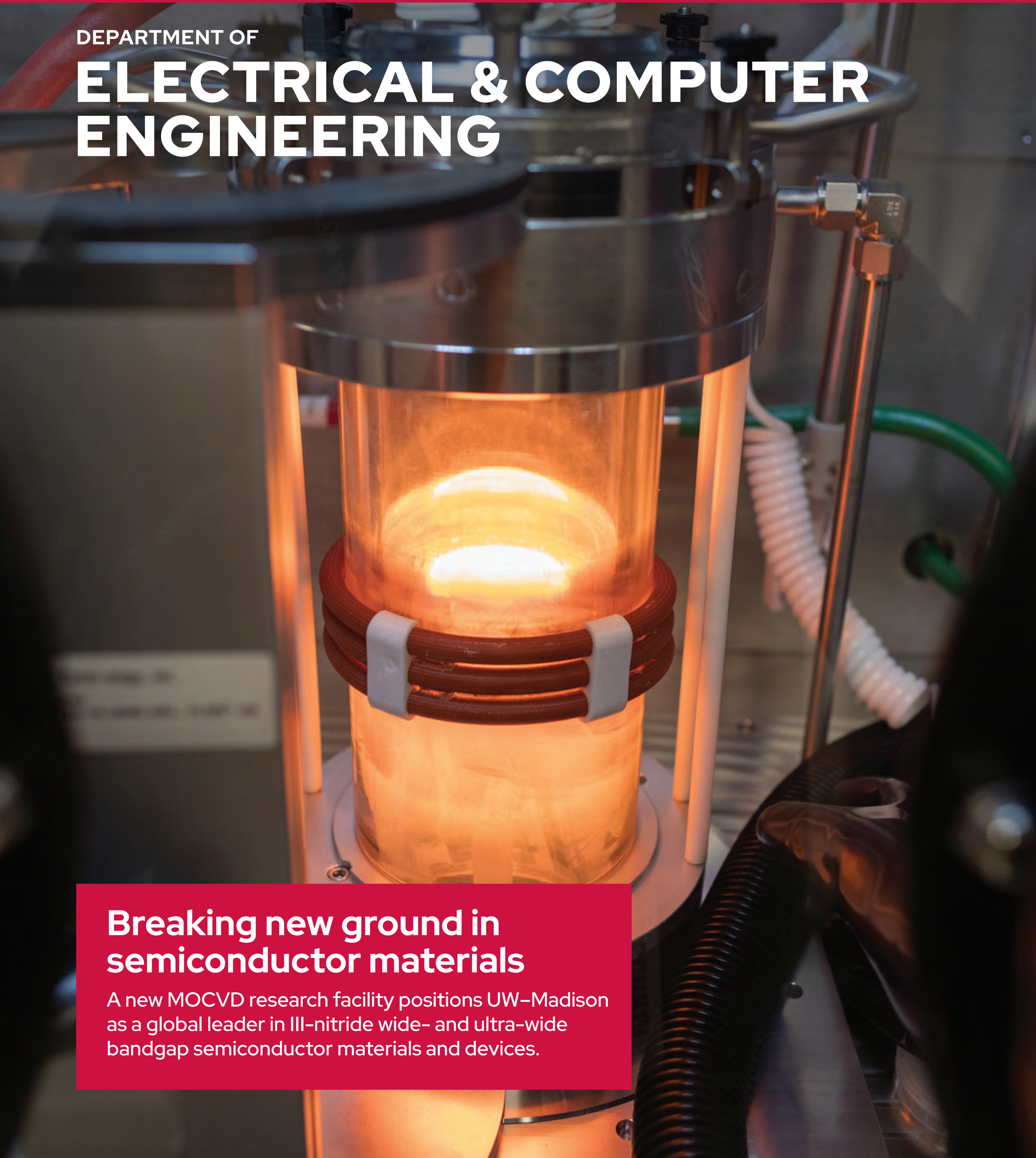
College of Engineering
UNIVERSITY OF WISCONSIN–MADISON

FALL 2025 NEWSLETTER

DEPARTMENT OF
ELECTRICAL & COMPUTER ENGINEERING



Breaking new ground in semiconductor materials

A new MOCVD research facility positions UW–Madison as a global leader in III-nitride wide- and ultra-wide bandgap semiconductor materials and devices.

Dear alumni, colleagues and friends,

It's the start of an exciting fall semester here in ECE at UW-Madison! We are in the midst of construction on the engineering campus with the new 400,000 square foot Phillip A. Levy Engineering Center building project underway. In the meantime, ECE has been renovating existing spaces to accommodate our growth and to create new state-of-the-art research and instructional environments that foster learning, innovation and discovery.

Last month, we celebrated the grand opening of the Ultra-Wide Bandgap Semiconductor Metal-Organic Chemical Vapor Deposition Laboratory, led by Assistant Professor Shubhra Pasayat. This multi-reactor III-nitride facility, unlike almost any other on a university campus, positions ECE at the forefront of advances in emerging semiconductor materials and devices that are reshaping technologies from power electronics to deep UV optoelectronics and extreme-environment systems critical to space and defense applications. (See cover photo and full article inside.)

