College of Engineering
UNIVERSITY OF WISCONSIN–MADISON

SPRING 2024 NEWSLETTER

DEPARTMENT OF
MECHANICAL ENGINEERING

Greetings from Madison!

In this newsletter, I am delighted to bring you the latest department updates, while highlighting how your support is facilitating an exciting journey of discovery and growth in the department.

Our extensive faculty hiring efforts over the past three years have sparked exciting new research in energy storage, robotics and machine learning. This hiring effort has also stimulated a transformation of research lab spaces. In the past year alone, we opened three new electrochemistry research labs that will catalyze innovations in batteries, self-healing metals and hydrogen-based approaches to decarbonization. We also remodeled four other research labs to enable research in thermal energy storage, soft robotics, precision mechatronics and legged robots.

In progress is the construction of two other new robotics labs. We are installing a small pool in the basement of the ME building to enable Assistant Professor Wei Wang to conduct marine robotics research that relies on underwater sensing and communications. We are also constructing a biomicrobotics lab to enable Assistant Professor Yunus Alapan to investigate robotic approaches for tissue manufacturing and targeted drug delivery.

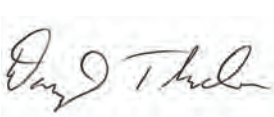
The increasing number of undergraduates (more than 1,400 students pursuing ME or EMA degrees in ’23-24) is propelling us to also update and scale up capacity in our instructional lab spaces during the summer of 2024. These efforts are highlighted by a new required mechatronics lab-based course that debuts fully in fall 2024, which will provide students with critical experience in embedded systems, sensors, actuators and microcontrollers. To do this, we will be expanding the mechatronics lab space, while also opening a new lab for courses in experimental mechanics, controls and advanced mechatronics.

We will also be doubling the size and capacity of our measurements lab space, where students learn the ins and outs of thermal, flow, pressure, strain and vibration sensors. Finally, we will be enhancing the layout and use of our Introduction to Mechanical Engineering Lab, which provides an important community-building experience for students in both the ME and EMA programs.

These research and instructional lab renovations are made possible via the support of the college and your generous donations. Thank you for enabling us to evolve our research and educational programs, while also sustaining the excellence our department is known for.

As always, we would be delighted to have you visit the department and to give you a tour of these new research and instructional lab spaces, which are critical to sustain the formative experiences that prepare Badger engineers for their careers. We extend our heartfelt gratitude to our alumni, whose interest, dedication and passion propel us forward, shaping the future of mechanical engineering and engineering mechanics at UW-Madison.

On, Wisconsin!



Darryl Thelen
John Bollinger Chair of Mechanical Engineering
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On the cover: Undergraduate student Luke Eberle and Assistant Professor Eric Kazyak test adhesion of battery electrode particles on transparent substrates used for visualizing dynamics during charging and discharging in Kazyak’s lab. Photo: Joel Hallberg.

Accelerated Engineering Master’s Programs

Our accelerated engineering master’s programs allow graduates to get the jobs they want by obtaining an advanced degree in as little as one year. Delivered on campus and designed to be finished in 12–16 months, learners can choose from 12 programs in 7 disciplines.

go.wisc.edu/eng-accelerated

Support the Department of Mechanical Engineering

To make a gift to the department, go to:

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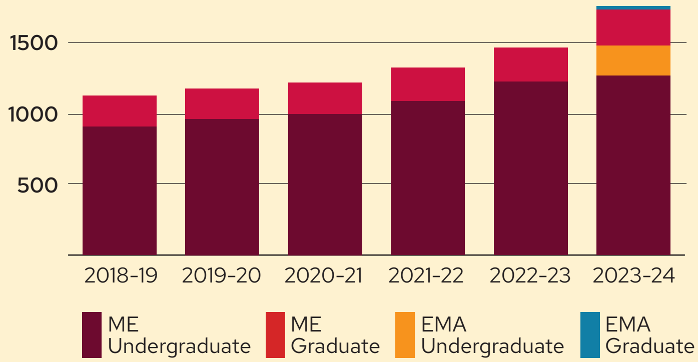
FACTS AND STATISTICS

