THE BRIDGE

DATA BASE

The first of its kind in the world, CEE's new NSF-funded center gathers perishable data in the aftermath of natural disasters.

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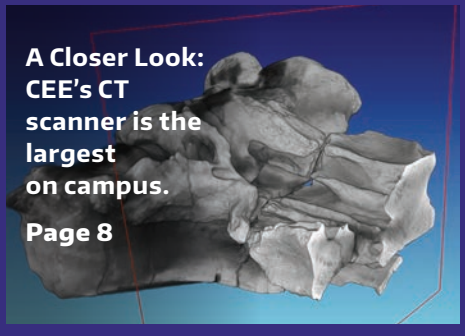
FALL 2018

CIVIL & ENVIRONMENTAL ENGINEERING
UNIVERSITY of WASHINGTON



A Closer Look: CEE's CT scanner is the largest on campus.

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MESSAGE FROM THE CHAIR

Autumn quarter marks the beginning of several exciting undertakings in the Civil & Environmental Engineering Department, including a new admission process for engineering students, a new master's degree program, the beginning of operations for the NSF-sponsored Natural Hazards Reconnaissance Experimental Facility and a fundraising campaign to improve our teaching labs and student spaces.

The College of Engineering welcomed 930 incoming freshman students this fall who were part of the inaugural Direct to College (DTC) admission process, which assures placement into one of the 10 engineering majors for students who meet minimum progress requirements (see article below for more details). To connect with DTC students, we developed two new classes to showcase how CEE graduates are solving some of today's grand challenges.

Laura Lowes, Chair & William M. and Marilyn M. Conner Professor

Also new on the educational front is the online Master of Science in Civil Engineering: Energy Infrastructure program, developed in response to the shift in the country's energy infrastructure to renewable sources. Associated online courses are open to all CEE graduate students, including multiple one-credit classes addressing a variety of topics that civil and environmental engineers encounter in professional practice.

After two years of planning and preparation, the Natural Hazards Reconnaissance Experimental Facility, housed in More Hall, became operational this September. This issue of *The Bridge* offers a closer look at the new center, which provides data collection equipment for natural hazards researchers. Since its official opening, the center has already responded to several disasters including the magnitude 6.6 earthquake in Chitose, Japan and Hurricane Florence in Wilmington, North Carolina.

This issue of *The Bridge* also highlights a gift from Tom and Marilyn Draeger supporting lab upgrades, which have a big impact on BSCE and BSENVE students. Gifts such as these make it possible for students to complete more hands-on lab assignments and better collaborate on projects, preparing them to address real-world problems.

As the department continues to grow, I encourage you to visit our website to learn about opportunities for alumni engagement. From mentoring students to supporting industry collaboration to enhancing UW CEE's facilities, alumni help shape the future of the department.

Laura Lowes
Chair & William M. and Marilyn M. Conner Professor

DIRECT TO COLLEGE 101: A new admission process

Engineers work to improve systems, so perhaps it's no surprise that the UW College of Engineering has a new and improved admission process.

To assure incoming freshman students who are admitted into the College of Engineering that they can pursue an engineering degree at UW, a new Direct to College admission process took effect starting with this year's incoming freshman class.

Direct to College restructures the process for admitting students into engineering majors. Prospective UW freshman students who indicate an engineering major as their first choice on the admission application are considered for direct admission to the College of Engineering, not directly to a major. Students who are admitted to the college and meet minimum progress requirements will therefore be assured of their ability to place into one of the college's 10 engineering majors.

Previously, many aspiring engineering students were unable to place into an engineering major after two years of study. The new process aligns the UW with the engineering admission process practiced by the majority of peer institutions.

Learn more at
www.engr.washington.edu/admission/directtocollege/faq.

FEATURE STORY

DATA BASE

NSF-funded center gathers disaster related data to reduce risk

It may look like a toy boat, but the bright yellow Z-Boat 1800 has an important mission: capturing underwater topography for damage assessment following natural disasters. The small boat is one of more than 300 pieces of data-gathering equipment now available to researchers throughout the world.

Cover photo: During a four-day intensive training at UW in July, researchers from across the country learn how to operate the Z-Boat 1800.

Photo top: Learning how to use Emotiv EEG headsets to measure brainwave activity and sense various emotions such as stress.

Photo middle: Principal investigator Joe Wartman (right) interacts with a visiting researcher who is operating the Z-Boat 1800 as part of a user training hosted at UW in July 2018.

Photo bottom: A researcher learns to set up a seismometer to measure ground motion.

