Autumn 2025

MESSENGER

MECHANICAL ENGINEERING | UNIVERSITY of WASHINGTON

Magnetic microgels for limb regeneration, pages 8-9

CHAIR'S MESSAGE

Supporting our students

While reduced federal and state funding are impacting our research labs and educational mission, we remain focused on sustaining the excellence in teaching and research that defines ME. Central to this work are our graduate students — they play key roles in our teaching mission, mentor undergraduates and drive discoveries that improve lives.

In this issue, you'll meet several of these researchers. One is developing magnetic biomaterials that could one day help regenerate limbs. Another is designing tiny robots that could aid in search-and-rescue missions, space exploration and environmental monitoring.

Our graduate students not only advance discovery but also enrich the experience of our undergraduate students. That impact is reflected in our growing undergraduate enrollment, which has increased 11% in the past year and 30% over the past four years.

Looking ahead, we're excited about plans for a new Mechanical Engineering Building. With a feasibility study complete and pre-design underway, this building will expand our capacity for teaching, research and innovation — and strengthen our impact across Washington and the nation. I look forward to sharing opportunities for ME's community to help bring this vision to life.

Alberto Aliseda
Mechanical Engineering Chair
PACCAR Endowed Professor

STUDENT CLUB SUCCESSES

Advanced Robotics at the UW competed at RoboMaster North America at UC San Diego. The team won third place in both the 1v1 and 3v3 confrontations, as well as the Engineer Challenge, in which the team's specialized robot maneuvered three cubes into targets. ▼

At the Michigan SAE Electric competition, **UW Formula Motorsports** placed fifth overall and first in the dynamic discipline of autocross. In addition, the team traveled overseas for the Formula Student Germany competition. ▼

The new **UW Solar Vehicle Team** finished sixth and was named Rookie of the Year at the Formula Sun Grand Prix in Kentucky after three days of racing. ▼

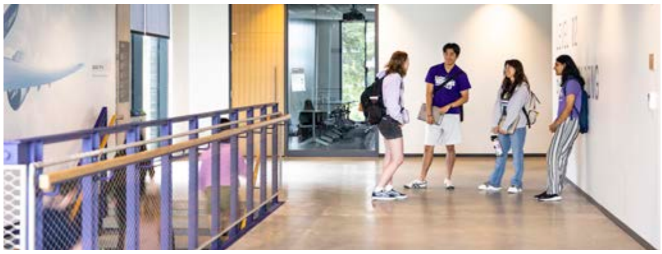
Husky Robotics competed at the University Rover Challenge finals in Utah, demonstrating their Mars rover's functionality and scientific analysis. The team also competed in the Canadian International Rover Challenge. ▼

PLANS FOR A NEW MEB

With student enrollment and research activity more than doubling in the past decade, the Department of Mechanical Engineering is growing rapidly. To meet this momentum, the College of Engineering is advancing plans for a new **Mechanical Engineering Building (MEB II)**, located next to the Interdisciplinary Engineering Building (IEB).

The department completed a feasibility study with Mahlum Architects to move the ME program out of the current building, built in 1959, into a new state-of-the-art facility conceived specifically for 21st-century mechanical engineering. In early 2026, this study will go to the University's Campus Architecture and Planning team that supports comprehensive capital planning for the campus.

Stay tuned for updates and opportunities to get involved in this transformative project.



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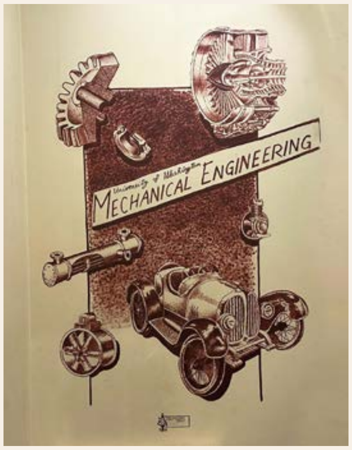
ENGINEERING MEETS EXPRESSION

Alums who painted the MEB mural share how ME shaped their careers.

If you've been inside the Mechanical Engineering Building (MEB) in the past 30 years, you've likely seen the eye-catching maroon mural above the north stairway featuring a car, jet engine, gear, turbine and a pressure vessel.

The mural was painted in 1995 by ME alums Brandon Shuman, Quang Nguyen and their friend Erwin. While brainstorming ways to brighten up the MEB, Shuman and Nguyen organized a mural design competition. Students voted for submitted sketches, and the winning artist received a prize — and would have their work displayed in the MEB for years.



After scanning the winning sketch onto cellophane, the students projected it on the wall to capture its shading and detail with red brushstrokes.

Thirty years later, Shuman and Nguyen are successful engineers who have stayed connected to the UW.

