

W

Aiming High

PIONEERING FIGHTER PILOT
STACEY COTTON BONASSO '90
INSPIRES THE NEXT GENERATION
AS A HIGH SCHOOL STEM TEACHER.

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Worcester, MA 01609



WPI Journal (ISSN 1538-5094) ©2023 is published quarterly by Worcester Polytechnic Institute (WPI) in conjunction with the WPI Alumni Association. Periodical postage paid non-profit at Worcester, Massachusetts, and additional entry offices. This publication is guided by WPI's principles of free expression and accepted standards of good taste. Opinions expressed in letters to the editor are of the signed contributors and do not represent the opinion or official position of WPI or its officers. POSTMASTER: Please send address changes, Form 3579, to WPI Journal, Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609-2280.

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LETTER

Letters to the editor may be altered for length, clarity, and accuracy. Opinions expressed do not necessarily reflect the views of WPI. Send your letters to wpjournal@wpi.edu.

A NEW WAY TO ENGAGE

Readers of the online version of the *WPI Journal* may have noticed a new way to engage with some of the feature stories. We've introduced a curated comments widget that invites readers to add their thoughts, as long as certain criteria are met. If you are reading the print version and want to chime in as well, use the QR code at the end of a story to jump to the digital site and comment away.

While I love when people take the time to send an old-fashioned letter to the editor, I also recognize that sometimes a thought-provoking piece might move you to show an immediate reaction. Even with the soft launch of this widget, we received several comments on stories in the summer issue, most offering support to those featured. A shout-out to the reader who used ChatGPT to comment on the story about ChatGPT. I should have expected nothing less from the WPI community.

I have mixed emotions about online comments on stories on other media sites. I may read them to get a flavor of reader reactions; sometimes my understanding of the subject is expanded through thoughtful additions—and sometimes the opposite is true. Rest assured that *WPI Journal* comments will be reviewed by a moderator (me) and all must adhere to our posting guidelines. Stories are also promoted on WPI social media outlets, which offer other opportunities to give feedback.

ERRATUM

Sharp-eyed reader **Gary Larson, MS '68**, electrical engineering, noted a problem in the story about the dedication of a plaque in Unity Hall that honors the life and accomplishments of William B. Gould III, one of the first African Americans to enroll in WPI in 1921 (Summer 2023, page 12). The story says the unveiling was held on the 100th anniversary of Gould's death, which doesn't make sense given that he served in World War II and went on to a distinguished career.

Turns out the unveiling was on the 100th anniversary of the death of his grandfather, the first William B. Gould, a skilled plaster tradesman who escaped enslavement in 1863 and joined the U.S. Navy during the Civil War. Gould kept a journal during his years in the Navy—the only known record of the war written by an escaped slave.

We regret the error, which has been fixed in the digital version.

—**Kris O'Reilly**, Editor

IT'S A TOUGH JOB BUT...

I had the pleasure of doing some hard-hitting research on one of our featured alumni in this issue: Moe Young, founder of Moeshmallows (see page 48). Early in the summer I caught up with her in Holden, Mass., where she had stationed her delightfully decorated retro food truck in the Chaffinville Floral parking lot. Because I just had to, I sampled her orange creamsicle Italian fizzy drink topped with an orange-flavored mallow. I can truthfully attest to its deliciousness.

Moe has strong support from her family, who are often the first to try out—and suggest—new flavors. I'm told that some experiments into savory marshmallows were quickly abandoned, but the pink and blue cotton candy flavor is a family favorite. Moeshmallows often make an appearance at Alumni Association events, so be sure to look for them when you return to campus.



THE POWER OF BELONGING

As the weather is cooling down and the trees are turning colors, autumn is here on our campus. From the many activities sponsored by student clubs and the fun of Family Weekend and Homecoming to the excitement of the football team taking the field with the uplifting support of our Pep Band, the campus is more dynamic than ever.

It has been inspirational to see our WPI traditions in action during such events as Move-in Day and the crossing of Earle Bridge. What makes those traditions so profoundly meaningful is that they are shared experiences that bond the entire community. They bring us closer and allow us to connect in a very special way.

WPI is a place where our students, faculty, and staff find others who share similar motivation, intellectual curiosity, and passion to better the world. Connections, mentorships, and lifelong friendships are forged here. Even after graduates cross the stage, the Hill serves as a welcome symbol of theory, practice, and ... home. That is the power of belonging.

The significance of belonging cannot be emphasized enough, especially as we maintain our focus on well-being and continue to foster a tightly knit, supportive, and inclusive community. Our vision for WPI is to create an environment where individuals from all backgrounds and life paths mutually respect and support one another. We aspire for every person to feel not only the freedom but also the

“It is only through experiencing a genuine sense of belonging that we can truly thrive and make meaningful contributions.”

encouragement to bring forth and express their true selves, share their authentic experiences, and communicate their unique perspectives.

It is only through experiencing a genuine sense of belonging that we can truly thrive and make meaningful contributions. This level of authenticity holds immense power, benefiting not only our community but driving the broader impact of our work and that of our alumni worldwide.

To those who have been away from campus for an extended period, I hope to welcome you back in the near future. To those who are currently here or who visit regularly, I extend my heartfelt gratitude for your contributions to making WPI an inclusive and welcoming place. We are truly fortunate to be part of this inspiring community.

Warmly,
Grace

NEMITZ STUDIES DISASTER RESPONSE WITH LOW-COST, FLEXIBLE ROBOTS

Markus Nemitz, assistant professor of robotics engineering, is developing an innovative architecture for low-cost custom robots capable of traversing challenging terrains by swimming, crawling, climbing, and diving through hostile and confined spaces as part of search-and-rescue operations. The project is funded by a \$599,815 CAREER Award from the National Science Foundation.

Nemitz will focus on developing small and flexible 3D-printed robots with integrated fluidic circuits that can be rapidly fabricated for specific disasters. His five-year project will involve testing these robots in a miniaturized model that will be built at WPI and replicate parts of the Tham Luang cave in Thailand where flooding trapped 12 members of a youth soccer team and their coach in 2018.

“Disasters often demand unique, specialized responses, such as was required for the Tham Luang cave crisis,” Nemitz says. “There lies immense potential in the development of small robots that are quickly fabricated from soft, flexible materials. These robots can significantly aid rescue efforts by exploring areas that pose potential hazards to humans or are otherwise inaccessible, including earthquake debris, flooded regions, and even nuclear accident sites.”

Nemitz’s project will involve making advances in soft robotics and printable robotics, fields that use flexible materials and advanced fabrication techniques. He will develop new principles for robot design and fabrication, specifically focusing on integrating electronic circuits with 3D-printed fluidic circuits in the robots. The fluidic circuits will use pulses of air to store programs, process data, and execute simple tasks that control the robots. The resilience of fluidic circuits to mechanical damage and electromagnetic interference, combined with traditional electronics, promises to expand the capabilities of the robots significantly.

Design possibilities for these robots are vast, with size variations ranging from as small as a mouse to no bigger than a basketball. Using commercial 3D printers and elastomeric filaments, Nemitz will ensure the feasibility and efficacy of the robots by evaluating the time taken to design and fabricate them and assessing their performance in reaching designated targets within the lab-based model cave system.

In addition to the technical aspects of the project, Nemitz will develop a hands-on robotics summer camp exclusively for female high school students. This initiative aligns with the plan to launch a new undergraduate course on printable robotics.

—Lisa Eckelbecker

STUDYING VISUAL CUES AND ALGEBRA

Researcher **Erin Ottmar** has launched a three-year project that will determine how using visual elements in mathematical equations, specifically spacing around numbers and colorful type, could help students learn algebra. The project, funded with a \$667,617 grant from the National Science Foundation, focuses on how visual cues could shift attention to different elements that students perceive when working on algebraic equations. The findings could impact math curricula and classroom teaching.

“When students look at a math equation, they see numbers and symbols in space,” says Ottmar, an associate professor in the Department of Social Science and Policy Studies and principal investigator on the study. “Our idea is that by using a colored font and spacing around groups of numbers in both helpful and unhelpful ways, we can help students recognize and think about correct or incorrect ways to solve an equation.”

The research is based on perceptual learning theory and focuses on a critical mathematical concept known as the order of operations, which dictates the sequence of steps to follow when solving a mathematical expression with multiple operations. Students learn to solve operations inside parentheses first, followed by exponents, multiplication, division, addition, and subtraction to reach the correct solution. Failure to follow the order of operations can lead to incorrect solutions. Ottmar says that in her research, students who struggle with math often do so because they ignore the order of operations.

Working with collaborators in Virginia and Indiana, Ottmar will examine the individual and combined effects that using a colored font and spacing around different numbers can have on students’ ability to correctly follow the order of operations while solving math problems. The researchers expect to recruit a total of 1,800 students for two studies in Virginia and Georgia. An important issue will be whether color and spacing, when combined with technology interventions, could lead to better, longer-lasting learning.

Ottmar will work on the project with four co-PIs: **Ji-Eun Lee**, a research scientist in WPI’s Learning Sciences and Technology Program; **Caroline Byrd Hornburg**, an assistant professor at Virginia Tech; **Avery Harrison Closser ’19 MS, ’22 PhD**, a postdoctoral scientist at Purdue University; and **Jeffrey Bye**, a cognitive scientist and consultant.

—Steve Foskett

SUCCESS IN THE DESERT FOR HIGH POWER ROCKETRY CLUB

Battling scorching temperatures and dusty winds in the New Mexico desert, the WPI High Power Rocketry Club (HPRC) recently achieved its first successful launch at the Spaceport America Cup.

The WPI crew launched *Capricornus*, its solid-fueled rocket, on June 22. Blasting just beyond its 10,000-foot goal, the 12-foot-long, 70-pound rocket deployed its parachute at 10,264 feet and gently returned to the ground. The launch earned the team the Jim Furfaro Technical Excellence Award and a third place in the Payload Challenge, sponsored by Space Dynamics Laboratory at Utah State University.

The annual Spaceport America Cup challenges teams to construct a rocket and successfully launch it with a small payload. This year the payload included a unique quadcopter designed to deploy weather data collection cubes in the desert, inspired by NASA's scientific missions to other planets.

The event unfolds over several days and includes a conference that allows students to present their projects in front of judges from sponsor companies (Blue Origin, Onshape, Virgin Galactic, and Relativity, among many others). This year the WPI Structures Team of the HPRC received an invitation to give a podium presentation in front of judges, industry professionals, and fellow competitors. Rocket Lead **Terence Tan '24** and Structures Lead **Tobias Enoch '25** presented the development of the team's threaded aluminum couplers, a critical part of the rocket's structure.

In addition to Tan and Enoch, members of this year's Spaceport Cup team included **Michael Beskid, Logan Frandsen, Abby Hyde, Newton Le, Jake Roller, Kevin Schultz, and Julia Sheats**, all Class of 2023; **Keelan Boyle, Kelli Huang, Cameron McAfee, Rayden Morley, Jackson Neu, Haggay Vardi, Jonathan Whooley, and Aunika Yasui**, all Class of 2024; **Cameron Best, Hunter Crossman, Francisco Diaz Quinones, Lyle Edwards, Max Friedman, Henry Lambert, Dan Pearson, Emma Pollak, Sarah Semy, and Ryan Truher**, all Class of 2025; **Dylan Dsilva, Nikhil Gangaram, Nikolaos Gerakaris, Kate Lindsay, and Daniel Willins**, all Class of 2026.

YAN WANG RECEIVES AMERICAN INNOVATOR AWARD

Yan Wang, the William Smith Foundation Dean's Professor of Mechanical and Materials Engineering, has been named to the Bayh-Dole Coalition's inaugural "Faces of American Innovation." Wang is among just five individuals to be recognized with the American Innovator Award by the Coalition, which consists of "a diverse group of innovation-oriented organizations and individuals committed to celebrating and protecting the Bayh-Dole Act." The awardees were chosen for their cutting-edge work in helping turn early-stage scientific discoveries into products that benefit people and the planet.

Wang's lab developed a lithium-ion battery recycling technique capable of collecting and reusing 98% of critical metals from discarded batteries. The process is only 10% as carbon-intensive as conventional lithium-ion manufacturing. WPI worked with Wang to patent the invention in 2012, and a spin-off company has since licensed the patent for commercial development.



"I am deeply honored to receive this award for my work in the field of lithium-ion battery recycling," said Wang. "This recognition underscores the critical importance of sustainable technology solutions that address our planet's pressing challenges. Through collaborative efforts, we are forging a path toward a greener future, where innovation and environmental stewardship intersect to create lasting impact."



INNA NECHIPURENKO EXPLORES TINY CELLULAR STRUCTURES

It takes a powerful microscope to view the tiny cellular structures known as primary cilia that are at the center of **Inna Nechipurenko's** research.

"You can think of primary cilia as tiny antennae that project from the surface of nearly all cells in our bodies, and these antennae are absolutely essential for our cells to be able to communicate with each other and to collect information about their environment," says Nechipurenko, an assistant professor in the Department of Biology and Biotechnology. "Their critical importance for human health is particularly highlighted by the fact that people who have any defects in the function of these structures suffer from devastating genetic disorders, for which there is no cure."

With nearly \$564,000 in recently awarded funding, Nechipurenko is launching two projects that will investigate the genetic basis of primary cilia formation and function in nerve cells. These projects will provide the basic science foundation that is a necessary stepping stone for developing therapies.

The first project, funded with a three-year \$363,984 grant from the National Institutes of Health, will determine how a gene called *RIC-8* shapes primary cilia structure and function in neurons.

The second project, funded with a two-year \$200,000 grant from the Charles H. Hood Foundation, will define the function of a human gene called *GNAI1* in primary cilia assembly. The project will also use the microscopic worm *C. elegans* as a tool to rapidly and systematically determine how patients' mutations in *GNAI1* affect the gene's function. *GNAI1* is a known risk gene for neurodevelopmental disorders.

Both projects build on Nechipurenko's research into the molecular machinery that is important for correct assembly and function of primary cilia in the nervous system.

"In the last 20 years or so, we came to appreciate how truly important cilia are for every aspect of human physiology," Nechipurenko says. "We literally see, smell, and hear through cilia. We have also learned a great deal about molecules that are at the core of these structures, but the functions of cilia in the brain remain a mystery."

—Lisa Eckelbecker

WPI EXPERTS WEIGH IN ON TRAGIC WILDFIRES

Devastation in Maui. A record-breaking fire season in Canada. Sweltering temperatures sparking deadly blazes in Greece. Wildfires have been thrust into the public consciousness this summer, but WPI researchers have been studying the phenomenon for decades. Professor and Fire Protection Engineering Department Head **Albert Simeoni**, Assistant Professor of Fire Protection Engineering **James Urban**, Dean of the Global School **Mimi Sheller**, and **Michael Ahern**, an instructor in The Business School who specializes in power systems and operational risk, give their unique perspectives on what happened and how communities can mitigate fire risk in the future.

Why do wildfires destroy some structures, while some things remain standing?

Simeoni: Communities include very different types of potential fuel for a wildfire. For example, in residential neighborhoods you'll find cars, houses, fences, sheds, and mulch, along with vegetation, which can be either natural and likely dry, or landscaped and regularly watered and thus moist. When a wildfire reaches the first houses, it can ignite them—and from this point, it is a very different kind of fire spread. The fire will spread through communities and the first houses burning will release a lot of embers (called firebrands), which fly forward with the wind and land on the roofs of other houses, fences, and mulch, and they spread the fire in a discontinuous way. When firebrands land on dry vegetation (pine needle beds on the ground) they can ignite it, but when they land on green foliage it doesn't happen. Green ornamental vegetation is usually clean and has grass below it, instead of more fuel for the flames. Most trees burn because there are flames below them that dry and heat up their foliage.

How can electrical wires and infrastructure spark wildfires?

Urban: Powerlines and related infrastructure can do this in several ways. Research of past fires has shown that powerline-involved wildfires occur more frequently during dry weather and high winds. Wildfires can be ignited when dry vegetation contacts live wires. Also, high temperatures can cause the powerlines to sag, and high winds can cause them to “slap,” a scenario in which uninsulated lines come into contact with each other, causing a rapid discharge of electricity. This discharge causes rapid localized heating, which can melt the conductors and even locally vaporize, ejecting hot metal particles or globules of molten metal onto the ground or flammable materials below.

How do investigators try to determine the point of origin and cause of a wildfire?

Urban: Post-fire investigations can be complicated, because there is always the risk that the fire has damaged or destroyed evidence. However, when a fire is first ignited, it is not initially at the same intensity and scale: in some powerline-involved fires, for example, a fire might start off very small before quickly growing. As a result, fire damage near the origin might be different compared to other areas impacted when the fire is much larger. If conductors are suspected, investigators will likely inspect nearby utility equipment for evidence of tree or vegetation interactions, line slapping, or other damage. Parts of this infrastructure will likely survive the fire. Surveillance video footage, along with data from the power company, may also be used.

Why are unmanaged grasslands so susceptible to fire and fire spread?

Urban: Fine fuels—small twigs, leaves, needles, grasses, and other small-diameter material—ignite very easily and quickly compared to larger fuels. If the grass isn't managed, it may grow long, and a significant portion may be dead or will dry out in a drought, leading to a high fuel load. The higher loading of fine fuel typically causes longer flame lengths, which can support faster fire spread. Grass that has been mowed is typically greener, wetter, and closer to the ground, which makes it harder to ignite.

Simeoni: A lot of grass in Maui's old cane sugar fields is non-native grass. In the summer it gets cured and is very dry. So, basically, you had all the conditions—the fuel, the heat, the wind, and the ignition sources—to create a catastrophe.

Sheller: Any island that has been exploited for plantation agriculture has been transformed in ways that leave it more vulnerable to climate-related disasters today—through the clearing of forests, eradication of native species, introduction of invasive species, and other changes to the land that lead to desiccation (such as damming streams). It has been known since the 18th century that small islands that had tree cover removed experienced less cloud formation and therefore less rainfall. Colonialism also created unequal economic conditions between native Hawaiians and wealthy visitors and buyers that concentrated the service-sector labor force in “affordable” areas that are often the most vulnerable to disasters.

