



College of Engineering
UNIVERSITY OF WISCONSIN-MADISON

SPRING 2025 NEWSLETTER

DEPARTMENT OF

INDUSTRIAL AND SYSTEMS ENGINEERING





Greetings from Madison!

It is remarkable to reflect on the approaching conclusion of yet another academic year, and to consider the significant developments within the Department of Industrial and Systems Engineering over the past months.

Last fall marked the beginning of my tenure as the David H. Gustafson Chair of the department, a role that has afforded me invaluable opportunities to engage with the exceptional students, faculty, staff and alumni who form the heart of our ISyE community.

Our student body has seen impressive growth and academic success. This year, our department has proudly supported five dynamic student organizations. Notably, the Institute of Industrial and Systems Engineers, our largest student organization, hosted the North Central Regional Conference in February. The event attracted more than 130 students from leading engineering institutions in the region, providing them with a platform for professional development and scholarly exchange. This opportunity, granted once every decade or so, was a resounding success and exemplifies the leadership and dedication of our undergraduate students.

Our faculty members consistently make significant contributions to both advancing knowledge and tackling critical societal challenges. Their recent projects address a wide range of topics, such as improving the safety of autonomous vehicles, enhancing fatigue management for emergency responders, and assessing the effectiveness of healthcare delivery models. This academic year, we've welcomed three new faculty members with expertise in industrial manufacturing and artificial intelligence. Looking ahead, we have plans to further expand our faculty as part of the university-wide Wisconsin Research, Innovation and Scholarly Excellence (RISE) initiative, with a particular emphasis on artificial intelligence and promoting population health.

Our faculty's ongoing scholarship reinforces our department's standing as a global leader in research with real-world impact.

The department also benefits from the active engagement of our alumni community. This year, we welcomed alumni as reviewers for more than a dozen student presentations, organized six alumni speaker events, and expanded our Industrial Advisory Board with the addition of two distinguished alumni. Furthermore, alumni contributions to our scholarship funds have enabled us to provide an unprecedented number of awards to deserving students during our fall scholarship reception. We extend our sincere gratitude to our alumni for their continued support and involvement.

In other important news, the College of Engineering will welcome a new dean in June. Devesh Ranjan, an alumnus of our college, brings a vision for our community's future that emphasizes the importance of the collective strength of its members. We express our appreciation for the leadership of outgoing Dean Ian Robertson, whose efforts have positioned us for continued success. We look forward to collaborating with Dean Ranjan as we embark on this next phase of our college's story.

We hope you enjoy this semester's newsletter. Whether you are an alum, a peer or a supporter, we are grateful for your continued interest in our department and for your support. **On, Wisconsin!**

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On the cover: In February 2025, our student chapter of the Institute of Industrial and Systems Engineers hosted the North Central IISE Conference, providing students with valuable career development opportunities. The conference rotates between 17 top engineering schools in the region. Photos: Alex Kerntop

$$x^T H x$$

$$(x-c)^T B^T B (x-c) \leq 1$$

$$x \in \mathbb{Z}^p \times \mathbb{R}^{n-p}$$

$$y = B(x)$$

$$\rightsquigarrow$$

$$\dots, b^i) \cdot \{c\}$$

For the love of the riddle: Del Pia's foundational math makes way for optimal solutions

Midway through an explanation of his research into some of the murkier corners of the mathematical universe, Alberto Del Pia cuts himself off.

"I understand this is complicated," says the associate professor.

While that statement could apply to researchers across the college, it's especially apt for Del Pia, whose list of focus areas reads like a word salad of mathematical terms—at least to those outside his field.

Broadly, Del Pia works in mathematical optimization, an area that seeks the best answer to a given question among all available possibilities and a traditional strength at UW-Madison. Think finding the quickest route to a destination.

But specifically? That's where it gets, as Del Pia notes ... complicated. He specializes in mixed-integer linear and quadratic programming, as well as binary polynomial optimization. In all three areas, he skews toward the theoretical side—proving whether classes of problems can be quickly solved with algorithms.

"Much of his work is going into the jungle out of optimization and trying to determine what is possible and what is not," says Harvey D. Spangler Professor Jeff Linderoth.

And Del Pia excels at slicing his way through that mathematical jungle. Linderoth estimates his colleague is one of the top three integer programming researchers in the world among his age cohort. That assessment is backed up by Del Pia's prestigious 2023 INFORMS Optimization Society honor, the Egon Balas Prize, named for the late applied mathematician who was a giant in the field. It's annually awarded to one early-career standout in optimization.