Photo top: Burying a seismometer reduces signal noise and improves the accuracy of ground motion measurements.

Photo middle: With a smile, a researcher dons a 14-channel Emotiv EEG headset.

Photo bottom: Visiting researchers learn how to operate the BLK360, a lightweight, highly accurate close range laser scanner used to capture 3D point cloud and imagery data.

To develop more resilient communities, the Natural Hazards Reconnaissance Experimental Facility officially launched in September to enable the collection, assessment and archiving of high-quality perishable data in the aftermath of disasters. Funded by a five-year $4.1 million Natural Hazards Engineering Research Infrastructure grant from the National Science Foundation, the center is the first of its kind in the world.

"This is going to transform natural hazards reconnaissance research by making a collection of state-of-the-art equipment available to a wide community of researchers from across the country," said CEE professor Jeff Berman.

Headquartered in Civil & Environmental Engineering, the center is led by principal investigator and professor Joe Wartman, working in collaboration with Berman and chair and professor Laura Lowes. The interdisciplinary team includes faculty from Human Centered Design and Engineering, the Evans School of Public Policy and Governance and researchers from the University of Florida, Oregon State University and Virginia Tech.

The new center launches during a time when natural disaster related losses continue to escalate. In the past 30 years, more than 2.5 million people and $4 trillion has been lost in natural disasters, according to the World Bank. In 2017, natural hazards resulted in $330 billion in global losses, a jump from $200 billion in 2014.

Transforming data collection

Working with existing organizations, including NSF-funded Geotechnical Extreme Events Reconnaissance Association, center staff equip researchers with tools and equipment for gathering data. Reconnaissance teams typically arrive on site within 1-2 weeks following a natural disaster, to avoid interfering with immediate rescue response.

"Data on infrastructure response is perishable, it goes away very quickly," said Jake Dafni, site operations manager for the center. "There is usually a big push to clean up the area and help communities get back to a semblance of normalcy, so the data disappears fast."

Collecting high quality data about damage and other impacts caused by natural hazards allows researchers to gain insight that helps inform the development of more resilient communities. From updated building codes to informing coastal development planning, the data is used by researchers to reduce impacts from natural hazards.

"One of the driving reasons to collect data is to validate models and design methods," Berman said. "The better, higher resolution the data, the better the modeling methods will be."

Current post-disaster data gathering procedures suffer from a lack of state-of-the-art equipment and uniformity in collection means and methods, which can affect the quality of the data gathered. Without standardized procedures for sharing results, information is often tucked into drawers or saved on researchers' hard drives.

"It's not good data and it's not being shared," Dafni said. "We are offering equipment that can capture much better data and not just for the person who is collecting it."

To enable systematic data collection, a custom mobile application is under development, called the "RApp," to guide researchers through standardized data collection methods. The app will also manage various types of data gathered, from handwritten notes to photographs to 3D point clouds, automatically uploading everything to a data repository called DesignSafe, which is accessible to the larger research community.

The center also offers data visualization and assessment via "CAVE" technology that allows researchers to "see" the disaster scene in three dimensions and continue their investigation of the damaged infrastructure well after cleanup has occurred.

Well-equipped with 300 tools

During the past two years, the center has procured more than 300 pieces of equipment worth an estimated $1.2 million. In addition to surveying tools and seismic instruments for monitoring aftershocks, the equipment portfolio includes a suite of equipment to collect high-resolution 3D information on the state of structures, slopes and coastlines. The equipment includes laser scanners (lidar) and a fleet of drones outfitted with ultra-high resolution cameras.

More specialized and experimental equipment includes the Z-Boat 1800, which uses sound waves to capture underwater topography information about the depth of lake or ocean floors for damage assessment; social science equipment such as EEG headsets to measure electrical brainwave activity and assess stress levels related to disasters; and an Applied StreetView camera to capture 360 degree imagery from a moving vehicle, enabling large-scale damage surveys.

Recent deployment

Since the center became operational in September, data gathering equipment has been deployed to several disaster sites around the world:

Hurricane Florence

North Carolina, U.S.

Following catastrophic damage from freshwater flooding in September 2018, two reconnaissance teams were deployed to North Carolina to assess damage from the hurricane using the Applied StreetView camera to capture continuous 360 degree imagery, close range laser scanners, drones and GPS units to build 3D models, and a thermal camera to assess water damage.

