THE BRIDGE

Capturing the eye of the storm

CEE's RAPID team gathers critical data from Hurricane Helene to improve disaster preparedness.

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Safeguarding privacy in transportation data

Professor Jeff Ban is using travel data to ease urban traffic congestion without compromising personal privacy.

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AUTUMN 2024

CIVIL & ENVIRONMENTAL ENGINEERING
UNIVERSITY *of* WASHINGTON

MESSAGE FROM THE CHAIR

Over the past two years, we have worked diligently to increase enrollment to meet the high demand for our graduates. This fall, our undergraduate and graduate cohorts have increased, and enrollment will remain a departmental focus. Other priorities this year include curriculum review; strengthening ties with our professional, alumni and donor communities; improving facilities; fundraising and continuing to implement our strategic plan.

Our strategic plan, released last year, continues to guide the department. However, as we put it into action, it has become clear that it is incomplete. Recently, an alumnus observed that our plan did not explicitly prioritize "excellence," leading him to conclude that it was no longer a goal. I assured him that excellence is still central to everything we do, but his feedback prompted me to reflect on how we communicate our priorities externally.

In a competitive environment for top students, top faculty, research funds and state resources, we strive for excellence on a daily basis. Recent recognition of our programs, students and faculty reflects this commitment. Our graduate program rankings from *U.S. News and World Report* rose significantly this year (from 19 to 12 for civil engineering and from 21 to 18 for environmental engineering). And students from our department received major honors, including Matthew Bonner, who was awarded the College of Engineering Dean's Medal, and Nathalie Thelemaque, who was the recipient of the UW Graduate School Medal.

This dedication to excellence is mirrored in the cutting-edge research conducted by our faculty members.

In this edition of *The Bridge*, we explore some of that research. Highlights include Professor Jeff Ban's work on privacy-preserving transportation systems, Associate Professor David Shean's role as a finalist for NASA's satellite research program, and Professor Jessica Lundquist's findings on how spring rainfall affects the Colorado River's water supply. We also remember alumnus Daniel J. Evans, who passed away after an illustrious career in public service.

Bart Nijssen
Chair & Professor

Faculty honors

Jessica Lundquist

Professor Jessica Lundquist was awarded a trio of honors earlier this year, earning the American Geological Union's (AGU) Ambassador Award, the American Meteorological Society's Robert E. Horton Lecturer in Hydrology Award, and induction into the AGU College of Fellows. These awards recognize her contributions to mountain hydrology, scientific leadership and mentorship. The AGU Ambassador Award specifically honors exceptional societal impact and service to the Earth and space science community.

Julian Marshall

Professor Julian Marshall was named the Boeing International Endowed Professor at the UW in recognition of his research in air pollution and environmental justice. His work addresses pollution disparities across diverse communities and promotes international collaboration. The professorship will support his continued research and the expansion of the Grand Challenges Impact Lab based in Bengaluru, India, which Marshall founded.

DEPARTMENT NEWS

UW, PacTrans and WSDOT relaunch fellowship to strengthen civil engineering pipeline

The Washington State Department of Transportation (WSDOT) Fellowship Program has been reactivated through the partnership of the CEE department, the Pacific Northwest Transportation Consortium (PacTrans) and WSDOT after being on hiatus since 2009. The program provides five WSDOT employees with the opportunity to earn a fully funded master's degree in transportation engineering, helping them advance their careers and contribute to Washington's transportation workforce.

This reactivation comes at a crucial time for the civil engineering field, which is facing a significant workforce shortage. As federal and state infrastructure investments ramp up nationwide, the demand for civil engineers continues to grow. However, fewer students are entering the field, leading to increased competition for talent and rising costs for infrastructure projects. In response to this challenge, the Washington state Legislature allocated funding in early 2024 to relaunch the fellowship as part of a broader effort to strengthen the civil engineering pipeline and ensure critical projects move forward smoothly.

The program will support five WSDOT employees during the 2024-2025 academic year.

"These fellows understand the issues in transportation and will also be the kind of researchers working on addressing those issues in the future," says Yinhai Wang, the Thomas and Marilyn Nielsen Endowed Professor in transportation engineering and the director of PacTrans.

Photo courtesy of the Washington State Department of Transportation

The revival of this program is an investment in the state's infrastructure and a commitment to cultivating the next generation of transportation leaders.

"There is a severe lack of transportation engineers," Wang notes. "This program helps current WSDOT employees grow while meeting the pressing workforce needs."

Wang also highlighted the long-term impact of past iterations of the fellowship, noting that "three consecutive state DOT traffic engineers were graduates of this program," a testament to its lasting contributions to WSDOT and the transportation sector as a whole.

