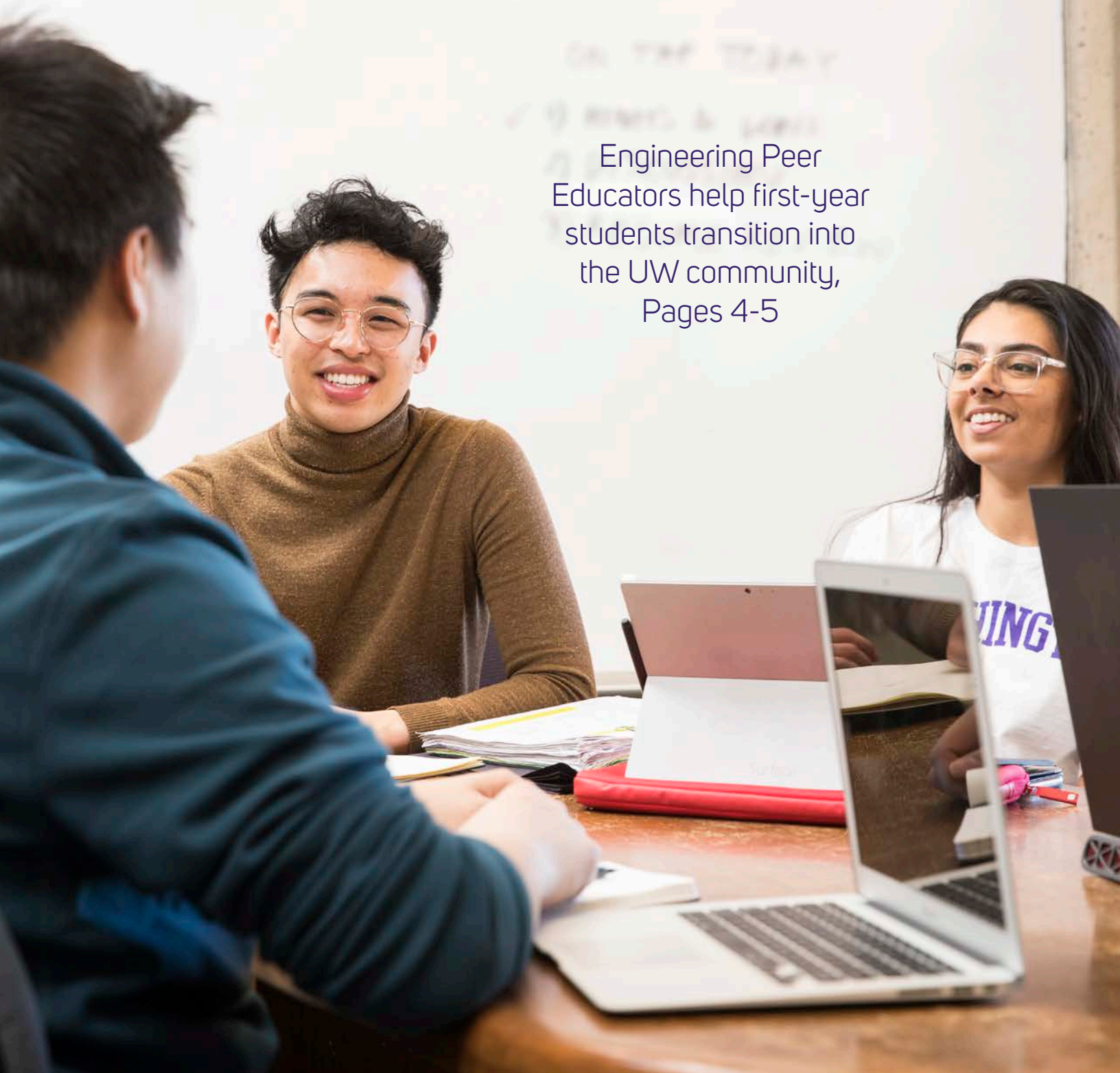


# The Trend in **ENGINEERING**

UNIVERSITY OF WASHINGTON COLLEGE OF ENGINEERING NEWSLETTER SPRING 2019

Engineering Peer  
Educators help first-year  
students transition into  
the UW community,  
Pages 4-5



## FROM THE DEAN

This spring is my last as Dean, and as I reflect on all we've accomplished together over the last six years, I'm also enthusiastic about what lies ahead. This is such an exciting time to be an engineer and a researcher. Our faculty lead the nation in many areas of research; it's wonderful to watch that energy expand.

We have faculty and students shaping fields from data science to clean energy to robotics — growth that is evident in several recent collaborations that have resulted in significant investments by federal agencies and leading industry



partners. And our faculty are forging new frontiers with a quantum initiative called the Northwest Quantum Nexus. Quantum systems promise the next revolution, and the UW is poised to lead in the research, implementation, and education critical to our future economy and personal well-being.

