

JOURNAL

Q&A



Robert CRUICKSHANK '83

BACK ON THE GRID. WITH RENEWED EFFICIENCY



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Editor Doreen Manning photobombing Robert Cruickshank '85, at the NREL campus in Golden, Colo. For more fun behind-the-scenes shots, including videos from our *WPI Journal* fall features photoshoots, stop by wpi.edu/+journal.

The *WPI Journal* team wants to know what you think of our university magazine!

STOP BY
wpi.edu/+journal/survey2017
for a quick survey and share your feedback with us.

A SONG IN HIS HEART

I am writing to let you know that my father, Robert Favreau '52, passed away at his home in Pottsville, Pa., on June 16. Before he died, his grandson, Ryan Drasher '04, emailed the lyrics of the WPI alma mater to his father, so that he could sing them to Bob at his bedside. Bob's eyes lit up at the memory, as they did whenever he talked of WPI (which to him was always Worcester Tech). My father had a great life, in large part due to the education he received at WPI and the friendships he made there. My sister and I heard more than one epic tale about fun times with college friends at The Boynton!

— Robin Harley

TRASK, SCANLON, REMEMBERED

After graduating from WPI, I did my master's in industrial engineering at URI and then my Army ROTC commitment. When I was ready to enter the real work world after my discharge in one piece, I contacted Bill Trask, who encouraged alumni to job interview. My luck was good. Engineering jobs were not plentiful in 1972 compared to 1968 when everyone I knew had 10 offers or more. I began a 30-year career with FM (Factory Mutual, now FM Global) until starting my own consultant business in the world of fire protection (now retired).

About the same time (45 years this October), I met my future wife, Ruthanne, who worked at Tufts University for Dick Blue, who turned out to be Bill's college roommate and was also in job placement/career development. My wife had spoken with Bill for years in her job and finally put a face with the name at one of the WPI reunions we attended (probably our 10th). In the last couple of years, Bill and Father Pete [Rev. Peter J. Scanlon], who married us, have passed. They were both the type of individual a young person needed to be available for guidance as one ventures into his or her future life.

— Kenneth Gminski '68

CORRECTION: In our Summer 2017 issue, our *Global Impact* story on Costa Rica should have been credited to writer Sharron Kahn Luttrell

Letters may be edited for length and clarity.

PRESIDENT LESHIN TALKS ABOUT
PRACTICEPOINT WITH GREGORY
FISCHER AND STEPHEN FLAVIN

[A CONVERSATION WITH THE *president*]

PracticePoint at WPI is a landmark healthcare technology initiative that brings together academia, industry, and healthcare practitioners in a central point of research, development, and real-world testing. President Leshin spoke with two key members of the PracticePoint initiative – PracticePoint director Gregory Fischer (center), associate professor of mechanical engineering and robotics engineering and director of WPI’s Automation and Interventional Medicine Robotics Research Laboratory, and VP of Academic and Corporate Engagement Stephen Flavin (below, left) – to help our readers understand just how important this enterprise is for WPI.

LL PracticePoint is really all about the idea of cyber-physical systems in health and medicine. So to start, let’s explain to everybody ... what are cyber-physical systems?

GF Well, we’re excited, as this aligns very well with our robotics engineering program. If you think about robots, there’s sensors, there’s actuators, there’s intelligence; and that’s essentially cyber physical systems in a much broader sense. So, what we’re talking about are smart medical devices.

LL Right. Smart devices that help us be healthier. Let’s talk more about what PracticePoint actually is.

SF PracticePoint is going to create a unique environment – one that brings together academia, industry, and healthcare practitioners in a single place where they can do rapid research development and applied testing. This environment is very disruptive and innovative, and I think we

have all the elements to bring together an exciting initiative.

LL I think it’s going to be amazing, because it’s going to provide a place where people can try things out, test new things. I love your story, Greg, about trying to test surgical robots inside MRI scanners at Brigham and Women’s Hospital at 3 a.m. What were some of the challenges you faced in trying to test these things?

GF When you’re putting together a medical device, it requires iterative development. So you need to be able to get into these clinical care scenarios, do your testing, get back and perform engineering changes and modifications, and then return to the clinical settings. It can take days, weeks – even months – between these experiments. So, we’re excited about the idea of interweaving these point of practice care scenarios with engineering, R&D, and manufacturing facilities that are co-located.

LL So there’ll be certain kinds of environments within PracticePoint that will serve as test beds. Tell us about a couple of these environments.

GF We’re going to have a hybrid medical imaging and operating room suite, plus a controlled-care scenario to mock up an emergency room, or a clinical care scenario. We’ll also have a residential suite and a rehab suite.

LL Love the idea of the residential suite. That, to me, resonates with the idea of aging at home. And soon we’ll be receiving data and information out of smart homes that

will help people stay healthier, longer, all within their own homes. We need places to test those concepts out. And it’s not just the devices, right? It’s understanding how to get the data safely, securely; it’s all about making sure they’re hacker-proof as well, right?

GF Absolutely. This is about designing security into these devices from the ground up.

LL This was a great win for WPI. Tell us a bit about the funding, and where it’s coming from.

SF We worked with the Massachusetts Technology Collaborative and secured a \$5 million capital grant to help build out this facility at WPI’s Gateway Park. In addition to the MTC, we have core founding partners and complementary partners – like UMass Medical School and MITRE – and our anchor partners at GE Healthcare, who have committed \$2.5 million over two years to help get this initiative off the ground.

LL Why this is important to do right now?

GF Medical devices are obviously a core business within the commonwealth. So, WPI’s expertise in robotics and cyber-physical systems, plus our cybersecurity knowledge, is a perfect combination, as well as an opportunity to accelerate this industry. This is an ideal time.

LL I can’t wait to see where PracticePoint takes us. Thanks so much to you both.

Check out a video of this entire conversation at wpi.edu/+journal.





WPI

This Is Not Your Typical Study Abroad

Our Global Projects Program sends students off campus to fundamentally change them—and their world.

100%

of students (beginning with the Class of 2022) receive a global scholarship to complete a project at one of 40+ project centers across the world.

TOP 10

Most Popular Study Abroad Programs for four years in a row—the only technological university in the top 20.

The Princeton Review (2017-18)



wpi.edu/+globalprojects



GREECE

[GLOBAL *impact*]

ILLUSTRATION: JON REINFURT



When WPI trustee Daniel Morgan approached the university about establishing a project center in Greece, the country was six years into its financial crisis and suffering high unemployment. The economic climate would offer students opportunities for real-world problem solving while learning sensitivity to a foreign culture. That's the kind of lesson you just can't get in the classroom, says Devon Bray, who in 2016 was among the first group of students to travel to Greece for their Interactive Qualifying Project (IQP).

"That was a critical learning," says Bray, who graduated last spring with a bachelor's degree in electrical and computer engineering. "The conversations always went better when we were coming from a place of 'we're trying to learn about your culture rather than we're trying to build something that we think you want.'"

Interdisciplinary & Global Studies instructor Robert Hersh was running the Sustainable Food Systems Project Center on campus

when Morgan first raised the idea of a project center in Thessaloniki, Greece's second largest city. Morgan has ties to the American Farm School in Thessaloniki and proposed that WPI partner with its Perrotis College of Agriculture, Environment, and Life Sciences. With Hersh's work in food systems, and the Greek financial crisis inspiring young people to return to their agricultural roots, it seemed like a natural fit.

Two groups of students have traveled to Thessaloniki for their IQPs since the spring of 2016. The focus has been on issues around urban agriculture, developing artisanal food products, and identifying export opportunities in the US for traditional Greek food products such as wine and olives.

Students are looking at critical questions in projects, even though their time is short in the country. Hersh explains, "We don't see them as one-off projects; we're looking at them as 5- to 10-year projects."

Bray and his three IQP teammates studied urban gardening. There isn't a lot of spare land in Thessaloniki, but virtually

every apartment unit includes a balcony, totaling many acres of growing space. The group investigated the viability of hydroponics – raising crops without soil – on the balconies. They gauged interest and collected information by interviewing residents – some they met through contacts at the American Farm School; others they approached on the street or in businesses. It was "super intimidating," Bray says, until the students embraced their status as outsiders. With data and 100 hours of interviews, the team designed three different balcony hydroponic systems.

"To be able to do this effectively, we had to have a somewhat comprehensive knowledge of the current state of affairs," he says. "We had to have the social science behind the engineering to build something that people would actually want and will use. It seems obvious now but it's not something that we, at the time, realized."

Electrical and computer engineering major Veda Booth '18 and her teammates came away from the Thessaloniki Project

Center with a greater confidence in their ability to work well under pressure. When they arrived in Greece, they learned that a staff change there meant their project would shift from researching the feasibility of crop-health sensors in small gardens to surveying residents about the city parks. They were forced to scrap the painstaking work they had completed back home and start fresh.

The team rose to the challenge, according to Hersh. Booth says the experience, while stressful, was invaluable. She and her teammates learned to work under pressure despite their different backgrounds, majors, and personalities. And they were able to do it in an entirely different culture.

"Although it was a little bit difficult, it was a good experience understanding what it's like to work on projects in the real world," she says. "With jobs, sometimes things don't go as planned and you have to make changes without getting too stressed out. It was, honestly, probably one of the best experiences I've had in my life."

—Sharron Kahn Luttrell





HOW THEY ROW

Members of WPI's women's rowing team took their skills across the pond this summer to compete in the revered and renowned Henley Women's Regatta in London. They made it to the quarterfinals of the Senior Eights as they competed against some of the strongest rowing teams in the world.

Participating in the Regatta gave the team a unique competing experience outside of Lake Quinsigamond. "It's a battle [in England], not a race," says Sarah Wutka '18. "We went head-to-head with just one other boat, compared to Worcester, where we race up to six other boats at once."

The team's regular season ended back in May, but they kept their momentum going to prepare for the Regatta. They rowed twice a day—at 6 and 10am—right up until the day they left for England. When they arrived, the practice continued because, according to teammate Gina Gonzalez-Roundey '18, "You are held to a higher standard, and are simply expected to be greater than what you were a day ago, every day."

And after building a strong groundwork with all but two rowers returning for the upcoming season, it's clear the team will continue to do just that.

— Allison Racicot

MAKING DRYING COOL

“We’re looking to revolutionize laundry,” says Viral Patel ’15 (PhD), who is part of a team of researchers at Tennessee’s Oak Ridge National Laboratory creating an ultrasonic dryer that requires no heat, thus speeding up drying time.

“The cost of energy associated with clothes drying is \$9 billion in the United States,” he says. “We are essentially trying to double [the dryer’s] efficiency.”

Patel says clothes-drying technology is long overdue for an update. He and his fellow researchers have been working on the ultrasonic dryer for several years, beginning with small prototypes capable of drying a piece of fabric the size of a quarter. High-frequency vibration applied to piezoelectric transducers forces water out of the fabric, all without the heat used in traditional drum-style clothes dryers.

While lab work is under way, he says, GE Appliances is offering consumer insight, working under an agreement to take the researchers’ innovation toward the commercial market.

Patel earned his BS at Illinois Institute of Technology and came

to WPI to pursue a doctorate in aerospace engineering. He switched to mechanical engineering and focused his research on thermal and fluid sciences. His PhD advisor was Jamal Yagoobi, head of WPI’s Mechanical Engineering Department and director of the Center for Advanced Research in Drying (CARD).

Yagoobi placed Patel among the top 5 percent of all graduate students he’s ever worked with. “Viral’s technical background in the field of fluid mechanics and heat transfer is very solid. He has played a significant and central role” in research on electrohydrodynamics cooling technology for spacecraft, published research that produced experiments for the

International Space Station.

Here on Earth, Patel points out that the development of new consumer technologies like heat-free dryers follows a cycle that is relatively slow, potentially up to five years.

But that period gives consumers more time to figure out what to do with all the time they will potentially save with a shorter laundry-drying process, and the money saved from using five times less electricity.

While the ultrasonic dryer will make doing laundry easier, it won’t solve all your washday woes, Patel jokes. You’ll still need to sort your colors and fold your towels—at least for now.

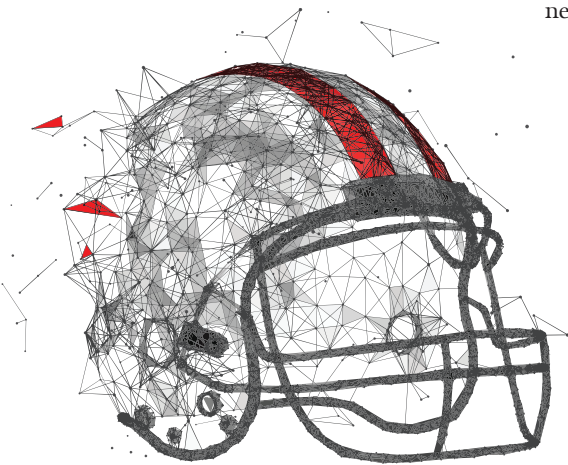
—Susan Shalhoub

HEADY RESEARCH

Sports concussions have been a growing concern for years. According to the Centers for Disease Control and Prevention, nearly 330,000 children aged 19 or younger were treated in United States emergency rooms in 2012 for sports and recreation-related injuries that included a diagnosis of concussion or traumatic brain injury. Despite their prevalence, the biomechanical mechanisms underlying these injuries are poorly understood.

A WPI biomedical engineering professor is studying this critical health issue from a new perspective. On the strength of a four-year, \$1.5 million award from the National Institutes of Health, Songbai Ji is seeking to better integrate advanced neuroimaging into biomechanical models of the human head to study traumatic brain injury in contact sports.

In a recently published paper in *Biomechanics and Modeling in Mechanobiology*, Ji and his associates found that certain white matter regions and



neural tracts deep in the brain are more vulnerable to injury than others, which is consistent with neuroimaging findings. Also, certain neural tracts are better indicators than others of the likelihood of brain injury.

