



THE TREND IN ENGINEERING

Autumn 2025

GOOD GRIPS

UW researchers refine
robotic grasp

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From the Dean

Like many of you, I'm navigating a season of both challenges and momentum. As I embark on a second term as Dean of the College of Engineering, the University and College are navigating significant changes and uncertainties in funding support.

The UW conducts more federally sponsored research on behalf of our citizens than any other public university — changing lives and boosting global competitiveness. Yet, our federal funding remains uncertain, and the state's most recent budget reduced the UW's general operating funds in addition to increasing the costs that must be paid to cover salary and benefit costs for employees.

As a result, the College implemented \$6.8 million in cuts. These reductions have been far-reaching, impacting programs, staff, research and the ways we serve our community and prepare students for the workforce.

At the same time, we remain committed to sustaining excellence in education and research. This fall we celebrated the full opening of our new Interdisciplinary Engineering Building for students — made possible through state and donor support — and we introduced a new professional program designed to strengthen leadership skills among professional engineers. We're also excited to showcase breakthroughs across our research enterprise — from robotics labs tackling the challenge of robot grasping to other innovations shaping how people live, work and thrive.



Even as budget reductions present difficult choices, our community continues to move forward with resilience, creativity and purpose. I am deeply grateful to those of you who have stood with us — through advocacy, philanthropic support, expanded partnerships, and gifts of time, talent and expertise. On behalf of the College of Engineering, thank you.

Nancy Allbritton, M.D., Ph.D.
Frank & Julie Jungers Dean of Engineering

Engineering research matters

Every day, UW Engineering researchers develop solutions for a healthier, more sustainable, more connected world.

From earthquake-resilient buildings to cleaner transportation and breakthrough medical technologies, engineering research fuels progress.

But today, this progress is at risk. With 87% of the College of Engineering research expenditures coming from federal sources, potential cuts threaten our ability to conduct research and serve our community.

Looking ahead, we're focusing on what matters most: sustaining our excellence in education and research. But we cannot address today's challenges alone. We invite you to learn more about how our research directly improves lives and how you can stand with us.



Read about our research impact
► engr.uw.edu/research-matters

Faculty leadership appointments



Elizabeth Nance
to chair Chemical Engineering

Elizabeth Nance has been named chair of the UW Department of Chemical Engineering. Nance, who holds faculty appointments in chemical engineering and bioengineering, is a distinguished researcher and mentor who has made pioneering innovations in nanomedicine and pediatric brain disease. In her prior role as associate chair, she expanded the department's undergraduate programs and advanced accessibility and inclusion.



Karen Leung
to direct UW-Amazon Science Hub

As the newly appointed director of the UW-Amazon Science Hub, Karen Leung will lead efforts to develop research and education programs in robotics, AI and machine learning. Leung is an assistant professor in aeronautics and astronautics whose research focuses on developing self-intelligent and trustworthy robotic systems. She also directs the UW Control and Trustworthy Robotics Laboratory.



Flying with the Blue Angels

At Seattle's summer Seafair festival, veteran aeronautics and astronautics professor Jim Hermanson got the ride of his life with the U.S. Navy Blue Angels.

Hermanson hitched a ride aboard a Boeing F/A-18 Super Hornet, experiencing an afterburner takeoff, speeds up to 700 mph and crunching 7.5 G turns — an unforgettable display of

the jet propulsion concepts and technologies he studies and teaches in class.

"Now," he said, "I can tell students what it is *actually* like."



Watch footage from Hermanson's flight
► engr.uw.edu/blue-angels



A HUB FOR FUTURE ENGINEERS

Find out how the new Interdisciplinary Engineering Building is already serving students across the College of Engineering.

By Ed Kromer

Photography by Mark Stone and Dennis Wise / University of Washington

The UW College of Engineering comprises a constellation of buildings. Some serve specific disciplines. And many serve a variety of purposes, from academic services, administrative suites and faculty offices to classrooms, labs and libraries.

Last spring, the College introduced a new building with a single purpose: to support the development of engineering students. All engineering students.

The Interdisciplinary Engineering Building (IEB), ensconced in evergreens, has quickly become the new nexus of student life and learning at the College. Its 76,000 square feet encompass classrooms, teaching labs, project team rooms, meeting spaces for student organizations, a machine shop, a testing studio — plus myriad social and study nooks and spectacular views. It's also the new headquarters of student advising, academic support and career services.

A place to learn, grow and connect

These features were shaped by hundreds of students who engaged with the building design through surveys and focus groups. “They told us what they needed, and we listened,” says Dan Ratner, the College’s associate dean for academic affairs. “The IEB was created to support the education and development of every student in the College of Engineering.”

It is a space to learn, study, collaborate, innovate. To engage with student organizations and activities and solve problems together. To get advised or get inspired. To figure things out or just hang out with friends and classmates.

That sense of connection is especially critical to first-year engineering students who have yet to declare a major.

Students like Melissa Reyes, now a sophomore studying industrial and systems engineering.