In another recently renovated research lab, Assistant Professor Robert Jacobberger, who just received a 2025 DoE Early Career Award, is developing scalable, industry-compatible approaches to engineer low-dimensional semiconductor materials and devices. His team is designing several custom CVD systems that allow them to explore new possibilities in nanomaterials synthesis and fabrication with unmatched atomic-scale precision. His approach offers unprecedented control over materials properties and device performance and paves the way for next-generation electronic, photonic and quantum technologies.

We are also expanding ECE into Element Labs—a brand-new 147,000 square foot building in University Research Park. Professor Zongfu Yu's photonics group will be the first to move into the beautiful new interdisciplinary space where they will continue their pioneering research on advanced materials and structures that manipulate how light is absorbed, emitted, and converted. Their work aims to improve solar energy devices, advanced lighting, and other photonic technologies, with the goal of creating smarter, more sustainable energy solutions. This move creates fresh opportunities for collaboration and innovation and showcases ECE's presence in Madison's growing tech ecosystem.

We just celebrated with five newly minted associate professors who earned tenure this summer and welcomed nearly 300 new first-year students into our undergraduate electrical engineering and computer engineering programs. Our undergraduates are actively involved in research with our faculty and graduate students—one of the cornerstones of extracurricular learning in ECE. This past spring, we hosted our inaugural ECE Undergraduate Research Symposium, where 38 students presented their collaborative research. Award-winning projects included unsupervised/MVAR clustering of iEEG states of consciousness, capacitance sensor platforms for wearable IoT applications, and image processing tools for investigating cellular metabolism pathways. An impressive breadth of societal applications!

I speak for our whole department when I say we are thrilled to create exceptional spaces for ingenuity and exploration today while also building toward an even greater future. Thank you for staying connected with the department. Your continued interest and support truly make a difference for our students and faculty.

On, Wisconsin!

Susan C. Hagness
Department Chair, Philip D. Reed Professor of Electrical and Computer Engineering and Maria Stuchly Professor in Electrical Engineering
susan.hagness@wisc.edu

Accelerated Engineering Master's Programs

ECE offers two on-campus Accelerated Master's Programs—Professional MS and Machine Learning & Signal Processing MS—designed to be completed in just 12–16 months. Taught by leading faculty, these programs provide advanced technical depth, flexibility, and industry-relevant expertise to expand your career opportunities.

Use link or QR code to go directly to our Accelerated MS programs page:

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Cover photo: Todd Brown.

FOCUS ON NEW FACULTY

Using machine learning to make biomedical and scientific imaging faster and more adaptable

The development of advanced imaging, including digital x-rays, ultrasounds, MRIs, CT and PET scans, as well as new types of microscopy, has revolutionized biomedical and scientific imaging over the last half century, giving researchers and doctors powerful tools to explore the world and the human body.

But advanced imaging technology faces big challenges: Medical scans can be long, uncomfortable and prohibitively expensive for patients; scientific imaging applications are often too slow to fully capture chemical and biological processes; some types of imaging produce radiation that can interfere with their subjects; and many types of imaging are simply reaching the limits of how much data they can collect.

That's why Ulugbek Kamilov, who joined the department in fall 2025 as the Leon and Elizabeth Janssen Associate Professor, uses computational imaging techniques and integrates physical models with machine learning to improve biomedical and scientific imaging applications.

Medical imaging is one area where Kamilov feels his work could have a big impact. For instance, he says patients undergoing chemotherapy or with other physical issues can have difficulty spending 20 or 30 minutes in a cramped MRI machine. That means the images produced are not as detailed as they could be. "Your treatment often depends on the quality of your scan," says Kamilov.

If his research can speed up the imaging process, it could make a real difference. "This is an area where my work can have a clear, positive impact on society," he says. "We can make some progress if we apply the technology in the right way."

Kamilov earned his bachelor's and PhD degrees from EPFL in Switzerland, focusing on signal processing optimization and machine learning for analyzing biomedical imaging data. There, he developed statistical models to improve the quality of accelerated MRI and CT scans.

He then spent three years at Mitsubishi Electric Research Labs working on imaging systems for autonomous vehicles before joining the faculty of Washington University in St. Louis, Missouri.

Over the last nine years, he has focused on machine learning and AI for biomedical and scientific imaging. Over time, engineers have developed different models of how imaging systems, like MRI, collect and interpret data based on the physics of the machines. "We know the physical models of how these machines work," says Kamilov. "I integrate these models with machine learning models in a way that allows me to collect less data but to be more accurate and consistent."

This allows the machines to do more with less, speeding up the imaging process. Kamilov often tailors his work to specific applications; for instance, he has worked with chemical engineers to maximize the speed of an MRI scan to capture chemical processes in real time. He has also developed MRI algorithms that accurately capture the motion of the heart and a CT scan that can image plants without giving them a lethal dose of radiation. Siemens has licensed some of his technology to accelerate MRI scans; he also worked for a year at Google applying his ideas to image restoration applications.

His research has earned Kamilov many awards, including an NSF CAREER Award and the 2024 IEEE Signal Processing Society Pierre-Simon Laplace Early Career Technical Achievement Award.