Nguyen, who went on to earn a master's degree in mechanical engineering and an MBA at MIT, has held business leadership and design roles at Blue Origin, Boeing and, currently, Amazon. He has delivered seminars at the UW and serves on the ME advisory board.

ME alums Brandon Shuman and Quang Nguyen

Shuman, who earned bachelor's and master's degrees in ME — advised by Professor John Kramlich — works in the medical device field. He has mentored student startups at UW CoMotion.

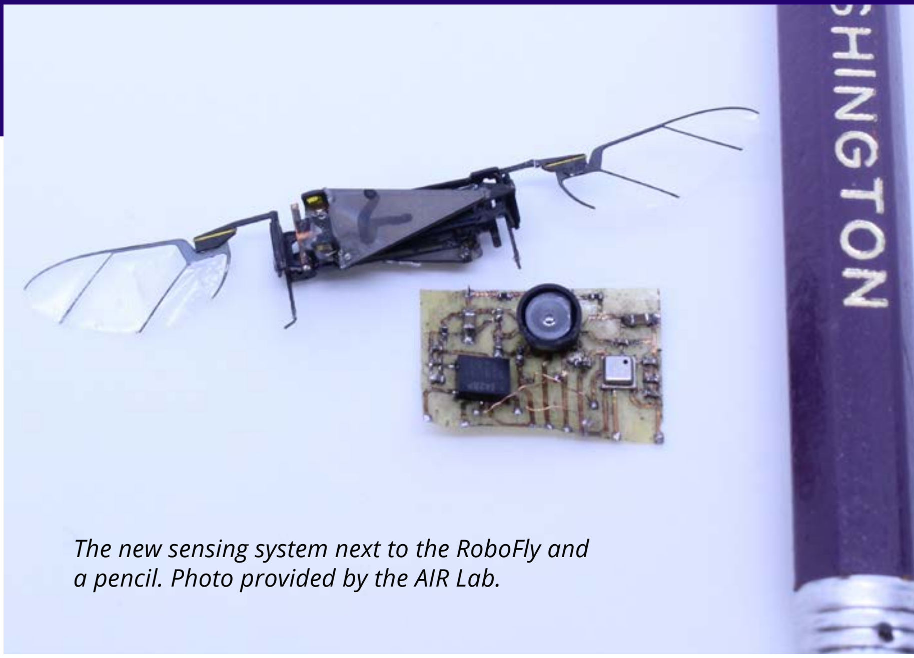
"From my perspective, ME is one of the most broad and applicable degrees you can get," Shuman says. "I've relied on the world-class education I received at the UW throughout my career."

Every year or two, Nguyen and Shuman pose in front of the mural that still holds court over streams of students.

"We wanted to do something with longevity," Nguyen says. "Little did we know it would still be here 30 years later."

A new sensor system for insect-scale robots

UW researchers are pioneering the lightest avionics system yet for insect-scale robots.



The new sensing system next to the RoboFly and a pencil. Photo provided by the AIR Lab.

A micro-robot the size of a bumblebee could soon take flight while sensing its surroundings, thanks to innovations from researchers in the Autonomous Insect Robotics Laboratory (AIR Lab).

Researchers from ME and computer science and engineering have developed the lightest avionics system yet for flying insect robots — a step toward documenting the lightest vehicle capable of sustained hovering. The new avionics system, fittingly called TinySense, is the first that's capable of enabling a flying insect robot to achieve sensor autonomy, or sense surroundings independently.

The researchers, led by ME Ph.D. candidate Zhitao Yu, recently received the Best Student Paper Award at the IEEE International Conference on Robotics and Automation. Other ME team members included Ph.D. candidates Aaron Weber and Yash Talwekar and Associate Professor Sawyer Fuller.

Insect-scale robots could be useful for search-and-rescue missions, space exploration, environmental sensing and other applications. However, unlike large drones that might carry a scanning light detection and ranging system or global positioning system (GPS) sensor to navigate, the tiny robots have size, speed, weight and power constraints that limit the sensors they can carry. Sensing and computation should take no more than 10% of the power needed for a drone to fly.

Weighing only 78.4 mg and consuming just 15.6 milliwatts, TinySense weighs less than a toothpick and meets the weight and power consumption requirements enabling the UW Robofly, a 160-mg flapping-wing flying vehicle, to have sensor autonomy. To reach this low weight and power, the team built a custom optic flow sensor and used a lightweight, low-power barometric pressure sensor instead of a heavy laser rangefinder.

When tested on board a flight on the Crazyflie, a palm-sized quadrotor drone, TinySense demonstrated accurate estimates of its behavior, such as pitch angle, translational velocity and altitude.