The findings are important at a time when many researchers are still largely focused on simple impact parameters such as linear and rotational accelerations to assess the likelihood of brain injury.

In addition to learning more about how impacts can damage important neural pathways, Ji and his research group are studying the cumulative effects of repetitive head impacts, particularly the importance of the repeated straining along white matter fibers from multiple head blows.

Ji says he hopes these studies will lead to the development of a tool for clinical concussion diagnostics.

“I am very encouraged by the research and think that we can make an impact in this crucial health area,” Ji says. “My research team understands just how important it is to advance concussion research for athletes of all ages.”

—Andy Baron

WPI IP

A dramatic upswing in patent and licensing activity in the past year reflects WPI's culture of innovation and entrepreneurship that focuses on practical application. Todd Keiller, director of WPI's Office of Intellectual Property & Innovation for the past five years, says, "The student entrepreneurial mindset has really increased, so we're getting a lot more students who say, 'I want to create my job rather than go out and get a job.' Many of the inventions involve faculty and students—so they are working together."

Here are some examples of WPI innovation that may touch your life soon.

feedback to the user. Toroidal air-filled actuators stiffen up around the user's fingers, and tactile sensor data is sent from the robot to the HERO Glove, where it is used to vary the pressure in the toroidal actuators to simulate the sense of touch. The technology has been licensed by PowerHive, which intends to incorporate it into virtual reality games.

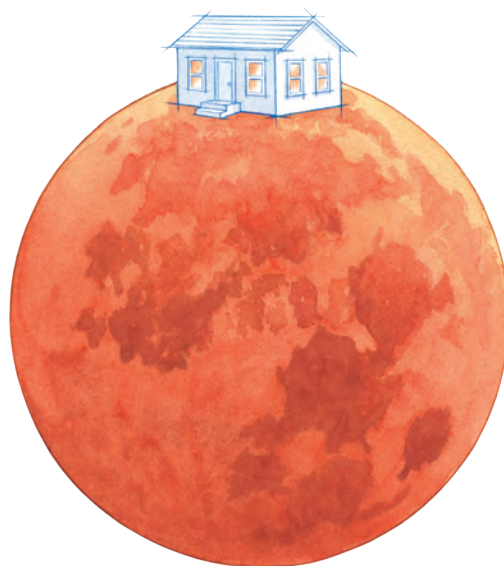
ULTRASOUND UPGRADE (PCT/U.S. Pat. No. 2006/012327)

The Freehand 3-D Ultrasound Scanner senses and tags positional points in a patient's anatomy, which are correlated, via software, with the 2-D planes normally produced by ultrasound imaging devices. The technology produces medical diagnostic scans that are clearer and more accurate.



SHOCK ABSORBING SKATE (U.S. Pat. No. 9,089,763)

ReLeaf Blade, a new type of figure skate attachment, incorporates a load absorption device between the top of the skate blade and the bottom of the skate boot, so impact loads are not entirely transferred to the foot and leg. This can reduce the occurrence of overuse injuries (stress fractures, tendonitis, etc.) due to jump landings common in elite figure skaters.



3D PRINTED HABITAT (U.S. PAT. NO. 62/237,670)*

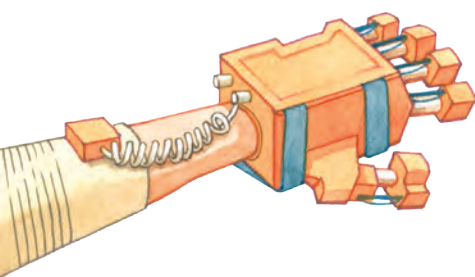
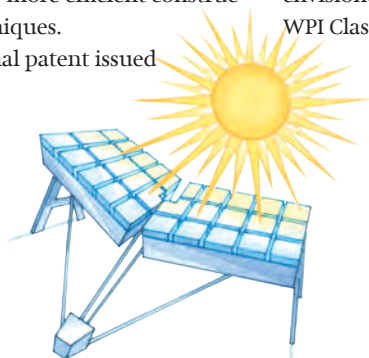
Invented to produce housing for astronauts on Mars, this scalable technology can be placed anywhere to rapidly construct full-scale structures at a relatively low cost, with minimal set-up time. Here on Earth, it could be used for providing emergency housing for disaster victims, as well as for more efficient construction techniques.

*Provisional patent issued

SELF-ADJUSTING SOLAR COLLECTOR

(U.S. Pat. No. 1,951,404)

The Focusing Mirror and Directing Mechanism for solar heating self-adjusts to follow the sun's vertical and horizontal deviation, and resets after sunset. Alternative energy companies are still trying to bring to market a fully realized version of this innovation first envisioned by Robert Goddard, WPI Class of 1908.



SOFT TOUCH ROBOTS (Patent application PCT/ US2017/031024 filed)

The Haptic Exoskeletal Robot Operator (HERO) Glove lets users remotely control robot manipulators while providing sensory

ILLUSTRATION ELIZABETH TRAYNOR

51 new invention disclosures in FY 2017

43 signed licenses to date

70 student teams who have come through the IPI office in the last few years inquiring about their new intellectual property

50/50 split on ownership, if WPI covers patent fees

99% ownership (1% remains with WPI) if student pays the patent fees

@90 alumni standing ready to help, through WPI's Tech Advisors Network (TAN)



GIRLS WHO CODE SCHOLARS

At first glance it looks like a classic case of supply and demand. Last year there were more than 500,000 open computing jobs nationwide, but only about 43,000 computer science students graduated into the workforce. This is great news for students studying computer science as it means the job market is ripe; however, a critical gap remains. Encouraging more women to pursue careers in the field and helping them pay for advanced education is one way to build a bigger and more diverse pipeline.

To help close this gap, WPI has partnered with Girls Who Code, a national nonprofit organization working to close the gender gap in computer science. Together they created the WPI/GWC Alumni Scholarship. It offers five graduates

of a Girls Who Code program \$20,000 each annually for up to four years of undergraduate studies. In August, WPI welcomed its first class of Girls Who Code Alumni Scholars.

“Our world is transforming,” says Reshma Saujani, founder and CEO of Girls Who Code. “Technology is about to change everything about the way we live and work, yet our girls continue to get left behind. We know that in order to get more women into technology fields, we need to create clear pathways for our participants to college and into the workforce. I am so grateful for WPI’s commitment to helping the recipients of the WPI Girls Who Code Scholarship reach their full potential and be the next generation of female technologists leading this revolution.”

The inaugural recipients of the WPI/GWC Alumni Scholarship are Sreeshti Chuke of Arlington, Mass.; Sadie Dominguez of Oakland, Calif.; Nicole Kuberka of Chatsworth, Calif.; Michelle Santacreu of Tampa, Fla.; and Ella Torregrosa of Putnam Valley, N.Y.

— Colleen Wamback

DISEASE DISCRIMINATION

It’s a fact: There is a gender bias in neurodegenerative disorders. Women are more likely to develop Alzheimer’s disease, while men are at greater risk for Parkinson’s. A better understanding of the differences in the basic neurobiology of males and females might yield some keys for the development of better treatment strategies for these crippling ailments.

To search for those clues, researchers at WPI are turning to an unlikely model, the olfactory system of a soil-dwelling worm about the size of a mustard seed.

“It is known that in human cases of Alzheimer’s, a diminished sense of smell is one of the early symptoms,” says Jagan Srinivasan, PhD, assistant professor of biology and biotechnology. “So understanding gender differences in the worm’s olfactory system may give us new information that is relevant for what is seen in human neuropathology.”

As principal investigator on a five-year, \$1.6 million award from the National Institutes of Health (NIH), Srinivasan is exploring how *Caenorhabditis elegans*, or *C. elegans*, a widely used model system for research on molecular biology, processes environmental stimuli. This tiny worm is deceptively complex: about a third of its cells are dedicated to its nervous system. It also has unusual gender differentiation:

Most *C. elegans* worms are self-fertilizing hermaphrodites, carrying both egg and sperm cells. But a very small percentage of the *C. elegans* population is fully male (none of the worms are fully female).

In previous studies, Srinivasan discovered a novel sensory circuit that helps male worms locate mates. In the newly funded project, he and his colleagues will dig deeper into the molecular mechanisms that actuate the olfactory nerve circuitry in the male worms, seeking to identify the specific neurotransmitters and neuropeptides involved and to understand the neural code that allows the organisms to distinguish types of odors and their concentrations. Dirk Albrecht, PhD, assistant professor of biomedical engineering, a co-investigator on the grant, has developed several imaging technologies and data processing algorithms that allow for visualizing neural activity of free-moving worms in real time, as they respond to multiple stimuli.

“These studies will define general principles of how specific neural pathways are recruited in the brain to mediate behavior,” says Srinivasan, “and will provide a framework for understanding gender biases in human olfaction as it deteriorates differentially in the two sexes.”

DRIVING INNOVATION

WPI TEAM SHOWS THAT LIQUID METAL MEMBRANES MAY HELP MAKE FUEL-CELL CARS VIABLE

Hydrogen fuel-cell cars have longer ranges and a lower overall environmental impact than electric cars, and they can be refueled in minutes, versus hours of charging time. But they've yet to make a dent in the marketplace, largely because it's still too expensive to produce the pure hydrogen needed to power them.

Hydrogen, the most abundant element, occurs naturally in the environment, but almost always as

part of chemical compounds like water and methane. To obtain pure hydrogen, it must be separated from these other molecules. Most of the hydrogen sold in the United States is separated from natural gas through a cumbersome, multi-step chemical process called steam reforming.

The cost and complexity of this operation can be reduced by replacing the final steps, in which the hydrogen is segregated from other gas products, with a membrane. Most of the hydrogen separation membranes under development use palladium, but this precious metal is expensive and fragile.

Engineers have long sought a replacement for palladium, but

without luck. A pioneering study by a team led by WPI chemical engineering professor Ravindra Datta, PhD, has shown that liquid metals may be the elusive alternative. A number of metals are liquid at the elevated temperatures found in steam reforming systems, and most are far cheaper than palladium. And as liquids, they are not subject to the defects and cracks that plague solid metals.

More important, the WPI team demonstrated that many of these metals appear to be significantly more effective than palladium at separating pure hydrogen from other gases. The team did theoretical studies and also built a working

membrane from gallium that was up to 35 times more permeable to hydrogen than a comparable palladium membrane. They learned that liquid metals offer challenges: they're highly reactive and can't be placed on metal and many ceramic supports. Plus, they need to be sandwiched between two layers of support materials to prevent leaks.

While many questions remain to be answered, Datta says "by demonstrating the feasibility of sandwiched liquid-metal membranes, we have opened the door to a highly promising new area of hydrogen energy research."

—Michael Dorsey

SAILBOT

"It's an incredible exercise to understand all the sophistication needed for control of robotic vehicles of any sort," says Ken Stafford, a full teaching professor in mechanical and robotics engineering. "But it's more complicated with sailing because of the hard-to-predict conditions." In 2017, he advised a student team that designed a robotic sailboat for the annual SailBot competition.

SailBot teams must feel equally passionate about sailing and robotics, because they won't understand the necessary mechanics of building a successful robotic sailboat without knowledge of each, says Stafford. He believes the environment and the high expectations give the students, most of whom took Stafford's sailing PE-credit class, an opportunity to test their skills and instincts in a constantly shifting setting. Competitors must manage



PHOTO: MATTHEW BURGOS

fluctuations like strong or absent wind, choppy or still water, rogue waves, and variable currents, but they do it all while operating the boat remotely or even autonomously.

The 11th SailBot event, held this year at the United States Naval

Academy, attracted teams from the US, Canada, Brazil, and the UK to sail their robotic creations in a series of challenges that test everything from navigation to endurance. Students from high school to graduate level may participate, as can individuals

and companies.

"You have to be both a sailor and a roboticist to do this," says Stafford. "It's one of the toughest robotics problems you can tackle."

—Julia Quinn-Szcesuil



ILLUSTRATION, JAKOB HINRICHS

CREEPY CINEMA

In the 50 years since the first audience-guided movie, filmmakers have been experimenting with “interactive cinema.” In 1967 the Czech film *Kinoautomat* premiered at Expo 67 in Montreal, where viewers could press green or red buttons on the armrests of their seats at key plot points to “vote” on different courses for the story. This was a great technological leap forward from the film’s original version, which had an onstage moderator asking for a show of hands.

Despite the hype, says IMGD professor Brian Moriarty, interactivity is still clunky and distracting because it requires a conscious decision that must be transmitted by physical device. “We can read keyboards, mice, touchscreens, and, occasionally, gestures,” he says, “but we can’t read minds.”

In a recent *New Yorker* article called “Alternate Endings,” Moriarty predicted some futurist mind-melding that is not at all far-fetched. In interactive cinema, he told staff writer Raffi Khatchadourian, “Explicit interactivity is going to yield to implicit interactivity, where the movie is watching you, and viewing is customized to a degree that is hard to imagine.”

Moriarty points to WPI’s UXDM (User Experience & Decision Making Laboratory), already equipped with technology that can unobtrusively monitor eye motion, pupil size, head tilt, respiration, pulse rate, and other real-time physiological indicators of a viewer’s interest and arousal. Based on a viewer’s responses, he says, a movie could be subtly tailored, on the fly, to better suit individual preferences—without having to stop and ask.

“Interactive monitoring is frequently used by advertisers now, he says, “but could easily be leveraged for streaming content such as by Amazon or Netflix. They know what you watch, they can find out what you buy and what you

post—so there’s potential for them to customize story content around your preferences.” Your personal cut of a movie could be altered to suit your age, your sexual orientation, or even your desire for more dwarf action in a *Lord of the Rings* movie.

