoza figures out how to 3D print ceramics.

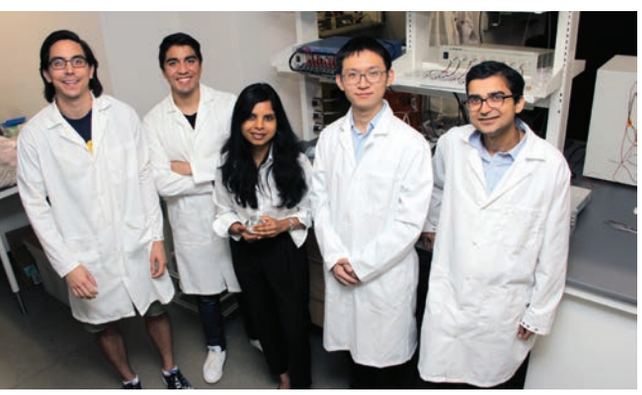
TAKING DOWN THE HEAT

"When you think of 3D printing, it's with plastic or metal," said Edgar Mendoza. "There's not much research done in using ceramics."

Mendoza is a Ph.D. candidate co-advised by Mechanical Engineering Professors Jack Beuth and Reeja Jayan. With his advisors, Mendoza learns about an unusual combination of fields: Beuth's metallic additive manufacturing and Jayan's ceramics research. "I wanted to merge their fields," Mendoza remarked, "and so we decided to pursue the emerging field of ceramic additive manufacturing."

Mendoza recently received the National Science Foundation's Graduate Research Fellowship to pursue this line of research.

Mendoza received his B.S. in mechanical engineering at UCLA in his native Los Angeles. He chose to pursue his Ph.D. at Carnegie Mellon because of the research, career, and outreach opportunities at the university. "I feel like outreach isn't necessarily important to many," he said, "but it shouldn't be overlooked."



When Mendoza arrived at CMU, both Beuth and Jayan invited him to their labs, so he chose them as co-advisors. "They're both great mentors, and I didn't want to lose one over the other," he said. In blending his advisors' curricula, Mendoza wondered why ceramics hadn't yet been used in 3D printing. "We looked at this issue and said, 'There must be a reason why people aren't doing it.'" He discovered the roadblocks, but also that these could be overcome.

In his NSF proposal, Mendoza emphasized that he, Jayan, and Beuth are positioned to combine expertise to create unheard-of technologies and processes. "My advisors threw a lot of information at me," he said. "And it was my job to create a story based on sound scientific principles to prove that we can tackle the current problems in ceramic additive manufacturing." Because this research would be so new, Mendoza wanted to engage the audience and demonstrate his work's value. "We were excited about this, and we wanted the audience to get excited with us," he said.

High-purity ceramics have great advantages, such as high hardness and temperature resistance, but they can be made only with temperatures achievable in an industrial blast furnace. Jayan researches how to reduce these temperature requirements; Mendoza aims to apply this technology to additive manufacturing with Beuth's help. To additively manufacturing ceramics at relatively lower temperatures could assist industries such as aerospace, automobile, and energy.

When he received the NSF fellowship, Mendoza and his advisors were elated. "Only so few students receive this kind of award," he pointed out. "It means the National Science Foundation believes in our team's research."

Junior **Alexander Baikovitz** earned the 2018 Barry Goldwater Scholarship from the Barry Goldwater Scholarship and Excellence in Education Foundation.

Ph.D. student **Stephen Coyle** has been awarded the G. Sundback Fellowship. He develops novel bio-hybrid microsystems.

Planning to continue his studies at the Ph.D. level, master's student **Daming Ding** received the ATK–Nick G. Vlahakis Fellowship.

Ph.D. student **Rose Eilenberg** earned a Dowd Fellowship for her research on air quality and low-cost sensors.

Changho Oh, a Ph.D. candidate, earned the Jean-Francois and Catherine Heitz Fellowship and the Neil and Jo Bushnell Fellowship in Engineering. He investigates the interactions between materials and environments in MEMS switch electrical contacts.

Ph.D. students **Angran Li** and **Yuxuan Yu** were members of the 2nd place team at the Siemens FutureMakers Hack-a-thon Challenge. Students had 24 hours to create and present innovative developments for Siemens MindSphere cloud-based OS.

During the 2018 CMU Energy Week Poster and Multimedia Competition, the Scott Institute for Energy Innovation awarded Ph.D. student **Gurjyot Singh Sethi** first place and seniors (now alumnae) **Ana Cedillo** ('18) and **Rhiannon Farney** ('18) the Best Undergraduate Student Poster award.

Phil Smith, a Ph.D. candidate, was named a Center for Machine Learning and Health Student Fellow. He is researching a cyber fingerprint for proteins.

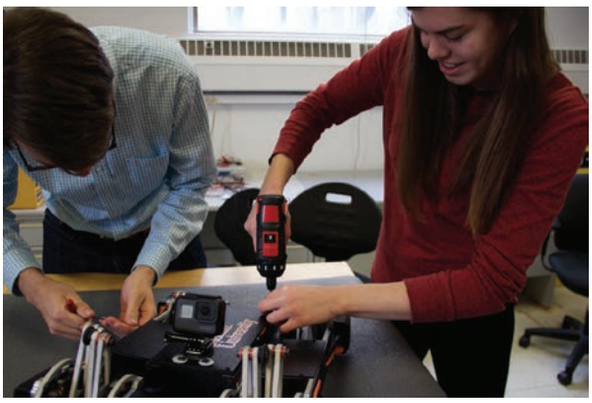
Junior **Ian Suzuki** interned with Covestro to further develop prototypes for safer hockey rink dasher boards after participating in the Rethink the Rink Make-a-Thon last spring.

STUDENT ACCOLADES

A paper co-authored by Ph.D. student **Keith Heyde** and researchers from the University of Pittsburgh's Swanson School of Engineering was nominated for the PLOS OpenSource Toolkit Channel Prize.

Ph.D. student **Dilip Krishnamurthy** received the Neil and Jo Bushnell Fellowship in Engineering for his research in nanotechnology and electronic materials.

Ph.D. student **Aishwarya Pawar** earned the G. Sundback Fellowship. She was accepted to the Massachusetts Institute of Technology's 2018 Rising Stars in Mechanical Engineering Workshop.



