



Food of the Gods

Leila Carvajal Erker '96
helps the world's
chocolatiers build
a better bar.



FOOD OF THE GODS

With her chemical engineering degree, Leila Carvajal Erker '96 has built a successful business importing responsibly and sustainably sourced cacao from her native Ecuador.

BY SCOTT WHITNEY | PHOTOGRAPHY BY YOLANDA ESCOBAR JIMÉNEZ

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BY JOHN MARTIN | PHOTOGRAPHY BY DAVID TURNER | PORTRAIT BY ROBERT FALCETTI

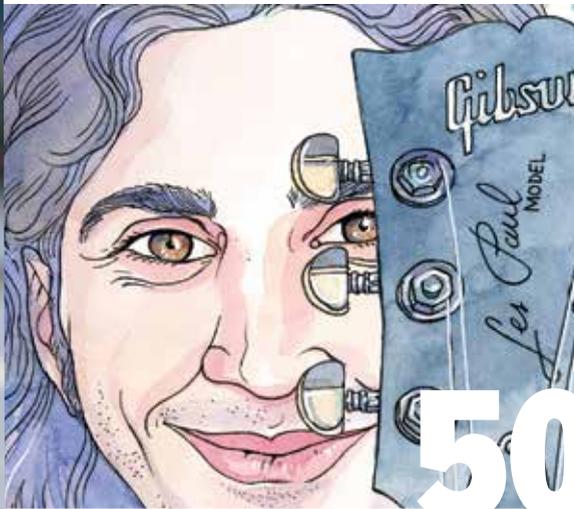


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LETTER

from the editor

Letters to the editor may be altered for length, clarity, and accuracy. We ask that letters offer the reader's opinion without rancor. Letters that mock or insult will not be published. Opinions expressed do not necessarily reflect the views of WPI. Send your letters to wpjournal@wpi.edu.

Mask Mystery, Tuition Benefit, and Our Digital Domain

The *WPI Journal* never sets out deliberately to perplex its readers, but it seems we did just that with the photograph that appeared on the back cover of the Winter 2021 issue (reproduced here). The photo shows **James Imperiali '11**, one of the alumni profiled in the cover story, "A Seat at the Lab Bench." The equation depicted on his face mask was unfamiliar to some readers.

Catharine Brown, widow of John Lott Brown '46, a longtime trustee who served as interim president of WPI during the 1994-95 academic year, wrote, "I live in a retirement community due to my very advanced age and no one here can decipher for me what the mask on James Imperiali means. Help! Please let me know."

Bradshaw Lupton '72 sent this note:

"Congratulations on the LGBTQ cover. My parents sent me to a nice 'boys' engineering school in 1968, and I got to be in all of Jayne Rosetti's and Lee Small's classes [WPI's first two women undergraduates]. They, however, did not get to be in all of mine. They were excluded from ROTC and gym.

"The back cover ... I can't figure out $d^3 X / dt^3$. Might you please decode the message?"

To help us do the decoding, we turned to **Douglas Petkie**, professor and head of WPI's Department of Physics. "It is the time derivative of the acceleration (i.e., acceleration changes)," he explains. In other words, the equation describes a phenomenon in physics in which an object's acceleration changes with respect to time. That phenomenon is called jerk.

"One example of 'jerk' is when you step on the accelerator in the car and get 'jerked' back (a very creative phrase)," Petkie adds. "You can also relate this to a changing force, which creates a changing acceleration. Pushing someone would also cause a jerk, so the time derivative is usually large (change in the force over a short time equals a larger derivative). The 'jerk' might not be noticeable for slow changes."

When provided that explanation, Lupton—who said he spent all four of his WPI years "on top of Salisbury Hall playing with radios and antennas with W1YK, the ham club"—sent this reply: "I know about jerk, and didn't get it. The good old change of acceleration with time. But what is the change of jerk with time? I feel I am the human example of that. My jerkiness has been in a state of flux for all of my now 70.7 years!"

So to close the book on this mystery, the text on the mask reads, "Don't be a jerk. Wear your darn mask."

We couldn't agree more, and we'll try not to be jerks in the future and leave our readers hanging over unexplained equations.



PHOTO BY TODD VERLANDER

Expanded Alumni Tuition Benefit

In a constantly changing world, one thing remains true: the value of a WPI education. Now alumni can secure that value and save money, too. WPI has expanded its Alumni Tuition Incentive Program, which provides a 20 percent discount on graduate tuition.

The program now applies to all alumni with a bachelor's, master's, or doctoral degree, whether they're enrolled as full-time or part-time students, or as non-matriculated students, and regardless of whether they take classes on campus or online. So, if you are a WPI graduate, you can take one course for fun, set out on a career change, or complete an entire graduate degree at a reduced rate. All eligible alumni are pre-coded to participate, so just register for the course or courses you want and receive the discount, on every course you take, automatically. It's a bit of good news in these uncertain times. For more information, see the ad on page 14.

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We hope you enjoy receiving the printed edition of the *WPI Journal* in your mailbox. There is another way you can enjoy all the *Journal* has to offer; that's by visiting our digital domain, wpi.edu/+Journal. There you will find the content of the most recent issue along with some exclusive content available only online. You'll also find an archive of past issues. All are available as PDFs; the most recent issues are also presented as web stories.

And here is just one more benefit of perusing the *Journal* online: to make reading easier, you can use your computer to zoom in on the text, or switch to Night Mode, which some readers find makes the text a little easier on the eyes.

When you visit the digital *Journal*, use the form provided to send us your news for Class Notes. And we always welcome your comments and opinions for our Letters page. Send those to wpjournal@wpi.edu.

—Michael Dorsey, Interim Editor



Featuring Jean King, Peterson Family Dean of Arts and Sciences

THIS IS AN EDITED VERSION OF THE RECORDED ZOOM EXCHANGE BETWEEN PRESIDENT LAURIE LESHIN AND DEAN JEAN KING. VISIT WPI.EDU/#JOURNAL TO SEE A VIDEO OF THE ENTIRE CONVERSATION.

LL: Great to talk with you and to see you. I want to talk about the School of Arts and Sciences. We know there are many science majors at WPI, but the arts, humanities, social sciences – they’re so important to every WPI graduate. How are things are going in the school?

JK: We’re doing exceptionally well. And the pieces of the school that are so important to WPI and, in general, to who we are as human beings are the fundamental and foundational skills that the arts, humanities, and social sciences and policy studies bring to us – the basic tenets of being human: critical thinking, creativity, communication, curiosity.

We try not just to foster and engage our faculty and students in these tenets, but to overlay them with STEM. And in that overlay, I think we produce students who care about their communities in an ethical manner, using all of these skill sets to have global impact.

LL: So many of your departments and programs are going to be represented in the interdisciplinary smart world approach we’re building together in our new academic building.

JK: In particular, computer science, which is in the School of Arts and Sciences, has many interdisciplinary programs, including neuroscience, data science, bioinformatics and computational biology, and interactive media and game development. And they really do that well. The idea that we collaborate across all these spaces and that computation is part of the center of this new building means that we are critical to the building, and we are excited about that.

LL: You mentioned neuroscience. That’s your background as a scientist, and it sits at the intersection of so many great things that we do here at WPI. We’ve got a new neuroscience program enrolling its first students. Talk a little bit about that.

JK: When I came to WPI, we took the pulse of the faculty to see whether this was a program they were interested in. We had 40 faculty respond from eight different departments. Some of them actually had elements of neuroscience in their courses. We got all of them together

and said, “If we do neuroscience at WPI, how is it going to be different? How is it not going to look like every other neuroscience program?”

We thought about the strengths of WPI, the strengths of computational biology, the strengths of computer science, the strengths of data science, the strengths of all these digital modules. Our neuroscience program here looks quite different in that it features computation at its core. It’s a computational neuroscience program.

LL: That’s so exciting. You are an academic leader here at WPI, but you also focus on health and wellness for our broader community. You catalyzed a group of folks across the institution to create an initiative during this time of COVID, when we can all feel so isolated and apart, called Be Well Together. Tell us about that.

JK: My background in neuroscience also speaks to this initiative, because as a neuroscientist, what I study is the impact of stress on the brain and the interaction between stress and the brain. For stress researchers, COVID represented the culmination of things we never want to see together: something that’s chronic, something that’s unpredictable, and something that’s uncontrollable. Those are the three areas we look at to understand stress better. And we had, on top of it, isolation, which we had never modeled.

We’d been talking about wellness since I got here and some people had already been engaged in wellness practices. When COVID hit, we quickly got a few of them together and said, what can we do immediately to respond? We pulled together our head of Humanities and Arts, Kate Moncrief, professors Jeanine Skorinko and Angela Rodriguez, and staff members in the library who were already offering mindfulness. We asked them, “Could you do this for our community?” And they said yes.

It has been amazing. I have to thank the School of Engineering for co-sponsoring these events. We’re really excited about the fact that although we’re isolated, we’re really together in terms of wellness.

LL: Thank you for the part you’ve played in bringing our community together. And thank you so much for being with us.

WJTU

The latest in university news, research, and commendations





WPI RESEARCH UNDERPINS NEW FEDERAL LAW ON GAS CAN SAFETY

It happens only under limited conditions, but when it does, the results can be horrific. When a portable plastic gasoline container is nearly empty and is tilted to pour out the last few ounces, a zone of highly flammable vapors can form in the top of the can and in the spout. A nearby ignition source can cause a cascade of flames to race down the spout, producing an explosion.

A report by *NBC News* correspondent Lisa Myers and producer Richard Gardella, broadcast on the *Today* show in December 2013, documented a number of cases nationwide where such explosions caused severe burns; the report noted that according to Consumer Product Safety Commission (CPSC) data, gas can explosions had led to at least 11 deaths and 1,200 emergency room visits since 1998. That report also documented research conducted in WPI's Combustion Laboratory, including dramatic video of commonly sold red containers exploding on a test stand.

Motivated by reports of portable gas can explosions that dated back to the 1970s, the WPI research, conducted by PhD candidate **Brian Elias** and **Ali Rangwala**, professor of fire protection engineering, and supported by ASTM International, an organization that establishes standards for consumer products, including gas cans, sought to establish the conditions under which explosions can occur. Their conclusions, published in *Fire Science Journal* in May 2013: the greatest explosive risk is present when the cans contain 30 milliliters or less of gasoline (equivalent to about 2 tablespoons), when the air is cool, and when the can is tilted at a common pouring angle of 42 degree.

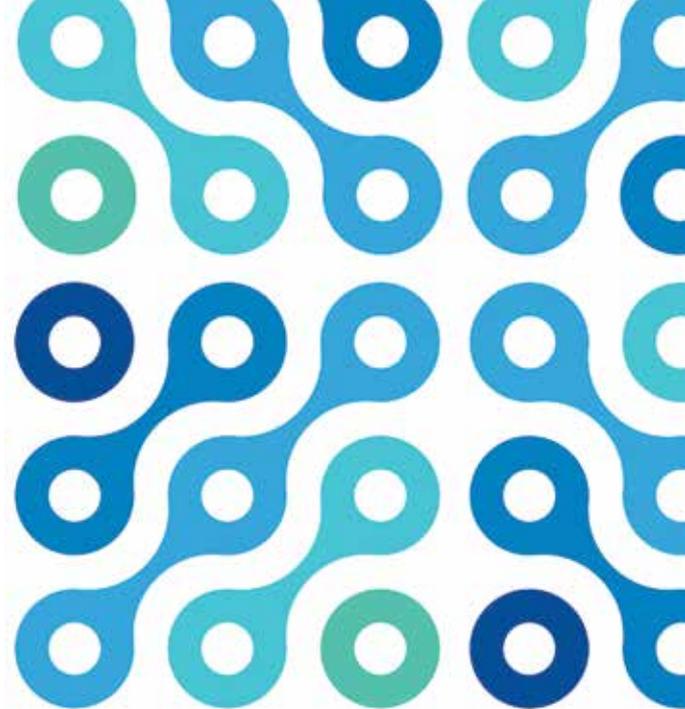
In two subsequent phases of the ASTM International-funded study, Elias and Rangwala explored possible mitigation measures. In particular, they looked at the effects of flame arrestors, devices with metal or plastic mesh that can keep flames from propagating into a container. The devices are already found in metal "safety" gas cans, fuel tanks, and some containers of other flammable liquids.

In a 2016 report, Rangwala and Elias found that flame arrestors can, indeed, prevent explosions in plastic gas cans. In fact, they concluded that these mitigation devices are "necessary." They noted that some prototype gas cans containing flame arrestors had passed safety tests. The WPI research reinforced a recommendation from the CPSC, which, the day after the NBC story ran, called on manufacturers to add flame arrestors to plastic gas cans.

Thanks to the Portable Fuel Container Safety Act of 2020, a new law included in a massive appropriations bill passed by Congress late in 2020, that recommendation and the conclusions of Elias and Rangwala are now backed up by federal law. The act, sponsored by Rep. Henry Cuellar of Texas, requires that the millions of plastic gas cans sold in the United States each year include flame mitigation devices. Specifically, it establishes "performance standards to protect against portable fuel container explosions near open flames or other ignition sources" and directs CPSC to "promulgate a final rule to require flame mitigation devices in portable fuel containers" within the next two and a half years.

Asked for his reaction to the law by *NBC News*, Rangwala said, "I am very proud and happy to see that the work we did on flame arrestors for gas cans has led to the passing of a law by the U.S. Congress."

—Michael Dorsey



EXPLORING CELL DIVISION WITH COMPUTATIONAL MODELS

Researchers can watch human cell division under microscopes, manipulate genes and proteins involved in the process, and monitor the consequences when defects occur, but there are limits to how much can be accomplished in a lab.

That's why **Sarah Olson** and **Amity Manning** have turned to computational modeling to better understand a critical piece of cellular machinery that often goes awry in cancer.

With a \$917,999 award from the National Institutes of Health, they are using mathematical techniques and biological findings to assess how cellular forces influence the geometry of the mitotic spindle, a part of the cell's machinery that is responsible for separating genetic material during cell division.

"There is too much going on during cell division to tease out and examine all the possible forces at work through laboratory experiments," says Olson, professor and interim head of the Mathematical Sciences Department and principal investigator for the three-year project. "But by combining experiments with modeling, you can explore factors that lead to defective spindle structure in cells."

Computational models use math and computer simulations to adjust numerous variables in a complex system and observe outcomes. Olson and Manning, both of whom are affiliated with WPI's Bioinformatics and Computational Biology program, have previously used computational models to illuminate the forces in human epithelial cells during division.

Their project will use models to simplify complex functions and test scenarios in cell division. They expect laboratory experiments to inform new computational models, and the models to spur additional laboratory experiments.

"This is truly a collaborative project with a balance of math and biology," says Manning, assistant professor of biology and biotechnology and co-principal investigator for the project. "We can brainstorm and think about modeling questions, biological questions, and how we can apply our expertise to this problem."

—Lisa Eckelbecker



CREATIVE WRITING PROFESSOR WINS FLANNERY O'CONNOR AWARD

It's been said that home is where the heart is. But for **Kate McIntyre**, professor of creative writing, home is a place of "productive tension," both heart-filling and heartbreaking. Her home state of Kansas is the setting for *Mad Prairie*, her collection of stories that won the Flannery O'Connor Award for Short Fiction in 2020.

Named for the writer of short stories and novels, the award was established by the University of Georgia Press in 1983 to help bring emerging writers a national readership. Each year, the series editor, renowned American writer and social commentator Roxane Gay, selects one book manuscript from among 300 entries for publication. Previous honorees who've gone on to storied careers include Ha Jin, Antonya Nelson, and Mary Hood.

McIntyre cites two inspirations for her stories: other writers and lived experience. "The collection's literary antecedents include the razor-sharp wit of Muriel Spark and Ottessa Moshfegh, the surreality of Kelly Link and Yoko Ogawa, and

the unnerving horror of Shirley Jackson," she says. "The stories are all set in rural and small-town Kansas, where I grew up. So alongside these literary influences, the stories were shaped by county fairs and demolition derbies, Friday night football and field parties, my first job catering fried chicken out of a bingo hall, the salt mines, the wide open prairies, and the skies, as the late Denis Johnson would have it, 'as blue and brainless as the love of God.'"

She says she learned about the award just before teaching her first class in A-Term. "I yelled to my husband to tell him. Then—and this sounds very dramatic, but it did happen—I cried for a while. The Flannery O'Connor Award is such a big accolade in the literary world and has such a history of launching emerging writers' careers. In the midst of so much heartache—the lives lost to the pandemic, the constant reports of anti-Black police violence, the wildfires burning the west coast—it felt almost obscene to have received such good news. I'm still processing the dissonance."

For her next project, McIntyre is co-authoring a novel with her husband, Joe Aguilar, assistant teaching professor of humanities and arts at WPI. "It's literary speculative fiction, or cli-fi, fiction of climate change," she says. "It shares my story collection's interest in dark humor and spectacle."

—Jessica Messier

Debora Jackson Named Foisie Business School Dean

The **Rev. Dr. Debora Jackson**, who earned two graduate degrees at WPI—a master of science in management (1989) and a master of engineering in manufacturing engineering (2000)—has been named dean of the Robert A. Foisie Business School (FBS) following a nationwide search. A member of the WPI Board of Trustees since 2012, she also holds master of divinity and doctor of ministry degrees from Andover Newton Theological School and most recently served as the inaugural director of lifelong learning at Yale Divinity School.

Jackson is a widely respected business, academic, and spiritual leader who has held C-suite and other leadership roles in technology companies and has managed the growth of large and small nonprofits. She is the author of numerous articles and two books on effective leadership: *Spiritual Practices for Effective Leadership: 7 Rs of Sanctuary for Pastors* (2015), which received the Illumination Book Silver Medal Award, and *Meant for Good: Fundamentals in Womanist Leadership* (2019).

In 2019 she was inducted into the WPI Hall of Luminaries, which recognizes individuals who have made exceptional contributions to their fields and to humanity, and was honored with the WPI Alumni Association's Robert H. Goddard Alumni Award for Outstanding Professional Achievement. She says her interest in FBS stems from her

belief that today's businesses ought to make a difference not only for their employees and partners, but in local and global communities.

"Our world requires strategic thinkers and leaders who are innovative in ways that yield societal impact while also engaging diverse constituencies," she says. "This is a particularly wonderful time for WPI and the Foisie Business School to reimagine our work and mission so that we can best provide the education and the skills needed by our students, industry, and the globe."

President Leshin noted that the university is "focused on repositioning the Foisie Business School as an essential academic enterprise at the intersection of business, STEM, and humanity. We are seeking to create a set of unique-in-the-nation experiences to ensure STEM students and professionals have the critical skills necessary to make meaningful contributions through the business world. Our transformational approach required us to embrace a broad search for talent to find the person with just the right expertise, experience, and passion to lead the school, and we have found that person in Dr. Debora Jackson."

—Colleen Wambach



Negotiating for a Song in Nashville

Elizabeth Long Lingo, assistant professor in the Foisie Business School, was a PhD candidate at Harvard studying negotiations by day and hanging out with her singer-songwriter husband at music sessions by night when she noticed something about music production.

"I watched real-life negotiations unfold and saw how much ambiguity, passion, ego, and soul went into the production of music," she says.

Her observation later led to a remarkable research project:

For seven years, while she and her husband lived in Nashville, Long Lingo studied how established and aspiring music producers navigate a constellation of relationships with record label executives, writers, singers, musicians, and others to record songs.

The result was a new understanding of entrepreneurial leadership that she calls "creative brokering"—a way of mobilizing and directing teams of creative experts with competing viewpoints to produce something novel and of value. It's a model of leadership that can be used to produce success in industries other than country music, she says.

"The process music producers use to manage tensions, help team members stay committed, and elicit expertise and input from stakeholders relies on emotional intelligence," says Long Lingo, who is an expert on negotiation and organizational behavior. "Once you understand how music producers successfully manage people with different talents and opinions to create songs, you can apply the insights and techniques to other industries."

As part of her research, she even wrote and produced her own song, "til Quitting Time," about a waitress.

"Obviously, I am not a songwriter," she says with a laugh, "but my research is all about experiences, and I can't write about something until I've done it."

An article on her research appeared in *Journal of Management Studies* in March 2020.

—Lisa Eckelbecker

Growing Environmentally Sound Sustainability: a Data-Driven Approach

With a \$3 million grant from the National Science Foundation (NSF), WPI is establishing a unique graduate curriculum to train the next generation of scientists who can apply chemical sciences along with data analytics, mathematics, and computing power to reduce energy usage, waste, and pollution. The funding is part of the NSF Research Traineeship (NRT) program, which encourages the development and implementation of bold and potentially transformative models for training scientists and engineers.

The program, called CEDAR (Circular Economy and Data Analytics Engineering Research for Sustainability), looks at developing solutions to these global issues through a new lens. Students will study large datasets, including chemical reaction rates, heat release levels, or dangerous chemical spill amounts.

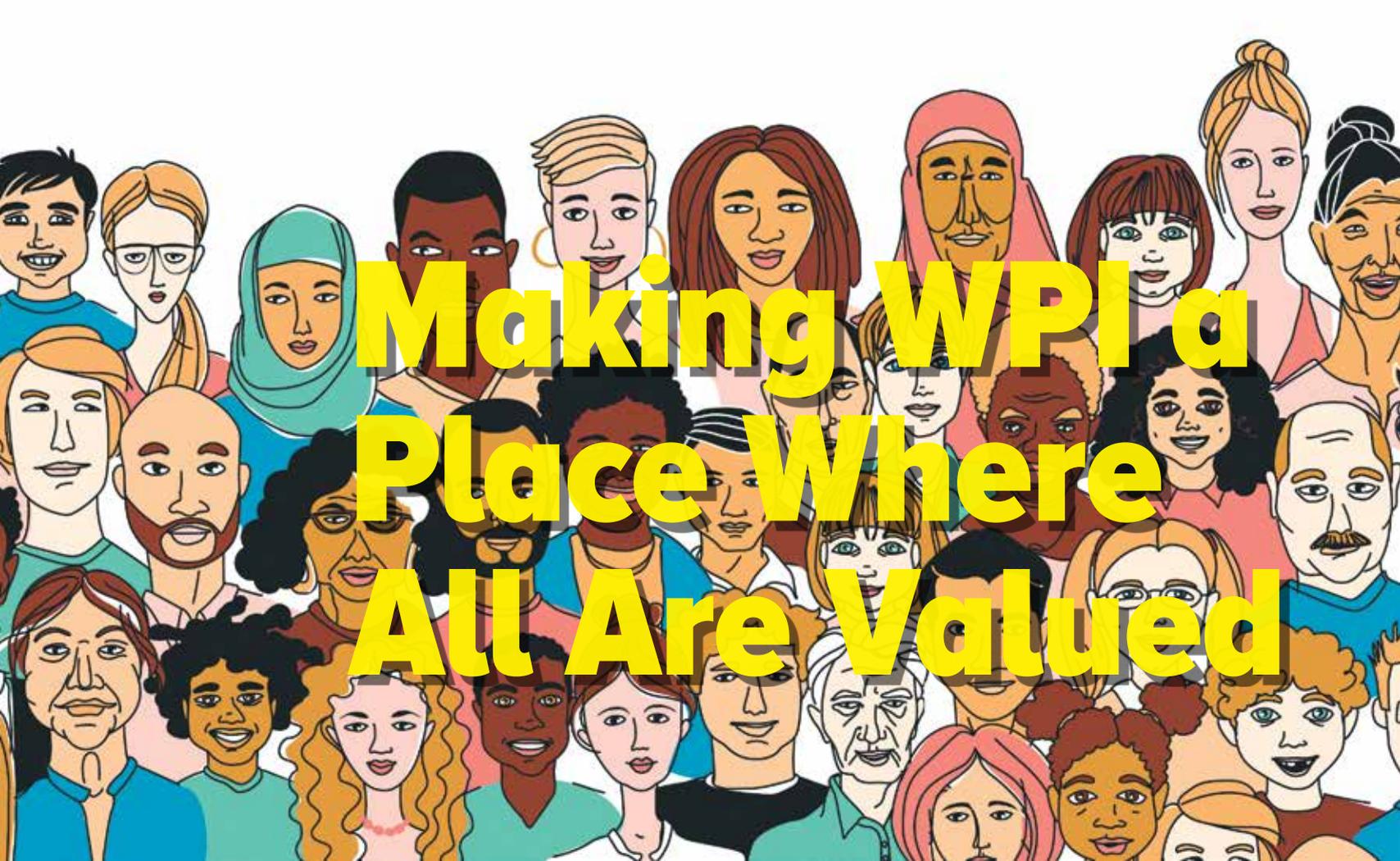
They will also analyze long-term impacts of innovations, thereby shaping outcomes that will minimize health and environmental hazards while creating sustainable economic development.