ME DEPARTMENT STUDENTS



ME DEPARTMENT SCHOLARSHIPS

$884,980
awarded to 285 ME and EMA undergrads in 2022-23

35
awards to first-year students

79
awards to women in ME

10
Faustin-Prinz research fellows

31
STAR (Strategic Targeted Achievement Recognition) scholarships

4th
largest major at UW-Madison

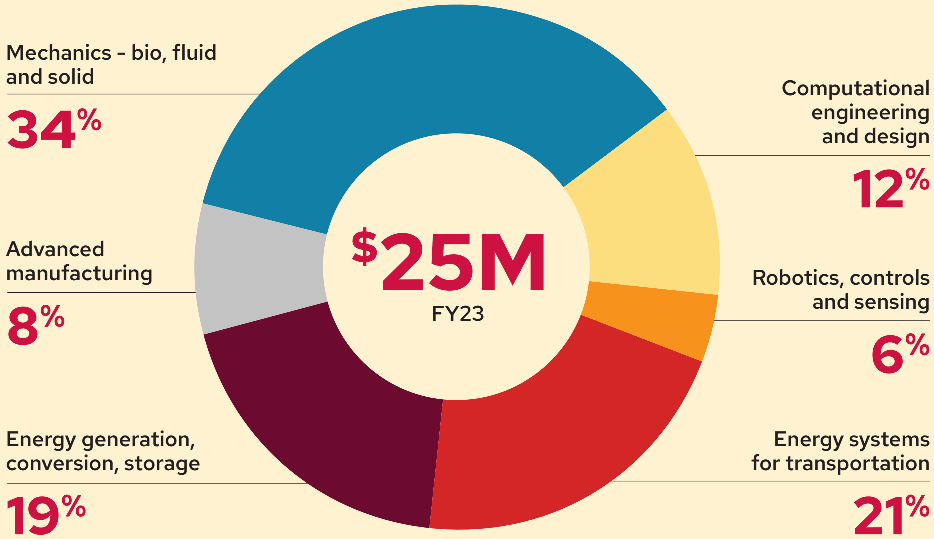
6th
fastest growing major over the last 5 years

#7
graduate ranking among public universities

#12
undergraduate ranking among public universities

6
faculty with active NSF CAREER awards

ME DEPARTMENT EXTRAMURAL RESEARCH



5
faculty hires in 2023-24

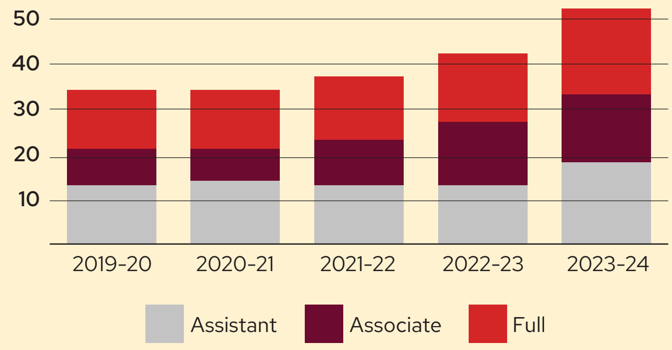
Yunus Alapan | James Pikul | Graham Wabiszewski
Wei Wang | Lei Zhou

6
new research labs focusing on:

Electrochemistry
- Batteries
- Fuel cells
- Self-healing metals

Robotics
- Legged robotics
- Marine robotics
- Biomicrorobotics

ME DEPARTMENT FACULTY




Wei Wang


Yunus Alapan

FOCUS ON NEW FACULTY

Wei Wang charts course for aquatic robots

An autonomous boat ferries passengers down the water, docking at their destination. Elsewhere, a similar vessel collects garbage from waterfront buildings. Still others converge to form a pedestrian bridge across the water, connecting two busy streets. All while also monitoring water quality.

While the scene sounds like something out of a science fiction novel, it's not only eminently possible—it's already been demonstrated. Just ask Wei Wang, who as a research scientist at the Massachusetts Institute of Technology helped develop some of the technology behind such a system as part of a pilot project on the famous canals of Amsterdam.

These days, the Roboat project has spun off into a startup company, while Wang has brought his work on aquatic autonomous robots to UW-Madison. He joined the department as an assistant professor in January 2024.

Wang works on the design of autonomous robots that can handle complex environments such as water, including the control and navigational systems that allow them to function. Such robots could aid marine science and ocean exploration, efforts to tap into renewable energy and other underwater resources, environmental remediation, urban transportation, and more.

"The oceans hold immense biodiversity and valuable resources, yet they remain one of the least studied environments on Earth," says Wang. "Marine robotics play a pivotal role as a unique tool for unraveling the secrets of the sea, developing innovative systems for capturing renewable energies, and monitoring and safeguarding our oceans."

Wang, who holds a PhD in mechanical engineering from Peking University in his native China, spent seven years at MIT, working in both the Computer Science and Artificial Intelligence Laboratory and the Senseable City Lab. As part of the Roboat project, he was first author on a paper chosen for the cover of the *Journal of Field Robotics*, detailing the 4-meter craft that's capable of transporting up to 1,000 kilograms (roughly 2,200 pounds).