Kamilov says UW-Madison is an ideal place to continue his work. "It's a very diverse scientific community that is hungry for advanced imaging technology," he says. "And I'm excited to contribute and collaborate with them."

New lab is a hub for next-generation semiconductors

In summer 2025, we celebrated the grand opening of the Ultra-Wide Bandgap Semiconductor Metal-Organic Chemical Vapor Deposition (MOCVD) Laboratory, a unique research space that gives UW-Madison capabilities rarely found on university campuses.

The facility will serve as the cornerstone of the College of Engineering-led focus at UW-Madison on an emerging class of materials called III-nitride semiconductors, which are at the heart of dozens of next-gen technologies. "These semiconductors have uses in all sorts of applications," says Assistant Professor Shubhra Pasayat, who oversees the facility. "Deep ultraviolet LEDs; high-power radar; high-voltage power electronics, motors, and vehicles; as well as nuclear reactors and applications in other extreme conditions like space."

Silicon is reaching its fundamental material limits: It can no longer handle the high energy, frequencies and temperatures required for next-generation technologies. Now researchers are studying wide bandgap semiconductors, which allow for smaller, faster, more efficient electronic devices that can handle much higher energies and frequencies. The electronics industry is already rapidly adopting these semiconductors for use in fast chargers, radar systems, LED lighting and even microchips.

But researchers are already looking to ultra-wide bandgap materials, including the III-nitride semiconductors aluminum gallium nitride and aluminum nitride. These materials are even more robust and able to survive extreme conditions.

Fabricating these ultra-wide bandgap semiconductors requires expertise and expensive equipment.

When she joined UW-Madison in 2021, Pasayat set up a commercial Aixtron metal-organic chemical vapor deposition reactor, which uses high temperatures and low pressure to convert gasses into thin layers of crystalline solids, including wide bandgap materials like gallium nitride and low-aluminum aluminum gallium nitride. This helped establish her at the forefront of wide bandgap semiconductor research.

Now, the new facility, which took years of planning and cooperation among UW-Madison, the College of Engineering and the ECE department, takes that research to the next level. The newly installed Agnitron Agilis 100 system can handle even higher temperatures and lower pressures, allowing Pasayat and her students to design and precisely synthesize high-quality 2-inch-diameter wafers of high-aluminum-content aluminum gallium nitride, aluminum nitride and other ultra-wide bandgap materials.

Pasayat says this capability is spurring collaborations with researchers across campus and drawing industry partners to UW-Madison. It's also an incredible opportunity for students, she says, who will enter the workforce trained on some of the most advanced fabrication equipment available and with hands-on knowledge of next-generation materials.

Pasayat's lab is at the center of UW-Madison's rising III-nitride ecosystem. Broad faculty expertise in chip design and architecture, materials characterization, fabrication, advanced packaging and systems integration means these ultra-wide bandgap semiconductors can go from the drawing board to the motherboard all on one campus—streamlining and improving the research process.

Assistant Professor Shubhra Pasayat (center, cutting the ribbon) was joined by (right to left) ECE Chair Susan Hagness; College of Engineering Dean Devesh Ranjan; UW–Madison Vice Chancellor for Research Dorota Grejner-Brzezinska; Associate Vice Chancellor for Research in the Physical Sciences Amy Wendt; and Vivek Prasad, Vice President for Design Engineering Ecosystem Enablement at Natcast. Photos by Todd Brown.

NSF CAREER Award fuels high-performance power semiconductor transistor development

At the heart of almost every power conversion system are power semiconductor transistors. These components convert, control and regulate electric flows—and are key to safely and efficiently powering everything from electric forges to sensitive MRI machines and supercomputers.

But current versions of these power transistors simply can't handle the increasing demand of emerging next-generation technologies—such as electric transportation and data centers. That's why Assistant Professor Chirag Gupta is using a five-year National Science Foundation CAREER award to study transistors made from ultra-wide bandgap semiconductors—materials that could enable our electrified future.

"Our goal is to use this CAREER funding to push these ultra-wide bandgap materials from relatively nascent stage to something that shows their material advantages over incumbent materials," says Gupta. "We basically want to prove to the world that, yes, these materials are really good and can outperform existing technology."

For decades, power semiconductor transistors made from cheap and plentiful silicon worked just fine for most power electronics needs. But silicon can't handle newer applications such as point of load applications, fast chargers, EVs and industrial motors.

A new generation of power semiconductor transistors made from "wide bandgap" materials, including gallium nitride and silicon carbide, has recently hit the market in electric car and fast chargers. The larger the "bandgap" of a semiconductor material, the more voltage and temperature it can handle. Soon these power transistors will find their way into numerous other applications such as computer chips, smart grid components, solar inverters, appliances and other electronic devices.

Gupta and many other electrical engineers, however, anticipate the need for even more powerful transistors in the next few decades as electric motor power and computing needs intensify. That's why they are working on ways to fabricate transistors from next-generation ultra-wide bandgap materials, including diamond, gallium oxide and aluminum gallium nitride, the material Gupta studies.

"These materials can operate in extreme environments and very high temperatures," says Gupta. "These are advanced materials compared to the previous generation of transistors, and they can even operate in applications like hypersonic jets, where temperatures can reach up to 800 degrees Celsius (nearly 1,500 degrees Fahrenheit)."