What can communities do to better protect buildings against wildfire risk?

Urban: There are a variety of newer construction methods and materials that have become commercially available that can help. However, one of the most achievable ways to fire-proof buildings is to reduce the fuel loading near the building exterior (ornamental vegetation, sheds, outdoor furniture, etc.).

What critical infrastructure improvements need to be examined in Maui and other susceptible areas?

Ahern: The wildfires in California and Maui have underscored the need to enhance the resilience of power systems. Additional vegetation management around power infrastructure, faster protection system trip settings, greater use of (partially insulated) tree wire, and aerial cables would all reduce the risk of sparking wildfires. These infrastructure investments would also boost reliability.

In the near term, public safety emergency response protocols could mitigate the risk of such incidents but at a cost to reliability. This approach would mean that utilities would de-energize the power system in dry, windy areas that are susceptible to wildfires. This has already been implemented in parts of California.



▶ **ANDREW HALEY, PELHAM, N.H., MECHANICAL ENGINEERING**
"THIS IS A PICTURE OF ME AND MY SIBLINGS—MY SISTER AND MY OLDER BROTHER. IT'S JUST SOMETHING NICE TO HAVE TO REMEMBER HOME."

MOVE-IN DAY INCLUDES CONNECTIONS TO HOME

Amid the rush of residence hall Move-In Day on Sunday, Aug. 20, we asked a few first-year students to show a significant item they brought with them to their home away from home, and explain its importance as they start their college adventure. A common answer: The item is a reminder of friends, family, good times, and home.



▶ **CIERA ST. PIERRE, WESTBROOK, MAINE, CHEMICAL ENGINEERING**
PLUSHY: "MY BEST FRIEND AND I WERE LOOKING FOR STUFF TO DO AND NOW WE HAVE MATCHING PLUSHIES. HIS IS IN ARIZONA WITH HIM. THIS IS NOW IN WORCESTER WITH ME."



▶ **CAMERON HOBBS, CANTON, GA., ROBOTICS ENGINEERING**
PEN HOLDER: "I MADE THIS CERAMIC PEN JAR OVER THE SUMMER AND GLAZED IT MYSELF. IT HAS 13 TOTAL FACES AND REMINDS ME OF A CERTAIN GAME I LIKE PLAYING. THE FACT THAT I MADE IT WITH MY OWN HANDS IS NICE."



▶ **JONAH OFFREDI, SYRACUSE, N.Y., ELECTRICAL AND COMPUTER ENGINEERING**
STUFFED GENGAR POKEMON: "IT HAS SIGNIFICANCE TO ME BECAUSE I'M A BIG FAN OF THE POKEMON FRANCHISE. IT'S A LITTLE REMINDER OF HOME."



▶ **JOSHUA MEESERAPU, BEDFORD, N.H., ELECTRICAL ENGINEERING**
"THESE ARE THE FOUR MAIN CHARACTERS IN THE SHOW NINJAGO. THEY'RE SPECIAL CHARACTERS AND REALLY HARD TO FIND. I WATCHED THE SHOW A LOT AS A KID."



▶ **MADISON SILVA, MIDDLEBORO, MASS., ENVIRONMENTAL ENGINEERING**
SIGN: "MY 4TH GRADE TEACHER GAVE ME THIS SIGN. THE ZIP CODE OF MY HOMETOWN IS ON THE FRONT. THE MESSAGE ON THE BACK IS 'YOUR HEART IS NEVER FAR FROM HOME—MRS. PENNEY.' IT'S A PIECE OF HOME."



▶ **JELAJEEDIN GYLYCHMUHAMMEDOV, ASHGABAT, TURKMENISTAN, ROBOTICS ENGINEERING**
FLAG: "THIS IS THE FLAG OF MY COUNTRY. I BROUGHT IT WITH ME AS PART OF OUR CULTURE. I KEEP IT NEAR MY BED AND I LOOK AT IT SOMETIMES. I'M PROUD THAT I'VE COME SUCH A LONG DISTANCE."



▶ **BIWEN DONG, NINGBO, CHINA, MATHEMATICAL SCIENCE**
PILLOW: "I'VE HAD THE PILLOW FOR FOUR YEARS. MY BOYFRIEND BOUGHT IT FOR ME AND IT'S VERY SOFT."



▶ **GRACE BERGEON, KENNEBUNK, MAINE, COMPUTER SCIENCE**
RACE CAR: "I WENT TO A NASCAR RACE WITH MY FRIENDS THIS SUMMER AND I GOT IT THERE. IT WILL REMIND ME OF MY FRIENDS, INCLUDING ONE WHO IS GOING TO SCHOOL IN WALES."



HOLY CROSS AND WPI COLLABORATE ON DUAL DEGREE PROGRAM

Two of Worcester's oldest and largest institutions of higher education have announced a partnership to strengthen collaborations and provide new pathways for students. WPI President **Grace Wang** and College of the Holy Cross President Vincent Rougeau signed a memorandum of understanding to collaborate on combined bachelor's/master's programs.

These programs will provide opportunities for Holy Cross students to complete the bachelor of arts degree at Holy Cross and the master of science or master of engineering degree at WPI in an accelerated 4+1 model.

"For many years, WPI and Holy Cross have worked cooperatively on common goals and to engage in topics of mutual interest—and to drive positive changes in the best interest of higher education in Central Massachusetts. Now we are expanding our partnership, reflecting the innovative spirit of our respective institutions to foster an even closer network of collaboration," said Wang at an event announcing the agreement. "This partnership will provide pathways for Holy Cross students to pursue graduate studies in a distinctive STEM institution while enriching WPI with exceptional graduate candidates."

"We are delighted to collaborate with WPI on these innovative educational programs," said Rougeau. "This partnership helps us expand our curriculum by connecting our model of outstanding liberal arts education with graduate training at one of the nation's great technological universities. At the same time, we are able to work together to deepen our shared commitment to Worcester as a great place to live and learn."

Holy Cross juniors majoring in mathematics and computer science or physics will be eligible to start the path toward completing the 4+1 program by taking WPI courses. Initial MS and MEng degree programs at WPI participating in this partnership are mechanical engineering, and electrical and computer engineering, with more offerings in computer science, mathematics, physics, neuroscience, business, and sustainability to be available in the near future.

—Colleen Bamford Wamback

BUSINESS SCHOOL ACCREDITATION EXTENDED

The Business School's accreditation was extended recently by the Association to Advance Collegiate Schools of Business (AACSB), the longest-serving global accrediting body for business schools, and the largest business education network connecting students, educators, and businesses worldwide. The AACSB commended the Business School for relevant and current curricular content, impactful and interdisciplinary research, and faculty commitment to experiential learning, stating, "The School takes its mission of using technology to impact society very seriously."

"We are delighted to have been re-accredited by AACSB, especially as guidelines emphasize continuous improvement and using business education as a force for good in the world," says **Debora Jackson**, Harry G. Stoddard Professor of Management and Dean of The Business School. "We're using AACSB standards to realize our mission, driving positive societal impact locally, regionally, and globally at the intersection of business, technology, and people. Our standing within the AACSB community signifies the excellence employers, students, and faculty deserve and expect from WPI."

The hallmark of excellence in business education, AACSB accreditation has been earned by fewer than five percent of the world's business programs. Just 989 business schools across 60 countries and territories are currently accredited.



URANIUM AND THE NAVAJO NATION

THE STUDENT: **Kylar Foley '24**, Summer Training in the Arts and Sciences Award recipient

THE ADVISOR: **Robert Krueger**, Department Head and Professor of Social Science & Policy Studies

BACKGROUND:

During and after World War II and the Cold War, the United States had an ever-growing demand for uranium. Navajo Nation, the land of the Navajo people in Arizona and New Mexico, was able to meet a great deal of this demand. Nearly 30 million tons of uranium ore was extracted from 500 mines leased from Navajo Nation, with many Navajo people either working the mines or raising families near them. But because of uranium contamination, this agreement has left a harmful legacy, with the 500 leftover uncleaned uranium mines leaving above-background uranium and radiation levels.

THE PROBLEM:

Mining destroys the environment and makes uranium more free flowing. When uranium is underground, it's not bioavailable; natural background levels are safe. But when mining introduces uranium into the air or water, it becomes dangerous. The research highlights the dangers of uranium mines, emphasizing both the chemical and radiological effects.

THE METHODOLOGY:

The paper thoroughly reviewed bioremediation techniques, with a primary focus on phytoremediation and microbial remediation. It looked at different research on plants with high uranium uptake and then compared those to plants that are native to the area. Finally, an analysis was done to determine which plants deserve further research due to their potential for remediation.

THE CONCLUSION:

Bioremediation techniques using either heavy root absorbers or heavy aerial tissue absorbers could be promising, but future testing is needed.

THE FUTURE:

"We are currently trying to obtain soil from the region to move into the more experimental phase of the project," says Foley. "In WPI's nuclear lab, we can use gamma spectroscopy to determine concentrations and activities in the soil. Once the chemical makeup is known, we can have a better idea of what phytoremediation or microbial remediation would be most promising."

See how WPI students put theory into practice through projects.

PROJECTS

PAUL PACHECO BRINGS AUTHENTICITY TO HIS HIGH SCHOOL BIOLOGY CLASS

WPI'S TEACHER PREPARATION PROGRAM UNCOVERED HIS PASSION TO TEACH AND SUPPORT STUDENTS.

The new notebooks and freshly sharpened pencils, the last-ditch efforts to finish summer reading assignments, the distinct sense of excitement and possibility—there's nothing like the beginning of a new school year.

It's something **Paul Pacheco '22, MS '23**, has experienced for years, starting with his time in the Lowell, Mass., school system through earning a BS in psychological science with a concentration in psychobiology and an MS in learning sciences and technology from WPI. This year, though, he'll be experiencing it all in an entirely new capacity: as a ninth-grade biology teacher at Burncoat High School in Worcester.

"I just hope my students like me," he says with a laugh. "I want to be the cool, crazy teacher whose class might be difficult, but who's also made it clear that I want to help them succeed."

The "It" Factor

For some, teaching is what they know they want to do from day one; they can't imagine doing anything else. Pacheco's path to the front of the classroom, on the other hand, was anything but linear.

He arrived at WPI in 2018 as a first-generation college student (also as the first in his family to graduate from high school) with the intention of becoming an environmental engineer and taking advantage of WPI's collaborative, project-based education experience. After meeting Professor Lisa Stoddard during the Great Problems Seminar and participating in research on Project Inclusion, a campus-wide initiative to make campus culture more welcoming to all, Pacheco started looking more into equity in the classroom and beyond.

"That's when I first realized that I might not be meant to be an engineer, and that was okay," he recalls.

After a brief stint in environmental studies, Pacheco stumbled upon learning sciences with Associate Professor of Psychology and Learning Sciences Erin Ottmar, as well as WPI's Teacher Preparation Program. The program gave him the opportunity to earn both his bachelor's degree and a Massachusetts Department of Elementary & Secondary Education-approved initial teaching license for middle or high school.

Pacheco completed his student teaching at Worcester Vocational Technical High School. He credits his Worcester Tech mentor, Jocelyn Coughlin, with guiding him while still allowing him to make mistakes, helping him implement learning strategies and routines in his work, exposing him to different aspects of education, and—most of all—confirming that he was on the right path.

"She helped me realize that teaching isn't just something I'm good at, but something I'm passionate about, that I have a calling for, that I just have it," he says. "And whatever it is, I'm glad that I do."

All in This Together

Pacheco's goal is to ensure that his classroom is a special place for his students, one where posters of Rosalind Franklin, Mae C. Jemison, and other unsung STEM heroes have real estate right next to *Star Trek*

posters and a birthday wall for his students. More than anything, though, he wants his classroom to be a home base, somewhere students feel safe and like they're all in this together—because to Pacheco, they are.

"Education's not about where you come from outside of the classroom," he says. "It's the one playing field where we all support each other in our learning, even if we're at different places. I don't want to hear anyone tearing each other down. That happens enough in the outside world, but it won't happen within our four walls."

That focus on authenticity and support has already proven to have an impact on Pacheco's students, even before he had a classroom of his own.

"It was important to me to share bits and pieces of myself when I was doing my student teaching. I never had a Latino, queer educator; I never had a teacher who was first-gen and actually talked about it. One experience that stuck with me the most was when a student felt safe enough to come out to me.

"I had been scared to show who I was. It means a lot to me to know that when they come to my class, students feel seen, heard, and safe."

In addition to ensuring that his classroom is one that cultivates learning and safety, Pacheco is excited to model his own teaching style on experiences he's had with different professors and courses at WPI.

"Science is not exclusive, and I love that I can still be creative while teaching it," he says, citing some projects he's led his students through: creating a virtual escape room to learn about DNA, hosting a role-playing game about global greenhouse emissions, and drawing a flipbook to illustrate the different cycles of mitosis and meiosis. "I can show them that project-based learning is fun, and the courses I took at WPI helped me ensure that high school students would have the same type of learning opportunities that I did."

Looking Toward the Future

In a time where teaching is a profession under especially high scrutiny, Pacheco focuses inward, celebrating his peers in the Teacher Preparation Program who will continue to teach, support, and be there for students through it all. "I see them and their approaches to education, and I know the world will get better," he says. "I can see the hope that's there, the care they have for their students."

As a first-generation college graduate, Pacheco has a profound understanding of the importance of education, regardless of field. He's thrilled, too, that he has the opportunity to help students build a healthy relationship with learning.

"Teaching is a profession that makes all others," he says. "I could teach a future astronaut, a marine biologist, a dancer, a Nobel Prize winner! I'll be happy seeing students achieve their dreams, because teaching is mine."

—Allison Racicot



PHOTO BY MATTHEW BURGOS

MELISSA KAGEN

ASSISTANT PROFESSOR OF INTERACTIVE MEDIA AND GAME DEVELOPMENT

WANDERING GAMES

My book *Wandering Games*, published in fall 2022 by MIT Press, looks at the ways we wander through gaming worlds, and what that says about our concepts of work, colonialism, gender, and death.

PHOTO BY TODD VERLANDER

JUGGLING BALLS

I learned how to juggle when I played a jester character in a college theater production. I came to game theory through the theater. Juggling is great stress relief.

FOAM DICE

These dice are helpful in every game designing course I teach. You can use them in paper prototyping, where you create a rough draft of a game using simple materials. They can be dice in a paper game, but also as something to throw in an athletic game.

COOKIES

I offer cookies to students who come for office hours to help break the ice and make me seem less intimidating. This particular brand is vegan, so I can eat them, too.

POKER CHIPS

My grandfather gave these to me. He taught me how to play cards when I was four and gave me a lifelong love of gaming. I use these chips to teach poker in Intro to Critical Game Theory.

GAME CARDS

These are Mary Flanagan's *Grow a Game* cards, which I use in many of my classes. I use them as a quick way to get students designing games.



FACULTY SNAPSHOT

Get to know faculty through items they have in their offices.



GLOBAL IMPACT

STUDENTS RETURN TO CHINA'S HANGZHOU PROJECT CENTER

While all of WPI's 50+ project centers were forced to pivot back in 2020, the majority of them have been able to resume operations at their original locales. Now, after three long years, the Hangzhou Project Center has joined them—in fact, as of this publication, students are hard at work on collaborative projects in the bustling city.

"We're really excited," says Jennifer Rudolph, professor of East Asian history, director of the China Hub, and co-director of the project center. "Because of the friction and tension between the U.S. and China, this type of person-to-person exchange is more important than ever for both countries in terms of building a reservoir of goodwill and understanding each other's perspectives."

Founded by Rudolph in 2014, the Hangzhou Project Center was part of an effort to expand offerings related to China for WPI students. "Back then," Rudolph says, "there was no Chinese Studies minor and no Chinese language courses at WPI; the only IQP project center in the greater China region was in Hong Kong, which has a much different vibe than mainland China."

In 2019, the project center transitioned into a mixed-team model, which is utilized by only a handful of project centers and makes for a richer, even more cultural Interactive Qualifying Project experience. Together with students from academic partner Hangzhou Dianzi University (HDU), students work on projects focused on everything from determining the feasibility of an electric bike share system in Hangzhou to developing an app with an NGO for improving mental health to exploring best practices for a local bilingual Montessori school.

"It's a real growing experience for both groups of students," says Associate Professor of Teaching and Associate Director of the China Hub Wen-Hua Du, who joined the project center as co-director after advising projects there in 2018. "It gives them the chance to reflect on and implement different approaches to the work at hand while navigating educational, cultural, and political norms. There's nothing more meaningful than doing a project together."

From navigating the visa application process to on-the-ground research on how the city has changed since the pandemic began and what students can expect. The process of reopening the Hangzhou Project Center took collab-

orative efforts from Rudolph, Du (HDU's academic liaison to WPI), Yunhong Shen, and WPI's own Global Experience Office (GEO).

"It takes a whole team to make any of these projects work," says Rudolph, citing the GEO staff in particular for their expertise. "It's such a complicated logistical puzzle, and they put so much time and effort into this. We couldn't do any of it without them."

The students aren't the only ones who have been looking forward to connecting with their partner university colleagues and the city of Hangzhou itself. Professor of Management Joseph Sarkis and Hansong Pu, adjunct teaching professor of Integrative and Global Studies, have been advising students since the pandemic began in 2020, and for the first time, they'll be advising projects in Hangzhou instead of locally or from a third site, like Hawaii, where the students conducted projects in 2022 working with sponsors and students in Hangzhou.

"The thing I am looking forward to most is helping the students appreciate the culture, the environment, the vitality of Hangzhou," says Sarkis. "I look forward to the conversations the students will have as they try new foods, learn the culture, and see the sights. For many, it will be unlike any experience they have had."

While students are currently making memories of their own in and around Hangzhou, Du has one from before the pandemic that has stuck with her to this day. As a project advisor in 2018, she worked with a student who was born in Hangzhou but grew up in the US after having been adopted. Using the limited information provided by her adoptive parents, as well as help from an HDU faculty member, the student was able to find and meet her birth parents in Hangzhou; the happy meeting was even written about in a local newspaper.