"This project is a great example of the vertical integration we like to do in the AIR Lab," Fuller says. "The team tackled everything from microfabrication to advanced estimation algorithms. They built the lens system of a tiny optic flow camera, created an ultra-lightweight flexible circuit, and implemented software on a microcontroller to take raw pixels and compute optic flow. Lastly, they ran flight tests on a small drone and tuned a sophisticated estimation system to get maximum performance."

After graduating, Yu will remain involved as the AIR Lab transitions TinySense onto RoboFly, which would become the lightest sensor-autonomous vehicle capable of sustained hovering.

"I'll keep working with my labmates to integrate the sensor suite onto RoboFly, refine the state-estimation and control algorithms, and run free-flight tests that realize the sensor autonomy of flying insect-scale robots," Yu says. ■

Accelerating U.S. manufacturing

How can the U.S. manufacture better batteries for broad applications in cost-effective, sustainable ways? A paper from the UW, Pacific Northwest National Laboratory (PNNL), materials businesses and researchers from various institutions shares how academia and industry members can work together to achieve this goal.

For enhancing grid resilience and powering drones, cars and sensors, batteries manufactured in the U.S. must be cost-effective and high-performing, integrating elements such as digital twins, automation and AI-enabled smart manufacturing. Considering the costs of raw materials and processing technologies is key to manufacturers adopting new battery materials and chemistries.

“From mining to manufacturing, industry has a lot of scientific challenges that they don’t have time to address which, however, academia researchers are fully equipped to help solve,” says the paper’s lead author Jie Xiao, Boeing Martin Professor in ME with a joint appointment as a Battelle Fellow at PNNL. “If researchers become aware of issues faced by industry, which are present everywhere from extracting critical minerals and materials to scaling technologies, they can adjust their research and development to better support industry by utilizing their scientific tools and facilities more effectively.”

The paper discusses how researchers can reduce costs, manufacture longer-lasting battery materials, create materials more sustainably, control impurities, detect defects and quickly validate materials in industry-relevant settings. In addition, the paper surveys opportunities and challenges to scale up and manufacture next-generation battery “recipes,” such as lithium metal foils, solid-state electrolytes and sulfur cathodes.

“It’s important that scientific research proceeds in directions that have the potential to help manufacturers reduce costs so they can quickly establish a strong supply chain and manufacturing capability in the U.S.,” Xiao says.

This paper also explores how digitization and AI can help researchers and manufacturers improve battery production efficiency and quality. This includes using digital twins, created by placing sensors on physical batteries to track information about materials, model manufacturing processes and predict production effectiveness.

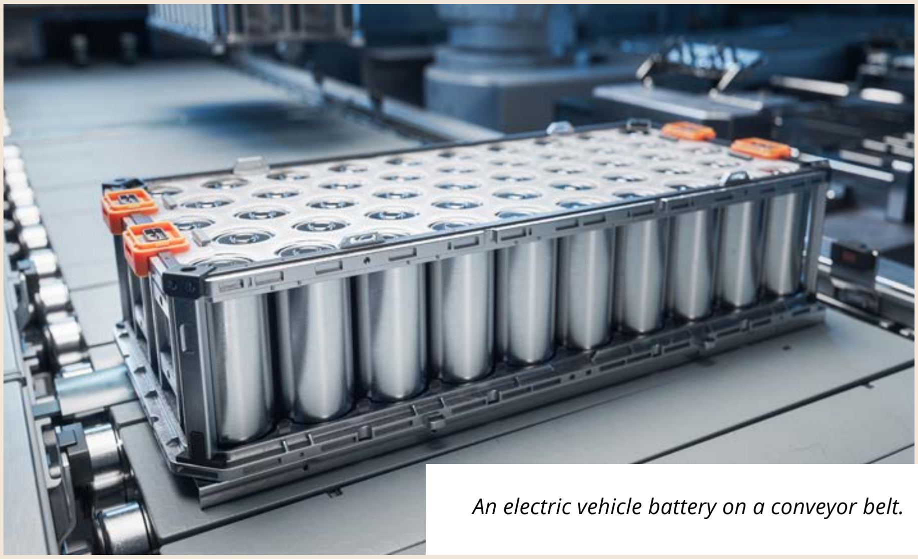
“This paper is a powerful example of how academia and industry can come together to address one of the nation’s most pressing technology challenges — scaling battery manufacturing in cost-effective, sustainable and impactful ways,” says Nancy Allbritton, Frank & Julie Jungers Dean of Engineering at the UW. “Through our deep partnership with PNNL, the UW is uniquely positioned to bridge scientific innovation with industrial-scale solutions. Together, we are accelerating the development of next-generation batteries while building the knowledge, tools and workforce that U.S. industry urgently needs.”