Ph.D. student **Catherine Pavlov** was awarded a 2018 NASA Space Technology Research Fellowship to support her work to expand rover mobility and manipulation capabilities in robots.

Leiming Hu, a Ph.D. student, received the Phillips and Huang Family Fellowship for research in renewable energy and energy efficiency.

Henry Peck, now a senior, received the Osher Lifelong Learning Institute Award for Best Oral Presentation at the Meeting of the Minds Undergraduate Research Symposium in May 2018. His topic was "Using Virtual Reality Experiences and Games to Augment Pre-Prosthesis Training."

Ph.D. student **Laisuo Su** received an award for Best Poster Presentation at a meeting of the Western Pennsylvania Chapter of the American Vacuum Society. He engineers nanoscale materials to enhance interfaces within lithium-ion batteries.

Junior **Kehui (Rosie) Zhang** earned second place in the Undergraduate Research Office's Speak Up! Program. The five-part seminar taught students how to communicate their work to general audiences and culminated in an event of public presentations in July 2018.

Edgar Mendoza, a Ph.D. student, was awarded a National Science Foundation Graduate Research Fellowship to research innovative, ceramic 3D printing.

Rudy Torres, a Ph.D. student, earned the Nam Pyo and Young Suh Fellowship and the Mary Jane and Milton Shaw Fellowship for work in bio-inspired fuel cell catalysts.

IT TAKES TEAMWORK

Carnegie Mellon Racing took first place overall in the electric vehicle class in the Formula SAE Lincoln (Nebraska) competition in June 2018. Weeks earlier, the team had become the Formula North (Ontario, Canada) electric vehicle champion, also winning the endurance category and placing first overall in dynamic events. For the 2018-2019 academic year, MechE senior **Katie Lam** will serve as the team's president.

Carnegie Mellon Rocket Command earned the Altitude Award during the NASA Student Launch Competition at Marshall Space Flight Center in April 2018, coming closest to NASA's one-mile target launch altitude. Prior to graduating with B.S. and M.S. degrees, **Genevieve Parker** ('18, '18) served as president and team leader.

STUDENT ACCOLADES

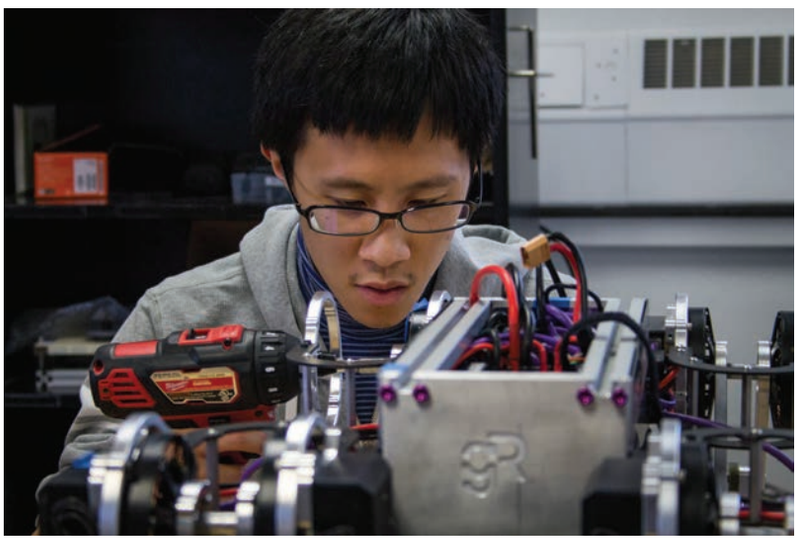
The **Solar Splash** team earned third place in solar endurance and seventh place overall in the June 2018 international intercollegiate solar/electric boat regatta in Springfield, Ohio. Prior to graduating, **Rhiannon Farney** ('18) had served as the president with **James Zhang**, now a senior, taking over the team's leadership.

Women in MechE is a community of female mechanical engineers connecting students, faculty, alumnae, mentors, and experienced professionals. Students participate in networking lunches, outreach with local high school students to promote STEM education, and the national Women in Tech Summit events. **Bethany Wang** ('18) served as the organization's president prior to graduating. The 2018-2019 executive board includes **Vida Ekhlas**, **Hyeon Ju Song**, **Victoria Sotolongo**, and **Emily Wu**.

The **Tartan Ice Drilling System** team was a top 10 finalist in the NASA RASC-AL Mars Ice Challenge, competing to extract the most water from a simulated Martian ice deposit in 2018. Now a senior, **Paula Zubiri** oversaw the structure and the XYZ position system. Robomechanics expert and Assistant Professor **Aaron Johnson** advised the team with help from Ph.D. candidate **Catherine Pavlov**, drawing on her research experience at NASA.

HANDS-ON LEARNING

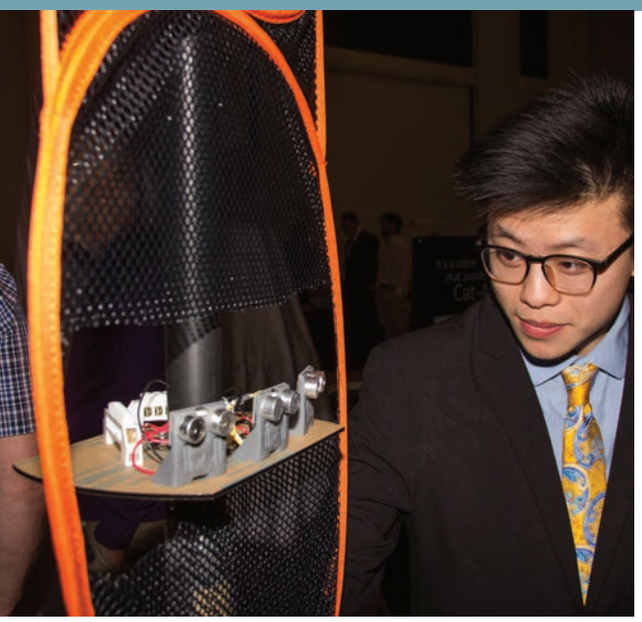
In the Gadgetry: Sensors, Actuators, and Processors course, students studied microcontrollers and mechatronic design.