“Walking into the IEB as an engineering student, I felt empowered knowing that I’m part of a larger community supported by the College,” says Reyes. “The design is spacious and inviting of collaboration. I appreciate that our physical spaces are reflective of the team-oriented approach of UW Engineering.”

Cross-disciplinary collaboration

Sierra Kasl-Godley, a fourth-year environmental engineering student who gives tours of the IEB through the College’s Engineering Ambassadors program, loves the building’s many sustainable elements that earned it LEED certification and the sweeping views to Lake Washington and the Cascades through the vast windows that climb its eastern walls.

But the biggest plus for her may be its convocation of the many engineering disciplines.

“As its name suggests,” Kasl-Godley says, “the IEB should help foster interdisciplinary connections across the College of Engineering, encouraging students to work collaboratively, creatively and thoughtfully — as all engineers should — to best serve sustainably and equitably in our professional careers.”

“The IEB is a great place for engineering students to collaborate,” adds Matthew Cristobal, who is in his third year studying materials science and engineering. “Prior to this building, there was no space as large dedicated to engineering students. Many student organizations and engineering courses will benefit from the updated facility and equipment inside.”



The IEB, ensconced in a stand of evergreens, provides ample, airy spaces to study, collaborate and engage in UW Engineering.



The IEB offers engineering students new spaces for interaction (above) and new sources of inspiration (below).

Reservable spaces

The IEB presents 22 breakout rooms that engineering students can reserve, each equipped with power outlets, white boards and places to sit — “the three most important needs that students identified for us,” Ratner says.

Study and project spaces fill up fast, especially around exams, says Nathaniel Wagner, a sophomore studying computer engineering who met advisors and attended club events as a first-year student in the IEB last year.

“So, it’s nice to have a new modern space available,” he adds. “Many of the rooms are tailored to engineering student organizations and group studying, making them great places to tackle a club or group project.”

A hub to call home

For Jenny Phan, the IEB became her go-to between classes for homework, studying, advising or snacking (the HUB food court is just across the street). She appreciates the IEB’s blend of social spaces and quiet areas for focused work. “I like being able to choose the kind of environment that works best for me that day,” says Phan, now a sophomore studying materials science and engineering.

“The modern layout creates an environment that encourages collaboration and supports success,” she adds. “Before now, there wasn’t a dedicated space where engineering students could study, collaborate, attend classes and receive academic advising. The IEB has become that centralized space where students can achieve it all.”

No one knows this better than Athena Ortega, a senior studying human centered design and engineering who also staffs the building’s information desk.

“The IEB offers the opportunity for both undeclared and advanced engineering students to feel more connected and supported,” Ortega says. “It’s so exciting to have a space that belongs to us, that teems with energy, new ideas and, most importantly, the opportunity to build community within the College of Engineering.”

The \$106 million IEB was funded by the State of Washington and the federal government, the UW and a coalition of individual and corporate donors.❖



Fostering engineering leaders

By Ed Kromer

The UW Engineering Leadership Institute, a new partnership of the College of Engineering and Foster School of Business, will equip mid-career engineers to lead effectively in fast-evolving industries.

Engineers solve problems and innovate.

Engineering *leaders* solve problems and innovate — at a strategic scale, by catalyzing colleagues and teams and managing risk and return on investment.

But doing this effectively requires an enhanced skill set that goes beyond the technical.

To help develop those enhanced skills, the College of Engineering is partnering with the Foster School of Business to launch the Engineering Leadership Institute (ELI).

The ELI is designed for mid-career engineers, across all disciplines and industries, who are taking on greater responsibility to lead their organizations in an increasingly complex context.

Addressing market demand

The institute’s 15-week hybrid executive education program will equip engineers to lead at the pace of change, leveraging emerging technologies and communication techniques to drive innovation and influence strategy.

The work-compatible program derives directly from market demand, according to Cassady Glass Hastings, the College’s director of new programs and innovation. “When we ask industry leaders what types of upskilling they want to see from us,” she notes, “*everyone* says leadership.”

What’s good for organizations and industries will be equally good for engineers who aspire to amplify their impact within them.

Powerhouse faculty, powerful curriculum

The ELI is led by world-renowned faculty experts at the Foster School and College of Engineering, and enhanced by industry

leaders from across the region — one of the nation’s most innovative engineering hubs.

The wide-ranging curriculum spans innovation, financial analysis, enterprise AI, business strategy, organizational change, problem-solving, collaborating across teams, negotiation and advanced communication techniques.

And the program culminates in an in-person case competition to solve a dynamic, real-world leadership challenge involving the impact of AI on engineering teams and organizations. Teams will present their solutions to a judging panel of industry leaders.

A force multiplier

Glass Hastings says that the College’s initial public offering of executive education is designed to produce engineering leaders — across all disciplines — whose technical expertise is augmented by advanced leadership skills that will drive organizations and industries forward.

Or, to put it another way, the ELI can serve as a force multiplier in the careers of those who aspire to shape the future of engineering.