Elke Rundensteiner, professor of computer science, founding director of WPI's Data Science program, and principal investigator on the five-year grant, is collaborating with **Michael Timko** and **Aaron Deskins**, associate professors of chemical engineering, and **Randy Paffenroth**, associate professor of mathematical and data sciences, among others. CEDAR will train 90 master's and 30 PhD students, and will support 30 NRT-funded PhD-level trainees. In addition to taking required courses, students will participate in internships, professional development, and other activities.

QUOTABLE

"Requiring students to pay a fee to receive an admissions decision is in direct conflict with our mission to increase access to a high-quality STEM education."

—**Andrew Palumbo**, Assistant Vice President for Enrollment Management and Dean of Admissions and Financial Aid, announcing that WPI has eliminated its undergraduate application fee



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As a part of its focused and purposeful work to develop a campus culture that rejects bias, prejudice, discrimination, and hateful acts, WPI has established the Bias Response Program (BRP) at the direction of President Laurie Leshin.

Committed to creating an equitable, inclusive, and anti-oppressive community where all are valued and respected as intrinsic members, the BRP fosters awareness and understanding of bias while addressing individual and community-wide bias incidents.

As a university working toward identifying, mitigating, and preventing bias incidents in the community, BRP puts into action WPI's stated commitment that bias is unacceptable.

The Bias Response Team (BRT) is co-chaired by **Rame Hanna**, director of diversity and inclusive excellence, and **Casey Wall**, assistant dean of students and director of residential services. Ten more staff and faculty members from across campus have also offered their time, knowledge, and expertise as team members. In addition, the Bias Advisory Council will provide recommendations to the president on community-wide incidents and their potential impacts.

"When developing the program we wanted to take a proactive approach to prevent and help mitigate the recurrence of incidents of bias at WPI," says Hanna. "With numerous reporting channels available, we felt it was critical to be able to serve as a resource that can help our community members better understand and navigate the options available to them."

The team also serves as a resource and advocates for individuals who may not be comfortable pursuing formal reporting channels or who may report an incident that doesn't rise to the level of a policy violation. The BRT isn't a judicial group—its role is to act as a coordinated network of support to WPI's formal reporting channels and to develop remedial approaches (e.g., educational, training, resource allocation) to bias incidents.

This initiative's four cornerstones help blend diversity, equity, and inclusion into the full fabric of the institution:

• **Response and Referral:** Identify and respond to incidents of bias and help connect individuals to their options.

• **Advocacy and Accountability:** Provide resources and support to those impacted by a bias-related incident while also ensuring incidents are responded to promptly, effectively, and equitably.

• **Data and Assessment:** Assess data trends and patterns from reported incidents and use the information to share strategies to mitigate and reduce the recurrence of bias incidents on campus.

• **Education and Impact:** Use education to aid the development of a WPI community of individuals who demonstrate civility while advocating for themselves and other community members, and to advise on the potential impacts of critical incidents on campus and of world events.

"We care deeply about fostering a culture where all feel valued and respected," Hanna says, "and hope BRP can also serve as a means of accountability to ensure incidents that are reported are equitably addressed."

—Julia Quinn-Szesuil



ACADEMICS BRANCHES OUT

WPI's academic tree sprouted a new limb and three new branches during the 2020–21 academic year as a new school and three new departments were inaugurated.

The **Global School** has joined WPI's three other schools: the School of Arts and Sciences, the School of Engineering, and the Foisie Business School. While The Global School has its own faculty, students, and academic programs, its mission is to involve the entire university in engaging with the world by focusing the university's minds, resources, and experience to have a positive impact on some of the world's most pressing challenges. Building on WPI's nearly half-century of undergraduate global project work and a globe-spanning network of some 50 off-campus project centers, the new school will help send students and faculty members from across the university out into the world to address social, technological, ecological, and economic problems through interdisciplinary, purpose-driven research, education, and partnerships.

The **Department of Integrative and Global Studies (DIGS)**, located within The Global School, serves as a

gateway for students and faculty who want to connect with and make a difference in communities around the world. The new department's faculty members serve three core elements of the undergraduate curriculum: the Great Problems Seminar, the Interactive Qualifying Project (a degree requirement for all undergraduates), and the Global Projects Program. The new master of science program in Community Climate Adaptation is offered jointly by faculty in DIGS and the Department of Civil and Environmental Engineering (see *sidebar, page 41*).

The **Department of Aerospace Engineering** was formerly a program within the Department of Mechanical Engineering. With more than 260 undergraduates, nearly 40 grad students, and 10 core faculty members, the program awarded its first bachelor's degree in 2005 and its first master's and PhD in 2014. It was accredited by ABET (Accreditation Board for Engineering and Technology) in 2009. Department head **Nikolaos Gatsonis** says the new department, which has a diverse funding portfolio in

aeronautics and astronautics and close to 6,000 square feet of specialized facilities, "will further establish WPI's identity as a research university and will enhance the stature of WPI's School of Engineering."

The **Department of Robotics Engineering**, housed in the School of Arts and Sciences and the School of Engineering, represents the continued evolution of WPI's Robotics Engineering Program, the first program in the nation to offer a bachelor's degree in the field (it was also the first to offer bachelor's, master's, and PhD programs in robotics). The recipient in 2016 of the inaugural ABET Innovation Award (for developing and implementing the first ABET-accredited undergraduate Robotics Engineering program in the United States), the department has 18 core faculty members and enrolls over 370 undergraduate majors (not including double majors) and more than 230 graduate students. "RBE is one of WPI's signature programs," says department head **Jing Xiao**, "and a pioneer in the nation—and arguably the world—in robotics education and in integration of education and research."

CHEMICAL ENGINEERS TAKE AIM AT WASTE

Through its 2026 Idea Machine competition, the National Science Foundation (NSF) invited the scientific community, industry, nonprofits, and the public at large to help it set the agenda for fundamental research in science and engineering in the United States. Out of more than 800 entries submitted, “A World Without Waste,” submitted by **Michael Timko**, associate professor of chemical engineering, was one of 14 semifinalists.

As a follow-up to that program, the NSF invited proposals (for conferences and early concept, exploratory research) that address the problems identified in the competition’s first phase—including the one Timko flagged, the need to find ways to reduce and reuse waste. This time, two research projects led by chemical engineers at WPI were among the 21 funded programs.

Timko and **Aaron Deskins**, associate professor of chemical engineering, received a two-year, \$277,359 grant for a project called “Nitrogen-Bearing Hydrochars for Nitrogen Upcycling in a World without Waste.” Working with Klaus Schmidt-Rohr of Brandeis University, Timko and Deskins will explore potentially useful applications of nitrogen-rich waste products in areas such as water purification.

The work will focus on the complex structure of molecules called N-hydrochars—nitrogen-bearing, carbon-rich materials formed by the hydrothermal treatment of food waste, livestock manure, sewage sludge, and other waste products. “Nitrogen has interesting benefits, such as acting as a great absorbent,” Timko says. “We’ve found that nitrogen’s molecules require a delicate balance within its configuration in order to act this way. As it turns out, these absorbents are effective for binding to harmful products, like metals, which can be found in our water supplies.”

Nikolaos Kazantzis, professor of chemical engineering, and Timko received a two-year, \$259,299 grant for their project, “Probabilistic Analysis of Converting Marine-Borne Plastics into Usable Fuels.” They will explore ways of converting plastics into fuel for ships that collect them from the ocean (4.8 to 12.7 million tons of plastics are dumped into oceans each year). If the ships can refuel themselves using the plastics they collect, they can stay at sea longer and produce fewer fossil fuel emissions.

In particular, Kazantzis and Timko will model a specialized reactor that might one day be built into these ships. Loaded into the reactor, harvested plastic would be broken down with hydrothermal liquefaction (HTL), a process that uses moderate heat and high pressure to convert wet biomass into crude-like oil. In other research, Timko has used HTL to convert food and yard waste into biofuels.

“We were absolutely thrilled that the NSF funded two grants for the same institution, and within the same department,” Kazantzis says. “It’s quite unusual, since such a competition is highly competitive.”

—**Jessica Messier**



WPI CHEMICAL ENGINEERS ARE EXPLORING CREATIVE WAYS TO REUSE WASTE, INCLUDING HORSE MANURE AND PLASTIC BOTTLES FLOATING ON THE OCEAN.



THE ARCHIVIST

The Father of Modern Fire Science

Upon his death in November 1998, **Howard Wilson Emmons** was considered one of the most accomplished scientists of the 20th century. In addition to his major advances in heat transfer and flow research, he introduced a new field of science, known today as fire protection engineering. Born on August 30, 1912, in Morristown, N.J., Emmons earned his BS and MS in mechanical engineering at Stevens Institute of Technology and a doctor of science degree at Harvard in 1938. After a brief career with Westinghouse, he accepted a position at the University of Pennsylvania before joining Harvard as an assistant professor in 1941.

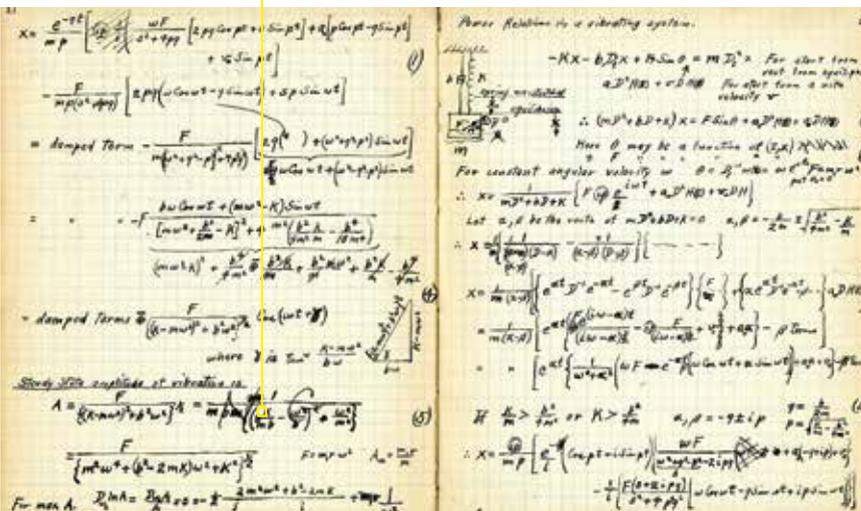
At Harvard, he performed pioneering work in an area known as compressed flows and was the first engineer to observe that air moving over jet engine turbine blades can transition in places from smooth, laminar flow to turbulent flow. Now known as “Emmons spots,” these pockets of what aerodynamicists call “propagating stall” can damage the turbine blades. Emmons long considered this one of his most important findings. A pioneer in the application of numerical methods, he used mechanical calculating machines, including his trusty slide ruler (now housed in the WPI Archives), to make important contributions to space travel, paper drying, and aerodynamic heating.

Beginning in the early 1950s, Emmons turned his attention to combustion science and fire research. His efforts as chair of the 1962 National Academy of Science Summer Study on Fire Research led to the passage of the Fire Research and Safety Act of 1968, which established a fire research and safety center within the National Bureau of Standards and the National Commission on Fire Prevention and Control. He was present as President Lyndon Johnson signed it into law. He also started the Harvard Home Fire Project, which served as the prototype for all subsequent fire prediction models.

When WPI founded the world’s first graduate program in fire protection engineering, Emmons was a major supporter. He delivered the first talk in the Howard W. Emmons Distinguished Lecture series. His papers and research are now housed in the archives of WPI, to which his children, Beverly, Keith, and Scott, continue to donate material and other artifacts. The Howard Emmons collection is part of the Foundations of Fire Protection Engineering archives, which document the creation and pedagogy of WPI’s pioneering program. The collection may be seen in the Archives and Special Collections at the George C. Gordon Library

—Arthur Carlson, assistant director of Archives & Special Collections at WPI’s George C. Gordon Library

CLOCKWISE FROM TOP: EMMONS IN 1933; A FIRE SAFETY EXPERIMENT UNDER WAY IN 1953; PAGES FROM EMMONS’S UNDERGRADUATE NOTE-BOOK; HIS SLIDERULE.



COVID-19 Research News Roundup

Toward Secure Digital Contact Tracing

Investigating the close contacts of people who have tested positive for COVID-19 is a critical part of the strategy to mitigate the virus's spread. While contact tracing is typically a manual process, "we can make that process easier, faster, and more efficient if we supplement manual contact tracing by digitally obtaining accurate and pinpointed contact information," says **Patrick Schaumont**, professor of electrical and computer engineering.

But some have bristled over the use of digital technology—especially using smartphones—for contact tracing since the technology could reveal personal information, including the movements of people being traced and those they come in contact with. With a \$120,000 RAPID grant from the National Science Foundation, Schaumont and colleagues at Virginia Tech are developing a smartphone app that can help conduct contact tracing without risking users' privacy or personal security.

By tracking a user's exact location and detecting close encounters with other contact-tracing app users, the smartphone app could determine whether an infected person is close to someone else when they are contagious. The researchers will look for, test, and implement digital technologies that can enable this kind of contact tracing to be done securely and privately, in part by using encryption and cryptography.

—Sharon Gaudin

Detecting COVID with Robotic Ultrasound

Respiratory illness, among the more serious manifestation of COVID-19, can require repeat scans to allow healthcare providers to monitor a patient's lung function. Thanks to an innovation by **Haichong Zhang**, assistant professor in robotics engineering and biomedical engineering, healthcare workers will be able to perform those scans without exposing themselves to the virus.

Zhang has received a \$300,000 grant from the National Institutes of Health (NIH) to build a robotic ultrasound machine to detect disease symptoms in the lungs. It virtually eliminates physical contact between patients and healthcare workers during scans and is a lower cost option, compared with X-ray and CT scan machines. Zhang is working on the innovation with an international team based at Beth Israel Deaconess Medical Center/Harvard Medical School, African University of Science and Technology, Massachusetts College of Pharmacy and Health Sciences, and Yamaha Motor Co. Ltd.

The grant is part of the NIH Common Fund, formed to "address emerging scientific opportunities and pressing challenges in biomedical research that no single NIH Institute or Center can address on its own, but are of high priority for the NIH as a whole." The Common Fund received \$30 million from the 2020 Coronavirus Aid, Relief, and Economic Security (CARES) Act to support new research to prevent or respond to the virus in all parts of the world.

—Colleen Wamback

An Oxygen Sensor Tuned to COVID

The COVID-19 pandemic has put healthcare workers at risk. One study of the U.S. and the U.K. found that front-line healthcare workers face a nearly 12-times greater risk of becoming infected with COVID-19; they're also at risk of infecting their families and contributing to the virus's spread in their communities. Early signs of COVID-19 include changes in lung function, which is detectable by looking for changes in dissolved oxygen levels in the blood, a vital indicator of the overall effectiveness of the lungs.

Ulkuhan Guler, assistant professor of electrical and computer engineering and director of WPI's Integrated Circuits and Systems Lab, is developing a small, wearable blood oxygen sensor that can be worn by healthcare workers and others at high risk of contracting the disease and serve as an early warning device. The sensor (about the size of a Band-Aid) is being developed to be flexible, stretchable, wireless, inexpensive, and mobile—enabling the wearer to be monitored remotely and continuously without an invasive procedure.

The sensor is an outgrowth of work Guler did on a wireless sensor that can measure blood oxygen in hospitalized babies, eliminating the need for them to be tethered to a device and allowing them to be more easily and frequently examined and held. "The electronics we have been developing for the baby oxygen sensor will be the same for COVID patients," she says, "so we're in a good position to fine-tune the design for babies and adults. We're producing prototypes for both at the same time."

—Sharon Gaudin

See how WPI students put theory into practice through projects.

PROJECTS

The Great Problems Seminar introduces first-year students to the benefits and challenges of team-based project work. This project was completed in 2020 by students in a seminar, called Heal the World, advised by Reeta Rao, professor of biology and biotechnology, and Elisabeth Stoddard, associate teaching professor of environmental and sustainability studies.

THE STUDENTS

Kendall Begin '24 (Environmental Engineering) and **Mikaela Enax '24, Tera Keang '24,** and **Lauren Vitellaro '24** (all Biomedical Engineering majors)

THE BACKGROUND

Neonatal Abstinence Syndrome (NAS), observed in some infants who were exposed to opioid drugs in the womb, is a growing problem; in Massachusetts, it is seen in 13.8 of every 1,000 births. Affected babies have symptoms of withdrawal, including tremors, vomiting, irritability, diarrhea, and temperature instability. Kangaroo mother care (KMC), in which an infant is placed against its mother's chest with skin-to-skin contact, can soothe babies with NAS, help them sleep, and improve their heart rate, breathing, oxygen saturation levels, and weight gain. This can lead to an earlier hospital discharge.

THE CHALLENGE

For a variety of reasons, including a lack of education about the technique, not all mothers of infants with NAS are able to practice KMC. Existing substitutes, including volunteer cuddlers and technology that simulates KMC, are inadequate or have significant drawbacks, including hospital staffing shortages and high costs.

THE GOAL

Design technical and educational solutions to overcome the physical and social challenges of providing KMC to infants who critically need it.

RECOMMENDED SOLUTION

TECHNICAL: Adapt the mamaRoo, a rocking infant seat commonly found in hospitals, by inserting a thermal pad with sensors so it can respond to an infant's body temperature, and adding technology for generating white noise and reproducing the sound of the mother's heartbeat and breathing.

EDUCATIONAL: Develop videos and infographic posters about NAS that emphasize KMC and other non-pharmacological interventions geared toward mothers. With medical, philanthropic, and industry partners, solutions will be developed and tested through clinical trials.

NEXT STEPS

Address limitations (unequal access, need for training, reliance on a device for comfort), survey hospital staff, contact manufacturers, and research clinical trials.

Learn more about the Great Problems Seminar at wpi.edu/+GPS

LIFELONG LEARNING. FOR LESS.

You can't place a value on the lifelong benefits of a WPI education. But thanks to an expanded Alumni Tuition Benefit, you can get those benefits at a reduced cost.

All WPI graduates* may now take graduate courses and receive a 20 percent discount on tuition. Complete as many credits as you'd like—the benefit is available to full-time, part-time, and non-matriculated students. It applies to any course delivery method—on-campus, online, or blended.

Perhaps you'd like to take one class for fun or to brush up on your knowledge. Maybe you've been thinking about trying a certificate program, or starting work toward a graduate degree. With this benefit, you may "test drive" WPI's graduate education before you commit to a full program—with no strings attached.

So if you're looking to reach your academic, career, and personal goals, now is the perfect time.

Learn more at
wpi.edu/c/alumni-tuition-benefit

** bachelor's, master's, and doctoral degree recipients*

Near the end of the 2019–20 academic year, a year upended by COVID-19, Hannah Schulz '21 learned to walk a slackline. Day by day, her confidence grew. Remembering her early struggles, she sees an analogy to the challenges she and other students faced as they navigated an unfamiliar academic landscape.

“At times, you’re shaking uncontrollably, really not sure how you’re even still standing upright,” she says, “but with repeated practice and time things begin to settle and it gets easier to move forward.”

How to move forward was the challenge Schulz faced in March 2020 when the Interactive Qualifying Project she’d planned to complete in Thessaloniki, Greece, was called off when WPI cancelled international travel. “It was incredibly disappointing,” she says, noting that the opportunity to have a global experience was what had most excited her about attending WPI.

With guidance from their advisors, she and other students who were to work in Greece instead completed a project that looked at how people were coping with the pandemic. Schulz wrote a chapter of the final report called “Mindfulness amid Madness: Finding Nature from Home.”

“I focused on the ways the outdoors can be a place of renewal and escape, especially in a world filled with social distancing and quarantining,” says the Berlin, Conn., native.

Schulz’s own love of the outdoors led her to pursue a double major at WPI, in civil engineering (CE) and environmental and sustainability studies (ESS), located in the School of Arts and Sciences. The choice reflects her interest in the engineering of the built environment and in pursuing a career in environmental protection. “I grew up hearing about the effects of climate change and I’ve always wanted to make sure that wherever I land after graduation that I’m helping work toward a solution to reverse those effects.”

For her Major Qualifying Project (which had to fulfill the requirements of both of her majors), she and a team of CE majors worked with engineers from Stantec to assess how climate change–fueled coastal flooding might affect a small East Boston neighborhood between now and 2070. In the final phase of her project, Schulz planned to work with GreenRoots, a community-based organization in Chelsea, Mass., to conduct a workshop to better understand the community’s perceptions and needs with regard to sea-level rise and flooding.

Among Schulz’s many extracurricular activities at WPI (she played club soccer, she is vice president of the Phi Sigma Sigma sorority chapter, and she is a member of the Outing Club and a building manager in the Makerspace in the Foisie Innovation Studio), her work with the Engineering Ambassadors has been especially meaningful, she says. Through presentations and hands-on activities at K-12 schools, the group helps students gain a better understanding of STEM careers and how they can make the world a better place. Schulz says she hadn’t contemplated an engineering career, herself, until she first toured the WPI campus. “It has been an incredibly rewarding experience to change that for so many different students.”