Across his projects, he's refining control, sensing and perception algorithms that are critical for autonomous aquatic robots. He's eager to join the growing number of robotics researchers in the college and to connect with experts across the UW-Madison campus.

"The field of marine robotics remains relatively underexplored, presenting numerous challenges that require interdisciplinary collaboration," he says. "I feel like robotics is still growing at UW-Madison, offering ample opportunities for me to make meaningful contributions to research, education, and services related to robotics here."

FOCUS ON NEW FACULTY

Yunus Alapan creates microrobots to benefit human health

During a medical appointment, a doctor deploys a tiny robot in a patient's body, where it homes in on the patient's diseased cells and tissues and delivers drugs directly to them. In the future, such localized therapeutic delivery could make treatments more effective and alleviate damage to vital organs and non-diseased areas of the body.

It's one potential application of Yunus Alapan's research, which is focused on developing bioinspired and soft microrobots and systems for healthcare.

"I am interested in developing microrobots to interact with and manipulate cells and tissues inside and outside of the human body," says Alapan, who joined the department as an assistant professor in March 2024.

He says that having the capability to mimic the biological and physical interactions of cells with other cells and their extracellular environment is key in developing realistic physiological and disease models. These models are important for mechanistic studies and drug screening, as well as for high-efficiency cell/tissue manufacturing and therapeutic delivery.

Alapan draws inspiration from cells to create microrobots that are as small as our cells and tissues (a few millimeters). Actuated via wireless magnetic signals, the microrobots can be loaded with biological molecules that enable them to sense, activate and kill target cells.

"Cells are the ultimate microrobots," he says. "They can autonomously travel, sense, communicate, self-replicate and regulate their environments, which are capabilities we envision for our microrobots to have as well."

That's why he uses living cells as the base material for making some of his microrobots, adding magnetic particles and cargo carriers to create cellular cyborgs.

While realizing microrobotic targeted drug delivery is a big long-term goal for the field, in the short-term, Alapan's microrobots are useful for applications outside the body. He's especially excited to employ microrobots in studying and engineering immune cells, and to improve the quality and efficiency of T cell manufacturing for cancer therapy.

Alapan earned his bachelor's and master's degrees in mechanical engineering from Yildiz Technical University in Turkey and his PhD in mechanical engineering from Case Western Reserve University. Alapan comes to UW-Madison from Georgia Tech, where he was a postdoctoral researcher.

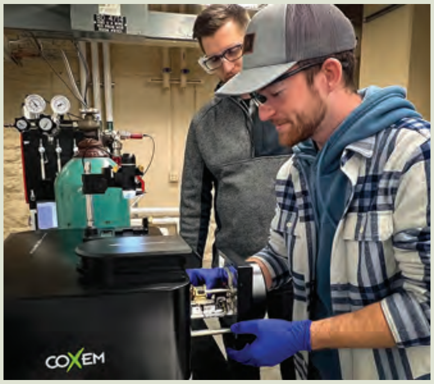
New electrochemistry research labs open exciting opportunities for students

The department has opened three new electrochemistry-focused research labs led by faculty members Eric Kazyak, Luca Mastropasqua and James Pikul. These labs are working together on pressing societal challenges related to electrochemical energy storage and conversion and are equipped to conduct research on batteries, fuel cells, soft robotics and self-healing metals. Together with the exciting suite of research opportunities, the three faculty are also introducing a series of three new elective courses for undergraduate and graduate students on energy and sustainability, principles of electrochemistry for ME applications, and electrochemical devices for energy conversion and storage.

Kazyak lab: Materials for Energy and Sustainability

Members of Kazyak's lab are working to enable the next generation of energy storage technologies for applications including electric vehicles and grid storage. The researchers use a wide range of techniques to characterize and understand the various types and causes of degradation occurring inside of electrochemical systems such as batteries.

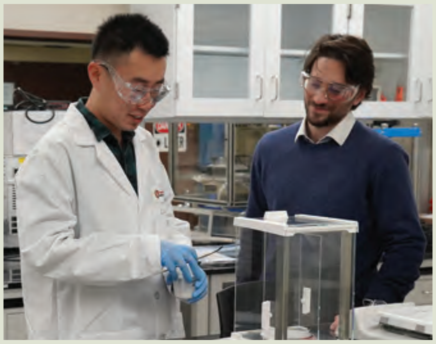
Top: Undergraduate student Logan Fitzpatrick loads a sample into an ion mill to polish a cross-section for imaging. *Bottom:* PhD Student Diprajit Biswas assembles an electrochemical cell inside of an argon-filled glovebox in the Kazyak lab.



