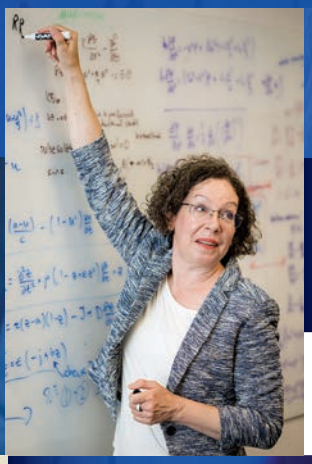
McCormick School of Engineering and Applied Science

NORTHWESTERN ENGINEERING

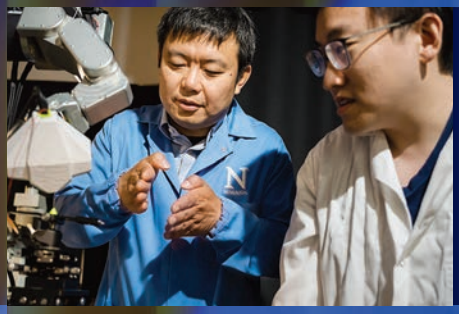
FALL 2026











ENGINEERING ENGAGEMENT

Developing new technologies to help people connect with the world and one another



WHERE IDEAS SPARK

This fall, Northwestern Engineering welcomed 593 new undergraduate students and 719 new graduate students—and already our collaboration spaces are filling up with equations, sketches, and ideas. We are investing in a growing number of such spaces like the one shown here in the Technological Institute, because engineering's best thinking doesn't happen in isolation. It happens when students have a place to think out loud, together, from day one.

Photo by Jason Brown


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ELOP VENTURES IN
AN TECHNOLOGY SPACES
Northwestern | ENGINEERING



"I am continually inspired by the energy students bring to our halls, and when I meet with alumni, I see how that energy endures. It is an honor to be a part of this network of innovators and problem-solvers—people who never stop wanting to help."

GREETINGS FROM NORTHWESTERN ENGINEERING

Ask any of our students why they chose engineering, and you might hear, "I wanted to help people." For many engineers—even those who transition to careers in other fields—using their distinctive abilities to benefit society remains a lodestar throughout their lives.

So, this issue is devoted to how our students and faculty use their engineering expertise to improve the lives of others. Our cover feature focuses on professors who are developing technology to help individuals better engage with their world: AI and imaging tools to help people see, innovative cochlear implants to help them hear, and new technologies to help them walk or navigate a wheelchair. This is the kind of research that shows the real power of engineering to directly improve people's lives.

This instinct to help shows up in how we teach as well. You have no doubt read about the ongoing conversations around AI, particularly its use in the classroom. When used under the careful direction and control of the professor, AI can be a tool that improves education. That's the goal with the Socratic tester developed by Ilya Mikhelson, Charles Deering McCormick Distinguished Professor of Instruction. His new testing platform uses AI to allow professors the feasibility of turning their exams into a one-on-one conversation with each student. With this testing platform, students have more freedom to demonstrate all they know, and professors gain clearer insight into that knowledge. In pilots, students found that the platform interprets their responses correctly and alleviates testing stress, while professors report gaining a deeper understanding of what students learned.

You'll also find a story about mechanical engineering students who set out to build something that could help people—starting with a haptic glove, then pivoting through physical therapy, before a connection through the Northwestern network pointed them toward warehouses instead. It's a great example of how our educational ecosystem supports students through the inevitable pivots of the entrepreneurial journey.

As always, it has already been a busy fall here at Northwestern. I am continually inspired by the energy students bring to our halls, and when I meet with alumni, I see how that energy endures. It is an honor to be a part of this network of innovators and problem-solvers—people who never stop wanting to help.



CHRISTOPHER A. SCHUH
Dean, McCormick School of Engineering and Applied Science

On the Cover
Northwestern Engineering researchers are developing new technologies and methods to prevent blindness, restore hearing, facilitate feeling through touch, improve the ability of wheelchair users to better navigate their environments, and help stroke survivors walk. Read more on page 12.

Northwestern Engineering is published by the Robert R. McCormick School of Engineering and Applied Science, Northwestern University, for its alumni and friends.

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Northwestern | McCORMICK SCHOOL OF ENGINEERING

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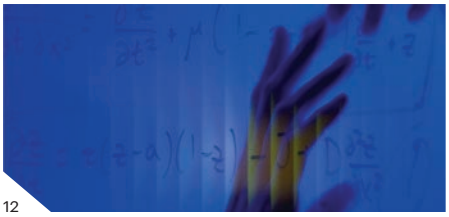
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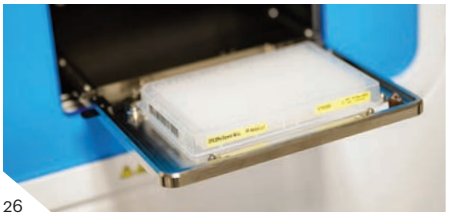
12



18



22



26



28



33

NORTHWESTERN ENGINEERING
FALL 2026

4
NEWS

7
LAB NOTES

12

ENGINEERING TECHNOLOGY EMPOWERS ENGAGEMENT
Researchers are developing new innovations that empower people to better engage with their surroundings and one another.

18

SOCRATIC TESTING ENABLED BY AI
Faculty and students experiment with Northwestern-developed testing innovation designed to enable students to show what they know and professors to see it more clearly.

22

BUILDING BIG IDEAS
Northwestern's entrepreneurial ecosystem helped the founders of computer-vision technology startup HaptE adapt their idea, find their focus, and launch into the market.

26

LAB TOUR: THE BIOFOUNDRY AT THE CENTER FOR SYNTHETIC BIOLOGY
The lab provides tools to rapidly assemble DNA, engineer microbes, and run large numbers of experiments in parallel.

28
CLASS NOTES
At Apple, Fatemeh Pishdadian (PhD '20) develops audio processing for hearable devices.

Alanna Cotton ('96) advises business owners on the next phase of growth.

Michael Chung ('01) has a passion for helping others achieve success.

33
SOLVING THE "PROBLEM-SOLVING" PROBLEM
Professor Nikos Hardavellas, who confronts complicated systems every day, shares a five-step approach to solving difficult problems more effectively.

NEWS

BUILDING SOLUTIONS AND COMMUNITY AT WILDHACKS 2026



- WildHacks, Northwestern's largest hackathon, is an annual coding competition where students of all experience levels come together to learn, build, and innovate in an energetic, supportive atmosphere.
- Alongside 105 Northwestern participants, hackers from across the country joined the in-person event.
- Forty representatives from academia, industry, and the event sponsors volunteered their time to evaluate project submissions.

Collaborative, creative, and fast paced, WildHacks is Northwestern's largest hackathon—an annual coding competition where students of all experience levels come together to learn, build, and innovate in an energetic, supportive atmosphere.

Themed "Time," WildHacks 2026 was held this past April in Mudd Hall and the Technological Institute. Nearly 250 participants representing 53 colleges and universities nationwide, including 105 students from Northwestern, spent the weekend building functional and compelling software within three tracks—childhood games (past), problem-solving for community causes (present), and predictive data storytelling (future). A total of 68 projects were submitted.

Northwestern's Jefferson Wu won first place overall for Wildcat Arcade, an application that enables users to play Nintendo's Wii Sports Resort games on a smartphone without a Wii console. Attenda Health, developed by Northwestern students Bodie Feinberg, Oscar Jakacki, Aiden Tian, and Andrew Xue, earned second place. Their mobile-first web application decentralizes the nursing call bell system and features a personalized, real-time queue of patient requests designed to make the patient care process more efficient.

A team comprising Northwestern student Alan Tai, University of Illinois Chicago students Inika Goyal and Krithin Narayan, and Sara Khan of Western Governors University won third place for Architec, an energy audit system that generates information about how a building consumes energy and what improvements could reduce costs and emissions. Local and regional institutions represented included Illinois Tech, Purdue University, University of Chicago, University of Illinois Chicago, University of Illinois Urbana-Champaign, and University of Wisconsin–Madison.

20% The energy efficiency of a system developed by Professor Ted Sargent to convert carbon dioxide into ethylene

7.8X The extra improvement in arm function for stroke survivors after 6 weeks of video game-based therapy developed by Northwestern professors

Partnering Globally to Advance Water Security



Northwestern's 10th Annual Transboundary Water Symposium, hosted by the Northwestern Center for Water Research and the Northwestern Israel Innovation Project, brought together scholars on May 6 to discuss "Water Security in Israel, the Middle East and Africa: Regional Solutions for the Climate and Water Crisis."

Because water insecurity affects communities in vastly different contexts, participants emphasized collaboration as a central driver of impact and the importance of sharing data, expertise, and lived experience to ensure that solutions developed in one region can be adapted and applied elsewhere. The symposium also laid the groundwork for future collaborations across Israel, Africa, and the United States, building on longstanding partnerships and emerging opportunities. A major focus was integrating community-level survey data with technological and infrastructure-based approaches to better assess needs and measure outcomes.



CS+LS TEAM WINS A BEST PAPER AWARD AT CHI'26

A Computer Science and Learning Sciences team led by fourth-year PhD student Caryn Tran earned a Best Paper Award at the Conference on Human Factors in Computing Systems hosted by the Association for Computing Machinery Special Interest Group.

Inspired by Tran's time as a middle school computer science teacher, the team aimed to understand how educational programming tools shape K–12 students' motivation to learn computer science.

One such tool, block-based programming, lets students build programs by dragging and dropping code blocks that snap together like puzzle pieces. After the research team demonstrated how such tools could build Android and iPhone apps, a group of high school students reconsidered their earlier assumptions about block-based programming's capabilities.



Aaron W. Saak Offers Graduates Four Guiding Principles

Speaking at the McCormick PhD Hooding and Master's Degree Recognition Ceremony on June 15, Aaron W. Saak (MS '97, PhD '00), president and CEO of Crane NXT, shared four "directionally correct" principles that have guided him for the past 25 years: focus on what is not changing, live with a "healthy" paranoia, balance healthy paranoia with confidence, and balance confidence with gratitude.

Saak expressed his hope that when asked about their accomplishments 25 years from now, graduates will answer with a story about a problem solved, a person championed, or uncertainty navigated. "That is whole-brain thinking, and that is what this education is for."

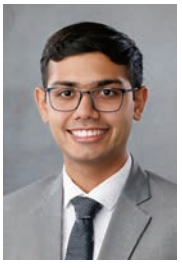


Antonio Daniels Shares Seven Pieces of Advice with Graduates

Comcast Business chief information officer Antonio Daniels ('93, MBA '15) shared seven pieces of advice during his address at the 2026 McCormick Undergraduate Convocation on June 15: escape gravity; you must build, not work; collaborate across boundaries; remember you are greater than AI; take ownership early; design your life; and move fast.

"The world you're entering does not need more observers. It needs builders—people willing to create, challenge, and lead," he said. "You leave Northwestern with more than a degree. You leave with the tools to build what does not yet exist, so go build something that matters."

60% Proportion of federal judges who report using an AI tool in their judicial work, according to a survey conducted by a team that included Professor V.S. Subrahmanian



DEV SHAH NAMED CO-OP STUDENT OF THE YEAR

Computer science student Dev Shah ('26) had numerous standout projects during his co-op at SCal Mobile, which deals in re-commerce to extend the life cycles of iPhones. One of his projects involved building a WhatsApp chatbot that could handle customer orders and answer questions. What started out as a structured, form-like tool to reduce manual workload evolved into a language-model-powered assistant capable of natural conversation.

The core challenge involved balancing reliability with flexibility. "It was pretty fun because it also let me apply a lot of the classroom skills that I learned," Shah says. For his efforts, Shah was named the 2026 Walter P. Murphy Cooperative Engineering Education Program Student of the Year. He now works full-time in SCal's data science department.



Biohub Releases a World Model of Protein Biology

Biohub, a nonprofit research institute cofounded by Priscilla Chan and Mark Zuckerberg, has unveiled the next-generation ESM—AI tools designed to model protein biology—which Professor Shana Kelley says will help write "the book of life."

Biohub combines AI and experimental biology to better understand living systems. Its goal is to cure or prevent all disease. Northwestern is one of the organization's key academic partners; Kelley serves as its president of bioengineering.

Unlike traditional AI systems that perform narrow tasks, the ESM world model of protein biology has learned fundamental underlying rules of proteins. The newly released suite serves as a scientific engine for prediction, design, and discovery that can map proteins across the tree of life, predict their structures, and help design new protein binders or molecules that attach to particular proteins to explore their function.