She also found personal rewards as president of the Food Recovery Network, which delivered food from WPI’s residence halls to Friendly House, and as a tutor at Worcester’s Elm Park Elementary School. An essay she wrote at the end of her first year that conveyed all she had gained from her community service work, her first-year Great Problems Seminar project (on the design and construction of humanitarian shelters for refugee camps), and her extracurricular pursuits, won her the distinction of being named Outstanding Member of the Class of 2021.

As she prepares to start her job as an engineer in the Community Development and Land Use Department of Woodard & Curran, a water and environmental engineering firm in Portland, Maine, Schulz says she is excited to start a career that will allow her to build on what she learned through her two majors and what she is taking away from her many activities and personal connections.

She says she is also grateful for the many people who helped keep her on firm footing—even she found herself losing her balance at times. “This past year has been incredibly challenging,” she says. “But I’ve really been kept afloat by the kindness and attentiveness of my friends.”

—Michael Dorsey

INSIDER

HANNAH SCHULZ '21





IN A WORLD TURNED UPSIDE DOWN

...WE'RE STILL THE SAME WPI.

It's good to take some time to reflect on our goals and how to move forward after such an unexpected, constantly changing year. WPI offers online summer programs designed to provide high school students with a pre-college experience, and the opportunity to explore STEM content with real-world applications. This summer, seize the opportunity to learn from our renowned faculty, through hands-on learning with like-minded students from across the globe.



WPI PRE-COLLEGE EXPERIENCE

Launch

- Rising 9th and 10th graders
- June 28–July 2, 2021 or August 9–13, 2021
- Explore STEM while connecting with fellow students from around the world
- Join us for Video Game Design, Programming with Python, Biology, Robotics, and more

Frontiers

- Rising 11th and 12th graders
- Frontiers I: July 11–23, 2021
Frontiers II: July 25–August 6, 2021
- Frontiers I & II: July 11–August 6, 2021
- Dive into a STEM passion complemented by a Humanities & Arts minor
- Join us for Data Science, Electrical & Computer Engineering, Engineering Exploration, Physics, Robotics, and more

Frontiers for Credit

- Rising 11th and 12th graders
- July 11–August 13, 2021
- Earn college credit with WPI professors and college students
- Utilize tutoring services and engage in community activities
- College courses offered include Computer-Aided Design (CAD), Biotechnology, Calculus, Economics, Psychology, Global Health, and more



Apply today at wpi.edu/+precollege



GLACIER NATIONAL PARK

The Glacier National Park Project Center has a certain rugged, off-the-grid appeal. Located in northern Montana, it's a place where fast internet speeds aren't always guaranteed, where impromptu camping trips in Canada are commonplace, and where you might arrive to 86-degree weather only to learn, a few weeks later, that part of the park is closed after being buried under snow.

It's a place where the unexpected is more or less a daily occurrence, and in the words of project center director and professor of music **Frederick Bianchi**, "Nothing's cookie-cutter." It's not surprising, then, that since its inception in 2018, the project center has had just one year that can be considered "business as usual."

This isn't the first time that WPI and Bianchi have collaborated with the National Park Service. In 2012, he helped found the Bar Harbor, Maine, Project Center in Acadia National Park, which has become a popular summertime destination for students completing their Interactive Qualifying Projects (IQPs). Based on the success of that center, in 2016 he had the idea of expanding into other national parks.

Having asked the National Park Service to recommend comparable parks that could support the kind of in-depth research students were doing in Acadia, he then scoped out several, including Denali National Park in Alaska and Grand Canyon National Park in Arizona, before settling on Glacier.

In 2018, the first project teams had to split their time between Glacier and Acadia after rampant wildfires tore through Glacier. The following year, things proceeded as planned, with students completing projects on everything from tourism and visitation to invasive species and citizen science.

Spurred on by his dream to visit every one of America's national parks, **Kyle Lang '21** traveled to Glacier in 2019. Between sunrise hikes, encounters with grizzlies, and mountaintop lunches (with mountain goats, no less), he and his team worked with the Crown of the Continent Research Learning Center on incorporating technology into its Common Loon Citizen Science Project. The work called for computer science—from a team of mechanical, chemical, and environmental engineering majors. They didn't let that deter them, though, using their combined knowledge to create an effective mapping application for the sponsor.

"You're not always going to be given a task that you can solve completely on your own; it may require knowledge you haven't obtained yet," Lang says. "By employing the help of others and really working together, no problem is unsolvable."

While Bianchi had been looking forward to building on the success of the 2019 projects, 2020 had other plans. In response, he and newly named project advisor **Fred Looft**, professor emeritus of electrical and computer engineering, worked hard to ensure that while their students' experiences would undoubtedly be different than expected, they'd still be able to complete meaningful project work; seeing them do exactly that is something Bianchi considers one of his favorite memories as Glacier's director.

"2018 was the beginning of some incredible student problem-solving and adapting," he says. "Needless to say ... 2020? Same thing. We've all made these kinds of adjustments and sacrifices this year, but the amazing quality of these students, their versatility and resilience, is what I'm most impressed by."

Devon Poisson '22 was one of the students affected by COVID-19 restrictions. His team worked with members of the park staff to develop a web app to assist hikers with the intensive backpacking planning process. Having delivered a prototype to the park, he adds, "Hopefully, future WPI teams can help facilitate continuous improvement in the backcountry permitting and planning process."

With 2020 in the rearview mirror, Bianchi hopes to have the opportunity to emulate the experiences of 2019 once it's safe to do so, something that will not only give students a chance to complete their work in person, but give Glacier officials more of a chance to see just what WPI students can do.

"To us, the students' work just seems normal because we're surrounded by it," he says, "but when other people, outside of WPI, see it, they're blown away."

—Allison Racicot

Visit the online *Journal* (wpi.edu/+Journal) for more on the Glacier National Park Project Center.



Q&A

PHOTO BY MATTHEW BURGOS

As associate dean for student development and director of counseling at WPI's Student Development and Counseling Center (SDCC), **Charlie Morse** has helped the WPI community navigate the challenges of living through a global pandemic.

What is your role at WPI?

As associate dean, I oversee and support the director of health services and the director of accessibility services, as well as those two offices. Before I started in this role, I was the full-time director of counseling services at WPI, and that's been the bulk of my role, historically. I had a clinical internship at WPI in 1992–93 and stayed on part-time while I was a stay-at-home dad. I was hired full-time in 2000.

Has the COVID-19 pandemic change that role?

In March, as WPI was shutting down, we had well over 500 students seeing counselors or who were connected to counselors in some way. So as WPI was starting to shift into virtual delivery of classes, we shifted into a virtual format and were able to continue seeing students until May.

In the summer, when the director of health services retired, my world turned upside down. I got far more involved in the health planning side of things. We began talking about creating two health services clinics to separate COVID care from well care. We had no public health office, so we needed to build that by finding people, funding them, and finding space for them on a de-densified campus.*

I joined a working group charged with figuring out how to do this and what policies, procedures, and systems were going to be needed. It was amazing, meaningful, consequential work, but it was hard, because we were doing this while also getting ready to bring the

students back. There was no model to follow. The fact that it was meaningful is what kept us going, because early on there was no end in sight. I am so thankful we have learned so much.

How has the SDCC worked to help students in these difficult times?

We've asked ourselves, how do we double down on the work we are doing to help the campus community find a healthy environment, and how do we help students learn about coping and resilience. We hope and expect, beyond anything we do, that they will carry that sense of resiliency forward. Because this isn't just a pandemic. The pandemic has broken open racial and economic injustices, and political and societal divisions. The pandemic has laid it bare.

Will the pandemic have long-term consequences?

We all have been impacted by the pandemic, and we've all been separated from each other. Students, faculty, and staff have shifted into survival mode—just wanting to get through. In some respects, it's a simplified life. We're holding on and supporting each other. But it is survival mode; none of us thrives like this. I've been so impressed by our students and young people's inner resilience. But long-term, I can only guess at the impact on mental health. There's been so much loss for our students. There's been so much suffering, and I expect we will see that when the dust settles.

What gives you hope?

I take a 360-degree view. I think from this survival mode, creativity and strength will carry forward as an inner resilience. We are slowing down, students especially. They realize it's OK to slow down. Young people expected so much of themselves.

My two younger children got married in 2020. They had small weddings with receptions in our driveway—not what we had imagined, but we wouldn't change it. One was on November 7, a day with unseasonably warm temperatures. Since we couldn't gather inside, we did feel the weather was a gift.

A year from now, I hope the vaccine has been fully deployed, so that as a society we begin to feel safe enough to reopen again; that we are in the clear to gather in large groups, to sing, and to dance. I would love to be celebrating that. I expect we will be able to.

I am excited about reclaiming normalcy, but it won't look the same. It became clear to me how we were driving ourselves. I hope this helps us reevaluate what's most important in life: family, friends, and education.

—**Julia Quinn-Szcesuil**

**The new public health team includes Lisa Pearlman, director of health services (see *Conversation with the President, Winter 2020*), Jennifer Hapgood-White, isolation/quarantine coordinator, and Chloe Green, COVID testing coordinator.*

BINDER WITH DOUGAL DRYSDALE'S NOTES

The notes for the Fire Dynamics course he developed while on sabbatical at WPI in 1982 were turned into the most famous and most widely used textbook in fire science and fire protection engineering. Dougal gave them to me when we worked together at the University of Edinburgh.

WILDLAND FIRE HELMET

I used (and cleaned) this helmet to fight fires as a lieutenant in the North Corsican Fire Service. The organization follows military ranks—and lieutenant is equivalent to captain in the United States.

FIREFIGHTER QUALIFICATION

This national certificate qualified me to manage teams of firefighters to respond to wildfire calls in my native Corsica.

INSTITUTE OF FIRE ENGINEERS RASBASH MEDAL

Given for excellence in wildland fire research, this is highly symbolic to me because David Rasbash was the first chair of fire safety at the University of Edinburgh and I was No. 4.

CORSICAN FLAG POSTCARD

In 1745, when Corsican patriots were fighting for independence against the Republic of Genoa, they modified an old flag inspired by the coat of arms of the King of Aragon. It showed a prisoner with a bandana over his eyes. The patriots raised the bandana to his forehead as a sign of freedom.



PHOTO BY TODD VERLANDER

TOMSK STATE UNIVERSITY HOLDER

A replica of the façade of the old university building was a gift from colleagues at this university in Siberia. It was there, at a dinner with academicians, that I promised I would bring an international wildland fire conference to Russia.



APPRECIATION PLAQUE

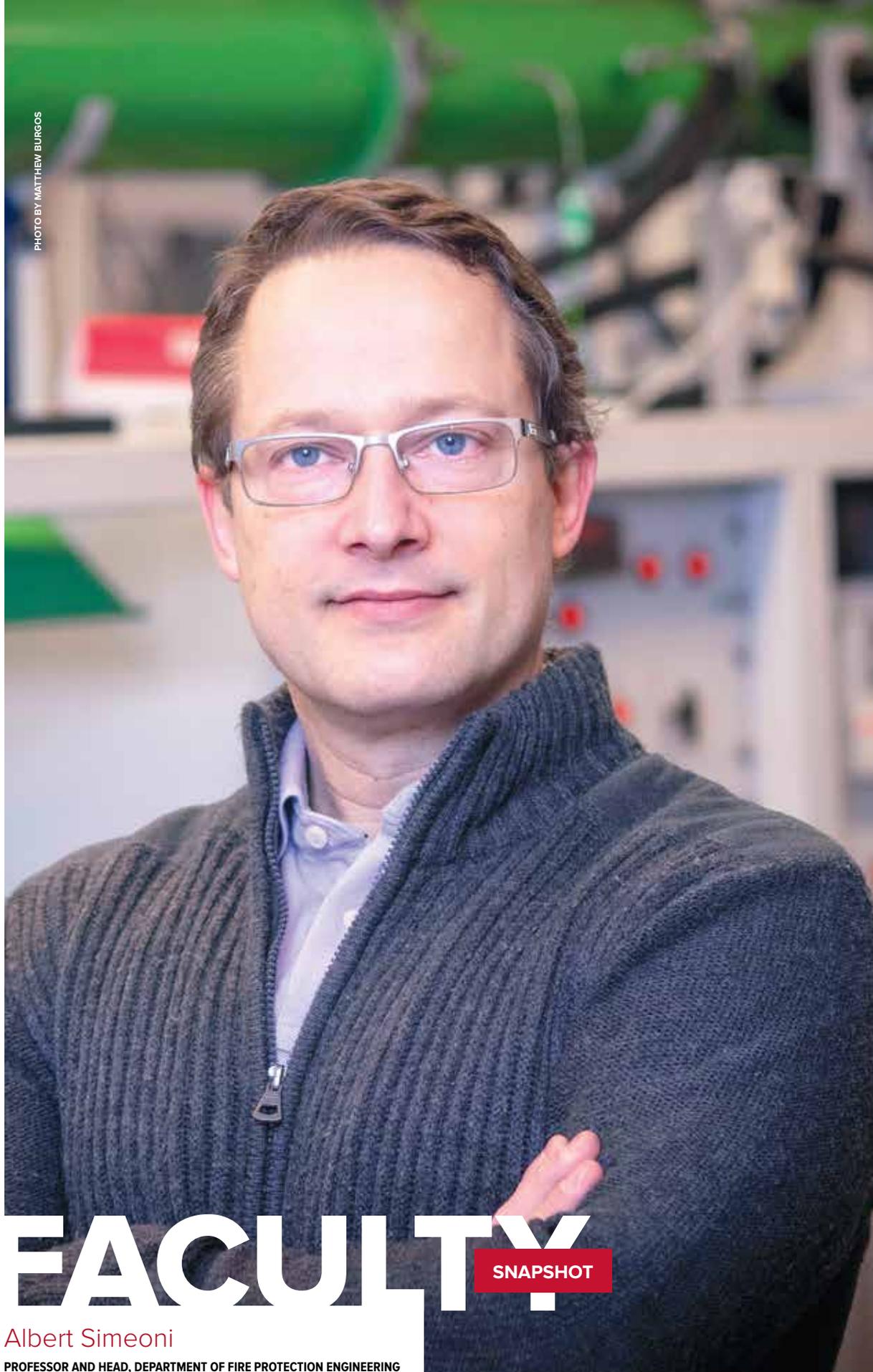
This was given following the international wildland fire conference I organized in St. Petersburg in 2015, delivering on the promised I'd made to my friends and colleagues in Tomsk.



PINE NEEDLES

This is the standard fuel I've used since the beginning of my career to study wildland fire ignition and spread. We burn them today in our state-of-the-art wind tunnel in WPI's Fire Protection Engineering Laboratory.

PHOTO BY MATTHEW BURGOS



FACULTY

SNAPSHOT

Albert Simeoni

PROFESSOR AND HEAD, DEPARTMENT OF FIRE PROTECTION ENGINEERING

Spanning Four Revolutions

Ascending Boynton Hill, a new academic and research building bridges WPI's past and future. At its apex, the building faces the Washburn Shops, a paean to practicality that rose at the crest of the first industrial revolution and bustled through revolutions two (the Electric Age) and three (the Digital Age). The 100,000 square feet of the new structure are dedicated to the fourth industrial revolution, in which disruptive technologies (Internet of Things, robotics, artificial intelligence) are changing our lives as completely as did the previous three transitions. And as Washburn continues to do, the new building will prepare WPI students to rise to the challenge of harnessing this latest wave of change to build a better world.





SENSE OF PLACE

PHOTO BY MATTHEW BURGOS

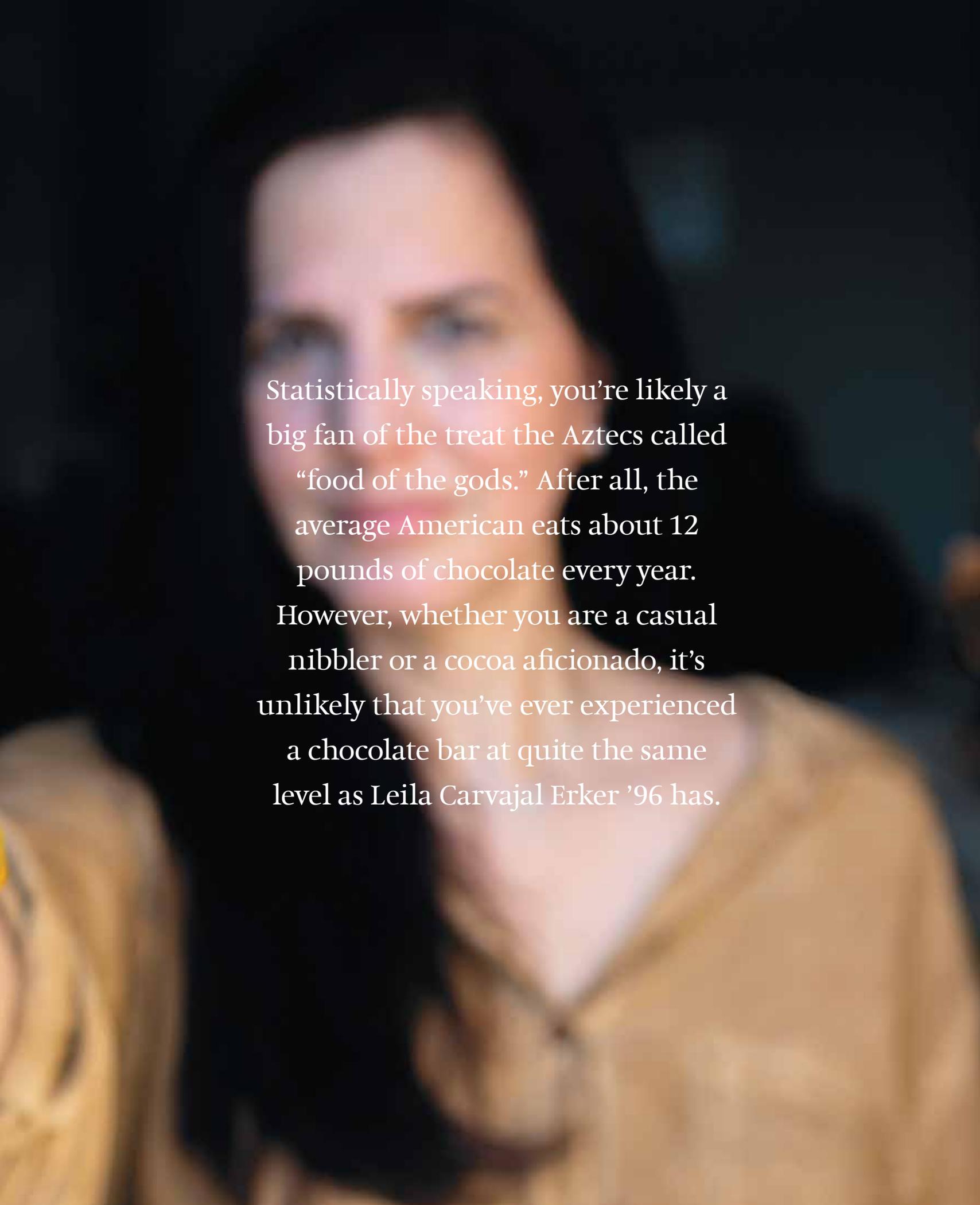
Food of the Gods

Using tradition and science, Leila Carvajal Erker '96 helps the world's chocolatiers build a better bar.

By Scott Whitney

Photography by Yolanda Escobar Jiménez





Statistically speaking, you're likely a big fan of the treat the Aztecs called "food of the gods." After all, the average American eats about 12 pounds of chocolate every year. However, whether you are a casual nibbler or a cocoa aficionado, it's unlikely that you've ever experienced a chocolate bar at quite the same level as Leila Carvajal Erker '96 has.



Born to a family of South American cocoa* producers and trained as a chemical engineer, Carvajal Erker's taste experience with chocolate is, shall we say, specific. "The first thing I notice is the butter content. That's what makes chocolate melt in your mouth," she says. "Then I'm interested in flavors. Just like wine, I'm looking for different notes—floral, nutty—and I can usually guess the origin based on those flavors."

Carvajal Erker's life has often revolved around cocoa; she spent much of her childhood shadowing her father at his cocoa-processing plant in the city of Guayaquil, Ecuador. Years later, she made the family business her own, launching Cocoa Supply in 2003. This New York-based distribution company connects Ecuador's cocoa farmers with the world's finest artisan chocolate makers. But with global cocoa sales expected to hit \$35 billion by 2026, why did the world need one more cocoa supplier (and one with an engineering degree, at that)? The answer may forever change the way you look at—and consume—chocolate.

Hot Cocoa

One of Carvajal Erker's earliest memories is munching on raw cocoa beans (bitter though they are) at her family's hacienda in the foothills of the Andes Mountains. She comes from four generations of cocoa producers, including a great-grandmother who inherited the management of five family farms at the age of 16. But Carvajal Erker's century-long family history, steeped in the world's favorite fermented seed, runs parallel to another family tradition—a deep appreciation for education.

"That comes from my great-grandfather," she says. After marrying into a cocoa-producing family in the early 1900s, he pivoted the business from strictly agrarian to more broadly entrepreneurial, an approach that required an educated workforce. "He rented a house in the city for his six boys, including my grandfather, and told them, 'I'll pay the rent and you don't have to do any hacienda work—as long as you study.'"

From that moment on, Carvajal Erker's family looked to education to open doors of opportunity and bring cocoa production into the modern age. Her grandfather studied to become a civil engineer; her father, John Carvajal, continued the tradition by becoming a mechanical engineer. When her father returned from his studies in Germany, he brought with him his German bride (Carvajal Erker's mother) and a thirst for innovation. He began to look beyond simply harvesting cocoa by building a factory in the port city of Guayaquil that allowed him to process cocoa and expand their product line to include cocoa butter, liquor, and powder—well beyond just the raw beans that had been the family's staple crop for generations.

Throughout her childhood, Carvajal Erker received a crash course in the family business. One afternoon, a farmer who sold her father beans stopped by his office to negotiate a higher price than what the commodity exchange dictated. "He walked in with a milk jug full of moonshine and said, 'Let's talk business,'" she recalls. "My dad turned to me and whispered, 'Leila, make sure I don't agree to anything stupid.'" A careful observer, the then-teenager learned the nuts and bolts of negotiation, as well as the value in treating farming partners fairly—a value that guided her in business years later.

When it came time for Carvajal Erker to settle on a college and a career path, she found herself of two minds. "My mix is a little strange," she explains. "My mom was a philosophy major and into literature, painting—everything that has to do with the arts. My father, from Ecuador, comes from an engineering background. For me, that mix gave me a creative, problem-solving mentality."

Through a chance meeting with a WPI professor, Carvajal Erker discovered the institution that would help synthesize her creative and scientific impulses, albeit more than 3,000 miles from home (she says she's proud that her daughter, Natalia, is following in her footsteps; a member of WPI's Class of 2021, she's majoring in computer science and psychological science). "I wanted to learn the applications behind the theories, and so I was very attracted to how project-based WPI is," she explains. "I learned not to worry too much about the perfect solution, but to always look for a solution that works."