“The creative opportunities are almost unimaginable,” Moriarty says. “So is the potential for abuse.” With the advent of virtual and augmented reality making it possible to alter the world we perceive, “Anything is possible,” he says. “I don’t know if I’ll like it, but that doesn’t matter. It’s coming whether I like it or not.”

—Joan Killough-Miller

EARLY PROMISE

WPI's Newest CAREER Award Winners Target Cybersecurity and Education

With its five-year CAREER Award, the National Science Foundation invests in young faculty members whose research shows exceptional promise. Two recent awards bring to five the number of WPI faculty members who have received the prestigious honor during the past two years.

Ivon Arroyo in Social Science and Policy Studies, with her \$587,000 award, aims to develop a new way to teach mathematics in elementary school, one that not only helps students master concepts but keeps students—particularly girls, underrepresented minorities, and those who may be struggling—from disengaging from math and possibly missing out on STEM careers down the road.

Arroyo's approach uses games that students play in groups, with instructions, feedback, and hints provided by smartphones or smartwatches. These "embodied" games use movement and gestures to reinforce learning; they also involve social interaction and communication. The games are driven by an "engine" that will ultimately be able to adjust the games' difficulty to students' abilities and detect emotion and intervene when students disengage. This smart tutoring system will also gather data that will help teachers assess students' progress and target their teaching more effectively.

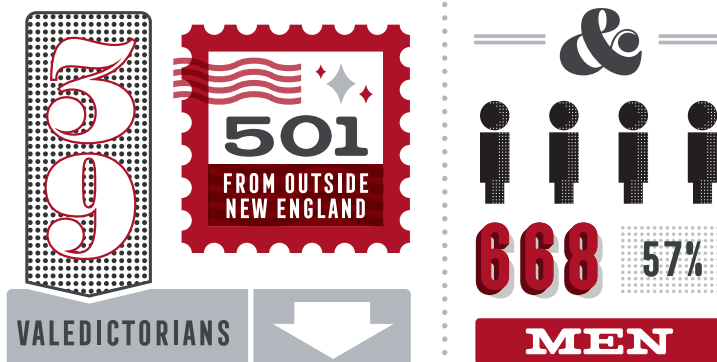
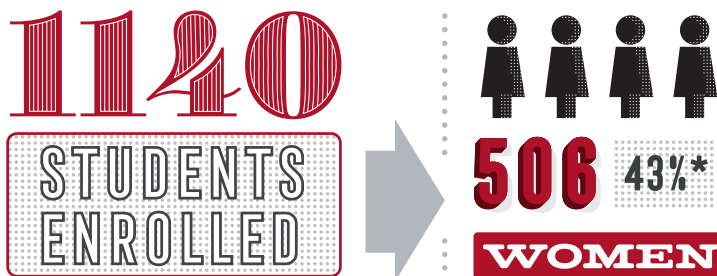
Craig Shue in Computer Science is concerned about the nation's 54 million residential computer networks, which are, for the most part, poorly secured against the cyberattacks that can leave us vulnerable to fraud and compromise and make our computers and connected devices inviting targets for hackers seeking to build "botnets" to send phishing emails or launch malicious Internet attacks.

Shue, with his half-million-dollar award, will develop a groundbreaking approach to security that uses cloud-based security providers and deployable security solutions to take the task of defending home networks out of the hands of homeowners—who typically have little training—and outsource it to experts. It's an approach he believes will transform home networks from security liabilities into assets.

—Michael Dorsey



#GoWorldClass



*HIGHEST NUMBER AND PROPORTION OF WOMEN FOR AN INCOMING CLASS

FACTS AND FIGURES CURRENT AS OF JULY 1, 2017

TOUCHING TOMORROW, TODAY

If you thought downtown Worcester looked a little less crowded on June 10, it wasn't your imagination—nearly 10,000 attendees flocked to WPI for TouchTomorrow. The annual festival has become a summer staple for countless families, giving them a glimpse of future science and technology in action, and this year (its sixth) was no different. From controlling robots and watching up-close fire testing demonstrations to mastering the basics of coding and using a laser cutter to create souvenirs, the WPI campus was the place to be that Saturday.

Besides introducing kids and their families to all that the world of STEM has to offer, TouchTomorrow is the definition of a team effort. Nearly **50 faculty members and their students opened their labs** and shared their research with visitors; more than **275 members of the WPI community volunteered** to help ensure that the day went off without a hitch.

"It really shows how dedicated they are to science, to WPI, and to sharing their enthusiasm for what they do," says Stephanie Pasha, one of the project leads on TouchTomorrow. "I could not be more proud of this community and the work that people from all parts of campus put in to ensure that our guests, especially our youngest ones, had the best day possible."

—Allison Racicot



SUB-SAHARAN MATH & SCIENCE

WPI hosted the inaugural Math and Science for Sub-Saharan Africa (MS4SSA) Conference in May. It attracted approximately 150 attendees who are interested in facilitating a new classroom approach to math and science education in their home countries.

"This will demystify science and technology and get students to feel

they can do it," says Winston (Wole) Soboyejo, dean of engineering and professor of mechanical engineering at WPI. With uniform teaching modules presented in a digital format, students across Africa will have access to the same material and will be taught by educators who are trained in the same way.

Representatives from 17 African countries (including Niger, Senegal, Lesotho, Ghana, and Rwanda), the United States, China, Japan, and India came to the conference and the 10-day post-conference workshop. Participants worked on modules in mathematics and

physics, materials science and engineering, biology and chemistry, and robotics—and they learned how to train the trainers who will introduce the method to classroom teachers. Nigeria hosted its first in-country training in July.

The consistent access to knowledge gives students greater educational opportunities and more career options; it strengthens the global STEM pipeline. More education means more skilled workers will enter a growing workforce that desperately needs them and will be qualified for higher paying careers in the global

job market.

"There are a lot of young folks who have to be engaged," says Soboyejo. "Electronic access to good information is critical. Then it's about how you creatively use that information."

The conference has personal significance for him. "I was raised in Africa from the age of 1 to 13," he says. "I could have been one of those school kids. I had ideas of what I wanted to do, and by pursuing a life of science and technology I have been able to do those things."

—Julia Quinn-Szcesuil

Coming in with the ASSIST

Neil Heffernan, PhD, professor of computer science and director of the Learning Sciences and Technologies Program, is aiming to change the way students do homework—one classroom at a time. Thanks to two new grants totaling \$7 million, he's one step closer to achieving his goal.

"These two new IES grants will further examine and, I believe, validate the efficacy of ASSISTments in improving students' math skills, while also providing significant 'clinical grade' data to demonstrate the program's ability to close the achievement gap across socio-economic groups," explains ASSISTments lead creator Heffernan.

Since 2002, Heffernan and his wife, Cristina, have been working on ASSISTments, a tutoring platform that gives students immediate feedback as they complete their homework. Their labor of love has already been shown to improve student learning, and has regularly received multimillion-dollar grants from organizations like the National Science Foundation, the U.S. Department of Education, and the Bill and Melinda Gates Foundation, allowing them to further improve the program and make it more accessible to students around the world.

Their latest grants—Evaluating the Effectiveness of ASSISTments for Improving Math Achievement and Efficacy of ASSISTments Online Homework Support for Middle School Mathematics Learning: A Replication Study—are from the Institute of Education Sciences (part of the U.S. Department of Education). Thanks to these and more grants, efficacy studies, and successful implementation in Maine classrooms, ASSISTments can now begin to be integrated into schools across the country.

While ASSISTments focuses on improving learning, students aren't the only ones benefiting from the program. Teachers are getting feedback and adjusting their teaching styles to better accommodate the learning needs of students. ASSISTments produces a personalized report listing the problems that gave students the hardest time, making for a more effective lesson the next day.

—Allison Racicot

ASK THE ARCHIVISTS

Q. George C. Gordon may be a familiar name if you've spent a lot of time in the library at WPI, but who was this man? And why is his name on the building?

A. George Crompton Gordon was born in Worcester in 1872. He graduated from WPI in 1895 with a degree in electrical engineering.

According to the 1895 yearbook, *Aftermath*, he "will always be remembered as he who put the base-ball nine on its feet." He was also a star cross-country runner and a member of Sigma Alpha Epsilon fraternity.

George's brothers preceded him at WPI: Lyman (1881) would found Wyman-Gordon with fellow alum Winfield Wyman (1882), and Albert (1886) would become chairman of Crompton & Knowles Loom Works.

After working a while for Lyman at Wyman-Gordon, George moved to Cleveland and in 1911 became vice president of Park Drop Forge Company; he was named company president in 1930 and chairman of the board in 1958. He also formed an associate company, Ohio Crankshaft, which became one of the largest manufacturers of crankshafts for diesel and gas engines.

Even though he moved away from Massachusetts, George kept close ties with Worcester Tech. When he passed away in 1964, he



left \$5 million to WPI, the largest gift ever given to the school at the time. Most of his donation funded the construction of the library, which opened its doors in October 1967. A smaller part of the gift was used to fund the Leonard P. Kinnicutt Professorship (current recipient is Carissa Perez Olsen, assistant professor of chemistry and biochemistry).

Do you have a question for WPI's archivists? Send it to archives@wpi.edu and check out the next issue of the WPI Journal for more interesting facts and information about WPI wonders.

Robert CRUICKSHANK '83

BACK ON THE GRID. WITH RENEWED EFFICIENCY

LIKE AN ELECTRICAL CIRCUIT THAT HAS FINALLY CLOSED, ROB CRUICKSHANK'S LIFE HAS COME FULL CIRCLE. HAVING BEGUN HIS CAREER AT WPI STUDYING ENERGY EFFICIENCY, HE TOOK A 21-YEAR DETOUR INTO THE CABLE INDUSTRY, HELPING CREATE SOME OF THE MOST PIONEERING INNOVATIONS IN THE FIELD. NOW, AS A DOCTORAL STUDENT AT THE UNIVERSITY OF COLORADO AND THE NATIONAL RENEWABLE ENERGY LABORATORY, HE'S FOCUSING ON ENERGY MANAGEMENT ONCE AGAIN.

BY MICHAEL BLANDING | PHOTOGRAPHY MATT FURMAN

[COVERstory]



CRUICKSHANK OUTSIDE THE RESEARCH SUPPORT FACILITY ON THE CAMPUS OF THE U.S. DEPARTMENT OF ENERGY, NREL IN GOLDEN, COLORADO.



AT THE NATIONAL WIND TECHNOLOGY CENTER, UTILITY-SCALE WIND TURBINES UNDERGO RIGOROUS TESTING AND COMPLEMENT SOLAR PHOTOVOLTAIC GENERATORS.



His career in cable was hardly a lark, however. Indeed, he sees telecommunications as the key to transforming our energy grid, integrating renewables, and ensuring a more sustainable energy future. Along with others in the field, Cruickshank envisions a grid that works not just one way—pumping energy from power plants to our homes and businesses—but communicating in all directions at once, sending power where it's needed and, crucially, stopping the generation of power when it's not.

It's an idea that has obsessed him ever since his freshman year at WPI. A student who favored hands-on over book learning in high school, he spent most of his hours building things in a wood- or metal shop. He was most in his element on his parents' property in the Catskills, where both sets of grandparents owned large compounds filled with everything a future engineering student could want—farm tractors, bulldozers, a gravity-fed spring water system. "I remember reading about electric motors and the distinction between AC and DC when I was in fourth or fifth grade," he says. "There was an old Jeep pickup truck you could use to go out and look for deer at night—but you had to jump-start it to get it running first."

What really transformed his life was walking into Rich Pryputniewicz's mechanical engineering class. The new, young faculty member ran the impressively named Center for Holographic Studies and Laser micro-mechanics (CHSLT)—or as it was known by the grad students, the laser lab. It was a playground where they could experiment to their hearts' content.

Brian Nason '83, Cruickshank's freshman-year roommate and inseparable companion, remembers working on everything from fiber optics and circuit boards to a liquid

metal thermometer and a device using UV light to kill barnacles on Navy vessels. "Rich would bring in something new and tell us what he had in mind, and we'd figure out how to build it," he says. Cruickshank ate it up. "Bob was just an open-minded and energetic guy, and always found a way to find fun in whatever we were doing," Nason says.

But Pryputniewicz was also an extremely rigorous professor, who forced Cruickshank to get serious about the underlying science as well. "When he was on the podium, he would start by asking the class, 'Do you have any questions? If not I have a question for you,'" recalls Cruickshank. "And you'd better have a question, because if he called on you it was going to be ugly."

The new rigor was just what Cruickshank needed, forcing him, for the first time, to dedicate himself to his studies. What made the biggest impact on him was the basic concept of efficiency, which in the simplest terms means the amount of useful work you get out of something divided by the amount of energy you put into it. He was inspired by how the equation changed depending on where you drew the boundaries. If you considered the amount of cold a refrigerator produced compared to the amount of electricity to run it, for example, you got a completely different answer than if you included the amount of heat released from the coils on the back, which then had to be removed by air-conditioning.

"The equation works on so many levels," he says. "If you look at lightbulbs, for example, now LED lightbulbs hardly get hot at all, so they are so much more efficient [than incandescent bulbs]. It works for any system—and once you understand efficiency, you get it."

For his MQP, Cruickshank went back to his grandfather's farm in the Catskills, with the ambitious project of calculating just how much energy the land could produce—including sun, wind, water, and organic matter. With his father's help, he hauled a shack up to the top of a mountain, installed solar panels, and set up a weather monitoring station complete with two anemometers atop a 50-foot tower to measure wind. His father bought him a microcomputer to store data, but the microchip inside only had the capacity for two weeks of data. "Every other Friday night, I'd be driving home, rain or shine, to climb the mountain to swap in a fresh chip," he says. "It was a real adventure."