CREATIVE AGENCY IN THE AGE OF AI

The Northwestern University Center for Human-Computer Interaction + Design—a collaboration between Northwestern Engineering and the School of Communication—convened researchers, designers, and artists to examine how generative AI is reshaping what it means to be creative.

At the March 6 symposium, participants—faculty, students, and industry partners involved in the arts—explored key interdisciplinary questions about human-AI collaboration, including how AI shifts roles within creative teams, how interface design can better support human intention, and what knowledge people need to stay in control of their creative process. The symposium opened with a demo of AI applications and workflows followed by a networking luncheon and three panel sessions.



INSTITUTIONAL READINESS FOR THE AI ERA

Advances in AI and modern cyberinfrastructure are transforming sectors across scientific and technological domains, including research and higher education. More than 200 researchers, students, and practitioners attended two recent events hosted by the Northwestern Network for Collaborative Intelligence to explore these ideas.

Through its Distinguished Speaker Series, NNCI sparks interdisciplinary and cross-functional dialogue and illuminates emerging thought around responsible, high-impact research and education in data science and AI. Recent topics have included AI and modern cyberinfrastructure and the future of education.



Northwestern Launches Thriving Planet Institute

The urgency to address Earth's sustainability challenges—from climate change and pollution to food and water insecurity—grows constantly. To help meet the moment, Northwestern has launched the Thriving Planet Institute, where researchers can work across disciplines and sectors to design solutions to meet the challenges.

Directed by Professor Jennifer Dunn, the institute has set four priorities:

- Redesign chemical and material systems to reduce their harm to people and the environment
- Strengthen water and food security in communities facing growing risk
- Restore and enhance the ecosystem services that sustain human life
- Develop open-data, modeling, and decision-support tools that help communities act on better information

LAB NOTES

Jumping Spiders Inspire Ultra-Efficient 3D Camera



Called SpiderCam, the new device senses depth the same way that jumping spiders judge distances.

"WE WANTED TO UNDERSTAND WHETHER WE COULD BORROW SOME OF THE SAME PRINCIPLES TO CREATE AN EXTREMELY ENERGY-EFFICIENT DEPTH SENSOR THAT COULD BE USED IN RESOURCE-CONSTRAINED SITUATIONS WHERE USERS DON'T HAVE UNLIMITED ACCESS TO POWER."

Emma Alexander
Assistant Professor of Computer Science

The innovation could enable a new generation of battery-powered devices that gauge their surroundings, like wearable technologies, assistive devices, robots, and drones.

Borrowing a trick from tiny jumping spiders, Northwestern engineers have developed an extremely energy-efficient 3D camera.

The new device, SpiderCam, senses depth the same way jumping spiders judge distances before making a high-precision hop. To estimate depth, the system captures two images of the same scene with slightly different focus settings and measures subtle differences in blurriness between the two images. With this strategy, the camera produces real-time 3D maps while consuming less than a watt of power, less energy than used by a standard nightlight.

The innovation, led by Assistant Professor Emma Alexander, could enable a new generation of battery-powered devices that must gauge their surroundings, like wearable technologies, assistive devices, robots, and drones.

Unlike human eyes, which have one retina each, jumping spiders' eyes have multiple layers of retinas, each of which captures an image focused at a slightly different distance. One layer might see an object sharply, while another sees the same object but slightly blurred.

SpiderCam uses a similar optical design. First, a custom camera simultaneously captures two images with slightly different focus settings. Acting as a translator between blur and distance, a custom algorithm then analyzes how the sharpness of edges and textures changes between images. Finally, it converts those differences into depth measurements in real time.

Rather than running complex software on a conventional processor, the team built the algorithm directly into a low-power field-programmable gate array, a customizable computer chip optimized for energy-efficient processing. The resulting prototype generates depth maps at 32.5 frames per second while consuming just 624 milliwatts of power.



"IN THIS CRUCIAL MOMENT FOR AMERICAN INNOVATION TRANSFORMED BY AI, NORTHWESTERN'S RESEARCHERS ARE RISING TO MEET THE CHARGE."

Mung Chiang
President, Northwestern University

NORTHWESTERN PROJECTS RECEIVE GENESIS MISSION FUNDING

The US Department of Energy's Genesis Mission has selected four projects with ties to Northwestern for Phase I funding, including three involving Northwestern Engineering faculty. The national initiative aims to build the world's most powerful scientific platform to double the productivity and impact of American research and innovation within a decade.

Northwestern-affiliated projects include efforts to discover materials for fusion energy, to design electronics for quantum technologies, and to develop a more sustainable way to manufacture plastics from captured carbon. With Phase I funding, project teams will design, develop, and test AI-enabled research workflows to explore new approaches to scientific discovery.

New Spinning Drone Hides in Plain Sight





Dubbed the "Phantom Twist," the drone spins up to 25 times per second, too fast for the human eye to see clearly.

"THIS IDEA OF LOW VISIBILITY THROUGH MOTION IS SOMETHING FEW PEOPLE HAVE EXPLORED."

Michael Rubenstein
Associate Professor of Computer Science and Mechanical Engineering

For years, researchers have tried to design invisible drones and robots using camouflage, transparent materials, or light-bending optical systems. Instead, a Northwestern team used a concept called "motion blur"—the effect that makes fast-spinning fans and propellers seem to disappear.

Called the "Phantom Twist," the team's drone spins up to 25 times per second, too fast for the human eye to see clearly. Unlike a typical quadcopter with four separate rotors, Phantom Twist has one motor and one propeller. The propeller spins in one direction, the rest of the drone in the opposite direction.

While not completely invisible, the drone morphs into a ghostly smudge that seamlessly blends into the background. The work could lead to drones that monitor wildlife, survey the environment, and inspect infrastructure with less visual disruption.

To design the drone, the Northwestern team—led by Associate Professor Michael Rubenstein—first used a computational model to generate roughly 20,000 drone configurations capable of stable flight. Then, they used AI and optimization algorithms to repeatedly rearrange the drones' major components and simulate the drones spinning in flight.

The resulting design spread the components around the drone—at different heights and different angles with lots of space in between—to prevent them from visually overlapping when spinning. When everything blurs together, the drone becomes a faint, semitransparent cloud rather than a distinct shape. According to a visibility metric, the optimized drone is about 10 times less visually perceptible than a conventional quadcopter.

Rubenstein says his team plans to design future iterations with more transparent materials or quieter propulsion to make the Phantom Twist even less noticeable.

1 MILLION Samples that can be screened in less than 30 minutes to find new materials in Professor Chad Mirkin's megalibraries platform

21° Temperature in Fahrenheit at which snow flies can survive by generating their own body heat and producing antifreeze proteins, according to research by Professor William Kath

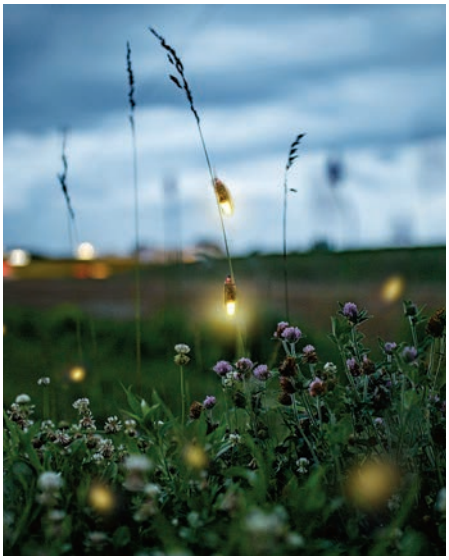


BOTTLED LIGHTNING MAKES A CLEANER FUEL

Northwestern researchers discovered a new way to turn natural gas into liquid fuel—it's like lightning in a bottle. Harnessing tiny bursts of plasma—or mini "lightning bolts"—in glass tubes submerged in water, the team has successfully converted methane directly into methanol in a single step. Methanol, a versatile, high-demand chemical used in manufacturing many consumer products and as a solvent, is also gaining attention as a cleaner-burning fuel for ships and industrial boilers.

While the current multistep method, which blasts apart methane and rebuilds it as methanol, is reliable, it's also energy intensive and emits millions of tons of carbon dioxide each year globally. The new method bypasses the extreme heat and high pressures required for current industrial processes.

Using just electricity, water, and a copper oxide catalyst, the new process could offer a cleaner, electrified path to producing one of the world's most widely used chemical building blocks. The team, led by Assistant Professor Dayne Swearer, plans next to explore ways to efficiently recover and separate methanol as a purified product.



NATURE MIGHT HAVE A UNIVERSAL RHYTHM

Animal communication can look wildly different across species—flashing lights, chirping calls, croaking songs, and elaborate dances. New research suggests many such signals share a surprising feature: They repeat at nearly the same tempo.

Northwestern researchers, led by Professor Daniel Abrams, found that communication signals across a wide range of species tend to repeat at about two hertz, or roughly two beats per second.

The researchers propose this tempo might reflect a shared biological constraint. Animal brains, including humans', may be tuned naturally to process signals arriving at that pace. In other words, two beats per second may be a rhythmic "sweet spot" that enables brains to detect signals more easily and process communication more efficiently.

Understanding this potentially universal tempo could help scientists better interpret animal signaling and social behavior across species. The findings also hint that human perception of rhythms, including beats in popular music and the cadence of speech, may arise from the same neural timing principles found throughout nature.

DISINFECTANTS INFLUENCE MICROBES ACROSS HOSPITAL ROOMS

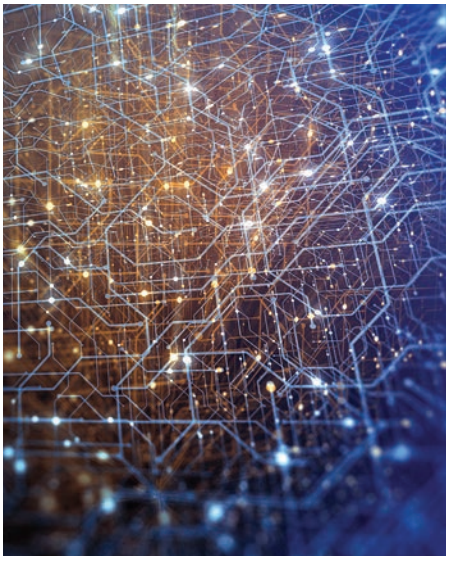
Swabbing a topical antiseptic on the skin doesn't mean it stays on the skin. Associate Professor Erica Hartmann and her team studied how the powerful antiseptic chlorhexidine affects bacteria in hospital environments. Hospitals rely heavily on chlorhexidine wipes to sterilize patients' skin before procedures.

The researchers found that traces of chlorhexidine linger on surfaces much longer than previously known—long enough to help microbes build tolerance. Experiments also showed that chlorhexidine-tolerant bacteria spread throughout the hospital environment through touch and, surprisingly, through the air. The findings could inform strategies for preventing infection and antimicrobial resistance.

AI Gets a Cerebellum

The brain's cerebellum doesn't waste energy—it constantly monitors the world for the unexpected and springs into action only when something suddenly changes.

Inspired by such remarkable efficiency, Northwestern researchers developed a new brain-like electronic device that detects novelties almost instantly while consuming very little energy. In experiments, the device identified abnormal heart rhythms within one-fifth of a heartbeat with more than 98 percent accuracy. The device also needed roughly 10,000 times fewer computer operations than conventional AI approaches, paving the way for more energy-efficient AI. The work, led by Professor Mark Hersam, could enable a new generation of low-power AI systems for health monitors, self-driving cars, and robots.



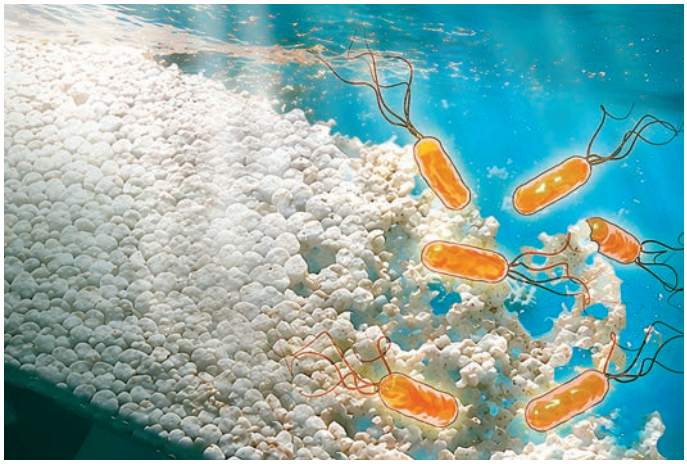
Quantum Internet Leaves the Lab

Quantum information is notoriously fragile. Internet traffic is anything but. Yet Northwestern researchers demonstrated the two can peacefully coexist within the same fiber-optic cable.