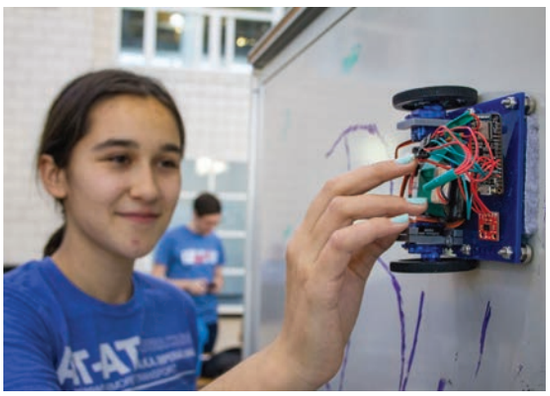
Students in the Special Topics in Robot Design & Experimentation course developed bioinspired robots after observing animals at the Pittsburgh Zoo.

Edible taffy balloons lightened the mood during the Special Topics in Culinary Mechanics final presentations.

STUDENT HIGHLIGHTS



Teams of seniors showcase their capstone projects at the Design Expo each semester.



MechE students are active participants in ECE's annual Build18 competition. They demonstrated their projects after an intense week of creativity, innovation, and teamwork.

Krishna Dave and her friends won a personal tour of Carnegie Mellon's steam tunnels and other off-limits areas with Dean James Garrett last spring.

MAKING IT HAPPEN

From collaborative maker spaces to multidisciplinary make-a-thons, Diana Haidar plays an integral role in the college's maker ecosystem.

In 2013, Diana Haidar had a comfortable job as a manufacturing engineer for Chart Energy & Chemicals. She enjoyed her job, but there was one problem; she didn't feel challenged. "It wasn't changing the frontiers of science," Haidar said.

She headed for the University of Delaware to pursue research in nanocomposites and earn her Ph.D. There, she recognized the impact of bringing rapid fabrication equipment together in a fully stocked academic makerspace. She served as a facilitator for senior undergrads, creating and testing their capstone design projects while simultaneously developing her own research instrumentation, all in the maker space.

"When people come into this space, they have all the resources they need to be creative and to fabricate their designs," she says. "I want them to be enabled to go from imagination to reality."

Haidar found her passions divided, straddling the line between research and teaching. In an epiphany moment, she asked herself, "'Where do I enjoy being the most?' and I had the most fun designing my machines, going down into the makerspace, and fabricating that equipment."

In the fall of 2017, she joined the Department of Mechanical Engineering as an assistant teaching professor, facilitating the effort to expand the university's maker ecosystem. She serves as the faculty director of the Tech Spark, the collection of new, student maker spaces.

Haidar's goal for the Tech Spark is to be a place where every student can turn theory and ideas into physical, tangible results. "By providing students with this level of resources, they can take their product from saying, 'yeah, I think this should work,' to 'it didn't work initially, but we were able to fix it' and successfully bring their ideas to fruition."

With appropriate training, any Carnegie Mellon student may use the design space, rapid prototyping area, and student shop in the Tech Spark.

Last semester, Haidar taught the first Maker Series course, Intro to Modern Making, as a crash-course for students to understand and utilize rapid fabrication equipment. Additional Maker Series courses will provide students with the opportunity to work on design projects in multidisciplinary teams.

A DRIVING FORCE IN THE 3D PRINTING WORLD

Rahul Panat, associate professor of mechanical engineering, enjoys the buzzing atmosphere of educational institutions, where students collaborate with faculty and ideas constantly sweep through campus. At Carnegie Mellon University, Panat uses advanced aerosol jet technology to study 3D printing processes at the nano and microscales. But before he entered the realm of teaching, he spent 10 years conducting research at Intel—a multi-national tech company—expanding upon the knowledge he acquired as a Ph.D. student in applied mechanics at the University of Illinois, Urbana-Champaign.

"My passions were teaching, research, and mentoring students because in a student-centric atmosphere, you can shape somebody's life for the better. That's such a powerful concept."

Panat eventually returned to higher education to fulfill his long-term goal of teaching and mentoring students. He began his academic career as an adjunct faculty member at Arizona State University, where he studied the structure of nanomaterials for lithium-ion batteries, before moving to Washington State University, where he focused on nanoparticle 3D printing.

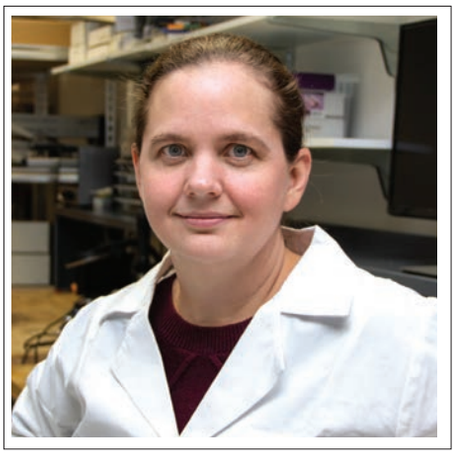
At WSU, Panat and his colleagues created a revolutionary manufacturing method that produces 3D structures from the nano-to-centimeter scale. This method uses advanced aerosol jet technology to create fog-like structures by capturing nanoparticles in tiny liquid droplets. Once these structures are made and the droplets are deposited in space, the printer uses heat to evaporate the liquid, leaving only the nanoparticles behind to form complex, strong, and lightweight microstructures. According to Panat, 3D printing at the nanoscale has applications in many research areas such as lithium-ion batteries.

In 2017, Panat joined Carnegie Mellon's mechanical engineering department to continue his additive manufacturing research at CMU's NextManufacturing Center while also mentoring students in the classroom. In his advanced mechanical design course, Panat teaches his students the fundamentals of mechanical design by making connections to real-world industrial applications.

"When students present their projects in class, I always tell them to present their work as if they are talking to senior managers in a company, says Panat. Having technical knowledge is important but getting to know how to communicate that knowledge to different audiences is equally critical."

"A lot of times, people think it's difficult to go back and pursue their dreams after being at one place for so long. But I always tell people to push themselves to get to where they want to be."