"My mix is a little strange. My mom was a philosophy major and into literature, painting—everything that has to do with the arts. My father, from Ecuador, comes from an engineering background. For me, that mix gave me a creative, problem-solving mentality."



* In this article, the terms "cocoa" and "cacao" are used interchangeably.



“Somewhere along the line, I fell in love with cocoa. Ever since I was a little girl, chocolate has been a part of my life, but when I started my business, I made it a choice.”

That pragmatism served her well as she entered the workforce as a cocoa broker and discovered the industry’s deeply troubling problems, which cried out for solutions. For this lifelong chocolate lover, cocoa was about to get complicated.

Building a Better Bar

After graduating from WPI, Carvajal Erker moved to Germany and worked as an independent cocoa broker, connecting chocolate makers with cocoa suppliers like her father. She began to hear questions from artisan chocolate makers that suggested a shift was under way in the industry, a shift that created a need she was well qualified to fill.

For decades, cocoa had been treated exclusively as a commodity product, with little attention paid to where it came from or the work conditions of those who produced it. Behind the scenes, the industry was plagued by a reliance on child slavery for cultivation, particularly along Africa’s west coast, which produces two-thirds of the world’s cocoa, according to the U.S. Department of Labor. Today, it’s estimated that more than two million children are active workers in the cocoa industry, many without choice. Larger producers often hide behind the plausible deniability of a Byzantine supply chain. But Carvajal Erker saw an opportunity for small- to mid-sized chocolate makers to act ethically and differentiate their product from their competitors’.

“Buyers in Europe would tell me, ‘I can buy this product cheaper from Africa,’ she says. “‘Sure,’ I’d say, ‘but do you know what you’re buying? Do you know the conditions behind that product?’

“When I started telling them stories from the farms back home, and how the cocoa was actually harvested and processed, they were hooked. That’s when I realized there was a need to educate buyers, not just about flavor and quality, but about the ethics of cocoa.”

As the market for artisanal chocolate grew and the dirty secrets of the industry gained publicity, ethically sourced cocoa became a growing concern for small producers. Informed consumers demanded a better product, and Carvajal Erker knew just where to find the supply – as well as the story behind it. With a new vision, she put both feet back in the cocoa business, relocated to New York, and founded a new brokerage company named Cocoa Supply. She began splitting her time between New York and Ecuador, renewing ties to the farming families she’d known as a child and educating them about the market’s emerging demands.

In addition to concerns about child slavery in cocoa production, many buyers also wanted to make the claim that their cocoa was free of pesticides and other inorganic chemicals. “To help my customers make authentic claims, we have to do some education with the farmers,” she says. “I help them get organically certified and handle the paperwork that goes along with it, with the understanding that they’ll end up with an in-demand product at the end. I always tell them, ‘If you give me cocoa produced according to these standards, customers will be asking for your hacienda by name.’” That was a far cry from the disconnect many farmers experienced with large manufacturers who turned their cocoa beans into sweet treats they’d never see or taste.

Through these relationships, Carvajal Erker effectively collapsed the supply chain, putting chocolate makers within one or two degrees of separation from the farmers themselves. This transparency became a win-win for farmers hungry for stable prices and for chocolate makers looking to tell authentic stories about their high-quality cocoa.

Kushal Choksi, co-founder of Elements Truffles, a New Jersey-based artisan chocolate maker, was one such customer. “When my wife and I started our company,” he says, “we received cacao from all over the world [including West Africa]. For the price, it was really good ... but we knew what was going on behind the scenes and we didn’t want to support that.” For socially conscious customers like Choksi, Cocoa Supply offered an alternative to the black box of cocoa production by providing a product they could trace from bean to bar – and traceability was the new name of the game.

“Traceability and storytelling are at the core of our business, and they’re very much related,” says Carvajal Erker. “We often invite customers to Ecuador so they can say, ‘We buy from this farm. In fact, here’s a photo of me and the farmer, and I know that he’s been

paid fairly.” She explains that this approach to marketing is critical for an artisan chocolate maker whose price point for a chocolate bar may be seven or eight dollars, compared to one or two dollars for a bar made with commodity chocolate, often of unknown origin.

Choksi stresses that chocolate lovers are prepared to pay more for natural, ethically sourced chocolate, once they understand the impact. “Customers ask me all the time where our cacao is from, and most understand that it’s impossible to buy fair trade cacao for less than five bucks a bar,” he explains. “If you work the math backwards, your cacao price has to be cheaper than peanuts if you’re paying less than five dollars. A consumer who wants a product with a lower price point either doesn’t understand the implications or doesn’t care.”

Thanks to the transparency of her supply chain, Carvajal Erker can work with Choksi and makers like him to support the claims they want to make: fair trade, natural, sustainably farmed, or ethically sourced, to name a few. But there are some claims that she will not support. And here, she reveals the chemical engineer within.

Wake Up and Smell the Theobromine

The use of raw cocoa is a fast-growing trend among chocolate makers—but it’s an example of a claim that Carvajal Erker finds specious. “The science of it doesn’t work. For starters, the ingredients in raw chocolate should never exceed 41 degrees Celsius,” she says. “The equatorial sun where cocoa grows already exceeds 41 degrees, and then the beans go through an exothermic fermentation process, which adds ten more degrees. So there’s no way we can call that ‘raw’ with any authenticity.” Here Carvajal Erker reveals her secret superpower; she is more than just a cocoa broker—she is a broker who truly understands the science behind cocoa.

Her background in chemical engineering has served her well in other ways. “Microbiology helps. When I look at a spec sheet for a new product, I’ll take a look at the cocoa butter or other free fatty acids, and this tells me if the product is fresh or potentially rancid,” she says. “Many small producers need help in understanding these details. Because I understand what’s happening in these processes, it gives our advice to them real authenticity.”

For chocolate makers looking to justify a higher price point for their chocolate, this level of intelligence is critical. “When I speak with suppliers, I need to know more than the price,” says Choksi. “I want to know the real composition, the exact percentages of flavonoids and percentage of fat—and Leila can rattle off those numbers. She really understands her product.”

Carvajal Erker’s knowledge of the science behind chocolate serves her in both business and pleasure. “Chocolate hasn’t traditionally been seen as a healthy food, but it can be,” she says. “For example, it contains theobromine, which is a neurostimulant that wakes you up but doesn’t give you the jitters like coffee does. And it’s not as acidic as coffee, so it doesn’t upset your stomach.” Not surprisingly, she treats herself to a little bit each morning.

Beyond understanding the chemistry of cacao and chocolate, as a chemical engineer Carvajal Erker also has insights into the process involved in transforming the contents of cacao beans into what are known as elaborates, including cocoa liquor, cocoa butter, and cocoa powder. With her understanding of industrial operations, she is able to identify ways to reduce the energy these processes consume and lower the carbon footprint associated with the products she sells, which further increases their value in the marketplace.

The same expertise can carry over into other commercial food processes, she says. In fact, she has reached out to brewers to help them improve the efficiency of the processes used to produce beer. “We have even been able to guide small manufacturers with new trends,” she says. “These include vegan ice cream, where we worked with artisanal ice cream makers to substitute cocoa butter for milk fat.”

Regardless of the health benefits she now espouses or the innovative new directions she is forging for her company, Carvajal Erker knows that her passion for what she sells truly started in the haciendas outside Guayaquil. “Somewhere along the line, I fell in love with cocoa,” she admits. “Ever since I was a little girl, chocolate has been a part of my life, but when I started my business, I made it a choice. And I can’t imagine a life doing anything else.”

Ethically sourced. Naturally grown. Always delicious. What’s not to love? 🍫

Bean-to-Bar

With artisanal chocolate on the rise, many consumers have shifted their perception of chocolate from a guilty snack food to a delicacy meant to be appreciated. Chocolate of this caliber often comes from “bean-to-bar” chocolate makers, a term that alludes to the supply chain transparency that brokers like Cocoa Supply offer.

Similar to its “farm-to-table” cousin, the term “bean-to-bar” is widely interpreted. Unlike labels such as “Fair Trade,” there is currently no

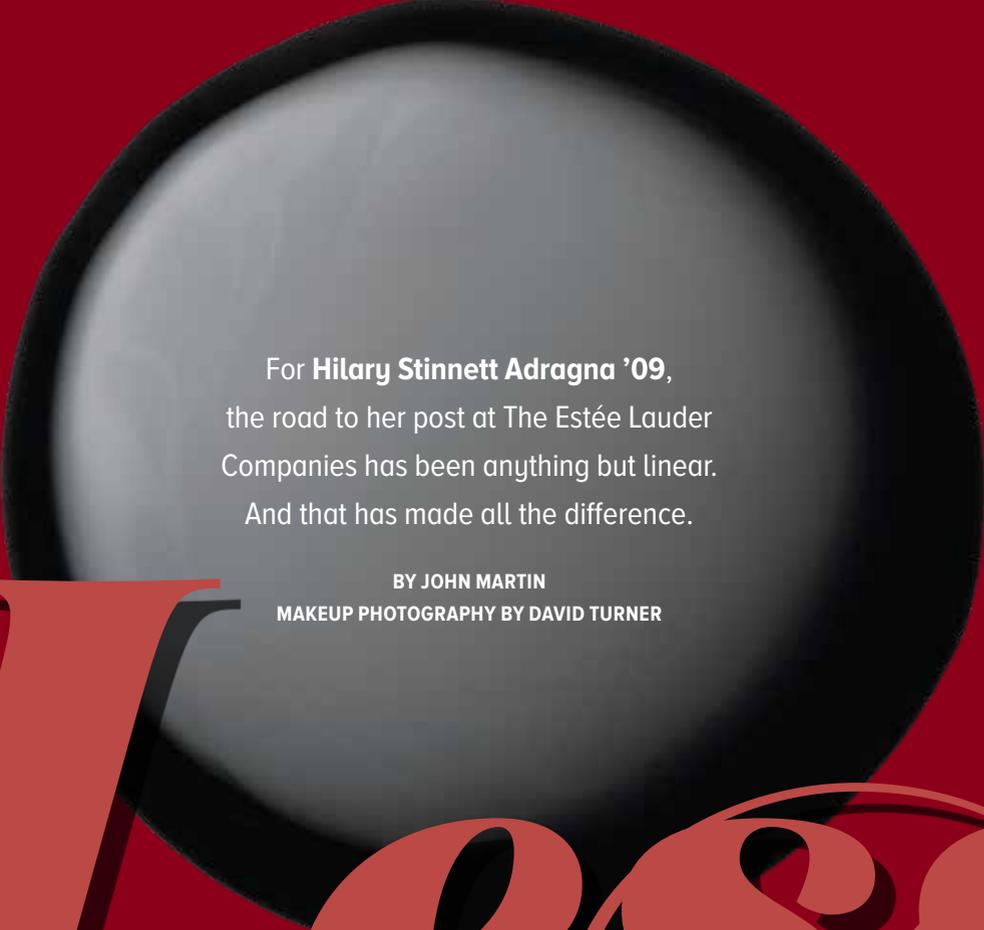
industry regulation of the “bean-to-bar” claim. However, for most chocolate makers, the term refers to a trade model where the maker can trace nearly every aspect of their chocolate’s production—from harvest (bean) to the final recipe (bar).

Large-scale chocolate manufacturers typically purchase a highly processed cocoa product as a base for their recipes. In contrast, bean-to-bar makers often start with cocoa nibs, small pieces of cocoa beans that have experienced little

processing beyond fermentation. Beginning with unprocessed cocoa allows makers far greater control over the manufacturing process, including roasting, grinding, and tempering the end product. Bean-to-bar makers also tend to offer eclectic flavor combinations, such as bourbon-infused chocolate or a lavender and black pepper blend.

Whether the end product is infused or unadorned, the journey from bean to bar always ends in delicious.

The Beauty Tra



For **Hilary Stinnett Adragna '09**,
the road to her post at The Estée Lauder
Companies has been anything but linear.
And that has made all the difference.

BY JOHN MARTIN
MAKEUP PHOTOGRAPHY BY DAVID TURNER

hILess we lead



PHOTO BY ROBERT FALCETTI

Hilary Stinnett Adragna '09 says it was the WPI Plan, the university's project-based approach to education, that first drew her to WPI, but it was the story of its most famous graduate, known today as the Father of Modern Rocketry, that truly sealed the deal.

"I was excited about the idea that the relevant, creative, application side of science and knowledge was part of the education at WPI," she says. "But I also loved the campus mythology about Robert Goddard blowing up labs in Salisbury, but still being allowed to experiment in the Magnetic Lab [now Skull Tomb] after he graduated. The idea that you could mess up, and mess up big, but still go on to do something important and meaningful ... that really resonated with me.

"What I really needed to hear when I was younger was that success can be achieved in a lot of different ways and that careers can be successful without being perfect and linear. It's easy to brush over the hardships and see a career that only ever moves forward and up. But taking detours, going in a different direction, adapting to unexpected situations, taking a break, or trying something new shouldn't be thought of as failure. It's all about accepting and learning from what went wrong, sticking with the struggle, and doing a little better next time."

On paper, Adragna's own career seems decidedly linear, but behind the orderly mileposts on her resume lies at least one critical turning

point, a detour, that in the end, made all the difference. Without it, she may never have found her way to The Estée Lauder Companies, one of the world's leading manufacturers and marketers of skin care, makeup, fragrance, and hair care products. As a senior scientist of toxicology, her job at The Estée Lauder Companies is to minimize the hazards and risks posed by the raw materials that go into products sold under more than 25 global brands, including Aveda, Clinique, DKNY, Ermenegildo Zegna, and Estée Lauder.

A Critical Detour

Interested in biology and chemistry, Adragna chose to major in biochemistry at WPI "because I couldn't decide between the two." As she threw herself into her studies, she reveled at being part of a community of like-minded people. "WPI was the first place where I felt like I really belonged," she says. "I loved being surrounded by intelligent people who understood what I was saying. One of the best parts about being around WPI people is that when you think of something new, they don't say, 'that isn't real.' They say, 'how can we make that real?'"

"My favorite game at WPI was sitting in the Rubin Campus Center bouncing ideas around with groups of people, imagining together the different ways an idea could be developed or made real, and pointing out flaws in the design," she says. "I still play these thought-

“I was excited about the idea that the relevant, creative, application side of science and knowledge was part of the education at WPI.”

experiment games at work with new ideas, looping in people from different departments and backgrounds to see if we can create something together.”

By the time she graduated, Adragna knew she wanted to work in government or industry. “I love theory, but I realized that applied knowledge was more important to me,” she says. “As a scientist, I wanted my work to have real, direct impact on people in my lifetime.”

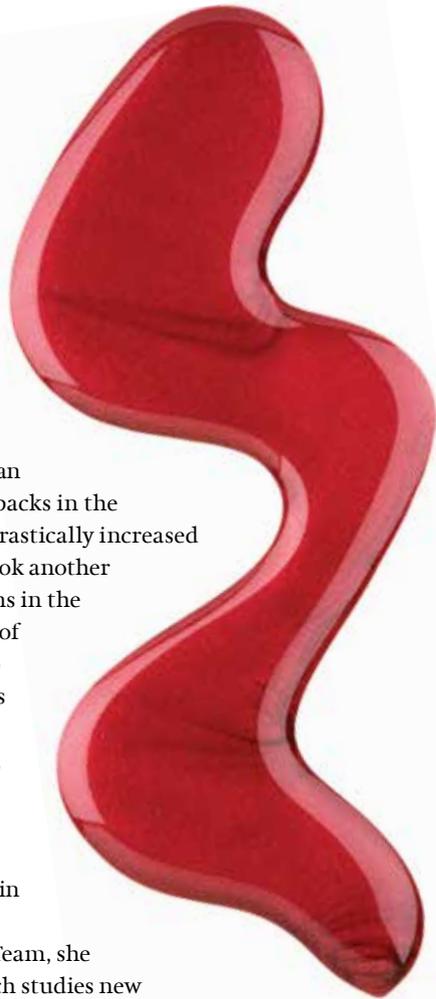
Pharmacology, which draws heavily on biochemistry, was a field in which she felt she could make that kind of immediate impact. She enrolled at Kent State University to pursue a PhD in pharmacology through a joint research-based program with the Northeast Ohio Medical University Consortium. In addition to teaching such courses as Cosmeceutical Laboratory and 3D Computational Modeling, she began a research project aimed at developing a new treatment for glaucoma. The work was difficult, made more so by a fraught relationship with her advisor. More than three years into her graduate program, she decided to change advisors and labs, which meant also changing her research focus.

“That’s pretty late in the game to be doing that,” she says. “I was strongly discouraged from continuing in the PhD program and told I should switch to a master’s. I refused.”

At weekly graduate student luncheons, she listened to a parade of academics who talked about possible career paths. “They all described perfect, linear, direct paths from one great lab to the next, with never a gap, or break, or mistake. It didn’t seem relevant to me. I remember thinking, ‘I’ve already screwed up my PhD program; how am I ever going to have a career if perfection is a requirement for success?’” Finally, one professor talked about his own circuitous route, from industry to academia and, perhaps, back to industry again. “The idea that you could take detours, go your own way, and still be successful was what I needed to hear right then.”

For her second research project, Adragna looked at how a therapeutic peptide called osteoactivin-D worked in osteoclasts (bone resorbing cells) and osteoblasts (bone building cells), with the hypothesis that the compound might prevent or reverse bone loss in osteoporosis. While the peptide worked well in cultures of osteoclasts and osteoblasts, it had no beneficial effect in an animal model. Still, when she presented the research in a poster session at the American Society of Bone and Mineral Research, she won a Young Investigator Travel Award, which enabled her to share her work at the Mechanistic & Therapeutics Insights into Skeletal Biology Learned from the Study of Rare Bone and Mineral Diseases Workshop. “I had the opportunity to share some of my data with people who were investigating osteoporosis,” she says, “and I had some illuminating conversations about ideas for related investigations.”





Into the Weeds

Adragna earned her PhD in 2015, just as an economic slowdown was triggering cutbacks in the pharmaceutical industry. Faced with drastically increased competition for jobs in her field, she took another detour and began searching for positions in the related field of toxicology. It took a year of underemployment and hundreds of job applications to land her first position, as an associate toxicologist at SafeBridge Consultants, which provides toxicology, industrial hygiene, and other safety services to the pharmaceutical, specialty chemical, and food industries. She joined The Estée Lauder Companies in her current position in early 2020.

As part of the Global Product Safety Team, she works with the Innovations Team, which studies new materials for cosmetics about which little is known, and the Raw Material Management group, which deals with ingredients that have already undergone safety testing by suppliers. The new materials evaluated by the Innovations Team may be offshoots of existing materials or, she says, may start out “as a rumor of a phenomenal, breakthrough ingredient.”

While the neuroscientists, pharmacologists, and biochemists work to understand how the new materials work and whether they can be harnessed to make exciting new products, “I get to be the voice that asks, ‘Is it safe?’” Adragna says. She says she looks for tripwires, including ingredients that may cause skin or eye irritation, materials with the potential to trigger skin sensitization and allergic reactions, and chemicals that pose the risk of systemic toxicity, including organ damage.

Swiss physician and alchemist Paracelsus is known for his assertion that the “dose makes the poison.” “So part of my job,” Adragna says, “is to consider the doses at which these effects might occur, and ensure that the maximum dose the user could be exposed to is well below the dose at which the effects were observed.”

Finding that maximum dose requires getting down into the scientific weeds, she says. She evaluates the pharmacokinetics of the raw materials—processes like absorption, distribution, metabolism, and excretion—to assess the risks associated with use. For example, an ingredient made up of large molecules that can’t be absorbed through the skin poses a low risk of affecting internal organs.

“I am ecstatic to be working at a company that takes social and environmental ethics into consideration when creating its products.”

“I have to consider the mechanism—how the raw material works, and what might go wrong,” Adragna says. “We test for impurities, like heavy metals or monomers [building blocks of larger organic molecules, some of which can be toxic], to ensure that we’re using high-quality and safe ingredients in our products. These are some of the factors I use to set use-level restrictions for the formulation chemists.”

Advancing Toxicology

“I am ecstatic to be working at a company that takes social and environmental ethics into consideration when creating its products,” Adragna says, noting the commitment of The Estée Lauder Companies to sustainability and ethical sourcing of raw materials. She says the company’s values play out in her own work, as well. “The Estée Lauder Companies embraces *in vitro* and alternative methodologies for testing product safety,” she says, noting that *in vitro* (“in the glass”) means that the tests are carried out in the lab and not in lab animals (unless demanded by a regulatory body). She says she’d like to see this approach adopted more widely in her field.

“I would love to see toxicology embrace more alternative methodologies,” she says, “and fully replace animal studies by developing replacement practices, like ‘organ-on-a-chip,’ microchip devices that simulate the functions of human living organs. I would also like to see more focus on sustainability and environmental impacts in pharmaceuticals.”

Tackling Hunger

Adragna is helping to tackle local food insecurity during the coronavirus pandemic by working with several mutual aid groups on grocery runs, seed swaps, and the development of local “food forests” as a source of fresh healthy food to residents. “Unemployment and food insecurity in the local area have skyrocketed, and we’ve seen lines at the food pantry that stretch for miles,” she says. “We’re working to establish community food forests in the surrounding areas while continuing to support local families with monthly food grants. The number of people experiencing food insecurity as a result of the coronavirus pandemic continues to rise.”

GLOBAL EXPLORER

She and her husband have taken part in Biosphere Expeditions, where people have the opportunity to be citizen scientists and assist in field work for environmental and conservation causes. She went to Kyrgyzstan for two weeks in the summer of 2019, searching for signs of snow leopards in the Tien Shan mountains. “I documented an enormous collection of Kyrgyz petroglyphs, thought to be from the Silk Road era,” Adragna says. “My team also found tracks from the Pallas’s cat, saw ibex [wild mountain goats], and left cameras that later recorded snow leopards. Most of our days were spent hiking up mountains and documenting prey animals for the snow leopard. The locals thought it was laughable that we climbed the mountain on foot. They rode horses!”

—John Martin

Her own goals include helping to advance toxicology to the next level through data science, structured methodology, and in silico computer simulations. “I would love to someday work with a team to develop predictive toxicity software for novel compounds using machine learning, the FDA’s Adverse Outcomes Pathways, Read-Across (a chemical hazard classification approach), and structure-mechanism relationships for novel compounds,” she says.

Breaking Down Barriers

At WPI, through her extracurricular activities (“I must have joined every club on campus at one time or another”) and engagement in WPI’s interdisciplinary Interactive Qualifying Project (her own IQP looked at the role of technology for mass immunizations in pre-industrialized countries), Adragna says she discovered the joy of working in interdisciplinary teams. “I became deeply interested in working in cross-functional teams,” she says, “and in the pollination of ideas between people with differing backgrounds and focuses. This is a skill I use every day at work.”