A team led by Professor Prem Kumar successfully sent entangled photons through a 24.4-kilometer fiber-optic cable connecting Evanston and downtown Chicago that simultaneously carried high-capacity internet traffic. Even amid the torrent of conventional data, the quantum signals remained remarkably intact—preserving entanglement with more than 94 percent fidelity.

Quantum networks rely on quantum entanglement, a property in which two particles' quantum states are inseparably linked regardless of the distance between them. Entangled particles can help exchange quantum information over great distances—without physically carrying it—through a process called teleportation.

By allowing fragile quantum signals and powerful classical data streams to share the same optical fiber, the work demonstrates a practical path toward building future quantum networks without requiring entirely new communications infrastructure.



Why Plastic Lingers and What's to Blame

Scientists have long known that sunlight helps break down plastic. So why do plastic products linger for decades and even centuries in rivers, lakes, and oceans, even when bathed in direct sunlight?

Professor Ludmilla Aristilde and her team uncovered an unexpected answer. Surprisingly, the culprit is water itself. In a study designed to mimic real environmental conditions, researchers found that the chemical makeup of natural waters—especially combinations of salt and organic matter—significantly delays the breakdown of polystyrene, a plastic commonly used in packaging and food containers.

Because sunlight cannot effectively initiate the degradation process, microbes cannot finish the job. That means nature's cleanup process slows down, allowing plastics to accumulate and persist in waterways worldwide.

The findings show that solving plastic pollution isn't only about the material itself but also about the environment it enters. These insights could be used to design new types of plastic that degrade even in salty, complex environments or that don't rely on sunlight to jump-start the breakdown process.

REDUCING KIDNEY DISCARDS, IMPROVING TRANSPLANT ACCESS

Professor Sanjay Mehrotra is helping get more donated kidneys where they are needed. His new Sliding Scale AdaptiVe Expedited (SAVE) algorithm could cut kidney nonuse in half, potentially saving more than 3,000 lives annually.

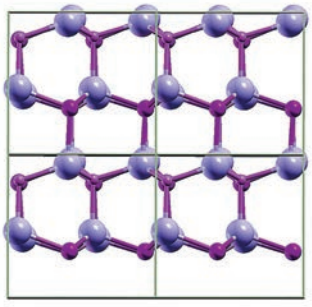
Currently, when a donor kidney is offered to a candidate, the longer the decision takes on whether to accept the kidney, the higher the risk the organ won't be usable. Mehrotra's algorithm flags a high risk of nonuse and expedites offers to multiple candidates at once, increasing the odds of successful transplantation. SAVE also statistically models acceptance decisions, embeds them within a digital twin of the national kidney allocation system, and uses that framework to design outcome-changing policy interventions.



Implantable "Living Pharmacy" Produces Multiple Drugs Inside the Body

A multi-institutional team co-led by Northwestern took a crucial step toward implantable "living pharmacies"—tiny devices containing engineered cells that continuously produce medicines inside the body. The team engineered cells to simultaneously produce three different biologics: an anti-HIV antibody; a GLP-1-like peptide used to treat type 2 diabetes; and leptin, a hormone that regulates appetite and metabolism.

When implanted under the skin of a small animal model, the device kept drug-producing cells alive and stably delivered all three therapies at once. Called HOBIT (short for hybrid oxygenation bioelectronics system for implanted therapy), the new system integrates the engineered cells with oxygen-producing bioelectronics. Professor Jonathan Rivnay was a coprincipal investigator.



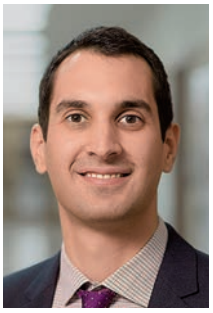
ELECTRIC CONTROL OF SPIN COULD ENABLE A NEW CLASS OF ENERGY-EFFICIENT ELECTRONICS

Computers and other electronic devices rely on a flowing electric charge to store and process information. As computing demands increase, that approach is running up against limits in heat generation, power consumption, and device scaling. One way researchers are addressing these constraints is through spintronics, which uses not only an electron's charge but also its spin. Controlling spin could enable faster switching, reduce energy use, and offer new ways to integrate memory and logic within a single device.

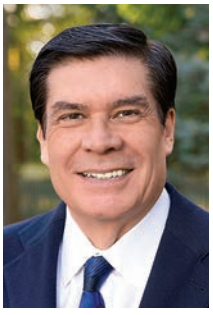
Professor James Rondinelli identified a new class of multiferroic materials that could help make that vision practical. The research examined ternary nitride compounds that combine several properties rarely found together, including ferroelectricity, magnetism, and nonrelativistic spin splitting. These combined characteristics suggest a pathway to electronic components that are faster, smaller, and more energy efficient than current technologies.



Zdeněk P. Bažant



Sinan Keten



Horacio Espinosa



Jennifer Fowlie



Jeffrey Richards



John Rogers



Connor Bain



David O'Neill



Aravindan Vijayaraghavan



Mahdi Hosseini



Ryan Truby



Junsoo Kim



Sara Sood

Faculty Awards

Zdeněk P. Bažant Wins Professor Herbert A. Mang Award
The honor is bestowed annually by the Central European Association of Computational Mechanics to an individual who has demonstrated sustained efforts in advancing either theoretical or practical aspects of computational mechanics.

Sinan Keten Wins 2026 Zdeněk P. Bažant Medal
The American Society of Mechanical Engineers selected Keten for contributions to the study of the mechanics and fracture behavior of network materials.

Horacio Espinosa's Impact Recognized by Medals
Espinosa won the 2026 Zdeněk P. Bažant Medal for Failure and Damage Prevention from the American Society of Civil Engineers. He also won the Horace Mann Medal from Brown University's Graduate School, its highest honor for alumni.

Jennifer Fowlie Named a Canadian Institute for Advanced Research Global Scholar
Fowlie was selected in the Quantum Materials category, gaining access to international networks, mentorship, and opportunities for deep interdisciplinary collaboration.

Jeffrey Richards Wins Arthur B. Metzner Early Career Award
The award from the Society of Rheology honors researchers who have distinguished themselves in rheological research, rheological practice, or service to rheology before their 12th year after their final academic degree.

John Rogers Elected to the American Philosophical Society
Rogers was among 33 resident members and nine international members elected this year to the prestigious society founded by Benjamin Franklin.

Connor Bain, David O'Neill, and Aravindan Vijayaraghavan Honored with 2026 University Teaching Awards
Northwestern's Office of the Provost recognizes professors who demonstrate excellence and innovation in undergraduate teaching.

Mahdi Hosseini Honored by ASEE 2026
The Curtis W. McGraw Research Award recognizes the significant achievements of early career researchers and educators.

Ryan Truby and Team Receive DARPA Director's Fellowship
The Defense Advanced Research Projects Agency award supports Truby's development of bioinspired power supplies.

Junsoo Kim Receives NSF CAREER Award
The US National Science Foundation's Faculty Early Career Development Program supports promising young faculty members who exemplify the role of teacher-scholar through the combination of outstanding research and education.

Sara Sood Receives Linzer Award for Faculty Excellence in Service
Given annually by Northwestern's Office of the Provost, the award celebrates individuals who have performed extraordinary service that has had a positive impact on the University.

ENGINEERING TECHNOLOGY EMPOWERS ENGAGEMENT

Technologies and methods developed by Northwestern Engineering research teams are helping widen worlds.

Imagine waking up in the morning seeing sunshine stream through your window and hearing the coffee machine gurgling in the kitchen. You stretch, get up out of bed, and walk down the stairs. After a quick breakfast, you open your front door and walk outside, ready to face another day.

It's a routine that many people take for granted. But when one of these abilities—sight, hearing, touch, mobility—is taken away, a simple routine can become challenging, possibly insurmountable.

That's where engineers can make a difference. At Northwestern, researchers are developing new technologies and methods to prevent blindness, restore hearing, facilitate feeling through touch, improve the ability of wheelchair users to better navigate their environments, and help stroke survivors walk.

The goal? To empower people with the tools they need to engage successfully with their surroundings and one another.

SIGHT

GOAL

Prevent blindness due to glaucoma and help make whole-eye transplants viable

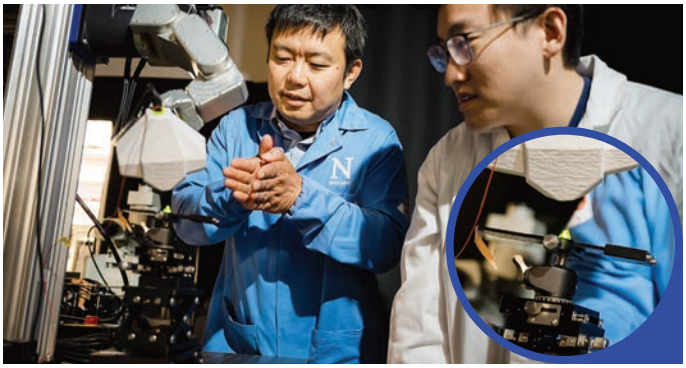
RESEARCHERS

HAO F. ZHANG
Professor of Biomedical Engineering
Director of the Center for Engineering in Vision and Ophthalmology

NICHOLAS J. VOLPE
George W. and Edwina S. Tarry Professor of Ophthalmology

CHENG SUN
Professor of Mechanical Engineering

MARK JOHNSON
Professor of Biomedical Engineering





A robotic optical coherence tomography system in the lab of Hao Zhang acquires 3D images of a mouse eye to reconstruct a digital twin, providing technical preparation for humans. Photos by Jason Brown (top) and Jackson Grischeau (bottom).

Glaucoma, a common eye disease and a leading cause of blindness in older adults, develops when high fluid pressure in the eye damages the optic nerve. To facilitate better drainage, surgeons typically implant stents in the inner nasal angle in the front of the eye, the most accessible location. Unfortunately, that location does not always provide the best drainage. As a result, high pressure often recurs.

At the Center for Engineering in Vision and Ophthalmology (CEVO), Professor Hao Zhang and his collaborators are committed to translating engineering discoveries into ophthalmology practice. They are exploring how to combine imaging with AI to model the individual patient's unique form to find optimal stent locations guided by the eye's many fluid outlets, called collector channels.

"Each eye is different," Zhang says. "We should implant stents at locations based on the features of each eye."

To develop such a model, Zhang and his team use noninvasive imaging that shines light within the front of the eye to build a 3D replica of its internal anatomy. They then use physics-guided AI tools to build a numerical model that can predict the outcomes of placing one or more stents in different locations.

With support from the Forsythe Family Foundation, Zhang and his collaborators are using human donor eyeballs and animal models to train the software to build the AI models. Their goal is to demonstrate to clinicians how this approach benefits patients.

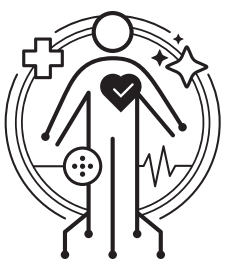
"Our collaborating physicians tell us that this is a longstanding challenge, and our hope is to have the data to guide surgical planning within four or five years," Zhang says.

Zhang's team isn't content to stop there. For glaucoma patients who have become blind from retinal neurodegeneration, no current treatment exists to restore sight.

Zhang and his collaborators from across the United States are working on a federally funded project to make whole eye transplants a reality. To do so, researchers must figure out how to regenerate the functional optic nerve that connects the eye to the brain. Zhang's innovative imaging technologies are being used to determine how long an eyeball can remain viable after it is removed from the body and whether neurons have actually regenerated after controlled damage.

"It's a moonshot project," Zhang says. "Nobody knows whether it's going to be successful or not, but during the process, there will be many new tools developed, which will help patients regardless."

The potential for new discoveries in this area could one day benefit the treatment of other ailments. "With the right imaging data, with the right AI agent, clinical management and diagnosis of the eye will be able to impact the whole health of the human body, including heart, brain, and more," Zhang says.



OPTIMIZING THE HUMAN HEALTH SPAN

The technologies featured in this article restore the senses and mobility that make independent living possible, advancing our priority of Optimizing the Human Health Span. At Northwestern Engineering, we seek not only to extend how long people live, but how fully they can engage with the world around them.