Other ME contributors to the paper include postdoctoral scholar Yuchen Ji and graduate student Hemanth Neelgund Ramesh.

Xiao is developing a UW certificate program in collaboration with industry partners in manufacturing science. ■

“It’s important that scientific research proceeds in directions that have the potential to help manufacturers reduce costs so they can quickly establish a strong supply chain and manufacturing capability in the U.S.”

– Jie Xiao, Boeing Martin Professor in ME



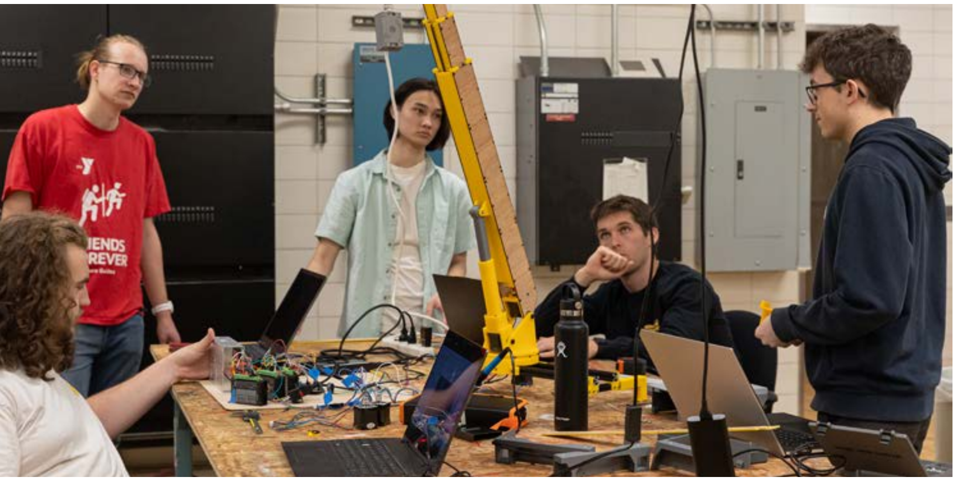
An electric vehicle battery on a conveyor belt.

IMPROVING CRANE SAFETY

Accidents involving tower cranes on construction sites or mobile cranes in warehouses can be catastrophic, leading to damage and injury. In 2019, a crane being dismantled in Seattle collapsed into traffic, killing four people. Among the lives lost was Sarah Pantip Wong, whose family is now working to prevent future tragedies through the Georgia Tech Crane Safety Research Center.

UW is a partner of the Crane Safety Research Center. The UW lead ME Professor Santosh Devasia is applying his expertise in iterative control and human-machine interaction to improve crane safety alongside students.

“We’re working on how to help people operate machines safely using automation,” Devasia says. “We want to prevent crane accidents to make our communities safer.”



ME students built a small-scale version of a mobile crane. Photo by Sara Coulsey/UW Photo.

Reducing mobile crane accidents

Working with Devasia, one team focused on improving the safety of mobile cranes, which are on wheels with a smaller base. The students developed a system that prevents cranes from tipping over, which can happen because the load is too heavy, or the crane is extended too far.

Simulating a controls system for their small-scale version of a mobile crane, they developed a visual interface that shows the crane’s top, side and rear views, and computes the center of gravity in real time to notify the crane operator of unstable conditions.

A “tip prevention” mode locks movement at 2% of the tipping angle. When the center of gravity goes near the crane’s support structures, the machine is in danger of tipping, and the screen displays warning lights.

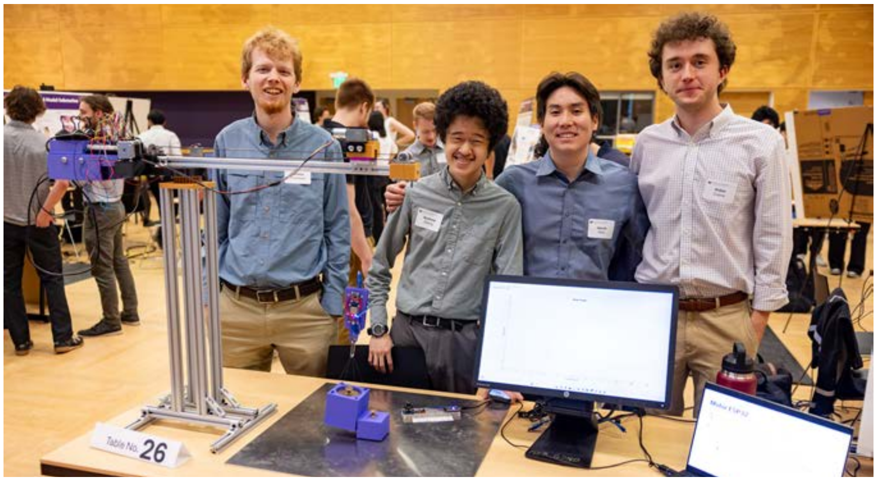
The team hopes their project could help simplify and automate crane operators’ decision-making process, which currently involves consulting physical graphs and charts. “It was exciting to build a working prototype that could improve safety and actually help people,” says team member Alex Cong (BSME ’25).