MERGING MICROSYSTEMS AND ROBOTICS



Sarah Bergbreiter brings her expertise to the College of Engineering

Sarah Bergbreiter has loved robotics since watching Star Wars as a child. That love continued when she learned of small-scale robotics and decided to pursue the discipline in her graduate studies. "It's an enormous challenge to build a big robot," she says. "It's an even bigger challenge to build a tiny robot the size of an ant!"

Joining the Department of Mechanical Engineering in Fall 2018, she directs the Micro Robotics Lab where her team uses microsystems, microfabrication, and novel materials as a tool to improve robotics.

Prior to her arrival at Carnegie Mellon University, she taught at the University of Maryland for the last decade. There, she appreciated the academic culture she, her students, and her colleagues created. She looks forward to investing herself in CMU's history of robotics and microsystems and working alongside the university's faculty and students.

After all, "the most important resource in any research program are the people," Bergbreiter says. "I hope that my research group continues to grow, and can create a bridge between robotics and research in microsystems/additive manufacturing." As one example, she plans to continue her past research developing microfabricated soft sensors to detect mechanical signals such as strain or pressure. Deploying these sensors on robots will allow autonomous systems to more easily adapt to environments and interact with people.

Bergbreiter received her B.S.E. in electrical engineering from Princeton University in 1999 followed by a short stint at a small startup building sensor networks. She received an M.S. and Ph.D. from the University of California, Berkeley, focusing on micro-robotics. She joined the University of Maryland, College Park in 2008 as an assistant professor of Mechanical Engineering with a joint appointment in the Institute for Systems Research.

"How can we build and take advantage of 100s to 1000s of mechanosensors on robotic systems?"

She received a DARPA Young Faculty Award in 2008, a National Science Foundation (NSF) CAREER Award in 2011, and a Presidential Early Career Award for Scientists and Engineers Award in 2013 for her research on engineering robotic systems at sub-millimeter scale. She also earned the Best Conference Paper Award at IEEE's International Conference on Robotics and Automation (ICRA) in 2010 for her work incorporating new materials into micro-robotics.

Bringing her expertise to Carnegie Mellon's College of Engineering, Bergbreiter and her research team will ask questions ranging from "how should ant-scale robots move?" to "how can we build and take advantage of 100s to 1000s of mechanosensors on robotic systems?" to "how can we better design robots made of many materials with widely varying properties?" We're looking forward to the answers.

FROM BIOINSPIRED TO BIOHYBRID

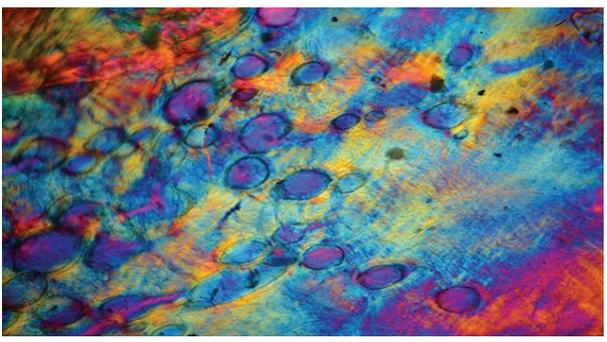
When we think of robots, we think of metal, machines, and hard surfaces. But robots come in many different shapes and sizes. They have evolved from simply looking like industrial machines to taking physical and behavioral inspiration from biology. These bioinspired robots, in turn, have led to innovations in biohybrid robots, which are made of materials from living organisms.

"My goal is to create a completely organic autonomous robot that we can program via natural learning pathways to perform specific tasks."

Assistant Professor in Mechanical Engineering Victoria Webster-Wood uses organic materials to build robotic devices for eventual real-world applications. After joining Carnegie Mellon University in Fall 2018, Webster-Wood established the Biohybrid and Organic Robotics Group (B.O.R.G.) to research and develop biohybrid robots.

"My goal is to create a completely organic autonomous robot that we can program via natural learning pathways to perform specific tasks," said Webster-Wood. "It's a very long-term goal."

B.O.R.G. has two main research thrusts. The first is to use organic materials to build the four fundamental components of robotic systems: the structures, actuators, sensors, and controllers. Webster-Wood aims to build devices that can be used for a variety of applications in fields such as medicine and environmental science. The second thrust is to study and develop biohybrid prosthetics, analyzing how to build technologies that will allow them to create large-scale tissues. These tissues will in turn be used to create large-scale muscle for clinical applications.



As a Ph.D. candidate at Case Western Reserve University, Webster-Wood initially began her research in bioinspired robots, looking at animals for design inspiration while using traditional materials and actuators.

"We were always trying to make our robots more robust and more flexible, more adaptable, more compliant, more like animals, doing the crazy things that animals do," she said. "Muscle naturally addresses these problems. It's squishy. It has fairly good energy efficiency. It has a pretty good force-to-weight ratio. It ticked all these boxes for what we wanted in our actuators. From there, it organically expanded: if we can use muscle as actuators, what about the other systems?"

In her first semester at Carnegie Mellon, Webster-Wood is looking forward to innovating how we perceive and define robots. To build completely organic robots, she hopes to develop a line of materials made from biological polymers, tissues, and proteins that have well-characterized material properties.

The next step? Cultivate the biohybrid technology to move outside the petri dish and improve the longevity of the robots.

"I want to really start studying how the structure of these different tissues affects their function: are there fundamental design guidelines we can extract to design biohybrid robots? Then we can start building up on that technology towards advanced biohybrid robotic systems."

FACULTY RECOGNITION

Associate Teaching Professor **Mark Bedillion** ('98, '01, '05) was awarded the Struminger Fellowship for his proposal, "A Portable Laboratory for Dynamic Systems and Controls." **Donald Struminger** ('59) created the fellowship to recognize untenured faculty members showing exceptional dedication to undergraduate education.

Chief Academic Officer for the College of Engineering and Professor **Jonathan Cagan** received Carnegie Mellon University's Robert E. Doherty Award for his substantial and sustained contributions to excellence in education.

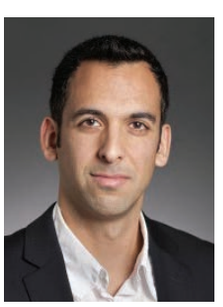
Assistant Professor **B. Reeja Jayan** earned the 2018 National Science Foundation Faculty Early Career Development Program (CAREER) Award to pursue research in 3D printing ceramics. She was also named to Pittsburgh Magazine's 2017 40 Under 40.