Earthquake

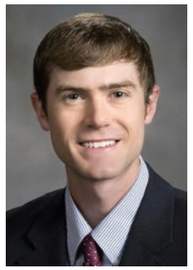
Chitose, Japan

Following a magnitude 6.6 earthquake, alumnus Alex Grant (Ph.D. '17), who works for the United States Geological Survey, was part of a two-person reconnaissance team that used close and long range laser scanners to gather data about landslides and liquefaction features.

To see where equipment is being deployed, visit the center's website: **rapid.designsafe-ci.org**.

AWARDS & ACCOLADES

Faculty



BRETT MAURER
CAREER Award

Most researchers rely on human records and data collected by seismic equipment to investigate earthquakes. But for CEE assistant professor Brett Maurer, those techniques are too contemporary. He plans to investigate earthquakes for which no record exists. To do so, he will study the only evidence left behind: soil liquefaction. He hopes to expose important information that can be used to inform the development of more resilient buildings and infrastructure. For his novel research approach, Maurer received an NSF Early CAREER Award.

BECCA NEUMANN
AGU Award

When it comes to food and water security challenges, associate professor Rebecca Neumann doesn't just watch from the sidelines. She heads to Bangladesh or Peru to conduct research and, more importantly, devise solutions. In recognition of her work, Neumann was honored with the American Geophysical Union's Charles S. Falkenberg Award. Neumann has worked to resolve arsenic contaminated groundwater in Bangladesh and has also helped reduce rice contamination by advocating for the use of less arsenic-laden water for irrigation.

YINHAI WANG
ITE Innovation in Education Award

Much like modes of transit, people also make good connectors. In recognition of his efforts to bring students and transportation professionals together, professor Yinhai Wang has been honored with the Institute of Transportation Engineers (ITE) Transportation Education Council Innovation in Education Award. According to the ITE nomination committee, Wang is an innovator in transportation education by founding and directing the Smart Transportation Applications and Research (STAR) Lab.

Alumnus

GEOFFREY MORGAN
Young Engineering Laureate

Working to promote the significance of infrastructure in country development has brought alumnus Geoffrey Morgan (BSCE '11, BA '11) something significant as well. This fall, Morgan was named a Young Engineering Laureate by the World Federation of Engineering Organizations. Employed by the United Nation's Office for Project Services, Morgan led the development of an infrastructure assessment tool to help countries plan, deliver and manage sustainable, resilient infrastructure from the local to the national level.

New faculty highlight

JESSICA RAY
realizes the value of wastewater

Despite the name, wastewater is actually quite valuable. It contains nutrients and has the potential to alleviate drinking water shortages around the world. However, since the value of wastewater hasn't yet been realized on a larger scale, incoming faculty member Jessica Ray is working to usher in a paradigm shift.

Joining the CEE faculty in January 2019 as an assistant professor, Ray envisions a circular approach to the wastewater lifecycle. Currently, wastewater is processed at a treatment plant and released back into local waterways without resource recovery or recycling of the water.

"Urban water supply was formally considered by environmental engineers in a linear approach of consumption to waste," Ray said. "However, this current paradigm cannot sustain increasing water demand."

To support a circular model approach, Ray is developing new technologies for water reuse and resource recovery, combining tools and methodologies from both material sciences and environmental engineering. To improve the quality of drinking water, Ray is developing low-cost selective adsorbents to remove toxic trace organic compounds from wastewater.

Ray is also creating new materials to passively remove contaminants prior to stormwater infiltration, when water enters the soil and feeds lakes, streams and rivers. In the future, Ray believes that captured, treated stormwater may have potential as an alternative water source.

Incoming faculty member Jessica Ray

To recover nutrients from industrial wastewater, Ray is working to create new materials that target nutrient extraction. This is especially critical for the recovery of phosphorous, used in fertilizers, which is being depleted at an unsustainable rate.

Ray comes most recently from a postdoctoral fellowship in the Department of Civil & Environmental Engineering at the University of California, Berkeley, where she designed and tested new composite materials for contaminant removal during stormwater treatment. Ray earned her Ph.D. at Washington University in St. Louis in the Department of Energy, Environmental & Chemical Engineering.

Originally from St. Louis, MO, Ray is looking forward to interacting with students both in the classroom and in her research group. In her spare time, she likes to hike with her dog, Lucy, and bake.

"I was first drawn to UW because of the reputation of the Civil and Environmental Engineering Department, the faculty and their research," Ray said. "UW also happens to be located in a great city, which also drew my interest."