"When I first came to WPI, one of the things that really drew my attention was the IQP," Du recalls after reminiscing about the special moment. "Yes, it's an opportunity for students to complete project work and collaborate abroad with cohorts. And like it was for this student, it could also be a life-changing experience—in more ways than one."

—Allison Racicot

PHOTOS FROM WPI ARCHIVES

INDUSTRY PARTNER ALLOWED ROBOTICS INNOVATIONS

As the introduction of robotic manufacturing began to rapidly change industrial processes, academics struggled with how to quickly transform their learning laboratories into viable teaching models for the modern world. Always on the leading edge of industry and pedagogy, WPI faculty members, including Mechanical Engineering Department Head **Arthur Gerstenfeld**, sought innovative ways to implement modern manufacturing robots into classroom settings in the early 1980s, at a time when even simple industrial robots cost a minimum of \$30,000 (\$100,000+ when adjusted for inflation), not including the cost of installation and maintenance.

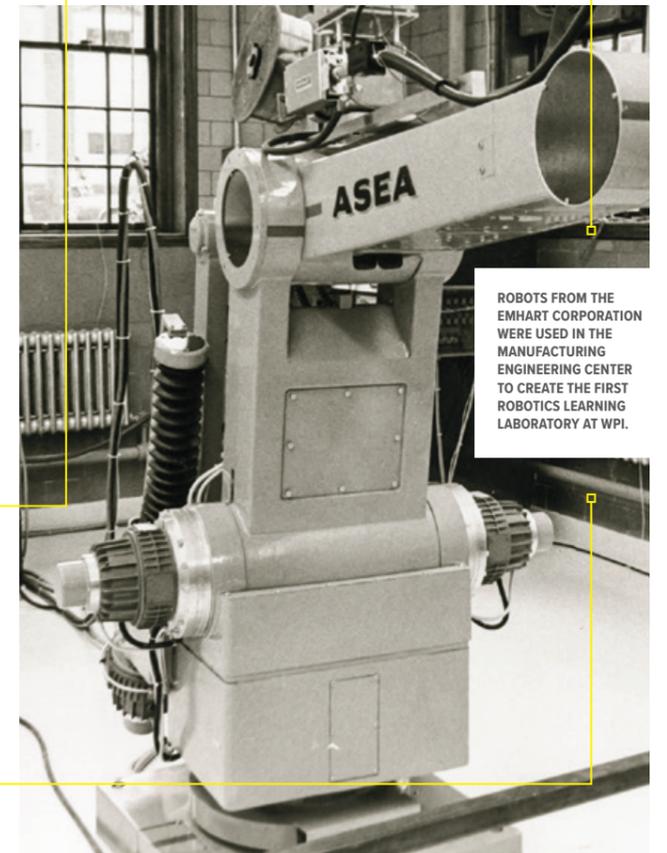
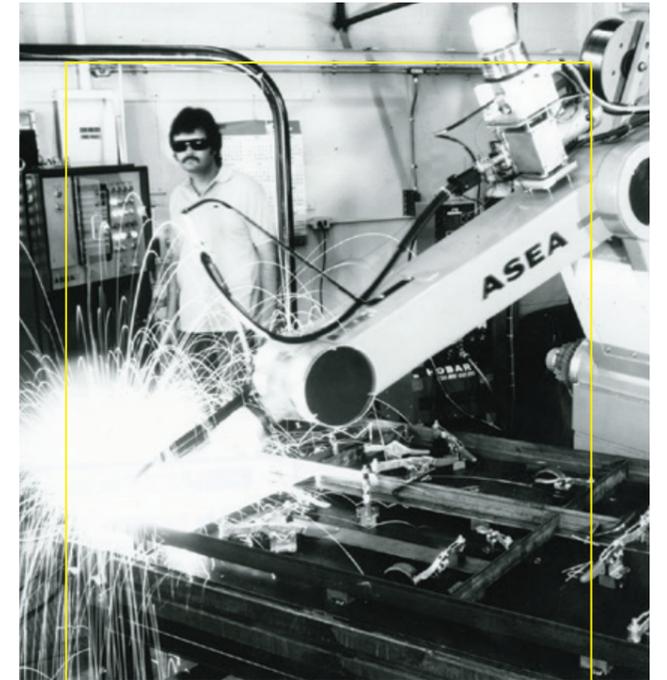
Meanwhile, at Emhart Corporation, **Walter Abel '39** realized that his company needed to better utilize robotic manufacturing processes if they were to remain viable and profitable. Realizing the plant floor was not the ideal platform for experimentation, he returned to his alma mater for

THE ARCHIVIST

inspiration. Abel met with Gerstenfeld, and over a cup of coffee, the idea for a new partnership was formed: the Manufacturing Engineering Applications Center. It would continue a philosophy as old as WPI itself, bringing together theory and practice to innovate in education and industry.

In March 1981, the first Emhart robots were wheeled into historic Washburn Shops, creating the first robotics learning laboratory at WPI. IQP teams partnered with their Emhart engineer to test the viability of robotic pop rivet guns, improve the production of doorknobs, and wrap shoe shanks as part of footwear manufacturing. Together with its sister program, the Center for Management of Advanced Automation Technology, WPI offered state-of-the-art opportunities in emerging technologies, just as it did from its founding.

—University Archivist **Arthur Carlson**, assistant director, George C. Gordon Library



ROBOTS FROM THE EMHART CORPORATION WERE USED IN THE MANUFACTURING ENGINEERING CENTER TO CREATE THE FIRST ROBOTICS LEARNING LABORATORY AT WPI.





PHOTO BY MATTHEW BURGOS

Director of Global Risk Colin Watters, on helping to keep WPI faculty, students, and staff safe when they travel abroad

What do you do in your role?

I support the students, staff, and faculty traveling abroad for the Global Projects Program (GPP), in addition to all WPI faculty, staff, and students traveling on other WPI-sponsored travel. My role primarily supports the GPP and, as a result, I work closely with the fantastic team at the Global Experience Office (GEO) on all risk, health, safety, and security issues. That includes developing protocols for GPP, training on risk mitigation, and managing incident response in collaboration with GEO and our excellent on-campus partners who support our students on a daily basis.

How do you assess and manage travel risks around the world?

At the Global School, we are fortunate to have experienced faculty as project advisors and center directors within the GPP who often have significant experience at their project centers; they help assess and mitigate potential risks at their sites. The GEO staff are well-versed in navigating travel risks. We also identify potential country-specific risks by leveraging information provided by WPI's international travel, medical, and security assistance partner, International SOS (ISOS), other intelligence gathering providers such as Global Guardian, Factal, GardaWorld etc., and information from the U.S. State Department to ensure we take the appropriate care to reduce travel risk. Additionally, I am a member of the PULSE network, a group of safety and security professionals specifically working in higher education, which provides further guidance and benchmarking on other potential risks.

What types of activities, training, and resources do you provide to WPI community members before and during travel to help keep them safe?

Prior to travel, students in the GPP complete several online courses through Canvas, and receive pre-departure training and site-specific orientation. They also register their travel with ISOS. During travel, students receive travel and security notifications from ISOS or directly from GPP staff/faculty advising them on how to mitigate any specific risks that may affect their location.

Before departure, our faculty and staff receive advisor training that is health- and safety-focused, along with retreats and support from the experienced teams at the Student Development & Counseling Center (SDCC), Health Services, the Title IX Office, and the Legal Office. For those outside the GPP, I work closely with student clubs and organizations, in addition to staff, students, coaches, and faculty on travel sponsored by WPI. I assist travelers with risk assessments, housing assessments, and provide health and safety orientations about the resources available to them.

GEO and I also maintain a duty officer rotation 24/7 throughout the year to act as incident responders during A- through E-Term travel. If an incident should occur, we work with our on-campus support partners (such as the SDCC, CARE team, Health Services, Sweet Center, and Dean of Students Office) toward a resolution. That said, managing risk is primarily an

individual traveler's responsibility, and I always advise our travelers to be aware of their surroundings and to avoid unnecessary risk when possible. Step 1 is to register your trip.

Why is the registration policy for international sponsored travel important?

WPI has an International Travel Risk Policy in place for all students, faculty, and staff engaging in WPI-sponsored international travel that requires the travelers to register their travel on the WPI MyTrips Travel Registry, to update the registry if their travel plans change, and to be contactable while traveling. Additionally, students are required to sign a Participant's Statement of Agreement prior to travel under this policy. For travel to countries that are designated as high-risk (as defined in the policy), an approval process is required prior to traveling and, if approved, an Assumption of Risk and Travel Waiver must be completed.

Registration is important. Once registered, all WPI travelers can access critical international insurance coverage and emergency medical and security assistance during their travels. International travel registration also allows ISOS to send registered travelers automatic alerts of incidents impacting their destinations. Registration pre-authorizes travelers to use the medical, security, and travel services of ISOS while abroad. If you are not registered, you will not receive any notifications and our team will have no knowledge of your location or potential risks, which can cause delays in assisting you when you most need it.

What's the most challenging part of your job?

Managing my inbox and ensuring that I am responding in a timely manner to faculty, students, and staff who often have immediate decisions to make on their travel plans.

What part of your job gives you joy?

I thoroughly enjoy working with the Global School and with my colleagues at WPI. Being part of the team that brings an incident to either a successful resolution or the best possible outcome, given the circumstances, is the most rewarding aspect of my role.

What's your favorite place to visit in the world?

Since I am from Ireland, I have to say that my favorite place is home to see my family and friends. There is no better place to be than Ireland when the sun is shining—that leaves the other 364 days to travel the rest of the world! I have had very memorable and fulfilling experiences in Italy, France, South Africa, Lebanon, Cuba, and, most recently, Iceland, where I was lucky enough to catch a glimpse of the Northern Lights.



SENSE OF PLACE

THE LIFE OF PI

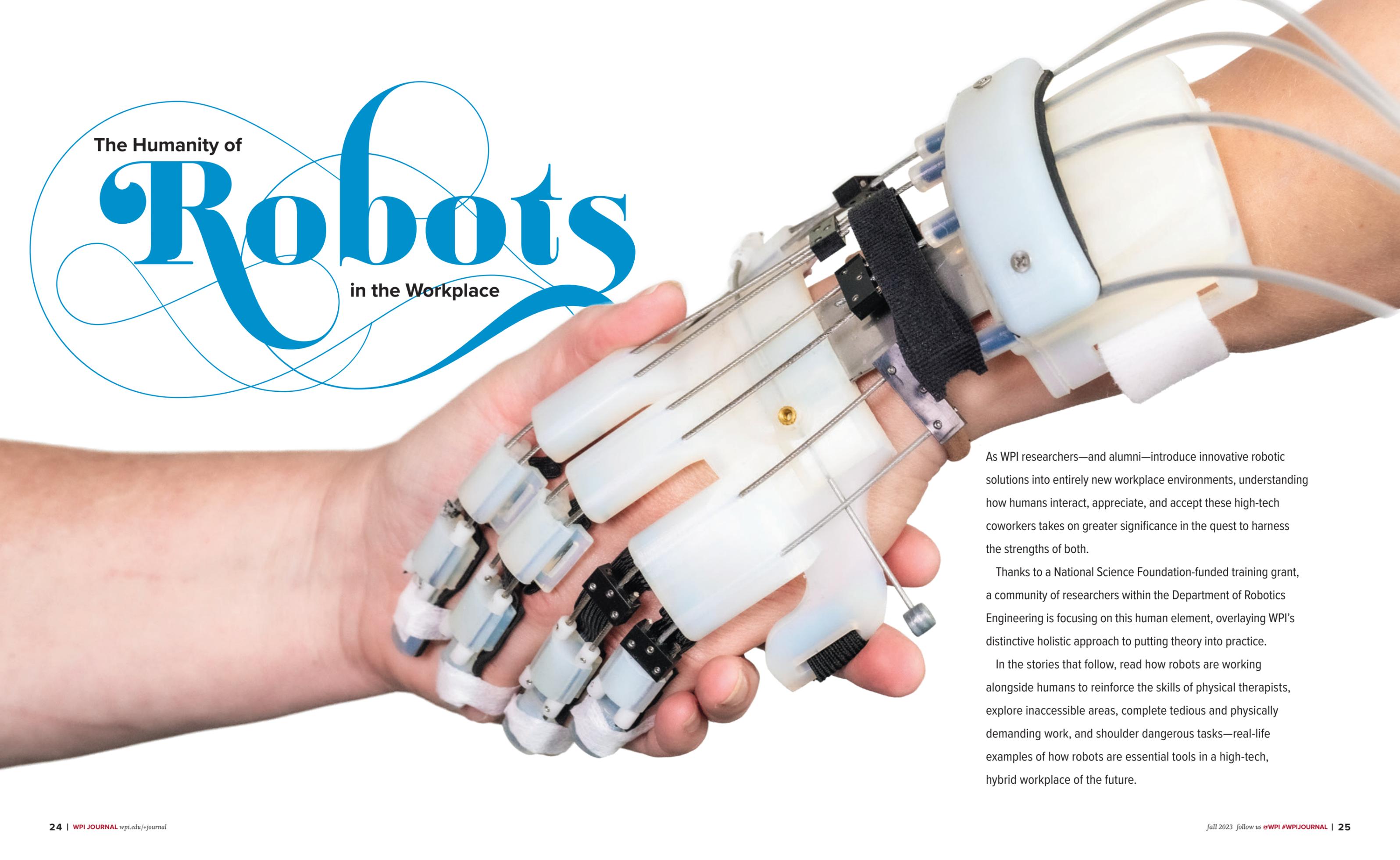
More than 1,360 first-year students, representing 40 states and 34 countries, gathered on the Quad during New Student Orientation in late August for their class photo.

PHOTO BY MATTHEW BURGOS

The Humanity of

Robots

in the Workplace



As WPI researchers—and alumni—introduce innovative robotic solutions into entirely new workplace environments, understanding how humans interact, appreciate, and accept these high-tech coworkers takes on greater significance in the quest to harness the strengths of both.

Thanks to a National Science Foundation-funded training grant, a community of researchers within the Department of Robotics Engineering is focusing on this human element, overlaying WPI's distinctive holistic approach to putting theory into practice.

In the stories that follow, read how robots are working alongside humans to reinforce the skills of physical therapists, explore inaccessible areas, complete tedious and physically demanding work, and shoulder dangerous tasks—real-life examples of how robots are essential tools in a high-tech, hybrid workplace of the future.



earable Robot Offers Hope

Tess Meier uses an insider's perspective to perfect an exoskeleton hand prototype.

As a junior biomedical engineering major looking to fulfill a lab credit requirement, **Tess Meier '18, MS '19**, began working with a robotics engineering graduate student on a hand exoskeleton prototype called the Hand Orthosis with Powered Extension, or HOPE hand. Coincidentally—whether by fate or chance—a close childhood friend was in a car accident about a year earlier that left her with a traumatic brain injury and hemiparesis, some of the very conditions that Meier's team hoped the device would help.

Her inside perspective on life with this type of hand impairment helped focus the research on a previously overlooked aspect. "A lot of exoskeletons provide grasp strength and help the person close their hand," she says. "But for a lot of patients, including my friend, the hand is in a closed fist position all the time and they need something to help them open their hand."

Fueled by her new passion, Meier discovered her calling. She added a robotics engineering minor to her BME major in her senior year, and went on to earn her master's in robotics engineering. She is now pursuing her PhD in robotics engineering.

During her master's studies, she continued to work in the Automation and Interventional Medicine Lab with Gregory Fischer, her master's advisor and a professor in the Department of Robotics Engineering. She was able to test the first HOPE hand prototype on her friend and then used that feedback to make mechanical revisions to the exoskeleton and conduct a larger-scale user study on muscle control.

A RETURN TO ACADEMIA

Meier worked in industry for two years after finishing her master's degree but ultimately felt drawn back to academia. Fischer enthusiastically welcomed her inquiry about continuing her hand exoskeleton research at the doctoral level and helped connect her with the FORW-RD Program (see story on page 37), a natural fit for someone so passionate about harnessing robotics to benefit people.

For her dissertation, she is exploring ways to improve the user interface on the HOPE hand, work that has prompted her to take some neuroscience courses to better understand the human brain.

"For someone with a prosthetic hand, the neural pathway is mostly intact from their brain to their muscles—they are missing their hand. But with a brain injury, like my friend has, it's an area of their brain that is not working," she says. To test how the hand and the brain interact, Meier has created the PneuHOPE hand, a version of the exoskeleton that replaces cables and motors with plastic strips, pneumatic cylinders, and other MRI-safe parts.

WPI's PracticePoint healthcare technology development facility has given her access to state-of-the-art manufacturing and prototyping equipment, as well as the MRI machine in which she will conduct a baseline study to measure whether the PneuHOPE hand can prompt brain activity, similar to when a physical therapist manually opens and closes a patient's hand.

Meier is quick to point out, though, that her goal is not to develop a robot that can replace physical therapists. Both of her parents are physical therapists, after all, and she has always admired the fact that they help people feel better. Instead, she hopes her robotic device will supplement physical therapy.

"If a person gets physical therapy twice a week and they use a hand exoskeleton at other times, that increases how much they're able to engage that part of their brain," she says, explaining that when the motor area of the brain has been damaged, repetitive exercises help reengage those neurons. "It's as if the main highway is closed, so we're trying to find the back roads that might still be connected. And then we help the patient travel those back roads more frequently."