Professor **Philip LeDuc** received the College of Engineering's 2018 Outstanding Mentoring Award in recognition of excellence in mentoring graduate students.

Associate Professor **Carmel Majidi** has launched two spin-off companies: Arieca creates the thermally conductive thubber material and Lifewear makes highly flexible electronic stickers for wearable computing in health care.

Professor **Jeremy Michalek** ('99) earned the College of Engineering's Steven J. Fenves Award for Systems Research. He also shared his expertise on electric vehicles and public policy with news outlets ***Fortune***, ***Scientific American***, and ***Wired***.

Professor **Yoed Rabin** was elected to the 20th Board of Governors of International Society of Cryosurgery (ISC).

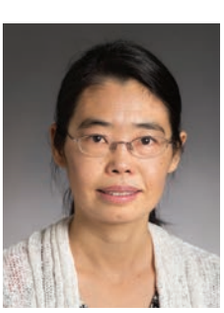


Professor **Allen Robinson** was named a fellow in the American Association of Aerosol Researchers (AAAR).

Associate Teaching Professor **Satbir Singh** received the Dean's Early Career Fellowship for using computational analysis to help students connect textbook-based learning with engineering applications.

Assistant Professor **Rebecca Taylor** earned funding through the Air Force Young Investigator Research Program to develop next generation sensors with DNA and peptide nucleic acids (PNA).

Assistant Professor **Venkat Viswanathan** received a Sloan Fellowship, the College of Engineering's George Tallman Ladd Research Award, and was named to Pittsburgh Magazine's 2017 40 Under 40 for his work on next generation batteries.



Professor **Yongjie Jessica Zhang** and visiting professors Zhonggui Chen and Juan Cao from Xiamen University received the best paper award at the 2018 Solid and Physical Modeling Conference.

FOND *Farewells*

Shi-Chune Yao

After 41 years in the Department of Mechanical Engineering, Professor **Shi-Chune Yao** has retired. During his tenure, he advised nearly 50 Ph.D. and master's students, published more than 220 papers, and served on numerous college and university committees.

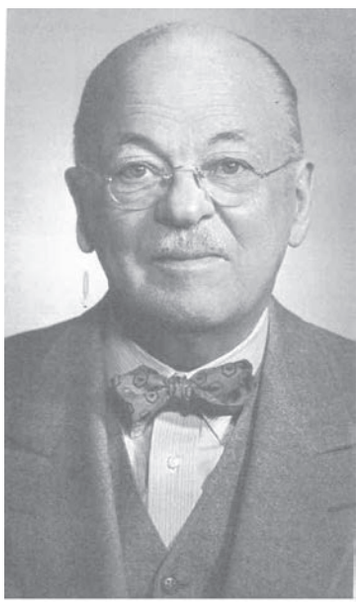
"Professor Yao taught me the art of doing systematic fundamental research with a view to eliciting insights into applications that I still teach to my students. Professor Yao has remained a dear mentor to me," said former advisee **Ranga Pitchumani** ('88, '92), now a professor of mechanical engineering at Virginia Tech.

Jim Dillinger

After dedicating 37.5 years to the Department of Mechanical Engineering, **Jim Dillinger** retired as machine shop foreman. Prior to his retirement, he had earned the College of Engineering's Continuous Excellence Award for his work teaching students, supporting faculty research, and overseeing machinists.

"Jim has guided countless students on how to better design and build prototypes and projects for research and coursework. His patience and positive attitude while working with students is admirable," said **Ed Wojciechowski**, engineering lab assistant and technician in MechE.

ZIPPER INVENTOR'S LEGACY LIVES ON THROUGH MECHE FELLOWSHIP



Gideon Sundback, credited as inventor of the modern-day zipper, developed the "Hookless No. 2" in 1914. Over a century later, the legacy of this clever and determined engineer endures around the globe through the ubiquitous fastening device. Gideon's memory has a special place at Carnegie Mellon University, where his work continues to inspire young creators through a generous fund established by his family – the G. Sundback Graduate Fellowship in Mechanical Engineering.

Since 2006, eleven MechE graduate students have received the G. Sundback Fellowship. With research ranging from engineering design to hydrogen fuel cells, these students exemplify the same tireless problem-solving skills as the fellowship's namesake. With fellowship support, the students can focus on tackling real-world challenges in the lab, exploring new ideas in the classroom, and even collaborating with leading professionals in industry.