In addition to working with interdisciplinary teams as part of her job, Adragna has pitched in at CoronaWhy, a group of volunteers who came together to try to solve the challenge of making the published scientific literature about SARS-CoV-2, the virus that causes the COVID-19 disease, more accessible to scientific experts and physicians by harnessing machine learning technologies. (Among the volunteers is John Adragna, Hilary’s husband, who is working toward his PhD in inhalation toxicology at New York University Langone Health.)

“The team consisted mainly of computer scientists with limited or no life science background,” Adragna says. “I gave them a ‘map’ to navigate the materials: what the section headers were, what keywords were important for scientists to filter the documents, where to find those keywords, how to exclude irrelevant results, synonyms and definitions, etc. I also suggested tools that machine-learning scientists could create to help pharmacologists, physicians, toxicologists, and other life scientists interpret the data in different ways.”

As a pharmacologist, she was curious about apparent gaps in the data. Early in the pandemic, for example, asthmatics had been identified as a vulnerable population, but the numbers she was seeing on New York’s coronavirus dashboard didn’t support that prediction. “We wondered, were anti-asthmatic steroids having a protective effect against disease severity?” she says. “How could we leverage the data to draw new conclusions on potential interventions or protective measures, and help experts filter the data to make their own inferences? If I hadn’t done cross-functional teamwork at WPI, I don’t think I would have had the confidence to walk in and offer to help.”

Adragna sees this work as an example of the progress that can be made when people from different fields break down the artificial barriers that often separate them, barriers that can stand in the way of progress. Breaking down barriers takes hard work, and, too often, she says, those who’ve broken through turn around and build the barriers back again. “I’ve often heard people say, ‘I’ve had a really hard time getting where I am, so I need to make it hard for the next person.’ But progress should be hard for the right reasons, and shouldn’t require that you sacrifice part of yourself to get there. We can challenge people intellectually and still treat them as human beings.”

Perhaps it shouldn’t be a surprise that the scientist whose own journey has been marked by unexpected challenges and detours would want to help others find an easier path. 🍎





CLIMATE CHANGE & THE A WORD

BY AMY CRAWFORD

ILLUSTRATIONS BY
ZOE PAPPENHEIMER

Scientists and engineers at WPI are helping the world adapt to the inevitable changes that a warming climate is bringing to the planet.

For a long time, says Professor **Sarah Strauss**, researchers working on the front lines of climate change considered “adaptation” to be a bad word. “This has been an issue in dealing with climate change up until relatively recently,” says Strauss, who came to WPI’s new Global School from the University of Wyoming in 2019. “We were hoping we could stave it off, so the focus was on mitigation. You really did hear people calling it ‘the A-word’; research was not geared toward adaptation.”

At one time this attitude might have made sense. If global powers had only worked together to figure out how to reduce carbon emissions, perhaps the worst effects of climate change could have been avoided. But instead, nine of the 10 warmest years on record have occurred in just the last decade and a half. Global surface temperatures are now half a degree Celsius above the average recorded between 1986 and 2005. And several more degrees of warming are predicted by the end of the century, portending a host of effects from rising sea levels and stronger hurricanes to more frequent wildfires and persistent droughts.

With change inevitable, “adaptation” is no longer a bad word. In fact, researchers are increasingly looking at how our communities can use design and engineering to weather the crisis. That includes a cluster of professors at WPI whose research offers insights into how human cultures influence the way we feel about change, how communities can make better decisions about using limited resources, and how we can reshape our cities and systems to be more resilient. As they work on projects in the United States and around the world, they are also mentoring a new generation of social scientists and engineers—young people who will have no choice but to take on the challenge of climate change and help lead human society through it.

Culture, Justice, and Power

With a background in cultural anthropology and public health, Strauss has conducted research around the world, examining the important role that culture plays in how people make decisions about local resources. One community she spent time in is the Alpine village of Leukerbad, Switzerland, which, with its economy built around tourism at ski resorts and thermal springs, depends for its very survival on a reliable supply of water, whether bubbling up from below or coming down as snow.

“They used to be able to ski from the top of the mountain down to the valley, and by the early 2000s they’d had to give up the lower slopes, because there wasn’t enough snow,” Strauss says. “A question that came up when I was working there was ‘Should we invest in more snow cannons to make more artificial snow?’ Those are the kinds of nitty gritty decisions communities are having to make. And, of course, there are also ones about less glamorous things than ski areas, like storm surge and droughts and pest outbreaks, which are increasing because winters are less cold.”

As people around the world face the impacts of climate change, their decisions and reactions will always be influenced by culture, Strauss says. For an Inuit family living a traditional lifestyle in Alaska, melting ice may limit the animals they can hunt for subsistence, dramatically altering their daily lives. In Greenland, on the other hand, some people have welcomed rising temperatures, which make agriculture possible in places it has not been seen since the Medieval Warm Period. But one broader pattern has become evident: the worst impacts will be felt by those who are already struggling: “In this



“I emphasize local, but the locals are always part of a bigger system. It goes local, regional, state, national—and then global.”



country, and everywhere else, environmental problems tend to weigh more heavily on poor people,” she says.

The importance of what has become known as “environmental justice” lies at the heart of a new, wide-ranging project Strauss is beginning with several colleagues at WPI. They are thinking about how infrastructure in the Worcester area—the built environment as well as food, water, energy, and transportation systems—will have to evolve to deal with climate change, and to accommodate continued efforts to mitigate it, such as a shift to electric cars.

“I emphasize local, but the locals are always part of a bigger system,” Strauss says. “It goes local, regional, state, national—and then global.”

Unique local efforts to adapt to a changing planet were part of what drew Strauss and **Carrick Eggleston**, her collaborator and husband, to Auroville, a utopian community in South India envisioned as a “universal town where men and women of all countries are able to live in peace and progressive harmony, above all creeds, all politics, and all nationalities.” As Fulbright-Nehru professors at Pondicherry University in 2012–13, they were able to participate in one of the longest-running renewable energy projects in the world; Auroville put up its first wind turbine in the late 1960s.

Eggleston, professor and head of WPI’s Department of Civil and Environmental Engineering, researches renewable energy and novel materials, with a particular focus on ways to use solar energy to displace fossil fuels. But he is also interested more generally in what he describes as “the feedback loops between human systems and earth systems.” These are the ways human activity can act as a sort of geologic force that changes the climate and the environment and, in turn, forces us to change the way we live. Auroville strives to have a

lighter impact; Eggleston calls its approach “a real eye-opener.”

In rural India, he explains, the electric grid is often unreliable, and Auroville’s power used to be off for more than half of each day. Power intermittency is a problem to solve in the United States, as solar and wind power become more prevalent. In addition, it is something more communities may soon face as climate change brings with it more severe storms. But Auroville has already figured out creative solutions—solutions that also put it in a good position to embrace renewable energy.

“In Auroville, pretty much every single little business and household had a battery storage system and inverters to run the lights and things when the power was off,” he says. “That means they already had everything they need except the solar panels if they want to go solar—and these days the cost of solar panels is minimal, so solar is now going up everywhere.”

Even a family that lives in a one-room home could have a solar panel the size of a sheet of paper to run a single light that allows them to read and study in the evening. “It can have a huge impact on education, or on how people make a living,” he says. “These days, with more reliable and plentiful power, they can power their kettles and hot water heaters with electricity, where they used to use propane.”

The WPI team was also impressed by the community’s eager uptake of new technology that turns food waste into methane fuel for cooking. Increasingly common in India, these anaerobic digesters are just beginning to be used in Europe and the United States, Eggleston says, noting, “Sometimes it’s places like India that are way ahead in adapting to change, and we should recognize that useful ideas and technologies flow in both directions between the West and places like India.”



“I would say the primary reason people don’t think about our water sources when it comes to climate change is, generally, a lot of people don’t think about their water sources, period.”

Decisions About Water

Environmental justice is also at the heart of **Jeanine Denu Dudle’s** research. An associate professor of civil and environmental engineering, she works on water quality issues, which are increasing as climate change alters weather patterns, often in surprising ways.

“Imagine a flooded river,” Dudle says. “It may be running brown, like the Mississippi when it floods. Obviously, that’s not something you’re going to want to be drinking, because it’s full of sediments. But the same problem happens if we’re in a drought condition. When pollutants that we normally put into the environment are not diluted by rainfall, you can still have contaminated waters.”

More severe floods and droughts will require better water treatment technology. But that’s more expensive, and it may be out of reach for many communities. “When you’re talking about drinking water, water for cooking, water for sanitation, this needs to be available to everyone at an affordable price every single day of the year,” she says.

To that end, Dudle and her undergraduate and graduate students have worked on projects in Costa Rica, Ghana, and other countries to improve testing for pollutants and prevent transmission of waterborne pathogens using alternative disinfection methods, which can kill microbes without creating potentially harmful chemical byproducts. As in the work in which Strauss and Eggleston are engaged, Dudle has found that culture plays a major role in how people experience and confront environmental problems.

“We often look at the reasons why people chose certain water sources, whether a hand pump or a local stream or river or some sort of reservoir,” she says. “You may take a strictly medical view and say, ‘This particular source is safe because it’s not going to make you sick,’ but you’ll still find that not everybody in the community makes that choice.”

Instead, price, proximity, perception of aesthetic qualities, or cultural beliefs may weigh more heavily on people’s decisions—and engineers trying to solve a community’s water problems must take those into account. “It all ties into how you devise solutions to meet

people’s needs, where their needs may be different. You can’t just tell people, ‘Well, I’m the engineer, here’s the solution.’”

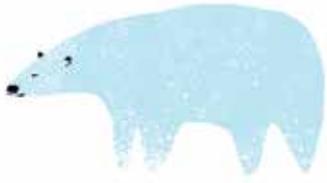
At a global level, it’s also important for all of us to understand just how broad the impacts of climate change are—they go far beyond rising temperatures and melting ice caps.

“I would say the primary reason people don’t think about our water sources when it comes to climate change is, generally, a lot of people don’t think about their water sources, period,” she says. “You expect to wake up in the morning and turn on the faucet and have water to brush your teeth and make a cup of coffee and cook your breakfast and take a shower and wash your clothes. So it can come as a shock to some people to learn about all of the technology and effort and planning, on a local and regional and countrywide basis, that goes into that. And the changes that are coming make that harder and harder.”

From Complacency to Action

Perhaps the biggest challenge in tackling climate change is overturning the complacency that has made it difficult to take meaningful action. But WPI professors have found that the younger generation is often much more realistic, and many are eager to build careers around finding solutions. This fall, the faculty will welcome the first class of students in a new master’s program in Community Climate Adaptation (*see sidebar*). Meanwhile, undergraduates are already exploring the ways in which they can tackle the problems of climate change, both in their own communities and abroad.

“I think WPI has a really great opportunity here, because of the new graduate program and the existing global programs, to lead the development of a workforce around this,” says **Seth Tuler**, associate professor of integrative and global studies, whose background is in environmental and sustainability studies. His research involves working with municipalities to prepare for coastal flooding and extreme heat, and he and his colleagues have developed a facilitated dialogue process that helps communities think about risk and making decisions about specific, practical interventions.



“Let’s say you’re building a new wastewater treatment plant, for example, and the lifetime of a wastewater treatment plant is on the order of 100 years,” he says. “You have to really think, ‘What’s the world going to be like in 30, 40, 50 years?’” Will it be regularly flooded because of sea level rise and extreme precipitation events? These practical challenges are not something that anyone can avoid, he notes, even those who may be less inclined to accept the science of climate change for political reasons. “Among planners and people who have some responsibilities at the local or regional levels,” he says, “I think that question is pretty much settled. Some talk of ‘rising waters,’ like a mayor in North Carolina, so they don’t have to say ‘climate change’ or that human activity is responsible, but they are planning for it.”

Currently serving as co-director of WPI’s Boston Project Center, Tuler spent 2011 to 2018 as co-director of the Bangkok Project Center and has advised Major Qualifying Projects (MQPs) and Interactive Qualifying Projects (IQPs) related to climate change and resilience in several countries, including Israel and Ecuador. Among the students he has worked with is **Jodi Kurilla ’21**, whose IQP last year involved creating a sustainable transportation planning tool for the Israeli city of Eilat. She is now designing a public green space that will replace a parking lot in Worcester’s Main South neighborhood. She says she has given much thought to the urban heat island effect, in which human activities and the built environment contribute to increased temperatures.

“If you’re in downtown Worcester and you don’t have adequate housing, summers are hell,” she says. More privileged city residents might not realize how increased heat affects their neighbors – which shows how important it is for designers, urban planners, and engineers to talk with people about their experience of climate change. “Climate change is so specific to every community,” she says. “It’s not one size fits all. My answer is working with communities and workshopping solutions.”

Hannah Schulz ’21 agrees. A double-major in civil engineering and in environmental and sustainability studies (see *Insider*, page 15), she is completing a two-part MQP that began with mapping potential sea level rise in Boston, with an eye toward giving planners a tool for shoring up the built environment. The second part of her project is designing flood protection for Condor Street in East Boston, which is already seeing high tides fill its streets.

“Boston will definitely look a lot different,” Schulz says. “There’s an eerie element—when does it get to the point where we’ll have to retreat?”

As demoralizing as adapting to climate change might feel sometimes, Schulz and her fellow young engineers are also hopeful. They grew up hearing dire warnings about the future from scientists and environmentalists; now, they are getting a chance to help.

“My generation is a lot more geared toward believing in climate change, and we’ll still have to work on mitigation,” Schulz says. “But now it’s about where can you have the most impact? As an individual, I can buy an electric car, compost, make these changes. But as an engineer—that is where I really have power.” 



Community Climate Adaptation Master’s Degree

In response to a global grand challenge, WPI recently introduced a new interdisciplinary master’s degree program called Community Climate Adaptation (CCA), which is among the programs within WPI’s new Global School. Offered jointly by the Department of Integrative and Global Studies (DIGS) and the Department of Civil and Environmental Engineering (CEE), the program gives students the hands-on training and broad perspective they will need to work with communities around the world as they adapt to the impacts of a changing climate.

“Just as the field of public health emerged in the late 19th and early 20th centuries to address problems of epidemic infectious disease, we now need to train a workforce that understands how to help communities adapt to the impacts of a changing climate and move forward in sustainable ways,” says Sarah Strauss, a DIGS professor, who co-directs the program with Jeanine Dudle, a CEE professor.

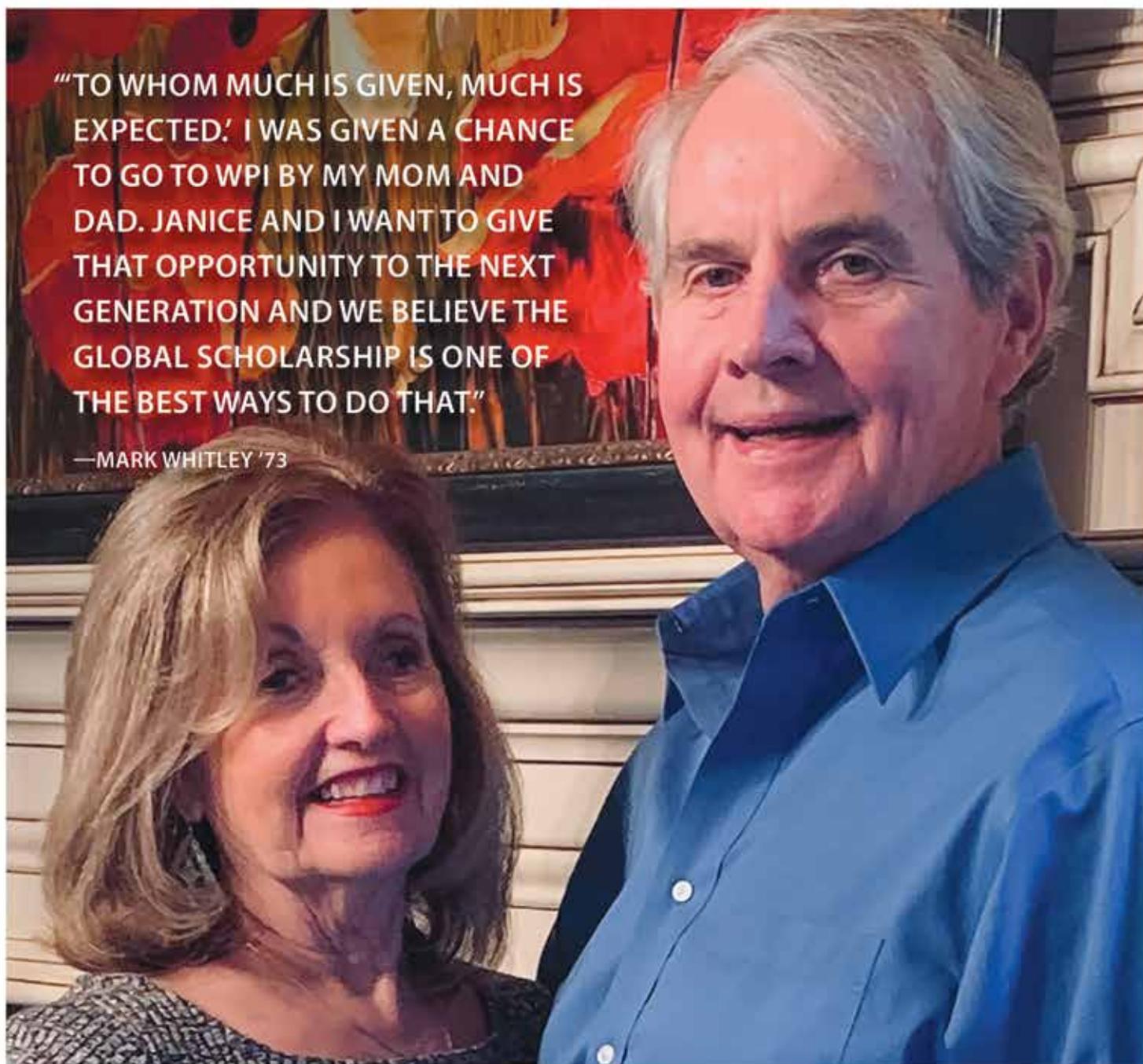
Students in the program gain expertise in engineering, social science, and the physical and biological sciences and learn to apply it to understanding the complex network between resources, environment, climate, and people in a community or region. By drawing on these different areas of expertise, students and community partners are better equipped to assess and find solutions appropriate to local contexts. In fact, while some of the degree work is completed in the classroom, a significant portion of the program happens in the field, as all students will be required to complete a Graduate Qualifying Project at a community site.

The program will help fill a growing worldwide need for professionals who approach climate change adaptation from a comprehensive global perspective. As professionals in a rapidly expanding field, graduates will bring their diverse perspectives and experiences (technical and nontechnical) to bear on complex techno-social systems. Navigating the environmental, cultural, policy, and built environment constraints imposed by the reality of climate change, they will seek robust and comprehensive responses to problems as varied as water resource and water quality impacts; loss of land and economic assets; actual and projected problems of infrastructure inadequacy; differential health and social impacts; and extreme weather events—work that requires coordination with multiple agencies; compliance with local, state, and federal policy decisions; and attending to local preferences along with social, cultural, and economic constraints.

—Julia Quinn-Szcesuil

“TO WHOM MUCH IS GIVEN, MUCH IS EXPECTED! I WAS GIVEN A CHANCE TO GO TO WPI BY MY MOM AND DAD. JANICE AND I WANT TO GIVE THAT OPPORTUNITY TO THE NEXT GENERATION AND WE BELIEVE THE GLOBAL SCHOLARSHIP IS ONE OF THE BEST WAYS TO DO THAT.”

—MARK WHITLEY '73



Through the Janice B. and Mark D. Whitley '73 Endowed Global Scholarship, the Whitleys are providing the same opportunity for deserving students that Mark's parents provided for him.



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ALUMNI NEWS



The Traditions Must Go On





How do you keep WPI’s cherished traditions alive during a global pandemic? In true WPI fashion, you collaborate, innovate, and make it happen.

For generations, WPI’s traditions have brought the community together to share school spirit, build relationships, celebrate alumni, and create lifelong memories. As keepers of tradition at WPI, the Student Alumni Society (SAS) has been powered by an especially passionate and committed group of students for the past four decades. This year, despite the challenges, the group was more determined than ever to keep school spirit and pride alive on campus.

In snappy red-and-white-striped rugby shirts, SAS members are easy to spot across campus encouraging participation in WPI’s long-standing traditions. Although COVID-19 has made it much more difficult to plan and run campus activities, the group has done all it can to ensure that WPI students, alumni, faculty, and staff can still celebrate their beloved traditions.

In one cherished tradition, first-year students cross the Earle Bridge en masse at the start of the school year. Undeterred by the need to adhere to COVID-19 restrictions, SAS developed a plan for a socially distanced crossing. It took six hours to complete, but SAS successfully welcomed 1,300 first-year students to the WPI community with a well-deserved SAS cheer, a WPI beanie, and a Tech Bible.

“We stayed true to our mission when planning this year’s campus events,” says SAS Herd Chair Dominick Gravante ’22. “We understood people were Zoom-fatigued and missing human connection, so we did our best to develop fun and safe opportunities to celebrate WPI traditions.”

By successfully organizing a Founders Day event on the Quad and activities at the Goat’s Head, recording fun Halloween Gompel videos, and hosting a haunted murder mystery across campus, SAS showed that safe events can be executed with strict adherence to protocol, creative innovation, and an extra hefty dose of school spirit.

“Two of the most important skills I’ve learned at WPI are adaptability and innovation,” says SAS Public Relations Chair Brittany Henriques ’22, who says her WPI education has given her the skills she needed to face the challenges of maintaining WPI traditions on campus this year. “With the various COVID-19 related restrictions, we had to find a new way to learn, collaborate, and plan events. As students we are always learning skills that help us adapt and thrive with change, and now more than ever we are putting those skills to the test.”