“The Engineering Leadership Institute will equip professionals to lead with confidence,” Glass Hastings adds. “It will build the skills needed to harness emerging technologies, drive innovation, manage high-impact teams and influence decisions-makers in rapidly changing environments.”❖



The Engineering Leadership Institute begins March 2, 2026. Learn more or apply today

► enr.uw.edu/eli

GOOD GRIPS

UW researchers are taking on one of the greatest challenges in robotics: the ability to grasp and manipulate objects with superhuman dexterity.

By Ed Kromer



Robots engineered in the UW Robotics Lab (left) and the Mechatronics, Automation and Control Systems Lab (above) demonstrate the growing ability to grasp and manipulate objects for both everyday and industrial operations. Dennis Wise / University of Washington

Have you ever considered how you pluck an egg from its carton? Retrieve a coin from a sofa cushion? Grab a loaf of bread? Screw in a wing nut? Pull out a weed? Catch a Frisbee? Tie a bow knot? Cut with scissors? Pour from a bottle?

Most of us perform countless everyday tasks with our hands without a second thought. These endlessly useful appendages, and the intricate sensory system that guides them, have been shaped by 60 million years of evolution.

Robots have far less history. And their ability to grasp and manipulate objects with dexterity — the key to their utility in industrial, health-care and household applications — remains one of the biggest challenges faced by designers and developers.

In robotics, the holy grail is a healthy grip.

“We forget how complicated these physical manipulation tasks are,” says Siddhartha Srinivasa, a professor in the Paul G. Allen School of Computer Science & Engineering. “You have to be simultaneously forceful and delicate.”

Researchers around the College of Engineering are working to find that balance, refining the capacity of robots to grasp with brute strength, delicate finesse, fine precision, preternatural dexterity — or some combination of each.

It starts with influential veterans such as Srinivasa, founder of the UW Personal Robotics Lab and Amazon’s Robotics AI organization, and Allen School Professor Dieter Fox, founder of the UW Robotics and State Estimation Lab and the NVIDIA Seattle Robotics Lab — and now leading a new initiative at the Allen Institute for Artificial Intelligence. Their fundamental contributions to motion planning, perception and machine learning have empowered robots to perform complicated manipulation tasks in real-world environments.

They are joined by a new generation of brilliant roboticists who are approaching the field’s enduring puzzle from multiple disciplines and with fresh ideas.

Grip that doesn’t slip

Xu Chen, the Bryan T. McMinn Endowed Research Professor in mechanical engineering, began in robotics by building a double-armed specimen that can play chess and solve a Rubik’s cube autonomously.

These feats were accomplished with feedback control algorithms that integrate visual and tactile data. And Chen began adapting this technology for industrial applications through the Boeing Advanced Research Collaboration (BARC) and the Mechatronics, Automation and Control Systems (MACS) Laboratory, both of which he directs.

“Industrial manufacturing requires great precision,” Chen says. “For that, the visual and the tactile need to work together.”

His group has developed a robot with parallel grippers, guided by external cameras producing three-dimensional images, that deftly removes and inspects complex aircraft engine blades for the tiniest blemish. It can do this more quickly, accurately and tirelessly than the sharpest of humans.

Another project integrates visual and tactile data to predict and prevent slippage. Tiny cameras mounted behind silicon sensors on robotic grippers capture the minute deformations that appear when an object begins to slip from its grasp. A machine learning algorithm processes the resulting entropy and its rate of change, then applies that feedback to correct the grip in real time.

“For many robots, precision isn’t there yet,” says Chen. “So, it’s scientifically intriguing to explore how we can apply precision control to robotics.”

“I like to focus on problems that seem impossible to solve. I want robots to do what humans can’t — *superhuman* things.”

– Siddhartha Srinivasa

Tactile textiles

Visual sensing works well in many industrial applications, but it can be difficult to scale up or down to guide more nuanced robotic graspers.

Enter Yiyue Luo, an assistant professor of electrical and computer engineering. In her Wearable Intelligence Lab, Luo is developing networks of tiny tactile sensors that are soft, flexible, lightweight and can conform to uneven shapes. Perfect, Luo says, for “complex geometries that would be super hard for conventional visual sensors.”

Like human bodies. Or robot hands.

The initial application of this technology is in textiles that can monitor physical health, sense body activity or support rehabilitation, as demonstrated by the candy-colored knit

sweaters, sleeves and gloves displayed in Luo’s lab. These smart garments are fabricated by an automated digital knitting machine — think a 3D printer but more complicated — from natural fibers that are imperceptibly coated in sensors. These sensors enable recording, monitoring and learning of human-environment interactions.

It was not a stretch for Luo to extend the sensors’ utility to robot-environment interactions. The technology — woven into gloves or worked onto robotic grippers — has the potential to accelerate imitation learning and policy training. And it promises to advance remote-control robotics (a.k.a. teleoperation), allowing a human conductor to “feel what the robot is feeling,” she adds.

Luo is open sourcing her tech and data to help advance the development of dexterous robotic grasping that may, one day, exceed human touch.

“It’s not hard at this point to capture tactile information,” says Luo. “But knowing the best way to use this information is more difficult.”

How to train your robot

Abhishek Gupta, an assistant professor of computer science and engineering, is working on this very thing. Gupta creates learning-based algorithms that help robots handle unfamiliar objects and unpredictable tasks in everyday spaces such as homes and workplaces.