Research partnerships

CEE faculty and students collaborate with industry, government and community partners to drive impactful, mutually beneficial projects. Here we highlight two recent examples:

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Seattle Public Utilities

In partnership with **Seattle Public Utilities**, first-year Ph.D. student Emily Everton and Professor Edward Kolodziej are studying the presence and impact of tire-derived chemicals, such as 6PPD-quinone, in roadway runoff throughout Seattle. Their research aims to improve stormwater treatment strategies and enhance water quality and environmental health by identifying high concentrations of toxic chemicals in urban creeks.

A team from CEE's structural engineering group partnered with **Concrete Technology Corporation**, based in Tacoma, to test the stability of long prestressed concrete girders used in highway bridges. These 150-foot girders, the largest ever tested, provide critical data on buckling risks during transportation, validating new stability theories developed by the team and contributing to safer infrastructure development across the region.

Safeguarding privacy in transportation data

By Julia Davis

As cities look to modern technology to solve transportation challenges, data collected from smartphones, GPS devices and traffic cameras offers valuable insight into how we move. But while these advancements promise to ease congestion and improve efficiency, they come with a price: personal privacy. Jeff Ban, the William M. and Marilyn M. Conner Endowed Professor in CEE, is working to ensure we don't have to choose between smarter streets and personal privacy by developing innovative algorithms that protect both.

Ban has spent more than a decade exploring the intersection of transportation systems and data privacy. His research focuses on how mobility data from smartphones, GPS systems and traffic cameras can help improve traffic flow and efficiency in urban environments. At the same time, he addresses the increasingly pressing question of how to protect personal privacy in an age when data is continuously being collected, shared and analyzed.

"There's always a balance between utility — how you use the data — and privacy — how you protect it," Ban says. "You don't need 100% privacy because then the data would be useless."

The evolution of traffic data collection

Ban's journey into privacy-related transportation research began in the early 2000s when "mobile sensing" — using smartphones and other devices to collect data — was still new. The introduction of smartphones and their built-in GPS systems opened up new ways to gather detailed traffic data. Ban, then a postdoctoral researcher at the University of California, Berkeley, was involved in a project where 100 cars equipped with Nokia phones collected data to monitor traffic conditions on a stretch of Interstate 880 in California.

"Even with just 2 to 5% of the cars giving us data, we could accurately estimate traffic speeds and congestion and even detect accidents before the authorities did," Ban recalls. This early success showed how mobile sensing technology could revolutionize real-time traffic management.

However, this success came with new challenges. The sheer volume of data collected, from where people traveled to what time they stopped for coffee, raised significant privacy concerns.

"Just limiting the release of personal identifiable information wasn't sufficient," Ban says. "With mobile data, even if we don't have your name, we can infer where you live, where you work and even your behavior patterns."

Ban addressed these concerns by co-designing privacy techniques and modeling methods to responsibly manage and share transportation data. One such method is called "virtual trip lines." Instead of continuously tracking someone's entire journey, this approach collects data at specific locations along a person's route, creating short segments of movement, or trajectories. These segments are then filtered to ensure that individual trajectories cannot be linked together to form a complete path. By focusing only on the most relevant locations, this method provides valuable traffic data while minimizing privacy risks.

Ban's algorithms strike a balance between preserving privacy and ensuring the data remains useful for improving transportation systems. His approach doesn't involve inventing entirely new algorithms but rather combining existing ones in ways tailored to transportation data.

"There are thousands of algorithms out there," Ban explains. "But transportation experts and privacy researchers haven't always been in conversation. We're trying to build a bridge between these fields, matching the right privacy methods to the data, so we can protect privacy and still make the data useful."

Shaping the future of smart cities

Ban's research has far-reaching implications for the future of smart cities and advanced transportation systems worldwide. As urban centers become more connected and data-driven, the ability to collect and use mobility data will be important in solving challenges like traffic congestion, pollution and road safety. These advancements won't just make cities more efficient; they have the potential to significantly improve everyday life.

One promising area of Ban's work focuses on "vehicle-to-everything" (V2X) communication. This technology allows vehicles to share data with other vehicles, traffic infrastructure like traffic lights, and even pedestrians carrying smartphones. For instance, a vehicle could send information to a traffic light to help optimize signal timing or communicate with other vehicles to prevent accidents. Imagine a pedestrian crossing a busy intersection — V2X technology could notify nearby vehicles of the pedestrian's presence, helping drivers react in time to avoid a collision. By sharing data in real-time, V2X technology has the potential to make roads safer and traffic flow more efficient. These kinds of systems are already being tested in cities like Seattle to enhance traffic safety.

"We're working to make sure technology can improve traffic safety without turning cities into places where privacy is at risk," Ban says.