It was that experience that first gave him the idea that perhaps there was a better way to manage our nation's energy grid. At the time, there was a wave of back-to-the-landers looking for ways to live "off the grid." His studies showed him that there was ample energy just sitting out there in nature if that could be harnessed—in other words, if the boundaries around the energy grid could be drawn to include the renewable sources of energy surrounding it. "I thought my 'off-the-grid' efficiency idea would work great on the grid as well," he says, "if only you were able to orchestrate supply and demand."

After graduation, Cruickshank took a job with AT&T Bell Labs in Denver, "thrilled to be working at the greatest research lab in the world." Reality quickly set in, however, as he began feeling like a cog caught in a large bureaucracy, and research opportunities were few and far between. "When I got there, I was like, is this it?" he says. "I was championing at the bit for more."

As he continued thinking about how he could get closer to his passion about integrating renewables

into the grid, he realized there was a problem in the way the system was designed. Then, as now, energy flows primarily in one direction, from the large central-station thermal power plants to our homes and offices, sometimes traveling vast distances to get there—and losing efficiency on the way. At any given time, the electric company is keeping up with demand by operating nuclear, coal, gas, or water-powered turbines—as many as it takes to keep the lights on.

"When we walk into a room and flip the light switch, we do it without a thought that a thimbleful of coal is being thrown on an already gigantic fire," he says. "It's the power companies' job to make sure it works." The dark side of that single-minded mission, however, is that powerful generators come with an incredible amount of inertia, which means they can't simply be switched on and off on a dime. In order to anticipate estimated demand, plants have to run generators at excess power levels to create reserves, starting with the least expensive generators and gradually turning on more expensive generators as the loads increase. Even after 135 years of engineering innovation, central-station thermal generation wastes as much as two-thirds of the energy we put into it.

Integrating more decentralized sources of energy such as wind and solar, Cruickshank realized, could cut down on the amount of power needed from the central generators, making the generation cleaner and more efficient overall. But there was a catch. Since renewable energy is both intermittent and unpredictable—varying greatly depending on whether the sun is shining or the wind is blowing—the system needed a real-time sense of how much demand is required from moment to moment. Ideally, it would even be able to send information back

to users about how much supply is available, so they could modify their energy usage accordingly and put less pressure on the system to tap into its inefficient reserves.

That meant developing a sophisticated means of telecommunication. Cruickshank went back to school at the University of Colorado to study the subject in an interdisciplinary PhD program in civil engineering, telecommunications, and computer science. He had completed all but his dissertation (the dreaded "ABD") by the time he received an offer to join a burgeoning company called Cable Television Laboratories, or CableLabs. There, his "detour" began, as he rose through the ranks for the next two decades developing cable modem technology. In the 1990s, he served as head of CableLab's DOCSIS project—short for Data Over Cable Service Interface Specifications—where he helped develop the ISDN (Integrated Systems Digital Network) standard that took modems from 28.8 kilobits per second to 64 kilobits per second. "It's a thousand times faster," he says, still in awe of what his team accomplished. "We took it up to Washington to demonstrate it on Capitol Hill, and showed that what might take three years to download before could be done in a day." The standard was eventually used in over a billion modems.

During all that time spent transforming our nation's telecommunications, however, Cruickshank never lost sight of his passion for energy efficiency. When his most recent employer, Cablevision, went through a merger last year with the Franco-Dutch conglomerate Altice, he took a buyout offered to executives—and went right back to the University of Colorado to pick up where he left off on the subject of how to make the energy grid more efficient. "Although the details are different, it's pretty



much the same burning question now as then," he says. "If the electric grid could be overlaid with a telecommunications network, and elements of supply and demand could communicate with each other, what would the impact be on efficiency, cost, and the environment?"

At the university, Cruickshank re-joined the civil engineering department, and also began working with the Renewable and Sustainable Energy Institute (RASEI), a joint project with the U.S. Energy Department's National Renewable Energy Laboratory (NREL). RASEI's



associate director, Gregor Henze, had been a student with Cruickshank 20 years earlier, and was now an engineering professor. In addition to becoming his thesis advisor, Henze helped him get a position at the lab, the nation's only laboratory completely devoted to renewable energy, where he works two days a week.

Henze admires Cruickshank's dedication and focus now that he is finally back where he's always wanted to be. "There is just a sense of humility and gratitude that he has," Henze says. "He is clearly someone who cherishes the fact he

is able to come back to the school and once again be on the receiving end of education."

Of course, in the two decades since he's been away from the problem, the entire communications landscape has been utterly transformed. "The networks are here now in a way they were not there before," Cruickshank enthuses. "Computing power is so great and inexpensive that first-year students can create elaborate big data analysis and control systems on their laptops." Not only is broadband and Wi-Fi able to transmit data at lightning fast speeds,

but the "Internet of Things" offers appliances and building heating and cooling systems the potential to communicate with the network like never before.

"Right now, when we hear the refrigerator go on in the other room, it's completely autonomous," says Cruickshank. "But you could imagine, in the face of high electricity costs, the fridge could decide, 'I can wait five minutes.'" Then, should the sun come out from behind a cloud, making lower-cost renewable energy available to the grid, the refrigerator could turn itself back on to keep the sun's energy from being wasted. Not only that, but that same fridge could have separate controllers to save energy-intensive activities, such as defrosting, for times of lower demand. "You could create pent-up demand, and then send a low price alert so a smart appliance controller would know it's time to use clean, low-cost energy."

The same principle could be used for millions of appliances across a region, as well as for building heating and air-conditioning, where the change in a degree or two might not even be felt by occupants, but could have a big impact on the amount of energy required from power companies. That, in turn, could allow them to use more renewable energy and hold off on starting up inefficient and dirty reserve generators.

In order to really implement such a system, however, companies need to have a better handle on just how much energy is required at any given time, so when the consumer hits that light switch, the lights still go on. That's where Cruickshank's latest research comes in. For his thesis, he is analyzing more than two years' worth of data on the energy usage of some 1,400 homes in the Pacific Northwest—taking into account such elements as insulation,

amount of light or shade, and age of construction. In addition, the data includes readings taken every 15 minutes on 30 different appliances, including hot water heaters, refrigerators, televisions, dryers, and ranges, providing a detailed snapshot of the energy demand of the homes' occupants.

By analyzing the energy usage of all of these homes, Cruickshank says, it will be possible to create a mathematical model to more accurately estimate electricity demand across a much larger region. In addition, analysts can experiment with different prices to examine how that demand changes as smart appliances react. "You don't want to create a rebound effect where everything turns off or on at once," he says. "You want everything to flow as smoothly as possible."

In a sense, the research is like his MQP up on the mountain in reverse—instead of meticulously measuring all the energy nature can provide, he is meticulously measuring all the energy civilization needs. But the principles, he says, are the same as those he learned in college. "Now I am using a computer to draw the same graphs I was drawing by hand in 1982," he says.

After finally earning his doctorate, Cruickshank intends to remain active consulting on energy projects, and using the connections he honed for years in the cable industry to bring together energy companies and telecommunications companies to work together to create an efficient energy grid. "WPI taught me how to be an engineer," he says, "and it gave me the confidence that I could succeed in making a difference." Now years after learning that lesson, Cruickshank is coming down from the mountain at last to make his long-held dream of making a difference on energy efficiency a reality. **J**





BUILDING TOMORROW'S **ECONOMIC RENAISSANCE**

AS A MEMBER OF EIGHT NATIONAL INSTITUTES,
WPI IS CREATING AN ADVANCED MANUFACTURING
HUB IN CENTRAL MASSACHUSETTS

BY JOSHUA ZAFFOS | ILLUSTRATION SEAN LOOSE



In 1865, on the eve of the American Industrial Revolution, Worcester was already emerging as a manufacturing hub, with factories turning out everything from textiles to horse-drawn carriages. Recognizing the need for a new kind of professional to lead such enterprises, two local self-made men dreamed of establishing new colleges. John Boynton, a manufacturer of tinware, committed to donating his life's savings—\$100,000—to establish a school that would provide a scientific education to the youth of Worcester County.

Repeated financial setbacks had led one of its city's most successful industrialists, Ichabod Washburn, owner of the world's largest wire-making enterprise, to set aside his own plan to establish a school to replace the age-old apprenticeship system for mechanics and other craftsmen. Reluctantly, he cast his lot with Boynton. He pledged to build his rival's school a working manufacturing facility where students could apply the knowledge they gained in the classroom building, which would be named for Boynton.

The Worcester County Free Institute of Industrial Science, later renamed Worcester Polytechnic Institute, opened in 1868. Nearly 150 years later, Boynton Hall still

stands beside the Washburn Shops, their distinctive towers symbolizing the blending of theory and practice that has always been at the heart of a WPI education.

For nearly a century after WPI's founding, its graduates regularly ascended to positions of leadership in the nation's manufacturing enterprises. But as American manufacturing jobs sharply declined, beginning in the 1960s, student interest in the field, along with WPI's research focus on traditional manufacturing, ebbed. Today, there are signs that the nation may be on the threshold of a new manufacturing renaissance, and the Institute, its professors, and its students appear poised to play key roles. The impetus is a new national initiative to invest in advanced manufacturing industries, accelerate product commercialization, and help prepare a workforce for emerging job opportunities.

Known as Manufacturing USA and formally established in 2014 with support from Congress and President Barack Obama, the initiative represents a \$1 billion federal investment to create a network of manufacturing research collaboratives that bring together universities, industry groups, businesses, and government agencies to share research and develop products,

technology, and services. To date, 14 public-private institutes have been established, each dedicated to a specific area of advanced manufacturing. Each was launched with \$70 million in federal funding, plus matching funds from non-government partners, to kick-start work that will take place over the next five years.

WPI has been named a member of eight of the 14 institutes, making it one of only a handful of universities to play such a prominent role in this high-level initiative. The eight institutes focus on such emerging sectors as lightweight materials manufacturing, regenerative medicine and tissue engineering, robotics, biopharmaceutical manufacturing, clean energy innovation, and integrated photonics.

WPI's leading role in Manufacturing USA is "a natural connection," says Bogdan Vernescu, WPI's vice provost for research, "because these eight fields reflect some of our current research and academic strengths and because our faculty members and students are already engaged in a lot of interesting and forward-looking work in these areas. We were founded by manufacturers for manufacturing-workforce development, so it's rewarding to think that we are continuing that long tradition."



BE PREPARED

Manufacturing has evolved considerably since the Industrial Revolution. While many people still picture textile mills, automobile assembly lines, and steel plants when they hear about “manufacturing” jobs, industries and opportunities today span a much wider range of products and services. That’s something even universities—including WPI—have been slow to recognize and support, Vernescu says.

With its new strategic plan, adopted in 2015, WPI has heeded this advice. Taking stock of its research enterprise, the university identified five multidisciplinary research areas for emphasis: health and biotechnology; robotics and cyberphysical systems; sustainable materials and manufacturing; cyber, data, and security science and engineering; and learning sciences and technologies.

offer the potential for society-changing advances, Vernescu says. In short, the five research themes of the strategic plan seemed tailor-made for Manufacturing USA.

In 2014, as the strategic plan was taking shape, one of the first Manufacturing USA institutes was launched; it also happened to be the first to accept WPI as a member. Lightweight Innovations for Tomorrow (LIFT) focuses on a goal that is familiar to researchers in WPI’s materials science and engineering programs.

“By reducing weight, we use less fuel, cut energy consumption, and reduce products’ carbon footprints,” Apelian says. He adds that improved reclamation and recycling of aluminum, another focus of research within MPI, allows manufacturers and suppliers to conserve natural resources and limit new mining, too.

For example, a decade ago a typical car included about 150 lbs. of aluminum. To meet safety specifications, the rest of the frame and body, the engine block, and many other components were made from steel and other heavier metals. Today, through advances in metal casting (including contributions from WPI’s research labs), cars typically contain 350–400 pounds of aluminum alloys,



“In meetings with leadership of different Fortune 500 companies, a lot of chief technology officers have told us that we in higher education are not doing enough in preparing a workforce for 21st century manufacturing jobs,” he notes.

Each of these areas encompasses current research strengths, while also embracing emerging disciplines where WPI faculty and students could have a wider impact. As it happens, each also touches on at least one field of advanced manufacturing—an area where novel manufacturing technologies

It’s called lightweighting, which Diran Apelian, founder of the university’s Metal Processing Institute (MPI), defines as developing materials from light metals, like titanium, aluminum, and magnesium, or composites like Kevlar, which can perform as well as denser iron, steel, and other ferrous components in cars, trains, planes, spacecraft, and infrastructure.

which are one-third the density of steel but just as strong. Ford even makes a pick-up truck with an all-aluminum body.

“We here at WPI have a running record of over 25 years of lightweighting,” Apelian says, referring to the accomplishments of the Advanced Casting Research Center (ACRC), the nation’s first aluminum casting laboratory. Established in 1985 as an industry-university

consortium, ACRC today works with 35 industry partners, including aluminum producers and metals casting companies, as well as manufacturers, including Boeing, Harley-Davidson, and Fiat Chrysler, who are increasingly relying on innovative lightweight materials, alloys, or advanced steel to make lighter vehicles.

Once Manufacturing USA opened requests for proposals for its initial institutes, Apelian and WPI collaborated with colleagues at other universities on a submission that emphasized the ACRC's track record and its industry connections. The pitch, coordinated by partners at The Ohio State University and the University of Michigan, led to the successful proposal for LIFT, which is headquartered in Detroit.

Based on WPI's expertise with metal processing, Apelian was chosen to lead LIFT's metal-cast-

ing and melt-processing research, one of the institute's six "technology pillars" (the others include welding and advanced joining and assembly, powder metallurgy, and novel and agile materials manufacturing). Each pillar represents a challenge related to producing advanced lightweight materials on a large scale.