The primary challenge is to create stable, practical and cost-effective transistors from these ultra-wide bandgap materials. Gupta plans to conduct several groundbreaking studies to fabricate transistors from aluminum gallium nitride and demonstrate their ability to handle voltages significantly higher than silicon and wide bandgap transistors. He and his students will also investigate the transistors' electric field handling capabilities, reduced resistance and other unique physical phenomena.

Gupta says he will consider the research a success if he can show a performance advantage for aluminum gallium nitride transistors over commercial transistors. "We want to see this as a serious contender for real-world applications," he says. "That's my lab's mission and vision: to actually transition these technologies to the real world."

With prior work experience in the semiconductor industry, Gupta says university-based research like his and others working on ultra-wide bandgap materials and devices across the United States is crucial to move power electronics forward. "Research like this is too expensive and too risky for industry to do," he says. "If the technology works and the potential is demonstrated in academia, great, then industry will eventually take over this technology. In case it doesn't work out, it doesn't justify the balance sheet for industry. That's why government support for academic research is crucial: If we don't do the research, another country will, and then their local industry will benefit instead."

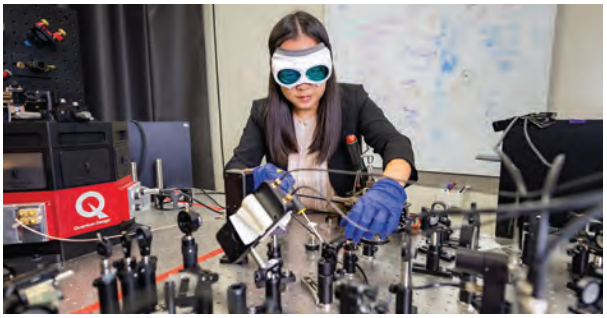


Photo: Joel Hallberg

New probing technique maps properties in quantum materials

A team of engineers led by Dugald C. Jackson Assistant Professor Ying Wang has developed a new technique to map the quantum phase diagram in a promising class of quantum materials called Weyl semimetals.

The technique enables scientists to identify phase transitions in topological materials and determine whether these transitions are linked to deeper changes in the material's topological properties. This insight could accelerate the discovery of exotic quantum phases and help identify materials with optimal electronic characteristics for building next-generation, low-power, high-efficiency electronics and optoelectronic devices.

The UW-Madison team used the nonlinear Hall effect, a recently discovered quantum electrical response that is sensitive to both symmetry and topology, as a window into the underlying physics. The researchers' goal was to determine whether this nonlinear signal could act as an electrical fingerprint for hidden phase transitions and emergent quantum states in a topological semimetal called tantalum iridium telluride—especially a form just several layers of atoms thick.

By carefully varying the temperature and input current, the researchers observed dramatic changes in the nonlinear Hall signal, a clear sign of an emergent quantum phase. Using a home-built Raman spectrometer, the team confirmed that a new charge density wave phase emerged in the low-temperature regime, likely causing the nonlinear enhancement. With this information, the researchers constructed a quantum phase diagram for ultrathin tantalum iridium telluride—mapping how temperature and current drive the formation of correlated quantum states.

"This work suggests this method could be used as a phase diagram probe," says Wang. "If you find 'hot spots' in the nonlinear Hall effect, it could indicate that a new quantum state is emerging."

UW-Madison spinoff company promises bright future for next-generation cameras

A rapidly advancing technology called the single-photo avalanche diode (SPAD) sensor is poised to replace current CMOS sensors in digital cameras over the next decade and revolutionize imaging one light particle at a time.

SPAD sensors collect a massive amount of visual data—100 gigabytes per second, or more—making it difficult for the processors in our phones or cars to render practical images or videos. Enter Ubicept, a computational imaging startup company based on the work of Associate Professor Andreas Velten. Sebastian Bauer, a former postdoctoral scholar in Velten's lab, is co-founder and CEO.

"We work on strategies to make the data processing energy-efficient and lightweight," says Velten. "We have developed a system called FLARE, or the flexible light acquisition and representation engine, that manages the massive data streams from SPADs using encoding schemes to reduce the data load while preserving enough information for image reconstruction."

Founded in 2021, the company has received significant investment, including a $1 million prize for winning the TitletownTech StartUp draft competition in spring 2025, backed by the Green Bay Packers and Microsoft.

On the top is an image taken on the Las Vegas strip with a high-end automotive camera, while on the bottom Ubicept's hardware and software is leveraged to reduce blur and noise and deliver a clear image. Image courtesy of Ubicept.

New trapped-atom qubit technology translates to industry-ready quantum computing product

A team of UW-Madison engineers and physicists has developed a streamlined method for trapping two types of atoms to create quantum bits, or qubits—the fundamental units of quantum computing that offer vast computational power. Their approach is simpler and more cost-effective than previous methods for forming interleaved atomic grids and is already being tested in early-stage quantum devices.