To protect the privacy of this shared data, Ban's team is working with researchers from the University of Connecticut, with support from the National Science Foundation, to develop advanced methods like local differential privacy. This technique adds small, random "noise" to the data, similar to blurring an image — where the overall picture remains visible but personal details are obscured. This ensures that specific information cannot be traced back to an individual or vehicle. So even though traffic patterns or vehicle locations are analyzed, the privacy of each driver is protected.

"Privacy is a basic right, just like free speech," Ban says. "If people feel confident that their data is being protected, they're more likely to share their data and support the technologies that can improve traffic systems and make our cities smarter."

This visual illustrates how vehicles could communicate with each other to share data and improve traffic flow. Ban's research addresses how such advancements can be achieved while protecting personal privacy. Image courtesy of the U.S. Department of Transportation.

Smarter irrigation for a greener UW

The University of Washington is testing sensor-driven technology to reduce its water footprint and create a more sustainable campus.

By Julia Davis

Strolling through the University of Washington's campus in the height of summer, visitors are surrounded by lush expanses of green space that showcase the Pacific Northwest's natural beauty — from majestic trees to vibrant flower beds. But keeping these landscapes thriving during Seattle's increasingly dry summers demands vast amounts of water. With climate change contributing to longer, drier summers, conserving water has become a pressing issue.

To address this challenge, the UW launched a pilot project that explored the possibility of making campus irrigation more efficient by combining satellite data with on-the-ground sensors. The project's ultimate goal was to optimize water use and reduce waste.

Led by CEE Professor Faisal Hossain, the project was a collaborative effort involving UW Facilities, NASA, the National Science Foundation-funded Center for Soil Technologies and students from the College of Engineering's (COE) Industry Capstone program. By merging satellite data with sensor technology, the team worked to monitor soil moisture in real time and adjust irrigation accordingly.

Cultivating a campus solution

The project's origins can be traced back to 2018 when Brian Davis, a project manager at UW Facilities, learned about Hossain's work in South Asia. Hossain had been using satellite data to manage irrigation for crops in regions facing limited water resources, such as Pakistan and Bangladesh. Recognizing the potential for this approach to be applied locally, Davis approached Hossain with an idea: Could the same technology help manage the UW's own irrigation needs during Seattle's dry summer months?

"The UW is one of the largest water users in the city of Seattle during the summer," Davis explains. "So finding ways to reduce our water consumption is definitely important."

Hossain was enthusiastic about bringing his global research closer to home.

"We do amazing research all over the world, but it's rare to see these innovations implemented right where we work and teach," Hossain says. "This project is about more than just saving water — it's about demonstrating our commitment to sustainability right here at UW."

A hybrid approach to irrigation

The project's success hinged on integrating two sources of data: satellite observations from NASA and real-time data from sensors strategically placed around campus. While NASA's satellites provided a broad overview of regional weather patterns, precipitation levels and soil moisture, the on-the-ground sensors provided localized data to address the specific irrigation needs of various areas.

The diversity of campus landscapes makes irrigation needs more complex than they might initially seem.

"At the UW, you can see towering trees alongside medium canopy trees, massive rhododendrons, smaller shrubs and groundcover, all with different water needs," Davis says.

The sensors helped fine-tune the satellite data, ensuring that each area received just the right amount of water.

"This approach allowed us to use fewer sensors while still getting a comprehensive view of the entire campus. It's about using the best of both worlds — satellites and sensors — to create an optimal and affordable system," Hossain says.

These "hopping sensors," provided by the project's industry partner OnsetCOMP, were particularly effective in the UW's urban environment. Unlike traditional sensors that require a direct connection to a central router, these sensors communicate by "hopping" data from one sensor to the next. This system ensured that data could still be transmitted effectively even when physical barriers like buildings or large trees were present.

> "This project is about more than just saving water — it's about demonstrating our commitment to sustainability right here at UW." - **PROFESSOR FAISAL HOSSAIN**

Capstone collaboration

The project came to life thanks to the work of students participating in the COE's Industry Capstone Program. Over the course of two academic quarters, these students integrated the satellite and sensor data into a user-friendly system. They also developed an online dashboard that allowed UW Facilities to monitor irrigation data in real time and make informed decisions about watering schedules.

For Shahzaib Khan, a CEE graduate student, this project was a unique opportunity to apply his research skills to the local environment.

"Previously, I worked on a project estimating irrigation needs for crops, and this capstone allowed me to take that research further by focusing on our own campus," Khan says.

Khan's role involved utilizing sensor data to estimate evapotranspiration — the process of water moving from the soil through plants and evaporating into the air.

The students' work was instrumental to the project.