Students

SHANNON & WILSON SCHOLARSHIP

Undergraduate student Emma Hutchinson received a $1,000 scholarship sponsored by Shannon & Wilson, a geotechnical and environmental consultancy firm headquartered in Seattle. The scholarship was presented in May 2018. Pictured are academic adviser Mariko Navin, department chair Laura Lowes, scholarship recipient Emma Hutchinson, Shannon & Wilson president Gerard Buechel and Shannon & Wilson vice president Martin Boivin (BSCE '66, MSCE '71), from left.

SALMON SOLUTION

To devise innovative solutions for quickly transporting fresh seafood from Norway to Asia, UW and Norwegian students worked together during the first annual Seafood Industry Transportation Challenge held in Norway in June 2018. The grand prize winning team included CEE Ph.D. students Haena Kim and Ruimin Ke, who proposed replacing human-driven trucks with smaller electrical autonomous cars pre-programmed to operate on difficult-to-navigate roads. Program sponsors included the Supply Chain Transportation and Logistics (SCTL) center, Valle Scholarship and Scandinavian Exchange program and the Pacific Northwest Transportation Consortium (PacTrans).

Most people have never held a 150-million-year-old marine crocodilian skull. But if you operate UW CEE's CT scanner, your odds improve.

"There's always something interesting coming through," said lab manager Sean Yeung, who operates the largest CT scanner on UW's campus. Housed in More Hall, the Computed Tomography Facility (CTF) opened for business in January 2016.

Discovered in Ethiopia, the 150-million-year-old skull may be a new species of marine crocodilian. It was scanned as part of a collaborative research project undertaken by Randall Irmis, associate professor of geology and geophysics at the University of Utah, UW Department of Biology associate professor Greg Wilson and Mark Goodwin, assistant director for the University of California Museum of Paleontology. The researchers hope to gain a better understanding of the space between the brain and the inner surface of the skull, called the endocast.

"The endocast has a lot of information about the animal and how it lived," said Irmis. "If we know the different sizes and shapes of portions of the brain, we can make comparisons to other animal endocasts to see how they vary."

Since the inside of the skull is filled with rock, it requires a powerful scanner to penetrate the dense material, so that enough data can be collected to create a 3D model. Other scanners, such as those used in the medical field, are not powerful enough to scan through the layers of rock embedded in the skull.

"I came here because the scanner has excellent resolution and higher energy," Irmis said. "When we publish our research, we will be able to share the 3D models with other researchers and the public."

Interesting applications

Taking X-ray images from different angles, the CT scanner produces 3D models that reveal what the inside of objects look like without cutting into them. The facility is utilized by engineers, biologists, anthropologists, earth scientists, paleontologists and more for a variety of applications. A few examples include:

- Seattle start-up VICIS scanned their new NFL and college football helmet, designed to reduce injuries
- A vascular surgeon scanned patient stent implants for post-mortem analysis
- Dentists are using the scanner to improve methods of tooth repair
- Biology researchers scanned mammal skulls in a bite-force study
- Geologists are researching mineral filled bubbles in ancient lava flows
- Atmospheric sciences researchers are investigating gas bubbles in polar ice cores
- A local violin maker scans violins to determine the repair history of instruments

Industry users welcome

The CTF is available to other universities, government agencies, private companies, individuals and the general scientific community. Scans are performed by trained engineers. Learn more: **www.ce.uw.edu/research/facilities/xray**.

Photo opposite top: While University of Utah researcher Randall Irmis watches, CEE lab manager Sean Yeung prepares a marine crocodilian skull to be scanned.

Photo opposite bottom: The reconstructed 3D model can be sliced to reveal the interior of an object.

Photo right: Standing in front of the CT scanner, University of Utah researcher Randall Irmis holds a 150-million-year-old marine crocodilian skull.

A TALENTED TEACHER

Remembering professor emeritus Ronald Nece

Many words describe the late professor emeritus Ronald Nece: humble, witty, a punster and lover of baseball. But the word that surfaces most often is teacher— and for good reason.

"My dad was first and foremost a teacher with an open door policy, an open mind, and a keen grasp of hydraulics and fluid dynamics," Gary Nece said. "When I was in kindergarten, my dad would grade papers while I sat on his lap and he taught me chess."

A valued colleague, mentor and friend to many in the department for more than 30 years, Nece passed away in March 2018 at the age of 91. A highly respected and passionate educator, Nece taught at both the undergraduate and graduate levels. Throughout the years, he received awards for his teaching, including an Outstanding Teaching Award from the UW College of Engineering. In addition to serving as an adviser to students, he also supported student societies through his role as an adviser for the student chapter of the American Society of Civil Engineers (ASCE).