Through LIFT, Apelian and Brajendra Mishra, director of the Metal Processing Institute, currently oversee eight projects at different universities, including several based at WPI. In one, WPI engineers are studying how to directly produce aluminum composite materials from molten metal and chemical precipitates to develop stronger materials that can withstand higher temperatures. That would allow manufacturers to use aluminum alloys in diesel engines without fearing that they might be melted by

engine heat. That breakthrough could almost double a diesel engine's fuel efficiency. In another major effort, WPI and Ohio State researchers are developing and casting ultra-thin-walled, high-strength, die-cast aluminum that can be commercially produced.

So far, LIFT has brought about \$2 million to WPI, while helping the university and the ACRC leverage and complement existing funding and support. The expanded portfolio of projects and public and private partners is also attracting more engineers, scientists, and students eager to work at WPI and the casting center.

Ultimately, the success of LIFT and the other Manufacturing USA institutes will be defined by commercialization of technologies and products that serve society and nurture new business, Apelian says. "You can have laboratory innovations and results,

you can write papers and publish them, but for us the payoff is when people are using the technologies we develop here—when someone takes an innovation and applies it and commercializes it."

NEW GROWTH

Other Manufacturing USA programs are charting even more novel areas for manufacturing, including regenerative medicine, which holds the promise of healing damaged tissues and organs and producing innovative disease treatments.

Researchers in industry and university labs have been creating engineered versions of skin, muscle, and other kinds of tissue for nearly 20 years, says Kristen Billiar, head of WPI's Department of Biomedical Engineering. These efforts have led to lab-grown skin grafts to treat ulcers, replacement cartilage cells for use in damaged



knees, and an engineered trachea, among other notable successes. But important engineering challenges still need to be solved before the dreams of regenerative medicine can be fully realized.

At WPI, a team led by Glenn Gaudette, professor of biomedical engineering, took a large step toward a solution for one hurdle: the difficulty in getting oxygen and nutrients to cells deep within a growing engineered organ. They discovered a method for removing the living cells from spinach leaves and using the remaining vasculature to support the growth of beating heart muscle (*WPI Journal*, Summer 2017).

The breakthrough may ultimately play a role in helping scale up tissue and organ regeneration. It also highlights one of the ongoing challenges for research teams involved in regenerative medicine: how to take new methods and technologies developed in the lab, often on a small scale, and turn them into manufactured products that can be commercialized.

To address that need, the federal government in December 2016 inaugurated the Advanced Regenerative Manufacturing Institute (ARMI), one of the last of the 14 Manufacturing USA hubs to get under way. With 87 public and private partners, including WPI, ARMI launched BioFabUSA, which is led by Dean Kamen '73, founder of the New Hampshire-based DEKA Research & Development who is credited with such biomedical innovations as the first wearable medication infusion pump (invented while Kamen was still a student at WPI) and the Luke robotic prosthetic arm.

Still in its formative stage, BioFabUSA has identified five research and workforce training focus areas

and is forging relationships between biomedical researchers and biotechnology, so each can better understand the others' needs. That connection will be a critical link as the institute seeks to support efforts to scale up new and more complex technologies and, ultimately, to build a marketplace and job opportunities. Billiar says he also expects the institute to serve as a forum to standardize and share research and production methods, improve quality control of engineered materials and tissues, and speed up product development.

Billiar and his lab, for example, concentrate on engineering replacement heart valves, a process that began by painstakingly making small samples at the lab bench. By partnering with a company, Billiar now has access to automated fluid-handling robotics that can rapidly and precisely replicate his processes. "And that's basic compared to what we could do in the future through BioFabUSA," he says.

The other six Manufacturing USA institutes to which WPI belongs are also in the developmental stage. They include the Advanced Integrated Manufacturing in Photonics (AIM) program, which is dedicated to advancing the technology for manufacturing photonics integrated circuits (PICs) [photonics involves generating and harnessing light and other forms of radiant energy]. Integrated photonics allow designers and manufacturers to put thousands of photonic components (such as lasers, detectors, and waveguides) on a single chip, allowing capabilities that were not previously possible. Under the direction of Douglas Petkie, head of the Physics Department, WPI is building a partnership with Quinsigamond Community College to develop a workforce training, testing, and

prototyping center for companies in Central Massachusetts in collaboration with AIM Photonics at SUNY Poly and the AIM Academy at MIT.

PROMISING OPPORTUNITIES

As the various hubs of Manufacturing USA launch projects and collaborations, WPI finds itself once again in the role of helping drive the evolution of manufacturing and manufacturing education. And as a member of eight manufacturing institutes, which span a breathtaking sweep of the diverse disciplines that fall under the umbrella of advanced manufacturing, Vernescu says WPI has an opportunity to restore itself and, by extension, its home region to the prominence it once enjoyed in the manufacturing landscape.

"Our vision is to develop a 21st century manufacturing hub here in central Massachusetts," he says. "While we acknowledge that we are part of eight separate institutes, each with its distinct vision and goals, we also recognize that these eight memberships offer us the chance to create a unique synergy. Already, we are seeing the cross fertilization of ideas across the faculty associated with these eight entities, and we fully expect these connections to lead to new interdisciplinary grant applications, new innovations, and new opportunities."

Vernescu says the synergy he envisions extends to education and workforce development, which are vital elements of the mission of each of the Manufacturing USA institutes. In addition to creating the new knowledge and innovations that will help build new industries and commercial ventures in the United States, WPI will help prepare students with the skills required for jobs in these

novel fields.

"The majority of our undergraduate students are going to work in industry," Billiar says. "So as these industries grow, they will be well prepared because it won't just be theoretical stuff, they'll actually understand the manufacturing processes that these companies are really going to need."

Looking to the future also means WPI and other partners are already planning for future funding to sustain the initiatives beyond the federal government's five-year investment. Vernescu says some initiatives will likely prove more successful than others, but successes in commercializing products and applications should help sustain the programs.

Ultimately, the investment, collaboration, and acceleration toward manufacturing industries and innovations represents a "culture change," Vernescu says. University researchers who think of themselves as scientists and engineers now have opportunities to be manufacturing innovators and leaders and help reinvigorate American manufacturing industries at large.

"Manufacturing has not always been in vogue," says Apelian, "but, at WPI, we have always taken the view that manufacturing is a critical, transformational, and foundational industry for this nation." WPI's wide engagement with Manufacturing USA reaffirms that premise across a new range of disciplines – while connecting the school's storied past with exciting opportunities for the future. "To some extent we're building on the legacy of the university," Apelian adds, "and when you are true to your legacy and what you are good at, it always pays off. And for us, it really has paid off." **J**



ASHELEY

THE SCIENCE OF MARKETING

WHEN SHE TURNED FIVE,

Ashley Daisley '12 (BS BE) told her mom she wanted guests to bring books to her birthday party, not presents. It was an odd request, she acknowledges in retrospect, but her mom relayed the message and her friends complied.

To everyone's surprise, the book-themed event was a massive hit. The five-year-olds spent nearly the entire party reading aloud from the books they'd brought.

In that moment, Daisley's mom saw opportunity—she brought the idea of “reading parties” to Ashley's day care center in Brooklyn, and later to area Barnes & Noble bookstores. She formed a literary organization, Young Readers Network. Ashley was integral to the new nonprofit: she attended the events dressed as a butterfly, reading books to her peers. Their story was written up in the *New York Times*, and they received a letter from President Bill Clinton thanking them for their work.

BY ERIN PETERSON | PHOTOGRAPHY MATT FURMAN

HERO

MY JOB IS TO BE THE CONSUMERS'

The experience taught Daisley that there is value in paying close attention to what resonates with people and being brave enough to act on that knowledge. “I loved that there was a way to take a little idea and turn it into something that had an impact on a lot of people’s lives,” she says. It’s a lesson she carried with her to WPI and one that has helped her thrive beyond it.

THE SEEDS OF SUCCESS

Daisley made an early mark through reading, but in school she also showed an aptitude for math and sciences. When a math teacher at her magnet high school in Washington, D.C., told her to consider WPI, she admitted she’d never heard of it. But after a bit of research—which included looking into WPI’s biomedical engineering program—she was persuaded to give the school a chance. An overnight visit sealed the deal.

Thinking she might become a medical doctor, she enjoyed her first few science courses. But while there was a lot she loved about the biomedical engineering program—learning to define problems, ask questions, and investigate hypotheses—there was one sticking point. “The labs made me realize I wasn’t that great around blood,” she says. A social animal at heart, she also realized she might not be cut

out for often-solitary research projects.

Though she didn’t find a perfect fit in her classes, she did discover an outlet where she was able to bring her considerable skills to bear: the Goat’s Head pub on campus. As a sophomore, she was hired as the restaurant’s first student entertainment coordinator. Her responsibilities included planning events, negotiating fees with performers, and creating marketing materials to attract students.

Assistant dean of student programs Jim McLaughlin recalls that Daisley’s commitment to the work was admirable. “Whether she was planning a Halloween-themed pumpkin-carving contest or a gingerbread house decorating party in the winter months, it was clear she enjoyed planning activities that made students’ lives fun at WPI.”

Nevertheless, she wondered if she had her finger on the pulse of student desires. She sent out a survey to learn what students really wanted to see. She took their feedback to heart and developed an array of new events, including a “Minute to Win It” game show-style competition that proved enormously popular. She admits she never would have come up with the idea without hearing from students. The lessons from that simple questionnaire had a

lasting impact on her.

Daisley used her fledgling customer research skills to land a coveted spot in a week-long consumer strategy workshop at Procter and Gamble the summer after her sophomore year. After besting close to 10,000 applicants, she and eight other students completed a case study linked to Olay skin care products, worked on consumer research, and even presented findings to former P&G CEO Bob McDonald. She parlayed that experience into a summer internship at the company the following year and landed a full-time role at P&G after she graduated.

The work in consumer and market knowledge allowed her to combine her curiosity and scientific thinking, her love of people, and her desire to make the world better—one small step at a time.

GETTING INTO THE MIND OF A CONSUMER

Her first full-time position at P&G, as a consumer and market knowledge associate manager for beauty and grooming, focused on the look and feel of Pantene shampoo and conditioner bottles.

The products were effective, but sales were slow. Shoppers seemed disinclined to take the bottles off the shelf. She and her team needed to find out the “why.” How do people make decisions? What makes us do what we do?

Daisley conducted surveys and

had volunteer consumers browse mock stores with shelves set up like a typical haircare aisle. But she obtained the most useful feedback from focus groups where she would ask consumers to think about the bottles in unexpected ways.

After showing research participants two bottles of Pantene—one with the current design and one with a new design, she asked them to imagine that the bottles were guests at a party they were hosting. “If you saw these two bottles,” she’d say, “how would you describe them?”

Once the initial confusion about the questions faded, participants were game, she says. “Women might say things like, ‘The older bottle looks like the person who didn’t even want to come to the party. She’s not talking to anyone, and I have to worry about her because I’m not sure she’s making friends.’ About the new bottle they might say, ‘She looks like she came to the party in a nice car and gave all of my friends great fashion tips.’”

Embedded in those statements, she says, were deep insights about what consumers like (or loathe) about a product. Most people find it difficult to explain why a certain product doesn’t connect with them, but when researchers reframe their question into terms that resonate with our everyday



DAISLEY GETS EXCITED WHEN SHE TALKS ABOUT HER ADOPTED HOMETOWN OF CINCINNATI. "I LOVE THE ART AND CULTURE YOU CAN FIND ALL AROUND THE CITY," SHE SAYS, LIKE THIS MURAL DONE BY FRIEND CODY GUNNINGHAM.



experiences—like hosting a party—they can gain surprisingly useful insights. Translated, that knowledge can help guide designers and help marketers create products that people love to have in their lives.

For personal care products, she says, getting the details right matters. “These are products people use every single day. They put the bottles in their showers—some of the most intimate spaces in their homes. In a crowded marketplace, something as simple as the color of a bottle can keep a shopper from buying an otherwise outstanding product.”

Daisley’s work stood out, and she quickly scaled the corporate ladder, taking on new roles that led her to dig deep into subtle issues that led consumers and businesses to buy

or not buy a product.

For example, she traveled to Brazil to see if P&G could develop a new market for its liquid floor cleaners. But when she visited homes and restaurants, she discovered that consumers “liked using gritty powdered laundry detergent on their floors, because they felt it cleaned better.” “That insight—which we couldn’t have discovered any other way—saved us from going into that market with a liquid product,” she says.

Her ability to extract key lessons about what people really want has helped her in other areas of her life. She has served as campaign manager for a friend who ran for a seat on Cincinnati’s City Council. Though she wasn’t able to propel him to victory, she helped the

upstart candidate garner 10,000 votes—just short of a seat. And she has been a tireless volunteer for her local NAACP branch, working to attract new members, leading branch retreats, and developing new projects for the group. “I did some consumer research work within our branch to understand what we were really passionate about,” she says. “Our executive committee was my focus group.”

At work these days she’s busy on top-secret work in fabric care, called “front-end innovation.” She and her team gather up some of the company’s best ideas, determine which ones have a shot at success, and do small tests to see if they’re worth pursuing.

While she can’t say much about her current work, she does share

something that’s already out in the world. Her group was responsible for a pilot test of Tide Spin, a partnership with Uber. “Just press a button in an app,” she says, “and someone will pick up your laundry, wash and fold it, and drop it back off at your house when it’s done.”

For Daisley, the joy of her work isn’t about a new bottle shape or a new app. It’s about understanding people better, knowing what they really want, and finding ways to deliver that to them. “In [P&G] meeting rooms, there will always be people who want to cut costs or increase profits, but my job is to be the consumers’ hero—to be their champion,” she says. “People rely on our brands every day of their lives. I want to make sure we’re doing the best we can for them.” **J**

VISIT WPI.EDU/+SCIENCEOFMARKETING FOR A BEHIND-THE-SCENES LOOK AT ASHLEY DAISLEY’S PHOTOSHOOT ON THE STREETS OF CINCINNATI.