"They brought a level of expertise and enthusiasm that was essential," Hossain says. "They weren't just participants; they played a critical role in designing and implementing the system."

A blueprint for broader use

While the pilot data is still under review, both Hossain and Davis are optimistic about its potential to inspire wider implementation. Davis sees even modest reductions in water use as a significant achievement.

"If this system can help us reduce even a small percentage of our water usage, that's a big win," he says. Looking ahead, Davis hopes the system will continue to evolve and maybe even get to a place where it could be integrated into their existing irrigation systems.

Hossain shares this optimism, envisioning the project as a scalable model beyond the UW's campus.

"This project is not just about UW," he says. "It's about creating a model that can be used by other universities, municipalities, and even private companies looking to reduce their water footprint."

Why spring rain is key to the Colorado River's water supply

By Sarah McQuate

The Colorado River is a vital water source for seven U.S. states and Mexico, providing hydropower, irrigation and drinking water. Much of this water originates from snowpack that melts each spring. However, since 2000, predictions of streamflow have consistently been higher than the actual water available, leaving researchers puzzled.

New research points to a lack of spring rainfall as the culprit. CEE researchers discovered that warmer and drier springs account for nearly 70% of the difference between predicted and actual streamflow. Without rain, plants rely more heavily on snowmelt, reducing the amount of water that flows into nearby streams. Additionally, the sunnier weather in drier springs increases water evaporation and boosts plant growth, further depleting the snowpack.

"Our research shows that spring rain is crucial," says doctoral student Daniel Hogan. "With less rain, the plants essentially act like giant straws, pulling water into the soil rather than allowing it to flow into streams."

Hogan and Professor Jessica Lundquist studied 26 headwater basins in the Upper Colorado River Basin. Their findings revealed that basins at lower elevations are particularly affected, as the snowmelt occurred earlier in the season, giving plants more time to grow and consume the water.

As ongoing droughts continue to affect the region, these findings may impact how future water predictions are made. April is when water managers calculate annual water availability, but without factoring in spring rain, predictions may continue to fall short.

The Colorado River and its tributaries (including the East River watershed, shown here) provide water for hydropower, irrigation and drinking water in seven U.S. states and Mexico. Photo by Mark Stone

David Shean part of NASA satellite mission finalist team

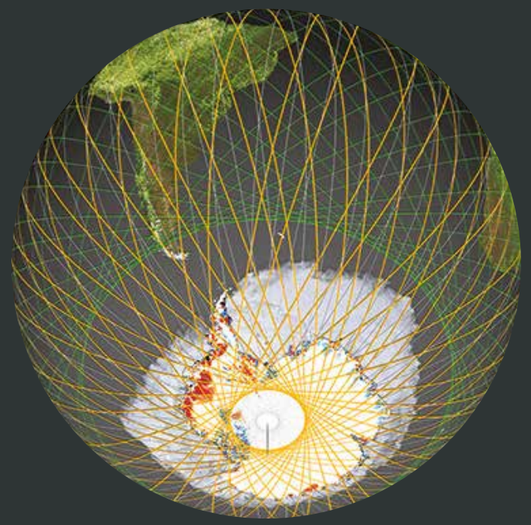
Assistant Professor David Shean is part of a team that has been selected as a finalist for a $310 million NASA satellite mission. Shean is a co-investigator on the Earth Dynamics Geodetic Explorer (EDGE) team, which aims to revolutionize our understanding of terrestrial and polar ecosystems through advanced satellite technology.

EDGE, one of four finalists in NASA's Earth System Explorers Program, will observe the three-dimensional structure of ecosystems like forests, and the surface features of glaciers, ice sheets and sea ice as they change in response to climate change.

These observations are possible because of new satellite laser altimetry technology, which will provide detailed measurements of the Earth's changing surface topography and vegetation.

Shean's role focuses on developing data fusion approaches to combine EDGE's elevation measurements with other satellite data. As part of the land ice elevation team, he brings expertise in mountain glaciers and ice sheets.

The team, led by Scripps Institution of Oceanography, includes 25 scientists and engineers. NASA will select two finalist missions for full implementation, with launches scheduled for the early 2030s.



EDGE orbit (orange tracks) extends to the polar regions allowing for dense mapping around the edges of ice sheets and sea ice. Photo courtesy of EDGE

The impact of flooding ON OUR ROADS

As climate change brings more extreme weather and rising sea levels, flooding poses a growing threat to our roads. Stephen Muench, the Thomas R. and Marilyn M. Draeger / Beavers Endowed Professor in the CEE department, answers questions on how to make transportation infrastructure resilient.

By Sarah McQuate

How does flooding impact roads?