"Two generations of students who took his courses had no need for a course in ethics," said professor emeritus Stephen Burges. "They only had to observe him in action to learn ethical engineering practice. He was an exceptional classroom educator as well as an excellent mentor of graduate student colleagues."

Nece "loved" going into the field to watch fluids in motion, said his son. On a father-son outing, they even hunted for the source waters of the Columbia River.

When Nece joined the faculty in 1959, he and the late professor Eugene P. Richey built on the legacy of professor C. W. Harris who earned UW a reputation for expertise in hydraulic engineering. In the early 1960s, Nece and Richey developed research facilities in the newly expanded Harris Hydraulics Laboratory to support a new graduate education and research program in fluid mechanics and hydraulic engineering. Nece served as the founding director of the C.W. Harris Hydraulics Laboratory.

In his research, Nece worked on regional design problems in hydraulics, with a focus on coastal engineering. The professional community benefited enormously from his pioneering work on tidal flushing of marinas, lake flushing and the design of floating breakwaters. In the early 1970s, Nece conducted research and field-testing of the porous breakwater attached to the south side of the original Highway 520 Floating Bridge, together with Richey. The porous breakwater prevented the majority of breaking waves from washing over the bridge and minimized the number of bridge closures.

Nece "loved" going into the field to watch fluids in motion, said his son. On a father-son outing, they even hunted for the source waters of the Columbia River.

"My dad and I took a trip to B.C. in 2014 in hopes of finding the source waters of the Columbia River," Gary Nece said. "We believe we found it next to a golf course north of the town of Cranbrook B.C."

Nece also assumed leadership roles with ASCE. He chaired the Hydraulics Division Executive Committee at a critical time when the quality of the flagship journal was in question, helping to reestablish the Journal of the Hydraulics Division as the premiere journal in the field. He also served as president of ASCE's Seattle Section.

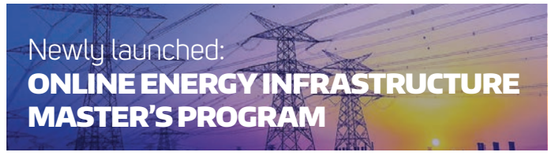
After retiring in 1996, Nece worked for more than two years for the U.S. Army Corps of Engineers, Seattle District, as a technical expert on Columbia River dams and coastal problems. He also mentored young engineers in the office. Together with his wife, Mary, he kept busy attending Husky football games and traveling the world, touching all continents including Antarctica. An excellent photographer with a collection of more than 20,000 pictures, Nece also enjoyed frequenting senior centers to share presentations of photographs he had taken around the world.

Born and raised in Seattle, Nece earned his bachelor's degree in civil engineering from UW in 1949. After receiving a master's degree in Civil Engineering from Lehigh University in 1951, he taught at Rutgers for a few years before earning his Sc.D. degree at Massachusetts Institute of Technology (MIT) in 1959. He was an instructor at both Lehigh and MIT before joining the UW.

Ron Nece and his grandchildren.

CEE faculty members Stephen Burges, Scott Rutherford, Ron Nece, Joe Colcord, Colin Brown and John Ferguson, from left, at the ASCE Seattle Section Meeting in January 2006.

Gary Nece and his father, Ron Nece, from left.



CEE students are energized this fall and for good reason. The new online Master of Science in Civil Engineering Energy Infrastructure program officially launched.

A total of 15 students are enrolled in the program, which prepares students to plan, design, construct and manage energy related infrastructure projects. The new program responds to current changes in the country's energy infrastructure, which is quickly moving from traditional fossil fuel systems to renewable energy sources. The changes are driven by both climate change concerns and technological advancements.

The online master's degree program allows students to pursue a specialized focus while setting their own schedule, enabling them to participate from any location and work full-time. Students are able to complete the program in 2-3 years.

Coursework is similar to in-person programs and students communicate with classmates and instructors online. Courses are taught by UW CEE faculty in the Construction, Energy and Sustainable Infrastructure group, as well as experts in the field.

New students are enrolled quarterly. Learn more at **www.energy-infrastructure.uw.edu**.