Ten years earlier, Del Pia first came to the United States after receiving another extremely selective honor: a Goldstone Fellowship at the IBM Thomas J. Watson Research Center north of New York City. At most, the company awards two fellowships worldwide each year. Spending a year living in Manhattan and working alongside industry-leading

researchers convinced Del Pia, who was born and educated in Italy and completed postdoctoral stints in Germany and Switzerland, that his future lay in the United States.

He arrived at UW-Madison in 2014, along with his wife, Assistant Professor Carla Michini. Around that same time, Jeff Poskin (PhD mathematics '17) was contemplating abandoning his doctoral plans and leaving the university with his master's degree after struggling to connect with potential PhD advisors. A fellow student mentioned Del Pia's name.

"As a mentor, he was very motivated to find out what would work best for me as a PhD student," says Poskin, now a mathematician at Boeing. "There were times when he was very hands-off and would let me dig into what was I working on, and once I needed to meet with him, he would give me as much time in his day as possible. If I was deep into something and needed his help, we'd talk for hours."

Del Pia's belief that his graduate students need to truly enjoy what they're doing to be productive and successful is very much rooted in his philosophy regarding his own work. The reason he gravitates toward the types of problems he investigates has little to do with their industrial applications and all to do with his enjoyment of the process of solving them—just like he used to spend all day contemplating riddles a friend of his father's would pose to him as a kid in Treviso, Italy.

"My goal," he says, "is just to keep working on problems I like, try to find interesting questions, and try to solve them—having fun doing that."



Photo: Joel Hallberg

Could neurostimulation help fatigued first responders?



Ranjana Mehta

Ranjana Mehta had just finished presenting her work on occupational fatigue at a conference when a first responder approached her with a somewhat startling request: Could the neuroergonomics researcher look into performance-enhancing drugs as options for overtaxed, worn-out emergency medical services personnel?

The question lingered with Mehta, a professor whose research includes human performance under fatigue and stress.

“We don’t have effective support systems to help our first responders,” says Mehta. “They are just figuring it out on their own, how to manage their fatigue. As a fatigue researcher, it becomes my responsibility to do something that really works for them.”

Neurostimulation is used to treat a wide range of medical conditions, from intractable depression to heart failure. Clinical trials of transcranial direct current stimulation, in which a wearable device delivers low electric current through the scalp, have shown promise for treating fatigue in patients with multiple sclerosis and chronic fatigue. In prior research, Mehta found that weak doses for 10 minutes can counter fatigue-related performance declines for up to an hour.

Given the frequency of long shifts and high levels of stress involved with first responders’ work, fatigue in the profession isn’t a surprise. A 2012 study from the University of Pittsburgh found more than half of surveyed EMS personnel were fatigued, which resulted in 3.6 times greater odds of behavior that compromised safety. And taxing work conditions aren’t helpful for recruitment in a profession that’s facing a workforce shortage: A 2018 study by the National Center for Health Workforce Analysis projected the field would need to add 40,000 full-time workers by 2030 to keep pace with demand.

“Fatigue is not just an issue for response readiness or safety; it is also linked to their mental health,” says Mehta, whose lab is working with the emergency medicine department at UW Health to study fatigue management strategies. “Fatigue can exacerbate mental health conditions for these individuals. So, everyone agreed that something needed to be done. Everyone agreed that what they have currently isn’t really working for them.”

In their interviews with active and retired fire and emergency medical services personnel, Mehta and her collaborators found that more than half were interested in neurostimulation as a countermeasure to fatigue. The first responders’ biggest concerns were

autonomy over using a device, privacy regarding their usage data, and the long-term safety of neurostimulation.

They also raised questions about the wearability of any device, which is why Mehta is working with a team of students in the Department of Biomedical Engineering’s undergraduate design program to create a system that fits inside a hard hat.

Mehta hopes to use the device for a pilot study in the lab before partnering with an EMS agency for field testing.

“We want to collect more of such data that is presented in this paper,” she says, “where we can create recommendations for how such technologies should be responsibly designed, trained on, rolled out, and sustained.”



In the years since that interaction, Mehta has begun to explore noninvasive neurostimulation—the use of targeted electrical pulses to certain regions of the brain—as a potential solution.

In work published in the journal *Frontiers in Neuroergonomics*, Mehta and collaborators at Pennsylvania State University interviewed fire and emergency medical services professionals about the prospect of using neurostimulation to counter fatigue, then analyzed the responses and detailed the ethical considerations of such technology.

Their research could help guide the design of future neurostimulation systems and policies for how they’re implemented.

New country, abundant resources and aptitude for research help undergrad build confidence

A year ago, Fengxu Li says, the idea of talking to a stranger on Zoom about himself would have simply felt too nerve-racking and intimidating.

He had only arrived in the United States in fall 2023. Shy by nature, he wasn't confident in his English and was still emerging from a gloomy period.