[TURNING*point*]

The soundtrack to Bob Sinicrope's years earning his BS in math was jazz—with a touch of polka.

Sinicrope '71, now in his 44th year at the prestigious Milton Academy, launched the prep school's jazz department and serves as its jazz director. But he hadn't started out on that path.

"I worked my way through college playing in a polka band," he says with a smile. He also played in the WPI Brass Choir and the ROTC band; he sang in the Glee Club; and he composed and conducted pieces for the Brass Choir at his commencement ceremony.

"I loved math and music," he says, he was encouraged by a WPI career counselor to consider teaching at a prep school. Hoping to combine his love of both by teaching both subjects, he was encouraged by a WPI career counselor to consider teaching at a prep school.

"I applied to several and was hired by Milton Academy in 1973 as a full-time math teacher," he says. "I asked if I could teach a jazz course in my second year and over the next decade I increased the number of jazz courses to serve the students' interests. I have taught jazz courses full-time since 1995."

Teaching and working with young students has become a fulfilling blend of career and hobby for Sinicrope. He's toured South Africa with students 11 times, delivered over \$200,000 of donated materials to township music programs, won four national awards, played at the White House, and performed at the gubernatorial inauguration of his former math student Deval Patrick. He's also had the honor of playing for Desmond Tutu and James Taylor; he's played on four NPR programs, at 10 International Jazz Education conferences, and at several European jazz festivals. He was the first high school teacher to serve as president of the Jazz Education Network.

The teachings of WPI have kept the melody harmonious with his career in various ways. "I learned how to approach problems by isolating their various aspects and understanding how to deal with them," he says. "Once you understand smaller components, you can approach the entire problem. I still can hear Professor van Alstyne asking, 'What don't you like about this problem?'" I often ask the same thing of my jazz students."



HART IN THE GE HITACHI CHANGING ROOM AT THEIR WILMINGTON, SC NUCLEAR FACILITY. THIS ROOM IS FOR 'DRESSING OUT' TO ENTER THE CONTAMINATED AREA OF THE FACILITY.

SHOE COVERS

X-LARGE

X-LARGE

LARGE

LARGE

LARGE

MEDIUM

MEDIUM

MEDIUM

NUCLEAR

A POWERFUL ATTRACTION KEEPS DIANA HART '92 IN THE ENERGY INDUSTRY

ENGAGEMENT

BY JOAN KILLOUGH-MILLER | PHOTOGRAPHY MATT FURMAN

IT WAS LOVE AT FIRST SIGHT.

In her sophomore year, Diana Hart piled into a van with the other students in Professor John Mayer's nuclear engineering class for a field trip to the Pilgrim Nuclear Power Station. Almost three decades later, she vividly recalls what was running through her head when she first glimpsed the reactor. "Oh my god, I want to do this. I want to work at one of these."

While her classmates were entertained with tall tales about the enormous lobsters that gathered in warm waters around the plant's outflow, Hart was overwhelmed by the sheer size and complexity of the plant. It's an attraction that defies words. "There's just something about the nuclear aspect—because I understand it, and I have always been fascinated by it—so it just draws me," she says.

Apart from a few years in hydroelectric operations, Hart has spent her entire career in nuclear safety. She holds thousands of lives in her hands, with the confidence grounded in solid education.

A physics major, she took all the nuclear engineering classes (then offered by the mechanical engineering department) that she could. She speaks glowingly of labs done in WPI's Leslie C. Wilbur Nuclear Reactor: activating Tums antacid tablets, a section of sewer pipe, and a bit of gold foil. The students were outfitted with meters to measure radiation, but that never worried Hart. "I found it exciting. It wasn't scary. I thought it was really interesting and new."

A health physics class during her sophomore year helped define her niche. She liked the blend of theoretical physics and fact-based engineering, and she went on

to earn a master's in the field. A second master's in environmental engineering and science broadened her scope.

Her early work with the U.S. Nuclear Regulatory Commission involved inspecting facilities and improving radiation protection programs. It was a valuable foundation, she says. "I still pick up my 10 CFR [the document that defines federal standards for the energy industry] when I have questions on how to interpret a regulation," she says. "Of course, most of it is online these days, but I still keep that big fat book on my desk."

Yet, all along, she yearned to get closer to the operations side of things. She joined Exelon in 2003 to manage radiation protection and industrial safety. Within a few years she was offered the opportunity to manage the company's Conowingo Hydroelectric facility—an offer she couldn't turn down. Although hydro power might sound like a cakewalk compared to nuclear, it could be a wild ride at times. When Tropical Storm Lee raged in the fall of 2011, she had to make crucial decisions about opening the plant's 50 floodgates, some of which were more than 80 years old.

Even in more peaceful times, when raging floodwaters weren't threatening thousands of downstream residents, lives still hung in the balance. She recalls with humor one delicate standoff: One afternoon, as she was about to rev up for the evening's peak power demand, she saw through the window five deer that had wandered in from the adjacent parklands. The innocent animals were huddled on a ledge right in front of the dam.

"I said a word I won't repeat

here," Hart relates. "I am a huge animal lover. I knew we would kill those deer if we turned the units on. I was thinking, 'I don't want to do this; and I really don't want to do this in front of members of the public, some with children.'" She put in a call to corporate relations to broach the idea of delaying operations. She also knew that soon customers would be reaching their homes and turning on the TV, the oven, the dishwasher ... maybe starting a load of laundry.

After some deliberation, a decision was reached to close the park. But once the intimidating throng of people dispersed, the deer took off. "It was the crowd that was keeping them there all along," she says. "Now we know how to get rid of deer if that happens again!"

NUCLEAR STRONG

As much as she thrived on the challenge of running 1,619 mW worth of hydro, Hart was pulled back to her first love in 2012, when she joined GE Hitachi in Wilmington, N.C. Today, as a vice president with numerous managers of the various safety and security areas reporting to her, she favors being "boots on the ground," out where the real work is being done, rather than sitting behind a desk or in endless meetings. To make this clear, she set up a second office within the controlled access area, to be in better touch with her "rad protection" monitors and nuclear safety team. She takes every opportunity to "dress out" in an anti-contamination jumpsuit, gloves, and booties, and "badge in" to the radiological areas to observe workers in action.

That allows for the kind of ongoing dialog she says is vital for im-



GE HITACHI MONITORS THE NORTH CAPE FEAR RIVER TO ENSURE THAT NO EMISSIONS GO BEYOND SAFE LIMITS.

proving processes and procedures. Asking questions—like "What's not working for you?" or "How can we make this better?"—helps her zero in on improvement opportunities.

Much of Hart's work centers on fostering a culture of nuclear safety in which everyone takes responsibility. She explains, "If you look back in this industry, there are examples where employees didn't always feel comfortable raising concerns to the management. We want them to know that anyone can raise a concern, and we offer employees multiple pathways for problem identification and resolution." GE Hitachi has developed a program it calls "Nuclear Strong," inspired by the NRC's policy statement of traits that define a positive safety culture.

"You need to look at your leadership, your communications, and



your work processes,” says Hart. “It’s important to refine procedures so they’re simple, straightforward, and clear. You need to make certain that workers have the right tools and products to do their jobs.” She stresses that in her own role, she needs to be more than a slot on the org chart, or a nameplate on an office door. “When you’re talking about driving a culture, you can only do that by being an example and interacting with folks. When I tell them, ‘If you’ve got a concern, I want to hear about it,’ then I need to be there to hear about it.”

A STUBBORN STREAK

What keeps her up at night? After a hearty laugh, Hart replies, “The problem somebody doesn’t want to tell me about!”

Hart’s self-described stubbornness has served her well, dating

back to high school, when she nearly flunked a physics test. “It was the only D I ever got,” she says, “and that’s what I decided to major in.” After “freaking out” over the grade, “I went for all the extra credit I could, and I went to the teacher for extra help until it clicked.” She ended up getting an A in the class.

To the question “Why nuclear?” she replies, “I like something that’s not easy. With every job I’ve ever taken, I’ve always had some nervousness: Am I really ready for this? Am I am really capable? If my answer is ‘Heck, yeah, I can do this!’ then I’m probably not interested. I like being challenged!”

As the lone female physics major for much of her time at WPI, and a minority in her profession, she says, “To get where I am, I’ve seen some ... let’s call it ‘adversity,’ and

some non-supportive people.” She prefers to focus on the mentors who helped her along the way, and to return the favor by working with the Society of Women and Engineers, and U.S. Women in Nuclear. Today, she says, “There are still not many women on the operations side of the nuclear industry.” She also worries about declining interest in the academic discipline. (See sidebar)

“Back in 2005, to about 2007, we were looking at a nuclear renaissance, with plans to build a lot of new plants. The school programs dusted off their books. We saw a resurgence of students going back into nuclear-specific engineering programs. Then, with the Fukushima disaster in 2011, that sort of ended that renaissance. It’s unfortunate. I personally feel that we as a nation are in need of a balanced

portfolio. I don’t think that renewables alone can meet our [power] generation needs. To reduce greenhouse gasses and our reliance on fossil fuels, I think nuclear has to be a part of that mix. To do that, you’re going to need people that understand it and can work in it.”

Apart from her brief stint in hydro, Hart has stayed true to her first love. “I came back to it, because that’s where my passion is. I like the rigor that is applied in nuclear. It’s a highly regulated industry—I would say, equal to aviation, in terms of oversight from the regulators. There’s just something about that rigor that appeals to me.”

As for reactions to her chosen occupation, she notes dryly, “People do tend to provide their opinion.” Although she’s always willing to answer genuine questions, she says, “I tend not to engage in debate at this point in my life. I don’t find it gets me anywhere, really.” To those who ask “Do you glow?” she’ll quip, “Only in the dark.”

“Not everyone loves nuclear,” she acknowledges. “I’ve always said, and I still maintain, people are afraid of what they don’t understand. And I can’t expect everyone to understand nuclear power. I’d rather live next to a nuclear power plant than a plant that manufactures acids. Because I don’t know what their safety requirements are, or what they have in place. So I understand why people feel the way they do about nuclear, to some extent.”

Asked how she copes with the responsibility of all the lives she holds in her hands—nearly a thousand employees, and thousands more surrounding GE Hitachi’s facilities in the US and Japan—she says, “I will say that our plants are very safe, and I feel very comfortable working here. And so should the people who live near them.” J

WPI'S NUCLEAR DISCIPLINE

1953 "The United States knows that peaceful power from atomic energy is no dream of the future. The capability, already proved, is here today. Who can doubt that, if the entire body of the world's scientists and engineers had adequate amounts of fissionable material with which to test and develop their ideas, this capability would rapidly be transformed into universal, efficient and economic usage?"

—President Dwight D. Eisenhower, in his 1953 "Atoms for Peace" speech to the United Nations General Assembly

1958 "The nuclear program on campus, the first one to be available for training purposes in New England, shows again the pioneering spirit of W.P.I."

—Professor Donald N. Zwiep, on WPI's Leslie C. Wilbur Nuclear Reactor (named in 1995) in the Washburn Shops. In 1967 WPI's reactor is upgraded from 1 kW to 10 kW, and nuclear engineering courses see a similar surge in enrollment.

1980 "One important thing the nuclear people learned was that you can't put men with only a high school diploma and a little Navy training in charge of operation of a nuclear plant."

—Professor Leslie C. Wilbur, in the aftermath of the Three Mile Island accident. Construction of new power plants in the U.S. ceased, and enrollment in nuclear engineering programs declined.

1990 "If the trends in nuclear engineering education continue, a rising demand for nuclear engineers will outstrip the supply within a few years."

—"U.S. Nuclear Engineering Educations: Status and Prospects," National Academy of Engineering report

2000s With course enrollment declining, the WPI faculty votes to phase out Nuclear Engineering major in 2000. The Wilbur reactor is decommissioned, with a "Possession Only" license issued in 2007, and decontamination continues over the next seven years.

2014 WPI receives more than \$1.1 million in grants from the Nuclear Regulatory Commission to educate a new generation of nuclear scientists and engineers to fill a critical need. The awards support the development of new curricula, graduate fellowships, and faculty research.

"There is both a domestic and worldwide need for highly qualified nuclear professionals to keep nuclear power plants and nuclear materials safe and secure. ... These grant programs offer college and university recipients an opportunity to encourage their best and brightest to pursue careers in nuclear engineering, health physics, radiochemistry, and related sciences."

—NRC Chairman Allison M. Macfarlane

2017 and Beyond

A master's program in nuclear science and engineering and a PhD program in health and medical physics will soon be formalized at WPI, in addition to the undergraduate courses and graduate certificate currently available. The curriculum for a restored undergraduate major is under development. The university supports the national objective of reinvigorating the nuclear power industry, as well as fostering research on medical therapies and imaging technologies.



HART OUTSIDE THE MAIN OFFICES OF GE HITACHI.



➔ *These results are typical at WPI.*

\$66,977 average starting salary
(2016 bachelor's degree)



92+ percent are in jobs or graduate school
within several months of graduation

8th Private Colleges That Are
Worth the Price (*Payscale.com*)



400+ employers recruit on
campus each year

#12 Best Salary Outcomes
(*Chronicle of Higher Education*)



Discover our formula for success
➔ wpi.edu/+results

As you know, the education you get here is *anything but*.



Worcester native **AMA BINEY '18** (management engineering with a concentration in operations) is a team player. We're not just talking about her generous personality here, but also her place on the rosters of two varsity teams—basketball and softball.

As a high school senior, Biney struggled with many decisions— which college to attend, what to study, what sport(s) to play, even what division to strive for within her chosen sport. On her second visit to WPI, she spoke with associate athletic director and women's basketball head coach Cherise Galasso and softball head coach Whitney Goldstein. Both coaches spoke of the community and culture at WPI in a way that resonated with Biney.