HEARING

GOAL

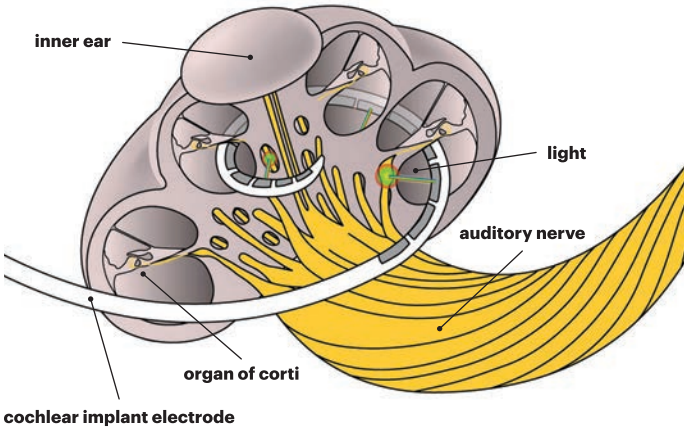
Develop cochlear implants that offer better hearing than current devices

RESEARCHERS

PETIA VLAHOVSKA
Professor of Engineering Sciences and Applied Mathematics

CLAUS-PETER RICHTER
Professor of Otolaryngology at the Feinberg School of Medicine
Professor of Biomedical Engineering (by courtesy)





top Professor Petia Vlahovska is using her expertise in fluid mechanics, membranes, and biophysics to help develop cochlear implants that use synthetic membrane systems to stimulate the auditory nerve. Photo by Jason Brown.

bottom A schematic of the cochlear implant being developed by Professor Claus-Peter Richter in collaboration with Professor Petia Vlahovska. The human implant will be a thin-film electrode with more than 18 optical sources embedded in silicone to stimulate the auditory nerve with light. Image courtesy of Claus-Peter Richter.

Much of human communication, learning, and awareness happens through hearing. For people who are deaf or severely hard of hearing, cochlear implants can relay a sense of sound to the brain by stimulating the auditory nerve.

Such implants, however, are imperfect. By electrically stimulating neurons with metal electrode arrays, they create sounds that can seem off and nonspecific. Because researchers assumed neurons fire only through electrical stimulation, these implants have remained the only option.

Professor Petia Vlahovska knows that a different sort of implant is possible. At Northwestern University's Feinberg School of Medicine, Professor Claus-Peter Richter has shown that action potentials—tiny sparks that neurons use to send signals throughout the body—can also be stimulated with infrared light instead of electricity. Other research has shown that action potentials are not only electrical but also mechanical waves.

For Vlahovska, an applied mathematician, the idea that neurons could be stimulated differently has opened a whole new way of thinking about machine-brain interfaces. Her previous research into the behavior of soft materials has led her to study cellular membranes, which she now hopes to harness to create new types of implants.

"If we don't need electricity to propagate signals, could we do it mechanically through soft materials that better connect with tissue?" she asks.



"If the membrane itself changes state during stimulation, then that's a mechanism we can engineer around to build better hybrid cochlear implants for people who have run out of options with today's devices."

Claus-Peter Richter
Professor of Otolaryngology at the Feinberg School of Medicine, Professor of Biomedical Engineering

With a $3 million Trailblazer Engineering Impact Award from the National Science Foundation, she and Richter aim to do just that. Using Vlahovska's expertise in fluid mechanics, membranes, and biophysics and Richter's expertise in developing cochlear implants, the team will create and test synthetic membrane systems that generate the dynamics of action potentials without using electrical currents.

Together, they will study whether the infrared stimulation works by heating nerve membranes to trigger stimulation. Confirming that could lay the groundwork for future neuroprosthetic technologies, including better cochlear implants.

"I've been circling this question since my master's thesis, and it's exciting to finally have the collaborators and the resources to answer it directly," Richter says. "If the membrane itself changes state during stimulation, then that's a mechanism we can engineer around to build better hybrid cochlear implants for people who have run out of options with today's devices."

TOUCH

GOAL

Improve foot sensing for people with peripheral neuropathy

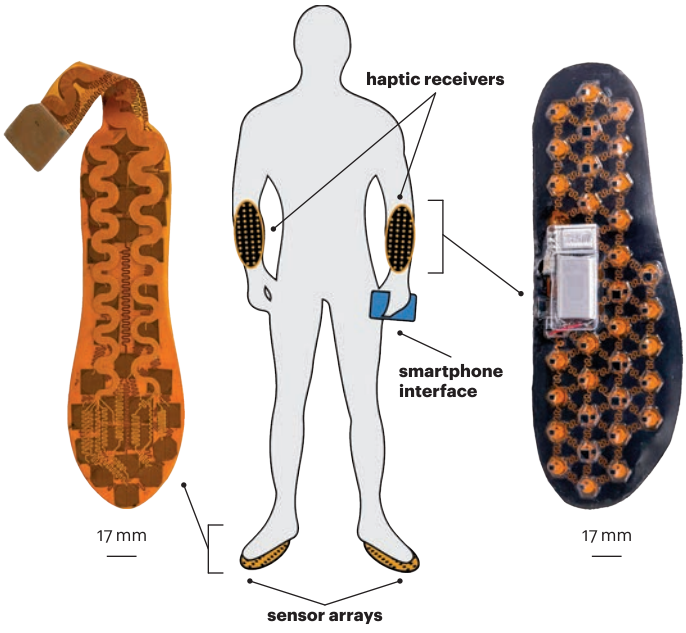
RESEARCHER

JOHN ROGERS

Louis Simpson and Kimberly Querrey Professor of Materials Science and Engineering, Biomedical Engineering and Neurological Surgery



Photos by Shane Collins



Professor John Rogers and his collaborators have developed pressure-sensing shoe insoles (left) that transmit real-time data to flexible haptic arrays (right) worn on the forearms, where patterns of vibration and heat recreate a sense of foot-ground contact through sensory substitution. The technology helps users with nerve damage learn how to feel their feet through their upper legs or forearms.

Sensations on the bottoms of human feet give people information about their environment, movements, and even balance. When nerves are damaged—whether from diabetes or stroke—diminished foot sensation can lead to more trips and falls.

Wearable sensor expert John Rogers wondered if he could combine the flexible sensor technology he's developed with miniaturized forms of haptic technology, which use tactile responses to give feedback to users. Such a system could help people with this sort of peripheral neuropathy sense the ground beneath their feet in a new way.

"For people who are unable to sense the pressure on their feet during normal walking and movement, we thought that we might be able to reproduce those patterns of pressure as tactile sensations on another part of the body, as a form of sensory substitution," Rogers says. "If we could build a soft, wearable technology to serve that purpose, then users might be able to effectively learn how to feel their feet through their upper legs or forearms, thereby enabling them to walk with more confidence and without risks of falling."

Working with researchers at the Shirley Ryan AbilityLab and the Georgia Institute of Technology, he and his team developed a shoe insole outfitted with an array of sensors that quantifies the pressure distribution on the foot in real time as users walk. That pattern of pressure is then wirelessly transmitted to actuators placed on a person's forearms or upper thighs.

Each actuator gives off a small vibration, which corresponds with pressure from different parts of the foot. That essentially allows users to feel on their forearms or upper thighs what they would normally feel on the bottom of their foot. When the device was tested on stroke survivors at the AbilityLab, users could translate the vibrations accurately within an hour or two.

"With this type of system, you don't need to look at your feet while you're walking," Rogers says. "You are free to walk normally, looking at your surroundings and perhaps having a conversation with a friend. Tests with patients showed that even a modest amount of training with these devices led to significant improvements in their gait and balance."

This sensory substitution technology goes beyond feet. Working with a veteran who lost his lower arm in combat, Rogers's team developed a system that included a robotic hand with an array of pressure sensors embedded into the fingers. Those sensors transmitted the information to haptic arrays mounted on his upper arm, giving him a sense of "touch" that allowed him to pick up and manipulate objects by "feeling" them on his upper arm. The device was so successful that he could pick up an eggshell without cracking it.

Next, the team will work to simplify the insole technology using fewer sensors and actuators to reduce the cost and complexity of the system without sacrificing its efficacy. They are also exploring other potential uses. "Adding this haptic capability across the wide range of sensors that we've already developed could profoundly increase the therapeutic value to patients," Rogers says.

MOBILITY

GOAL

Help wheelchair users drive with independence

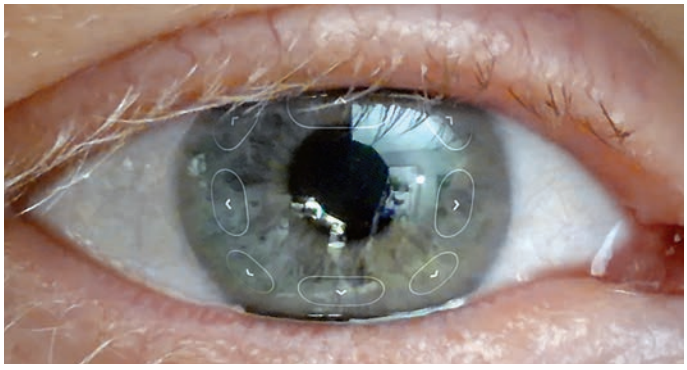
RESEARCHER

BRENNA ARGALL

Professor of Mechanical Engineering, Computer Science, and Physical Medicine and Rehabilitation

Principal Investigator of Project DRIVE







Wheelchair users steer through their environments using a variety of controls—including joysticks, head movements, and sip-and-puff switches. Yet each of these controls can only be integrated into most wheelchairs through one kind of proprietary cable.

Software and communication protocols developed by rehabilitation robotics expert Brenna Argall and her collaborators in Northwestern's Project DRIVE have made it easier to integrate any digital interface with wheelchairs. Project DRIVE focuses on wheelchair driving autonomy, accessibility, and independent mobility, and has produced the first-ever open-source wheelchair digital interface (WDI).

"With our WDI, you can use an Xbox controller to drive your wheelchair or even a USB clicker to indicate an emergency stop—any technology with a USB or Bluetooth interface," Argall says.

In September, Apple released a new accessibility feature leveraging the precise eye-tracking of Apple Vision Pro, empowering users of compatible alternate drive systems to control powered wheelchairs via the WDI using only their eyes.

"Apple Vision Pro users have the option to control a wheelchair with just their eyes, demonstrating how technology can expand independence for people with disabilities," Argall says. "The wheelchair digital interface is open source and accessible to anyone, so hopefully this will help the wheelchair industry adopt this as a standard."

The WDI was developed collaboratively by Project DRIVE with partners LUCI, a physical AI company that brings smart technology to powered wheelchairs, and LifeDrive Mobility, an alternative controls partner.

Supported with funding from the National Science Foundation, the Project DRIVE team hasn't stopped there: Argall's lab has developed an algorithm that will help users of wheelchairs equipped with LUCI's technology better avoid obstacles. Currently, these wheelchairs slow or stop when approaching an obstacle. The new algorithm would help the wheelchairs actively drive around obstacles. The researchers also are working to develop fully autonomous wheelchair driving on top of LUCI's deterministic safety layer.

"Most wheelchair users want to stay in control, but some users, such as those with late-stage ALS, want full autonomy in certain contexts," Argall says. "We keep pushing, because we know there's more we can do for wheelchair driving. We want people to have driving systems that meet their needs."

top Software and communication protocols developed by rehabilitation robotics expert Brenna Argall and her collaborators in Northwestern's Project DRIVE have made it easier to integrate digital interfaces with wheelchairs. Photo by Shane Collins.

middle Alternative drive controls, like Look to Drive for the Apple Vision Pro, allow users to direct powered wheelchairs using only their eyes. Image provided by Apple.

bottom An engineer from LUCI pilots a wheelchair using drive controls operated by eye movement. Photo courtesy of LUCI.

GOAL

Redefine how stroke survivors relearn to walk

RESEARCHERS

KEVIN LYNCH

Professor of Mechanical Engineering

Director of Northwestern's Center for Robotics and Biosystems

JOSE PONS

Scientific Chair at Shirley Ryan AbilityLab

Professor of Physical Medicine and Rehabilitation at the Feinberg School of Medicine

Professor of Mechanical Engineering (by courtesy)

DANIEL LUDVIG

Research Scientist at Shirley Ryan AbilityLab

Research Assistant Professor at the McCormick School of Engineering

LEVI HARGROVE

Scientific Chair of the Regenstein Foundation Center for Bionic Medicine at Shirley Ryan AbilityLab

Professor of Physical Medicine and Rehabilitation at the Feinberg School of Medicine

Professor of Biomedical Engineering (by courtesy)



Professor Kevin Lynch and his collaborators developed a first-of-its-kind rehabilitation system that virtually connects therapists and patients through robotic exoskeletons. The real-time connection allows therapists to respond to a patient's movements, adapting support as the patient's performance evolves. Photo courtesy of Shirley Ryan AbilityLab.