"Other groups have trapped two types of neutral atoms, but their setups are pretty sophisticated, use multiple lasers, and are expensive," says Antoine-Bascom and Jack St. Clair Kilby Professor Mikhail Kats, who co-led the work with Physics Professor Mark Saffman and ECE PhD student Chengyu Fang.

There is no consensus on which material should be used to make the qubits. One relatively scalable qubit candidate is neutral atoms (like rubidium and cesium, which have a net-zero electrical charge) that can be isolated, or "trapped," using lasers.

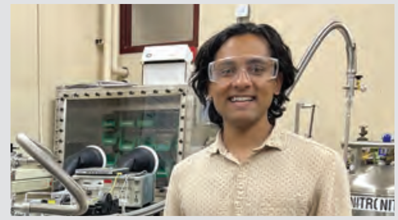
PhD student Chengyu Fang (left), and Professors Mikhail Kats and Mark Saffman (Physics) developed a new method of trapping neutral atoms using a microfabricated optical mask that splits laser light. Photos: Joel Hallberg.

Qubits of any type are sensitive to their environment and need to stay isolated from the outside world so they maintain their quantum state. External influences can cause them to "decohere" and lose information.

"Having two species of atoms is important because they can serve different roles in a quantum machine. For example, one species might serve as memory qubits, where they can be perturbed as little as possible and keep their quantum state as long as possible," says Kats. "And then the other species can communicate more to the outside world. Even though they're very close to each other, just a few microns apart, lasers of different wavelengths allow the computer to 'talk' to one type of atom and not the other."

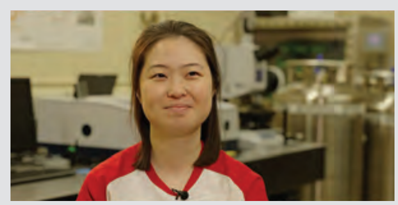
To isolate two types of atoms in the same space, the team used the Wisconsin Centers for Nanoscale Technology to fabricate an optical mask using ultrathin layers of gold and the semiconductor germanium. Sending a specific frequency range of laser light through the mask divides it into a pattern of bright, dark and intermediate areas, which interact to form the traps. The researchers filter and demagnify the light pattern before it enters a vacuum cell filled with cesium and rubidium atoms, which are attracted to bright and dark traps, respectively. The result is two sets of neutral atoms in distinct patterns near each other; one set can be used for computing and the other for sensing.

The work is proving impactful, as researchers have filed for a patent and industry adoption is underway.



Tanuj Kumar awarded NASA fellowship to advance far-infrared optics research

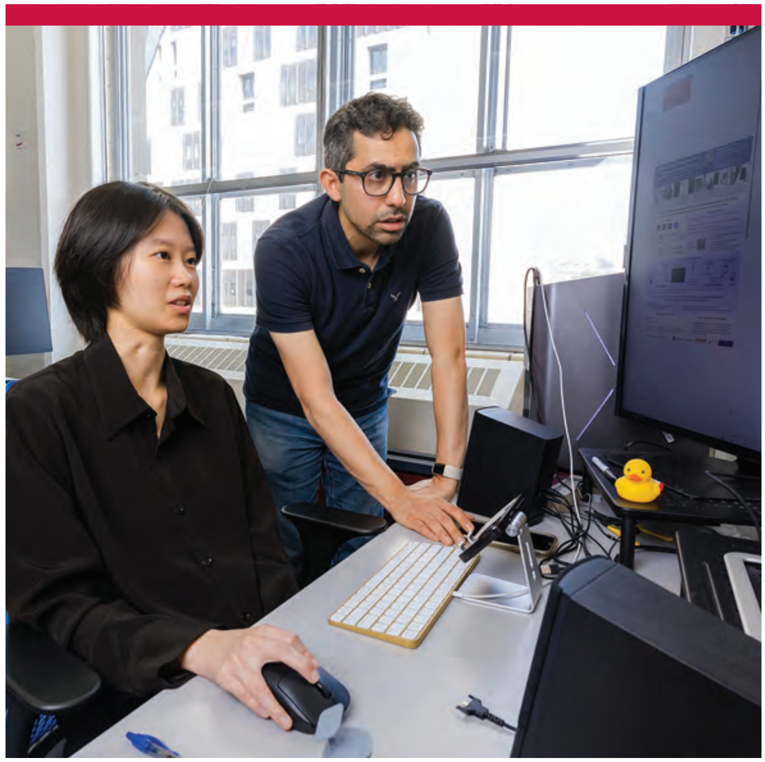
PhD student Tanuj Kumar has received a Future Investigators in NASA Earth and Space Science and Technology fellowship to advance his research in far-infrared optics, critical for next-generation space telescopes. Kumar will develop high-transmissivity, low-temperature-resilient optical components to help future NASA missions detect the cosmic microwave background and faint space phenomena.



Hongyan Mei awarded Schmidt Science Fellowship

Postdoctoral scholar Hongyan Mei has received a 2025 Schmidt Science Fellowship—an elite program supporting only 32 early career researchers worldwide who pursue innovative, interdisciplinary science. As a PhD student within the Kats research group, she developed a groundbreaking infrared spectroscopy method and led record-breaking optical research; now, as a Schmidt Science Fellow placed at Stanford University, she'll push the boundaries of quantum-enhanced measurement tools.