This work encompasses a keen interest in a higher-order challenge of robotics known as “functional grasping.”

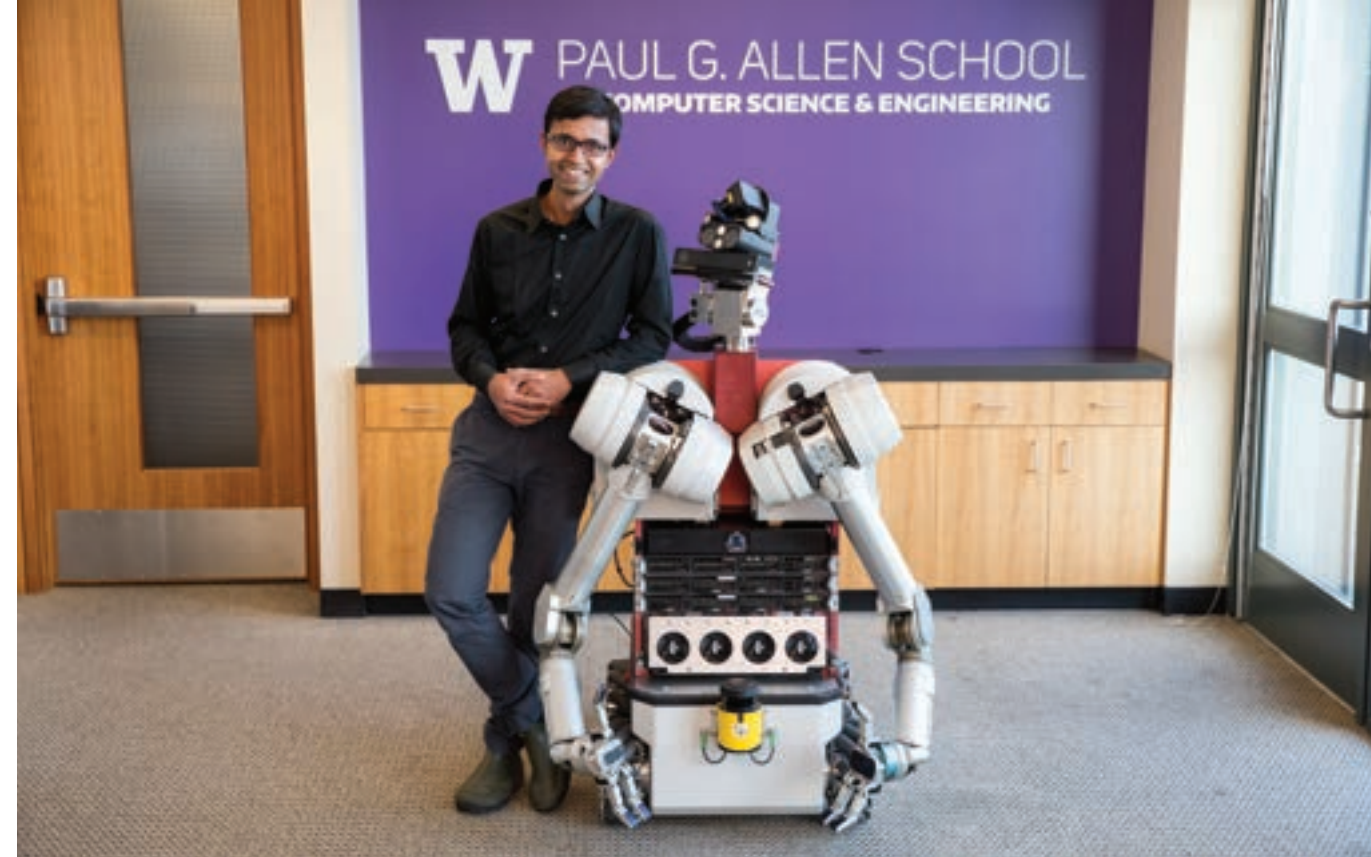
“The idea is that you can either grasp to *grasp* or you can grasp to *use*. These are not the same,” Gupta says. “If I want to grasp something with the intent of performing a task downstream, what is the best way to do it?”

The task can dictate the optimal approach, grip and force on an object.

Optimizing manipulation is a key focus of Gupta’s Washington Embodied Intelligence and Robotics Development (WEIRD) Lab, where his algorithmic system allows a robot to learn from limited human demonstrations and by trial and error. Like young children, only faster.



Yiyue Luo’s advanced tactile sensors, woven into wearables or worked onto robotic grippers, can accelerate imitation learning and policy training. Ryan Hoover



Siddhartha Srinivasa is pushing robotic grasp and manipulation beyond the limitations of human imitation. Dennis Wise / University of Washington

This work has spanned parallel jaw grippers for warehouse picking, packing and extracting; robotic chopsticks for meticulous grasping; and a three-fingered robotic “hand” that approaches human dexterity in maneuvering household items in the UW Robotics Lab’s test kitchen.

Gupta’s next frontier is dexterous grasping in the most real-world environment of all: clutter. “Grasping has seen a lot of progress in the last few years,” he says. “But grasping in clutter is a pretty unsolved problem. We’re very much in its infancy.”