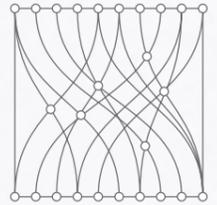
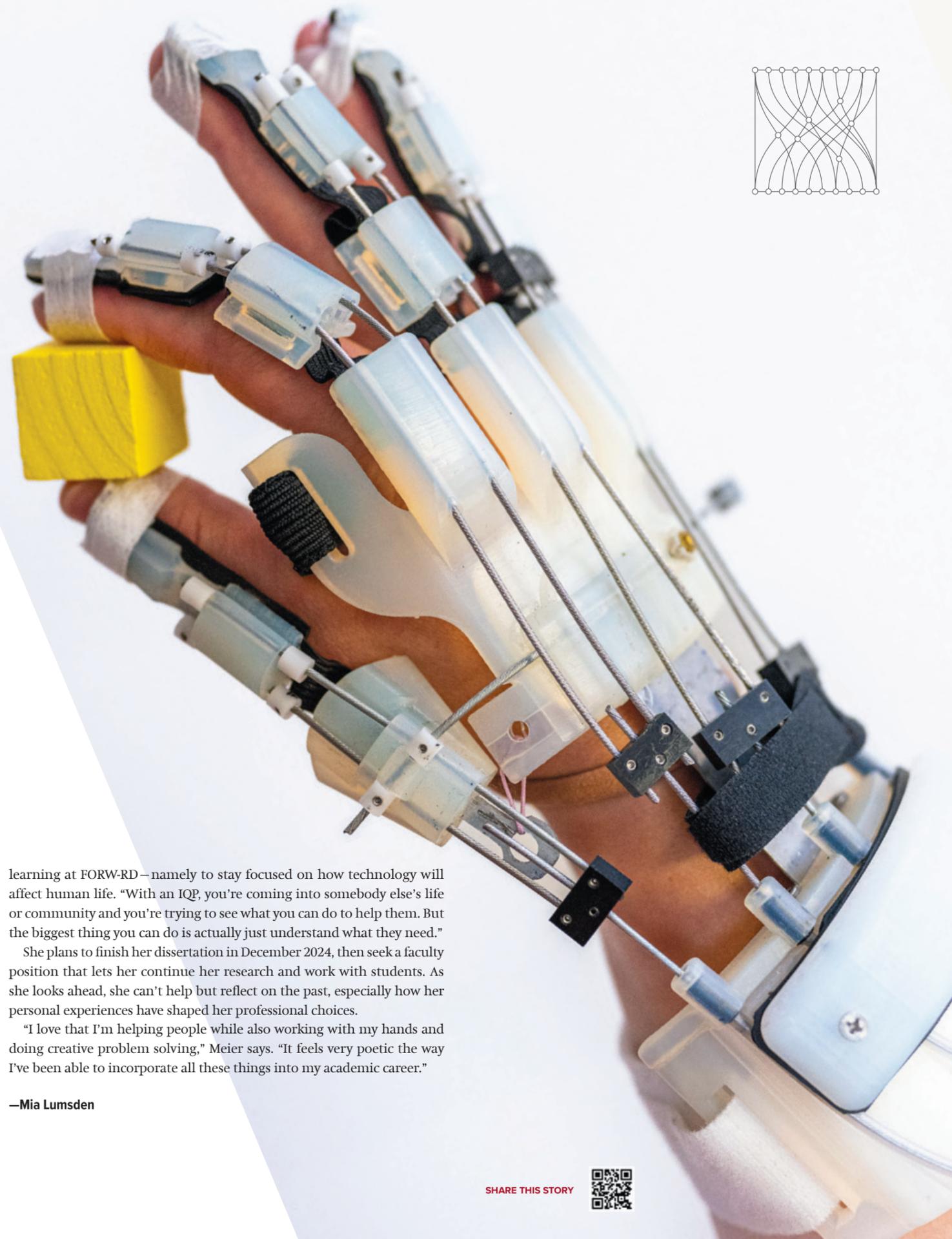
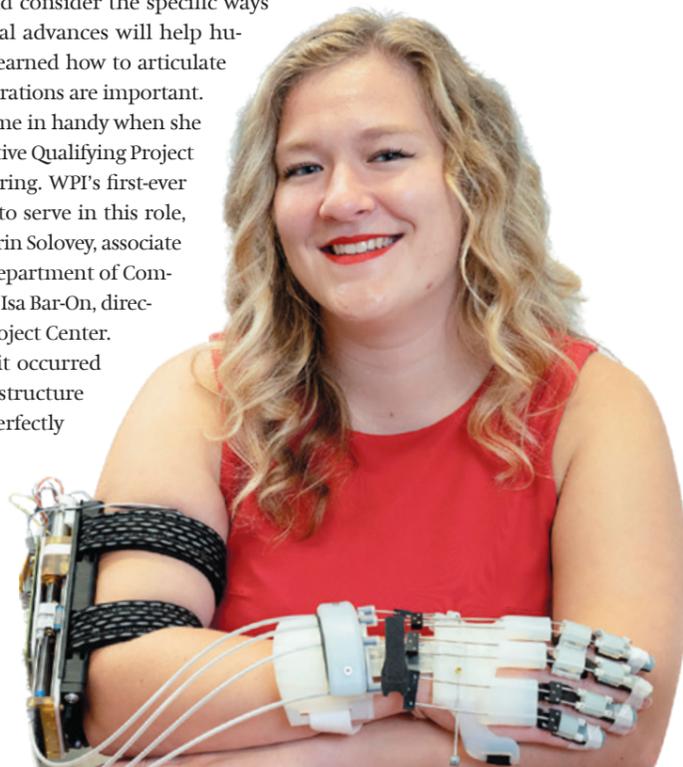
TECHNOLOGY HELPING HUMANS

Working at FORW-RD has helped Meier understand why researchers should consider the specific ways their technological advances will help humans. She's also learned how to articulate why those considerations are important.

Both lessons came in handy when she co-advised Interactive Qualifying Project (IQP) teams last spring. WPI's first-ever graduate student to serve in this role, she worked with Erin Solovey, associate professor in the Department of Computer Science, and Isa Bar-On, director of the Israel Project Center.

At some point it occurred to Meier that the structure of IQPs dovetails perfectly with what she is

TESS MEIER '18, MS '19, AND HER HOPE HAND.



learning at FORW-RD—namely to stay focused on how technology will affect human life. "With an IQP, you're coming into somebody else's life or community and you're trying to see what you can do to help them. But the biggest thing you can do is actually just understand what they need."

She plans to finish her dissertation in December 2024, then seek a faculty position that lets her continue her research and work with students. As she looks ahead, she can't help but reflect on the past, especially how her personal experiences have shaped her professional choices.

"I love that I'm helping people while also working with my hands and doing creative problem solving," Meier says. "It feels very poetic the way I've been able to incorporate all these things into my academic career."

—Mia Lumsden



Breaking Up Is Hard To Do

Berk Calli and James Akl tackle the quest for a robotic shipbreaker.

When large ships and other marine structures are taken out of service, they often end up at shipbreaking yards. There, workers with oxy-propane torches cut them into pieces to be melted down and turned into new products. Shipbreakers must be able to size up and break down objects that come in all manner of shapes and sizes, while working in a rough, hazardous environment. As jobs go, it's a far cry from the structured, repeatable, and relatively easy work robots are typically asked to do.

Despite this challenge, WPI's Manipulation and Environmental Robotics (MER) Lab (one of just a few labs dedicated to developing robotics solutions for such challenging environmental applications), set out three years ago to develop the world's first robotic shipbreaking system. Funded by European Metal Recycling (EMR), a company with shipbreaking operations around the world, the research has produced a robust foundation for a robotic partner that may ultimately help EMR workers be more productive and allow the company to get a leg up in the highly competitive international shipbreaking industry.

More than 20 graduate students and nine undergraduates—all advised by **Berk Calli**, assistant professor of robotics engineering and founding director of the MER Lab—have worked on various aspects of the system over the past three years. **James Akl**, who recently completed his PhD in robotics engineering, directed much of the foundational research.

The work required him to gain knowledge well beyond the realm of robotics. That process began with a week spent observing all aspects of the shipbreaking process at an EMR yard in Brownsville, Tex. "I was really taken aback," he says of the visit. "I could see this was a really complex challenge."

In Brownsville, he saw how teams first detach large chunks from a ship, which experienced cutters and foremen slice into smaller pieces. Finally, less-experienced workers cut the simpler fragments into bits small enough to be sent off for recycling.

The visit convinced Akl and Calli that they should focus their initial efforts on that last step, a relatively simple but time-consuming part of the workflow. They also realized that they could develop a working system quicker if they partnered the robot with a human worker, using the worker's knowledge to help the robot perform its main task: operating the torch and making the cuts.

"It is preferable," Calli says, "when you are going for a commercial solution to make the robot's part of the operation as simple as you can. The human-robot collaboration makes that possible."

Akl identified three main tasks for the robot: determining the best path for a cut; moving the torch at the right speed along that path to fully cut through the metal (adjusting the speed, as needed, to maintain the desired cutting conditions); and recognizing anomalies that might require it to stop work.

To simplify the first task, Akl decided to have a worker mark the best path for a cut with spray paint. With this guidance, he says, the robot can focus its camera on the relevant regions containing the painted line while ignoring the rest. Akl next

JAMES AKL, PHD '23

BERK CALLI

developed a visual tracking algorithm that enables the robot to quickly trace the painted line, even if the line branches or goes around corners.

To tackle the next step, teaching the robot how to cut metal, Akl first had to learn to operate the torch himself, which required training and certification from WPI's Environmental Health and Safety Office and other entities. Working on a test stand set up at the university's Advanced Manufacturing Center on Sagamore Road, he found that by manipulating the feed from a color video camera aimed at the torch, he could create a visual reference that would tell the robot whether it was maintaining a desired heat pool—how human torch operators tell whether a cut is advancing properly.

Over the course of more than 100 lab experiments, Akl accumulated a dataset of images that illustrate successful cuts, failed cuts, and anomalous cutting conditions. He used the image library (now avail-

able for use by other researchers) to train a machine-learning model that can detect an anomaly and alert the worker of the need to turn off the torch (the third task).

Calli says work continues on the shipbreaking robot, building on Akl's research that has led to one-patent and two-patent applications. Among the remaining tasks: integrating the systems Akl developed into a working prototype and marrying that prototype with a mobile platform designed by an undergraduate Major Qualifying Project team.

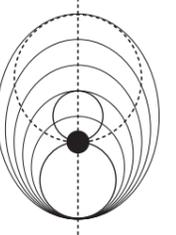
EMR's desire to deploy a working system in actual shipbreaking yards as soon as possible adds urgency to the work. "This is not just an intellectual exercise," he says. "They really see this as a realizable product to enhance their competitiveness."

—Michael Dorsey





MATTHEW URBAN, AT LEFT, CAPITAL PROJECTS MANAGER FOR THE CITY OF WORCESTER, WITH ASSOCIATE PROFESSOR OF ROBOTICS ENGINEERING CAGDAS ONAL, AT WORCESTER CITY HALL WITH ONE OF THE ROBOTS THAT CAN SQUEEZE INTO SMALL SPACES.



A Welcome Invasion of City Walls

Lizard-like robot sneaks into small spaces for mapping, inspections.

WPI researchers have developed a lizard-like soft robot that can creep into walls, ductwork, and pipes to perform inspections and 3-D mapping tasks that could be dangerous or impossible for humans. Associate Professor of Robotics Engineering **Cagdas Onal**, Associate Professor and Director of Sustainability **Paul Mathisen**, Associate Professor of Anthropology **Yunus Telliel**, and Assistant Professor of Robotics Engineering **Berk Calli** collaborated with students and the City of Worcester to design the slender and deformable robot that can get into tight spaces much less invasively than current methods allow. The project was funded by a \$50,000 National Science Foundation grant.

Matthew Urban, capital projects manager for the City of Worcester, worked with the WPI team as it developed and tested the robot, providing access to tight spaces in old buildings.

“City Hall is almost 130 years old,” says Urban. “Within the walls, there is plaster, wire mesh, solid masonry, and steel-type construction. Anytime I need to know what’s in this wall, I need to cut a hole. Then I need to see if I can get a camera in there, and it needs to look in the right direction, and maybe it’s not bright enough. Then I need to go cut another hole.” He says the robot promises to go beyond the limitations of current scoping technology and could prove to be a critical tool used to carefully update historic buildings.

The team built the prototype robot – an “origami” design made of plastic, 3D-printed and laser-machined parts, custom circuit boards, a miniature computer, sensors, a few metal parts, and motors – and tested it in locations across the city. Due to its size and shape, the prototype robot was able to maneuver into the nooks and crannies of the aging infrastructure to unobtrusively navigate inside the walls, above drop ceilings, and into ductwork. Designed to accommodate cameras and sensors that can measure temperature and contaminant levels, the robot can use artificial intelligence to operate with a level of autonomy, and can map the areas it moves through, collecting important data.

Since its steering and propulsion systems are separate, the robot can deform its body—like a lizard—to get into small spaces. Once inside, it

can travel horizontally and even vertically in small spaces. It can navigate maze-like structures without getting stuck, and its modular body structure allows it to use multiple motors to climb over larger steps or gaps, and operate in pipe networks.

If completed and commercialized, the robot could improve worker safety and make cities more sustainable by making it easier to retrofit buildings for climate adaptation.

“Some of these places the robot can get into are not ideal for workers,” says Telliel. “One of our priorities is to design for the safety of people who would be using this robot.” As the social scientist on the team, he says a significant aspect of this project is its potential to present partnerships with the public and civic sector as a motor of innovation in robotics—what he calls “public interest robotics.”

Mathisen says that for Worcester and a lot of other cities, energy is a major factor when determining the impact of climate change on a population. The robot could be helpful in determining how best to insulate upper areas of buildings, which are susceptible to high heat and energy losses in colder, winter months, and also concentrated heat during summer heatwaves, he says.

Calli says the robot’s video and three-dimensional mapping capabilities could bridge the gap between what a municipality knows about a building from blueprints and building permits, and what actually exists. Many older buildings lack detailed plans and likely have had modifications done over the years without much documentation.

Onal says the team is developing proposals and is continuing its efforts to further refine the design, conduct more testing, and develop a system that supports municipal employees in their efforts to mitigate the impacts of climate change.

—Steve Foscett



Working Smarter, Not Harder

Robots tackle the back-breaking, detailed work of layout transfer.

To **Derrick Morse '01, MS '03**, gray spray paint on the floor of a building under construction is a sign of an industry problem—one ripe for a robotic solution. The paint represents a mistake made when workers hand-transfer engineering plans from an architect's blueprints to the bare floor of a jobsite, a physically demanding, exacting job that can take days or weeks to complete, depending on the size of the project.

"When workers make a mistake, they use gray paint like Wite-Out and then snap a new chalk line," says Morse. "Every construction site I've ever been on was covered with gray spray paint. I started thinking, what about a kind of robot that drives around and prints the architectural engineering design on the floor?"

A civil engineering major with a master's in fire protection engineering, Morse started his career in the construction industry as a professional engineer designing fire protection equipment. After earning an MBA from MIT's Sloan School of Management and spending four years in South Korea working as an internal strategy consultant at Samsung, he was looking for a new challenge back in the United States, one that took advantage of his business skills and his insider knowledge of the construction industry.

"I didn't want to be a hammer looking for a nail. I wanted to solve a problem," he says. He ran his idea—what he called a layout Roomba—by his former classmate **Jake Coolberth '02** at Consigli Construction Company, who agreed it might be a brilliant solution for a time-consuming task that takes a physical toll on workers. Morse harkened back to wisdom his father gave him: "My dad always taught me to work smarter, not harder. That's what I'm trying to do."

He attracted some early pre-seed money, then set out to identify a partner with the advanced technical and coding skills he lacked. After meeting nearly 100 roboticists, he connected with Logan Farrell, at the time a NASA engineer who happened to be idle during a government shutdown. Farrell had the technical pedigree, but no previous exposure to startup culture or the construction industry. "He saw my vision and was excited to solve a real-world problem," says Morse.

In 2019, the two joined forces as cofounders of Rugged Robotics, now a growing, 32-employee, Houston-based startup set on changing minds in an industry not known for embracing high-tech solutions. Its

four-wheeled robot, the size of a large cooler, autonomously navigates around a floor using stationary targets as guides, precisely printing detailed information for the skilled-trade workers to follow. One robot can complete the layout five times faster (and more accurately) than if hand-drawn; multiple units working in tandem can cut that time exponentially.

Rather than selling or leasing the robots, Rugged Robotics markets itself as a service, which helps reduce barriers to adoption, says Morse. And with a looming shortage of skilled tradespeople on the horizon, these robots can shoulder a difficult job that may not appeal to the younger generation. "If we're going to change the industry with technology, that opens the door to a broader workforce," he says. "The construction industry isn't viewed as glamorous, but there's no reason it can't be if it's tech-enabled. It's a very rewarding career."

CHANGING MINDS

As might be expected at a five-year-old startup, the Rugged Robotics work environment exudes a mix of buoyant energy, easy camaraderie, and informality, where the lack of office walls or any boundaries at workstations—including those of the two founders—invites collaboration and impromptu problem-solving sessions. The company now occupies about 8,000 square feet in the East End Maker Hub, a makerspace and manufacturing center in Houston's East End, which includes a large demonstration/testing room covered in layout lines and infused with real-life obstacles for the robots to show off their navigation skills.

Being able to relate to workers on job sites is the key to winning converts, says Morse, especially when introducing a high-tech product that might be viewed as a gimmick—or worse, a job stealer. All Rugged Robotic employees, even those in charge of the finances, are required to visit job sites often to understand the challenges and stay focused on the solutions.

"Most of us didn't come from the construction industry, but we all talk the language now," says **Dikshya Swain, MS '17**, a robotics software engineer and one of three other WPI alumni working at the company. Just the fifth employee hired, Swain's software skills



secured her the job, but her willingness to tackle any problem showed she fit into the startup's culture. "My entire first year I was doing electrical work. You have to wear a lot of hats. I loved that phase because you had an immediate impact."

Field engineer **Soumya Balijepally, MS '21**, says she sometimes encounters initial suspicion on weeklong deployments.

"A lot of them come with the prejudice that a robot might take their job. We reassure them, we're not trying to take jobs. We're trying to give them tools so they won't have to bend to snap a chalk line," she says. "On Mondays, they are a little cynical and also a little excited. The more they see it, the more we help them interact with the robot; they come around by the end of the week."

Morse agrees. "There are people in the industry who see this as the future and are excited to get on board, and they learn how to engage with us and use technology to improve their performance. They ask questions; we ask questions. The product has matured and improved because of feedback we get from a jobsite," he says.

The most recent WPI graduate to join Rugged Robotics is mechanical engineer **Madison Kroncke '22**, whose fondness for her alma mater is reflected in the name of her 5-month-old puppy, Higgins. Kroncke was recruited by Farrell, who knew her from her high school days in Dallas when she competed on her school's FIRST Robotics team. In the summer before her senior year at WPI, she interned on a NASA project formerly led by Farrell, which solidified the connection. "I love the fast pace of a startup and working on a team that is so talented.