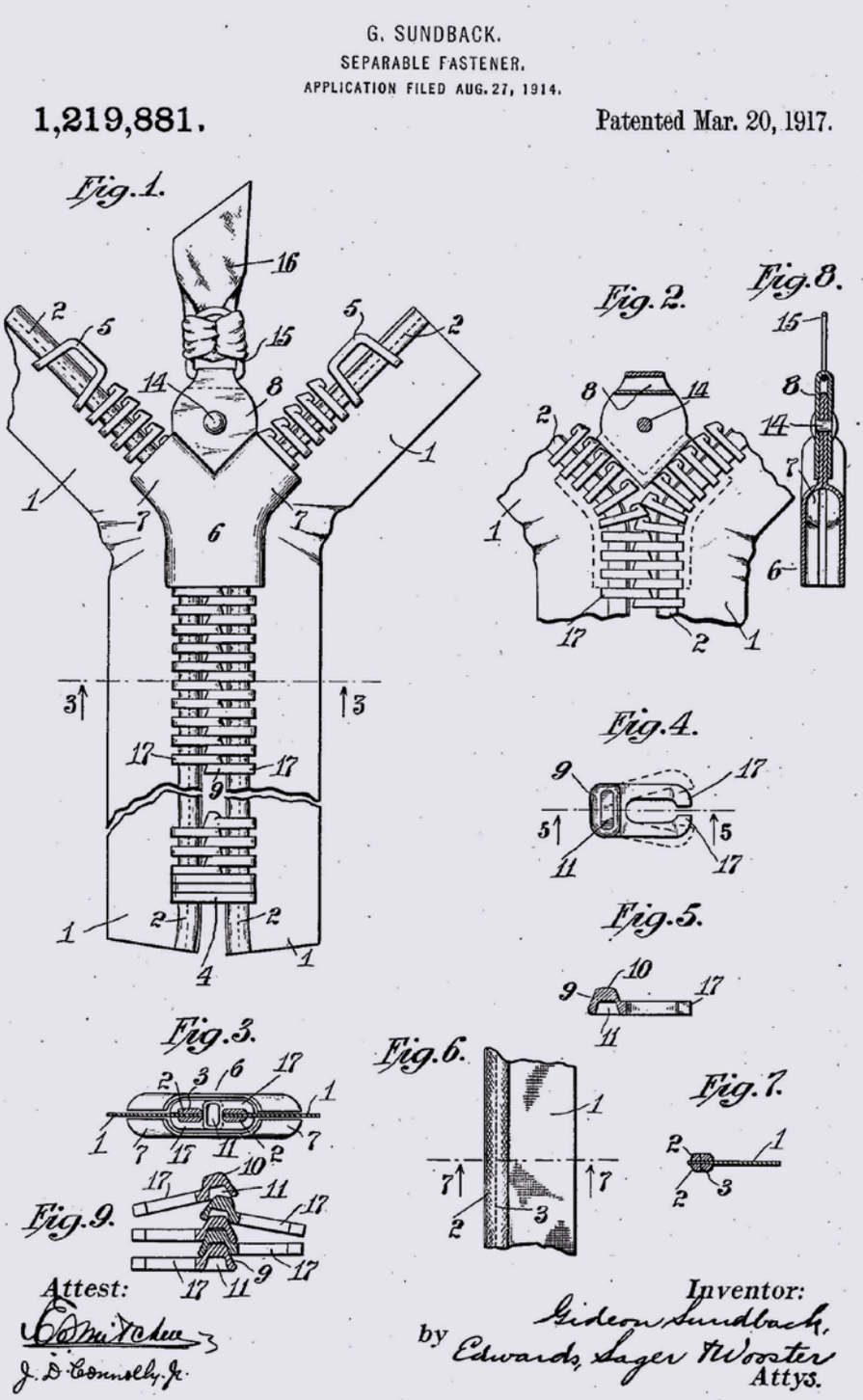
For some students, like 2009-2010 recipient Frank L. Hammond III, the G. Sundback Fellowship means even more. For Hammond, it provided enough funding to complete several experiments critical to his doctoral research at Carnegie Mellon. With the support he received, he finished his Ph.D. thesis focused on the design of cutting-edge medical and industrial robots and was able to line up the next step in his career. Hammond now teaches at Georgia Tech and continues to foster the success of other promising young students.

The fellowship, and the determination that the award encourages, is a fitting celebration of Gideon. His family fondly remembers him for his strength and resolve. "Gideon was not the hard driving guy that you might expect from a CEO today. He was an engineer that kept things going," says Gideon's son Eric. "This fellowship is a way for us to honor his hardworking nature."

Gideon spent years developing what we now know as the zipper. Like all engineers, he was looking to solve a problem: make fastening clothing and other items simpler and more secure. As head engineer for Hookless Eye (which eventually became Talon Inc.) he made numerous, incremental advances towards perfecting both the zipper and the machinery used to produce the product. His zipper manufacturing machine was known for its efficiency. The "scrapless" machine produced large amounts of product a day with no waste. It took decades for the zipper to be widely adopted by the clothing industry, but after World War II the device was embraced.

"My father was totally interested in quality; this was his hallmark. He didn't quit when he had something partially done," says Eric. "Perfecting [the zipper] was what kept him going for a long time."

Gideon's family is motivated to support MechE because of Carnegie Mellon's dedication to innovation and the students' drive for success. The family also has ties to the Pittsburgh area, beginning with Gideon. After emigrating to the United States in 1905, Gideon worked at Westinghouse Electric and Manufacturing Company in Pittsburgh. The G. Sundback Graduate Fellowship, and the memory of Gideon that it holds, motivates discovery in MechE – perhaps for the next device as universally useful as the zipper.


G. SUNDBACK.
SEPARABLE FASTENER.
APPLICATION FILED AUG. 27, 1914.

1,219,881. Patented Mar. 20, 1917.

Fig. 1.

Fig. 2.

Fig. 8.

Fig. 4.

Fig. 5.

Fig. 3.

Fig. 6.

Fig. 7.

Fig. 9.

Attest:
J. D. Connolly, Jr.

Inventor:
Gideon Sundback,
by Edwards, Sager & Wooster
Attys.

"I am honored to be one of the recipients of the G. Sundback Graduate Fellowship. The fellowship will enable me to continue my research, which is using the powerful technique of Isogeometric Analysis in advanced image analysis problems, such as image registration, geometric modeling and image-based analysis.

I am interested in applying for faculty positions after my graduation, and this generous support will be crucial towards attaining my career goals. Thank you for enabling this wonderful opportunity!"

Aishwarya Pawar, Ph.D. student

Hahna Alexander (2012), earned honorable mentions in the Start-Up Entrepreneur and Innovation in Energy categories at the 2018 Carnegie Science Awards. She is CEO and co-founder of SolePower.

Alec Assaad (2015), is co-founder and lead engineer of Skycision, a startup that helps farmers derive actionable insights from drone-collected imagery. The company won the Start-Up of the Year award from the Pittsburgh Technology Council.

Best friends for 60 years, **Paul Bohn** (1961) and **Bill Feige** (1961) reminisced about their buggy-pushing days during Spring Carnival 2018. Both are members of the Order of the May and the Andrew Carnegie Society.

Earl Crane (2000), co-founder and CEO of the Emergent Defense Network, spoke at the SXSW Conference in March.

After participating in the Rethink the Rink Make-a-Thon last spring, **Alexander Duncan** (2017, 2018) interned with Covestro to further develop prototypes for safe hockey rink dasher boards.

Bryony DuPont (2010, 2013), an assistant professor of mechanical engineering at Oregon State University, was quoted in a Newsweek article about open ocean wind turbines and electricity production last October.

Aubrey Donnellan (2007), founder of Bear Flag Robotics, was interviewed by TechCrunch about her startup's autonomously-driven tractor and how the technology can help to address issues in agriculture.