There are two issues. The first involves "scour," which occurs when water dislodges pavement and underlying material, usually soil and rocks. Scour can be addressed by raising a roadway or protecting it with levees, but both options are expensive. Relocating the road is another option, though it is also expensive and sometimes not possible.

The second issue is that flooded roads may become permanently weakened and unusable, especially with extreme precipitation or sea level rise. Higher sea levels mean that high tides — sometimes called "king tides" — may regularly flood roads. In places like Florida, where sea level rise is quite noticeable, we have seen some rather extreme measures put in place. For instance, Miami Beach has spent more than a decade raising its roads and installing backflow preventers and pumps to combat flooded neighborhoods and roads.

How does your research address these issues?

The industry buzzword for addressing climate change is "resilience." Here, this means the ability of roads exposed to hazards like flooding to resist, absorb, accommodate or adapt — and then to recover in a timely manner.

It is not practical to design a pavement to be resistant to everything. At some point, you have to admit that if a flood is strong enough, you are just going to have to absorb damage and then recover. I study how to do that quickly and with limited resources after a hazard event.

My research focuses on how flooding impacts the resiliency of pavement systems. We are working with the National Cooperative Highway Research Program to provide state transportation departments with guidance on improving resilience.

What do you wish people understood about roads and climate change?

Resilience is so important to infrastructure today that it is at the core of our department's strategic plan: "Create a resilient and sustainable world." We build this idea into our teaching, and it forms the basis for a large amount of our research both in climate change adaptation and as a response to natural hazards.

I think we have the technology and ability to address climate change with respect to pavements and a lot of other infrastructure. However, most of this adaptation will take effort and money. So, I think this is more a "people issue" than a technology issue. Specifically, are we, as a society, willing to spend money and time to address this?

Alternative paths, shared success

With diverse backgrounds and experiences, CEE's transfer students show that there is more than one path to success at the UW.

By Julia Davis

For many aspiring engineers, the journey to the UW starts not in bustling university lecture halls but in smaller community college classrooms. In fact, one in four CEE undergraduate students has transferred to the UW. While some come from other four-year institutions, the vast majority enter the department from community colleges. Along the way, these students gain unique skills and perspectives that enrich both their education and the department as a whole.

Overcoming uncertainty

For many transfer students, the biggest hurdle is wondering whether they're prepared for the UW's academic rigor. For Nicky Tejada, who transferred from Everett Community College in autumn of 2023, the challenge was daunting.

"Even after getting accepted, I worried if I could handle the workload," Tejada recalls. "But community college gave me the time and space to figure it out."

Ingrid Phillips (BSCE '23), who transferred into the department from Everett Community College, says her community college experience sharpened her academic skills and taught her time management.

"Getting used to the pace of a quarter system at a community college was really helpful for making the transition to the UW," she explains. "Community college challenged me because I had to create a study schedule and stick to it, and that discipline really paid off."

Building connections

Beyond academics, creating meaningful connections and finding a sense of belonging can be one of the most important challenges transfer students face at the UW.

"The thing I was most worried about was finding my place and meeting other people I could relate to," Phillips recalls. "At first, it felt overwhelming. But the way the civil engineering program was structured helped me feel more connected."

She credits CEE's track layout, which places students in core classes with the same group for the entire junior year — when most transfer students enter the program — as a key factor in helping her build relationships.

"Seeing the same faces every day made it easier to form study groups and make friends. It made UW feel smaller and more familiar," she says.

For Casera Pinto (BSENVE '24), who transferred from Santa Rosa Junior College, coming to the UW was also about building a new sense of community.

"At community college, students have all kinds of different goals, and because of that, there wasn't as strong of a community," she says. "At the UW, where almost everyone is working toward a bachelor's degree, it was easier to find common ground."

Outside the classroom, extracurricular activities offer transfer students a chance to engage with their peers in new ways. Tejada joined the Steel Bridge Club and learned how to weld, something she had never done before.

"Joining a club helped me feel more connected and gave me the chance to develop new skills," she says. "It was exciting to dive into something so hands-on, which is something I didn't get to experience in community college."

The benefits of starting at community college

While the transfer route comes with challenges, it also offers unique advantages. For many students, starting at community college provides flexibility, time to explore academic interests and significant financial savings.

> "Advocating for yourself is key, and my experience in community college helped me build that confidence."
>
> - INGRID PHILLIPS

Navigating the transition

From dedicated advisers who ensure transfer students remain on track to student organizations that help build community, the UW offers a range of support systems that ease the transition from community college.

"Be well acquainted with your academic advisers," says Pinto. "I met with mine every quarter to make sure I was on track."

Phillips agrees, noting that the UW's detailed course equivalency system made the transfer process smoother.