Hydrogen and Electrochemical Research for Decarbonization (HERD) Lab

Mastropasqua directs the HERD lab. His lab's mission is to research and develop electrochemical energy and hydrogen-based systems to promote decarbonization and sustainable development. He also holds the Ragland Family Faculty Fellowship, which he uses for research and educational activities that address the issue of global warming and climate change. Mastropasqua is leveraging his expertise in electrochemical systems to develop more sustainable solutions for industry sectors that are difficult to decarbonize.

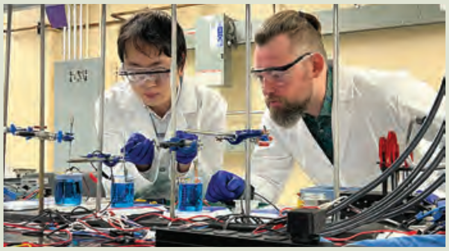
Mastropasqua works with students in the new HERD lab.



Pikul research group

A unifying goal of Leon and Elizabeth Janssen Associate Professor James Pikul's lab is to enable energy dense and adaptable robots that eat, breathe and heal. Pikul aims to make transformative advances in energy storage and robotics by understanding and exploiting electrochemistry and soft matter physics. In a recent advance, Pikul and his collaborators developed a new electroadhesive clutch that can improve haptics in virtual reality gloves. The clutch can be applied to a wide range of technologies—including robotic exoskeletons and prosthetics, finger-gripping systems and shape-shifting robots—because it is strong, small, operates at low voltages and easily switches between stiff and flexible states.

Top: Postdoctoral scholar Jungtaek Kim with James Pikul. Bottom: First year PhD student Chris Cai in the Pikul lab.



Photos: Caitlin Scott.

Henak earns NSF CAREER award to improve understanding of cartilage redox behavior

In osteoarthritis, as well as in other disease states, the oxidative-reductive (redox) balance—the ratio of oxidants to antioxidants—in articular cartilage gets out of whack.

With a National Science Foundation CAREER Award, Assistant Professor Corinne Henak will identify the effect of mechanical loading on redox balance in articular cartilage. She is using a technique called optical redox imaging, which will allow her to evaluate changes in redox balance that happen during shorter timescales after a mechanical stimulus is applied.

"There's a big question about how the redox balance changes over these short time periods, such as from five to 30 minutes, and this is something that hasn't been explored before. It's really a fundamental knowledge gap," Henak says. "With this project, we want to understand how quickly the redox balance shifts in cartilage, and how that might interplay with different disease states or different types of stimuli."

Findings from this research will improve understanding of cartilage behavior and could eventually enable better screening of treatments for joint disease. And in the future, this research could inform new therapeutic approaches, such as pharmacological treatments, for patients who have suffered an injury like an ACL rupture that predisposes them to early-onset osteoarthritis.

For the education and outreach element of Henak's CAREER award, she will create a peer mentorship group for mechanical engineering undergraduates, which will help support student success. In addition, Henak plans to develop a new course focused on teaching mechanical engineering undergraduates the skills they need to conduct research in the lab. "By giving more undergraduates the opportunity to engage in research activities and develop this skillset, the experiential learning in this course will also help students build their identity as engineers," she says.

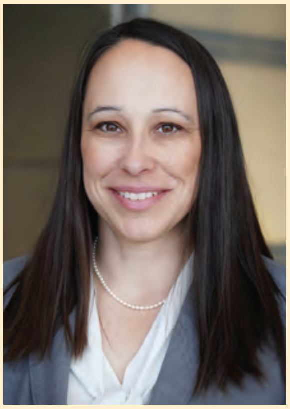
With NSF CAREER award, Jennifer Franck aims to advance renewable marine energy

When it comes to renewable energy, wind and solar are the most prominent technologies. But marine energy—energy harvested from moving water in rivers, tidal channels and oceans—could provide another source of renewable electricity to complement these well-established technologies.

That's why Assistant Professor Jennifer Franck is working to advance marine energy technology. With a National Science Foundation CAREER award, Franck is investigating a technology called an oscillating foil that can operate as a turbine to harvest energy from rivers or tidal channels.

An oscillating foil is essentially a flapping underwater wing inspired by bird flight and the propulsion of fish and aquatic mammals. "It turns out, if you flap at a slower rate, you can transition from this propulsion mode typically used by fish (they are exerting energy to flap) into an energy-harvesting mode, where the energy is extracted from the moving water," Franck says.