In this issue, you'll learn more about how we're continuing to transform undergraduate engineering education through programs like our new Engineering Peer Educators mentorship program, and you'll pay a visit to our newest campus makerspace, The MILL. You'll also meet inspiring members of the UW Engineering community, including an environmental engineering student committed to increasing solar power on campus, industrial engineering professionals who are mentoring students as they prepare to enter the workforce, and, of course, our 2019 Diamond Awards recipients.

I can't mention our strong engineering community without acknowledging those who came together to support the new Bill & Melinda Gates Center for Computer Science & Engineering. Several companies and more than 500 individuals who share the College's commitment to access, community and excellence made the building, which opened this winter, possible.

I've always been impressed by our alumni's dedication and ongoing connection to the UW. It inspires me to think of even more great things to come for the College and our students.

Mike Bragg  
*Frank & Julie Jungers Dean  
of Engineering*

## Jim Pfaendtner appointed as Chemical Engineering chair

Jim Pfaendtner, the Jagjeet and Janice Bindra Endowed Associate Professor of ChemE, was named chair of the department



in January. His research is in the field of computational molecular engineering and science, focusing on the area of interfacial phenomena of biomolecules and the study of complex reacting systems. Pfaendtner has provided leadership in ChemE in various roles since 2009, and he holds multiple appointments on campus — as an adjunct professor of chemistry, a Pacific Northwest National Laboratory senior scientist, an eScience Institute senior data science fellow, and most recently the Associate Vice Provost for Scientific Computing.

## Engineering students impress at 2019 Alaska Airlines Environmental Innovation Challenge



An idea to make battery technology more sustainable electrified the judges who awarded the \$15,000 grand prize to Mechanical Engineering's MOTiF Materials team. Engineering teams also secured the Clean Energy Prize and the "Judges Also Really Liked" award.

# Increasing access and opportunities

## Bill & Melinda Gates Center opens a new era of computer science education and innovation at the UW.

On February 28, local tech, policy and UW leaders convened to officially open the Bill & Melinda Gates Center for Computer Science & Engineering.

The 135,000-square-foot Gates Center provides space to accommodate a doubling of the Paul G. Allen School of Computer Science & Engineering's student body, which has steadily grown over the past five years with funding from the Legislature.

The building's layout and design reflect the school's commitment to delivering an unparalleled educational experience to its students. The building houses two 100-seat classrooms; a 240-person auditorium; five seminar rooms; an event center; collaboration spaces; offices; student support spaces; and laboratories, including a wet lab, a 3,000 square-foot robotics lab, a fabrication lab, the Center for Neurotechnology, the Center for Game Science, the UW Reality Lab, and the Taskar Center for Accessible Technology.

"We invent technology, but we're all about people," said Hank Levy, Director of the Allen School. "This building was designed to cultivate a welcoming environment and strong sense of community for a diverse student population."

"Even more than the building itself, what's really important is what goes on inside: the teaching, the research, the learning," said Microsoft President Brad Smith, who led the fundraising campaign.



Speaking at the building dedication Bill Gates said, "It's amazing when a local university produces talented graduates who go on to launch companies and then ultimately give back to the institution. This state is very lucky that that's going on here in such a strong way. The frontiers of software are as important and exciting as they've ever been."

The \$110 million building was funded through a public-private partnership that included contributions from the state Legislature, the university, technology companies including Microsoft, Amazon, Zillow, Google and Madrona Venture Group, and more than 500 individuals — including more than 300 Allen School alumni. While Bill and Melinda Gates were among those who generously supported the project, their participation was not the reason behind the building name. Microsoft and 13 couples who are long-time friends and colleagues of the couple came together to name the building in their honor.

"This is a wonderful Seattle story," said Allen School professor Ed Lazowska. "When I joined UW, computer science had just 12 faculty members, and Microsoft was a dozen 20-somethings in Albuquerque. Today, the Paul G. Allen School is one of the world's leading computer science programs, and the Puget Sound region is one of the world's great technology centers. We're blessed to belong to a true community — people and organizations that help one another to grow and excel."

*Left: Bill Gates, Brad Smith, Jay Inslee, Ana Mari Cauce, Ed Lazowska and Hank Levy toast the new building. Photo by Matt Hagen*

# PEER-TO-PEER EDUCATION

By Chelsea Yates  
Photos by Mark Stone / University of Washington

Through the College's new Engineering Peer Educator program, experienced undergraduates help first-year undeclared students transition into the UW Engineering community.

His first year at the UW, Miguel Monserate decided to major in bioengineering. "My parents worked in health care, and I was curious about engineering, so bioengineering seemed like a good fit," he says.