How automation apps can spy—and how we can detect it



Associate Professor Kassem Fawaz (right), computer sciences PhD student Shirley Zhang (left) and their collaborators developed tools to help people detect unauthorized activity on their personal devices. Photo: Joel Hallberg.

Volunteers at the Madison Tech Clinic, an initiative staffed by volunteer UW-Madison students and faculty to aid survivors of domestic and intimate partner violence and other technology-facilitated abuse, had often seen abusers using tools like spyware apps or stolen passwords to stalk, harass or embarrass survivors. Recently, however, clinic staff discovered some abusers used automation apps, like Apple Shortcuts, to quickly and easily take over digital devices. And because of the nature of these apps, the digital intrusions were much more difficult for users to detect. Staff brought the issue to the attention of privacy and security researchers on campus.

"Because of all of the capabilities of these automation apps, you can do a suite of things that previously would have required more technical sophistication, like installing a spyware app or using a GPS tracker," explains Grainger Institute for Engineering Associate Professor Kassem Fawaz. "But now, an abusive partner just needs a little time to set up these capabilities on a device."

Automation apps—including native apps like Apple's Shortcuts and Bixby Routines on Samsung phones, as well as third-party apps like Tasker and IFTTT—help easily simplify digital tasks. On the flip side, an abuser who has access to another person's phone for even a few minutes can set up automation routines that share location or texting information, or enable them to overload or control a phone, take unauthorized videos, and impersonate them, among other activities. Though each of these automations is embedded within one of the automation apps, it acts like a mini-app—yet doesn't trigger a notification when it's been activated or is running. That means malicious automations may go undetected.

Graduate student Shirley Zhang first took up the issue as a class project, then continued the research as part of Fawaz's group. She surveyed public repositories, finding 12,962 automated tasks of all sorts for Apple iOS alone. Then the research group developed an AI large-language model-assisted analysis system to detect shortcuts with the potential for abuse. In the end, they found 1,014 combinations that, if placed on someone's device, could enable abusive behavior.

Next, the researchers used test devices to confirm that it is indeed possible to use those 1,014 shortcuts to perform activities such as sending malicious emails from another person's account, overloading a phone so it is unusable, locking a user out, turning on airplane mode, and stealing photos—all without leaving obvious, detectable traces.

The researchers' analysis also showed that conventional security and detection strategies were of little use: Permissions settings apply to apps, but not individual automations within those apps. Notifications can be easily turned off, and third-party malware detectors don't scan for malicious automations.

That's why the researchers decided to turn their AI large-language-model-based evaluation tool into its own app—an online service people can use to detect these malicious recipes, says Fawaz.

While AI may be the current solution to the issue, the team is also concerned that AI will enable even more digital abuse: Combining AI assistants and automation apps, for example, will likely make it even easier for abusers to cook up recipes for malicious digital tools.

In the meantime, the researchers and their collaborators will continue to be on the lookout for emerging forms of digital abuse and ways to mitigate it.

Students shine in N+1 Institute's reverse pitch competitions

In April 2024, UW-Madison launched the N+1 Institute, a new model of tech education that blends applied learning, advanced research and innovation.

To foster applied learning, the institution is hosting reverse pitch competitions, in which a company presents a business challenge that student teams try to solve, pitching a proposal to company representatives.

So far, ECE students, and in particular students who work in Associate Professor Joshua San Miguel's lab, have won the first two N+1-sponsored pitch competitions.

The goal of the reverse pitch is to encourage students to start thinking at a higher level.

"These competitions require students to build on their classroom skills by applying them to the real world," says N+1 executive director David Ertl. "We're asking students to solve lofty problems facing entire industries, not just a single company."

For the inaugural campus-wide reverse pitch competition in October and November 2024, Google asked students how it could maintain progress toward reducing the carbon footprint of its data centers while still growing its AI and other data-intensive businesses. The winning concept came from Asmita Pal, Zhewen Pan and Elise Song, all PhD students in San Miguel's lab.

Their pitch involved approximate computing—an emerging paradigm which trades a tolerable loss in precision for notable gains in energy efficiency and performance. Their solution coupled "good enough" measures to reduce total power consumption with practical steps like reusing memory components of existing hardware to double its lifespan.

For the April 2025 competition, GE Healthcare challenged students to use clinical data and edge-based computing to create a solution capable of improving global healthcare accessibility and outcomes.

Submitted photo.

The winning team included Ashwin Avula, a graduate student in San Miguel's lab, Sumanth Karnati, a computer science and computer engineering double major with a focus on machine learning, and neuroscience major Elly Kruse. Their proposal, CognizantCare, focused on a character named David in rural Ohio, who used a wearable device that helped prevent a second heart attack. The team's tool includes a machine learning pipeline that flags early signs of patient deterioration and the differential privacy protocols that keep patients anonymous while sharing data with researchers. Its goal is to link researchers, hospitals, clinicians, patients and medical device producers to expand their reach into rural and remote communities.