When stroke survivors relearn to walk, they often practice on a treadmill with their weight supported by a harness. A physical therapist helps them lift and move their affected legs.

In recent years, robotic lower-body exoskeletons that give users extra strength have emerged as a possible rehab tool. Robotics expert Kevin Lynch and his collaborators at the Shirley Ryan AbilityLab recognized that putting patients into exoskeletons alone wouldn't suffice—they would still need a physical therapist to guide them. But what if the therapist could guide them through their own separate exoskeleton?

Addressing that question, the team developed a new system called therapist-exoskeleton-patient interaction (TEPI), where both the patient and the therapist wear lower-body exoskeletons that are connected by virtual springs and dampers at the hips and knees. This enables the therapist to guide the patient's movements.



"By moving their own legs to help move the patient's legs, therapists have direct influence on the patient's joint motions, as opposed to trying to control joint motions by using their hands to push or pull a particular location on the leg."

Kevin Lynch
Professor of Mechanical Engineering,
Director of the Center for Robotics and Biosystems

"By moving their own legs to help move the patient's legs, therapists have direct influence on the patient's joint motions, as opposed to trying to control joint motions by using their hands to push or pull a particular location on the leg," Lynch says. "It's more intuitive for the therapist and also safer for the therapist long term, because they're not bent over in an unnatural position, manually moving the patient's legs."

Therapists can also calibrate the strength of the virtual connection, which creates more personalized rehabilitation experiences for each patient. "That personalization allows the therapist to apply their own judgment and expertise while leveraging state-of-the-art robotics," Lynch says.

The system was tested on stroke survivors at the AbilityLab. With TEPI, patients had higher muscle activation and typically reached step heights and lengths 30 to 50 percent greater than they had using conventional manual therapy. Patients also reported high levels of satisfaction with the therapy.

The next step is for Northwestern and the AbilityLab to validate the system with many patients. The goal is to give therapists another tool to help patients recover.

"This sort of innovation is possible with Northwestern's history of collaborative robot research and our close connection to the AbilityLab," Lynch says. "It's a big part of our mission and heritage."

EMILY AYSHFORD

SOCRATIC TESTING ENABLED BY AI

Faculty and students experiment with Northwestern-developed testing innovation designed to empower students to show what they know and professors to see it more clearly.



THE TEST IS ABOUT TO BEGIN. Students sit down at their computers. It's a familiar scene, yet the interaction about to take place between each student and the exam is revolutionary.

Rooted in ancient Greek teaching philosophy, a new Socratic testing technology enables faculty to gauge student comprehension through an AI-mediated, tailor-made conversational exam. Invented by Northwestern Engineering's Ilya Mikhelson, the software provides accurate and scalable insights into students' domain knowledge.

Like a one-on-one oral exam, the platform shapes the testing interaction in real time through a scaffolded dialogue between system and student. Mikhelson acknowledges that oral exams were his inspiration.

"Unstructured oral exams allow me to prompt, prod, and map out students' cognitive ceiling in a given topic, but the time and logistics that takes just aren't feasible, especially for a large class," says Mikhelson, Charles Deering McCormick Distinguished Professor of Instruction in the Department of Electrical and Computer Engineering. "And, while many students have interacted with computer adaptive testing, a computer-based examiner that can have an actual conversation with students was impossible until the current state of AI."

Testing the tester

In spring 2026, Mikhelson sought an opportunity for faculty and students to work together to evaluate and improve the software. David O'Neill, Charles Deering McCormick Distinguished Professor of Instruction of Biomedical Engineering, piloted the platform for a midterm exam in Fluid Mechanics (BMD_ENG 270), a required core curriculum course for all biomedical engineering undergraduates. Participating in the pilot was optional for students. Two weeks before the exam, he introduced his class of 66 students to the system's standard exam mode, presenting a live demo of its organic, personalized conversation.

Mikhelson's Socratic tester begins with low-cognitive-load questions and incrementally raises complexity with guided help along the way. The test's content and scope draw on relevant training data—lecture notes, past exams, problem sets—while instructors set guardrails through custom directions or constraints tied to their specific learning objectives. In evaluating student answers, the system is instructed explicitly to disregard spelling, sentence structure, abbreviations, or slang.



"IT IS EXCITING TO SEE FACULTY AND STUDENTS EXPLORING THE POSSIBILITIES OF NEW TESTING APPROACHES ENABLED BY AI. WHILE THE PLATFORM IS ENABLED BY AI, THE JUDGMENT, MENTORSHIP, AND HUMAN CONNECTION OUR FACULTY MEMBERS BRING TO ASSESSING LEARNING REMAIN AT THE CENTER OF HOW WE EVALUATE OUR STUDENTS."

Karen Smilowitz Associate Provost for Undergraduate Education,
James N. and Margie M. Krebs Professor of Industrial Engineering and Management Sciences

Seeking a solution, Mikhelson coded a Socratic-inspired testing platform and then partnered with the Office of the Provost to pilot the prototype in three courses in biomedical engineering and civil and environmental engineering during spring quarter 2026. The initial results, including faculty and student feedback, were promising.

Most students thought the system accurately interpreted their responses and pushed them appropriately when their answers were incomplete. Similarly, course instructors reported that the system efficiently broke down complex concepts, pushing students to articulate their reasoning rather than relying on rote memorization or factual recall.

"It is exciting to see faculty and students exploring the possibilities of new testing approaches enabled by AI," says Karen Smilowitz, associate provost for undergraduate education and James N. and Margie M. Krebs Professor of Industrial Engineering and Management Sciences. "While the platform is enabled by AI, the judgment, mentorship, and human connection our faculty members bring to assessing learning remain at the center of how we evaluate our students."

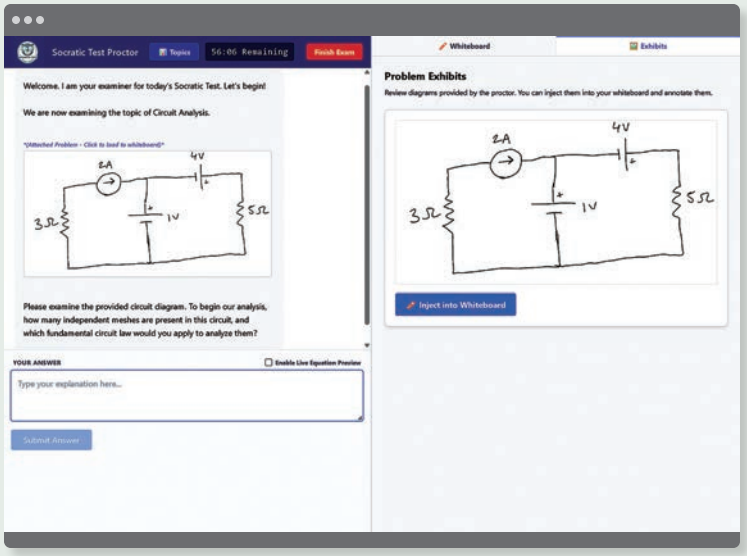
In O'Neill's course, students also had unlimited access to the platform's asynchronous practice mode, a study tool that provides detailed formative feedback on each interaction, to prepare for the midterm.

During the live exam, as a safeguard against AI hallucination, students were authorized and encouraged to challenge the tester if they identified an error or if a question posed by the system was out of bounds. The system accepted the student's assertion, flagged the interaction for audit by the instructor, and pivoted to a new question.

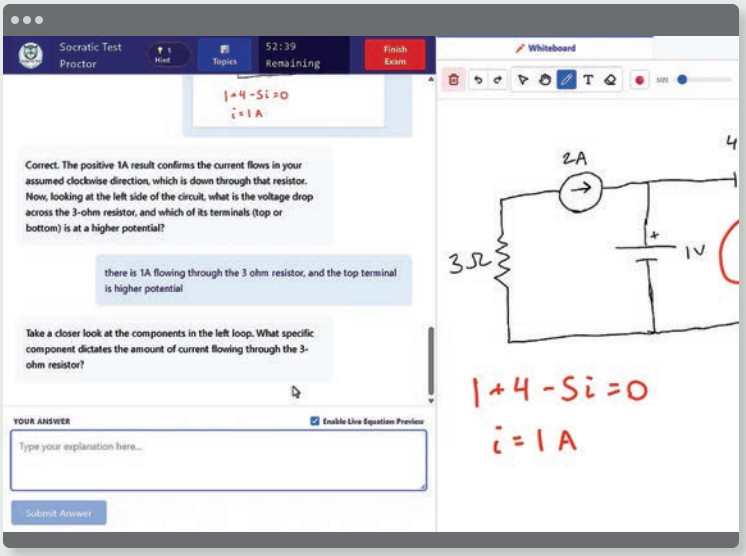
That is what happened with Nathan Miller, who is studying biomedical engineering and integrated science. Confident after extensive practice, he pushed back during the midterm, defending his approach to solving a problem. The system acknowledged the miscommunication and moved on.

Compared to traditional exams with similar stakes, Miller reported significantly reduced stress and anxiety during the midterm using the Socratic testing platform. Overall, a majority of students surveyed after the spring pilot also reported lower stress levels.

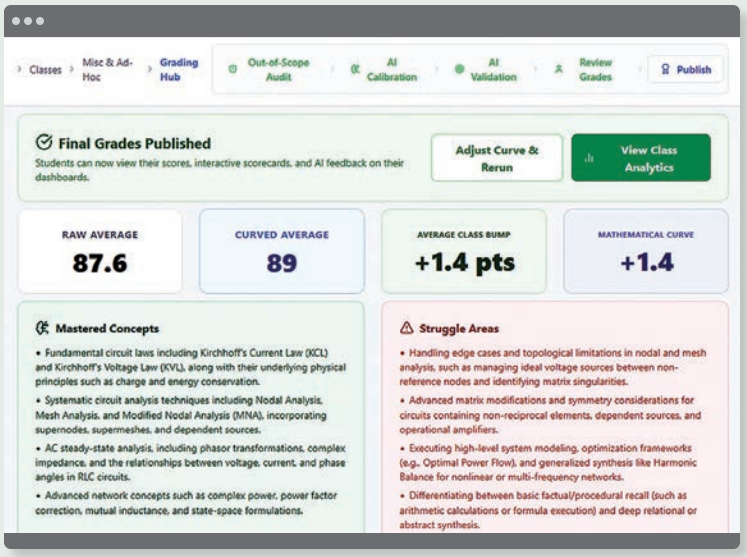
opposite Photo by Jason Brown



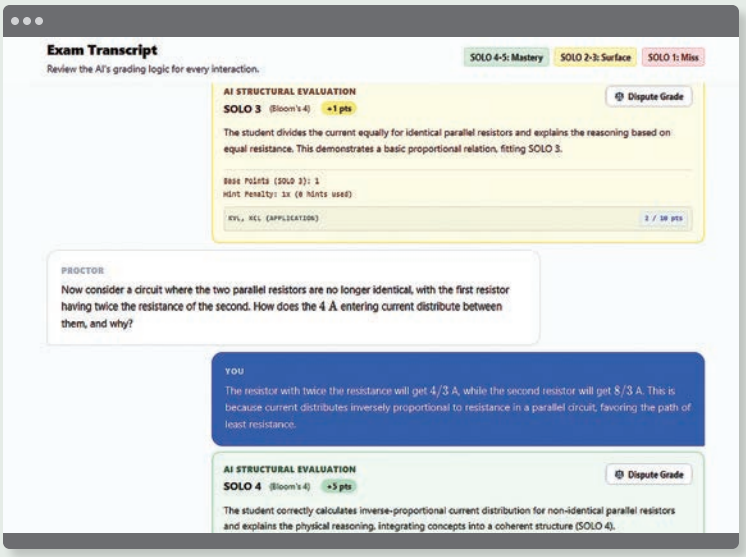
1
Because a text-based chat is often insufficient to evaluate highly complex, spatial, or mathematical skills, the tester interface includes several optional workspaces such as a whiteboard, drafting grid, integrated development environment for coding, a calculator, and reference materials like the periodic table. During the midterm exam, O'Neill's students used portable graphics tablets to write freehand, including annotating technical diagrams and formulating problems with handwritten calculus.