Preventing tower crane snag

To address the problem of cranes getting caught on ground objects, a student team advised by Devasia designed a sensor-based system, informed by industry experts and state regulators, to detect and correct a potential snag to prevent damage. The control system could make a difference for crane operators, who might face challenges communicating with workers on the ground.

The team built a model tower crane with a five-pound lift capability, wireless controls and a trolleying system with wheels to move loads horizontally. The crane’s arm, which rotates as well as moves up and down, lets out a cable to lower objects or hoist them up.

To inform operators when the crane might snag, the system rapidly measures the cable angle using an angle sensor on the crane’s block, which is attached to the cable and the hook that picks up objects. A microcontroller disconnects all motors if the angle is past 3 degrees. Then, the operator can return the payload to a vertical position.



A team designed a sensor-based system to detect when their model crane might snag and correct for the snag to prevent further damage. Photo by Matt Hagen.

CAPSTONE CREATIONS

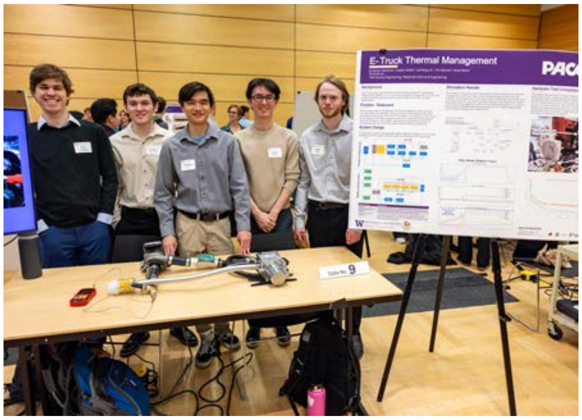
Photos by Matt Hagen

At the 2025 ME capstone expo, students showcased their capstone design projects — the culmination of their undergraduate education that provides recommendations for tackling real-world engineering problems.

Capstones were sponsored by local companies, community organizations, national labs, UW research labs and more. Students and clubs also initiated several projects.

“We’re really proud of the diverse types of needs that students are able to address in our program,” says Eli Patten, an assistant teaching professor and director of the capstone program. **“Many projects this year had an ambitious scope, and the students really stepped up. The level of iteration, testing and functionality of final deliverables keeps increasing every year.”**

Hytek Finishes sponsored a team that created a tape-masking system for their workers to prepare aerospace components for painting, which is currently done by hand. The students met their goals of improving worker comfort and reducing process time.



A team from the E-Truck club designed and simulated a thermal management system for the diesel truck provided by PACCAR that they’re working to convert into an electric vehicle. The goal was to maintain ideal temperature ranges for the truck components under various operating conditions in western Washington. The team predicted that the components they selected would keep them below their maximum allowable operating temperature.

Faculty and Boeing engineers mentored students in UW Formula Motorsports projects. One team developed a 3D-printed mold design and manufacturing process for using forged carbon fiber — a strong, lightweight material — for key components of the race car. Another project validated that the car’s custom motor requires active thermal management and confirmed that a water-based cooling system effectively maintains safe operating temperatures.

For a project sponsored by Blue Origin, students characterized the mechanical properties of the Passive Terminal Decelerator landing pad on the New Shepard rocket system. Through building an impact frame, the students worked to better understand how the decelerator, meant to absorb any remaining impact energy after the rocket lands, performs after experiencing partial damage to assess reusability.

THE POTENTIAL TO REGENERATE LIMBS

ME researchers are exploring how to regenerate tissue using magnetic microgels.

Story by Lyra Fontaine
Photos by Dennis Wise/University of Washington

About 2 million Americans have limb or digit loss from injuries or diseases. For them, the ability to restore or regenerate part of the missing limb would mean a significant improvement to quality of life. Extending the length of the bone, for example, could improve the fit of a prosthetic device.

What if we could regenerate musculoskeletal tissue and grow a limb outward using biomaterials that release growth factors, or proteins that can help form bones and joints, at controlled times and locations?

Feini (Sylvia) Qu, an assistant professor in ME and in orthopaedic surgery and sports medicine, received a National Institutes of Health Trailblazer Award to explore how injectable biomaterials could lead to limb regeneration. The award provides $400,000 to new and early-stage investigators over three years to support research programs that connect life sciences with engineering and the physical sciences.