"One of the great things about transferring from a Washington state community college to the UW is that the path was pretty easily laid out," she says. "The course transfer equivalency was great, and I was able to knock out a lot of my required classes that way."

"The reason I went the community college route was primarily because college is so expensive," says Pinto.

In addition to being more affordable, community colleges offer students time to decide on a career path.

"Going to community college gives you time to focus on what you really want to do without the pressure of a heavy course load or big university environment," says Tejada. "It allows you to take a breath and figure things out."

Phillips adds that smaller class sizes and closer connections with professors at her community college made her transition to the UW smoother.

"I had smaller classes and more access to professors at my community college, which made me more comfortable asking for help when I needed it at UW. Advocating for yourself is key, and my experience in community college helped me build that confidence," she says.

For these transfer students, starting at community college wasn't just about saving money or easing into a new environment — it was about shaping their academic journey and future. The sense of community they've built, the adaptability they've gained and the skills they've honed have empowered them to thrive at the UW.

"The flexibility and support at community college helped me find my footing," says Tejada. "It was exactly the preparation I needed to succeed."

While their paths may have been less conventional, their experiences exemplify resilience, resourcefulness and a commitment to education — qualities that continue to strengthen the CEE community.

From left to right: Nicky Tejada, Casera Pinto, and Ingrid Phillips.

24 students selected for the 2024–2025 Valle Scholarship Program

This fall, 12 CEE graduate students embarked on fully funded research abroad through the prestigious Valle Scholarship and Scandinavian Exchange Program. Established by Norwegian immigrants Henrik Valle and Ellen Stray, the program supports collaboration between the UW and Nordic institutions. Since its inception in 1980, over 850 scholarships have been awarded.

"Students applying for this program come from a wide range of research areas, and the broad application guidelines allow them to craft unique proposals tailored to their specific interests," says Bryan Crockett, CEE's Valle Program Adviser.

Morgan Sanger, a geotechnical engineering student in the second year of her Ph.D., cited the Valle Scholarship program as one of the things that drew her to the UW. She says she has been working towards being a Valle Scholar since she started her Ph.D.

"The opportunity to experience research in another place with different institutions and ideas was a major factor in my decision to apply for the scholarship," she says.

This year's projects span hydrology, geotechnical engineering, transportation and structural engineering, showcasing the diversity of the program.

A view of Trondheim, Norway, which is home to the Norwegian University of Science and Technology, where many Valle Scholars, past and present, have chosen to study.

Nathalie Thelemaque receives the 2024 UW Graduate School Medal

Nathalie Thelemaque (CEE Ph.D. '24) was awarded the 2024 UW Graduate School Medal, an honor that recognizes one UW graduate student for their academic excellence and commitment to social impact. Thelemaque's dedication to addressing critical issues in sustainability and equity, particularly within marginalized communities, set her apart as an exemplary scholar.

Her research at the UW focused on how slow-onset disasters, such as climate change and the COVID-19 pandemic, impacted drinking water systems. These disasters develop gradually, offering some warning but often leading to prolonged, significant effects. By studying how these crises affected vulnerable populations, Thelemaque's work highlighted the urgent need for proactive planning and adaptation. Her dissertation examined the financial strain on small water utilities during the pandemic, the effects of historical redlining on infrastructure maintenance in Seattle, and the challenges of maintaining water systems in rural Alaskan communities. Her dissertation concludes by advocating for sustainable solutions that emphasize community involvement and long-term resilience.

Thelemaque was a leader in the Black Graduate Student Association, where she created supportive spaces for Black students across disciplines. She also mentored and recruited students from underrepresented backgrounds through the UW's Office of Graduate Student Equity & Excellence, contributing to a more inclusive academic environment.

After graduating in May, Thelemaque accepted a postdoctoral position at the University of Massachusetts Amherst, where she continues her research on sustainable water infrastructure, particularly in rural and underserved Alaskan communities.

RAPID team gathers critical data on Hurricane Helene

In September, the Natural Hazard and Disaster Reconnaissance Facility (RAPID) team traveled to Florida both before and after Hurricane Helene's landfall. Collaborating with researchers from the University of Florida, the team deployed wave gauges to measure storm surge levels and wave height and used drones equipped with LiDAR — a technology that uses lasers to create precise 3D maps — to map beach fronts and coastal infrastructure before the storm.

"Wave and storm surge levels during hurricanes are often predicted based on models, so this dataset will help researchers validate and better calibrate their predictive models," says Michael Grilliot, RAPID Facility's operations manager.

After the hurricane, the team returned to Florida to assess the damage. Using drones with specialized cameras, they captured detailed images, including damage invisible to the naked eye. They also used LiDAR to measure erosion and building damage and a sonar-equipped Z-boat to map changes to the underwater landscape.