Specifically, Franck will research the unsteady flow physics within a system where multiple oscillating foils are very close to one another and are cooperating in a constructive manner. She will use a computational model combined with artificial intelligence to uncover methods for improving the overall energy production. "The system will continually learn which parameters achieve the greatest success, allowing us to optimize the system," Franck says. "And the AI will control the foils to change their motion—their speed or flapping trajectory—to achieve the best efficiency."



For the education and outreach element of Franck's CAREER award, she will expand efforts to improve recruitment, retention and climate for women in mechanical engineering, and will develop renewable energy modules for K-12 outreach. In addition, she is developing a new design course, EMA 200: *Introduction to Mechanics and Aerospace*, for first-year students in the engineering mechanics (and aerospace engineering option) major. "This is exciting since it gives students in the major a way to connect with each other and the engineering mechanics faculty much earlier in their progression," Franck says. "Building community and having a sense of belonging has shown to improve retention of diverse populations and I hope this class can fulfill that role."



Students in ME 201 test their crane. Photos: Caitlin Scott.

In design class, cranes prepare first-year students to soar

When Greg Nellis and Kris Dressler set out to revamp the hands-on design project for ME 201: *Introduction to Mechanical Engineering*, they saw an opportunity to also help prepare students for their statics course.

"Statics is a very foundational course for mechanical engineering students and is important for their progression in the major. It's also a challenging course for many students," says Nellis, the William A. and Irene Ouweneel-Bascom Professor.

That's why he wanted to develop a design project that would introduce students to statics concepts through an engaging, hands-on learning experience. In fall 2023, Nellis tasked the students with designing and building small cranes. Their goal: to lift the heaviest mass, as fast as possible, using the smallest crane possible.

"When students build a crane and try to lift something very heavy, the crane tips over—and that's a statics problem," Nellis says. "So this problem gives them motivation to learn enough statics to figure out how to keep their cranes from tipping over, and it helps the students see the real applications connected to the math and science they're learning in their other courses."

In the first half of the semester, the students learned the basics of key software, mathematical and design tools, such as the 3D solid modeling program SolidWorks, to prepare them for their design project. Each team of students received a kit that contained a microcontroller, a platform, wheels and motors, and the students needed to work together to build the lifting mechanism and construct their crane.

A key aspect of the project is for the students to perform calculations that inform design decisions for their cranes. "Engineers don't randomly build something and test it," Nellis says. "They need to first do some calculations based on math and science and then based on these calculations build something and test it and finally interpret the results based on the calculations. A lot of this is new for the students. So this gives them a flavor of what engineers actually do."

The students had the freedom to explore different approaches to accomplishing their goal, allowing them to gain firsthand experience in assessing the tradeoffs of their designs. For example, some teams decided to try to lift a light mass very quickly, while other teams chose to prioritize lifting the heaviest mass possible.

As part of the course, the students get training in the college's TEAM Lab and makerspace facilities. They learn fabrication skills so they can feel comfortable using the facilities and start with a strong foundation for tackling hands-on design projects throughout their engineering education.

Student Zoe Gureno embraced the opportunity to learn how to do 3D printing. She ultimately 3D printed more than 30 pulleys and six different hooks to test with her team's crane. One of her teammates completed a training course for welding and laser cutting, which enabled him to weld the team's crane arm together and create a custom base plate for the arm and motors.

"I enjoyed that this project involved several hands-on building aspects, such as the arm, the pulleys, the counterweight and the base board, and it offered a lot of opportunities to learn how to use the many tools and resources available at UW-Madison," Gureno says. "I definitely grew my understanding of 3D printing during this process. I had a lot of fun working on this project, and it was a great introduction to the department."

Nellis says ME 201 also aims to foster a sense of community among first-year students in the department, giving them an opportunity to work closely and build friendships with other new ME students. Instead of teaching assistants, the course has undergraduate-level ME student assistants who help run the labs.

"This allows first-year students in the course to interact with ME student assistants who are sophomores, juniors and seniors," Nellis says. "The older students pass on institutional knowledge and share their experiences, which is incredibly valuable for building community and helping first-year students navigate their major."

EMA 569 students in spring 2024. Photo: Sonny Nimityongskul.

Senior designs that are out of this world

In the engineering mechanics and aerospace engineering (EMA) program, which moved into the ME department in 2023, senior design spans two semesters, giving students a hands-on learning opportunity to tackle an aerospace-related challenge they're excited to work on.

In the first semester, students in EMA 469 work on a smaller project from the idea phase through building a prototype. When EMA 569 launches in the second semester, students lean into aerospace and develop an aircraft or spacecraft design.