The Carnegie Science Awards recognized Allegheny Country Executive **Rich Fitzgerald** (1981) with the Chairman's Award for his leadership in revitalizing Allegheny County into a modern technological hub.

Zachary Francis (2015, 2017), an additive manufacturing software developer at ANSYS, returned to campus as a guest lecturer in the course Additive Manufacturing Laboratory.

Alumnus **Kosa Goucher-Lambert** (2014, 2017) received the Reviewer's Favorite award at the 2017 International Conference on Engineering Design for his paper "Using crowdsourcing to provide analogies for designer ideation in a cognitive study."

Lindsay Hanna (2008, 2009) and **Eric Landry** (2007, 2009) were featured in a September 2018 Hartford Courant article about work-life balance as engineers and parents.

Hyliion, founded by CEO and alumnus **Thomas Healy** (2014), won the 2018 Jim Winsor Memorial Technical Achievement Award.

Jake Helmers (2014) led his team to win the U.S. Navy's Isherwood Award for developing and testing an unmanned underwater vehicle container for mine detection.

We want to hear from you! Email your news to

ALUMNI MAKING HEADLINES

Nicole Huang (2016), a medical student at the University of Virginia, was featured in a story on Carnegie Mellon's website about combining her passions for medicine and engineering through CMU's Health Professions Program.

Lanterman Group founder **Anthony Hughes** (1995) launched ACADEMI, the first national hands-on certification program focused on designing and producing products for 3D printing.

Rajil Kapoor (1992), Lyft's chief strategy officer, was named #37 on Recode's 2017 Top 100 people in tech, media, and business.

Djitt Laowattana (1990, 1994) was featured in the Bangkok Post for over two decades of work in bringing automation and robotics to Thailand through his Institute of Field Robotics at King Mongkut's University of Technology Thonburi.

Sneha Prabha Narra (2015, 2017) joined Worcester Polytechnic Institute as an assistant professor of mechanical engineering after pursuing postdoctoral research in Jack Beuth's Advanced Manufacturing Lab.

Rich Pantaleo (2009) was profiled by the Observer-Reporter in August 2017. A senior mechanical engineer for the National Robotics Engineering Center, he also owns his own photography enterprise.

Isabel Roscoe (2018) was quoted in the Boston Globe last March about the "Rethink the Rink" make-a-thon, a collaboration between Carnegie Mellon, Covestro, and the Pittsburgh Penguins to make hockey safer. She is a Carnegie Mellon MBA candidate.

Prior to graduating with a master's in integrated innovation for products and services, **Olivia Roy** (2017, 2018) received the Carnegie Mellon Student Engagement Award for her significant contributions to the quality of life at the university.

Maria Sensi Sellner (2001, 2003), served as guest conductor for the Westmoreland Symphony Orchestra during its December 2017 holiday concert.

Joe Sepic (1938), 101 years old, was featured in the Tampa Bay Times in August 2017 for his dedication to the sport of golf. He spent his career as a mechanical engineer at Curtiss-Wright Corp. and made his first-hole-in-one at age 98.

In an episode of Xploration Awesome Planet, **R. Subramanian** (2004) demonstrated his network of RAMP sensors that measure pollution and provide actionable air quality data to the public. He is a researcher with Make Our Planet Great Again in Paris, France.

Heather Tomko (2010) was named Miss Wheelchair USA in July 2018. At the ceremony, she also received the Invacare People's Choice Award and the Dr. Georgi Hudson Smith Quest for Knowledge Award.

Matthew (Bonacci) Westin (2006) was named the 2018 International Music and Entertainment Association's Male Country Artist of the Year.

James Wissman (2017) is a postdoctoral engineer through the National Research Council (NRC) Research Associateship Programs at the U.S. Naval Research Laboratory.

me-alumni@andrew.cmu.edu

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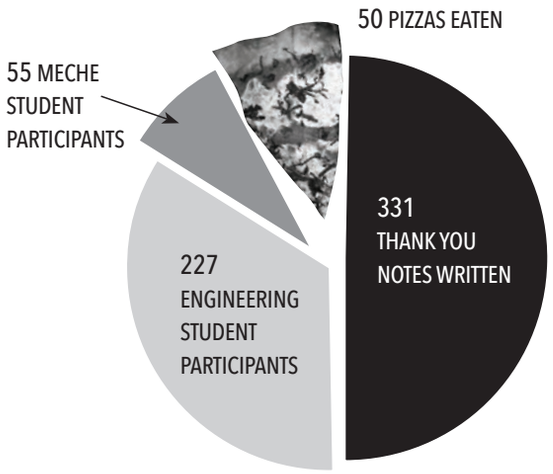
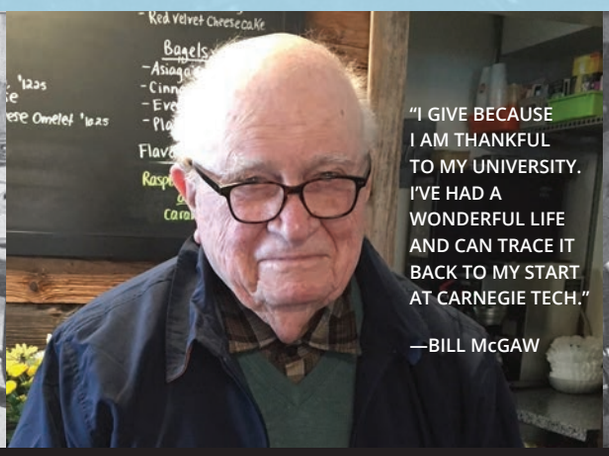
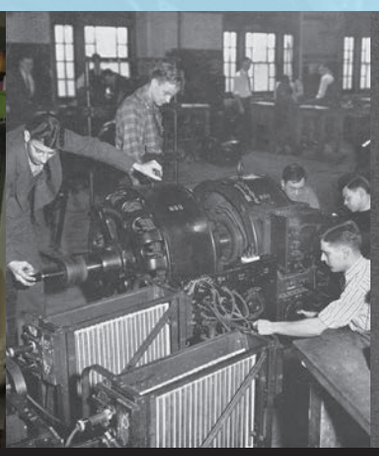


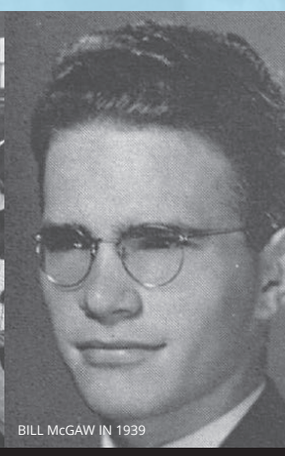
THANK A DONOR DAY

On March 28, MechE students joined their peers from across the college for a pizza party in celebration of Thank-a-Donor Day. At the event, students showed their appreciation for College of Engineering donors.