But after getting into the program, he realized he didn't like biology and cellular engineering. He began to panic.

"I wished I'd learned more about bioengineering — and engineering in general — before committing to a major," he reflects. "I felt like it was too late to change my mind, and I worried I was going to be stuck in a field I didn't like."

Fortunately for Monserate, his worries subsided once he was introduced to bioelectronics and medical imaging. He discovered he loved applying electrical technologies to health care so he stuck with his major.

"Questioning your major when you've worked so hard to get into a program is a terrible feeling, and I knew I couldn't be the only student in that situation," he says. "I wanted to

share my experience and make sure others felt more prepared and less alone."

This past year, the BioE senior became one of 50 engineering students who took part in the inaugural Engineering Peer Educator (EPE) program. The program is designed to help first-year undeclared engineering students transition into the community while providing upper-class students with leadership and mentorship opportunities. An EPE leads a class of about 20 first-year students on an introductory journey — exploring engineering disciplines and career pathways and building a support network along the way.

## Establishing E-FIGs

"This year, 950 engineering undeclared students came to campus through the inaugural Direct-to-College admission (DTC) process," says UW Engineering's Associate Director of Advising & Student Engagement Shanai Lechtenberg. "We wanted to set them up for success."

A key component was connecting new students with current engineering students. Academic adviser Lauren Fryhle had previously managed a small-scale peer mentor program and, based on its success, she and Lechtenberg saw an opportunity to expand it by developing the EPE program and Engineering First-Year Interest Groups (E-FIGs).

*This page: "As an EPE, I've worn so many hats — instructor, mentor, coach, advocate, adviser, friend," says BioE senior Miguel Monserate, right.*

*Opposite page: "Thanks to my E-FIG, I'm now involved in many student organizations, and I'm excited to take part in some of the innovation challenges on campus," says first-year student Pamel Kang, right.*



"E-FIGs are designed to help students make more informed decisions when it comes time to declare their majors," Fryhle explains. "It's not uncommon for students to arrive on campus intending to study engineering, but having never heard of industrial engineering or human-centered design. Similarly, few incoming students are aware they can pursue health care through mechanical engineering or sustainability through chemical engineering."

This peer-to-peer engineering education model is an innovative way to build community, encourage leadership and help students understand the diversity that engineering offers.

"Peers are a powerful resource," says Fryhle. "With training, structure and support, peers can become some of the best educators for new students."

### Sharing the student experience

Experienced students apply to become EPEs during winter quarter. Selections are made, and training begins in the spring for the weekly classes they will lead in the fall. During their classes, they facilitate discussions and manage lesson plans and grading. EPEs receive a \$1,000 scholarship and academic credit for their work.

"It's a competitive process," says Lechtenberg. "We look for students across the College who are interested in leadership, communication and service, and who want to grow as individuals."

Being an EPE may seem like a big commitment for engineering undergraduates, but most of them, like Monserate, view it as a one-of-a-kind opportunity.

"As an EPE, I've worn so many hats — instructor, mentor, coach, advocate, adviser, friend," he says. "My time and project management skills are sharper, and I'm better at synthesizing information and thinking on my feet."

Monserate has especially appreciated the opportunity to support other students.

"EPEs are students, too, and even though we're a few years ahead, we still have homework, exams and projects. We're also attending career fairs and working on our resumes. So in a way, we're all sharing the engineering student experience," he says.

First-year student Pamel Kang was in Monserate's class. At first she was skeptical about the E-FIG but says that quickly changed.

"When I arrived on campus, I wanted to focus on my math and science classes," the Spokane native recalls. "But Miguel's class turned out to be a great experience. He was committed to creating a supportive community in our classroom, and I made some good friends because of it."

It also introduced her to different kinds of engineering.

"I want to work with biomaterials and am pretty sure I want to study bioengineering, but I'm now also interested in learning more about materials science as there's a lot of overlap," she says. "I didn't know that was an engineering field before the class."

### Setting students up for success

After graduating this June, Monserate will work at Philips Healthcare as an ultrasound engineer. He's quick to add that his EPE experience will follow him beyond the UW and plans to continue to make time to help others.

And Kang says that, while she's excited to focus on engineering research, she hasn't ruled out applying to be a peer educator.

"Thanks to my E-FIG, I'm now involved in many student organizations, and I'm excited to take part in some of the innovation challenges on campus," she says.

More than anything, she's grateful for the sense of community the program has given her.

"Engineering still feels competitive, but thanks to my E-FIG experience I know I'm not alone," she says.