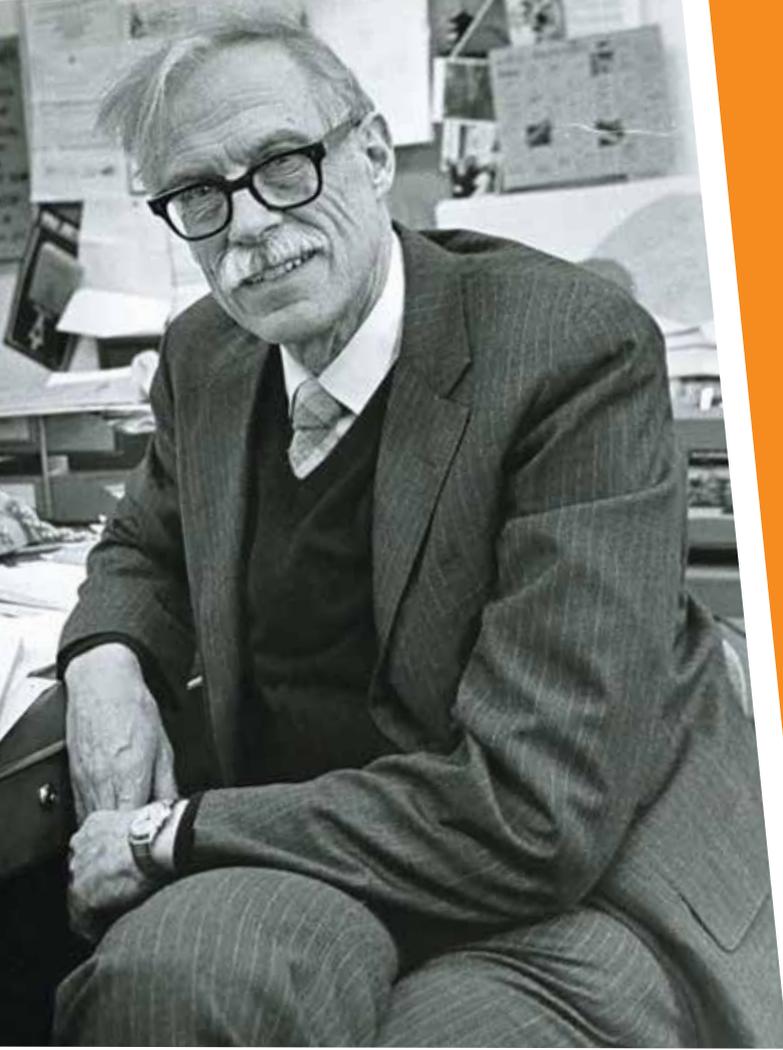
Three cheers for the Student Alumni Society for keeping traditions alive at WPI in these challenging times.

—Sira Naras Frongillo

“During our time at WPI, we learn a lot about working through difficult situations and overcoming obstacles. That training allowed SAS members to successfully collaborate, reimagine, and execute successful SAS events—despite the pandemic and the obstacles we’ve faced.”

—Joseph Howell ’21





van A Tribute Fund

For nearly three decades, Dean John van Alstyne—“van A”—was dedicated to WPI and its students. Equal parts teacher, guide, fan, and friend, he exemplified the spirit of the university and the WPI Plan he helped envision and bring to life.

HONOR VAN A TODAY

The Tribute to van A Memorial Fund, led by alumni and friends, is raising funds to name a space and create a lasting physical remembrance in the new academic building to memorialize this beloved member of the WPI family.

Make your gift and help create a space where generations of students can meet the advisors and mentors who will steer their lives in positive directions—just as van A did for so many.

THE GOAL IS \$500,000 BY SEPT. 30, 2021.

Make your gift online at

wpi.edu/+vanA or 888-WPI-FUND.

The Herd Sticks Together On the Hill and Beyond

To our alumni, parents, friends, donors, volunteers, virtual event attendees, social media followers, and more

Thank you for keeping the WPI community together while we've been apart.

**Stay Connected.
Stay Together.**

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From the Desk of

MARK MACAULAY '89, '94 MS
ALUMNI ASSOCIATION PRESIDENT

I'm so proud—but not at all surprised—to see how our global Goat Nation has stepped up to support our alma mater and each other in challenging times. Your gifts of time, talent, and treasure make a meaningful difference every year—and especially this year. Goats give back, without question.

1,200+

WPI community members worldwide who have participated in WPI virtual events so far this academic year

300+

Great conversations between our student callers and alumni

900+

Dedicated alumni who have volunteered for WPI this year

3,310

Generous alumni, parents, and friends who have supported WPI this fiscal year

\$2.4 MILLION+

Current-use annual gifts donated to WPI already this fiscal year from our generous alumni, parents, and friends

\$14 MILLION+

Total donations to WPI so far this fiscal year from generous alumni, parents, and friends

3

Number of things all great alumni do

- GO TO WPI VIRTUAL EVENTS
- GET INVOLVED WITH WPI
- GIVE TO WPI

Another number that matters: students seeking financial aid. Your gift to WPI, of any amount, helps these students close the gap between their dream of a WPI education and making it a reality. Consider also a gift to the WPI Emergency Assistance Fund, which helps students and WPI community members experiencing negative financial impacts from the pandemic.

wpi.edu/+alumni | wpi.edu/+give



Joseph Botelho '14

Jim Bouton, the big league pitcher and author of *Ball Four*, wrote, “You spend a good piece of your life gripping a baseball and in the end it turns out that it was the other way around all the time.” Baseball gripped Joey Botelho early on. “I could play, talk, and watch baseball all day, every day,” he says, “and never seemed to get tired of it.”

While he loved to play the game (he was on the varsity team at East Providence, R.I., High School and made the NEWMAC Baseball All-Academic Team as an infielder for WPI), his sights were set not on the field, but on the front office. “I began to think of a career in the front office in high school, when Theo Epstein was a pretty big deal locally as GM for the Red Sox,” he says. “He was someone I could look to and say, ‘Hey, I want to do that!’”

Still, when he arrived at WPI in the fall of 2010 he kept his options open. Torn between aerospace engineering and business, he opted for a major in business administration after a first-year course called Discovering Careers and Majors helped him realize that his interests lay in that direction. While he saw a business major as a logical route to a career in baseball operations, “I also had an interest in entrepreneurship and could’ve seen myself in the start-up world,” he says.

He did get a taste of entrepreneurship when he completed his Major Qualifying Project. With a team of business majors, he started Gompei’s Goat Cheese, which partners with Westfield Farms of Hubbardston, Mass., to sell high-quality goat cheese logs branded with WPI’s mascot, Gompei the Goat. “That was one of the best examples I was able to experience at WPI of combining theory and practice,” he says. “It’s great learning about business in the classroom, but when you are actually trying to launch something, there are a lot of unforeseen challenges. Ultimately it comes down to just being able to find a way to get the job done.”

The business was successful from the start, and continues today as a student-run enterprise. “I think the fact that the business is still operating shows that WPI students are passionate about being involved and making a difference, in the WPI community and in general,” he says.

After graduation, Botelho took a position as associate supply chain leader at PepsiCo’s Frito-Lay manufacturing plant in Killingly, Conn., where he managed a team of 60 front-line employees in the packaging department. “It was a great experience for someone just out of school to be put in a leadership situation immediately and to learn how to make decisions under pressure.”

While the job was an excellent learning experience, and a Fortune 50 company offered great potential for upward advancement, he couldn’t ignore the lure of the baseball diamond. He wrote to all the major league teams, but received no reply. Then a classmate, Tim

O’Neil ’14, put him in touch with his brother, a college baseball coach in Maryland, who connected him with the general manager of the Delmarva Shorebirds, a minor league affiliate of the Baltimore Orioles, who introduced him to Kent Qualls, director of the Orioles’ minor league operations. The next thing he knew, he was at the MLB Winter Meeting in Nashville chatting with Qualls, who soon offered him a post as a video intern with the Shorebirds.

Walking away from a well-paying, full-time job for a minimum-wage internship with a limited term and no assurance of future opportunities required a leap of faith. “You start to question yourself when your friends are getting married, buying houses, and traveling the world, and you’re substitute teaching in the off-season, not sure of what’s coming next. But I was in my 20s, pursuing my dream, and no matter how things turned out, I’d be happy to say I gave it a shot.”

As it turned out, he spent four years as an intern (for the Shorebirds and the Bowie, Md., Baysox, and at the Orioles’ training complex in Sarasota, Fla.) before being offered a full-time position as a development coach. His job involved using technology, including an in-game video system and a radar tracking system called TrackMan, to give coaches sophisticated information (on pitch velocities and spin rates, for example) and videos to help them work with players to improve their performance.

When a new management team came on board during his fourth year with the organization, bringing in even more technology, Botelho’s responsibilities and leadership opportunities grew. He found himself coordinating the use of those systems across the entire Orioles minor league system. Today, as coordinator of minor league technology, he is continuing to find new ways to use technology to give the coaches the information they need. “We have such an incredibly talented group of development coaches and tech coordinators,” he says. “I see my role as finding out how to support them without getting in the way and slowing them down.”

After being shut down for several months due to the COVID-19 pandemic, major league baseball resumed in July 2020, albeit with empty stands. Botelho says he stayed busy throughout the shutdown and afterward, working at the team’s alternate training site and for the Fall Instructional League.

Now that he’s made the leap to baseball operations, he says he’d like to continue in player development and maybe even transition to pro scouting someday. “I don’t want to try planning too far down the road because you never know how life is going to unfold.”

But no matter where that road leads Botelho, it’s likely that baseball will never lose its grip on him.

—Michael Dorsey

TURNING POINT



PHOTO BY JEFF MAURITZEN

Learning How to Push the Envelope

Les Paul Foundation Supports Student Music Innovations

V.J. Manzo, associate professor of music technology in the Humanities and Arts Department, has been giving his students the opportunity to experience innovation this year through a project supported by the Les Paul Foundation.

“Les Paul was a pivotal figure at the convergence of music and technology,” explains Manzo, who is a guitarist and director of the Electric Guitar Innovation Lab (EGIL) at WPI. “He had a lifetime of doing interesting and innovative things. There’s a real WPI-ness about him.”

Manzo shares Paul’s story, how he “came from a humble background with very little money” and was curious about music and doing interesting things with music. Like many WPI alumni, even as a child, Paul took apart items at home such as the player piano, the telephone, and record player, just to see how they worked.

“He was doing this way back in the 1920s,” Manzo says.

In early 2020, Manzo and other WPI music faculty members redesigned Humanities and Arts capstone courses centered on hands-on projects that explore Paul’s music innovations. Students from various majors enrolled in the course, in which they undertake projects to recreate Paul’s innovations in a modern way, with materials paid for by the Les Paul Foundation.

As an example, Manzo describes how Paul experimented with sound, using a piece of steel railroad rail, guitar string, and a microphone under it. In the lab, students have recreated this instrument from comparable materials and then varied the materials to hear changes in the timbre. The goal is for students to experience the same “aha” moments that Paul had when he conducted similar experiments.

In another project, students followed Paul’s path in using unconventional found materials to construct musical instruments. In this case, students repurposed vinyl records in the construction of a guitar body.

Manzo’s interest in Paul and these types of innovations is a natural outgrowth of his own interest in technologies that can help people compose and perform music, “especially those who don’t normally—adults, children with special needs.” After earning tenure at WPI, he founded the EGIL—the only lab of its kind in the world—which provides opportunities to work with companies, professional musicians, and instrument makers. When looking for funding to

support his interactive and adaptive work, Manzo discovered the Les Paul Foundation.

“I thought, if he were alive, Les Paul would be hanging out on our campus.”

The course launched in January 2020, a couple of months before the pandemic impacted the WPI campus. By mid-March, students no longer had access to labs and equipment.

“And it’s been even more like the Les Paul experience,” Manzo says. “It actually worked out pretty perfectly that we didn’t have the safety net of all the fancy machines and support staff—of course, I hope this never happens again.”

In true WPI spirit, Manzo has found the added challenges of the pandemic have deepened the lessons discovered in the Electric Guitar Innovation Lab.

“I really love what we’re doing. I love the whole idea of being resilient, of telling students failure is normal,” he says. “We’re telling students Les Paul was pushing the envelope his whole life, and you can do that, too.”

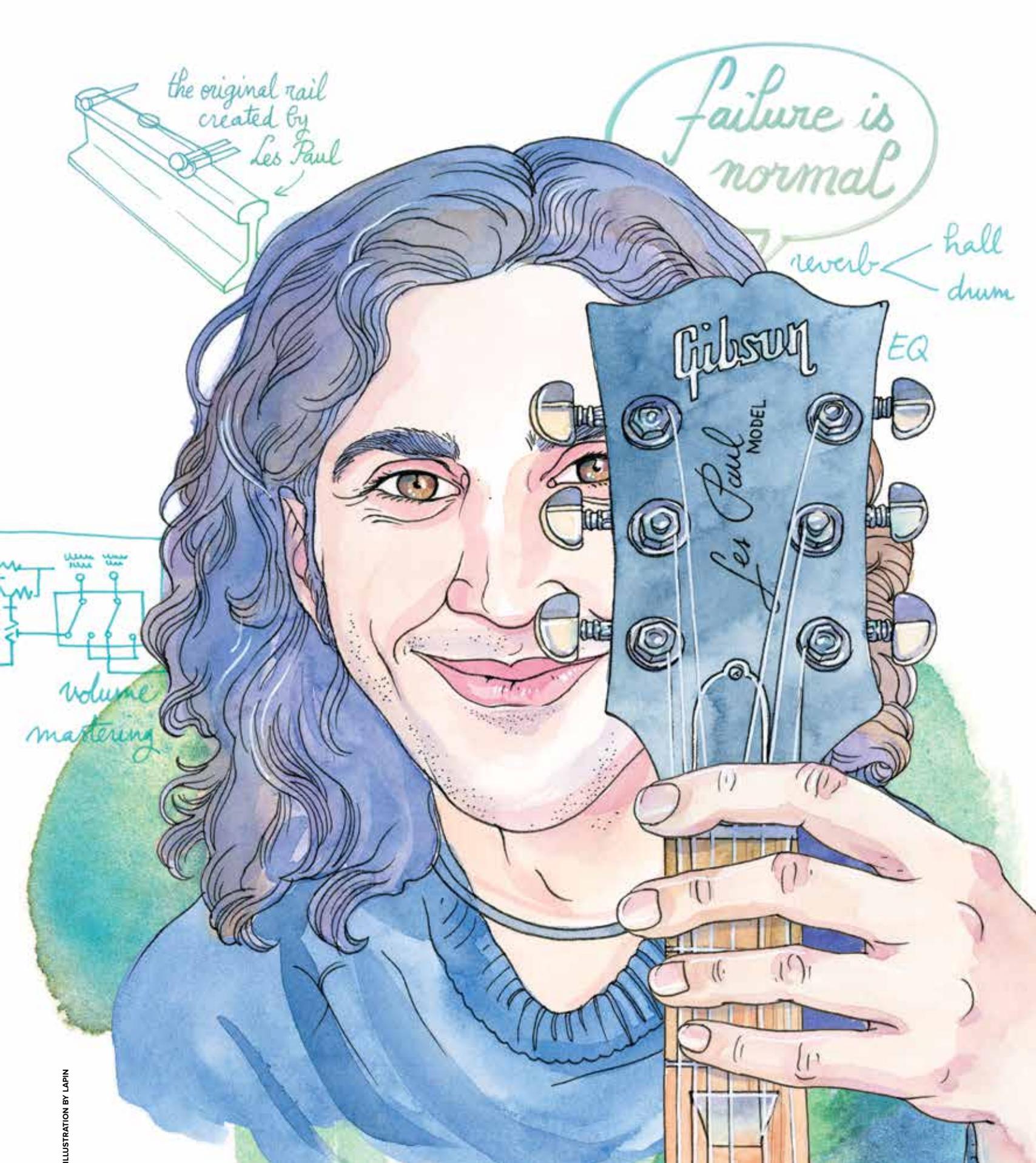
The Les Paul Foundation is also pleased to see the musician’s legacy expressed in this way.

“The students of V.J. Manzo at WPI are clear examples of the same innovative thinking as that of Les Paul. Les always looked to create things that didn’t exist and by doing that he changed the world of music forever. We are looking forward to all the things that will be brought forward by the remarkable creativity and innovation of the students at WPI,” says Michael Braunstein, executive director of the Les Paul Foundation.

To build on this work, Manzo is looking forward to sharing Paul’s legacy and lessons with even more young people. With an additional grant recently awarded by the foundation, Manzo will hold a music tech summer camp for underrepresented elementary and middle school students, either virtually with materials shipped to students’ homes or on campus.

More student projects can be found on the Electric Guitar Innovation Lab page (electricguitarinnovationlab.org).

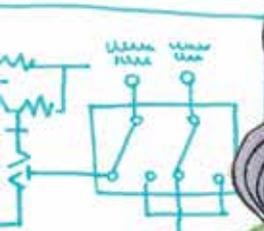
—Judith Jaeger



the original rail
created by
Les Paul

failure is
normal

reverb ← hall
drum



volume
mastering

EQ

Gibson

Les Paul
MODEL

ILLUSTRATION BY LAPIN

PAUL WYMAN '85  **WPI**
BS MECHANICAL ENGINEERING



3 TIME ALL-NEW ENGLAND
WON 750-POUND NECCVIA TITLE
PLACED **7th** IN NATIONAL CHAMPIONSHIP

PART OF 20-1 1985 NE CHAMPIONSHIP TEAM
CAREER TAKEDOWNS **155**

TODD WYMAN '89  **WPI**
BS MANAGEMENT ENGINEERING



3 TIME ALL-NEW ENGLAND
2 TIME SCHOLAR ALL-AMERICAN

MEMBER 1987 NE CHAMPIONSHIP TEAM
ALL-TIME DUAL MEET RECORD **25-9**

TOBY WYMAN '91  **WPI**
BS MANAGEMENT ENGINEERING



4 TIME ALL-NEW ENGLAND
NEW ENGLAND CHAMPION NATIONAL QUALIFIER

CAREER TAKEDOWNS **153**
CUMULATIVE DUAL MEET RECORD **45-9-1**

ILLUSTRATION BY SR. RENEY

Wrestling, Excellence, Giving Back

The Wyman Family Supports the DeFalco Endowment for Wrestling

For the Wymans—including **Paul '85**, **Todd '89**, and **Toby '91**—hard work and generosity, qualities ingrained early on at the family dairy farm, constitute a family tradition. At WPI the brothers began a lifelong relationship with the wrestling community, which embodies those same values. Today the Wymans' philanthropy is driven by what makes the wrestling program—and this family—so special: rewarding relationships, shared success, and a dedication to giving back.

The Wymans' wrestling ties are lasting and deep, something that is evident at each WPI Homecoming Weekend. During the pandemic that connection has shone through in Zoom catchups that run hours beyond their allotted times. During the decade that saw at least one brother wrestling for WPI, and over the nearly three decades since, the brothers have remained connected to the wrestling community, which includes two former teammates who later served terms as head coach. **Matt Oney '90**, the current head coach, had a seat at the Wyman dinner table each Thanksgiving break; **Steve Hall '87** brought the brothers closer to the program as alumni.

These relationships were forged through a shared experience of excellence. During the Wyman family's tenure, the WPI wrestling team reached new heights, recording an 89 percent average win record, placing in the top four each year at the New England regional championships (including two wins), and achieving two nationally ranked seasons. In addition, the brothers each earned national recognition, either as a qualifier for national championships or by being named a Scholar All American—or both.

This success was the product of a team culture and work ethic thoughtfully and intentionally instilled by Coach **Phil Grebinar**. While wrestling is largely an individual sport, accountability to the team was central. "Every person who stepped onto that mat had a specific job to do so the team could win," says Toby.

Whether it was the wrestlers winning their matches (or at least minimizing point losses) or the supporters behind the scenes, each role was equally important. "Your success was never just your own," says Paul. "None of us would have succeeded without the support we received."

Coach Grebinar and Professor **Frank DeFalco**, a devoted and beloved supporter of the team, made a point to keep academics front and center. Athletics didn't compete with classwork, it complemented it. Grebinar taught student-athletes to push through challenges on and off the mat, and DeFalco mentored and advised many students, including Toby on his Interactive Qualifying Project (IQP) in San Francisco.

Teamwork was central to the WPI Plan and, of course, to life after WPI. "People working on teams, whether on the mat or in class, was how things really got done in the real world," says Todd.

After graduating, Paul got the chance to experience it from another angle by volunteering as assistant coach. "Phil was the master of understanding what motivates different people," he says. "Learning to be a coach and get the most out of an athlete translated directly to leading a team in a company."

Even further, the wrestling program introduced student-athletes to successful alumni, who shared tips and tricks on the mat, contributed financially to the program, and even connected seniors with their first jobs. All of it amounted to so much more than a sports program.

"Phil, Steve, and now Matt give kids a chance to know what life's about and how to succeed in life," says Todd. "The success that we experienced at WPI allowed us to create success in our lives, as student-athletes, in our careers, and with our families."

"People like Phil and Frank were instrumental in their development," adds **Arthur Wyman**, the brothers' dad, who, with the boys' mom, **Diane**, traveled to all of the meets and supported the team at every turn. "We have an allegiance to WPI."

The Wymans return to campus frequently to meet with today's student-athletes, giving wrestling pointers, holding mock interviews, and sharing news of openings in their companies for internships or entry-level roles.

Through their family philanthropy, the Wymans are helping ensure continuity of the program for generations to come. For years, the brothers and their parents supported the endowment named for Coach Grebinar, providing lasting capital support for the team.

Now they are coming together to provide a family gift to the newly established Dr. Frank D. DeFalco Endowment for Wrestling, a meaningful and lasting tribute to DeFalco, who passed away in fall 2020 (see *Completed Careers*, page 63). The endowment will fund a much-needed full-time assistant coach who will support immediate day-to-day needs and provide a talent pipeline for the head coach position, enabling a junior coach to learn the values that set the team apart.

"Alumni have so much pride in the program's success over the last 40 years," says Toby. "When the call to action came out for this endowment, there was no doubt what the response would be. There's nothing better than getting your hand raised; you want the next kid to feel the same thing."

—Judith Jaeger



THE FRIEDENS: MARK (FAR RIGHT) AND BECKY (SECOND FROM LEFT), WITH DAUGHTERS HANNAH (FAR LEFT) AND SOPHIE

PHOTO BY JACLEEN LEMAY

Finding Their Places at WPI

Marc Frieden '93 is an unassuming guy, but he positively lights up when asked about his daughter Hannah's decision to apply to WPI. "I never pressured her!" he swears, and **Hannah**, now a junior, agrees, but it's clear that he is happy she found the right fit on his former campus. "And she's a much better student than I was!"

Marc is a Worcester native through and through, having attended Bancroft School and lived on Burncoat Street. You might say he was destined to come to WPI: the house his family purchased when he was in middle school had previously been owned by the Jeppson family.* They found some of John Jeppson's papers stuffed in eaves in the attic and donated them to the WPI Archives.

After he'd applied to a few colleges, a high school friend who knew the Kennedys from Kennedy Die Castings (another family with several WPI alumni) told him, "Well, if you get into WPI, that's where you are going. There's no better place." So in 1989 he moved into Riley Hall and began studies as a mechanical engineering major.

Marc was intrigued by how things worked. He took on a work-study job in the machine shop and his principal activity outside of classes was participating in the Formula SAE (Society of Automotive Engineers) race car project. "I missed my own graduation because we had a race that day," he says. After concluding his WPI career, he worked for General Dynamics Electric Boat division in Groton, Conn., before taking a management position at a family-owned packaging company.