Photo: Joel Hallberg

T.W. Huang's systems set for global rollout in C++ update

Beginning in 2026, Taskflow—a powerful task-parallel programming system developed by Associate Professor Tsung-Wei (T.W.) Huang—will play an active role in shaping the future C++ standard. The tool will help ensure that the next generation of high-performance computing systems can execute complex workloads with greater efficiency and scalability.

Modern computers and networks are a mix of CPUs, GPUs and accelerators grinding away at tasks simultaneously in a method called parallel processing. Ensuring that everything works together seamlessly across different processing units is challenging for developers.

That's why the C++ standards committee—the body responsible for evolving the language that underpins most operating systems, web browsers and large-scale software systems—is standardizing the task-parallel programming interface. Taskflow, designed and guided by Huang over the last half decade, is a parallel processing programming system that is being adopted by those shaping C++ standards.

To date, Taskflow has been adopted by major companies such as AMD, Intel and NVIDIA in their software projects. So, when the C++ standards committee decided to include an updated task-parallel programming standard in the 2026 version of the language, many developer communities chose Taskflow as a key reference implementation for this effort.

"I feel very excited to see our research being adopted by the community," says Huang. "When people are using C++, they are indirectly using the Taskflow system developed by our group. This will benefit potentially millions of C++ developers around the world. It's incredibly rewarding to know that our work could have a global impact."

Engineers' Day award recipients

In fall 2025, two electrical and computer engineering alumni earned College of Engineering honors for outstanding career contributions.

Distinguished Achievement Award

Pankaj Patel
MSEE '77 (BSEngr '75, Mirla Institute of Technology and Science, Pilani)
CEO, Nile

When Pankaj Patel came to Wisconsin from India in 1975, the information age had barely begun; in fact, he didn't even have the resources to research Madison—but over the last 50 years as an entrepreneur and executive in networking, Patel helped make the digital age a reality.

After earning his master's degree from UW-Madison, Patel worked at Digital Equipment Company in Boston for a decade before decamping for California, where he founded a company developing design tools for chip development. After selling that company, he joined Stratacom, a pioneer in networking and the early internet. Soon, Patel was running most of the engineering for the company—and when it was purchased by Cisco in 1996, Patel spent most of the next 20 years leading various divisions within the company. Ultimately, he became chief development officer, responsible for all engineering, marketing and product management, with a $38 billion portfolio of projects and 29,000 employees.

After retirement, Patel joined with John Chambers, former Cisco CEO, to create a venture capital fund, investing in 10 startup companies. At the same time, he created his own startup, Nile, which is developing a platform that provides autonomous networks to clients, reducing the complexity, maintenance and bottlenecks of legacy systems. "You know how Amazon Web Services disrupted traditional computer and storage companies? That's what we plan to do with networking," says Patel.

The company has more than 230 employees and has raised $300 million in funding.

Early Career Award

Adria Brooks
Energy Analysis and Policy Certificate '18, PhDECE '20 (BSEP '11, University of Arizona)
Director of Transmission Planning, Grid Strategies LLC

When Adria Brooks started her graduate studies in 2015, the electricity grid wasn't a particularly hot topic. "Ten years ago, talking to people in utilities, the feeling was that we had solved all the issues and there wasn't really anything new to do with the grid," says Brooks.

That sentiment changed, quickly; the integration of large amounts of renewable energy like wind and solar, the electrification of transportation, and the boom in energy intensive industries like AI data centers, among other issues, have put renewed focus on upgrading the grid. And during her brief yet influential career as an energy policy analyst and planner, Brooks has helped determine the policies and technologies to move the transmission network forward.

At UW-Madison, Brooks studied electricity markets, utility regulation and grid technologies, serving as a transmission planning engineer for the Public Service Commission of Wisconsin during the last year of her PhD. Then she was an AAAS science and technology policy fellow in the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, where she covered cutting-edge energy technologies. Brooks ultimately took a full-time position with the office, and later joined the Grid Deployment Office when it formed in 2022 following the passage of the U.S. Infrastructure Investment and Jobs Act.

There she oversaw many national laboratory energy projects, conducted in-house modeling, and regularly briefed the White House and the Secretary of Energy on grid-related topics. Brooks also led the National Transmission Needs Study and the National Transmission Planning Study—influential reports used in local, state and federal rulemaking. In 2023, she received the U.S. Secretary of Energy Achievement Award, one of DOE's highest honors.

In 2025, Brooks transitioned to the private sector as director of transmission planning for Grid Strategies LLC.

Faculty news

Jennifer Choy, Dominic Gross, Tsung-Wei Huang, Bhuvana Krishnaswamy and Kangwook Lee have been promoted to associate professor with tenure.

Harvey D. Spangler Professor Nader Behdad, Jim and Anne Sorden Professor Daniel Ludois, Grainger Institute for Engineering Associate Professor Line Roald and Grainger Institute for Engineering Professor Daniel van der Weide have received named professorships from the ECE department and the College of Engineering. Professor Azadeh Davoodi received the Vilas Distinguished Achievement Professorship and Associate Professor Dominic Gross received the Vilas Faculty Early Career Investigator Award, both from the Office of the Provost.

Assistant Professor Grigoris Chrysos received the Conference on Parsimony and Learning Rising Star Award for his work on efficient machine learning paradigms.