"They genuinely wanted to help me make a decision that was best for me, even if that meant not going to WPI," she recalls. "Understanding that type of selflessness and maturity combined with the long-lasting tradition of WPI, drew me to fall in love with the school and ultimately enroll."

Biney says her athletics involvement has offered her a new level of growth. "Through sports here at WPI, I have been able to sharpen my leadership skills and instincts. Also, I have been able to create many bonds and even spark different job opportunities."

Her secret to juggling two teams on top of her school and extracurricular activities? Stay on schedule and be a good teammate. "Whenever I am finding myself lazy, I think of my teammates," she says. "If I can't work hard for my team, then that overall trust is broken. We all must continue to do the right thing even when no one is watching."


This hard-working student also finds time to volunteer weekly (through the basketball team) at Elm Park Community School as part of the Big Brother Big Sister Program; she is a member of the Black Student Union; and she has been accepted to the Trustee Mentor Program.

Her biggest surprise so far has been the overwhelming support from the many diverse groups across campus, she says. "Many people—from individuals in the student body to professors to even the president—are engaged in all that the students are doing. They are so quick to offer support and congratulations when it is needed or deserved."

After graduation, Biney has her sights on either becoming a grad assistant at WPI while she obtains her MS or landing a job at a company as a program manager or business analyst. No matter which path she takes, Biney is on a stellar winning streak.

HONORABLE MENTIONS:

CRIMSON AND GRAY AWARD • TRUSTEE MENTOR PROGRAM • DEAN'S LIST • ACADEMIC ALL-AMERICAN • BLACK STUDENT UNION • INVESTING ASSOCIATION • APICS ORGANIZATION



ALLYSA GRANT '18
Hometown: Framingham, Mass.
Major: Mechanical Engineering

Involvement:

- **Swimming & Diving Team**
- **Alpha Phi Omega**
- **Association for Mechanical Engineers**
- **IQP Site: Rabat, Morocco**

"Your support makes my experiences at WPI possible. Without you, I wouldn't be able to follow my dreams."

Through WPI's hands-on, project-based curriculum, students learn to solve real-world problems, work in diverse teams, and experience what it means to be resilient—all skills that will propel them throughout their careers.

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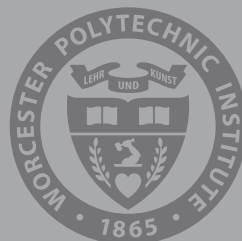
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(please make checks payable to WPI)



[FACULTY*snapshot*]

STEVE KMIOTEK

WPI BS '80, MS '82, PHD '86 PROFESSOR OF PRACTICE, CHEMICAL ENGINEERING

1 Photo of my professor, mentor, and friend, Professor Bob "Daddy Wags" Wagner, the person who inspired me to stay in chemical engineering at WPI back in the 1970s. There are many stories, but among my favorites: Bob would find out when our birthdays were and sing to us in class. We returned the favor on his 60th birthday, at 2am on a Sunday morning in July, belting out Happy Birthday to him on his front lawn. (There might have been fireworks and adult beverages involved.)

2 Outstanding Teaching Award, April 2017. I was completely blown away!

3 "Bullshit grinder" that my Dad made. I was a first-generation college student, the son of a carpenter. My folks were really supportive of my education.

4 Tower packings. I spent most of my career working in the environmental field ... I got my start as a fresh engineer, charged with redesigning and building/installing an air pollution control system at my first employer, Cabot Corp. It was a tricky problem, but the WPI projects really set me up for solving it. These tower packings went into that project.

5 Goodbye clock. In the 1990s, I joined what was a startup environmental firm, ultimately helping build it to a national firm, providing chemical and environmental design engineering services around the country. I got this clock when I left.

6 Minions. I made the mistake of referring to my first MQP groups (after starting as a prof) as my "minions." They returned the favor by getting me these toys—including a GRU for me.

7 ChemE Car. I advise the WPI chapter of the American Institute of Chemical Engineers; this was the chemically powered car that competed in the 2017 competition. We didn't win, but it was cool!

8 Boxes of data. A local, retired chemical engineer has contracted Alzheimer's and his family wants to preserve his legacy. As part of that, the students of WPI are cataloging his life's works, which we will archive and make available.

9 Me on a camel. My daughter did a semester abroad in Cairo back in the summer of 2010 and we visited her. For some reason, this pic gets a lot of comments!

10 Hardhat from Dow. Prior to coming back to WPI as faculty, I was responsible for all environmental, health, safety, chemical process safety, security, and emergency response at Dow's NorthEast facilities.

11 Vials of Ferric Molybdate Catalysts. I did my PhD at WPI with Professor Ed Ma, studying the deactivation of catalysts in exothermic reactions. Cabot graciously supported the studies.

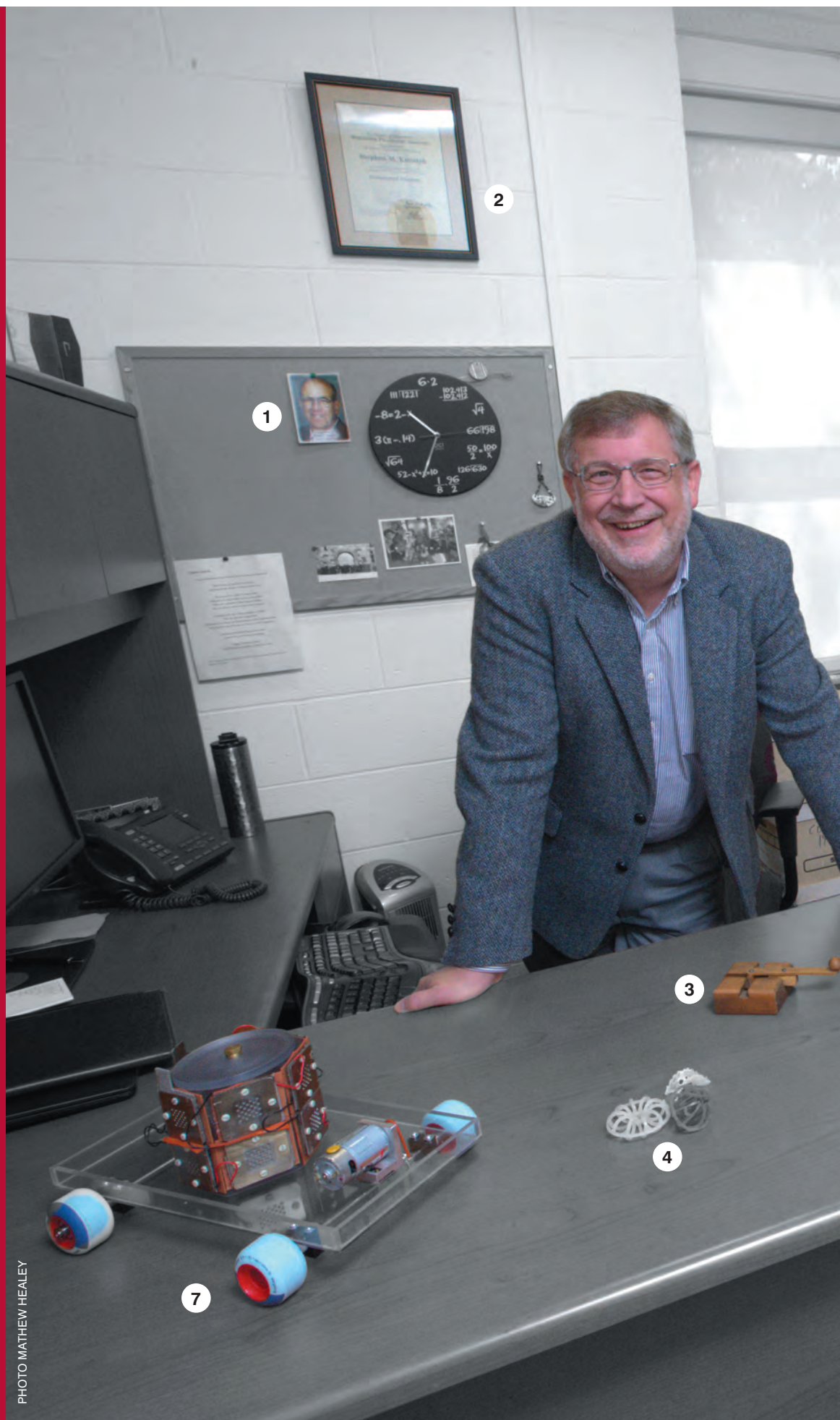


PHOTO MATHEW HEALEY



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ALUMNI WEEKEND 2017 HIGHLIGHTS

Nearly 1,000 alumni and friends returned to campus for Alumni Weekend, June 1-4, 2017. This is one of our favorite times of the year—welcoming a new group of alumni while celebrating our most outstanding graduates, our most steadfast supporters, and our time-honored traditions.

Celebrating WPI

One of the main reasons people come back to campus for Alumni Weekend is to share in the strong traditions that make WPI the place so well loved across generations.

Alumni who graduated 50 years ago or earlier attended the 50-Year Associates dinner on June 2. The dinner honored two award recipients from the Class of 1967—Douglas Klauber and Jonathan Titus—for support of the mission of WPI and professional achievement, respectively.

Saturday morning, June 3, after a campus update from President Leshin, reunion classes gathered at the parade. Groups proudly carried their banners around the Quad, and members of the Class of 2017, the newest members of the WPI Alumni Association, received their class banner. The parade was followed by the Annual Alumni Awards Luncheon, where 11 more remarkable alumni were recognized for their outstanding contributions to their professions and for their service to WPI (see page 50-51).

Saturday evening festivities included reunion class dinners and receptions. All alumni gathered for post-dinner entertainment featuring live music and lawn games on the Quad, Wagers in the Wedge, and dancing in Bartlett Center.



GOATS COME HOME

Many alumni celebrated their 30-, 40-, and 50-year reunions at Alumni Weekend 2017; WPI's younger alumni found the weekend a great excuse to return to campus for trip down memory lane.

“Why wouldn’t you want to come back to WPI?”

—Rachel Delisle '96, '06 MBA
immediate past president of the Alumni Association

“I love seeing my friends and the amazing staff in the Office of Lifetime Engagement, where I worked when I was a student.”

—Bo Pierce '16, '17 MBA



CELEBRATING OUR SUPPORTERS

Alumni Weekend provides an opportunity for us to thank and recognize some of our most generous donors. The weekend kicked off on Thursday, June 1, with the Giving Societies Reception, which celebrated members of the Founders, 1865, Goddard, Salisbury, Washburn, and Boynton Lifetime Giving Societies, recognizing donors who have achieved lifetime giving of \$100,000 or more; members of the President's Circle, which recognizes WPI's leadership annual donors; and Alden Society members, who have included WPI in their estate plans or who have made endowed gifts to WPI. President Leshin gave attendees insights to her work on the Mars Curiosity Rover mission and her time as a director at NASA.

The next day Alden Society members gathered for their annual luncheon; WPI's Bernard M. Gordon Dean of Engineering Winston Oluwole (Wole) Soboyejo, spoke on his vision for engineering at WPI.

"I've enjoyed going to the Washburn Shops and getting an engraving on my WPI keychain favor, and being presented with the banner for my class."

—Alexander Wald '17

"I love the trip down nostalgia lane."

—Joseph Sceviour '07

"I'm here with my wife and child (and another one on the way), and it seemed a good time to come back and show them the campus."

—RJ Ramirez '92

"I just had to see all my friends who graduated with the Class of 2017."

—Tori Miller '15

"It's been great reconnecting with the alumni community and seeing the staff from the Alumni Office and my friends."

—Hasson Harris Wilcher '17

"My cousins graduated from WPI, too, and I just have a lot of connections here. This place will always have a special place in my heart."

—Russ Grossman '07

"It was really fun seeing my old residence hall."

—Richard Skowrya '07

LETTER FROM THE ALUMNI PRESIDENT



Dear Alumni:

This fall has started off filled with WPI pride. Homecoming Weekend, Sept. 8 and 9, brought so many alumni and families back to campus. In keeping with the theme of the weekend, we could not hide our Tech pride. The Parade of Floats, football and other athletic games, the Rope Pull, and enjoying time with friends on the Quad made for a weekend of tradition, cheer, and great memories.

On Friday many alumni and friends returned for a special memorial service for Bill “Tuna” Trask, who was a fixture of our community for decades. Tuna was a mentor and friend to countless alumni and students, and was a presence on campus until the end of his life. He is missed by his WPI family, but his legacy continues in those who now act as mentors to others.

I am now looking forward to Nov. 1 and the inaugural Hall of Luminaries induction ceremony and festivities. If ever there is to be a WPI pride moment – this is it, and you do not want to miss it. We’re hoping to see as many alumni, students, faculty, staff, and friends as possible in the Sports and Recreation Center as we honor 11 remarkable individuals who have brought about the most extraordinary accomplishments to our society. This is going to be an amazing moment in the history of our university, and I hope you will join us.

When I’ve been on campus lately, I’ve started paying more attention to other pride points. The large, heavy oak doors on Boynton Hall; the many spaces in the Rubin Campus Center where I attend events and meetings; the two goat statues that symbolize our mascot and the proud spirit of our community; the bricks engraved with names on the Quad. An individual, a reunion class, or a senior class made a gift to WPI to create these lasting legacies on our campus. They symbolize our long and proud tradition of philanthropy – a tradition we can all be a part of each year through the WPI Fund. I hope you will consider joining me in sharing your pride at the Hall of Luminaries event and through the WPI Fund this year.

It’s not too early to save the date for Alumni Weekend 2018 – May 31–June 3. I also encourage you to email me at wheelerda@alum.wpi.edu with your ideas and feedback.