**Help support the EPE program by contacting Jessie Muhm, Associate Director of Advancement, at [jmuhm@uw.edu](mailto:jmuhm@uw.edu).**

# LOOKING BACK, LOOKING AHEAD

**As his tenure comes to a close, Dean Michael Bragg reflects on where the College of Engineering has been since he joined in 2013 and where it's headed next.**

After six years as the Frank & Julie Jungers Dean of Engineering, Mike Bragg will retire in June. Under his leadership, the College raised over \$435 million in private support, completed three facilities projects, established the Institute for Nano-engineered Systems, secured state support to grow enrollment and expand facilities, and hired 80 new faculty members to join the UW community.

Dean Bragg anchored his leadership in two guiding principles: excellence and access. During his tenure, several initiatives to improve the student experience were advanced, including the introduction of the Direct-to-College (DTC) admissions process and the expansion of STARS, the academic redshirt program to increase access and diversity amongst the undergraduate student body. The College grew partnerships with UW Housing & Food Services to offer engineering living-learning communities and makerspaces in residence halls, and in conjunction with the UW Career Center, opened the Career Center @ Engineering to support and connect engineering students and industry partners.

*The Trend's* Chelsea Yates recently sat down with Dean Bragg to reflect on where the College has been since he arrived on campus and where it's headed next.

## **What were your priorities for the College when you arrived at the UW?**

When I arrived, the College was recovering from the Great Recession and experiencing unprecedented demand from the community for engineering education. I intended to focus on expanding the College, building connections with local industry, supporting the research mission and addressing our aging infrastructure. What perhaps surprised me was that soon after arriving it became clear the undergraduate experience needed attention. Our admission process was outdated and in need of revision. Students identified admissions and

department placement as areas that had the greatest potential to improve the student experience. It's what ultimately led us to pursue DTC.

## **Of all that's been accomplished in the last six years, what do you see as having the most impact?**

The implementation of DTC and our work to expand diversity and access programs. As a great public university, the UW must serve all the communities in the state. Engineering is centered on problem solving, and research shows that diverse teams lead to more innovative solutions. A diverse faculty and student body enable all students to interact with peers who have varied perspectives rooted in different backgrounds. These experiences are highly valued by employers and give students the skills they need to succeed in an interconnected world.

I'm proud that the UW has the highest percentage (24.2%) of female faculty in the top 25 colleges of engineering, but that number still needs to be higher. Similarly, our access and diversity programs, like STARS, are making important interventions, but there's still more work to do.

The state's investment to increase enrollment has also had great impact and the College has almost doubled in degrees granted since 2009.

## **What do you see as the College's top priorities moving forward?**

Expanding engineering education opportunities and facilities to serve more Washington students. The state of Washington is the top importer of engineers with bachelor's and advanced degrees because our universities aren't keeping up with demand.

It's also important to understand how the nature of engineering education has changed. When I was in school, I went to class and then home or to the library to

study. For that education model, a traditional classroom facility fit. But today's engineering education focuses on project-based learning — hands-on research and prototyping, design challenges, crossdisciplinary teamwork — activities that require different kinds of facilities. That's why we're moving forward with a campaign to build a new interdisciplinary teaching and research building.

### **What opportunities are on the horizon for the College?**

There is such a wonderful engineering and tech community here in the Northwest and many opportunities to continue to grow and deepen our connections with industry. This is an exciting time to be an engineer and a researcher. Data science and artificial intelligence are changing our world and quantum systems promise the next revolution.

The UW is poised to lead in the research, implementation, and education critical to our future economy and personal well-being. This is a college that is ascending, and I'd like to see us be even more visible in the region and connect with more engineering leaders across the state. But also on the global stage — it's important to explore and build partnerships with industry worldwide.

### **What role can alumni play?**

Meeting and interacting with so many interesting and distinguished alumni has been a highlight of my tenure as dean. Whether they're leading companies or starting out in their professional careers, alumni can help build connections, mentor students, share their insight and support research and other opportunities on campus. Alumni are crucial to the success of our Be Boundless campaign; the impact of that support will be felt for years to come.

### **How can the College best serve the state of Washington?**

By providing a world-class education for more Washington students, most of whom stay in the state after graduating. They work here, start companies,



develop and contribute to products and technologies — all of which helps feed the state's economy. I think this is especially valuable to small companies that may not have the ability to recruit and hire nationally.

We also benefit Washington by serving as an engine of innovation and encouraging students and faculty in technology translation and commercialization. Since 2012, the College has been responsible for 55% of all of UW's startups. The world-class education and research enterprise that we deliver is thanks to our outstanding faculty and staff. The College is an incredible asset to this community and our students.

### **What are your plans for retirement?**

I will continue my research and advise graduate students as an emeritus faculty member in Aeronautics & Astronautics. I'm also looking forward to traveling, spending time with family and supporting initiatives around broader access to higher education.