I'm expanding my knowledge in so many areas—electrical, software, you name it," she says. "Everyone is eager to help, even if you ask to learn about something totally unrelated to your job."

All agreed the fast pace of WPI's seven-week terms, plus the focus on projects and teamwork, prepared them well for the unpredictable challenges they've encountered at the startup. "We need to fix things fast before we go on to the next deployment. When a problem arises, everyone has to jump in and solve it," says Morse.

He notes that Swain, Balijepally, and Kroncke are challenging stereotypes as female engineers working in construction.

"We're working in the construction industry, which is male dominant. And in the robotics sector, which is also male dominant. We're hiring the most talented person across the board," he says. "We're not specifically looking for women, but we're finding some who are really talented. I'm proud of that."

And while he knows the long hours and the stress of building a business takes time away from his family, he also wants to set an example for his two young daughters.

"I want to show them to chase their dreams," he says. "What better way to do that than trying it myself. You don't know if you don't try. If you have an idea, and you want to go for it, go for it. What's the worst that can happen? You will have an amazing journey and maybe you're successful."

—Kristen O'Reilly



FROM LEFT, SOUMYA BALIJEPPALLY, MS '21, DERRICK MORSE '01, MS '03, MADISON KRONCKE '22 (WITH HIGGINS), AND DIKSHYA SWAIN, MS '17.





Robotics Resource for Solving Problems

ROSE-HUB bridges the gap between WPI research and the development of commercial technologies.

Sometimes, a job is so unappealing or impractical that the best candidate for the position may be a robot, one that might not even exist yet. When that happens, researchers and students affiliated with the WPI ROSE-HUB can help.

ROSE-HUB, which stands for Robots and Sensors for the Human Well-Being, is an industry/university cooperative research center (I/UCRC) supported by the National Science Foundation (NSF) that aims to solve critical U.S. business challenges, boost innovation, and develop a high-tech workforce through collaborative research into applied robotics and sensing. Since joining the center in 2020, WPI has launched research projects with six companies, brought in more than \$700,000 in government and private funding, and given students opportunities to improve workplaces for humans.

“The ROSE-HUB model helps facilitate industry-funded research at WPI and exposes our faculty, graduate students, and undergraduates to real-world problems that we can address,” says **Jing Xiao**, William B. Smith Dean’s Professor of Robotics Engineering and head of the Department of Robotics Engineering. “ROSE-HUB projects also give us the opportunity to transfer our technologies to industry, which increases the impact of our research.”

ROSE-HUB, founded in 2014, is one of more than 80 I/UCRCs in the United States and the only center focused on applied robotics and sensing research for applications that benefit human health, safety, and environments. The University of Minnesota leads ROSE-HUB; other academic members with WPI are the University of Pennsylvania and Clemson University.

Although NSF funding supports the universities’ administrative and management costs – WPI has been awarded more than \$500,000 from NSF – each university is also responsible for recruiting industry partners to the center. Industry partners pay at least \$35,000 a year for full membership in ROSE-HUB.

A key feature of I/UCRCs is that they bridge the gap between basic research at universities and industry development of commercial technologies. Research projects can run for years but are typically designed to take place in one-year modules so that results can be rapidly reported. University and industry members of ROSE-HUB meet twice annually – once to select projects for the year ahead and once to report on project progress. In addition, the research is considered “pre-competitive,” so academic members

are free to publish their research, and they retain the rights to intellectual property developed through projects. Industry members can obtain royalty-free, non-exclusive licenses to their center’s intellectual property.

ROSE-HUB is one of three I/UCRCs at WPI. The university also leads the Center for Advanced Research in Drying, which focuses on energy-efficient industrial drying technologies such as those used in food production, and the Center for Resource Recovery and Recycling, which concentrates on recovering, recycling, and reusing materials throughout the manufacturing process.

WPI faculty members affiliated with ROSE-HUB are Xiao; Associate Professor **Carlo Pinciroli**; assistant professors **Berk Calli**, **Jane Li**, and **Markus Nemitz**; assistant teaching professors **Gregory Lewin** and **Andre Rosendo**; and Affiliate Assistant Teaching Professor **Siavash Farzan**. All are members of the Department of Robotics Engineering.

WPI projects have ranged from an autonomous ground vehicle designed to help Dig Safe technicians mark the location of underground utilities on a worksite to a robotic device that slides across power lines to chase away roosting cormorants. A project to develop a semi-autonomous robotic cutting system for metal scrap recycling has led to one patent, additional patent applications, papers published in journals and at conferences, and one PhD dissertation.

Worcester Envelope, a manufacturer based in Auburn, Mass., sought assistance from the ROSE-HUB site at WPI to automate a production job that involved packing paper envelopes into boxes. The job was repetitive and had become challenging to fill, Xiao says, so WPI began working on a way to automate the task. Researchers have made progress on a system that folds flat cardboard into a box and uses sensor-based perception and grippers to pick up and place envelopes into the box.

“It’s a challenging manufacturing problem to solve, because the robotics system must integrate a number of different processes and operate without making mistakes,” Xiao says. “Our goal is to develop a proof of concept for the client, who can then decide whether to commission machines that use our specialized software and hardware.”

For WPI graduate and undergraduate students, working on a ROSE-HUB project is an opportunity to gain experience that appeals to prospective employers. The one-year length of projects is ideal for graduate students, she says, but undergraduates have also participated through senior capstone research projects that developed a prototype Dig Safe robot and a “Bot on a Wire” bird deterrent for overhead power lines.

“ROSE-HUB participation has allowed us to enhance WPI’s project-based learning by giving graduate and undergraduate students a role in effective teams that are addressing critical problems,” Xiao says. “We also know that employers appreciate graduates who can show that they possess experience that goes beyond the classroom.”

—Lisa Eckelbecker



“The ROSE-HUB model helps facilitate industry-funded research at WPI and exposes our faculty, graduate students, and undergraduates to real-world problems that we can address.”

— Jing Xiao

A Community Built on the Intersection of Humans and Robots

A National Science Foundation-funded training program has helped graduate student researchers think holistically about how humans interact with robots in the workplace, while also providing them with mentoring and career advice. The Future of Robots in the Workplace-Research and Development (FORW-RD) program also created a much-needed community of like-minded graduate students, a community that faculty hope can continue even after the five-year, \$3-million NSF grant ends.

The grant came about after principal investigator **Cagdas Onal**, associate professor in the Department of Robotics Engineering, and **Yunus Telliel**, assistant professor of humanities and arts and co-PI, talked informally about the intersection of their work: How robotic technology can be integrated in the workplace in a socially responsible way, and how humans respond to such technology in the workplace.

In 2019, they applied for and received a grant from NSF’s Research Traineeship (NRT) program, which that year awarded \$49 million to 17 institutions across the United States to develop and implement graduate education traineeship models in STEM fields. Since then, 47 trainees—half of whom are international students—have joined the program, with 21 receiving fellowships that include a stipend, tuition, and health insurance. While the grant expires this year, the hope is that the structure can continue using institutional funds or other grants.

In addition to career help and mentoring, FORW-RD trainees participate in specific courses, idea-exchanging seminars, and soft skill development seminars. They also can connect with industry partners, including the five members of the program’s advisory board: Heather Cheong of BD AI Institute, Zachary Dydek of Vecna Robotics, Greg Longtine of Amazon Robotics, Nicole Neves of iRobot, and Victor Puksta of Meta. Each trainee is also expected to complete a thesis/dissertation that includes an aspect of human-robot interfacing in the workplace.

“It started as a funding mechanism, but it’s no longer just that,” says Kristen Keane, NRT program coordinator. Participants continue to be involved in the community even after their funded year, mentoring new trainees and remaining involved in career development and social activities.

Other co-principal investigators include **Jing Xiao**, professor and head of the Department of Robotics Engineering; **Jane Li**, assistant professor of robotic engineering; and **Pratap Rao**, associate professor of mechanical engineering. Other faculty participating include **Soussan Djamasbi**, professor of information systems in The Business School; **Jeanine Skorinko**, professor of psychology and director of the Psychological Science Program; **Berk Calli**, assistant professor of robotics engineering; **Carlo Pinciroli**, associate professor of robotics engineering; **Erin Solovey**, associate professor of computer science; and **Loris Fichera**, assistant professor of robotics engineering.

“In my view, the FORW-RD program is a living testimony to how cross-disciplinary collaboration leads to communal growth,” says **James Akl, PhD ’23**, a former trainee. “The program’s overall structure, the relationships, and the community aspect have been real treasures. Without FORW-RD, my PhD path would have been a much lonelier and isolated path.”

“I have learned from FORW-RD that while robotics can be a source of world-changing innovation, we cannot move forward without thinking of the societal, economic, and political impacts of the technology,” says **Raagini Rameshwar, PhD ’23**. “The FORW-RD program has also provided an invaluable source of community within the WPI graduate program. The cohort is a diverse set of students and together we learn about robotics, social and ethical issues in technology, the world, and ourselves.”

SHARE THIS STORY



JING XIAO





Aiming High

Pioneering fighter pilot Stacey Cotton Bonasso '90 inspires the next generation as a high school STEM teacher.

BY AMY CRAWFORD
PHOTOGRAPHY BY WENDY ADAMS

STACEY COTTON BONASSO was used to hard work and busy days. At WPI, she balanced aerospace engineering classes with multiple sports and early morning ROTC training. Commissioned a second lieutenant in the United States Air Force after graduation, she fulfilled her duties while earning a master's degree in aeronautics and astronautics at Stanford University. As an engineer with the Air Force, she took on extra assignments, joining missions to test new technology on flights across the Caribbean and Europe.

But fighter pilot training was something else entirely.

“IT was grueling,” Bonasso remembers. “It was a firehose of information, so much memorization. When we got there—this is before anybody had laptops—they gave us our books, and the pile I got was about that tall.” She reaches one hand a foot over her head and laughs. “And that was just for one airplane.” The yearlong training, which she completed at Columbus Air Force Base in Mississippi, involved 12-hour days, which sometimes started at 3:30 a.m. Evenings were spent studying before catching what sleep she could.

“It was definitely the most exhausted I’ve ever been,” she says. What kept her going? Her faith, she says. And the conviction that she couldn’t let down the people who believed in her—including the only other woman in her class, who had Bonasso’s back at a time when female pilots were not always welcomed by their male peers. But there’s also something in Bonasso that wouldn’t let her give up, no matter the odds.

“I just wasn’t going to quit,” she says. “I was determined to get through it, whatever it took.”

That grit has always served Bonasso well, from WPI to pilot training to her time as one of first female fighter pilots in the U.S. Air Force. Now, as a high school teacher and mother of five, she hopes to instill that determination in the next generation, too.

SETTING HER MIND TO IT

When Bonasso arrived at WPI in 1986, she had dreams of becoming an astronaut. That was her father’s idea, actually. A U.S. Navy veteran who made a solid living as a plumber in the southeastern Massachusetts town of Norton, he hadn’t gone to college himself. But he believed that his smart, tough daughter, who loved science and math—and was “a bit of a daredevil,” Bonasso adds with a laugh—could do whatever she set her mind to.

“He had been a radar operator, and he would tell me stories about the Navy,” she says. “I was fascinated. So, one day when I was around 12, he was like, ‘I think you might make a good astronaut.’ And I was like, ‘Yeah, you know what? That sounds incredible!’”

When it came time to apply for college, Bonasso sought options that would fulfill her interests in science, math, and military service. She was accepted into the U.S. Air Force Academy, but going to school more than 2,000 miles from home seemed a daunting prospect. “It was such an honor,” she says. “But I think at the end of the day, I just wasn’t quite ready to be that far away from my family.”

Mulling over her options, she realized WPI offered the perfect solution. It was close to home, with a respected engineering program, and by participating in ROTC (Reserve Officer Training Corps), which offered a generous scholarship to boot, she could still graduate as a commissioned Air Force officer. “It was the best of both worlds, and I totally do not regret my decision,” Bonasso says. “I think it really molded me, in many ways, into who I am now.”

Academically, she thrived in Worcester. Her classes were small—as few as 10 students at the upper levels—and the professors were approachable and supportive.

“Of course, everyone knows Van A, right?” she says, remembering beloved WPI fixture Professor John van Alstyne, who taught math for 30 years, served as dean of academic advising, and helped create the WPI Plan. “He was a strong influence in my life because he was just such an encourager. Whenever I was unsure of what to do academically or even with my future, I could go to him and just talk to him about it. He was somebody you could always talk to, even if you were just having a bad day.”

In addition to attending many of her volleyball and basketball games, he would write her encouraging letters, she added. “He called me ‘Supercal.’ He gave me so much belief in my ability to achieve great things.”

That didn’t mean it was easy, though—and there were times that Bonasso’s seemingly boundless energy was challenged.

“All four years, I did volleyball and basketball,” she remembers. “But one year, the track coach asked that, because I was a volleyball player and I could jump pretty well, would I come out and do the high jump. I don’t really like track, but I thought, I’m just jumping. I could do that. I



STACEY COTTON BANASSO '90 AND A 3D-PRINTED AIRFOIL SHE USES TO TEACH HER STUDENTS ABOUT LIFT.

started practicing, and then, of course, my first track meet rolls around, and the coach is like, 'We don't have anybody to do the 400.'

That distance is widely acknowledged as the hardest race in track, Bonasso says, but, somehow, she found herself running it. "That one I'll never forget. I got done and I threw up," she says. "It was that kind of race!"

Meanwhile, she had ROTC obligations, including weekly Leadership Lab, which required full uniform, and early morning physical training. "I've got academics all day, basketball practice, maybe a game," she says. "I come home, do my homework, get up at 5:30 a.m. to go run for ROTC. It was kind of brutal sometimes."

Patti Newcomer-Small '90, who lived with Bonasso their sophomore, junior, and senior years, remembers that Bonasso could seldom be found home. "She and I were just talking about that," Newcomer-Small says. "So senior year she says, 'I'm going to get a cat.' And the rest of us were all like, 'No, no, you're not having a cat, because that will become our cat and we don't want a cat!' She wasn't trying to be inconsiderate—it was more that she just thought, 'I can do anything.' She was driven."

Bonasso did back down from the cat idea, but she stuck with her overcrowded schedule, managing to get top grades even as she stood out on the court and in ROTC. The sense of comradery, and of being part of something bigger, made it all worthwhile, she says. And it was good preparation for the next phase of her life.

THE CALL OF THE COCKPIT

A well-trained engineer, Bonasso knew the ins and outs of aeronautics. But it wasn't until a summer internship at Edwards Air Force Base in California that she felt called to the cockpit.

Midway through her master's degree at Stanford, she was assigned to investigate control issues on the Grumman X-29, an unusual experimental aircraft with forward-swept wings. Edwards was also home to the Air Force Test Pilot School and an engineer was needed to troubleshoot a software issue. Called in to help, Bonasso got to know some of the officers there—and realized something about herself. "As much as I enjoyed engineering, I did not enjoy being behind a computer all day," she says. "It just wasn't me. I needed to be out there doing."

The Air Force, on the other hand, needed her engineering skills, so flight school had to be deferred. Meanwhile, she sought every opportunity to leave the ground, including joining experimental missions to test radar systems in the Caribbean and a classified project that involved daily flights across Europe.

"We flew over the Swiss Alps every day, and then we'd circle over the Adriatic—it was pretty wild!" Bonasso says.

Finally, in 1994, she got the chance at her own plane. Only a year after U.S. Secretary of Defense Les Aspin issued his historic order allowing women to fly in combat, Bonasso was accepted to USAF flight training, one of just two women in her class. And while most of her classmates were welcoming, Bonasso was always conscious of being a pioneer.

"Most of the guys were great, but there were a couple who just didn't want you there," she says, remembering one instructor who was "pretty bigoted," boasting that he would never rate a woman high enough to

"There's a lot to be said for trying to encourage somebody in a positive way to achieve their goals, to better society, to be a good citizen—I like doing that."

earn a fighter. "My girlfriend and I did have to bring that to the attention of the main commander because that was going to directly impact what happened to us after," she says. "Fortunately, the leadership was awesome. They were really upset, very apologetic to me and the other girl, because it was just not right."

It boosted Bonasso's confidence to know that the brass had her back, and she earned her pilot's wings in 1995, along with two Top Gun awards, for aviation and formation flying. Although she qualified to fly fighter jets, a medical issue forced her to take an interim job as a public relations director at Luke Air Force Base in Arizona. Once she was cleared to fly again, she took the controls of the F-16 and never looked back.

"Some of my favorite memories were flying over the mountains of Utah at low level," Bonasso says, noting that "low level" for fighter pilots is just 500 feet above the ground. Her missions, most often over the western United States, involved flying in close formation on training runs, dropping test bombs over salt flats, and speeding through canyons and mountain ranges, all at up to 500 miles an hour.

"That was pretty epic! And those were some of my best memories, just being able to see that beautiful nature around you, and you're flying this machine that's so powerful."

Her life was about to change again, though. During her stint at Test Pilot School, she had met and fallen in love with a test pilot named Vince Bonasso. In 2001, the two married, and soon the F-16 pilot was expecting her first child.

"I would say that that maybe the F-16 community didn't quite know what to make of it," she says with a laugh. "They hadn't had very many pregnant pilots before. I may have been the first!"

For her health and the baby's, she had to be grounded, but she got back in the air as soon as she could, this time as an instructor for the T-38 Talon, a supersonic two-seater. It was then that she realized how much she enjoyed teaching.

"I loved seeing students get a concept that they hadn't previously understood," she says. "If they hadn't been able to land well, and then then



they have a great landing—that was just very rewarding. That was probably my most favorite assignment in the Air Force."

A FAMILY BREAK

Before they were married, Vince Bonasso left the Air Force and took a job flying jumbo jets for FedEx, based at the shipping company's headquarters in Memphis. The family—which would grow to include five children, including twins—lived for a time in Oklahoma, where Stacey was stationed at Vance Air Force Base.