They wrote personal thank you notes to the alumni, friends, students, and staff who have given gifts to spark innovation in research, create new student programs, and build state-of-the-art facilities in MechE.






BILL McGAW IN 1939

Give strategically, Support generously.

BILL McGAW (MechE '39) sees motivation in hard work. During a 35-year engineering career at Pratt & Whitney, he was instrumental in converting gas turbines from aircrafts and battleships for use in operating pumps and electric power generation.

At Carnegie Mellon University, Bill has created a lasting legacy by establishing two gift annuities that will support a graduate fellowship in mechanical engineering, spurring innovation for generations to come. Bill named the fellowship in honor of his father (CIT 1917) and mother. The fellowship is a fitting celebration of Bill's parents, who worked hard in order to support his education.

Learn how easy it is to achieve your philanthropic vision through a planned gift by visiting giftplanning.cmu.edu. Contact the Office of Gift Planning today at 412.268.5346 or askjoebull@andrew.cmu.edu.

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College of Engineering

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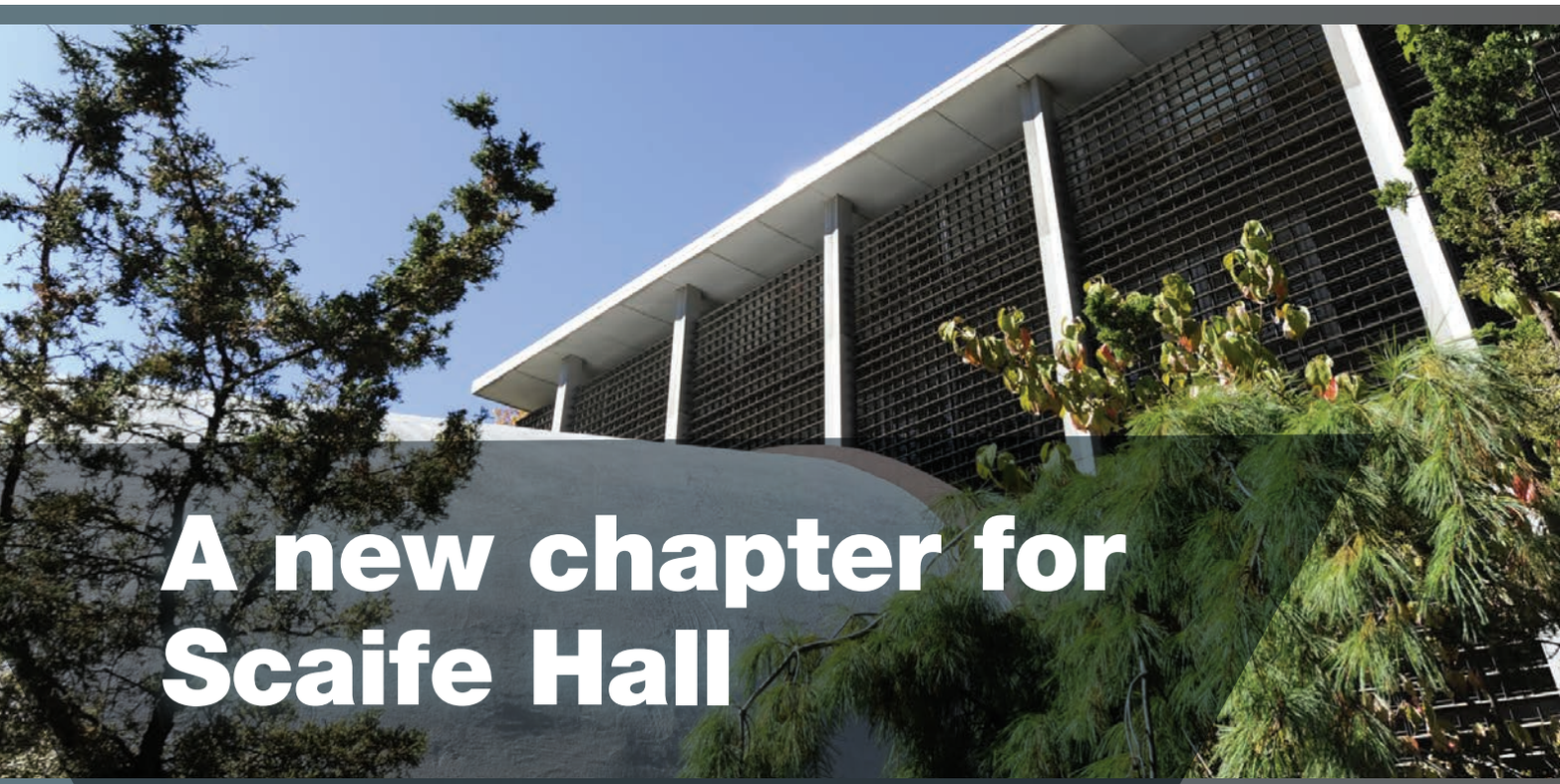

A new chapter for Scaife Hall

"The demand for mechanical engineers—and for Carnegie Mellon's innovative approach to real world problem solving through advanced collaboration—is stronger than ever."

Allen Robinson
Professor and Head
Department of Mechanical Engineering

With a generous lead grant from the Allegheny Foundation, the university has announced plans to build a new Scaife Hall. The building will feature expanded, technology-rich labs; modern, flexible classrooms; and spaces that facilitate formal and informal collaborations. The new building will more than double the size of the existing one, expanding the footprint on Frew Street and forming an engineering and maker quad with Hamerschlag and ANSYS Halls.

https://engineering.cmu.edu/news-events/news/2018/10/26-scaife-hall.html