“I feel grateful to the NIH for supporting me as an early-career researcher. It’s exciting to see a project I imagined years ago become reality,” says Qu, a UW Institute for Stem Cell & Regenerative Medicine core faculty member. “We hope to figure out how to induce natural regeneration — that’s present in animals such as salamanders and certain types of fish — in people.”

Magnetic microgels for limb growth

Human tissue typically scars after injury and does not regenerate. While bone can heal and regrow, it typically does not grow outwards. Qu is interested in how musculoskeletal tissue cells might respond to the regenerative effects of growth factors.

The goal is to regenerate limbs in people, but to do that, the researchers will first use experimental models in the lab setting.

“There’s an invisible boundary where the regeneration ends and it scars over,” Qu says. “Our lab has tried to identify the important cells and signals that participate in regeneration.”

Qu’s lab is creating a platform that can precisely control when and where to release two different growth factors through injected microgels, with the goal of regenerating a digit tip.

Microgels are small spherical droplets of hydrogels, which are 3D cross-linked, water-filled polymer networks used to create items like soft contact lenses. The goal is to make these biomaterials tiny, like a grain of sand, so that they are injectable in clinical settings, and to control where the microgels are delivered by making them magnetically sensitive.

Top: Ph.D. student Runrun Chen applies a magnet to one side of a tube with magnetic microgel particles. Bottom: Chen uses optical imaging tools to study the shape of the microgel and check whether the iron oxide is successfully incorporated.

The idea for magnetic microgels came to Qu when she observed her daughter using a magnetic play table that allowed her to remotely move objects around the table.

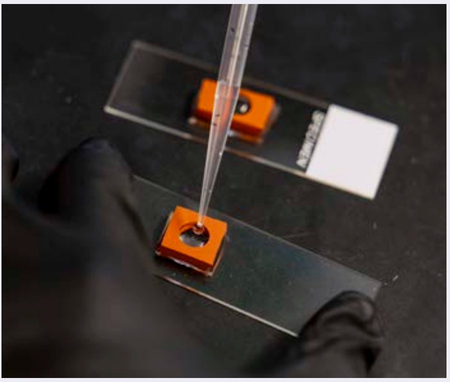
"I thought, why can't we do this for our biomaterials?" Qu says. "If we inject a mix of magnetic and non-magnetic microgels and put a magnet at the end of the limb, we could pull the growth factors in certain directions."

The researchers plan to use magnetic microgels to deliver the protein that can elongate bones to the edge of the bone, then release the protein that can induce a new joint to form at the end of the new bone. The goal is to form a joint at the end of the elongated bone — a step toward regenerating a whole limb.

The Qu Lab — collaborating with UW Medicine and the Icahn School of Medicine at Mount Sinai — is now successfully developing magnetic microgels.

Exploring microgel movement

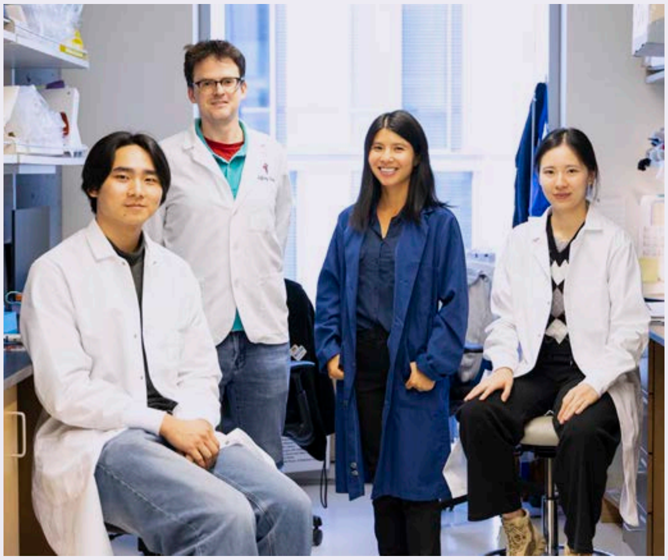
Student researchers in the Qu Lab have made valuable contributions to the project. ME Ph.D student Runrun Chen optimized the fabrication process to reliably synthesize the microgels with a magnetic material and reduce the biomaterials' size. The lab has developed microgels with different viscosity, density and other mechanical properties using biodegradable materials. Working with CoMotion, the researchers recently filed a patent application on this technology.



The researchers made a silicone well to synthesize the 3D collagen construct and keep its shape until it turns into a gel.