*Above: Mike Bragg at the 2018 College of Engineering Scholar-Donor Recognition Luncheon.*



# Meet The MILL

*By Chelsea Yates  
Photos by Mark Stone /  
University of Washington*

## **The new campus makerspace provides the UW community with a place to collaborate, innovate and create.**

This fall the UW welcomed a new makerspace: The McCarty Innovation Learning Lab (MILL). Located on the north side of campus in the newly-opened McCarty Residence Hall, the hands-on workspace gives UW students, staff and faculty access to cutting-edge professional equipment, workshop space, an educational wet lab and classroom / meeting space.

A collaboration between the UW College of Engineering and Housing & Food Services (HFS), The MILL is the second residence hall-based makerspace on campus. The other, Area 01's Dabble Lab, opened in Autumn 2015 in Maple Hall.

"Our partnership with HFS is helping to transform how we educate students at the UW," says Brian Fabien, associate dean of academic affairs for the College of Engineering. "By making it more accessible for students to practice engineering together in their living communities, we are laying the groundwork for an innovative approach to engineering education."

### **Living and learning together**

To deepen the campus residence hall experience with the academic mission of the UW, HFS has established six Living Learning Communities (LLCs) across campus, of

which engineering is one. In Maple Hall, which houses a LLC of nearly 800 engineering undergraduates, students can live and learn alongside other engineering students, attend engineering classes, use the makerspace, and participate in on-site career exploration events organized by College of Engineering staff.

Because of the success of the Maple Hall collaboration, when Fabien learned of plans to build McCarty Hall, he approached HFS about the possibility of establishing a makerspace there as well.

"HFS leadership was enthusiastically supportive right from the start," Fabien says. "They truly understand the value of integrating living and learning on campus, and we are thrilled to grow our partnership with them through The MILL."

Encompassing 8,000 square feet originally intended to be a fitness center, The MILL is a high- and low-tech environment that features a variety of tools and resources: 3D printers, laser cutters, advanced sewing machines, and a kiln. Fabien says that it's unprecedented for students to have nearly unlimited access to the same equipment that professional engineers use regularly in industry.

Makerspace staff — including two full-time employees and about 50 part-time students — offer classes and



equipment training at both The MILL and at Area 01 throughout the academic year. Classes at The MILL include introductions to CNC milling, 3D printing, embroidery and sewing, metal and laser cutting, and UV printing, to name a few.

The UW Student Technology Fund helps purchase equipment for The MILL and creates access for the UW student community. The MILL is free to all students who complete the required safety training. UW staff and faculty may purchase a \$25 quarterly membership to use the space.

### **Creative community**

In addition to industry-standard tools and equipment, The MILL features 700 square feet of meeting space, ideal for classes, workshops and events. By the end of the 2018-19 school year, more than a dozen classes and lab sections will have been held at The MILL. Academic and industry partners and registered student organizations are encouraged to host events there as well.

Since its opening, The MILL has been used by more than 1,000 students, many who have visited multiple times (for winter quarter, The MILL reports about 6,500 total student visits). Fabien hopes that the UW community will continue to take advantage on the new space.

**“By making it more accessible for students to practice engineering together in their living communities, we are laying the groundwork for an innovative approach to engineering education.”**

**– Brian Fabien, associate dean of academic affairs**

“The MILL is intended to be the home of experiential learning for engineering students but also a place where the entire UW community can collaborate, design and build,” he says. “We cannot wait to see the creativity and innovation that will emerge from it.”

The MILL is open year-round from 8:30 a.m. to midnight Monday through Friday, and 1:00 p.m. to midnight on the weekends.

*Opposite page: In addition to a variety of 3D printers, laser cutters and a kiln, The MILL houses several sewing machines.*

*This page: The MILL provides UW students, faculty and staff access to cutting-edge professional equipment and work space.*

**Learn more at [hfs.uw.edu/The-MILL](https://hfs.uw.edu/The-MILL)**



# Solar-powered passion

By Brooke Fisher

Photos by Mark Stone / University of Washington

## Civil & Environmental Engineering senior Alex Ratcliff is bringing solar power and increased sustainability to buildings across campus.

When discussing his work to bring solar power to the UW, Civil & Environmental Engineering (CEE) senior Alex Ratcliff lights up.

"UW is ranked the fifth most sustainable college in the U.S.," says Ratcliff, who is vice president and a project manager for the student-run organization UW Solar. "I'd like to make it number one or two."

Through his involvement in UW Solar, Ratcliff has helped bring solar power to three residence halls and has plans to increase the sustainability of even more campus buildings. Overall, UW Solar estimates they have saved the University from producing roughly 270 metric tons of carbon dioxide, equivalent to 30,372 gallons of gasoline, 625 barrels of oil, or 295,000 pounds of coal.

Ratcliff's involvement in UW Solar was serendipitous, thanks to a flyer he picked up at a career fair during his first quarter at the UW. Since then, his passion for a more sustainable campus, and world, has continued to grow.