2
The testing interface shapes the testing interaction in real time through a scaffolded testing dialogue between system and student. When a student struggles, the system employs a graduated approach starting with a general nudge, as reflected in this example.



3
Based on their own scoring configuration, instructors receive detailed reports with diagnostic feedback arriving through an analytics dashboard featuring a topic-by-topic cognitive mapping of where students demonstrated subject mastery and where they struggled.



4
Once the instructor posts grades, students receive a fully marked-up transcript including point values and feedback for every response. If they disagree, they can launch an appeal directly through the platform for faculty review.

Get a tour of the Socratic testing platform.



"By recruiting classes across disciplines—from theoretical to applied, interpretive to convergent—I aim to test the universality of this system's ability to provide insights that advance deep learning."

Ilya Mikhelson Charles Deering McCormick Distinguished Professor of Instruction

"The tester really did a good job giving me layered questions, allowing me to fill in what I knew and ask for help when I fell short. I felt like I had a fail-safe if I got really stuck," Miller says. "This was such a positive experience, but it was also the first version of the software, so I'm excited to see how it can grow."

O'Neill graded each student's midterm transcript by hand and found that it helped students demonstrate integrated understanding and accurately compared their conceptual physics mastery against their mathematical fluency.

"It felt a much truer balance of what I wanted students to come away from Fluid Mechanics being able to do and understand," says O'Neill, who is also Michael Jaharis Director of Experiential Learning and associate director of the Northwestern Center for Engineering Education Research.

Mikhelson's Socratic tester was also piloted during the spring in Medical Devices, Disease & Global Health (BMD_ENG 380) and Structural Art (CIV_ENV 220). In fall quarter 2026, Mikhelson is fully integrating and evaluating the platform's human-in-the-loop grading pipeline.

Activating the test's evaluation framework

- Mikhelson designed the tester first to dictate the learning objective of each exam prompt based on the six cognitive skills of Bloom's Taxonomy—remember, understand, apply, analyze, evaluate, create. The system then applies a separate framework called the Structure of the Observed Learning Outcome (SOLO) taxonomy to measure the structural quality and complexity of the student's response.
- Instructors configure specific point capacities for both the Bloom's levels and the SOLO evaluation. During the exam, students gain points as they demonstrate evidence of knowledge.
- When an exam is over, instructors review any interactions students flagged as out of bounds. Confirmed cases are struck from every student's record for that question. For each student, Mikhelson's tester predicts a SOLO level and ambiguity score for each interaction, then sends 15 edge-case interactions to the instructor for manual review and ranking.
- Using an instructor's calibrated examples, the system analyzes a new, random set of ten interactions, and the instructor independently grades the same interactions. If the alignment is weak, the disagreements are used for recalibration, and the validation process repeats until there is strong agreement between the professor and the platform. When alignment is achieved, the system reviews the tests en masse, evaluating individual responses using the full conversational context of the exam transcript. Instructors then review the full analysis and flag any issues for recalibration and the cycle resumes.

"I want the grading process to be completely transparent for students," Mikhelson says.

- Once the instructor posts the grades, students receive a fully marked-up transcript including point values and feedback for every response. If they disagree, they can appeal directly through the platform for faculty review.
- Instructors receive detailed reports as well, with diagnostic feedback arriving through an analytics dashboard with a topic-by-topic cognitive mapping of where students demonstrated subject mastery and where they struggled.

Widening the conversation

Mikhelson is continuing to iterate and refine the tester in collaboration with an interdisciplinary research team that includes O'Neill; Jacob Kelter ('15, PhD '25), director of NetLogo and an alumnus of the Computer Science and Learning Sciences doctoral program; and Almaz Mesghina, assistant professor of instruction in psychology.

The team's plans include rigorous testing of the platform in several fall quarter 2026 courses. In addition to Mikhelson's Intro to Electrical Engineering (ELEC_ENG 202), other courses chosen for testing include Communications Systems (ELEC_ENG 307), Human Physiology (BIOL_SCI 310), Structural Steel Design (CIV_ENV 323); and First-Year Seminar: Mental Health Diagnosis and Treatment: Psychological and Economic Themes (PSYCH 101). Testing will be followed by a formal study of the software to analyze whether this testing technology helps professors accurately and equitably gauge deep understanding as compared to traditional tests.

"By recruiting classes across disciplines—from theoretical to applied, interpretive to convergent—I aim to test the universality of this system's ability to provide insights that advance deep learning," Mikhelson says.

MICHELLE MOHNEY

BUILDING BIG IDEAS

How Northwestern's entrepreneurial ecosystem helped the founders of computer-vision technology startup HaptE find their focus

When Trevor Abbott ('26) arrived at Northwestern, he knew he wanted to build something big. He'd grown up among ambitious thinkers: his father was an adjunct faculty member; his brother, an alum, is CTO of Acorn Genetics, a Northwestern-born startup. So, when Trevor met fellow mechanical engineering student Victoria Israel ('26) at a Wildcat Welcome event, he knew he'd met a kindred spirit.

"I felt a fire inside of me," Israel says. "I wanted to do something beyond school, beyond clubs."

The two were ready to create a business. The only question was which problem to solve.



"NORTHWESTERN INCREASINGLY ATTRACTS **ENTREPRENEURIAL STUDENTS** WHO WANT TO **EXPLORE IDEAS**, **TAKE INITIATIVE**, AND **LEARN FROM EXPERIENCE**."

Hayes Ferguson
Endowed Director of the Farley Center for Entrepreneurship and Innovation

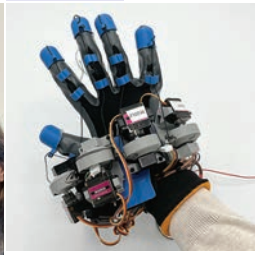
A home for explorers

Entrepreneurial ambition is a common story at Northwestern, according to Hayes Ferguson, endowed director of the Farley Center for Entrepreneurship and Innovation.

"Northwestern increasingly attracts entrepreneurial students who want to explore ideas, take initiative, and learn from experience," Ferguson says. "We see many students like Trevor and Victoria who make thoughtful use of multiple opportunities through the Farley Center, The Garage, and elsewhere in the University's vibrant entrepreneurship ecosystem. It's exciting to see how they continue to build on the foundation they gained at Northwestern throughout their careers."

Northwestern's entrepreneurship ecosystem includes opportunities for students to connect with like-minded founders and mentors and access resources such as incubators, classes, fellowships, and funding. Spread across multiple programs and schools, this ecosystem also enables students from diverse academic areas and backgrounds to plug in at any stage.





Trevor Abbott ('26) and Victoria Israel ('26) created a haptic technology digital sensing glove that first was designed for virtual reality gaming then pivoted to physical therapy applications.

Starting with a haptic glove

Abbott and Israel took full advantage of the ecosystem's offerings. In their second year at Northwestern, they had homed in on their first product idea.

The spark came to Israel early one summer morning when she stumbled on a video essay about how a software update to the virtual reality game *Half-Life: Alyx* might make the game feel dramatically more real through VR gloves.

"I thought, what if you took it further?" Israel says. "What if you created a glove that allowed you to feel things digitally outside of gaming?"

As an international student missing the feeling of hugging her parents or petting her cat back home, the idea felt personal. She pitched the haptic glove idea to Abbott. The two named their startup HaptE, short for haptic electronics, and began prototyping.

They refined their idea during Jumpstart, a 10-week accelerator at The Garage, Northwestern's cocurricular space and community for student entrepreneurs. Early on, they discovered similar haptic gloves already existed in the gaming space, prompting a rethink. After interviewing hundreds of people from various industries, they discovered a new direction.

"There were many problems in the physical therapy space, and a lot of them could be solved by our glove," Israel says.

But they soon hit a wall. Potential physical therapy customers wanted clinical studies proving the glove's therapeutic outcomes, which experts warned could take five to 10 years. As students approaching their third year and hoping to have something to launch by graduation, that timeline was not workable. It was time to look elsewhere.





above HaptE affixes AI-powered cameras and small computers onto forklifts that move across warehouses. HaptE's cameras read labels and track products as they move across a warehouse floor, and the computer alerts warehouse administrators of errors and inventory status in real time. Photo courtesy of Trevor Abbott and Victoria Israel.

right Abbott and McGinley ('28) won the $100,000 grand prize at the 2026 VentureCat, Northwestern's annual student startup competition. Photo by Joel Wintermantle.

Finding a new problem

The answer came through the Northwestern network. The team attended a talk at McCormick given by Tom Wagner, CEO of warehouse robotics company Berkshire Grey. Afterward, the team spoke to him, told him about their device, and asked for advice. When they described their technology, Wagner told them it could be valuable for logistics.

Abbott was hooked. Israel, comparing the timeline in physical therapy with what Wagner described in logistics, saw the opening, too. "That's an interesting tangent we could explore," she said.

The duo spent the following months visiting manufacturing and logistics warehouses. They learned that most manufacturing facilities operate with a certain picking error rate—when workers select the wrong items during fulfillment—which can add up to significant losses in revenue. Confronted with a compelling problem, they turned to the Farley Center and dug in on finding potential solutions.

Zeroing in

During the summer of 2025, Abbott and Israel participated in the Farley Center's Morehead Family Innovator Fellowship, a 10-week, full-time program funded in part by a donation from Jennifer ('00, MBA '08) and Brad Morehead (MBA '05). The program's $6,000 stipend meant the cofounders could spend the summer working on HaptE instead of pausing their efforts to earn income in an unrelated job.

That's the gap the fellowship aims to close. "We hear too often from students who are making progress on a venture that they have to slow down over the summer to get an income-producing job that's not tied to what they really want to do," says Ferguson.

The major value of the fellowship was the dedicated time spent in warehouses conducting customer interviews and the weekly check-ins with Ferguson. She offered feedback, accountability, and connections, including an introduction to Farley Center advisory board member Mark Desky ('88, MS '90). Desky, an early marketer at Groupon, guided the students on messaging development.

During the fellowship, the team had a meeting that would finally define the company's mission. At the Chicago warehouse of Element Bars, a custom energy- and protein-bar company, they pitched company leadership an idea: a camera mounted on a forklift that could watch inventory move across a warehouse floor and catch costly errors in real time.

Their idea was well received, and "that's when modern-day HaptE was born," Abbott says.

Now an optical intelligence technology startup, HaptE uses forklift-mounted custom cameras, computer vision software, and an operational dashboard to track what happens on warehouse floors.

"THE ONE WORD I WOULD USE TO DESCRIBE **NORTHWESTERN IS SUPPORT**. IT WAS ALWAYS THERE FOR US, AND I KNOW THAT IT'S STILL THERE FOR US TODAY."

Victoria Israel '26



The future of HaptE

The HaptE team has continued to evolve. In January 2026, shortly after Israel moved on to another opportunity, Quinn McGinley ('28), a rising third-year mechanical engineering student, met Abbott and joined HaptE as COO.

McGinley says Abbott's approach to HaptE aligns with his values. "The way Trevor thinks about this industry clicked for me. He spent so much time in warehouses absorbing as much as possible from that customer base. It told me this is a founder who really cares about deeply understanding the problem he is working on."

With McGinley on board, the HaptE team took advantage of yet another Northwestern opportunity and won the $100,000 grand prize at the 2026 VentureCat, Northwestern's annual student startup competition. The nondilutive money, Abbott says, means HaptE can keep building without giving away equity, a marked advantage over the typical venture capital route. As they look toward the future, the HaptE team aims to expand nationally, adapt their technology to warehouses of various sizes and types, and grow their team.

Help from the Northwestern network "has allowed the company to spread its wings," says Abbott. "That's what happens when a Northwestern Wildcat takes advantage of what the school has to offer."

"The one word I would use to describe Northwestern is support," Israel says. "It was always there for us, and I know that it's still there for us today."

ERICA MASINI



Photo by Jason Brown

THE POWER OF NUVENTION

Many Northwestern student startups begin in Farley Center NUvention courses. In class, interdisciplinary student teams work through the full startup lifecycle—from ideation, customer discovery, and business modeling to final pitches—with support from industry experts and faculty. Here are two notable recent examples.

HydroFlo

The idea A smart catheter technology to monitor shunt flow and detect shunt failure in hydrocephalus, a chronic neurological condition

The origins This startup began as a class project in NUvention: Medical, led by faculty from McCormick, the Kellogg School of Management, and the Feinberg School of Medicine.