"I was flying, it was great, but he was gone so much because of the commute," she says. "I had had my third child at that point, and it was just getting really physically demanding for me, and I didn't have family there. We knew I probably couldn't do this much longer and maintain my health. We moved to Memphis and I stopped flying, but it was hard. Columbus Air Force Base (where I did my pilot training) is about two and a half hours from Memphis, and I did consider transitioning to that unit. But at the end of the day, I wanted to be with my kids."

Bonasso stayed in the Air Force Reserve, but her main focus for the next decade would be her children, who now range in age from 11 to 21. Despite missing the cockpit, five years ago she found a way to instill her love of science, math, and flying in the next generation by teaching aerospace engineering at a local Christian school.

"There's a lot to be said for trying to encourage somebody in a positive way to achieve their goals, to better society, to be a good citizen—I like doing that," she says.

Her engineering curriculum also cuts no corners. The school has its own wind tunnel, and Bonasso leads her classes in a project that involves using it to test a 3D-printed airfoil, the streamlined body that creates lift for aircraft. Another unit is geared toward students who might want to be pilots one day.

"That's where I teach them a little bit about how to fly," she says. "We have simulators, so I teach them about the basics of flight, about air traffic control, those sorts of things. And then we do a final unit on space, where I teach all about orbital mechanics and general space topics. So it's really comprehensive—it really is aerospace."

Bonasso doesn't oversimplify things just because her students are in high school, and it's gratifying to see them take to the challenging material. And occasionally a student—like the rising junior who confided that she wants to be an astronaut—reminds Bonasso of herself at that age. "I thought back to when I was 17 and I had so many principles," she says. "I wanted to serve. I don't meet a lot of other kids who talk like that, and I don't expect them to. I was pretty intense."

She laughs, imagining that determined teenager who knew she could do whatever she set her mind to. "Probably the number one thing I would say to my younger self," Bonasso says, "is to just enjoy the ride a little more and not think so much about the future. I was so goal-oriented that sometimes I missed what was going on around me. Although I did enjoy it. I did!"





“Much of the success I have enjoyed in my career I attribute to my time at WPI. As I look to where I can support different philanthropies, WPI is always at the top of my list as I want to give back and make sure WPI has the alumni support it needs to continue to innovate, grow, and thrive. Without the generosity of alumni, this would not be possible. —ROBERT VARY '91

Bob became an Alden Society member in 2021 after reading a story about a fellow fraternity brother who had made a gift to WPI. Bob and his wife, Michelle, had just finalized their estate plans and the story inspired them to share those plans with WPI. Through this very generous commitment, Bob and Michelle join a special group of people who are securing WPI's future.

HAVE YOU INCLUDED WPI

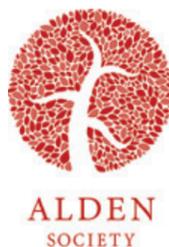
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From the Desk of

ALUMNI ASSOCIATION PRESIDENT **PAMELA (GIASSON) LYNCH '05**



Dear Alumni,

Settling into the role of president of the Alumni Association, I find myself thinking about WPI often and recalling many fond memories of the Hill. It's been wonderful to take these walks down memory lane, and I hope to inspire you to also reflect on your time at WPI. What did your WPI experience mean to you? What impact did the university have on your personal and professional lives? How has the community you built while at WPI continued to play a role in your life?

As you welcome nostalgic thoughts of your alma mater, rest assured in knowing the Alumni Association is doing its part to support the university's mission and keep the Alumni Association thriving. By working strategically to increase meaningful alumni engagement, our goal is to connect and involve alumni with WPI in

a way that will positively impact both the alumni community and the university. And as we work hard to ensure our beloved alma mater and alumni community continue to thrive, we invite you to do your part by engaging with the university.

We thank those who return to the Hill for Reunion Weekend and Homecoming each year. Your attendance at these signature events helps solidify your appreciation for the university and keeps the alumni community connected. Other ways to engage with and support your alma mater are to follow WPI on social media and attend the wide range of exciting events that occur on campus each year.

Keep WPI in your hearts and minds. Your alma mater remains a cornerstone of your life journey—let's continue to build its legacy together.

ILLUSTRATION BY ZOE PAPPENHEIMER



University Celebrates 30th Anniversary of Connections Pre-Orientation Program

WPI's Connections Pre-Orientation Program, formerly known as the Excellence in Math, Science, and Engineering Pre-Orientation Program (EMSEP), celebrated its 30th Anniversary in August. Almost 800 past participants of the program were invited back to the Hill for a Connections Opening Day Ceremony, an alumni lunch, and a 30th anniversary celebration event, all hosted by the Office of Diversity, Inclusion, and Multicultural Education.

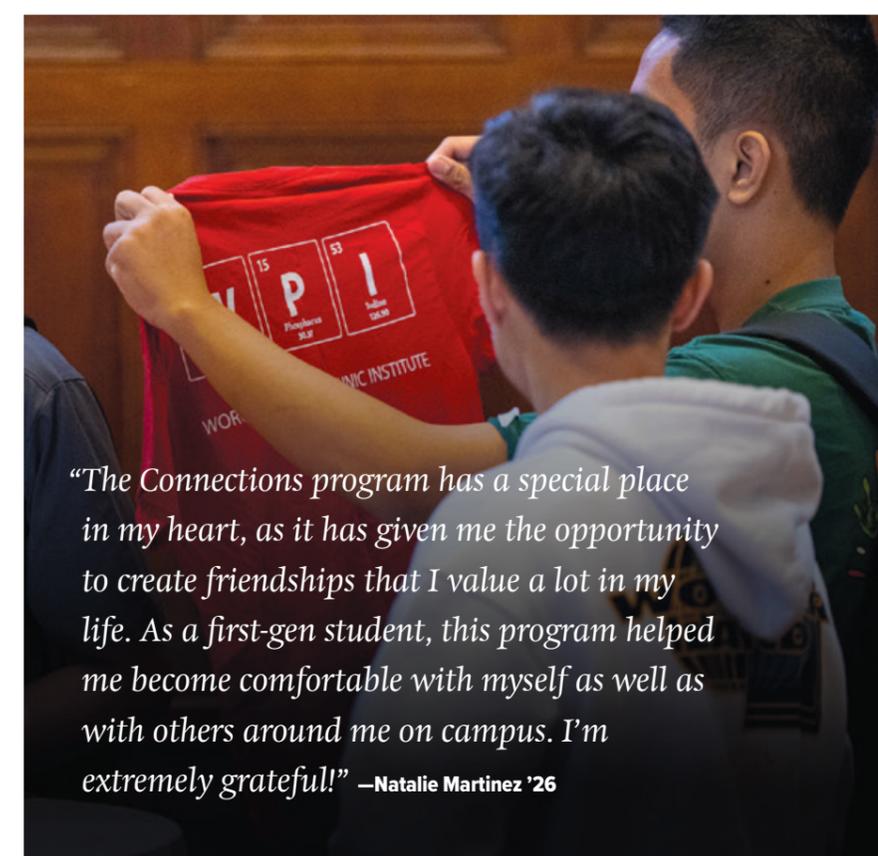
Connections was first established in 1993, when the university welcomed members of the incoming class to campus during the EMSEP Pre-Orientation Program. Although the name changed, the purpose and core values have remained the same: "The mission of Connections is to assist diverse incoming WPI students in successfully navigating through the college transition process while developing a community of leaders and scholars compelled to advocate for diversity, equity, inclusion, and belonging."

Remaining true to its mission, the program continues to support underrepresented students who identify as a first-generation college student; Black, Indigenous, and People of Color (BIPOC), and/or Lesbian, Gay, Bisexual, Trans, Queer, Intersex, Asexual, Aromantic, Agender, and Pansexual (LGBTQIAP+). By fostering friendships and building bonds, the Connections Pre-Orientation Program has positively impacted many of the university's underrepresented students. The number of alumni who attended the 30th anniversary event is a testament to the importance and value of the program.

Happy Anniversary, Connections!

For more information on the Connections Pre-Orientation Program, please visit:

wpi.edu/offices/diversity/success-programs/connections



"The Connections program has a special place in my heart, as it has given me the opportunity to create friendships that I value a lot in my life. As a first-gen student, this program helped me become comfortable with myself as well as with others around me on campus. I'm extremely grateful!" —Natalie Martinez '26

TURNING POINT

MOE YOUNG '03
SPREADS JOY WITH
MARSHMALLOWS.

When **Maureen “Moe” Young** graduated with a biology and biotechnology degree 20 years ago, she never knew her future would include a career that feeds her passions for science and food. Experimenting with flavors, ingredients, and process is part of her everyday activity as founder of Moeshmallows, a custom and gourmet marshmallow company. And while she works with sugar and gelatin instead of cells, her approach isn't all that different from what she loved about working in a biology lab.

Young sells hand-cut marshmallows in local retail stores, and at pop-up locations out of her red-and-white polka dotted 1972 IV Travel Trailer, a vintage treasure fitted to her specifications. She has swapped cell development for business growth that's reflected in fanciful flavors like butterbeer, strawberries and champagne – even dill pickle – with textures and colors to match.

Her work, full of experiments and problem solving, isn't all that different from what she did in labs at WPI and then at Wellesley College, but now she delves into exploring food and science with hefty doses of business and human nature mixed in. “It's probably why I liked WPI and the terms,” she says. “I like to change things up.”

Finding a Home at WPI

When considering college, Young was attracted to WPI because she loved science and felt at home in a lab environment. But she's always been an avid baker, and at WPI, her interests and science and food began to merge.

Her Major Qualifying Project was focused on the military nutrition division of the U.S. Army Natick Soldier Systems Center, where her research evaluated how changing military soldiers' diets could impact their performance in the field. A later project looked at how zinc, known for helping the body repair, could help soldiers recover and get back on track.

A year after graduation, Young was working as a lab supervisor at Wellesley College, where she remained until 2020. That's when she began to focus more fully on creating marshmallows.

“When I was growing up, my mom was always baking,” she says. “There were four of us and there were always fresh cookies or

whoopie pies or something for us. It's probably why I went into science because of all the measuring of everything and figuring out why something didn't rise. Even when I was working and stressed, my go-to was baking.”

An early devotee of baking blogs and an avid reader of cookbooks, Young never shied away from difficult recipes. Fun foods hold a special place in her heart, and when she stumbled across a recipe for marshmallows in 2011, she thought, “Why not?” The squishy, pillowy, almond-flavored results were nothing short of a huge hit. “People were just eating them,” she says, laughing.

That initial flavor has since expanded to include more than 40 flavors and combinations – and she currently churns out 1,000 to 1,600 marshmallows a week.

Interruptions, weather, and the slightest temperature variations can wreck a batch, but they can't deter Young. As she made more marshmallows for family and friends, she'd hear the same refrain: “You could sell these!”

“Then,” she says, “it became a thing.”

She began selling them at a couple of craft fairs, but with two small kids and full-time work, there wasn't much time for more. When the pandemic shut down stores, including bakeries, she found many people still yearned for the comfort of home-baked goods. She began offering a monthly box of 8 to 10 goodies, often with a holiday theme, including cookies, brownies, and marshmallows that could be ordered and picked up safely.

Producing a product that people wanted and enjoyed was satisfying, but Young didn't know if it could be a career move. “It was unique, fun, kind of science-y. I knew how to do everything in the kitchen, but the business side of it? I had no idea.”

She applied and was accepted into EforAll Greater Worcester, a 12-week entrepreneurship training program where she gained an essential understanding of legal issues, business set-up, insurance, and reading the market, among other things.

Since her grand opening in January 2023, her weekends have been packed with weddings, fairs, brunches, and birthday parties. She even appeared at the 2023 Big E in Springfield, Mass. Marshmallows are the obvious draw, but Young offers various goodies that include

marshmallow-filled crepes, smiley-face sandwich cookies, churros filled with homemade fluff, cookies, “s'moe” tarts – even marshmallows colored, flavored, and shaped like cider doughnuts.

Her newest menu offering is a fizzy Italian soda-like drink topped with a colorful marshmallow that delights children and transports older customers back to a time when their cares were fewer. “We keep thinking the tagline should be, ‘It makes you feel like a kid again,’” she says.

The pink sanding sugar-dusted marshmallows that top a strawberries and cream soda drink honored the recent *Barbie* movie, and the charming, swirled colors of a cotton candy flavor (Young's personal favorite) are as eye-popping as they are palate-pleasing. Adult flavors – margarita, cosmo, gin and tonic, and even beer – are also hot sellers.

While the product itself spreads joy, she wants to do more – and it comes from a personal reason. Young intends to eventually open a storefront or other location (the food truck will remain) where she can start employing folks in the autism community. With a 13-year-old son who has autism, she knows firsthand the great potential he has as a steady employee (he already packs bags for Moeshmallows) and the pitfalls he may face finding employment.

A food truck was not in Young's life plan, but this path combines everything she really loves – from science to cooking to her family. “I never would have believed marshmallows would be a thing. I didn't realize people wanted this,” she says. “I want to bring fun food products to people.”

—Julia Quinn-Szcesuil



PHOTO BY MATTHEW BURGOS

Gratitude and Giving Back

ALUMNUS ESTABLISHES THE RANDALL D. PARTRIDGE '72 ENDOWED RESEARCH FUND TO HONOR PROFESSOR ALVIN H. WEISS.

It's not uncommon for individuals to hold lifelong feelings of gratitude for a special teacher. But for **Randall D. Partridge '72**, the relationship he formed with Professor Alvin Weiss was so impactful he established a research fund in Weiss's honor. The Randall D. Partridge '72 Endowed Research Fund Honoring Professor Alvin H. Weiss will help WPI chemical engineering students follow their research dreams as he was able to do while at WPI and well beyond.

Funding research at WPI is a powerful testament to the importance of the university's academic and research enterprise. And for Partridge, it was the perfect way to recognize the role Professor Weiss played in his life—while also giving back for all he was given. "Over the years I've benefited greatly not only from the time I spent at WPI, but also from working with and knowing many professors and WPI graduates spanning many years. I'm sure they feel the same as I do, that we all got a great education, both academically and professionally. I believe it's important to give back so that the students of today and tomorrow have access to the benefits we all received when attending WPI."

Chemical Engineering Professor and Department Head Susan Roberts is grateful for the significant impact this gift will have on the Chemical Engineering Department. "Alvin Weiss was an incredible educator who both taught and inspired the chemical engineering students who were lucky to work with him. The endowed fund in his name will help our undergraduate students complete innovative and transformative research projects in diverse areas such as alternative energy, environmental sustainability, synthetic biology and biotechnology, and medical nanoscience."

Partridge, who was recently recognized by the WPI Alumni Association with the Robert H. Goddard Award for Outstanding Professional Achievement, became interested in chemistry and engineering at an early age. With the encouragement of his parents, he set up a lab in his home, competed in local science fairs, and began to learn about scientific research. When it came time for Partridge to look at colleges, one of his childhood neighbors, a WPI alumnus, suggested he consider "Tech." He was impressed by the then-new Goddard Hall facility for chemistry and chemical engineering and the campus in general, and describes being very happy when his WPI letter of acceptance arrived.

Reflecting on his university experience, Partridge says, "I totally enjoyed my time at WPI, including the Saturday morning classes in math, physics, and chemistry, followed by ROTC drills we all endured in 1968 and 1969. Not only did I receive a great education in chemical engineering, but I was able to develop my research and

interpersonal abilities, both of which have served me exceptionally well over the years."

What remains with Partridge the most from his time as a student is the relationship he formed with Weiss. "Professor Weiss was truly my mentor and friend for many years. I was incredibly fortunate to have had the opportunity to work with Professor Weiss on his research projects, starting in my freshman year and continuing through postgraduate participation in the Joint US-USSR Collaboration in Chemical Catalysis. He encouraged my research activities while holding me to a high standard, all the while providing me with opportunities few students receive, including setting up and operating the new mass spectrometry laboratory at WPI. We planned, researched, and published together, while he made me feel a part of his group and family."

Upon graduating from WPI in 1972, Partridge began his nearly 50-year career with Mobil Research and Development Corporation and later ExxonMobil Research and Engineering Company. Among his remarkable professional accomplishments and achievements, Partridge's career efforts led to more than 65 U.S. patents, numerous publications and presentations, and a unique opportunity to travel and contribute to the world of science and technology.

As a leader, consultant, and mentor on various separation, process, and catalytic technologies, Partridge offers gratitude to his alma mater for the role it played in his successful career. "The education I received at WPI was top-notch. Learning the nuances of chemistry, thermodynamics, mass and heat transfer, and other chemical engineering basics were key in my successful research career with ExxonMobil. Learning how to plan and conduct experiments, and to present the results clearly and concisely—both in writing and orally—were equally key."

Following his return to the Hill after many years for his 50th Reunion, Partridge shared, "I couldn't help but notice how much nicer the campus is now than when we attended starting in 1968. The new research and project facilities are outstanding, and it's obvious the students make good use of them. I'm especially excited to know that the traditions of coupling strong academics with project work continues at WPI, and my hope for the Randall D. Partridge '72 Endowed Research Fund Honoring Professor Alvin H. Weiss is that it will help WPI's chemical engineering students to follow their research dreams, while honoring my old professor, Alvin H. Weiss, who made it possible for me to do the same."

—Sira Naras Frongillo

"It is my hope this fund will help allow chemical engineering students at WPI to follow their research dreams, while honoring my old professor, Alvin H. Weiss, who made it possible for me to do the same." —Randall D. Partridge '72

PROFESSOR ALVIN WEISS IN THE LAB WITH A STUDENT.



“This gift will set us apart from competitors and enhance our exceptional experiential learning programs, fostering collaboration between our students and partners in both the private and public sectors.”

—Associate Professor of Finance Kwamie Dunbar

ILLUSTRATION BY ALBERT ESRI

Anonymous Donor Makes Transformative Gift

SUPPORT OF FLAME-WPI BUSINESS SCHOOL FINTECH LABORATORY IS AN INVESTMENT IN STUDENTS.

A generous alumni donor is helping to keep WPI at the epicenter of research, instruction, economic impact, and community partnerships in the financial technology (FinTech) realm. The donor, who wishes to remain anonymous, made their gift in support of a partnership between WPI and Foundation for Liberal and Management Education (FLAME) University of India. The gift currently stands as the largest donation to The Business School in the last decade.