"It's the most beneficial thing that could have happened to me," Ratcliff says about his involvement in UW Solar. "Climate change is the greatest threat to human security and health, and I have always wanted to pursue a career that allows me to mitigate or even reverse the effects."

### Cultivating solar skills

With about 40 members, UW Solar's students are from various disciplines, from engineering to business to urban planning. Since forming in 2013, members have worked toward sustainable power production on campus to reduce the University's overall carbon footprint.

"Alex has always been an enthusiastic participant and a fast learner, so right away he got involved and he's participated in almost every project since then," says faculty adviser and associate professor Jan Whittington, from the Department of Urban Designing and Planning.



"Climate change is the greatest threat to human security and health, and I have always wanted to pursue a career that allows me to mitigate or even reverse the effects."

- Alex Ratcliff

Acting as consultants, UW Solar students learn skills by working on feasibility studies, reviewing designs, submitting projects for bid, and eventually collaborating with contractors to install solar arrays. To secure project funding, members spend a considerable amount of time writing grant proposals. With a lead role, Ratcliff spends several hours each week searching for and securing new projects and opportunities.

"I have a good work ethic because of my work with UW Solar. I've learned countless skills," Ratcliff says. "I am more diligent with my time, and rather than watch TV, I work on projects that have real meaning and demonstrated effect."

### **Bringing solar power to student housing**

Shortly after joining UW Solar, Ratcliff was tasked with overseeing solar installations on three west campus residence halls: Maple, Alder and Elm Halls.

Ratcliff, who was living in Maple Hall at the time, was involved in every aspect of the project, from completing a feasibility study to monitoring the rooftop solar arrays to securing funding, including \$340,000 from the Washington State Department of Commerce and \$225,000 from Seattle City Light.

Completed in partnership with the UW Clean Energy Institute and UW Housing & Food Services in January 2017, the 100 kW photovoltaic system generates approximately 107,537 kWh per year. The system is also being used as a testbed, providing data to UW researchers who are working to develop more efficient solar energy systems.

"It will have a massive impact on industry as a whole if we can use our infrastructure here for research," Ratcliff says.

### **Campus-wide reach**

As the UW continues to grow, Ratcliff has been involved in advocating for sustainable features in new buildings. The new Life Sciences Building, which opened in September 2018, features Building Integrated Photovoltaics (BIPV) panels on the southern façade. In addition to providing shade, they generate enough electricity to power the lights on the main floor. This is the second installation of a BIPV system in the state of Washington.

"The shade gain is monumental and has a huge impact on cooling of the building, so costs go down tremendously," Ratcliff explains. "We hope this will be a pioneer for all educational institutions in the country."

Two campus master plans will also benefit from Ratcliff's expertise. To maximize solar photovoltaic capacity on all campus buildings, he's helping to develop a 30-year solar energy plan. He's also involved in coordinating sustainable features, such as solar battery storage systems and electric car charging stations, for a second master plan — the Campus Sustainability Plan — being developed by UW Sustainability and UW Transportation Services.

He's also working on a feasibility study for solar installations in the UW Greek system, and designs for solar array installations on the new Population Health Building (currently under construction) and the new Burke Museum, which opens in fall 2019.

### **A bright future**

As he nears graduation, Ratcliff is considering his career options. He will be part of the first cohort of students to graduate with a Bachelor of Science in Environmental Engineering degree, a program that launched in 2017. Not surprisingly, he plans to pursue a career in the sustainable building industry, where he hopes to utilize his skillset to produce net positive buildings that clean and produce more water and energy than they use.

"With solar projects, I can measure how many barrels of oil we are offsetting and how much carbon dioxide is not being emitted," Ratcliff says. "I've always wanted to work on something that I can see fulfilled and have a positive impact."

**Help undergraduates like Alex make an impact with a gift to the Dean's Fund for Excellence: [giving.uw.edu/engineering-excellence](http://giving.uw.edu/engineering-excellence)**

*Opposite page: CEE senior Alex Ratcliff*

*Below: Solar panels on the rooftop of Maple Hall.*



# Robot helper

UW researchers create a robotic arm that assists people with eating.

By Sarah McQuate

About 1 million adults in the United States need someone to help them eat, according to 2010 census data. It's a time-consuming and often awkward task, one largely done out of necessity rather than choice.

UW researchers are working on a robotic system to make it easier. After identifying different foods on a plate, the robot can strategize how to use a fork to pick up and deliver the desired bite to a person's mouth.

"Being dependent on a caregiver to feed every bite every day takes away a person's sense of independence," says lead researcher Siddhartha Srinivasa, the Boeing Endowed Professor in the Allen School. "Our goal with this project is to give people a bit more control over their lives."