"It's not an exhaustive aircraft or spacecraft design course," says course instructor Sonny Nimityongskul. "Instead, we leverage the breadth of knowledge gained in classes such as aerodynamics, flight dynamics, orbital mechanics, rocket propulsion and satellite dynamics within a design framework. This allows students to apply their learning to a project of their choice, offering them the flexibility to focus on the aspects of design that resonate with their interests and passions. Our students take this as an opportunity to 'geek out' on aerospace and showcase all the tools they've learned here at UW-Madison."

Professor Riccardo Bonazza says that several senior-year classes are especially rewarding for the students because they bring together all the material learned in previous foundational courses. "Besides senior design, the aerodynamics laboratory, flight dynamics and satellite dynamics classes all combine and synthesize three and half years of preparatory work," Bonazza says. "Students who take those classes are fully ready to enter the aerospace engineering workforce."

Previously, a team of students in EMA 569 worked on designing a rare earth metal acquisition satellite to address challenges from the mining of rare metals on Earth. The mining of these metals produces large amounts of toxic waste runoff. And since many electronics and new technologies are produced using rare earth metals, they are in very high demand and will eventually be depleted.

As a potential solution, students Avery Kendall, Ben Chapel, Clark Cantrall, Jacob Dedeo and Violet Suhrer explored the mining of asteroids in the Asteroid Belt that contain substantial amounts of rare earth metals. The team designed a satellite that can perform an orbit transfer between low Earth orbit and the asteroid 4460 Nereus, which contains large amounts of cobalt. The satellite, upon reaching Nereus, would mine significant amounts of cobalt using an apparatus, collect the mined cobalt and store it for use on Earth. The students' calculations determined that the satellite could acquire 2,500 kilograms of material from Nereus within a mission timeframe of 4.99 years.

Renovated lab enhances classroom, materials testing options

Renovations to the mechanics of materials testing laboratory in Engineering Hall will expand student understanding of materials deformation physics and demonstrate how materials choices affect every engineering discipline.

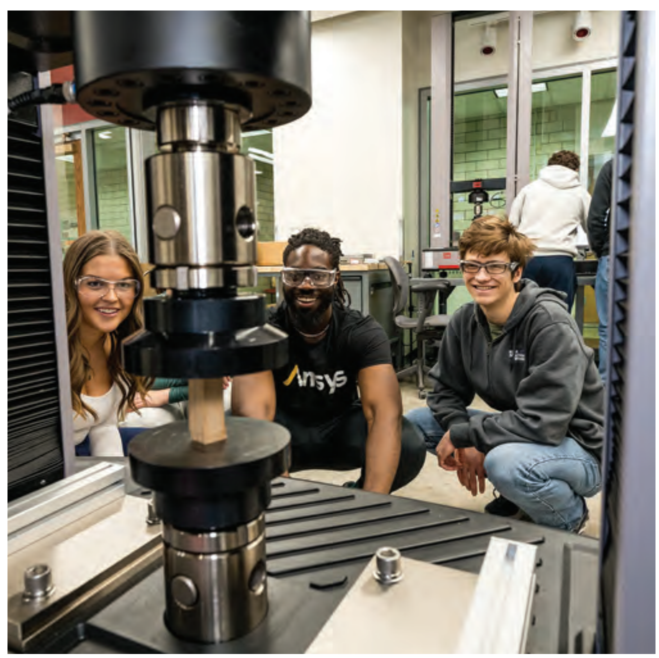
Professor Curt Bronkhorst chaired the committee overseeing the project, which has been in the works for nearly four years. The renovations have modernized the lab space, which was last updated in 1996. Work on the lab, located in 1313 Engineering Hall, was largely completed in time for the spring 2024 semester, with a few finishing touches to conclude over the following weeks.

"The lab has been redesigned to be able to accommodate two classes, when we could only hold one in it before," Bronkhorst says. "The ability for faculty to use this for a classroom setting is going to be substantial now."

The new renovations have added lots of new tools: The college has purchased $1.5 million in new equipment to bolster the types of tests students and faculty can perform in the space. Bronkhorst says the equipment will enable testing materials for performance at different temperatures, types of load conditions (static, cyclic, etc.), load capability, and more.

While the mechanics of materials testing laboratory has long hosted EMA/ME 307: *Mechanics of Materials*, which is required for many undergraduate engineering students, Bronkhorst says it has tremendous potential for use as a space for many additional classes.

The renovation underscores the importance the college places on providing multidisciplinary educational and research opportunities for its students and faculty. To that end, the equipment upgrades not only enable a wider variety of classes, but also can enhance the types of research experiments that can be performed in the laboratory space.