Hannah, of course, knew about her father's connection to WPI, but it wasn't on her radar as a place she wanted to attend. She asked her father to show her around campus, but she didn't request any admissions materials. A turning point for her was attending several

"Introduce a Girl to Engineering Day" programs run by **Judy Nitsch '75** at Nitsch Engineering. She was also influenced by **Paula Delaney '75**, a friend and colleague of her mother's. Two weeks before the deadline, having done no real research, Hannah applied to WPI.

She developed an interest in civil engineering and land planning in high school and fell in love with architecture and building design once she arrived on campus. She participated in the first-year Great Problems Seminar, choosing the section called "Livable Cities." Her project on food deserts in Atlanta was a GPS Poster Session award winner. She will complete her Interactive Qualifying Project in Greece.

When asked what makes WPI special to her, the Phi Sigma Sigma sister says, "It feels like home now in a way that I didn't understand before. People have similar goals and the same work ethic. I feel like I'm with like-minded people."

"It's okay to be to be a geek, to be a girl who likes math," her father added.

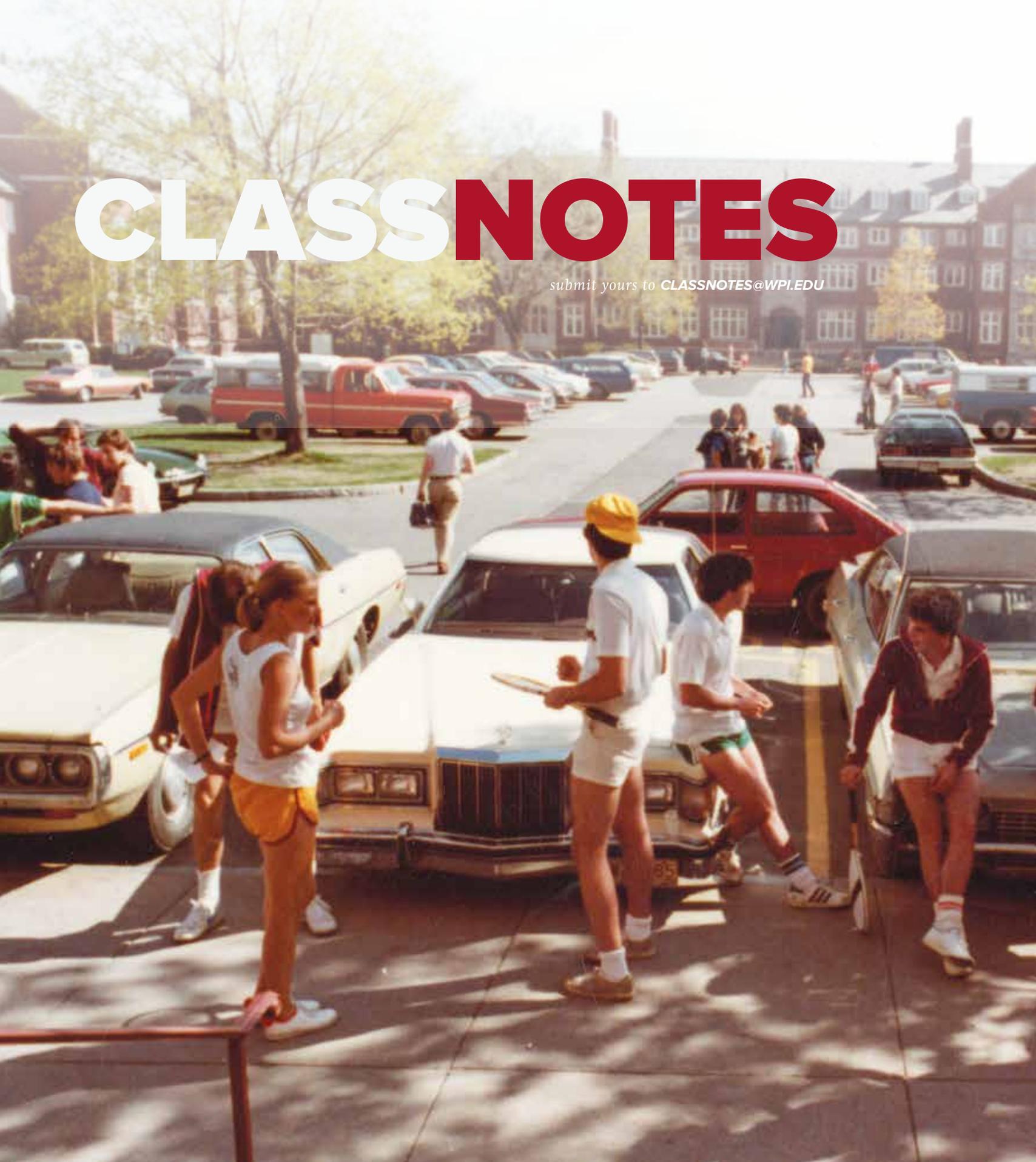
When asked what WPI means to him, Marc responds, "The best thing I've done in my life is raise my kids. To have one follow in my footsteps makes me very proud."

—Stephanie Pasha

**John Jeppson was a founder of Norton Company in Worcester (now a division of Saint-Gobain). His son George, who ultimately became Norton's chairman, attended WPI with the Class of 1897 and received a WPI honorary doctorate in 1945. George built a house at 41 Burncoat Street in Worcester and later moved to 1 Drury Lane. He donated the Drury Lane house to WPI in 1941.*

CLASSNOTES

submit yours to CLASSNOTES@WPI.EDU



1957

Ed Dennett writes, “Just to let you know that my wife, Kay, passed away on Nov. 4, 2019. We’d been married 62 years. I retired in 1987 as Vice President, Sales, after 31 years at Schlumberger Industries.”

1959

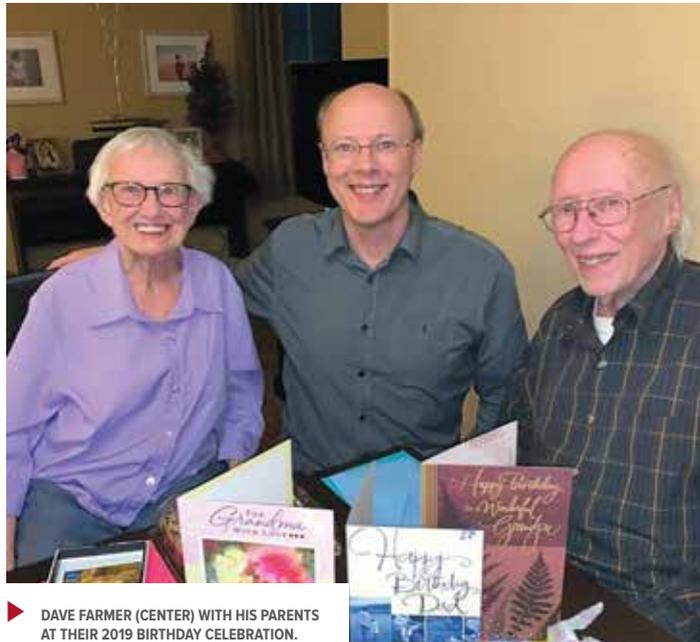
Joseph Bronzino (PhD EE) says, “I remain busy. The key to adapting to a wide variety of challenges is EXERCISE. With this in mind, I have established an exercise program that includes riding a stationary bike and several walks. This low-key exercise regime is worth trying. BE WELL.”

Robert Farmer ('69 cert: SIM) and his wife, Bev, received a special, unexpected treat in February as they celebrated their birthdays (his 90th and her 89th). Both are “not only rabid *BattleBots* fans, but WPI blood runs through both of them,” notes their son Dave. “They’ve been quarantined here in Westborough, but thankfully are able to watch *BattleBots* religiously every Thursday night. I’ve already purchased *BattleBots* t-shirts for their birthdays, which they’ll love.”

Through Brad Miller, associate director of WPI’s Robotics Resource Center, Dave sent out an appeal to **David Jin '20**, team leader for the WPI-sponsored robot Ribbot, one of the competitors in the current season of the Discovery channel program, to see if the team might record a birthday greeting for his parents. “Given the train wreck of a year they had in 2020,” Dave says, “a Happy Birthday video like this would lift them sky high.”

The team happily complied, and the video reached the team’s loyal fans on time.

Dave notes that his dad “graduated from WPI with a mechanical engineering degree, Mass Maritime with an electrical engineering degree, and served our country as a US Navy Officer. Mom (Bev) worked for many



▶ DAVE FARMER (CENTER) WITH HIS PARENTS AT THEIR 2019 BIRTHDAY CELEBRATION.

years in the WPI ‘Personnel’ (a.k.a. HR) department.”

Bill Rabinovitch recently wrote, “OMG, I just won the 2020 Van Gogh Museum Art Competition in Amsterdam. It’s a very big deal with thousands of entries worldwide. My art won for both still art and animation. In my ‘Vincent – The Field – Animation,’ I coupled Vincent with his field in a new way and then animated it.

“In other news, I still live in SoHo and am extremely active on Facebook with art lovers, artists, and writers. My feature film about Jackson Pollock, Lee Krasner, and de Kooning is being expanded into a longer version before its release.”

1962

Bill Krein writes, “My wife, Lee, and I moved to Duxbury, Mass., in 2018 and, thanks to the excellent Duxbury Marine School, I have become an avid sailor and I am learning to row a single shell. Looking forward to our 60th reunion next year. Now in my 26th year as an adjunct in the Foisie Business School.

1964

Milt Dentch writes, “I recently had a book published: *The Rise and*

Impending Demise of ISO 9001: An Auditor’s History of the International Quality Management System Standard (2020). It’s a 30-year history of ISO 9001 and my experiences in the last 20 years of providing auditing, training, and consulting for hundreds of companies throughout the world.

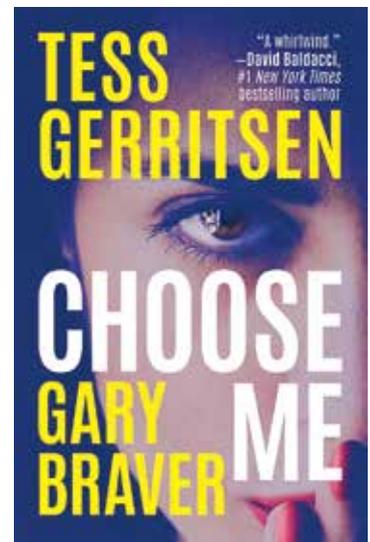
“My writing started as a hobby after I took early retirement from a 27-year career at Polaroid, and has resulted in the publication of four other books: *The ISO 45001:2018 Implementation Handbook* (2018); *The ISO 9001:2015 Implementation Handbook: Using the Process Approach to Build a Quality Management System* (2016); *The ISO 14001:2015 Implementation Handbook: Using the Process Approach to Build an Environmental Management System* (2016); and *Fall of an Icon: Polaroid after Edwin H. Land: An Insider’s View of the Once Great Company* (2012).

“I hope to publish my ‘great American novel’ – an autobiography of a local 1960s basketball star – by my eightieth birthday!

“My wife, Susan, and I live in Shrewsbury, Mass., and enjoy spending time with our seven grandchildren. Our son Jonathan is WPI ’88; his son Peter is WPI ’21; and our grandson Ryan Kennedy plans to join the WPI Class of 2025 in September.”



▶ GARY GOSHGARIAN '64



Gary Goshgarian (under his pen name Gary Braver) has teamed up with *New York Times* bestselling author Tess Gerritsen – their book, *Choose Me*, will be published in July. The “he said, she said” mystery murder thriller (set in Boston, where Gary is based) features a police detective who is determined to find out what happened between a popular college professor and his student. According to the press release, “... and what is discovered is NOT what you might expect.”

An award-winning and bestselling author, Goshgarian, professor of English at Northeastern University, has published eight mysteries and thrillers and five college writing textbooks.

1968

Kenneth Gminski writes, “2020 Low Point: I lost my wife, Ruthanne, of 47 years a week after her 72nd birthday in April. A combination of a four-year battle with Alzheimer’s and a fall where she broke her hip ball off that got infected needing a second

A portrait of a young woman with long, straight brown hair, smiling warmly. She is wearing a maroon turtleneck sweater with a white Under Armour logo and a white silhouette of a Longhorn bull on the front. The background is a dark, intricately carved wooden door with Gothic-style patterns. The entire image is framed by a white border, with red and white circular patterns visible at the corners.

Jocelyn Mendes '21

HOMETOWN:
Leominster, Mass.

MAJOR:
Chemistry

INVOLVEMENT:
Grimmgroup, American Chemical Society,
Materials Research Society, Phi Sigma Sigma

“Donations are an investment in students like me. I would not have had so many doors open to me and so many opportunities were it not for the generosity of alumni.”

After graduation, Jocelyn plans to earn a PhD in chemistry. She benefited from a summer research fellowship funded by an alumnus. She completed her Interactive Qualifying Project at the Zurich Project Center, which is supported by alumni donations to global projects.

Donations from generous alumni impact all facets of student life. When you give to WPI, you support students like Jocelyn and help them pursue their dreams on campus and beyond.

wpi.edu/+give

operation that was too much to overcome.

“2020 High Point: A week before Christmas, my son, Stephen, and his wife, Julianne, had their first child, Maddison Anne Gminski, who is also my first granddaughter—joining Colin (10) and Jacob Kenneth (6) by my daughter, Sarah, and her husband, Brian. Happy New Year: 2021, at last.

“Looking forward to May when I join my classmates who also will be turning the 3/4-century (75)—the first of the Baby Boomers. I’m actually slightly older than our three Baby Boomer presidents (Clinton, Bush, and Trump) also born in 1946. Who knew back in the ’60s with Viet Nam, the Beatles, JFK/MLK assassinations, Woodstock, a walk on the Moon, and the rest of the craziness that we would be dealing with Covid-19 that could affect our lives and the way we live as no other problem has.

“Wear your masks, get your shots, and keep your social distance so we can get together in 2023 for our 55th reunion.”

1969

Linda Rogers, widow of **Stephen Rogers** (ME), writes that he passed away on July 10, 2020, while at their summer home in Corolla, N.C. He was a member of Sigma Phi Epsilon fraternity. He was employed by DuPont in the Industrial Chemicals division for 38 years. After retiring in 2007, they moved from New Jersey to DeLand, Fla., where he enjoyed being with his children and grandchildren, playing golf, and traveling.

1970

Domenic Forcella is continuing his retirement and trying to relax during the COVID-19 pandemic.

He writes, “In my past life I worked as Director of Environmental Health & Safety and Director of Sustainability for Central Connecticut State University. I

was the first person in the position and also directed the campus Fire Marshal. Before that position I was Director of a quasi-public agency, the Connecticut Hazardous Waste Management Service. I also spent five years with the National Governors’ Association. All of which has faded into the past.

“During my time at the CCSU, AEDs were added across campus and the Fire Marshal was recognized for his efforts by the Connecticut Heart Association. I also led the school’s effort in adding a number of EV stations. In addition CCSU was recognized by the EPA as the top college in the nation for waste minimization during the EPA Football Challenge for three years.

“I have been writing a newspaper column, *Blues Beat*, which started at my local paper around 20 years ago. Since then it was picked up by Hearst Connecticut Media Group, the largest local news operation in the state. It is composed of eight daily newspapers (New Haven, Middletown, Danbury, Torrington, Bridgeport, Greenwich, Stamford, Norwalk) and 14 weekly newspapers including *The Darien Times*, *Fairfield Citizen*, *New Canaan Advertiser*, *The Greater New Milford Spectrum*, and *Westport News*.

“I have been active in the state and national blues community. I received a *Keeping the Blues Alive* Award in Journalism from the Blues Foundation. I served as president of the Connecticut Blues Society and a member of the Board of the Blues Foundation in Memphis. During my time at CCSU, I was a Blues DJ (aka The RoadHog) on WFCS 107.7. I continue my interest in photography with my photos appearing in the *Blues Beat* column—some have appeared in national magazines and on CD covers. Photos from my time at WPI can be seen here: <https://tinyurl.com/7v57mu67>

“I have documented my blues activities on my blog—*bluesbeatnews.wordpress.com*—which has been curtailed due to lack of blues shows during this pandemic time.”

1973

Joel Loitherstein has always enjoyed fixing and making things—that’s why he wanted to become an engineer. He says that since he and his wife (Massachusetts Senate President Karen Spilka) love working on cars, they put a lift in their garage when they built their house in Ashland, Mass. He also loves long-distance cycling, but during the initial surge of the coronavirus he did not want to risk having an accident and possibly have to go the hospital where he may take the bed from someone who really needed it—or get himself exposed.

After doing a few home repairs to occupy his time, he looked for another project and remembered a bamboo bike kit he’d bought several years ago but hadn’t put together. Now having some spare time, he used one of his road bikes as a template and—working with Karen—cut the bamboo, which he then put together with epoxy and covered with fiberglass “cast” tape. He started riding again and in August participated in his 26th Pan-Mass Challenge, raising \$15,155. Here he is with his bamboo bike and a PMC check for that amount, which results in a lifetime fundraising of over \$220,000 for the Dana-Farber Cancer Institute. Joel and Karen have lived in Ashland for 35 years; they have two sons: Scott, a history teacher in NYC, and Jake, WPI ’11, a management engineer. Joel is a Principal LSP at Tighe & Bond in Worcester and a part-time bicycle mechanic at Landry’s Bicycles in Natick, Mass.

Thomas Szymanski was presented with ASTM International’s highest recognition for individual contributions to developing standards—the Award of Merit, by ASTM board chair Taco van der Maten. The prestigious award also includes the title of ASTM Fellow. He was honored for outstanding and dedicated service to the ASTM International catalysts committee (D32), with a commitment to



▶ JOEL LOITHERSTEIN '73

establishing new and advanced catalyst characterization methods, and for esteemed technical expertise, leadership, and professionalism.

1974

John Thurber received the Navy Superior Civilian Service Award, the highest award the Chief of Naval Operations may bestow on a civilian employee. The award recognizes contributions that are exceptionally high in value, innovative, and that demonstrate outstanding leadership in highly successful programs that have had a wide impact in the Navy. When presenting the award during the virtual award ceremony, the Command Admiral stated that everything he knows about military construction he learned from John, who has been with Navy Facilities Engineering Command (currently at the Washington Navy Yard) since 1974. He lives in Arlington, Va., with his wife, Diane. He says retirement is not in the cards for a few years yet.

1975

Mark Cosenza writes, “In June of 2020, I retired from Atrenne Computing Solutions, a Division of Celestica, where I served as VP of Operations. I still live in Shrewsbury, Mass., where I now get to spend more time with my three grandchildren. I remain active as



▶ HOLDIN' BACK BAND AT DEAN PARK, SHREWSBURY, JULY 4, 2019 (CRAIG SMITH '75 IS AT FAR RIGHT)

a member of the Lambda Chi Alpha House Corporation and director of the chapter's fundraising arm, the Pi Zeta Fund."

Bob Cummings retired in April 2020 from the North American Electric Reliability Corporation (NERC) as Senior Director of Engineering and Reliability after 45 years in the electric power industry. He spent 14 years in electric system planning and operations in Vermont and New Mexico before joining the East Central Area Reliability Coordination Agreement (ECAR), then one of the NERC regions, in Canton, Ohio, in 1989. He moved to NERC in 1996 in Princeton, N.J., where he held several engineering positions over 23 years.

He was one of the principal investigators of the August 2003 Northeast Blackout, working with experts from the electric industry and government to produce the technical analysis supporting the U.S.-Canada Power System Outage Task Force report, which pointed out the need for mandatory and enforceable standards for the electric industry. He created and directed NERC's Event Analysis program for five years, leading and working on 12 major bulk power system disturbance analyses.

Cummings also was the principal investigator on the September 2011 Arizona-Southern California Outage and the Washington, D.C., Area Low-Voltage Disturbance Event of April 7, 2015. His work in event analysis led to his nickname of "Blackout Bob."

In 2018, the Department of Energy (DOE) appointed him to its Electricity

Advisory Committee, which advises DOE on technical and policy issues. He continues as a member, serving on all three of its subcommittees. He is also a member of the Scientific Advisory Board of CURENT (Center for Ultra-wide Area Resilient Electric Energy Transmission Networks), a National Science Foundation and Department of Energy Engineering Research Center at the University of Tennessee, Knoxville. He started Red Yucca Power Consulting LLC three days after he retired to keep his hand in the industry. Bob and his wife reside in Albuquerque.

(Photo above.) Following a successful career path directing the Manufacturing and Engineering Operations of Stanley Bostitch, Hasbro, and New Balance, **Craig Smith** continues to play bass/keyboards with one of Central New England's more popular Festival/Outdoor bands, Holdin' Back. Craig is happily married to the former Cindy Dickman, who worked in the Bursar's Office at WPI in the late '70s. They have two daughters and two grandchildren and reside in Holden. He can be contacted through the band's website, holdinbackband.com.

1976 ▶ R

Stephen Walz says, "I have retired as Director of Environmental Programs at the Metropolitan Washington Council of Governments—using my WPI engineering training to support local, regional, and state governments address air quality, water quality, energy and

climate policy, and green infrastructure challenges in metropolitan Washington. This came, among other jobs, after serving 30 years with Commonwealth of Virginia Department of Mines, Minerals and Energy, most recently as agency director. Now is time to use my experience personally to advance environmental quality and equality."

1977

Steven Fine writes, "As of January 2021, I have retired from Laticrete International, where I worked for 35 years. The company manufactures chemicals for the construction industry. My last position was manager of R&D Services. The R&D Services team did product support and managed the R&D infrastructure in our Bethany CT R&D lab. I earned my MS in chemistry from Texas A&M University in 1980. My wife of 15 years, Eileen, is a 6th grade science teacher; when COVID is over, we plan on traveling. I also plan on doing some volunteer work."

1979

John Haponik's child Stacy writes, "I regretfully inform you of his passing to COVID-19. He was a wonderful man and we're all very sad for his loss." A full obituary is at hopperfuneralhome.com/obituary/john-haponik.

Steve Hull died November 19, 2019. After leaving WPI he earned a PhD from Michigan State University in physiology. He investigated causes of sudden cardiac death and taught physiology at the University of Oklahoma Health Sciences Center. In 2000 Steve left academia and began raising alpacas and teaching other alpaca owners about animal and pasture management. He leaves his wife, Kathy Reilly, three children, two grandchildren, and a brother.

Chris Wilmot writes, "I recently retired in late 2019 after 40+ years in the Aerospace and Defense Industries

at varying levels of responsibilities. Retirement has been great thus far and I have recently gone back to work in a part-time consulting position. I currently live in Virginia with my wife, Adelaide; we plan to move permanently to our retirement home in Delaware in the coming years. We have three daughters and two grandchildren, who all live nearby. Hope all of my ATO classmates are doing well."

1980 ▶ R

David Drevinsky began his 32nd year working with the General Services Administration (GSA) as a Senior Civil (Structural) Engineer in Boston, specializing in Natural Disaster Preparation and Recovery throughout 11 regions within GSA.