To get started, the team needed to understand how people eat. The researchers arranged plates with different kinds of food, ranging from hard carrots to soft bananas, and asked volunteers to pick them up with a fork and feed them to a mannequin. The fork contained a sensor to measure force.

The team found that people used different strategies to pick up different kinds of food. When they tested this with their robot, they found that robots, like humans, need to adjust how much force and the angle they use to pick up different kinds of food.

So, to design a strategy that changes based on the food item, the team combined two different algorithms: an object-detection algorithm called RetinaNet, which scans the plate, identifies the types of food on it and places a frame around each item, and SPNet, an algorithm the researchers developed to examine the type of food in a frame and tell the robot the best way to pick it up.



The team is working with the UW's Taskar Center for Accessible Technology to get feedback from caregivers and patients in assisted living facilities on how to improve the system.

**"Our goal with this project is to give people a bit more control over their lives."**

**- Siddhartha Srinivasa, Allen School professor**

"Many engineering challenges are not picky about their solutions, but this research is very intimately connected with people," Srinivasa says. "If we don't take into account how easy it is for a person to take a bite, then people might not be able to use our system. There's a universe of types of food out there, so our biggest challenge is to develop strategies that can deal with all of them."

*Above: UW researchers have developed a robotic system that can feed people who need someone to help them eat. Here, a volunteer demonstrates how the system works. Photo by Eric Johnson.*

## NORTHWEST QUANTUM NEXUS

### **A joint research center is established for a quantum revolution in science and technology.**

The UW, the Pacific Northwest National Laboratory and Microsoft Quantum have announced a new coalition to develop a quantum-fluent workforce and economy in the region.

The Northwest Quantum Nexus was unveiled during a March summit at the UW. It aims to accelerate research, technologies, education and training in the quantum information sciences.

“The technological and societal impact of the upcoming quantum revolution is going to be enormous,” says Mary Lidstrom, UW vice provost for research and professor of chemical engineering and microbiology.

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## SHWETAK PATEL RECEIVES ACM PRIZE IN COMPUTING

### **The UW researcher has been honored for contributions to creative and practical sensing systems for sustainability and health.**

Shwetak Patel, Washington Research Foundation Entrepreneurship Endowed Professor of Computer Science & Engineering and Electrical & Computer Engineering, is the recipient of the 2018 ACM Prize in Computing.



Awarded by the Association for Computing Machinery (ACM), the prestigious prize recognizes early-to-mid-career computer scientists whose research contributions have fundamental impact and broad implications. After the Turing Award (known as the Nobel Prize in Computing), this is ACM's second most prestigious award in all of computing.

Patel is being honored for his work on developing creative ways to leverage simple sensors and machine learning for energy monitoring in the home and mobile phones for health monitoring.

# Breakthroughs

Read more research news at [enr.uw.edu/news](http://enr.uw.edu/news)

## **An app to detect opioid overdose**

UW Allen School researchers have developed a smartphone app that uses sonar to monitor someone's breathing rate and sense when an opioid overdose has occurred. Called Second Chance, the app detects overdose-related symptoms about 90 percent of the time and can track someone's breathing from up to 3 feet away. Once decreased or absent breathing is detected, it sends an alarm asking the person to interact with it before contacting a friend or emergency services.

## **Helping ER doctors**

Emergency room doctors often have a few minutes to determine if patients need a blood transfusion. Currently there's no method to assess the health of one of the blood's most critical components: platelets, tiny blood cells that help blood clot after an injury. Working with UW Medicine, UW mechanical engineers have created a system that measures platelet function to help doctors determine, within two minutes of a patient's arrival, if a transfusion is needed.

## **Burden of air pollution**

Black and Hispanic Americans bear a disproportionate burden from air pollution generated by white Americans, according to University of Minnesota and UW engineering researchers. The team found that, on average, white Americans spend more on pollution-intensive goods and services and are exposed to approximately 17 percent less pollution than they generate. Black Americans experience about 56 percent more pollution than they generate. For Hispanics, it's slightly higher: 63 percent.

## **It's all in the twist**

A research team from the UW, the University of Hong Kong, the Oak Ridge National Laboratory and the University of Tennessee has developed a system to twist stacked 2D materials to trap particles, creating a unique platform to study quantum optical physics. Once trapped, these particles — bound pairs of electrons and their associated positive charges — can be manipulated for developing technologies that will revolutionize computation and communications fields.



# From campus to career

## **Industry professionals help ISE undergraduates transition from student life to the working world through a unique new mentorship program.**

“Senior year can be such a stressful time with finishing classes while looking for jobs,” remembers Kelly Hoang, ’18. “It can seem overwhelming, which was why I was grateful for my mentor. She helped reassure me that I could do it all, and with her support, I did.”