A student group watches as a wood block deforms under pressure during a lab session in the newly renovated mechanics of materials testing laboratory in Engineering Hall. Photo: Joel Hallberg.

Undergrads gain hands-on research experience

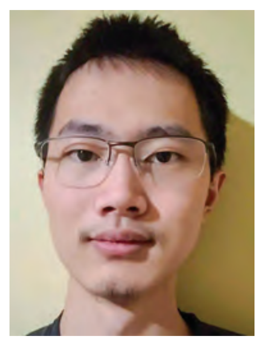
Five students received Faustin-Prinz research fellowships for projects starting in spring 2024. The fellowships support undergraduate ME and engineering mechanics students who want to develop a research project with department faculty, get access to cutting-edge laboratory equipment and work closely with a faculty project advisor.

Student Mitchell Erickson is working with William A. and Irene Ouweneel-Bascom Professor Greg Nellis on a project aimed at reducing the cost of advanced integration heat exchanger technology for microreactors. This fellowship work will plug into an existing project to develop and demonstrate the underlying advanced heat exchanger technology necessary to integrate a microreactor with any end-user application. The analysis and design process has been carried out for the air-Brayton cycle, and the researchers will now complete the analysis and design process for a supercritical carbon dioxide power cycle.

Student Jacob Hansen is working with Elmer R. and Janet Ambach Kaiser Professor Xiaoping Qian to optimize the design of heat sink components to meet the cooling needs of energy-dense devices. They will study a machine learning-based method that uses freeform geometric shaped fins and accounts for condensation that results from the cooling process. This has several advantages over previous studies: The design space can be searched faster and more thoroughly; the optimization computations would be less complex and thus less computationally expensive; and it may be more accurate for real heat sinks by incorporating the effect of condensation. The end goal is to develop an optimal heat sink design that can be validated via commercial computational fluid dynamics software.

Student Grace Heinrich is working with Charles G. Salmon Associate Professor Pavana Prabhakar to investigate the additive manufacturing of multifunctional polymer composites using a thermoset extrusion-based printing process with applications in lightweight aerospace structures and wind blades. They will explore the additive manufacturing of architected thermoset-based syntactic foams, with features resolved at multiple length scales spanning micrometers to millimeters. This research is essential to develop new strategies for designing and fabricating core material for sandwich structures of aerostructures in wind turbine blades or aircraft wings/blades.

Student Grace Morgan is working with Darryl Thelen, John Bollinger Chair of Mechanical Engineering and Bernard A. and Frances M. Weideman Professor, on a project using a wearable sensor to get a more accurate depiction of the loading in the ulnar collateral ligaments (UCL) when someone is pitching a baseball. They will correlate the UCL shear wave speed to the common flexor tendon shear wave speed, and correlate that to external forces. This project will demonstrate how different motions of pitching impact UCL loading, how the speed of the ball correlates to the loading and hopefully distinguish ways to prevent the UCL from being overloaded or damaged.



Student Austin Xu is working with Assistant Professor Eric Kazyak on a project researching battery safety. This research will focus on both developing methods of fabricating metal anodes and how the properties of these anodes affect safety testing of solid-state battery cells. The researchers will vary the thickness of lithium metal anodes to test its effect on the abuse response of solid-state batteries.

Alum Q&A: Denzel Bibbs

Denzel Bibbs (BSME '19) embraced all that Madison has to offer during his time as a student and is now working as an engineer at Findorff, a Madison-based construction firm. He also serves on the Wisconsin Alumni Association Recent-Grad Council, which helps recent graduates keep a strong connection to the university through resources and programs.

Spending time at a favorite spot on campus, The Chazen Art Museum. Submitted photo.

Tell us about your time on campus.

I came to UW-Madison in 2014, moving my belongings from Northwest Indiana into Sellery Hall. When I came to campus, I knew I wanted to study mechanical engineering. During my first semester on campus, I was part of an engineering First-Year Interest Group (FIG) where I had a cluster of introductory engineering courses with the same classmates. I lived on the entrepreneurial learning community floor in Sellery, now known as StartUp. I also came to campus as a Chancellor's Scholar and Leaders in Engineering Excellence and Diversity (LEED) Scholar. Through all these programs, I was able to acclimate into campus life very quickly with many friends and connections. Some of my favorite memories as a Badger engineer were spending time in the engineering makerspace with 3D printers, machine shop tools and VR headsets.

What can you share with us about your career path?