Wenk Lecture 2018: **ENJOY THE VIDEO**

From more options for generating power to accommodating customers who produce their own clean energy, changes are impacting all segments of the energy industry. The 2018 Wenk Endowed Lecture speaker, Ann Rendahl, offered insight into these changes during her lecture "A Powerful Transformation" on November 29. According to Rendahl, who was appointed to the Washington Utilities and Transportation Commission, it is critical for civil and environmental engineers to understand how these changes will influence the design of electricity infrastructure, the forecasting of water supply for hydro-electric power, air quality needs and more.

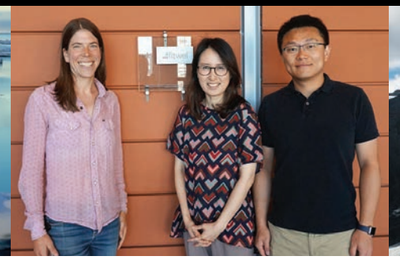
Enjoy the video at **www.ce.uw.edu/news/video**.

RESEARCH HIGHLIGHTS

NSF FUNDS WAVE-ICE-OCEAN RESEARCH
along Arctic Coast

It's a hot topic, considering that ice is involved. With Arctic coastlines quickly eroding, a team of UW researchers has received $1 million from the National Science Foundation's Office of Polar Programs to investigate how the interactions of waves, sea ice and the ocean affect coastal flooding. Focusing on the northern coast of Alaska, where coastlines are quickly eroding at rates of meters per year, CEE faculty researchers Jim Thomson and Nirnimesh Kumar will study the impact of reduced sea ice on ocean waves and the subsequent effects on shorelines. These processes can exacerbate coastal flooding as the ocean distance over which the wind blows increases, and powerful waves are generated. The researchers plan to create an open-source modeling system to inform strategic climate policy decisions.

BUILDING HEALTH:
First government building in Puget Sound Fitwel certified



Considering that most people spend one-third of their day at work, UW CEE researchers are advocating for healthier buildings. And they aren't wasting any time. The first government building in Puget Sound, Bellevue City Hall, recently gained Fitwel Certification thanks to guidance from assistant professor Amy Kim and post-doc Shuoqi (Stanley) Wang. One of the leading certifiers of healthy buildings in the United States, Fitwel encourages the adoption of more than 60 strategies that encourage healthy behavior of building occupants. Bellevue City Hall enhancements included adding signage to encourage occupants to increase physical activities in the building, standing desks and ergonomic furniture, green purchasing policies, improving lactation rooms and distributing green cleaning kits to improve indoor air quality.

GLACIER MELT
likely to impact Pacific Northwest water supply

In light of global warming, more glaciers means more melting. And for the Pacific Northwest, which is home to the most glaciers in the contiguous 48 states, that also means increased vulnerability. For the first time, a team of researchers including CEE alumnus Chris Frans and associate professor Erkan Istanbulluoglu has evaluated the hydrological impact of receding glaciers in the region. Their findings revealed that the rate of regional glacier recession will continue to increase. Lower-elevation basins will suffer, as smaller snowpack and the shrinkage of small glaciers will result in continued reductions in summer streamflow during the dry season. River volumes could be reduced by 80% due to decreases in both glacier and snow melt by the end of the century.

DEVELOPING A WATER ADVISORY SYSTEM
for struggling India farmers

From cucumbers to sunflowers to rice, farmers in India grow an assortment of crops. While variety is a good thing, farmers struggle with knowing how much water various crops require. As a result, crops are often over or under watered, which reduces crop yield. Unable to provide for themselves, many of India's 140 million farmers are leaving the profession at an epidemic rate. To empower India's struggling farmers, UW CEE researchers are developing an irrigation advisory system called the Advisory for Necessary Irrigation system. The system utilizes satellite and weather model data combined with information gathered via low-power ground sensors and geographic data to generate irrigation advisories, which can be sent to farmers via mobile phone.

BUS BATTLE:
Private shuttles vs. public transit

While many Puget Sound residents choose between taking public transit or personal vehicles to work, Microsoft and Seattle Children's Hospital employees have an additional option: private commuter buses. Last year, King County Metro and the Seattle Department of Transportation started a pilot program that allowed these shuttles to pick up employees at a few public bus stops throughout the city. Although some residents are concerned that sharing stops with private shuttles could make public transit less reliable, a recent study by assistant professor Don MacKenzie and graduate student Elyse Lewis shows otherwise. The study suggests that public buses are unaffected by private shuttles the majority of the time.