Amazingly, amid his despondency, he'd decided to take advantage of an opportunity to transfer to UW-Madison from Sichuan University in his native China—despite never having previously visited the United States.

It's worked out better than he could have hoped.

"It has been the most amazing time of my life," says Li, an industrial engineering student who is also majoring in computer science and math. "I'm getting all kinds of support I need to succeed."

In addition to flourishing in the classroom and enjoying Madison as a city, Li has gotten involved in research as part of Assistant Professor Yonatan Mintz's lab.

When Li first met with Mintz, the latter gave his new student a difficult theorem to work on, figuring it would take up the better part of a semester. Within a month, Li proved the theorem, which relates to an algorithm that's useful for behavioral interventions. The two are planning to write up the result in a journal paper.

"The guy is a super hard worker, super motivated, one of the more brilliant people I've worked with," says Mintz, who also taught Li in a PhD-level dynamic programming course in the fall 2024 semester. "He's been learning on his own; he's been doing stuff that I wouldn't have been able to do until like my second year of PhD. Really complicated, dense, theoretical material."



Assistant Professor Yonatan Mintz and undergraduate student Fengxu Li.
Photo: Tom Ziemer

In Mintz's lab, Li has continued to work on algorithms behind messaging apps that could influence safe driving, as well as physical activity vs. sedentary behavior. It's valuable, practical experience that will inform his future career plans, whether in academic research or in industry.

Nearly a quarter of undergraduate engineering students have completed independent study research experiences for credit over the past five years. Plenty more undergrads work or volunteer in labs.

In 2023, ISyE created an honors in research option for students interested in adding a tangible credential from their extra hours in the lab. Li began the program in the spring 2025 semester.

He's eager to continue exploring new territory, both in his academic studies, his research and his personal life.

"I'm doing great," he says. "I'm becoming more proud of myself. It's just kind of a positive cycle."



Meet the college's next dean

Devesh Ranjan, a mechanical engineer and a leader at one of the country's largest and highest-ranked engineering programs, will be the college's 10th dean. He will begin on June 16.

Ranjan, the Eugene C. Gwaltney Jr. School Chair and Professor of Mechanical Engineering at the Georgia Institute of Technology, remembers the promise he felt when he first arrived at UW-Madison in 2003 to begin graduate school in the college he will now lead.

"I've been blessed from that day onward," Ranjan says. "The thing I say about UW-Madison is if you dream about doing something here, it will happen. It will happen because of the opportunity and the support here for you at UW-Madison."



Read more about incoming Dean Ranjan.



FOCUS ON NEW FACULTY

Biehler combines 4D printing with machine learning

If Michael Biehler's research is successful, he will help enable soft robotics that can self-assemble inside the human body, as well as dynamic, protective packaging for everything from food to military Humvees. His machine learning work could enhance 3D printing control systems and improve manufacturing quality.

But Biehler hopes the biggest outcome of his career at UW-Madison will be the students who emerge from his classroom and research lab with the inspiration and skills to take on difficult, consequential problems.

"You can change the trajectory of those students, not just in an incremental way, but really change their lives and their kids' lives," says Biehler, who joined ISyE as an assistant professor in January 2025. "We want to build leaders for society who will do good things, solve some of the biggest challenges. If we educate Wisconsin engineers, once they go out into the world, we want them to be able to make the world a better place than they found it."

Biehler grew up on a small farm in rural Bavaria in southern Germany, but the notion of the Wisconsin Idea resonated with him when he attended the 2024 edition of WiscProf, the college's workshop for young scholars exploring academic careers. Biehler is the first faculty hire to come through the WiscProf pipeline.

"I made some great connections with people in the program," he says. "I really enjoyed the experience, and I liked the mission of a land-grant university. How can we make real-world impact to improve the quality of life for people in the state, the country and the world overall? Those are kind of my missions, and I thought that matched really well with the university."

Biehler comes to UW-Madison after earning his PhD from Georgia Tech. It'll be his latest stop on a globe-trotting educational adventure that's included a stint in Texas as a high school exchange student, as well as study abroad experiences in California (where he met his wife), Georgia and Australia.

"Where I'm from, there are literally six houses," says Biehler, who holds bachelor's and master's degrees from Karlsruhe Institute of Technology in Germany. "I always liked exploring new things."

Biehler is also breaking new ground through his work on 4D printing, an outgrowth of 3D printing that uses smart materials—be they polymers or alloys—that can respond to their environment or external signals.

"The idea is that you can activate it with different stimuli after the printing. Usually you just print something, you get a static structure, that's it. But with 4D, you can get some dynamic shape changes," he says. "You can think about biomedical devices. If you're trying to get something inside of a body, it would be nice if it could be small and then you could unfold it."