During school, I spent a couple of summers at internships. My first internship was through the Minnesota Technical Assistance Program at the University of Minnesota, Twin Cities. I spent a summer at a food manufacturing plant, where I supported project engineers onsite in analyzing utility systems for energy efficiency, water conservation and wastewater treatment improvements. During another summer, I interned on campus at the Space Science and Engineering Center. That summer I worked with engineers and researchers on ice coring drill systems that were being sent to Antarctica for National Science Foundation-funded research.

Upon graduation from UW-Madison, I moved to the Chicagoland area where I worked for Navistar as a product development engineer. I had the opportunity to work on drivetrain components for next-generation commercial vehicles, some of which were electric powered. I then returned to Madison to join Findorff.

How has UW-Madison shaped you into the person and engineer you are today?

The courses, professors and experiences I have had at UW-Madison certainly helped shape me into the person and engineer I am today. Right after graduation, I felt prepared to step into the automotive industry and use the problem-solving skills I developed in school. I also believe as a UW-Madison mechanical engineer alum, I was set up for success to make an industry transition. I had a great experience going from the automotive world to construction management.

The drafting, CAD and manufacturing courses (just to name a few) gave me a great technical background to be a quick learner in construction. One of my guiding principles today is the Wisconsin Idea. I believe that every UW-Madison alum should use their skills and potential to positively impact other people.

What can you share about your experiences as a member of an underrepresented group at UW-Madison?

My identity as part of an underrepresented group as a Black person quickly became apparent when I first arrived on campus, when I was frequently one of the few, if not the only, Black person in many engineering classes. I also started school around a time where there were deep conversations on race relations across the nation and on campus. I had many conversations with UW-Madison friends, classmates and dormmates about the state of race relations within education, law enforcement and government.

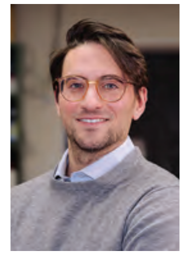
During challenging times, I relied on a great support system on campus through fellow Chancellor's Scholars, LEED Scholars and the Wisconsin Black Engineering Student Society. I had a community where I could share experiences amongst fellow Black students, as well as offer my support. I also found community at the Multicultural Student Center in the Red Gym, where there was space to study, mingle and reflect with other students of color on campus. I hope that my experience finding and helping build a great student-based support system as a Black UW-Madison engineer will positively impact Black Wisconsin students in the future.

Speaking at a Leaders in Engineering Excellence and Diversity Graduation Event. Submitted photo.

Faculty News

Associate Professor Melih Eriten received the 2023 ASME Burt L. Newkirk Award, which recognizes notable contributions to the field of tribology in research or development as evidenced by important tribology publications. Eriten was honored for his experimental and modeling contributions of friction, adhesion, wear, and fracture in hard and soft material interfaces, including the understanding of cartilage interfaces; and for implementing interfacial processes to nonlinear structural dynamics.

Inspired by his experiences visiting Korean factories during his recent sabbatical, Associate Professor Sangkee Min has established a new consortium at UW-Madison called MAUM (Manufacturing Advancement through Unprecedented Morphing) that aims to solve real challenges faced by the manufacturing industry.



Assistant Professor Luca Mastropasqua received a $10 million grant from the U.S. Department of Energy to pioneer technology for using clean hydrogen to decarbonize steel production. Mastropasqua and his collaborators will implement a solid oxide electrolyzer cell at an Ohio steel plant to demonstrate the viability of their approach.

Associate Professor Jacob Notbohm earned a prestigious R35 Maximizing Investigators' Research Award (MIRA) from the National Institutes of Health. The five-year, $1.9 million grant will support Notbohm's research in modeling the relationship between forces and motion in cell collectives.

Two research papers from the lab of Assistant Professor Ramathasan Thevamaran on vertically aligned carbon nanotube foams were featured on journal covers. A paper that reported the material's superior tailored thermal properties garnered the cover image on issue 218 of the journal *Carbon*. Another paper that demonstrated the material's ability to accommodate large shear strains at lower shear stress levels under large compression-shear loadings was selected for the cover of the February 6, 2024, issue of *Experimental Mechanics*.

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Excitement is building

Our engineering campus is getting a facelift. With formal approval of state funding for a new 395,000-square-foot building, we're continuing our growth initiative.

The seven-story building will span parts of the existing Engineering Mall and the space currently occupied by 1410 Engineering Drive (which will be demolished), and feature refreshed green space and indoor and outdoor gathering spaces.

The $347 million facility, funded through $150 million in private giving and $197 million from the state of Wisconsin, will be a catalyst for research while allowing the college to educate many more exceptional students.

Explore more, follow along with the building's progress, and support the project at engineering.wisc.edu/new-building.

All images by Continuum Smithgroup. Artist's concepts of the new building.