Toward the superhuman

While roboticists chip away at different facets of the great grasping challenge, there’s a bigger question to consider: how much more can be achieved by moving beyond mimicry of the human hand?

After all, our hands are just one evolutionary outcome — remarkably versatile, but not necessarily the best possible design for every task. Starting with the problem, rather than existing anatomy, could open new paths for innovation.

Srinivasa envisions general-purpose robots equipped with a set of interchangeable graspers, tools designed to work in harmony with intelligent software and complex learning algorithms to take on a wide range of challenging tasks.

This mindset is already shaping real-world advances.

In the Personal Robotics Lab, for instance, Srinivasa and his collaborators are developing a robot that can feed a person with limited mobility — deftly handling everything from

sushi to spaghetti to syrah. Another operates chopsticks with surgical precision for infinitely delicate tasks. And they are designing next-generation robots that may someday be capable of round-the-clock work in complex and extreme environments, like maintaining the engine room of a nuclear submarine.

“I like to focus on problems that seem impossible to solve,” Srinivasa says. “I want robots to do what humans can’t — *superhuman* things.” ❖



UW researchers are showing that dexterous robotic grasping can come in many forms — even chopsticks. Dennis Wise / University of Washington

Making cement greener... with seaweed

The modern world is built with concrete. It is the second most-used substance on Earth after water. Yet concrete's key component, cement, is responsible for up to 10% of global carbon dioxide emissions.

To tackle this problem, researchers at the UW and Microsoft have developed a low-carbon concrete by blending cement with powdered seaweed. The result: a material with 21% lower global warming potential that still meets strength standards.

“Cement is everywhere — it’s the backbone of modern infrastructure — but it comes with a huge climate cost,” says Eleftheria Roumeli, an assistant professor of materials science and engineering. “What makes this work exciting is that an abundant, photosynthetic material like green seaweed can cut emissions without costly processing or sacrificing performance.”

Unlike cement, seaweed is a carbon sink — absorbing carbon dioxide as it grows — and can replace part of the cement in concrete. The researchers used a custom machine learning model to identify promising combinations to test in the lab, leading to an optimal mix that passed strength tests with a dramatically smaller carbon footprint.



UW doctoral student Meng-Yen Lin casts green cement samples into molds to cure and later test their structural properties. Mark Stone / University of Washington

Next, they aim to explore other algae types — and even food waste — to create local, sustainable cement alternatives worldwide. “By combining natural materials like algae with modern data tools,” Roumeli adds, “we can localize production, reduce emissions and move faster toward greener infrastructure.”

- William Poor

Securing American research

The future of research depends on advancing groundbreaking discoveries while protecting those discoveries from evolving threats. The UW-led Safeguarding the Entire Community of the US Research Ecosystem (SECURE) Center brings together the national research community to co-create tools and strategies that address self-identified security challenges. These include misappropriation, violations of research integrity and interference by foreign governments.

Backed by a major National Science Foundation grant awarded in 2024, the SECURE Center is working to protect the integrity of U.S. research while preserving the openness and collaboration that drive scientific progress.

This includes developing a shared virtual environment that will serve as a national hub for research security, allowing researchers to collaborate, share information and access resources securely.

- Leah Pistorious



Nature’s shock absorbers

The secret to building safer aircraft and automobiles might be hidden in the neck of a diving seabird. Bart Boom, a Ph.D. student in aeronautics and astronautics, is studying how gannet seabirds plunge smoothly and efficiently into the ocean to hunt at breakneck speeds — without breaking their necks.

Boom finds that the segmented vertebrae in a gannet’s neck provides a cushioning effect, reducing the magnitude of shock energy by stretching it over time. This discovery opens new possibilities for shock-damping designs in aerospace, automotive and robotic applications — potentially making flights smoother and cars safer in an accident.

“We intend to empower engineers with a simple design tool for smart structural segmentation to mitigate shock and vibration damage without using heavy mechanical dampers and expensive exotic materials,” adds Ed Habbour, an assistant professor of aeronautics and astronautics and Boom’s faculty advisor.

- Amy Sprague



Fortifying building standards

Civil and environmental engineering researchers are contributing to a federal investigation of the 2021 partial collapse of the Champlain Towers South condominium in Surfside, Florida. Through a contract with the National Institute of Standards and Technology (NIST), the UW team conducted 13 full-scale tests using concrete materials sourced from South Florida that closely match the original building’s construction.

The UW researchers, led by Professors Dawn Lehman and Travis Thonstad, tested eight slab-column connections and three columns in the department’s Large-Scale Structural Engineering Testing Laboratory. These connections — between towering vertical columns and 11,000-pound horizontal floor slabs — are key to understanding how a building transfers weight to its foundation.

To simulate the building’s aging and column damage, the team worked with NIST to implement an accelerated corrosion protocol and long-term loading conditions. Using hydraulic jacks, punch shear tests pushed the slabs to failure.

The NIST is using data from these tests to refine structural engineering models and identify the cause of the collapse to improve building safety nationwide and prevent similar failures in the future.