EVALUATING UPS E-BIKE
delivery service

Seattle is one of the most congested cities in America, in part due to delivery trucks taking up space on crowded streets. To help remedy this, UPS will be pilot-testing deliveries with cargo e-bikes in downtown Seattle. To assess the success of the program, CEE researchers in the Supply Chain Transportation and Logistics Center's Urban Freight Lab will be involved in evaluating the study's outcomes. UPS has pilot-tested e-bike delivery systems all over the world since 2012. For the Seattle pilot test, UPS will use modular, detachable boxes for the first time, which can carry up to 400 pounds and can be presorted according to neighborhood or route. The e-bikes will operate on sidewalks and in designated bike lanes in the downtown Seattle area.

TAKING STEPS TO KEEP PEDESTRIANS SAFE

Crossing the street may not seem like a dangerous activity. However, almost every 90 minutes a pedestrian is killed and every eight minutes a pedestrian is injured in the United States, according to the National Highway Traffic Safety Administration.

"The conflict between pedestrians and vehicles is severe," said Ph.D. student Yifan Zhuang. "It is important to provide a new technology to give notice to drivers when pedestrians are coming, so drivers can slow down."

To help keep pedestrians safe, a team of STAR Lab researchers is building a new type of communications system that connects various roadway users and sends safety warnings to both pedestrians and drivers, alerting them of potential conflicts in their oncoming path. The system can be used at conflict-prone locations, such as busy intersections. Led by professor Yinhai Wang, the research team includes postdoctoral researcher Ziqiang Zeng, Ph.D. student Yifan Zhuang and Ph.D. student Ziyuan Pu.

Called the Smart Road Sticker (SRS), the technology consists of a small, solar-energy powered device that acts as a hub to facilitate communication between roadway users.

Installed on light poles or other infrastructure near the roadway, the basic function of the SRS is to detect mobile devices that have the STAR Detection App installed. The app enables people to receive safety notifications, warning them of hazards such as a driver who has failed to stop at an intersection.

This fall, the researchers are testing the system by installing SRS devices on the Burke-Gilman Trail in Lake Forest Park.

Photo right: A jogger runs along the Burke-Gilman Trail in Lake Forest Park while CEE researchers install a new sensor system they are testing.

SCTL AWARDED $1.5 MILLION
to improve the goods delivery system

Delivery drivers will one day soon have more than packages at their fingertips. They'll also have access to real-time information about parking availability in congested urban areas, thanks to a three-year $1.5 million U.S. Department of Energy (DOE) grant awarded to the Supply Chain Transportation and Logistics Center (SCTL).

The funding, which is part of a combined $80 million awarded by the DOE, will be used to improve the "Final 50 Feet" of the goods delivery system, when delivery drivers must locate both parking and customers.

Over the course of three years, the SCTL's Urban Freight Lab researchers will develop technology to inform delivery drivers about parking availability in Seattle, which is currently the ninth most congested city in America, according to INRIX's annual Global Traffic Scorecard. With the rise of e-commerce, Seattle faces new demands for unloading space on streets.

"We are especially excited to work on the ground with our partners, including the City of Seattle, to innovate urban delivery as well as improve the quality of life for city residents and operational efficiency for our industry partners," said project principal investigator and SCTL director Anne Goodchild.

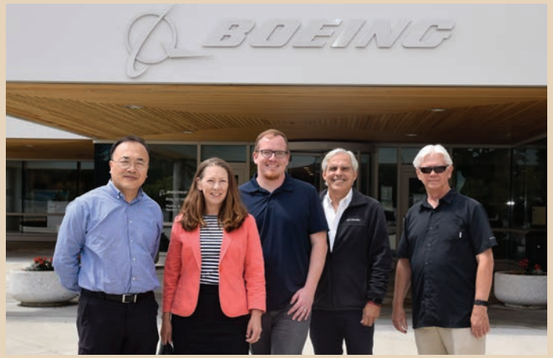
To develop technology that communicates parking availability in real time, the researchers will gather data at pilot test locations where delivery drivers will be delivering packages to smart locker systems. Sensing devices will collect locker usage data as well as delivery data, such as the length of time that vehicles are parked in various load and unload zones. The researchers will use this information to develop a mobile app and web platform that will relay real-time information about parking availability.

The team anticipates the system will reduce parking-seeking behavior by approximately 20 percent in the pilot test areas. They also expect to reduce parcel truck dwell time in pilot test area locations by 30 percent, which will increase the productivity of load/unload spaces near smart locker systems.