Biehler combines his experimental work with a computational focus that involves applying machine learning techniques to 3D printing data to enable real-time control mechanisms and printing quality improvement. Several biomedical and robotics companies have already implemented his techniques in their additive manufacturing operations.

He plans to build similar industry connections in Wisconsin.

"How do we make our manufacturing systems more sustainable, more efficient, but also have new capabilities?" he says. "But I think that also needs to include how do we solve some big social challenges? Wisconsin has a big manufacturing workforce, and it used to be bigger. How can we make sure the state and the country are successful? So I think there's an important workforce element as well."

Student news

PhD student **Rebecca Alcock** received a Fulbright/Swiss Government Excellence Scholarship to spend 10 months in Switzerland conducting research. Alcock is working with researchers at the Swiss university ETH Zürich to improve a technical toolkit she's developed to help healthcare facilities in under-resourced settings integrate solar power.

PhD student **Weijun Shen** received an Early Excellence in Teaching Award, which recognizes teaching assistants with fewer than four semesters of teaching experience at UW-Madison.

Student org updates

Our student chapter of the **Human Factors and Ergonomics Society**, which has 15 members, held career talks and a workshop on generative artificial intelligence and an alumni dinner during the ASPIRE international annual meeting.

ISyE Connections, our student-to-student mentoring group, is now an officially registered student organization. Its membership has increased to 75 in spring 2025.

Our student chapter of the **Institute of Industrial and Systems Engineers** hosted the IISE North Central Regional Conference in February 2025, welcoming more than 130 students from eight colleges. The two-day event included keynote speakers, company breakout sessions and a case competition. The IISE group, which had 111 members as of fall 2024, also participated in several volunteer opportunities and a resume review during the spring 2025 semester.

Our **INFORMS** chapter, which has 17 members as of spring 2025, received a 2024 Honorable Mention student chapter award. The chapter has hosted a number of networking and volunteer events as well as a talk by alumni working at American Airlines.

Our **SME** chapter, which has 15 members as of spring 2025, toured research labs across the department and attended the rapid + tct conference, the largest additive manufacturing event in North America.

Faculty news



Professor **Kaibo Liu** received the Grainger STAR Professorship from the college.



Associate Professor **Tony McDonald**, along with alums Azadeh Dinparastdjadid and Shu-Yuan Liu, participated in the Workshop on Computational Models of Human Road User Behavior for Autonomous Vehicle Evaluation, an exclusive international event organized by Waymo in the Netherlands.



Professor **Ranjana Mehta** received the prestigious Jack A. Kraft Innovator Award at the annual conference of the Human Factors and Ergonomics Society. Mehta also received the college Grainger Institute for Engineering Professorship.



Our Center for Health Enhancement Systems Studies received a series of federal grants totaling more than \$17 million to support treatment for substance-abuse disorder and mental health conditions. CHES Deputy Director **Todd Molfenter** is the principal investigator for all six grants, which come from the National Institute on Drug Abuse and the Substance Abuse and Mental Health Services Administration.



SME, previously known as the Society of Manufacturing Engineers, named Assistant Professor **Hantang Qin** among its 2024 Distinguished Faculty Advisor Award winners.



Associate Professor **Gabriel Zayas-Cabán** is co-leading a three-year project funded at more than \$1 million by the Patient-Centered Outcomes Research Institute to develop methods to better integrate risk prediction models into healthcare systems.



Photo: Joel Hallberg

Industry lessons for new Badger Engineers

As part of first-year students' introduction to the field of industrial engineering, the department is giving them the chance to hear hard-won lessons from industry veterans.

The department has connected its "Welcome Back, Badger" alumni speaker program with ISyE 191: *The Practice of Industrial Engineering*, a course that introduces first-year and transfer students to the various focus areas within industrial engineering, student organizations, wellness and study strategies, and some basic data analysis.

During the spring 2025 semester, alums **Jeff Roznowski** (BSIE '80), left, a retired telecommunications leader and longtime public servant; Jodi Glunz (BSIE '92), an ergonomics consultant; and Jayeeta Lakhani (MSIE '05), a general manager at Amazon Web Services and an angel investor, visited the class to talk about their career journeys.

"We spend much of the semester talking about what ISyE is, what types of jobs industrial engineers do, and what types of projects industrial engineers might work on," says course instructor Amanda Smith, an assistant teaching professor and associate chair for undergraduate affairs. "Bringing in alumni speakers brings the content to life and gives it a name and a face. Hearing stories from alumni helps students begin to visualize what it is actually like to be an industrial engineer. Plus, we always stress the importance of networking in a career, so it's an opportunity for the students to begin to build their professional network."