- Julia Davis



The site of the Champlain Towers South partial collapse in Surfside, Florida. Photo courtesy of NIST

Walkable cities inspire more walking

Highly walkable areas lead to significantly more walking. That’s the conclusion of research led by Tim Althoff, an associate professor in the Paul G. Allen School of Computer Science & Engineering.

Althoff and his co-authors studied data from the Argus step-tracking app and Walk Score, a measure of cities and neighborhoods based on the typical time it takes a resident to walk to amenities like local grocery stores and schools.

They found that relocations to cities with Walk Score increases of more than 48 points (out of 100) led to an additional 1,100 steps per day, on average.

“There’s tremendous value to shared public infrastructure that can make healthy behaviors like walking available to almost everybody,” says Althoff, “and it’s worth investing in that infrastructure.”

- Stefan Milne



Growing up with AI

While today’s AI chatbots can sound convincing, they often flub basic facts. Adults regularly fall for these errors, and it’s even harder for kids to tell when an AI is wrong, since they rarely have the background knowledge to sniff out falsehoods.

To help children think more critically about AI, UW researchers developed an abstraction and reasoning game called AI Puzzlers. The game is based on simple visual puzzles made from colored blocks. Kids try to solve a pattern puzzle, then ask AI chatbots to do the same — and explain their solutions. The twist? The AI usually fails, and even when it gets the puzzle right, its explanation is often wrong.

In the game, kids can compare their solutions to those from various AI chatbots. An “Assist Mode” lets them try to guide the AI system to a correct solution.

When testing the game at UW Discovery Days and KidsTeam UW, elementary school students first gave the chatbots broad hints but quickly learned to be more specific. This helped them to understand how AI “thinks” — and to view it as a tool needing guidance rather than as an answering machine.

“Kids are smart and capable,” says Julie Kientz, a professor in human centered design and engineering. “We need to give them opportunities to make up their own minds about what AI is and isn’t.”

- Stefan Milne



Addressing antibiotic resistance

Antimicrobial resistance is a lurking threat in hospitals around the world. As more strains of bacteria evolve defenses against available drugs, more patients risk contracting infections that defy treatment.

UW researchers studied nine common disinfectants — such as ethanol, hydrogen peroxide, benzalkonium chloride and UV light — against three well-known strains of antibiotic-resistant bacteria, including MRSA, that can proliferate in health-care facilities.

While disinfectants effectively killed bacteria, most barely damaged the genes that cause antibiotic resistance. These genes can survive and transfer to new bacteria, spreading resistance even after the original bacteria are dead.

“It’s not just the bacteria that we need to deal with in hospitals and elsewhere,” says Huan He, who completed the research as a doctoral student in civil and environmental engineering. “It’s also the behavior of their DNA.”

Of the disinfectants tested, UV light proved most effective at both destroying bacteria and damaging the offending genes.

- William Poor



Huan He tests the efficacy of common disinfectants against antibiotic resistance genes in bacteria. Mark Stone / University of Washington

Lab notebook

Predicting performance under pressure

By tracking eye movements and neural activity, Jiaxin Li, a Ph.D. student in industrial and systems engineering, is developing tools to anticipate when we’re about to make critical errors while juggling multiple tasks — potentially transforming high-stakes professions from air traffic control to emergency response.

- Amy Sprague

Breaching the blood-brain barrier

Chemical engineering researchers have developed better ways to isolate cells from the brain’s protective barrier, creating a roadmap for future scientists to follow. Blood-brain barrier research represents a critical intersection of neuroscience, engineering and medicine, with significant implications for treating neurological diseases.

- Jeremiah Wilhelm

Talking politics with ChatGPT

All AI models are biased — by the data and the humans that trained them. Allen School researchers found that the political opinions of democrats and republicans alike tend to lean toward the liberal or conservative bias of the chatbot model they interact with.

- Stefan Milne

A sensor system for tiny flying robots

Researchers in the Autonomous Insect Robotics Laboratory have developed an avionics system that weighs less than a toothpick. The TinySense system, a collaboration of Allen School and mechanical engineering researchers, is the first to enable a flying robot the size of a bumblebee to sense its surroundings independently — an invaluable tool for search-and-rescue missions, space exploration, environmental sensing and many more applications.

- Kristine White



FIGHTING FIRE BEFORE IT SPARKS

By Ed Kromer

The entrepreneurial undergrads behind Voltair are innovating drone technology to prevent wildfires from igniting along rural power lines.

One night last fall, Ronan Nopp and Hayden Gosch were brainstorming names for their newly formed startup that would deploy autonomous, self-charging drones to inspect rural power lines.

After the two electrical and computer engineering seniors debated — and dismissed — scores of candidates, Nopp's roommate chimed in from the couch: "What about Voltair?"

They liked the mashup of volt (a unit of electricity) and air (the domain of drones) — plus the nod to Voltaire, the Enlightenment thinker. It suited a company whose purpose is to "keep the lights on."

But Voltair has become more than a clever name.

Its innovative solution to a growing environmental and economic crisis took the grand prize at two UW Buerk Center for Entrepreneurship competitions. And its founders have grander aspirations.