Collaborators on the project are: the City of Seattle, Pacific Northwest National Laboratory, the City of Bellevue, Charlie's Produce, Expeditors International of Washington, the Ford Motor Co., Kroger, Nordstrom, United Parcel Service, United States Postal Service, CBRE Seattle, King County Metro Transit, Sound Transit (officially the Central Puget Sound Regional Transit Authority), and Western Washington Clean Cities, a program under the Puget Sound Clean Air Agency, an initiative of the U.S. Department of Energy.

BOEING TOUR TAKES FLIGHT

CEE visiting committee members, faculty and staff joined Boeing alumni for a VIP Tour of the Everett Boeing plant in August. During the tour, attendees met ASCE president-elect Robin Kemper, and alumni who work at Boeing shared information about the industry at large and the role that civil engineers play in the aerospace industry. Visiting committee members in attendance were Susan Betcher BSCE '90, Cindy Hirsch MSCE '90, Einer Handeland BSCE '66, MSCE '77, DeWitt Jensen BSCE '74, MSCE '83 and Steve Murphy MSCE '87. Boeing alumni who attended or helped organize the event include Anastasia Ghattas BSCE '13, H. Connor Smith BSCE '15, Begum Birsoz BSCE '17 and Ron Hadley BSCE '88.



Professor Yinhai Wang, chair Laura Lowes, director of academic services Bryan Crockett, professor Pedro Arduino and professor Joe Mahoney, from left.

DEDICATED DONORS:
Draegers fund new Environmental Engineering Lab equipment

Marilyn and Tom Draeger (BSCE '68) don't just wait for good things to happen. They come up with the ideas.

Long-time supporters of the UW Civil & Environmental Engineering Department, the couple recently donated $20,000 to the Environmental Engineering Lab to fund much-needed lab equipment.

"We wanted to contribute to a cause that would affect the most students," Marilyn Draeger said.

To have the greatest reach, several new pieces of lab equipment were purchased, rather than just one higher priced item. The equipment will be used by juniors in the Bachelor of Science in Environmental Engineering (BSENVE) program, now in its second year, as well as students taking introductory environmental engineering courses in the civil engineering program.

"These purchases will greatly improve our capabilities to teach critical concepts in environmental microbiology, environmental chemistry, water quality engineering and environmental analysis," said associate professor Mike Dodd, who oversees the introductory environmental chemistry lab course taken by students in the BSENVE program.

With a passion for giving back, the Draegers also collaborated with the heavy engineering construction association, the Beavers, where Tom Draeger serves on the board of directors, to establish a new fund to support the hiring of a construction lecturer for the department. The new position will be filled in the coming year. The couple also previously established a professorship in 2008 in partnership with the Beavers Charitable Trust, which is currently held by professor Steve Muench.

The Draegers' commitment to supporting students can be traced back to Tom Draeger's years as an undergraduate student at UW. During his senior year, he was offered a scholarship that covered more than half of his tuition and living expenses.

"The UW provided me with an education that allowed me to do a lot of things in life," Tom Draeger said.

Retired from Bechtel Corporation, where he worked for the majority of his career, Tom Draeger served as senior vice president of the Bechtel Group and the president of Bechtel Construction Operations. Responsible for Bechtel's global construction activities, he oversaw major civil, airport, rail and transportation projects around the world. His family relocated frequently to various job sites, including Saudi Arabia, Ireland and Bahrain.

Marilyn and Tom Draeger (seated) with their family.

After retiring, the couple moved to Walnut Creek, Calif., to be close to their daughters and family.

"We've moved 28 different times and have lived in almost every continent in the world," Marilyn Draeger said. "This is where we've come to settle and UW is where we wish to donate."

LAB FUNDING OPPORTUNITIES

Donations big and small can have a positive impact on CEE students, allowing them to complete more hands-on lab assignments and better collaborate on projects.

For a comprehensive overview of facilities funding needs, please visit www.ce.washington.edu/giving/student-labs-workspaces. To explore giving opportunities, contact Kaitlin Colleary at 206-685-6192 or kaitcoll@uw.edu.

Students use new lab equipment funded by Marilyn and Tom Draeger during an "Intro to Microbial Principles" environmental engineering course.

THE BRIDGE FALL / 2018

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RETURN SERVICES REQUESTED

Send address corrections, questions and comments by email to comments@ce.washington.edu or to the return address above.

Annual Alumni Tailgate

A tailgate party with CEE alumni is a winning combination! More than 85 UW CEE alumni, family and friends gathered for a tailgate party before the Huskies Homecoming game against the Colorado Buffaloes on October 20. Attendees enjoyed food and drinks, connected with former classmates, learned about student projects and received department updates from chair Laura Lowes.