Associate Professor Dominic Gross hosted the Universal Interoperability for Grid-Forming Inverters (UNIFI) Consortium on the UW-Madison campus in July. The annual meeting brought together researchers from other universities and national laboratories along with grid operators to discuss advances in power systems technology and standards.

Associate Professor Tsung-Wei Huang received a 2025 Design Innovation Conference Under-40 Innovators Award for his outstanding work in accelerating computer-aided design with GPUs.

Antoine-Bascom Professor and Jack St. Clair Kilby Professor Mikhail Kats has received the 2026 ACS Photonics Young Investigator Lectureship Award, recognizing his pioneering research in optical materials and devices as well as his leadership in advancing the photonics community.

Assistant Teaching Professor Eduardo Romero Arvelo received the 2025 Alliant Energy James R. Underkofler Excellence in Teaching Award for his exceptional record of fostering student success and leadership in instructional innovation.

ECE Professor and UW-Madison Associate Vice Chancellor for Research in the Physical Sciences Amy Wendt retired in October after a distinguished career spanning more than 30 years. An expert in plasma behavior and material interactions, Wendt held numerous leadership roles within the ECE department and at the university level. She earned many honors for her efforts in mentoring and promoting opportunities for women and historically underrepresented groups in the sciences. ECE Professor and Chair Susan Hagness cites her visionary leadership at all levels. “Amy is leaving an enormous legacy,” says Hagness.

Tech transfer news

Saturn Agrisense, a spinoff company based on the research of Alfred Fritz Assistant Professor Joseph Andrews, won third place in the Wisconsin Governor’s Business Plan Contest advanced manufacturing category for its innovative soil sensing technology.

C-Motive Technologies, co-founded by Jim and Anne Sorden Professor Dan Ludois and alumnus Justin Reed (MSEE ’07, PhDEE ’14) to commercialize high-efficiency electrostatic motor technology, is a finalist in the Wisconsin Technology Council’s 2025 Wisconsin Innovation Awards.

Alum Greg Piefer (BSEE, BS-Physics ’99, MSNEEP ’04, PhDNEEP ’06) received the 2025 Chancellor’s Entrepreneurial Achievement Award for founding and leading SHINE Technologies, advancing fusion-based solutions in healthcare, clean energy and national security while exemplifying innovation for the public good.

Student news

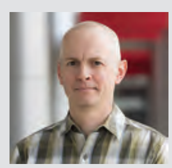
Recent PhD graduate Sankeet Deshpande, co-founder of Dirac Labs, is serving on the search committee for the first executive director of the newly launched Wisconsin Entrepreneurship Hub at UW-Madison.

Electrical engineering senior Ethan Ewer received a Wisconsin Hilldale Undergraduate Research Fellowship, supported by the ECE department and the J & H Wang Family Fund, for his research on online LLM hyperparameter selection under the guidance of Associate Professor Kangwook Lee.

PhD student Khush Gohel received the Best Poster Award at the IEEE Device Research Conference for research developing advanced AlGaN transistors capable of handling high power and voltage.

Recent ECE PhD graduate Robert Viramontes received the Wisconsin Initiative for Science Literacy (WISL) Award for Communicating PhD Research to the Public for his thesis chapter explaining deep neural network design using an accessible “lasagna” analogy. David Skrovanek won the same honor in 2024 as an ECE PhD student.

New teaching professors



ECE welcomed two new members to its instructional faculty in the energy systems and computer systems and architecture areas. Patrick Flannery (MSEE ’03, PhDEE ’08) joined as an associate teaching professor in January 2025 after 17 years at American Superconductor Corp., most recently serving as director of research engineering. Julie Hsiao joined as an assistant teaching professor in August 2025, after receiving her PhD in computer engineering from the University of Toronto.

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Alum named to Time100 AI

Navrina Singh (MSECE'03), founder and CEO of Credo AI, is among those named to the 2025 TIME100 AI. The list recognizes the influential people shaping the future of artificial intelligence.

An internationally recognized technology innovator, Singh has been a leader in mobile and AI technologies throughout her career. She began at Qualcomm, where she helped pioneer mobile breakthroughs, and later at Microsoft, where she advanced early applications of artificial intelligence in virtual agents for enterprise customers. In 2020, she founded Credo AI to address governance, one of the most pressing challenges in AI.

Her company's platform helps organizations identify and manage risks in their AI systems, from security vulnerabilities and compliance concerns to unintended bias. Singh emphasizes that responsible oversight is critical to scaling the technology. "It's all about oversight, control, and getting to trust very fast," she says.

Under her leadership, Credo AI has quadrupled its revenue in the past year, doubled its customer base, and partnered with clients such as Mastercard, McKinsey & Company, and Northrop Grumman. Beyond her company, Singh is shaping policy and practice on a global scale. She serves on the U.S. Department of Commerce's National Artificial Intelligence Advisory Committee, contributes as an AI expert at the Organisation for Economic Co-operation and Development (OECD), and advises the United Nations AI advisory board.

In 2019, Singh received the college's Early Career Award, highlighting her impact as a leader in the field. "Wisconsin was one of the most revered universities in computer architecture with some of the most brilliant professors, and I wanted to be part of that community," she says.