"Our mission," says Nopp, "is to enable autonomous inspections of the power grid with the goal of completely eliminating wildfire risk for public utilities that use our technology."

Self-inflicted flames

That risk is great — and growing. In a warming world, wildfire season has become longer and more severe. Many fires are caused by breakdowns along the electrical grid. Overgrown vegetation can spark power lines during storms or heat waves. Aging apparatus and insulation can fail at any time.

"The power grid," says Gosch, "is a ticking time bomb."

This concerns all public utilities, which collectively bear billions of dollars in wildfire liability. But the risk looms particularly large over small rural cooperative utilities. For them, Gosch adds, "the threat is existential. It's their single greatest fear."

These small providers typically make do with skeleton crews of technicians to maintain thousands of miles of power lines. In remote areas, it can take five to 11 years to complete a full manual inspection of the grid.

Voltair's founders believe they can cover the same ground every 60 days — at less than half the cost per mile.

Airborne and autonomous

Friends since middle school, Nopp and Gosch decided to cap their final year at the UW with a grand engineering and entrepreneurial challenge. Gosch, who had developed a passion for energy infrastructure while interning at Seattle City Light, posed the problem to Nopp, who had developed expertise in commercial drones.

Their solution was simple enough: equip a drone with tracking sensors, position mapping and a self-charging clamp. When its battery runs out, it simply latches onto the power line it's inspecting. Once recharged, it's back on its way for continuous inspection and reporting.

Motivated by the Buerk Center's spring entrepreneurial competitions, Nopp and Gosch developed the Voltair concept last fall and presented it in January at the Science & Engineering Business Association's annual Science & Technology Showcase.

Sharpening the pitch

They added additional expertise to their "scrappy team of undergrads," which eventually included computer science students Aryan Sharma and Andy LeGrand on software and detection systems; aerospace engineering student Hudson Wood on prototype design and competitive strategy; finance and information systems student Hunter McKay on business development; and psychology, communications and business student Isabella Crosby shaping the narrative and marketing materials. Former Husky Warren Weissbluth recently joined to run operations.

"With these startup competitions, it's all hands on deck," Nopp says. "A cool technology is great, but the competitions are about articulating your idea, figuring out your go-to-market strategy. These are things that don't fall neatly into any one degree. It takes everyone working together."

The original Voltair lineup celebrates the first of two UW startup competition victories.
Buerk Center for Entrepreneurship



The Voltair team brainstormed, prototyped, interviewed utility providers and regulators, conducted field studies, launched test flights — and created a coherent and compelling pitch.

Their proposed fleet of drones, equipped with their patent-pending charging system plus an arsenal of sensors, machine vision and Geographic Information System (GIS) mapping, can patrol a network continuously and autonomously, gathering and transmitting visual, thermal and ultrasonic data. Any vegetation encroachment or maintenance concern can be diagnosed on the spot and a crew can be dispatched to remedy the situation — before it becomes a fire hazard.

And these gains in efficiency, accuracy and frequency come with a significant cost saving over manual inspection.

"There's a huge cost to troubleshooting," Nopp says. "Our big bet is that our drones can find problems quickly so a utility crew can fix them immediately."

A win-win situation

The seasoned investors and entrepreneurs who judged both the Environmental Innovation Challenge and the Dempsey Startup Competition took that bet. Voltair became the first team to win both in the same year.

"Investors and venture capitalists echo this time and time again: it's not just the idea, it's the team behind it," says Buerk Center Director Amy Sallin. "Voltair set themselves apart by having a cross-disciplinary team that was able to connect not just with the judges who understand drone technology and climate tech, but with the dozens and dozens who do not."

The competitions awarded them valuable cash — \$45,000 in total winnings — but also invaluable connections and confidence.

"Wildfire is clearly a huge problem," Nopp says. "We were cautious at first with our solution. But the more we talked to public utilities and the feedback we got from competition judges reinforced that Voltair is a viable solution that we should pursue."

Nopp and Gosch are doing just that. Over summer, they refined Voltair's systems, conducted field tests and met with utility operators, insurers, wildfire experts and the FAA. They joined the Buerk Accelerator to facilitate the leap from competition to marketplace.

All in service of a path less taken but full of purpose.

"This definitely doesn't feel normal," Nopp says. "But we have this problem that we're really passionate about solving and we're going to keep working on it." ❖



FROM LABS TO LAUNCHPADS

Meet three recent graduates who turned curiosity into action, pursuing research, innovation and leadership that stretches beyond the classroom.

Unlocking the brain with the fruit fly

In an Engineering 101 course, Mary Bun became captivated by neural stimulation devices for spinal cord injury rehabilitation. “I found it fascinating that we could externally influence the nervous system to help people,” she recalls.

This interest led her to pursue a dual degree in electrical and computer engineering and psychology. As a junior, she took on her first research opportunity in a psychology lab, applying her academic knowledge alongside practical engineering skills.

“My first two years were about finding my footing,” she says. “But once I joined the lab, everything clicked. I realized how much I loved the process of discovery — asking questions, designing experiments and seeing results come to life.”