The team was excited to find that their wave gauges had successfully captured data from the most active parts of the hurricane, marking a successful first deployment of these devices, which were built by Kandai Shimada, a UW student studying electrical and computer engineering.

The combined pre-, during-, and post-storm data will provide unprecedented, high-resolution information on the effects of the hurricane. This includes the changes to the coastal environment and infrastructure, as well as the underlying mechanisms that caused the damage. Such detailed insights will help communities improve disaster preparedness and design more resilient infrastructure for future storms.

"We hope that this will help people better predict storm surges and wave heights, and that people will be able to know how at risk they are, trust that information and act accordingly to save lives and property," says Grilliot.

Cover: UW student Kandai Shimada checks a wave gauge in Cedar Key, Florida, the day before Hurricane Helene made landfall. This page: RAPID's sonar-equipped Z-boat gathers data to map changes to the underwater landscape in Cedar Key, Florida, after Hurricane Helene struck the area.

Future Rivers embarks on final year

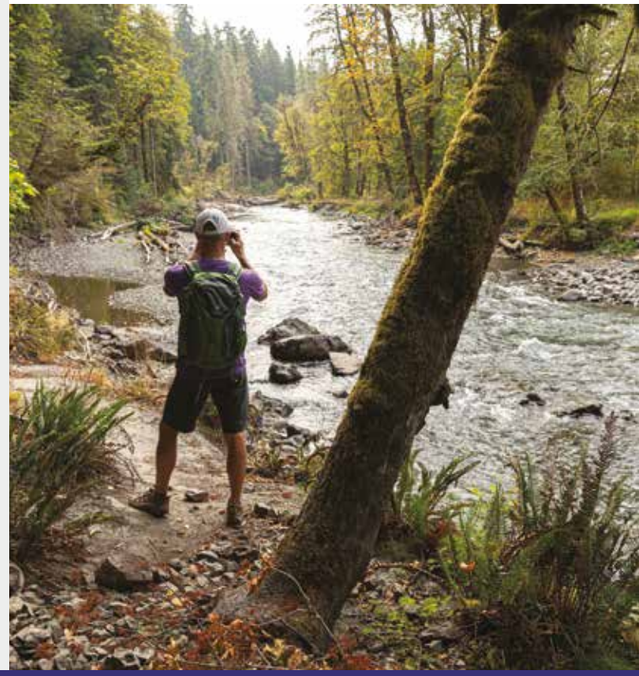
The UW Freshwater Initiative's Future Rivers graduate program has announced that this will be its final year. Funded by a five-year National Science Foundation National Research Traineeship grant, the program has made a significant impact, training 61 students from 13 departments, including 13 from CEE.

The program's mission was to develop a diverse STEM workforce with skills for sustaining freshwater ecosystems and tackling climate change and environmental justice challenges. This was achieved through a cohort-based approach fostering interdisciplinary connections, a focus on data science, a summer field institute, and skills training in science communication and justice, equity, diversity, and inclusion.

The program's accomplishments have strengthened the UW's reputation as a leader in freshwater research and education. Program leadership remains hopeful about the future of freshwater research at the UW and is exploring opportunities to establish new research ventures.

For more information or to discuss possible partnerships, please contact the program at futurerivers@uw.edu.

A student observes the Elwha River during the 2023 Future Rivers Summer Institute. Photo by Mark Stone



Remembering Daniel J. Evans' legacy of public service

Distinguished alumnus Daniel J. Evans (BSCE '48, MSCE '49) passed away on September 20, 2024, at the age of 98. A visionary leader in both engineering and public service, Evans left an indelible mark on Washington state and the UW community.

As a civil engineering graduate, Evans' early career included helping design one of Seattle's most iconic infrastructure projects, the Alaskan Way Viaduct. His technical expertise laid the foundation for a career dedicated to public service, where he brought an engineer's problem-solving mindset to his roles as Washington's governor and U.S. senator. His passion for environmental stewardship led to the creation of Washington's Department of Ecology, a model for the Environmental Protection Agency.

Evans' connection to the department also lives on through the Daniel L. and Irma Evans Lecture series, which he and his family supported to foster dialogue on the intersection between civil engineering and public policy. His legacy continues to inspire future engineers and public servants alike, reminding us that technical knowledge, when combined with a commitment to the public good, can create lasting impact.

Daniel J. Evans. Photo by David Ryder for Cascade PBS

Jenna Forsyth named to TIME's 100 Most Influential People in Health

Jenna Forsyth (MSCE '12) has been recognized on the 2024 TIME100 Health list for her research on lead exposure in vulnerable populations. Forsyth's work in Bangladesh uncovered lead contamination in turmeric caused by the use of lead chromate pigments to enhance color. This discovery led to significant government actions in South Asia, including bans on lead chromate, increased food safety oversight and public education campaigns.