He writes, "I am grateful to have acquired unique project-based skills under the WPI Plan (especially at Alden Research Laboratory in Holden, Mass.; Department of Environmental Quality Engineering in Lakeville, Mass.; and North Andover Textile Museum in Merrimack, Mass.) enabling me to leverage a 'diverse team approach' within our challenging global climate. Many schools attempt to copy the WPI blueprint—however, there is *ONLY ONE* WPI Plan!"

Mark Lefebvre writes, "After retiring from IBM in 2017, I've continued to spend the majority of my time consulting for NH and Maine nonprofits that focus on addiction prevention and recovery. I recently completed a two-year term at Southern NH Services as the statewide program director for NH Works for Recovery, a US Department of Labor-funded program that offers education and workforce development services for individuals and families impacted by the NH Opioid Crisis.

"I've also become licensed as a master trainer for ACES (Adverse Childhood Experiences) and Trauma-Informed Care and offer free

training for communities and organizations working on the front lines of substance misuse. I'm also the director of community engagement for Pinetree Institute in Eliot, Maine, and work on developing roadmaps for communities to become 'recovery ready.'

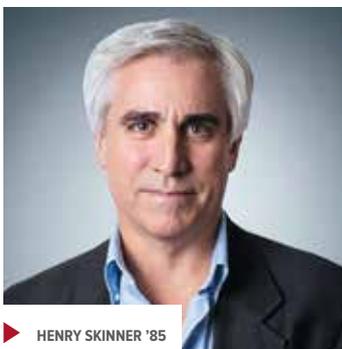
"I still live on the seacoast of NH with my wife of 37 years, Vivian. During COVID we've enjoyed having our adult children Joey (26) and Selena (24) at home with us. I still sit on the board and host a weekly punk/garage rock radio show on WSCA Portsmouth Community Radio (wscaf.m.org). Check it out – *Pirate Friday with Scurvy Dog* on Fridays, 1–5 p.m."

1983

Mark Scott retired from Sikorsky Aircraft in March 2020 and now works part time as a contract engineer for the U.S. Army. He spends considerable time flying his homebuilt airplanes and is working on pilot ratings to become a certified flight instructor.

1985 ▶ R

AMR Action Fund has tapped **Henry Skinner** as its first chief executive officer. He says his mandate will be "to acquire or invest in small companies with the ultimate goal to develop two to four novel antibiotics by 2030, thereby replenishing the global supply chain with much-needed weapons against these resistant superbugs."



▶ HENRY SKINNER '85

1986 ▶ R

John Niedzielski was reappointed as a member of the Westfield, Mass., Water Commission. With 30 years of project-related experience, he holds licenses in the field, has extensive experience in water management, and has authored many articles on bacteria and heavy metal removal in water.

Anne Marie Riechmann says, "In 2019 I moved from Oregon to Charlotte, N.C. It's great to be back on the east coast! Last year I joined the faculty at a local two-year technical school teaching engineering courses. It's been fun brushing up on statics and strength of materials!"

1987

Lisa (Anderson) Barton has been named EVP and COO of American Electric Power.

1988

David Hanlon has been appointed Vice President, Strategic Collaboration, at NanoView Biosciences, the leader in single exosome characterization. He most recently served as Vice President of Strategic Collaborations at Quanterix. He earned his PhD in biochemistry at the University of Illinois Urbana-Champaign in 1993.

Massachusetts Tech Collaborative, a Westborough-based state agency focused on technology and innovation, has named **Christine (Poirier) Nolan** director of its new Center for Advanced Manufacturing. She oversees all CAM programming, including a \$100-million Massachusetts Manufacturing Innovation Initiative launched in 2016 to co-invest in projects supported by the national Manufacturing USA network.

Diane (Brisette) Pauer was recently elected to the New Hampshire State Legislature to serve as State Representative for Hillsborough District 26, representing the towns of

Brookline and Mason. She writes that she is already busy in the N.H. House as prime sponsor on two bills and co-sponsor on four bills, and is serving on the House Committee for Municipal and County Government. "My husband of 30 years and counting," she says, "is **Col. Eric Pauer**, USAF (ret)—also Class of '88."

1991 ▶ R

Joseph Barbagallo has been promoted to President of Consulting at Woodard & Curran. He has more than 30 years of experience serving public and private clients on a wide range of civil, geotechnical, and environmental engineering projects. He joined Woodard & Curran in 2005, assumed the role of civil engineering service line leader in 2007, and in 2014 was promoted to Municipal & Institutional Business Leader. The business unit, which includes drinking water, stormwater, wastewater, community development, urban revitalization, solid waste, and intelligent technology practices, has seen notable growth in revenue and expanded to a national footprint under his leadership.

Frank Christiano, at Chevron for 29 years, has been promoted to Manager of Design Execution. He and his wife and two kids live in Sugar Land, Texas.

After 27 years of running his own Fire Protection Engineering & Code Consulting business out of Chicago, **Michael McGreal** has switched gears



▶ JOSEPH BARBAGALLO '91

and is now a Fire Protection Engineer with the Denver Fire Department.

1992

David Cortese is chief commercial officer at Simbe Robotics in Los Angeles.

1996 ▶ R

In August 2019, **Mike Caprio** took a full-time position at Discovery Communications as an API services software engineer – he worked with his team to design and build a global scalable platform for direct integration of the discovery+ streaming service with MVPDs. In 2020 he became the first integration specialist for Discovery and helped launch integrations in eight countries, including discovery+ on Sky Q in the UK last November and US integration with Verizon in January 2021.

1998

Max Cergneux is now chief development officer at Louvre Hotels Group in Paris. He most recently served as Head of International Corporate Development for Choice Hotels based out of London where he was tasked with setting up focus on international expansion, acquisitions, and investment strategy.

2000 ▶ R

Bhairavi Parikh (PhD) has been named Chief Operating Officer at Wildflower. An experienced healthcare technologist and product development leader with specific expertise in maternity care, integrated care management, and medical diagnostics, her background has centered on leveraging technology to drive improvement in health and economic outcomes. In her new role, she is responsible for company-wide operations, including client services, clinical operations, and



▶ JULIANA (WAKEMAN) '12 AND MIKE BOUCHER '12 WEDDING



▶ FUNMI ADEBAYO AYOBAMI '11

data analytics for evaluating the clinical and economic impact of Wildflower's solutions.

2010

Alejandro Solà (MS, System Dynamics) is now Director of Global Portfolio Management at Teva Pharmaceuticals.

2011

Olufunmilayo (Funmi) Adebayo Ayobami joined the WPI faculty in January as assistant teaching professor in the Department of Biomedical Engineering. Previously, she was assistant dean for inclusion and engagement in the Graduate School at the University of Massachusetts, Amherst. She has studied orthopedic



▶ ARNOLD NDEGWA '11

biomechanics, mechanobiology, contact mechanics in human joints during activities of daily living, and the persistence and success of traditionally underrepresented populations in higher education. Funmi earned an MS and PhD in biomedical engineering at Cornell University, where she received the 2014 Zellman Warhaft Commitment to Diversity Award. She completed a postdoctoral fellowship in biomechanical engineering at the Hospital for Special Surgery in New York City.

Arnold Ndegwa, a test engineer at Textron Systems, has been honored with the Modern Day Technology Leader Award from the Black Engineer of the Year Award (BEYA) STEM Conference 2021. After completing his secondary education

in Kenya, he moved to the United States to study aeronautical/aerospace engineering. Since joining Textron Systems eight years ago, he has supported various teams across the business and has moved into roles of increasing responsibility.

2012

Juliana (Wakeman) and Mike Boucher

were married in October 2019. They celebrated with many WPI alumni—at least 50 of whom hopped into the photo above. They've recently moved back to Massachusetts and say they love being close to WPI, where they met 12 years ago.

2014

Josh Croke sends an update on his organization, Action! by Design, with news of its new #PublicHearingPodcast. The intent is to give voice to those impacted by broken systems, and to learn from people who are using community-centered design to fix them.

He writes, "From getting families internet access to keeping kids out of prison, we're imagining ways to build inclusive, equitable, and prosperous communities. Before

COVID, Action! by Design was helping organizations facilitate community conversations through 75+ person think tanks, design charrettes, and hackathons. We've now taken our work virtual." Learn more at actionbydesign.co/public-hearing-podcast.

Zach Tomkinson is Area Sales Manager for the Eastern U.S. of Universal Robots.

2017

Kyle Cederberg is a Quality Engineering at Larson Tool & Stamping. He has worked on several computer-based systems that supported the network and communication systems, blockchain technology, and cyber defense systems for the U.S. military overseas.

Keirstan Field ('18 MS MG) has been promoted to design manager at Petersen Engineering. Founder James Petersen said, "She is a great ambassador for the firm, having helped us recruit many of our recent hires. She's also been instrumental in developing effective onboarding processes for our staff at all levels. This promotion is nothing more than a formal recognition of much of the work she had taken on through her own initiative." 

Frank DeFalco, Civil Engineering Professor and Wrestling Advisor

Frank DeFalco '58, whose career as professor of civil engineering at WPI spanned nearly six decades, passed away on Nov. 13, 2020. He was 86.

A Worcester native, DeFalco joined the WPI faculty in 1960 after earning BS and MS degrees in civil engineering at the Institute. He earned a PhD at the University of Connecticut in 1974.

A licensed professional engineer for more than 50 years and an accomplished professional land surveyor, he taught structural engineering to generations of students. Early in his WPI career, he taught in Iraq for two years under a Fulbright award. He earned WPI's Board of Trustees' Award for Outstanding Teaching, received a special commendation for achievement in engineering education from the Lincoln Arc Welding Society, and, in 2001, received WPI's William R. Grogan Award for Support of the Mission of WPI. Each spring the Department of Civil and Environmental Engineering presents the Frank D. DeFalco Award to a student interested in a career in constructed facilities.

DeFalco's expertise in structural engineering placed him in great demand

as a source for the media and an expert witness in the courtroom. His professional accomplishments earned him a wide range of honors, including fellowship in the American Society of Civil Engineers.

A lifelong athlete, DeFalco, who in 1994 received the Frank C. Harrington Award from the WPI Athletic Hall of Fame, was closely tied to WPI's wrestling program for over five decades, serving at times as advisor, volunteer assistant coach, and supporter. In October 2020, wrestling alumni established an endowment to honor the man generations of wrestlers knew as "Uncle Frank." "His help in academic advising and academic support for our team members was fantastic," said longtime wrestling coach Phil Grebinar. "He was a terrific person and leader."

DeFalco is survived by his wife, Mary-Jane, a daughter, and a sister. Donations to the Dr. Frank DeFalco Endowment for Wrestling may be made online (wpi.edu/+giving) or mailed to WPI Athletics Department, 100 Institute Road, Worcester, MA 01609.

Huong Higgins, Professor in the Foisie Business School

Huong Higgins, a longtime professor of accounting in WPI's Foisie Business School, died on Oct. 13, 2020, of Creutzfeldt-Jakob Disease. She was 56. Born in Saigon, she graduated from the University of Saigon with degrees in English and French. After her family moved to the United States, she earned a PhD in accounting from Georgia State University in 1998 and joined the WPI faculty the same year. Higgins conducted research on global accounting practices, investigating how institutions in different countries shape the behavior of market participants. She was a co-principal investigator on a \$515,000 National Science Foundation award received in 2014 for research aimed at developing visual analytics tools for detecting financial risk and fraud within real-time streaming data. A Certified Public Accountant in the Commonwealth of Massachusetts, she also served as a consultant to a number of organizations. She published extensively in leading accounting journals, including *Journal*

of Accounting and Public Policy, *Financial Analysts Journal*, and *Review of Quantitative Finance and Accounting*, and was a member of the editorial board of the *Journal of the International Accounting, Auditing and Taxation*. With associate professor Fabienne Miller, she received the 2016 Bea Sanders/American Institute of Certified Public Accountants Innovation in Teaching Award for a project titled "UBuild: A Simulation Bridging Financial and Managerial Accounting." "She was a strong proponent of financial education and believed that every student would benefit from financial competencies," Miller said. Higgins is survived by her husband, Read; their children, Annie and Conan; her mother, Cut Vo; and two brothers. "She is fondly remembered and will be greatly missed by her FBS colleagues," said Diane Strong, professor and department head in the Foisie Business School.

Thomas Newman Jr. '64, Former Alumni Association Treasurer

Tom Newman '64, former treasurer of the Alumni Association and co-chair, with his wife, Bonnie, of the Alden Society, passed away suddenly on Oct. 4, 2020. He was 77. Tom, who received a BS in electrical engineering from WPI, also earned an MS in the same discipline at Northeastern University and an MBA at Babson College. In a 2014 interview with the *Journal*, he said he traced his passion for using technology to benefit humanity to a ham radio demonstration he saw as a sixth grader. "I literally decided that day to become an engineer, so I'd be able to achieve those benefits." His passion took him to Sylvania, where he met his future wife, and then on to a 37-year career at Teradyne, where he held a variety of leadership posts before retiring in 2009 as vice president of corporate marketing and communications. Tom was an active volunteer for WPI for many years, serving most recently as chair of the Class of 1964's 50th reunion, which

broke Reunion fundraising records. As Alumni Association treasurer, he tripled the association's budget and used the increase to support more student scholarships. His work for WPI earned him the Herbert F. Taylor Alumni Award for Distinguished Service to WPI. Seeing in today's students the same drive he felt as a youngster, he and his wife established the Tom and Bonnie Newman Entrepreneurial Endowed Fund, which supports entrepreneurial activities at WPI and scholarships. He served on the Dean's Council of Strategic Advisors for the Foisie Business School. In establishing this fund, he recalled how important financial aid had been to him. "Scholarships were invaluable to me," he said. "I couldn't have gone to WPI without them." In addition to his wife, Tom is survived by a brother; seven nieces; and a nephew. He was survived by his mother, Louisa Newman Ovanessian, who since passed away at the age of 97.

Kenneth Bartlett '43, Landrum, S.C.

James Dashner '44 ME, ALPHA TAU OMEGA, Durham, N.C.

Anson Fyler '45 EE, PHI GAMMA DELTA, Trustee Emeritus, Vero Beach, Fla.

Robert Ballard '46 ME, ALPHA TAU OMEGA, Saint Louis, Mo.

Neal Cox '49 EE, Rocky Hill, Conn.

Edgar Vollaro '50 CHE, Grand Island, N.Y.

Duncan Munro '51 CE, SIGMA ALPHA EPSILON, Worcester, Mass.

Wilfred Beauregard '52 EE, Berlin, Mass.

Paul DesAutels '52 EE, LAMBDA CHI ALPHA, Poughkeepsie, N.Y.

Paul Edwards '52, SIGMA PHI EPSILON, East Orleans, Mass.

John Cnossen '55 ME, '72 MNS, Douglas, Mass.

Paul Dalton '57 CE, PHI SIGMA KAPPA, Dover, Mass.

John Matuszek '57 CH, PHI KAPPA THETA, Delmar, N.Y.

Robert Purple '57 EE, PHI KAPPA THETA, Nashua, N.H.

Donald Bean '58 CHE, SIGMA PHI EPSILON, Shrewsbury, Mass.

Joseph Belanger '58 EE, THETA CHI, Haverhill, Mass.

Robert Boyea '58 ME, PHI KAPPA THETA, Wellesley Hills, Mass.

James Christo '58, SIGMA ALPHA EPSILON, Holden, Mass.

James Dunne '58 CE, PHI KAPPA THETA, Linthicum Heights, Md.

Paul Byron '60 ME, Wilmington, N.C.

Preston Hall '61 SIM, Lancaster, Mass.

Alan Roseen '61 EE, Frankfort, N.Y.

John Meregian '62 CHE, SIGMA PHI EPSILON, East Longmeadow, Mass.

Daniel Webster '62 EE, Westhampton, Mass.

David Helsing '64 EE, SIGMA PHI EPSILON, Tinton Falls, N.J.

Eugene Niemi '64 MS ME, Dracut, Mass.

Harry Ochs '65 EE, Savoy, Ill.

David Drescher '67 MS EE, Nashua, N.H.

Warren Jacobson '69 SIM, West Boylston, Mass.

Barry Shiffrin '69 EE, Lancaster, Penn.

Edward George '71 ME, New Alexandria, Penn.

Richard Kmiec '76 CHE, Rutherford, N.J.

Anthony Modestino '76 MS CH, Hanson, Mass.

Manoj Shah '78 MS ME, Gujarat, India

Judith Batchelor '81 EE, Weatogue, Conn.

Gregory Doyle '82 CE, PHI KAPPA THETA, Framingham, Mass.

Joseph Ferrari '87 CE, Medford, Mass.

Michael Tinglof '88 CS, Concord, Mass.

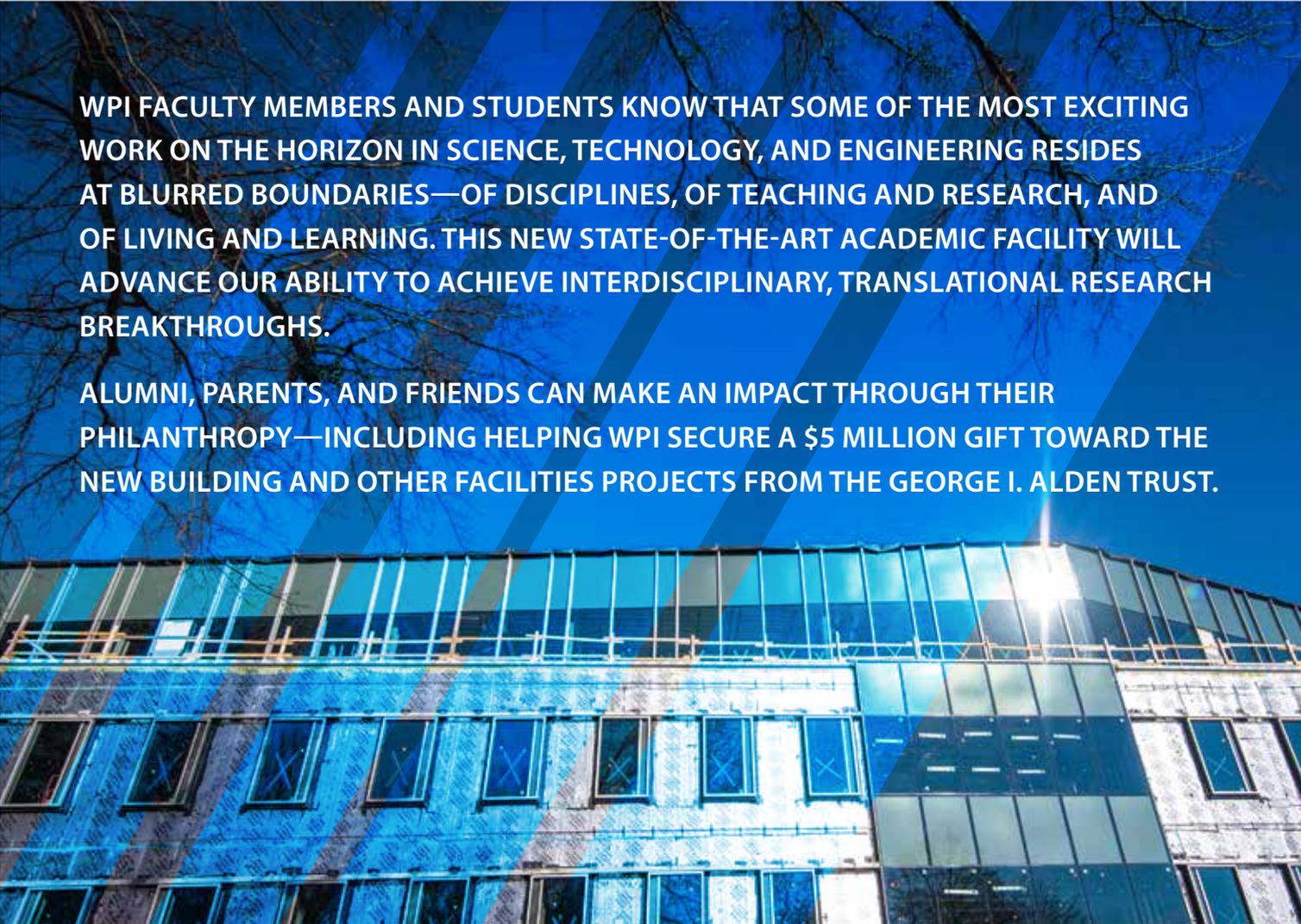
Joseph McLaughlin '90 MBA, Harwich, Mass.

Barbara Roberts '90 EE, Worcester, Mass.

Frederic Stevens '90 MS MG, Milford, Mass.

Harry Tenney Jr. '56, former Alumni Association President, passed away while this issue of the *WPI Journal* was being put together. An extended obituary will appear in the next issue. The WPI community also notes the passing of these friends of the university: **Sylvia Bryce, Joseph Erevelles, Scott Feldman, John Gaucher, Caroline June, Charles O'Connor, Stanley Olsen**, and **Louise Shipman**.

Complete obituaries can usually be found online by searching legacy.com or newspaper websites. *WPI Journal* will assist classmates in locating additional information. Contact wpijournal@wpi.edu.



WPI FACULTY MEMBERS AND STUDENTS KNOW THAT SOME OF THE MOST EXCITING WORK ON THE HORIZON IN SCIENCE, TECHNOLOGY, AND ENGINEERING RESIDES AT BLURRED BOUNDARIES—OF DISCIPLINES, OF TEACHING AND RESEARCH, AND OF LIVING AND LEARNING. THIS NEW STATE-OF-THE-ART ACADEMIC FACILITY WILL ADVANCE OUR ABILITY TO ACHIEVE INTERDISCIPLINARY, TRANSLATIONAL RESEARCH BREAKTHROUGHS.

ALUMNI, PARENTS, AND FRIENDS CAN MAKE AN IMPACT THROUGH THEIR PHILANTHROPY—INCLUDING HELPING WPI SECURE A \$5 MILLION GIFT TOWARD THE NEW BUILDING AND OTHER FACILITIES PROJECTS FROM THE GEORGE I. ALDEN TRUST.

THE ALDEN TRUST CHALLENGE

THE ALDEN TRUST WILL FULFILL ITS PLEDGE, IF

- 100 percent of our current trustees make a philanthropic commitment to WPI's current fundraising campaign **[ACHIEVED]**;
- trustees give at least \$8 million toward the new building or any part of the facilities component of the campaign **[ACHIEVED]**;
- and our alumni give at least \$12 million toward the new building or any part of the facilities component of the campaign.

THIS CHALLENGE BEGAN APRIL 1, 2019, AND WILL CONCLUDE MARCH 31, 2023.

Make your gift today and support our students and faculty as they continue to challenge each other to stretch beyond their own expectations and to engage more deeply with other great minds to solve the great problems of our time and of future generations.

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For more information about the new academic building and the Alden Trust Challenge, contact Donna Stock, vice president for University Advancement, at dstock@wpi.edu or 508-831-6073.



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