Chen's experiments show that the microgels move with the magnet in a liquid environment. She also tests the biomaterials' movement in collagen with different levels of stiffness that mimics how real-life tissue has a range of stiffness during regeneration. The team will inject the microgels loaded with regenerative proteins and track them in the tissue.

"We will inject the microgels to see whether we can achieve this regeneration," Chen says. "I'm excited to see how this research can be applicable to humans."



Undergraduate Martin Liu, staff scientist Jeffrey Carey, Assistant Professor Feini (Sylvia) Qu and Ph.D. candidate Runrun Chen.

Undergraduate Martin Liu develops computational models to predict how the microgels can move through tissue and how the collagen concentration affects the microgels' movement. This work will help the team better understand how the mechanical properties of tissue affect the growth factor release rate and magnetic responsiveness.

"I enjoy contributing to the lab because the research could eventually impact human health," says Liu. "The goal of providing better treatments for people who have had traumatic injury is inspiring to me."

The importance of mentorship

Qu decided to go to graduate school and pursue research after receiving mentoring and developing a sense of belonging in a scientific community when she was an undergrad. These experiences have made her passionate about providing mentorship throughout her career.

"It's rewarding to work with students and see them realize how mechanics influences biology," Qu says.

Liu found out about the Qu Lab from the ME open house. The biomedical applications of the research piqued his interest. Because of his experiences in the lab, Liu is interested in pursuing graduate education related to the mechanics of biology and human health.

"I've gained skills in finite element analysis, project management and coming up with my own research questions and methods," says Liu. ■

Making a difference in cancer diagnoses

A medical device provides rapid imaging of biopsies to improve breast cancer diagnoses.

By Lyra Fontaine

Peace and Love Hospitals CEO and consultant breast surgeon Dr. Beatrice Wiafe Addai and UW consultant Mark Fauver hold a tissue preparation tray, developed by the UW Human Photonics Lab. Photo provided by Addai.

A first-of-its-kind medical technology, developed in part by ME Research Professor Eric Seibel's UW Human Photonics Lab, is providing a new approach to biopsy imaging for faster breast cancer diagnoses at a hospital in Kumasi, Ghana.

In 2022, breast cancer caused about 670,000 deaths globally, according to the World Health Organization. In sub-Saharan Africa, less than 40% of people with breast cancer survive five years after their diagnosis, compared to 86% in the U.S.

An early diagnosis makes it easier to successfully treat breast cancer. A recent U.S. study emphasizes that for every 60-day delay between diagnosis and surgery, there is a relative 26% increase in breast cancer mortality.

However, reliable and timely testing can be a challenge for people in low- and middle-income countries due to limited availability at diagnostic centers, travel demands and socioeconomic factors.

To address this need, the UW, Emory University and UC Davis collaborated with Peace and Love Hospitals in Ghana — a partnership made possible by the American Society for Clinical Pathology. The result is CoreView, a device that combines a biopsy preparation tray with an imaging process that can provide diagnoses within minutes.

CoreView enables clinicians to image small tissue samples, about the size of a pencil lead, from potentially cancerous breast masses, in less than 10 minutes. Pathologists can then digitally assess the resulting image, so that the patients and clinicians can immediately know whether the mass is cancerous or not.

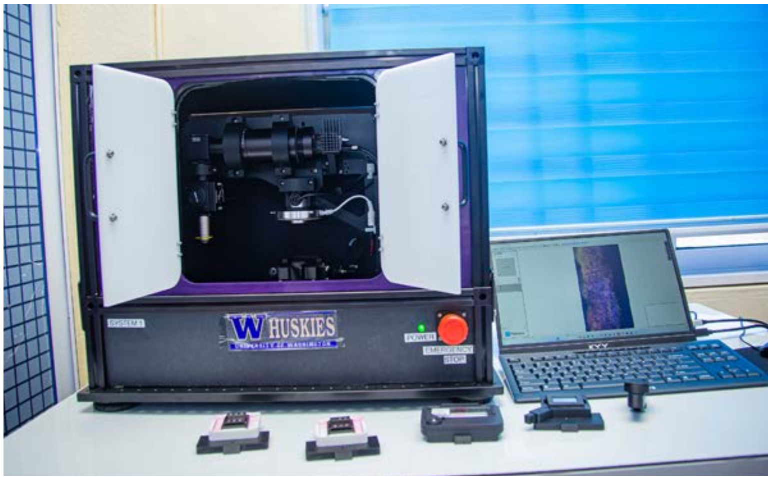
"This is the most fulfilling project I've had in 25 years," Seibel says. "Clinicians want to use it, and it can save people's lives. The steps are fast, reproducibility is high and we can match the gold-standard conventional pathology."

The work is funded primarily by the National Cancer Institute at the National Institutes of Health, with prior funding from the National Science Foundation, UW CoMotion and the Washington Research Foundation.