Forsyth's journey into public health began during her time in CEE, where her master's thesis on water quality laid the foundation for her future work. Under the guidance of her thesis advisors, Michael Dodd, an associate professor in CEE, and Scott Meschke, a professor of environmental and occupational health sciences, Forsyth developed a passion for addressing global health challenges.

"From day one, it was always clear that one of Jenna's primary aims in pursuing the career path she's taken was to be able to help others through her research and service, and it's been great seeing the impact she's had in that regard," Dodd says.

Her research has had a lasting impact, reducing lead exposure among workers by 30% and eliminating lead contamination in turmeric sold in Bangladeshi markets.

"The case in Bangladesh demonstrates the importance of credible evidence to catalyze action," Forsyth says. "It's incredibly gratifying to see such a tangible impact."

Looking ahead, Forsyth is committed to expanding her efforts to identify and mitigate other sources of lead exposure globally.

Victor Yamada receives 2024 CEE Distinguished Alumni Award

At the 2024 CEE graduation ceremony in June, Victor Yamada (BSCE '67, MSCE '68) was honored with the CEE Distinguished Alumni Award. Yamada was among the first UW students to focus on air quality in their civil engineering studies.

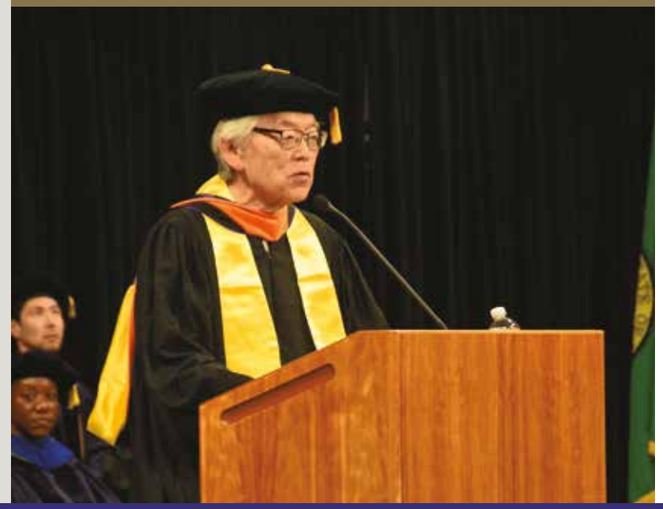
As an original staff member of the U.S. Environmental Protection Agency (EPA), Yamada played a key role in developing the nation's early air quality plans. After his time at the EPA, he further shaped national environmental policy and climate change regulations in the private sector, particularly in California.

In his retirement, Yamada has dedicated himself to preserving Japanese American history through the "Confinement in the Land of Enchantment" program, driven by his family's internment experience during World War II. The program is part of the Japanese American Citizens League.

"It's been rewarding and eye-opening for me to reconnect with my heritage and help share this important piece of our country's history," Yamada says of his work.

He and his wife, Millie, also established the Yamada Endowed Support Fund to provide scholarships for civil engineering students. In his acceptance speech, Yamada expressed deep gratitude to CEE for shaping his career and encouraged graduates to embrace curiosity and become exemplary engineers and citizens.

CEE Distinguished Alumni Award recipient Victor Yamada speaks to graduates at the 2024 CEE graduation ceremony.



Shahryar Ahmad awarded NASA Early Career Achievement Medal

Shahryar Ahmad (Ph.D. '21) was awarded the NASA Early Career Achievement Medal earlier this year, recognizing his significant contributions to NASA's mission. As a research scientist at NASA's Goddard Space Flight Center, Ahmad applies specialized models to study extreme water events, such as floods and droughts. By combining satellite data with on-the-ground observations, his work is helping NASA better manage and protect global water supplies in an era of increasing environmental challenges.

In addition to studying extreme weather events, Ahmad's research has recently expanded to investigate the impacts of wildfires on vegetation in the Western United States and the Amazon basin.

"Understanding how fire disturbances affect vegetation responses in different landscapes is essential for predicting and managing ecosystem changes," he says.

Ahmad built the foundation for his career during his time in CEE, where he worked under Professor Faisal Hossain. His doctoral research focused on the sustainable management of water resources, with one of his key achievements being the optimization of hydropower operations using advanced weather forecasts.

Ahmad encourages early-career scientists to stay curious and resilient.

"Find what you are passionate about, put your best in it and keep expanding your horizons," he says. "Impactful research doesn't happen in a day, but persistence and perseverance are the two things that go a long way in positively impacting the world with your research."

THE BRIDGE AUTUMN / 2024

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