The evolution Cofounders Rishi Garg (McCormick '27), Viet Tong (McCormick '27), and Eva Poliakova (Weinberg '27) enrolled in NUvention: Launch for another 10 weeks of development, mentored by Professor Lilli Zakarija, a medical device company founder. Simultaneously, the team incubated at The Garage and entered VentureCat in 2026, where they took second overall and first place in the competition's Life Sciences and Medical Innovations track, earning $50,000.

Restless

The idea An energy drink aimed at military members and first responders

The origins Founder Daniel Medina (MBA '27), a Marine Corps veteran, arrived at Kellogg already building the company. Drawn to Northwestern's founder community, he enrolled in the Jumpstart program at The Garage with his partner, economics student Jack Easterby ('28).

The evolution Medina took NUvention: Launch, which he credits with helping the team narrow their audience from "everyone who works hard" to a more specific customer segment. The team won first place at Jumpstart Demo Day and the 2026 VentureCat third-place prize of $25,000 along with the Audience Favorite Award of $5,000. Easterby, now Restless's vice president of marketing, also participated in the 2026 Morehead Family Innovator Fellowship.

LAB TOUR

In the field of synthetic biology, where biological systems are engineered to serve new and useful purposes, advancing ideas from imagination to reality requires building, testing, and iterating quickly.

THE BIOFOUNDRY AT THE CENTER FOR SYNTHETIC BIOLOGY

OPENED IN OCTOBER 2024, the BioFoundry at Northwestern's Center for Synthetic Biology provides tools to rapidly assemble DNA, engineer microbes, and run large numbers of experiments in parallel. Combining automated laboratory instruments with specialized software for data analysis, the BioFoundry helps scientists test more ideas, generate larger datasets, and move discovery forward faster.

The lab is led by director Josh Leonard, professor of chemical and biological engineering and (by courtesy) biomedical engineering, and codirector Arthur Prindle, associate professor of chemical and biological engineering, (by courtesy) biomedical engineering, and biochemistry and molecular genetics in the Feinberg School of Medicine. It is managed by scientist Lauren Clark.

1. Opentrons Flex Robotic Liquid Handler

This system automates one of the most common laboratory tasks: moving small amounts of liquid between containers. Researchers can program the system to perform these repetitive procedures with speed and precision, reducing human error while improving efficiency, consistency, and reproducibility across a broad range of experiments.

2. Echo 655 and Echo 525 Acoustic Liquid Handler

Rather than using pipette tips, this instrument uses sound waves to move tiny droplets between wells without physical contact. Operating at the nanoliter scale, it can transfer volumes as small as a few thousandths the size of a raindrop, enabling researchers to run hundreds or even thousands of experiments simultaneously using far less material. This increase in experimental throughput enables scientists to explore combinations of conditions, variables, and designs that would be impractical with conventional laboratory methods.

Explore the BioFoundry's technologies, capabilities, projects, and offerings on the facility's website.

3. Sony Cell Sorter

Also called a flow cytometer, the cell sorter helps researchers find and isolate rare cells from large populations. The instrument analyzes one cell at a time as it passes through lasers that detect properties such as fluorescence. Based on those signals, the sorter separates cells into different groups, helping researchers identify the few among millions that can successfully perform a desired function. The system supports everything from bacterial to human-cell experiments and uses interchangeable components that reduce the risk of cross-contamination.

4. MiSeq i100 High-Throughput DNA Sequencer

This sequencer can read thousands of DNA sequences simultaneously, enabling researchers to quickly identify and measure the biological components present in complex samples. Scientists can determine which organisms, genes, or genetic changes are present and how abundant they are, providing a detailed snapshot of what is happening inside a biological system.

5. AMBR 250 Eight-Way Parallel Bioreactor

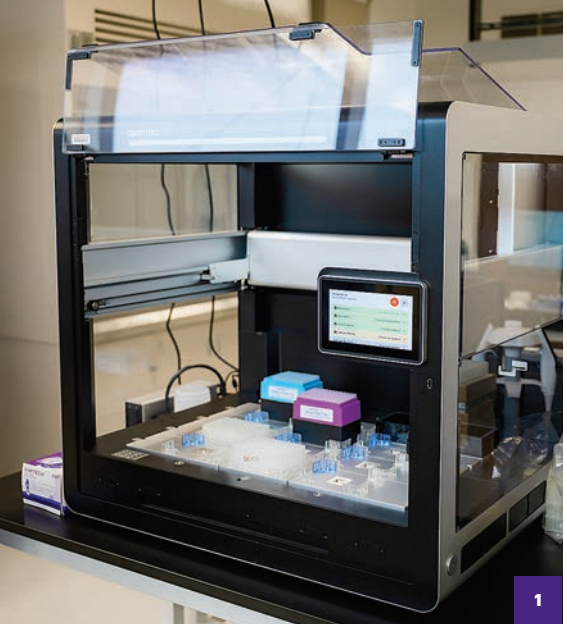
Researchers can grow and monitor up to eight cell cultures simultaneously under tightly controlled conditions in this parallel bioreactor. The system automatically regulates factors such as oxygen levels, pH, and temperature, allowing researchers to compare different cell or microbial designs side by side and identify top performers or most advantageous growth conditions. The instrument also helps bridge the gap between laboratory discovery and larger-scale production.

6. Two MP Auto Mass Photometer

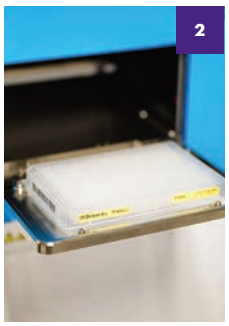
One of the lab's newest technologies, this instrument uses light to measure the mass of individual molecules and molecular complexes. Researchers can determine what subpopulations are present in different forms and assess the quality of advanced therapeutics, including antibodies, nanoparticles, and gene-delivery vectors by identifying which particles are fully assembled and which are not.

BRIAN SANDALOW

Photos by Jason Brown

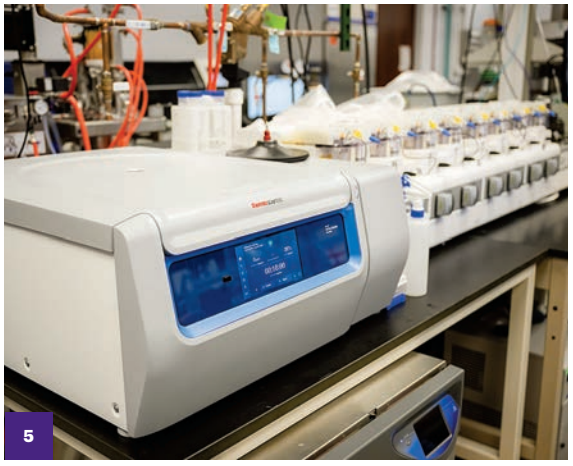
















LEADING THE NATION IN ACCELERATING BIOTECHNOLOGY DISCOVERY

Currently, the resources of the Center for Synthetic Biology's BioFoundry are available only to Northwestern, its collaborators, and local startups and biotech companies. However, the National Science Foundation recently awarded the University $20 million over four years to expand the lab's experimental throughput capability and open access to the lab's protein engineering expertise for researchers across the country.

Housed within the BioFoundry, the AI-Driven, Rapid, Experimental Automation Machine (DREAM) Cloud Lab for Protein Engineering will serve as the first national resource for accelerating the development of new medicines, sustainable materials, agricultural technologies, and other biotechnology innovations. Researchers will be able to design and run experiments remotely, access advanced scientific instruments, and leverage shared data and AI models to speed discovery.

Julius Lucks, Margery Claire Carlson Professor of Chemical and Biological Engineering, will serve as principal investigator. Coprincipal investigators include Danielle Tullman-Ercek, James N. and Nancy J. Farley Professor in Manufacturing and Entrepreneurship, chair and professor of chemical and biological engineering; and Han Liu, Orrington Lunt Professor of Computer Science at the McCormick School of Engineering and professor of statistics at the Weinberg College of Arts and Sciences.



The Magic Behind the Music

Fatemeh Pishdadian mixes her expertise in computer science with her passion for music in her work as an audio machine learning and digital signal processing engineer at Apple.

As an undergraduate student in Iran, Fatemeh Pishdadian's (PhD '20) interest in engineering sparked a curiosity about how systems work. That curiosity led her to computer science, which became a passion.

Pishdadian already had another passion: music. From an early age, she played piano and sang in a choir. "I had a conflict between these two worlds, super technical and musical," she says. "I wanted to find an interdisciplinary program that reconciled audio music processing and engineering."

Her desire to combine these two disciplines eventually led her to Northwestern.

After earning a bachelor's degree in electrical engineering at Ferdowsi University of Mashhad in Iran, Pishdadian came to the United States to pursue a master's degree in electrical and computer engineering at George Mason University. While there, she worked on audio processing and automatic music transcription.

When she learned about Northwestern's Interactive Audio Lab, she knew it was the perfect place to pursue her PhD. Led by Professor Bryan Pardo, the lab invents technologies that transform how people generate, authenticate, manipulate, separate, hear, and understand sounds, with a focus on music and speech.

"Professor Pardo is a musician and a computer scientist, and many of the people working in the lab played instruments," she says. "They were brilliant computer scientists, and all the research was about music signal processing. I've always been at the intersection of electrical engineering, computer science, and signal processing. It was a very long journey, but for me, the lab was home."

In the Interactive Audio Lab, Pishdadian's work focused on isolating different audio streams from a recording—a single voice in a crowded café or the sound of a violin in an orchestral piece. "That kind of problem always fascinated me," she says. "I remember a lot of very cool, stimulating discussions with Professor Pardo and my lab mates. It gave me the best kind of collaboration and environment to think about this problem and dig into it."

During her time at Northwestern, Pishdadian also became interested in audio perception, auditory systems, hearing health, and psychoacoustics, the study of how humans perceive sound. Today, she continues that work at Apple, where she is an audio machine learning and digital signal processing research engineer. In her role, she develops audio processing and speech enhancement algorithms for hearable devices using signal processing and machine learning techniques.

Pishdadian enjoys the hands-on, problem-solving nature of coding and algorithm design. "When you put your headphones on and use noise cancellation or when you talk on the phone and your speech quality is enhanced—these are examples of different audio processing algorithms that are part of everyday technology," she says. "With anything that has microphones and speakers, there is some magic going on behind the scenes."

From distinguishing different streams of audio to separating speech from noise, Pishdadian continues to build on the research that fascinated her at Northwestern, leading her into new areas of discovery. "Every day, new tools are emerging, and it keeps you busy," she says. "I enjoy learning. In computer science and in machine learning in particular, it's just ongoing."

SARA LANGEN



ENGINEERING A PATH TO THE C-SUITE

ALANNA COTTON'S COLLABORATIVE APPROACH TO LEADERSHIP WAS FORGED AT NORTHWESTERN.

Over more than 30 years steering global consumer brands, Alanna Cotton ('96) has forged a leadership philosophy built on inclusivity and collaborative problem-solving—one she traces directly to her engineering training at Northwestern.

"The Northwestern experience was really about teaching us students how to solve complex problems with creativity and collaboration," Cotton says. That collaborative approach has carried through her career, animating how she mobilizes teams, divisions, and entire organizations toward a shared outcome. "What that means is everyone gets involved in helping the company, the division, the team, the product move to the next level," she says, noting that each team member brings a unique perspective.

As a Northwestern student, Cotton served as a counselor for the University's Minority Engineering Opportunity Program (MEOP), where she fondly recalls first developing her leadership and mentorship skills. She graduated from Northwestern with a bachelor of science in environmental engineering.

The leadership philosophy rooted in collaboration that Cotton developed at Northwestern anchored her through the most consequential chapters of her corporate career. As president and chief business officer of Ferrero North America, she commanded a workforce of 6,000 across the United States, Canada, and the Caribbean, orchestrating the integration of major acquisitions into the company's operations—a feat requiring not just strategic clarity, but the careful alignment of newly merged teams around a common vision.

Before Ferrero, as president of operations for Central and Eastern Europe at Coca-Cola, Cotton helped spearhead a sweeping portfolio transformation, navigating hard trade-offs to grow and sustain brands under resource constraints.

At Samsung Electronics America, as senior vice president and general manager, she helped pivot the smartwatch category from communication-first to health-focused, while overseeing hundreds of product launches a year, from virtual reality devices to personal computers to tablets. "That was one of the most fun times of my career, blending technical know-how with innovation and leadership skills," she says.