Faster imaging with real-time results

Clinicians in Ghana typically send biopsy tissue samples by plane or car to various labs, where pathologists might make a diagnosis within a week to several weeks.

CoreView speeds up this process. The clinician places the tissue sample into a sample holder tray that was developed by Seibel's lab for simpler tissue preparation.



The CoreView machine, which includes a tissue sample tray and microscope, at Peace and Love Hospitals in Ghana. The laptop shows the real-time images of the tissue.
Photo provided by Addai.

The tray where the tissue sample from the biopsy is positioned, rinsed and stained for imaging.
Photo by Lyra Fontaine.

"We pioneered the concept of having a piece of tissue in a lab-on-a-chip device," Seibel says.

The tray helps position the tissue for rinsing, staining and imaging without manual handling.

"It's challenging to manipulate these extremely tiny pieces of tissue, and to not lose or damage them," Seibel says. "We're imaging the surface, so we need to be as gentle as possible."

Next, the clinician loads the tray onto the microscope and images the outermost tissue layers.

Invented at UC Davis, a type of imaging uses blue light to excite fluorescence within the specimen, which is then transmitted through the stained outermost tissue layers. Imaging the surface with a microscope and camera generates visuals that pathologists can interpret on-site or digitally.

"This provides similar results to images taken the more traditional way, which involves slicing tissue and sending it to the lab, where they examine each separate slice on a glass slide with a microscope," says UW consultant Mark Fauver.

UW researchers used design updates from Emory University to build an improved clinical instrument. Fauver and Holle Lam (MSME '25) were instrumental in developing CoreView and its accompanying control and display software. They tested the system with users to take it from idea to impact.

"Their invaluable work was a key part of why we could deliver the device to Ghana this year," Seibel says.

A team effort with global impact

Siebel and his collaborators hope that CoreView will increase patient access to breast cancer diagnoses and reduce costs. The device could be useful for pathology around the world, including in rural or under-resourced areas of the U.S. that lack access to nearby pathology services.

So far, clinicians in Ghana have used the machine for dozens of patients. Led by CEO and consultant breast surgeon Dr. Beatrice Wiafe Addai, Peace and Love Hospitals contributed their technical expertise in getting the biopsy onto the tissue preparation platform into the testing protocol.

"With highly trained staff led by Beatrice, Peace and Love Hospitals is the perfect place to validate and scale up this technology, which will expand to prostate cancer diagnosis in the future," Seibel says.

Hospital technicians quickly learned to prepare and image the tissue sample after Fauver walked them through the process.

Recently, Fauver delivered an upgraded version of the machine to Ghana, with reduced sensitivity to vibration, higher resolution imaging and improved software.

"I enjoy translating research to development to make an impact outside of labs," Fauver says. "I'm excited about what we learned from this and hope we can continue to refine the system."

In CoreView's next generation, the researchers plan to use artificial intelligence methods to detect malignant tumors, determine the breast cancer type and help inform therapeutic decisions. Eventually, they hope to build a lower-cost, portable unit for field use.

"Our end goal is to discover the type of cancer and its molecular target for getting the patient on the correct therapy before they leave the clinic," Wiafe-Addai says. "This is definitely a game changer in a country where late-stage presentation and diagnosis are the most important factors that contribute to the high mortality and morbidity rates." ■

How you can support this research

Donate to the Human Photonics Lab as its researchers work on a next-generation device that enables faster and potentially life-saving breast cancer diagnoses, both in the U.S. and abroad.

bit.ly/humanphotonicslab

MECHANICAL ENGINEERING

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Department highlights

Professor and UW Applied Physics Laboratory senior principal engineer **Michael Bailey** and his team received the UW Medicine Inventor of the Year award for their National Institutes of Health-funded research on how lithotripsy breaks kidney stones and NASA-funded research on how to mitigate the risk of stones in space.

Associate Professor **Xu Chen** is a principal investigator of a Kren Engineering-based Medicine Initiative project focused on a mobile, non-invasive health monitoring system.

Assistant Professor **Mohammad Malakooti** received a Faculty Early Career Development (CAREER) award from the National Science Foundation to advance sustainable manufacturing of flexible electronics.

Boeing-Pennell Endowed Professor of Engineering **Ramulu Mamidala** was invited to give the North American Manufacturing Research Institution of SME Founder's Lecture.

Assistant Professor **Krithika Manohar** will be conducting collaborative research about sparse sensing in nuclear digital twins as part of the National Science Foundation Mathematical Foundations of Digital Twins program.

Per Reinhall retired in September 2025 and is now professor emeritus, a lifelong designation that recognizes achievements of those with meritorious records.