As an innovative polytechnic, WPI long ago recognized the value of integrating business with the school’s STEM curriculum. For over 70 years, the university has been developing STEM students into adaptive leaders who effectively combine technology with business acumen.

Standing as a robust business school for the world’s top STEM change makers is a tall order, one assisted by the university’s founding tradition of philanthropy. “This gift is yet another stellar example of WPI alumni continuing the tradition of philanthropy at the school and making a positive impact on students, the WPI community, and the world,” says Assistant Dean Brent French. “Our biggest challenge is creating a transformational student experience in a way that’s financially sustainable over the long term. The FLAME-WPI Business School FinTech Laboratory gift helps us do just that – deliver exceptional student ROI now and for years to come.”

On a global scale, the multinational nature of the FLAME-WPI partnership further solidifies WPI’s global impact and lays the groundwork for future beneficial partnerships. Additionally, the gift supported the international Future Finance and Economics Association (FFEA) conference held on campus in October 2023. By bringing digital financial scholars together for the first time in the United States and providing them a forum for presenting new ideas and discussing the future direction of FinTech research, this gift helps WPI continue to grow FinTech as an area of expertise and thought leadership.

On campus, the gift will help contain costs and increase students’ value to the marketplace. For example, students now have access to valuable financial databases without paying additional course fees. And for those students interested in pursuing a career in the emerging FinTech industry, they now can enroll in one of two newly launched interdisciplinary degrees – Bachelor of Science in FinTech and Master of Science in FinTech.

For underrepresented students, in particular, this support is highly impactful. The Business School has been active in making FinTech available to underrepresented minority communities and socio-economically disadvantaged students so they can access and leverage the benefits of these technologies. A great example of the work being done in this area is The Business School’s Commonwealth FinTech Bootcamp held on campus in 2022. The Bootcamp taught the fundamentals of FinTech to high school and early college students to raise awareness, create passion for the industry, and encourage students to pursue FinTech-related education.

“We want to ensure FinTech is something that can be understood and harnessed by everyone,” says Dean Debora Jackson. “It’s all about marrying what is being learned in our labs and classrooms with meaningful community engagement. How can we ensure that those who have been left behind can have a seat at the table, and help to shape solutions that are relevant and empowering for them?”

Associate Professor of Finance Kwamie Dunbar says, “FinTech is reshaping the financial services industry, increasing the demand for tech-savvy individuals who can create innovative financial products, improve efficiency, and promote financial inclusion. Meeting these demands not only satisfies market needs but also stimulates economic growth.

“To achieve this,” he adds, “The Business School offers comprehensive FinTech programs that equip students with a wide range of tools and knowledge across disciplines like business, engineering, entrepreneurship, computer science, mathematical sciences, and data science. To ensure our programs are cutting-edge and unique, generous donations like this one are crucial. This gift will set us apart from competitors and enhance our exceptional experiential learning programs, fostering collaboration between our students and partners in both the private and public sectors.”

For more information on The Business School, visit <https://www.wpi.edu/academics/business>. To learn about ways to support the school, contact Karen Sharpe, assistant vice president of leadership giving, at ksharpe@wpi.edu.

—Sira Naras Frongillo

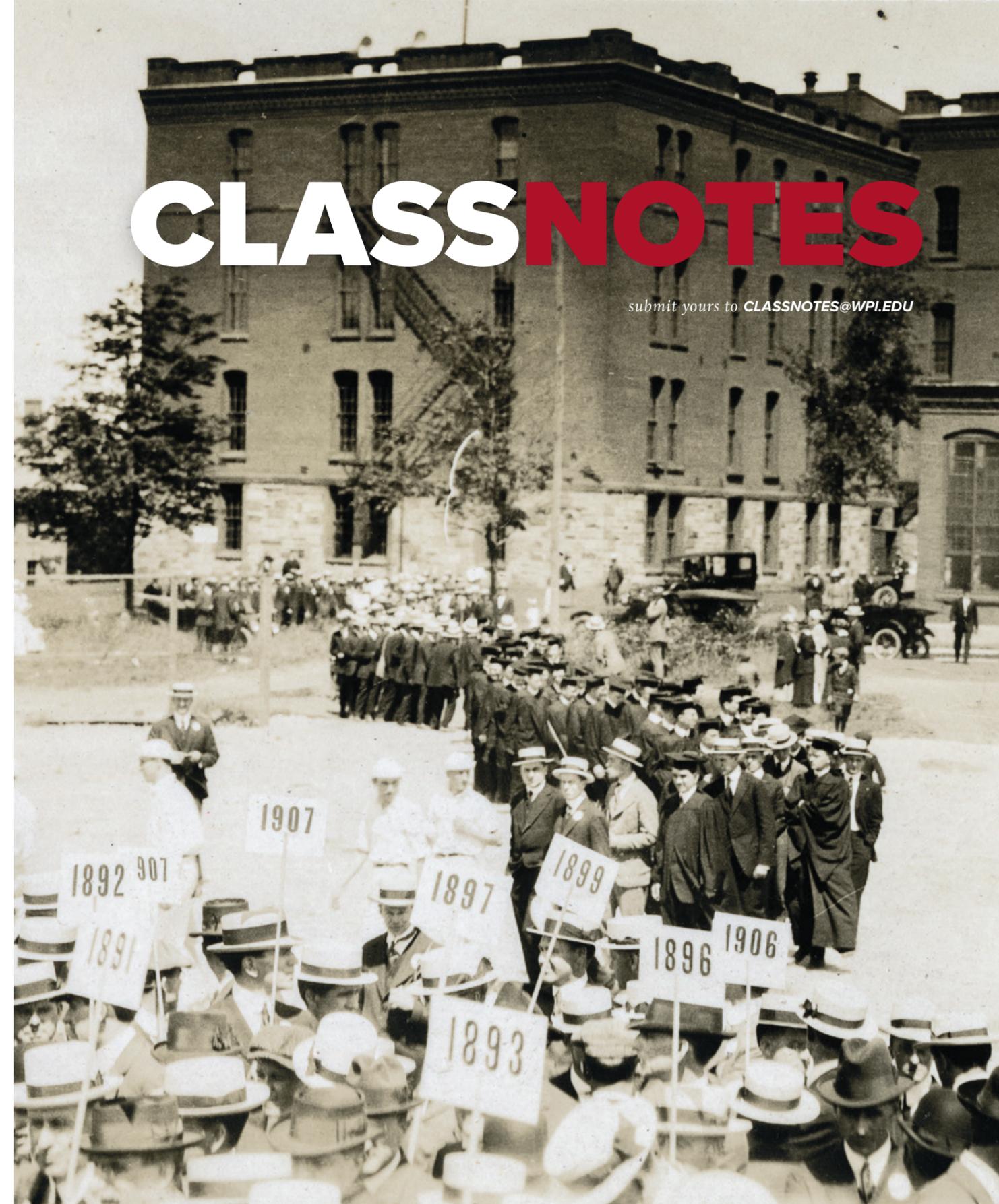


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1917

Edwin Eugene Aldrin Sr., the father of astronaut Buzz Aldrin of moon-landing fame and an aviator in World Wars I and II, was featured in a *Telegram & Gazette* article on “Worcester’s Notable Graduates.”

1950

John Margo reports that he is in contact with fellow class member **Schuyler Keating**. John shared that he retired from ExxonMobil in 1986, living for 30 years in Venezuela. He transferred to Houston, Texas, a few years before his retirement and now lives in a senior facility with Betty, his wife of 68 years. He would like to get in contact with other members of the Class of 1950.

1951

Dick Davis worked in engineering and marketing at Monsanto St. Louis until 1983, then returned to school from 1990 to 1994, graduating *magna cum laude*. He is a licensed chiropractor and acupuncturist; he practiced in St. Louis, Mo., and the surrounding area until 2021. He and his wife, Susan, live on a rural Missouri farm while enjoying nature.

1956

Jack McHugh now lives in Naples, Fla., with Joy, his wife of 66 years. He hopes to connect with WPI classmates in the Naples area.

1967

Len Lamberti writes, “I published my first book, *Embellished Prose: Fifty Years of Collected Writings*. A memoir of sorts—told through poems and vignettes—it is meant to resonate warmly with friends and family and entertain new readers. I think some of my WPI classmates and colleagues may find it of interest.”

1970

James Bagaglio writes, “At the Ecotarium’s *A Night at the Museum* fundraiser, I was honored for my volunteer work before, during, and after the COVID-19 pandemic.”

1971

Stan Sotek completed his career at Raytheon in the fall of 2022, having worked there full-time as an engineer for 37 years. His last assignment was in manufacturing test engineering at the Missiles and Defense Division of Raytheon Technologies Corporation.



▶ AMARA JOY MCBRIDE-BARBER, GRANDDAUGHTER OF WILL MCBRIDE '74

Prior to that, Stan worked as an engineer for Anderson Power Products, a business unit of High Voltage Engineering Corporation in Burlington, Mass.

1974

Will McBride writes, “We welcomed the arrival of our second grandchild, Amara Joy McBride-Barber on April 18. Everyone is doing well, except for lack of sleep. I get to help out and spend even more time with my three-and-a-half-year-old grandson, Owen. I am still working, but only part-time. I’m building a new dwelling in Anchorage to be close to the grandkids and I just finished designing a vacation cottage for the Big Island of Hawaii.”

1975

Jeff Webber writes, “The third book in my series (about an engineer being transported

accidentally to a medieval(ish) world where magic is real) was released this past August. The first book was released in December 2021 and the second in September 2022. I am currently working on book four. The titles (in order) are *Enimnori: Arrival*, *Enimnori: Discovery*, *Enimnori: Challenge*, and *Enimnori: Crisis*. Enimnori is the name of the city near which the main character appears after being accidentally summoned by a powerful but very young magician in a panic. The city deals heavily in iron mining and steel production, therefore ‘Enimnori’ is ‘Iron Mine’ spelled backwards (I thought it was funny).”

1976

Randy Emerson writes, “Our trip to Florida this winter took us through Gainesville, site of the 1974 Gator National Invitational Collegiate Bowling



▶ RANDY EMERSON '76

Championships won by WPI. I couldn’t resist stopping to see if the lanes were still there. Although they have been renovated and upgraded to modern standards, the 14 lanes have survived. Almost 50 years ago, but it brought me back!”

1977

Robert Desourdis has been included in Marquis Who’s Who for his nearly 50 years of professional excellence in systems engineering, radio and wireless telecommunications, and technical collaboration. This honor selects individuals who have made noteworthy contributions to their fields. He serves as a collaboration consultant, master solution architect, and editor for NOVA Science Publishers’ *Homeland Security Series* for Desourdis Collaboration, which provides services to businesses that cater

to governmental needs in the Department of Defense and homeland security domains. He has also created or contributed to 20 different books; his most recent focused on lessons learned from the COVID-19 pandemic.

1979

Robert Hart, a WPI trustee, was honored for his philanthropy by The Jewish Federation of Greater Los Angeles. He is the founder, CEO, and president of TruAmerica Multifamily, a Los Angeles-based multifamily investment firm that specializes in the acquisition and renovation of large apartment properties across the United States. He devotes his time to a wide variety of charitable organizations and has raised tens of millions of dollars to better his community. He also received the 2022 Outstanding

Philanthropist Award, the 2017 City of Hope Spirit of Life Award, and the 2009 Humanitarian Leadership Award.

Steve Rusckowski has been named to the Tenet Healthcare Corporation Board of Directors. He will serve as a member of the Human Resources Committee and Quality, Compliance, and Ethics Committee. Tenet Healthcare Corporation is a multinational healthcare services organization based in Dallas. Steve is the former chief executive officer and president of Quest Diagnostics, a position he held from 2012 until 2022. He also served as chairman of the board for Quest from January 2017 through March 2023.

Brad Traver is the former Petrified National Forest Park superintendent and has had a new Triassic reptile species named after him and his wife: the *Puercosuchus traverorum*. The reptile was first discovered in 2014 in the Blue Mesa area of Arizona and is believed to resemble a Komodo dragon. Brad provided much support to the paleontology program at the park.

1980

Stephen Kmiotek, WPI chemical engineering professor of practice, received the 2023 Trustees’ Award for Outstanding Academic Advising and served as honorary marshal at the Class of 2023 undergraduate commencement ceremony. Steve recently celebrated his 10th anniversary as professor of practice at WPI.

George Tobin was recently recruited by Brycotech Space and Engineering, a federal contractor headquartered in

Alexandria, Va., as a senior procurement officer and subject matter expert. He returns to the same department he retired from after 22 years of federal service. He also spent 15 years with AT&T and IBM Global Services in a number of capacities. He says, “I’m excited to be working on the successor to COVID-19 Operation Warp Speed within the department, the U.S. Department of Health and Human Services Coordination Operations and Response Element, H-CORE.” He and his wife, Jane, reside in Maryland—about 45 minutes from Washington, D.C.—and are active in church activities, car events, gardening, running, golf, and visits to their new granddaughter as often as possible.

Martin Rowe is the senior technical editor of *5G Technology World*, a site “for engineering adding wireless connectivity to devices and for engineers working on the wired and wireless aspects of 5G networks,” according to the site *Engineers Garage*.



▶ GEORGE TOBIN '80



▶ STEPHEN KMIOTEK '80, WPI CHEMICAL ENGINEERING PROFESSOR OF PRACTICE, RECEIVED THE 2023 TRUSTEES' AWARD FOR OUTSTANDING ACADEMIC ADVISING AND SERVED AS HONORARY MARSHAL AT THE CLASS OF 2023 UNDERGRADUATE COMMENCEMENT CEREMONY.

1981

Bradford Drury writes, "I retired from surgery 10 years ago and am now an artist and illustrator. My new book, called *A is for Anchor: B is for Boat*, is available on Amazon. My 33-foot Nonsuch sailboat is my studio for my fine art and illustrations. This boat has carried my family and me, plus two dogs and a hermit

crab (named Hermione), up and down the East Coast. I'm hoping those with children in their life will enjoy sharing the beauty and humor of the boating life."

1982

Bernard Gutmann was appointed to the board of Enovix, a California-based manufacturer of silicon-anode lithium-ion

batteries. He has over 40 years of experience in the semiconductor industry, holding various financial leadership roles. He most recently was the executive vice president and chief financial officer and treasurer of ON Semiconductor. "Enovix has an incredible opportunity to be an industry leader in a space that is in desperate need of

innovation," he writes. "I look forward to working with the management team and guiding the company into an industry-leading global corporation."

1986

George Aghjayan wrote an article for *The Armenian Weekly*, titled "Genealogy: 'Useful in the Toolkit of Genocide

Education." He is the director of the Armenian Revolutionary Federation (ARF) Archives and a member of the ARF Central Committee of the Eastern United States. As a retiree, he focuses on Armenian-related research and projects, especially on the demographics and geography of western Armenia. He is a frequent contributor to *The Armenian Weekly*.

1987

Nancy Pimental was featured in a *Telegram & Gazette* article, "Worcester's Notable Graduates." She is one of the writers of *South Park*, the adult animated sitcom, and she succeeded Jimmy Kimmel as co-host of the Comedy Central game show *Win Ben Stein's Money*.

1988

Pascale Fung was featured in the *Telegram & Gazette* article "Worcester's Notable Graduates." She is the director of the Center for AI Research at Hong Kong University of Science and Technology. Her research focuses on building intelligent systems that can understand and empathize with humans, according to the article.

Bill Noel was a contributing author for the *ABL Advisor* article "Factoring Finance: A Solid Anchor in Economic Storms." He is the chief product officer at Solifi, which develops software for financial institutions and equipment-leasing companies. He has over 30 years of experience in business and operational strategy across software electronics, semiconductor, and industrial products industries, specializing in business and

operational strategy, innovation management, and product development.

1991

Shawn Markham joined the Board of Trustees of Corning Museum of Glass. Her career at Corning Incorporated spans 32 years and she was recently named a corporate fellow. About her new role, she says, "By nature and by training, I tend to be a very practical and pragmatic person. We are always having to make choices on priorities in life, even when it comes to art. Using skills from the engineering world, I hope to help guide decisions as there is still room for feelings and ideas to be captured in the selection processes. And specifically, from a science perspective, how can we help someone think about glass or STEAM careers differently through a display in our Innovation Galleries."

1996

Rear Admiral John W. Mauger led the U.S. Coast Guard search for the *Titan* submersible when it went missing on a voyage to view the *Titanic* wreckage in June 2023. Prior to serving as rear admiral, he was the assistant commandant for Prevention Policy, responsible for the development of standards promoting marine safety, security, and environmental stewardship.

Shelby Walker was appointed as senior vice president and general counsel for Korro Bio, a leading RNA editing company focused on the discovery and development of novel genetic medicines. In her role, she leads Korro's legal organization including intellectual property,

corporate governance, and compliance functions, according to the announcement. She has over 20 years of experience serving as general counsel for several biomedical engineering companies. "Korro is a leader in the RNA editing space and has assembled a top-notch team driven to translate the company's foundational science into groundbreaking therapeutics for both rare and prevalent diseases," she said in the announcement. "I am thrilled to join Korro at such an exciting time for the company and the field of genetic medicine."

1998

Henna Karna was featured in an article by *Net News Ledger*, which detailed her career path and achievements. She was named as one of the top five global leaders in Insurtech by *Insurance Network News*. She has also received a slew of accolades, including ELITE Power Women, CELENT Model Insurer, and ACORD Top Women Executives. Her career has been the focus of articles in *Forbes*, *Leaders Edge*, and *Carrier Management*. She earned an MBA from MIT Sloan while also completing her master's in applied mathematics and her doctorate at the University of Massachusetts.

2000

Karen (Hirst) Spaleta writes, "I graduated this spring with a PhD in geosciences from the University of Alaska Fairbanks. My thesis, titled 'Developing new geochemical analytical methods and evaluating the potential for tellurium and bismuth extraction from existing gold mines,' was about

finding solutions to the world's pending critical minerals supply crisis. I continue to work as the deputy director of the Alaska Stable Isotope Facility at the University of Alaska Fairbanks, where I specialize in measuring strontium isotopes to reconstruct how animals move around their habitat. Some days I get to work on woolly mammoths and other days on a sculpin (a type of fish) the size of my thumb."