In her first role after graduating from Northwestern, Cotton served as a team leader at Procter & Gamble before earning an MBA at Stanford University and holding leadership roles at PepsiCo.

Today, her collaborative approach leans heavily into mentorship in her latest chapter as founder and CEO of CorARC Ventures. There, Cotton advises and invests in owners and founders driving the next phase of growth for their companies—channeling her three decades of operating experience into helping other leaders scale. "It's all about helping others realize their dreams," she says.

Across every chapter, Cotton says the constant has been Northwestern's emphasis on solving complex problems collaboratively—a skill that has outlasted any single technical specialty. "It has led me to the C-suite, and now to build CorARC Ventures," she says.

Cotton also serves on nonprofit boards, alongside her enduring loves of reading and biking around Dallas–Fort Worth.

To current Northwestern students and recent alums, Cotton advises them to take full advantage of a Northwestern education, inside and outside the engineering classroom. "Engineering is not done in a vacuum," she notes. "It's about solving real-world problems to make the greatest impact." And collaboration, she says, is the key.

"The Northwestern experience was really about teaching us students how to solve complex problems with creativity and collaboration."



INVESTING IN PEOPLE

MICHAEL CHUNG REFLECTS ON A CAREER IN GLOBAL FINANCIAL SERVICES AND HIS PASSION FOR HELPING OTHERS ACHIEVE MEANINGFUL SUCCESS.

MICHAEL CHUNG ('01) has spent his career investing in markets. He says the investments that have mattered most have been those made in community and people. Now global cohead of equities at Millennium Management, a global, diversified alternative investment firm, he goes on to highlight the role others have played in his achievements.

It all began with a phone call at Northwestern. Chung was a second-year student when the landline phone in his room rang unexpectedly at 8 a.m. and his roommate urgently woke him to take the call. Little did he know that the call would connect him to a lifelong mentor and open the door to an internship at a global financial services firm and a career in an industry he loves.

Chung's path took him through Tokyo, Hong Kong, New York, and eventually London, where he helped to lead a trading unit of Deutsche Bank that later spun out to become a multistrategy hedge fund firm called Arrowgrass Capital Partners. Ultimately he relocated to New York City, where he lives today. In 2015, the same mentor who had given Chung a chance as an intern recruited him to his current role at Millennium Management.

"One of the best things that has come from Northwestern is the friendships and the community that's been born from it," Chung says.

GROUNDED IN INDUSTRIAL ENGINEERING

The foundation of Chung's expertise was set when he was an industrial engineering major at Northwestern. Amid the problem sets, Professor William White was among the first to show him how academic theory connects with the real world of business.

"He had a special way of integrating real-world problems and opportunities with the classroom. It showed me how the lessons could be impactful and meaningful down the road. He made learning fun," Chung says, adding that industrial engineering, a major Chung describes as interdisciplinary and collaborative, is "about designing a process that maximizes potential outcomes as opposed to guaranteeing certainty to a specific outcome."

It's a lesson Chung applies to his daily work, where he helps to manage one of the largest equities businesses in the industry. "The thinking behind designing and optimizing complex systems that involve machines, data, and human and financial capital is very much applicable to designing and optimizing an investment and risk management process and platform," he says.

After years of professional experience in the financial services industry, Chung felt something was missing. "I realized life wasn't just about financial results, that I cared about the positive impact I can have on my people—my family, friends, colleagues, and the community around me," he says. "I found real purpose and joy in investing in others and witnessing lives and communities change before my eyes."

"I've been incredibly fortunate to have the people and opportunities Northwestern has brought into my life. Giving back and investing in others is one small way I can express that gratitude, and I hope others will find their own way to stay connected and join me in serving the community at Northwestern."

Today, Chung's ambition to give back drives him forward. He serves on the Leadership Council for Apex for Youth, an organization that supports Asian American youth from low-income backgrounds by offering them mentorship and access to critical resources. The organization honored Chung for his leadership, advocacy, and commitment at the 2026 Inspiration Awards Gala, where he was introduced by Olympic gold medalist Eileen Gu.

Chung has also found community by partnering with Michelin star chefs to create a restaurant group that currently owns and operates five restaurants in four states, with a couple more on the way. "It's been fun and meaningful to be able to support talent not just in the office, but also outside the office and be just a small part of a chef's dream come true," Chung says.

His passion for supporting creative talent has led him to endeavors beyond food service, including a business partnership with award-winning, multihyphenate artist Pharrell Williams.

BRINGING IT HOME TO NORTHWESTERN

Though it's been a long journey since college, Chung looks back on his time at Northwestern with deep gratitude. That gratitude has inspired him to give back, including through his service on the McCormick Advisory Council.

"I've been incredibly fortunate to have the people and opportunities Northwestern has brought into my life. Giving back and investing in others is one small way I can express that gratitude, and I hope others will find their own way to stay connected and join me in serving the community at Northwestern."

For current students looking ahead to their own career paths, Chung says, "You won't always know where your career will take you, and that's okay. Stay curious, invest in the community around you, and be open to where your relationships and life's adventure may take you."

JULIANNE BECK

IN MEMORIAM


Isaac M. Daniel


Ming-Yang Kao


Lyle F. Mockros


Arthur Hurter


Dan Brown


John Rudnicki

PROFESSOR EMERITUS ISAAC M. DANIEL

Isaac M. Daniel, professor emeritus of civil and environmental engineering and mechanical engineering, passed away September 3, 2026, at age 92.

Daniel's research focused on experimental mechanics and composite materials. He pioneered test methods for characterization of these materials and developed the Northwestern Theory, a framework for understanding and predicting failure in composite materials subjected to complex stresses.

PROFESSOR EMERITUS MING-YANG KAO

Ming-Yang Kao, professor emeritus of computer science, passed away on May 11, 2026. He will be remembered for his contributions to the field of theoretical computer science.

He was an expert in discrete algorithms and combinatorial optimization. His research included work on DNA self-assembly, variants of the classic traveling salesman optimization problem, and graph labeling problems.

PROFESSOR EMERITUS LYLE F. MOCKROS

Lyle F. Mockros ('56, MS '58), professor emeritus of biomedical engineering and chemical engineering, passed away at the age of 92 on May 6, 2026.

He was known for his contributions to the field of fluid dynamics of natural and artificial organs. He served as the first chair of the Biomedical Engineering Division, which laid the groundwork for the department.

PROFESSOR EMERITUS ARTHUR HURTER

Arthur P. Hurter Jr. ('56, MS '58, PhD '62), a professor emeritus of industrial engineering and management sciences, passed away May 5, 2026, at age 93.

The longest-serving chair of the department, Hurter will be remembered for his important academic contributions and his mentorship of students. During his tenure, he published extensively and helped the department grow into one of the nation's most respected industrial engineering programs.

PROFESSOR DAN BROWN

Dan Brown (MS '05), clinical professor at the Segal Design Institute, passed away on September 15, 2026, at age 70.

Brown will be remembered for championing his "Differentiation by Design" approach to innovation and for translating decades of experience as an inventor, entrepreneur, and patent holder into a practical design education that shaped Segal students.

PROFESSOR EMERITUS JOHN RUDNICKI

John Rudnicki, professor emeritus of civil and environmental engineering and mechanical engineering, passed away October 4, 2026, at age 75.

Rudnicki studied how geological materials deform, fracture, and fail, and how those processes are influenced by fluids. His work helped advance understanding of fault instability, the energy released by earthquakes, and problems in environmental and resource-related geomechanics.

Edward E. Westbrook '49, '52
Donald A. Dobson '50, '55
Gilbert A. Harter '52, '54
Leroy H. Busker '53
Robert L. Barlament '55
Charles I. Beatty '57
John C. Even Jr. '57, '59
Thomas G. McBride Jr. '57
Patricia Ludeman Castro '59
Louis A. Povinelli '59
Frederic M. Schweiger '59
Kenneth R. Johnson '60
John H. Sand '60
Charles J. Scott '60, '62
Raymond D. Carlson '61
Roger C. Mathus '61
Rodger W. Murtaugh '61
David C. Smith '61, '64
David Colson '62, '64
William L. Sjogren '62
Raymond W. Flumerfelt '63, '65
Roger L. Levin '63
Charles George Nevaril '63, '71
Terry E. Witt '63, '68
Kurt E. Knuth '64
John F. Kottas '64, '68
John H. Shortreed '66
Lee A. Bertman '68, '70
Louis H. Linneweh Jr. '69
Fang-Chen Luo '69, '73
Lynne McCutcheon '69
James A. Armstrong '70, '73
James F. Berrill '70
William D. Buchanan '70, '72
S. Michael Corlett '71
Srinivas R. Chari '73
James M. Nolan '74, '77
David E. Winnes '74
Susanne Norton Eichholz '76
George Wang '77
Mitchell J. Kowalczyk '78
John B. Rodgers III '79
Elizabeth Pritchard '81
Lin-Wen Lee '85, '94
Glenn Sykora '88
Philip Anthony III '97
Robert Ignagni '03
Joseph George Wain '17

SOLVING THE "PROBLEM-SOLVING" PROBLEM

Northwestern Engineering's Nikos Hardavellas shares five tips for approaching complex challenges.



"Studying a problem at its smallest, largest, and intermediate sizes can reveal patterns that are otherwise hidden. Those measurements often reveal how performance changes as the problem grows and where bottlenecks emerge."

Nikos Hardavellas Professor of Computer Science and Electrical and Computer Engineering

The most difficult problems often involve competing priorities, hidden dependencies, and countless variables, all of which can obscure the fundamental challenge and make solutions harder to uncover.

Northwestern Engineering's NIKOS HARDAVELLAS confronts complicated systems every day. His research explores how to overcome computer performance bottlenecks and build more efficient systems, from designing computer architecture for speed to developing future user experiences in photonic and quantum computing.

Drawing on that expertise, Hardavellas, professor of computer science and electrical and computer engineering, shares his five-step approach to solving difficult problems more effectively.

1. Define the Problem Before You Solve It

Vague goals, such as "make it faster" or "make it stronger," are rarely useful. Instead, start by identifying exactly what you want to achieve and any hurdles in the way. The more clearly the problem is defined, the easier it becomes to find the right solution. Progress often begins by isolating the key factor driving the problem, allowing for focus on the root cause rather than its symptoms.

2. Measure at the Extremes

A system that performs well on a simple task may struggle when scaled to dozens of use cases, millions of users, or trillions of calculations. Studying a problem at its smallest, largest, and intermediate sizes can reveal patterns that are otherwise hidden. Those measurements often reveal how performance changes as the problem grows and where bottlenecks emerge.

3. Simplify Until the Important Parts Stand Out

Difficult problems often include variables that add complications without meaningfully affecting the outcome. Create a simpler version of the problem that still captures its essential features by stripping away less important factors and by focusing on the most prominent contributors. Once the simplified version is clear, layers can gradually be added back in. Focus on the variables that matter most to gain a clearer understanding of the problem's core dynamics.

4. Look for Solutions That Already Exist

Many seemingly unique challenges can be reframed as versions of well-studied problems. Scientists and engineers often consider or borrow solutions from decades of existing work rather than build new tools from scratch. Finding the right analogy can reveal proven methods that may already exist for solving much of the problem.

5. Define Success Before You Begin

Before investing months or years pursuing improvements, establish what the best possible outcome might look like. Researchers often create an idealized benchmark that represents a best-case performance scenario. Comparing real-world results against that benchmark helps determine whether additional effort is likely to produce meaningful gains or diminishing returns. That helps focus effort where it can have the greatest impact.

BRIAN SANDALOW

Learn more about the Parallel Architecture Group at Northwestern, led by Hardavellas.

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FROM DEFECTS TO FEATURES

This rendering shows the atom-level view of a metallic alloy, where nano-scale crystals (assigned unique colors) meet at internal interfaces called grain boundaries. Research led by Fadi Abdeljawad, associate professor of materials science and engineering, offers a framework for predicting how chemical elements interact with these interfaces. Understanding this nanoscale chemistry could enable the design of advanced materials with improved engineering properties, accelerating advances in aerospace, energy, transportation, and other technologies.

The research shifts the focus from treating grain boundaries as defects to viewing them as design features. “What we’re hoping to show is that by carefully controlling the chemistry of these interfaces, we can stop thinking of them as defects and start treating them as design tools,” Abdeljawad says.

Image courtesy of Fadi Abdeljawad