Bun’s research focused on an important question: How do neural circuits manage multitasking? Using optogenetics — a technique that uses light to activate specific neurons — she studied how fruit flies perform tasks like walking and vibrating their wings at the same time.

“Despite its simplicity, the fruit fly can perform surprisingly complex behaviors,” Bun explains. “By understanding how the fly brain processes multiple tasks, we can start to uncover fundamental principles about how more complex brains, like ours, might work.”

Bun’s work challenged the traditional approach of studying behaviors in isolation. “Most research looks at one behavior at a time,” she says. “But in the real world, animals — and humans — are constantly juggling multiple tasks within

different states and environments. I wanted to explore how the brain handles that.”

By investigating how the brain prioritizes and processes information during multitasking, her research offered valuable insights into disorders like Parkinson’s, which affect cognitive function, potentially paving the way for new treatment approaches.

Next, Bun plans to pursue a Ph.D. to study neural engineering, continuing to explore the brain’s ability to manage competing demands.

“Research has taught me to embrace challenges and think creatively,” she says. “It’s not just about finding answers — it’s about asking the right questions and pushing the boundaries of what we know.”

- Danielle Holland

Above: A fruit fly may help researchers better understand the human brain. Below: Mary Bun works on a device she built for her research.
Photos by Jayden Beles



Omeed Yazdani prepares an experiment in the lab.

From classics to cures

“When Asclepius, the ancient Greek god of healing and medicine, began raising people from the dead,” Omeed Yazdani explains, “Zeus struck him down with a thunderbolt.” It’s a lesson in overreaching that Yazdani — who holds bachelor’s degrees in biochemistry and bioengineering and a master’s degree in bioengineering from the UW — takes to heart. For him, the myth is a reminder that innovation must be balanced with ethics.

At the UW, Yazdani conducted cancer research and founded a nonprofit to provide prosthetic devices to children in underserved communities. While focused on science and engineering, he was also drawn to the humanities and completed a classics minor.

“Some people think it’s weird, but the classics and medicine are far more interwoven than people realize,” he says.

Yazdani’s love of storytelling and medicine led him to Columbia University’s medical school, where he plans to focus on narrative medicine — an approach that emphasizes listening to and understanding patients’ stories. He hopes to one day create a simple, affordable cancer vaccine for immunotherapy.

The patient-first approach is also why Yazdani founded LegUp Prosthetics, a nonprofit he launched through the student organization Bioengineers Without Borders. Recognizing the need in low-resource communities for children with below-the-knee amputations, LegUp Prosthetics offers an adjustable device that can accommodate a child’s growth, easing the financial burden for families.

In medical school, Yazdani continues to bridge science, ethics and compassion — with an eye toward one day returning to the UW as a faculty member.

- Lincoln McElwee

Flight path to the stars

A fifth-grade field trip to a NASA space simulator set Grace Pardini on a course to the UW. Now she hopes to inspire other Indigenous students to follow her path into rocket science.

“I’ve always loved puzzles, science and space,” says Pardini. “But I think what’s driven me most is that I want to be part of something bigger than myself.”

Moving between high schools in California and Oregon, Pardini initially didn’t see college as likely. But an Instagram video of the Husky Marching Band caught her attention. “It just looked like joy,” she recalls.

But the deciding factor was the UW’s aeronautics and astronautics program, which offered the chance to study spaceflight systems in a city known for aviation innovation. She arrived with a clear academic goal and a place in the band — but found an even deeper sense of cultural belonging.

As a first-generation college student and an Alaska Native woman in STEM, Pardini carved out a space where she could thrive — and help others do the same. She joined the UW chapter of the American Indian Science and Engineering Society and eventually became a team leader for the First Nations Launch, an Indigenous-centered rocketry competition sponsored by NASA. Her team placed in the top three nationally — including a first-place finish during her first year.

“It’s not just about launching rockets,” she says. “It’s about proving what Indigenous engineers and students are capable of when they’re given support, space and a reason to believe in themselves.”

Grace Pardini holds a rocket designed by the UW chapter of the American Indian Science and Engineering Society.



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Behind every breakthrough is a graduate student

Graduate students drive discoveries with real-world impact. At the UW, they power research, mentor undergraduates and shape the next generation of innovators and leaders.

Yet they are the most financially vulnerable members of our academic community. As federal funding is cut, their ability to advance research, teach students and serve the public good is at risk.

"Graduate students help power the UW's research and teaching. Without stable support, those systems falter," says Colin Marquis, a Ph.D. student in materials science and engineering and a College of Engineering Dean's Fellowship recipient.

In the lab, Colin advances aerospace materials research. Beyond it, he's served as a teaching assistant, supported evidence-based instruction, led summer research programs through a Washington Space Grant fellowship, and mentored undergrads through clubs and teams.

"Investing in graduate research is not just about funding individuals," he adds. "It's about affirming our belief in long-term innovation, intellectual exploration and the potential for breakthroughs that will shape generations to come." - Photo by Michelle Enebo



Support graduate students like Colin, and help keep discovery moving — here at UW Engineering and around the world.

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