2001

Narayan Gangadhar (MS) was appointed as CEO of 5paisa, an online stockbroker based in India. He is a former senior executive at Google, Uber, and Amazon with over two decades of experience. "5paisa.com was the original disruptor in Indian broking industry and democratized equity investing for millions of Indians by offering a great platform at affordable fees," he said. "I am happy to be a part of the legacy and excited about the accelerated digital transformation journey ahead."

2003

Naveen Selvadurai was featured in the *Telegram & Gazette* article "Worcester's Notable Graduates." He co-founded the popular location-based social networking app Foursquare.

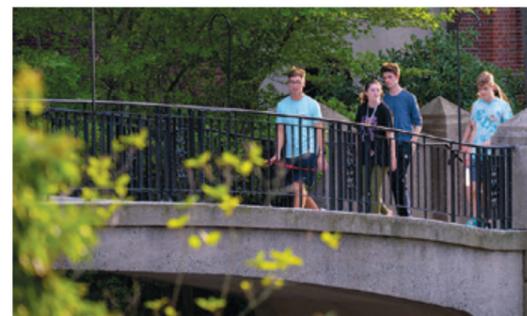
Conn Doherty joined Collins Aerospace as vice president and general manager of BMC2 & Autonomy Solutions. He manages Collins's command and control autonomy platforms. He is the former vice president of strategic campaigns at Raytheon Intelligence & Space.

Russ Bozek '03 sponsors a President's Circle Scholarship, which is awarded to a sophomore student with demonstrated financial need to support his or her remaining undergraduate journey. Supporting a President's Circle Scholarship is a powerful opportunity to impact students and help them get through to Commencement!

Inquire about establishing a President's Circle Scholarship at giving@wpi.edu or (508) 831-6052, or give online to financial aid and scholarships at:

wpi.edu/+giving

"I give to WPI because I recognize the importance of the sacrifices given by the many who came before. What I have achieved, I did so not alone, but with the support of others: family, friends, teachers, fraternity brothers, career mentors, and the WPI community. I encourage all alumni to give and help develop the next generation of leaders and problem solvers!"



2004

Phil Surgen was featured in an article by *Speedway Digest* for his work as a NASCAR engineer and crew chief for Trackhouse Racing driver Ross Chastain. He is based at the New Hampshire Motor Speedway in Loudon, N.H.

2005

Katherine Tromp was named interim dean of Northeast Ohio Medical University College of Pharmacy. She joined the university as the senior associate dean for the College of Pharmacy. Previously, she served as the associate dean of the Florida Pathway and associate professor for the Lake Erie College of Osteopathic Medicine School of Pharmacy in Bradenton, Fla., where she oversaw the progression of 500 students and supervised 25 faculty members.

2007

Priya Jayachandran is a director at Pfizer in Boston. Her published papers can be found in *Nature* and *New England Journal of Medicine*. She also produced a paper with Dr. Rada Savic of the University of San Francisco and Uppsala University in Sweden called "Computer Simulation of Drug Interaction in Humans and Pharmacometrics."

2008

Birk Birand is co-founder and CEO of Fero Labs, which secured \$15 million to reduce manufacturing emissions with artificial intelligence. Fero Labs is an AI-driven manufacturing process optimization software company. He said, "The

industrial sector is notoriously hard to decarbonize, and hardware solutions like carbon capture and storage come with a hefty price tag and daunting implementation process. White-box AI software requires no capital expenditure and can be quickly implemented. This means companies can immediately start reducing emissions and quantify emissions reduction more accurately with easy-to-understand dashboards and reports. Tangible proof of impact is a crucial part of the sustainability journey."

Jillian Kaplan was featured in the *Dell Technologies* article "Four Employee Influencers to Follow at Dell Technologies World." As head of global telecom thought leadership, she said, "Sustainability is a huge focus for me this year. I always love the 'Technology for Good' theme, and I think over time [as an industry] the focus on sustainability has come and gone a few times. However, this time I believe it is here to stay—and with my focus being Telecom—which has massive data centers and is building its edge and cloud right now—we need to come together to build a better future. I am excited to see this focus come to life and stay at the forefront."

2009

Kellie Moulin became the principal of Westerly High School in Westerly, R.I. She has more than 20 years of experience in Massachusetts schools, including as a math teacher, as department head, and as assistant principal of South High School in

Worcester. "I am thrilled about the opportunity to be the principal at Westerly High School," she said in an article in the *Westerly Sun*. "WHS has such a rich history of tradition and academic excellence, it is an honor to work with the staff, students, and community members. I have been visiting Westerly and am very impressed with the friendly and supportive community. I am looking forward to the coming school year."

2012

Fioleda Kesseli was named chief technology officer of a Duke University capital partner, medical device start-up company Resolute. She formerly served in executive roles at Duke and at Viamer Biosciences.

2013

Rebecca Coppa was interviewed for an article by *Coastal Review* about the Erosion and Sediment Control program in North Carolina and the threat of erosion. She is a sediment education engineer and teaches various community groups about erosion and erosion mitigation through various educational programs. "The environment has always been something I've been passionate about, and my passion for environmental education, getting learners of all ages outdoors, and letting them learn through play, has only grown these past few years as I've been learning so much myself as I am pursuing my North Carolina Environmental Education Certificate," she said in the article. "And as that

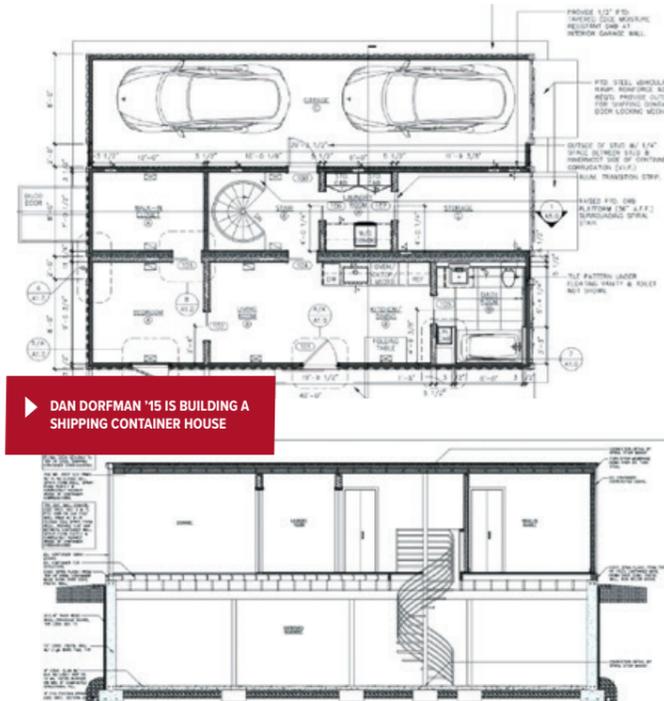
passion has grown, I've made a conscious effort to bring the Enviroscope, soil or water or other things that the students can touch and play with if I can't get the students outside. Because the more the students interact with the lesson and materials, the more I see them lighting up, becoming interested, and hopefully remembering what they learned for years to come."

2014

Joshua Croke runs Action! by Design, a consultant business they started while a student at WPI, and works to support community growth and change through creative arts, media, and design with a focus on equity, liberation, and joy. They are also the president and co-founder of Love Your Labels, an organization that explores identity and expression with LGBTQ+ youth through art, fashion, and design, and works with families and communities to create inclusive and loving spaces everywhere. They've also recently accepted a Transformative Development Initiative fellowship with MassDevelopment in support of equitable community and economic development in the Mason Square district of Springfield, Mass. "Because my IQP and MQP included the challenges that sometimes come from working with groups of people, each was very much a learning opportunity for me—teaching me how to collaborate and make friends with a wide breadth of interdisciplinary and multi-faceted peers. The value of WPI's project-based learning is not only that students got to work on cool and impactful



▶ JOSHUA CROKE '14



▶ DAN DORFMAN '15 IS BUILDING A SHIPPING CONTAINER HOUSE

projects, but also that we needed to work well with others. I don't know where I'd be without WPI's support of not only student projects but of students themselves. WPI's project-based curriculum became the framework of my craft, but the beautifully welcoming and accepting campus community became the foundation of my vocation."

Although Joshua has earned a lengthy list of community awards, ranging from the *Worcester Business Journal's* Power 50 (2023), and *Pride Magazine* LGBTQ Leaders Under 40 (2020), they remain humble, saying their most joy-giving moments come from seeing their work positively impact peoples' lives, especially when parents ask them questions or for help in understanding their children's experiences around diversity,

equity, and inclusion. "My hope is that our community and our world become a place where everyone has the opportunity to thrive, and that the unique diversity of every individual is what gives us strength to become a truly united nation."

2015

Dan Dorfman writes, "Over the past couple of years, I've worked with an architect's office to plan out a shipping container house that I plan to live in, which is designed with maximum sustainability and upgradeability in mind. I'm very proud of the vision that'll be realized. It's taking place in Quaker Hill, Conn."

2016

Elizabeth (Schofield) Vass is a

product design engineer for Seat King, LLC, where she works to develop materials, designs, and products that will lead the next generation of seating solutions. She explains how WPI prepared her for her professional journey, saying, "The education from WPI absolutely enabled me to start my career. In fact, when I was offered my first job, I was told I was hired due to the work I did on my Major Qualifying Project."

Beyond academics, WPI prepared Vass for her career in other ways as well. "At WPI, I learned early to be comfortable being the only female on a project, to be sure my voice is heard, and to stand up for myself," she says. "Outside of my MQP, the classes I took for my concentration in biomechanics have been the most important for me. They introduced me to my desired field and gave me

the background I needed to be successful."

2017

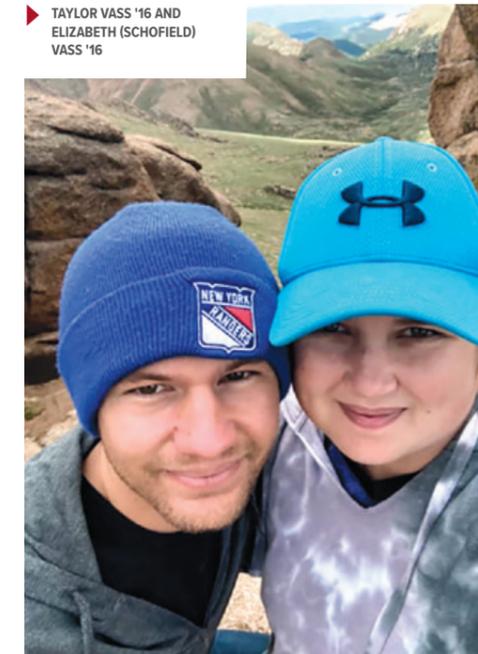
Tyler Nickerson is the co-founder of start-up Linguistic Systems, Inc., which aims to help students of English, Japanese, and Chinese jump from intermediate to advanced language learning. The start-up raised \$850,000 and is building an artificial intelligence platform for immersive language learning. According to the *Boston Business Journal* article, "The basic idea for Linguistic's software is letting students choose the materials they want to learn from and using AI to build a learning experience around that content."

2021

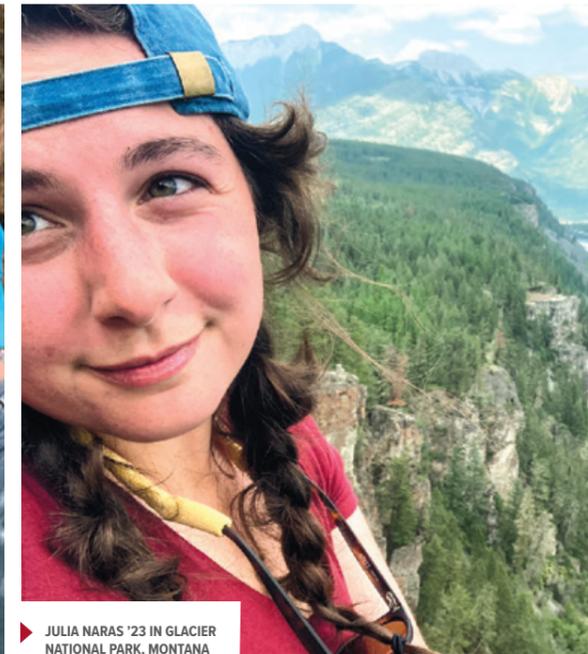
John Walser (MS) was promoted to assistant chief with the Fairfax County Fire and Rescue Department in Pennsylvania. He has served in various leadership roles in the fire and rescue sector over the last 20 years. He is also a principal member of two National Fire Protection Association technical committees.

2023

Julia Naras '23, environmental and sustainability studies, did her Interactive Qualifying Project in Glacier National Park and fell in love with Montana. She now works as a fisheries & wildlife biological science technician for the Kootenai National Forest in Eureka, Mont.



▶ TAYLOR VASS '16 AND ELIZABETH (SCHOFIELD) VASS '16



▶ JULIA NARAS '23 IN GLACIER NATIONAL PARK, MONTANA

Nominate WPI Alumni

Each year, the WPI Alumni Association presents awards to deserving alumni in recognition of their professional achievements, service to the university, service to the Alumni Association, and service to their local communities. Nominations are open for the 2024 award cycle. Nominate alumni from classes ending in 4 or 9 today!

LEARN MORE ABOUT THE ALUMNI AWARDS AT

[WPI.EDU/ALUMNI/AWARDS/ABOUT](https://wpi.edu/alumni/awards/about)

NOMINATE A DESERVING ALUMNA/US AT

[WPI.EDU/+ALUMNIWARDFORM](https://wpi.edu/+alumniawardform)

[IN *memoriam*]

William Walsh '43, CHE, MS CHE, SIGMA ALPHA EPSILON, Manchester, N.H.
Robert Allen '51, ME, SIGMA PHI EPSILON, Mattapoisett, Mass.
Alan Burke '55, ME, West Hills, Calif.
Roger Alvey '58, SIGMA PHI EPSILON, Marshfield, Mass.
Herbert Clarkson '58, EE, ALPHA TAU OMEGA, Rancho Palos Verdes, Calif.
Donald Carignan '59, ME, Westfield, Mass.
John Mack '59, ME, Ramsey, N.J.
Orr Shepherd '59, EE, PHI SIGMA KAPPA, Woburn, Mass.
Carl Karlsson '60, CHE, Yarmouth Port, Mass.
Robert Whittum '61, CE, SIGMA ALPHA EPSILON, Copley, Ohio
Paul Cultrera '62, CE, PHI KAPPA THETA, Murphy, N.C.
Ralph Herrick '62, EE, MS EE, THETA CHI, Richardson, Texas
Nicholas Barone '65, CHE, PHI GAMMA DELTA, Milford, Conn.
Harry Forrest '65, CHE, PHI KAPPA THETA, Vero Beach, Fla.
Stephen Rudnick '65, CHE, ALPHA EPSILON PI, Mountain View, Calif.
Frank Pfeiffer '66, EE, Worcester, Mass.
Steven Schumer '67, EE, ALPHA EPSILON PI, Citrus Heights, Calif.
Stephen Walsh '68, CE, Pocasset, Mass.
Richard Clemence '71, SIM, Southbridge, Mass.
Frederick Szufnarowski '71, MA, PHI SIGMA KAPPA, Ivoryton, Conn.
Joseph Gotta '72, MA, PHI SIGMA KAPPA, Ludlow, Mass.
John Kaletski '72, CHE, SIGMA PHI EPSILON, Eastham, Mass.
Patrick Hester '73, CE, PHI KAPPA THETA, Falmouth, Mass.
Paul Carlson '74, MA, SIGMA ALPHA EPSILON, Lebanon, N.H.
Joseph Dicorcia '78, MS NS, Rocky Hill, Conn.
Helen Vassallo '82, MBA, PHI SIGMA SIGMA, Worcester, Mass.
Philip Healey '83, EE, Hopkinton, Mass.
V. E. Simms '84, MBA, Petersham, Mass.
Thomas O'Keeffe '85, CH, Windham, N.H.
Daniel Farkas '87, EE, ALPHA CHI RHO, Milltown, N.J.
David Oberhauser '90, MBA, Stoneham, Mass.
Anthony Smith '91, ME, Medway, Mass.
Brian Boucher '94, CE, SIGMA ALPHA EPSILON, Sutton, Mass.
Bruce Kennen '99, SIM, Spencer, Mass.
Paul Dobson '03, MS FPE, Milton, Mass.

Complete obituaries can usually be found online by searching *legacy.com* or newspaper websites. The Alumni Office will assist classmates in locating additional information. Contact alumni-office@wpi.edu.

“I was very happy to hear about the updating of Stratton Hall to make it accessible. Those stairs! Plus, there’s never enough study space, project meeting space, or relaxing space near classes. A new student lounge in Stratton Hall will help meet those needs. I had to get involved and provide financial support for the renovation.” —Mike Abrams '77



Michael Abrams's gifts to Stratton Hall and the George C. Gordon Library Study Area renovations support *Beyond These Towers: The Campaign for WPI*, the university's most ambitious fundraising endeavor yet. His generous gifts also support the George I. Alden Trust Challenge. When alumni and trustees contribute \$20 million to facilities projects like these, by the end of the campaign the Alden Trust will contribute \$5 million.

Beyond these towers is a world of knowledge and innovation waiting to be discovered. We need champions to ensure our faculty and students have the spaces that launch their journeys to discovery.

Be a champion.
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WPI

Worcester Polytechnic Institute
100 Institute Road
Worcester, MA 01609



ON RESIDENCE HALL MOVE-IN DAY, ETHAN RASQUINHA '28 FROM SCARBOROUGH, MAINE, SHOWED OFF A SIGN HIS SISTER MADE FOR HIM. "IT HAS A NICE MESSAGE AND REMINDS ME OF HER WHENEVER I LOOK AT IT," HE SAYS. SEE WHAT OTHER ITEMS STUDENTS BROUGHT TO MAKE THEIR HOME AWAY FROM HOME MORE COMFORTABLE, ON PAGE 10.