Now an associate engineer at T-Mobile, Hoang was one of 13 students who took part in the Industrial & Systems Engineering (ISE) department’s inaugural industry mentorship program last year. Designed to provide undergraduates with guidance on transitioning from student life to the working world, the ISE Mentoring Program matches students with volunteer industry mentors based on interests and experiences. Mentors give advice stemming from lessons they’ve learned while searching for jobs, navigating the workplace and developing their careers.

The year-long program developed as a collaborative effort between ISE, the department’s Executive Advisory Board and the UW and Puget Sound chapters of the Institute of Industrial & System Engineers (IISE).

### **Making connections**

A small but growing field, industrial engineering brings together engineering and business. Industrial engineers design and implement systems to improve quality and

productivity in a variety of working environments and sectors, including technology, health care, manufacturing, retail, transportation and logistics.

It’s an area of engineering that is flexible and broad-reaching; many ISE graduates are hired as project managers and move into supervisory or management roles where they continue to draw on their technical backgrounds.

However, engineering positions that may be a good fit for an ISE student’s skillset aren’t always posted with an “industrial engineer” job title, so it’s important for students to understand how to explore career options and market their skills. This is where professional mentors can offer a great deal of support and guidance. Mentors help their mentees with everything from job searching and professional networking to resume review and interview preparation.

Students apply for the ISE Mentoring Program in autumn quarter. Seniors are prioritized, but all undergraduates are eligible to participate. After completing a questionnaire, they are paired with mentors from Seattle-area companies such as Accenture, Amazon, AT&T, The Boeing Company, Hanson Professional Services, Kocer Consulting and Seattle Cancer Care Alliance.

The department hosts a kick-off event in the fall at which mentees and mentors meet. The pairs agree to a monthly check-in schedule thereafter. ISE hosts two additional events in winter and spring quarters.

### Meaningful mentoring

"I couldn't wait to meet my mentor," remembers Hoang. "I was eager to soak in as much knowledge and advice from her as I could to carry over in my transition to the start of my career."

Hoang's mentor, Tiff Cremer, a senior innovation and design engineer at Amazon, had recently moved to Seattle and learned about the ISE Mentoring Program through the local IISE chapter.

"It's a fantastic networking opportunity for everyone involved," she says. "In addition to meeting soon-to-be professionals, I've been able to get more connected in the local Seattle ISE community and meet other industry professionals outside of my company."

Although Hoang graduated last year, she and Cremer still keep in touch regularly. This year both are serving as mentors.

ISE advisory board member Lauren Schroedter, a project manager at Hanson Professional Services, has also served as a mentor since the program's inception.

"I had a lot of great mentors, both formal and informal, throughout my education and career, and I like having the opportunity to give back," she says. "I've also met some really great students and have been able to learn from them about current technology and trends in industrial engineering."

Though only in its second year, the program is quickly expanding and has almost doubled in size — with aspirations for even more next year.

"The program gives industry professionals a framework through which to share our experiences with the next generation of industrial engineers," says Cremer. "It's helped me see myself in a different light and appreciate that I have expertise to pass along to others."

*Opposite page: Mentors give advice stemming from lessons they've learned while searching for jobs, navigating the workplace and developing their careers.*



# ENGINEER INNOVATION

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## DIAMOND AWARDS

Friday, May 17, 2019

Please join the College of Engineering as we honor five alumni and friends for their outstanding achievements.

**Ronald Howell**

*Dean's Award*

Ron Howell is the chief executive officer of the Washington Research Foundation, one of the nation's top-ranked technology transfer organizations, and stewarded WRF through its growth in assets from \$13 million to \$250 million.

**Wayne Gombotz, '85 M.S. Inter Engineering; '88 Ph.D. Bioengineering**  
*Distinguished Achievement in Industry*

Wayne Gombotz's technical contributions to health care have spurred the development of the biotechnology industry in Seattle and changed the landscape of drug development, impacting human health worldwide.

**Paul Skoglund, '68 B.S. Mechanical Engineering**  
*Entrepreneurial Excellence*

Paul Skoglund's ingenious valve technology has advanced commercial industries in a range of business markets, and his products have helped reduce greenhouse gas emissions, promoted energy conservation and improved the safety and efficiency of the oil industry.

**Patrick Shanahan, '85 B.S. Mechanical Engineering**  
*Distinguished Service*

Throughout his 30-year career at The Boeing Company and in his service leading the United States Department of Defense, Patrick Shanahan has been dedicated to supporting current engineering students and fostering a culture of excellence in education.

**Sergey Karayev, '09 B.S. Computer Science & Engineering**  
*Early Career*

Determined to solve an educator's biggest headache, grading papers and exams, Sergey Karayev developed Gradescope, an online tool that applies artificial intelligence to assessing student work in STEM classes and other disciplines.

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