My best,

David '93 '04
David Wheeler '93, '04 MS

OVER
[EARLEbridge]

CAN'T HIDE THAT TECH PRIDE

Campus was a sea of crimson and gray during Homecoming 2017, September 8 and 9. Alumni, students, and friends gathered to enjoy a weekend of traditions including the Pep Rally, Parade of Floats, football game, and Rope Pull. Special events were held for Admissions Tour Guide and Representative alumni, the Baystate Battalion, and Women’s Athletics. The community also paid tribute to the late Bill “Tuna” Trask on Friday afternoon.





PHOTOS JOE DOLEN AND CHARLES STERNAIMOLO



AN INVESTMENT OF TIME

Enrolling at WPI in 1974, Raymond Dunn '78 had his heart set on a life in the sciences. He majored in chemistry and, after his junior year, he took an internship with what was then Norton Company, a Worcester-based abrasives company.

The experience served its purpose, but not in the way Dunn expected.

"I was making experimental grinding wheels," he says. "It was an excellent experience, but I found some things were missing, especially greater 'people' contact."

Dunn altered his path. Reflecting on an anatomy and physiology class he took as a sophomore ("It was one of my favorite courses"), he decided more earnestly to pursue a career in medicine that had always been a consideration. He received guidance and encouragement

from the late John van Alstyne, beloved mathematics professor and dean who was known as "van A" to students.

Today, thanks in large part to van Alstyne and WPI, especially the WPI Plan, he is chief of plastic and reconstructive surgery at UMass Memorial Medical Center in Worcester. He's also been an adjunct professor of biomedical engineering at WPI since 1992.

Giving back to the community and his alma mater always has been in Dunn's character. As a member of Phi Gamma Delta fraternity, he donated time to Easterseals and Big Brothers Big Sisters of America. He has served WPI as a member of the Biology and Biotechnology Advisory Board and the Biomedical Engineering Advisory Board. He and his wife, Beth, supported the Sports and Recreation Center by naming one of the lanes in the

HERE IN A UMASS MEMORIAL HOSPITAL EMERGENCY SUITE, DR. DUNN SAYS HE CAN MAKE A SIGNIFICANT POSITIVE IMPACT UPON A PATIENT'S LIFE AT A CRUCIAL MOMENT.

new swimming pool. More recently, he made a gift to name one of the 34 century-old limestone grotesques that gazed from the heights of Alumni Gymnasium, which was razed earlier this year to make way for the new Foisie Innovation Studio and Messenger Residence Hall.

Incorporated into a promenade, the grotesques, most of them sports-related, will silently watch over the new facility, which will provide generations of students with the physical space in which to immerse themselves in WPI's distinctive brand of learning. Dunn says he made his gift out of a love for WPI but also for history (WPI's) and architecture (the

former Alumni Gym).

"I actually feel like my financial giving is significantly less relevant than the time that I give to the students," he says. "The financial part is just what I can do."

His interest in the university extends beyond service and monetary gifts. The Dunns are the parents of triplets, two of whom—Meaghan and Sarah—graduated from WPI in 2014 with degrees in biomedical engineering and management engineering, respectively.

Though Dunn completed his medical education at Albany Medical College in 1982, he continues to draw daily from his WPI experience.

"WPI placed an emphasis on self-learning and problem solving," he says. "Especially in plastic surgery, many might be surprised to learn that almost every patient situation is unique and may require a unique solution. When I encounter a problem without an obvious solution, the school and my further training influence my ability to 'figure out' those solutions."

Dunn's work includes all areas of plastic surgery but especially reconstruction for injury patients, including burns. As he envisioned, his his career is about helping others.

"In surgery, we can start something and, in a matter of hours, have a significant positive impact on a patient's life," he says.

To his WPI students, some of whom are aspiring physicians, Dunn says he tries to impart "as much advice as possible. I tell them that they really have to be devoted, love it, and be prepared to work hard, but the rewards are worth the effort."

—Andrew Faught

Alumni Benefits & Resources

Take advantage of these services and programs offered by the Alumni Association and Office of Alumni Relations. Some, like the insurance program, have special rates for WPI alumni. Several are free, and some benefit WPI scholarships.

More at wpi.edu/alumni



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WPI RING PROGRAM

Your connection to WPI tradition
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ALUMNI DIRECTORY

A global network of more than 38,000
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GORDON LIBRARY

Lifetime access
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WPI MERCHANDISE

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CELEBRATING OUR BEST

CONGRATULATIONS TO THE 13 INDIVIDUALS WHO EARNED RECOGNITION FROM THE ALUMNI ASSOCIATION IN 2017.



ALUMNI ASSOCIATION PRESIDENT DAVE WHEELER, DEBORAH FOLEY MCMANUS '97, MYLES WALTON '97, PRESIDENT LESHIN



WHEELER, MARNI HALL '97, PRESIDENT LESHIN



WHEELER, JOHN KELLY '82, LISE JORGENSEN '87, DAVID CORTESE '92, JOSEPH KILLAR '77, JAMES MAYER '77, PRESIDENT LESHIN



PRESIDENT LESHIN, IMMEDIATE PAST PRESIDENT OF THE ALUMNI ASSOCIATION RACHEL DELISLE '96, '06 MBA, JONATHAN TITUS '67, DUSTY KLAUBER '67



Marni Hall '97, John Boynton Young Alumni Award for Service to WPI: co-sponsor of student projects, guest speaker at WPI, host for incoming students events, Class of 1997 board member, WPI Life Sciences Advisory Board member, Women's Impact Network member, and WPI trustee.

"I remain engaged with WPI because this is where I learned how to be the best version of myself. ... Not surprisingly, I still get so much out of my current engagement with WPI. In addition to 'giving back' it provides me the opportunity to be part of this wonderful community in new ways, which I continue to find personally and professionally rewarding."

David Cortese '92, Robert H. Goddard Award for Outstanding Professional Achievement: worked for USWeb and was vice president and division CIO at Sony Pictures Home Entertainment for seven years; has his own company, Media Salvation; currently serves as president of digital technology at Advantage Solutions: Sales, Marketing, and Technology.

Mehrdad Givehchi '87, Robert H. Goddard Award for Outstanding Professional Achievement: co-founder of Acacia Communications, an optical interconnect market supplier; listed as an inventor on four patents.

Lise (Wivestad) Jorgensen '87, Robert H. Goddard Award for Outstanding Professional Achievement: has worked in research and development around the world for Procter and Gamble, Bristol-Myers Squibb, Clairol, Estee Lauder, and Unilever; seven patents to her name.

John Kelly '82, Robert H. Goddard Award for Outstanding Professional Achievement: vice president for quality operations and environment, health and safety at Pfizer, with global responsibility for all quality and EHS functions.

"This was a humbling experience for me and for my family. The recognition reflects on the opportunities I have had to contribute in my career at Pfizer to help to supply medicines to people around the world to maintain and improve their health and quality of life. And it all started with my undergraduate experience at WPI."

Joseph Kilar '77, Robert H. Goddard Award for Outstanding Professional Achievement: developed a high-profile \$27 billion project on a site of 168 square kilometers in Saudi Arabia; currently serves as head of construction and execution strategy at Oberoi Realty Limited, a real estate developer in Mumbai, India.

James Mayer '77, Robert H. Goddard Award for Outstanding Professional Achievement: co-founder of EPRO Engineering and Environmental Consulting, now leads strategic development and manages large EPC projects for TRC, following its merger with EPRO Engineering in 2002.

"WPI provided me an exceptional education and much more. I found WPI to be a challenging and demanding environment when I arrived. I also found supportive professors and classmates, willing to help. The high-performance environment of WPI along with a supportive culture prepared me to succeed in similar professional environments. It also guided me when influencing the culture of my own company and those where I have worked."

Zhiqiang Tan '87 PhD, Robert H. Goddard Award for Outstanding Professional Achievement: CEO and chairman at a start-up company, Framedia Ltd. in Beijing, where he grew revenues from RMB \$36 million to RMB \$1.2 billion; most recently worked for Northern Light Venture Capital, the China-focused venture firm, where he helped build its media presence.

Jonathan Titus '67, Robert H. Goddard Award for Outstanding Professional Achievement: invented the Mark-8 personal minicomputer in 1974, which was at the Smithsonian Institution as part of the "Information Age" display.

"My education at WPI gave me a good foundation for further study, but beyond that it taught me to think about and solve problems. My problem-solving skills improved as years went by, and I'm always grateful for the firm foundation I received at WPI."

Douglas Klauber '67, William R. Grogan Award for Support of the Mission of WPI: member of the Alumni Board, past president of the Alumni Association, longtime chair of the Alumni Association Citations Committee, active alumni volunteer in many capacities, and, with his wife, established an endowed scholarship fund for undergraduates.

"I have stayed involved because WPI represents excellence at all levels, and I will never be able to give back as much as I have received. As anyone who knew Bill Grogan or read his biography knows, receiving an award named after him is the highest honor an alum could ever receive for supporting the mission of WPI."

Deborah Foley McManus '97, Ichabod Washburn Young Alumni Award for Outstanding Professional Achievement: analytical and transformational executive leader for Morpho Detection, LLC, where she is vice president of quality and program management.

"I feel so incredibly grateful and blessed to have the career that I have and feel the root of it started at WPI. I received a significant scholarship from Ed and Millie Sydor when I was at WPI. The several times I saw Ed and Millie, I would thank them because I couldn't believe that a total stranger would help me pay for my education. Without them, I'm not sure if WPI would have been a reality for me. I now look at the time I spend giving back to WPI as well as our financial contributions as my way of thanking Ed and Millie."

Naveen Selvadurai '02, Ichabod Washburn Young Alumni Award for Outstanding Professional Achievement: co-founder of Foursquare, a location-based social networking website/app; currently a partner with Expa, a start-up studio that works with proven founders to develop and launch new companies.

Myles Walton '97, Ichabod Washburn Young Alumni Award for Outstanding Professional Achievement: managing director at Deutsche Bank; tied as the No. 1 aerospace and defense analyst in the nation, as ranked by Bloomberg Markets, and consistently a top-ranked analyst by Institutional Investor magazine.

"I was humbled to be honored by the Institute and the Alumni Association. There are so many deserving alums, so to get a special call-out was a great experience."



SAVE THE DATE



ALUMNI WEEKEND: MAY 31-JUNE 1, 2018

Alumni Weekend is the perfect opportunity to come back to WPI to reconnect with friends, revisit favorite spots, and see how the campus has changed since your student years.

Special reunion activities for undergraduate classes ending in 3 and 8.

Contact us at Reunion2018@wpi.edu or 508-831-5600 if you're interested in serving on your reunion committee.

For complete details on our biggest alumni gathering of the year visit

wpi.edu/+alumniweekend

submit your class notes to CLASSNOTES@WPI.EDU

1946

John Barrett '46 has extended his lineage with his son, **Tom Barrett '83**, and his grandson, **Matthew Barrett '21**. Tom writes, "Dad is 92 and loves that his youngest is attending WPI." ►

Floyd Wyczalek was interviewed on "Autoline After Hours" (episode AAH#377) about his work as project manager on General Motors' Electovan, the world's first hydrogen-powered fuel cell vehicle. Its 50th anniversary was celebrated last year. "This can't be real," he writes. "Star Trek teleportation, fast-forward once-upon-a-time... Kirk to Mr. Spock: 'Beam me up, Scotty.'"



1959

2. "Summer fun is lots of baseball games at the Oakland Coliseum with Gompei," writes **James Alfieri**, who brought the mascot along on an outing with his wife, Janet.

1961

Don Bottomley's widow, Betty, informs us of his passing on March 29, 2017, in Miami. Don continued his education in the military and earned honorable discharge in 1974 as captain of the 102D Engineer Battalion, New York Army National Guard. "I met Don in the Chicago area in 1974," she writes. "We were married in 1977 and pursued our careers in Miami while enjoying the local national parks on foot and in the water. Don inspired everyone with his knowledge and his love of life, and that passion to explore and share his experiences with others lasted his lifetime. He will be greatly missed and fondly remembered by so very many."

1962

Bill Krein writes, "This marks my 20th year as adjunct faculty with WPI, now teaching courses in the Foisie Business School MBA program and the Corporate and Professional Education division. A great opportunity to participate in the ongoing excellence of WPI."

Andy Terwilleger sends this shout-out to the class. "The Few! The Proud! The FEW! The Class of '62!" He elaborates, "Though the Class of '62 had just nine members at our 55th Reunion (**Carm Carosella, Bob Cawood, Mike Davis, Dick DiBuono, Bill Krein, Bernie Meister, John Szymanski, Andy Terwilleger, and Steve Wells**), we had more laughs per capita than any other class! Our Class Dinner went well into the evening, while we shared memories, thoughts, and joys. Those who could brought their wives. This evoked a mystery: How did these ladies mature more graciously than we? (When my wife was 'carded' for ordering off the

1952

Robert Favreau's daughter, Robin Harley, writes to tell us of his passing in June. See her Letter to the Editor on page 2 for a touching memory.

1953

David Hathaway sends reflections on life from Islesboro Island in Maine's Penobscot Bay, written on a rainy Memorial Day.

"It is a time to celebrate life and remember all those before us who have made this life possible for all of us. My father and I found this beautiful island in 1947 and we have been coming back every year. The Navy kept me away for a number of years while I roamed the earth, but I never forgot this beautiful space. In '47 and '48 I stayed over the summer to work, first as a caddy, then as a construction worker cleaning mortar off used bricks for a new house, and finally as assistant salad chef in the kitchen of the island's largest hotel at that time. When I learned of a significant piece of land for sale at \$350, it was a no-brainer for my dad. We tried to be woodsmen, my brothers and my Dad, which we were not. One rainy weekend, we moved our tent into an abandoned house nearby, then bought it, and ever since we have been spending

summers here.

"I used my engineering skills learned at WPI to construct staging around this large house (three floors in back) and installed vinyl siding to spare us repainting every five years. Later, after I retired, we needed a garage to house our toys (O'Day Mariner sailboat and 14 bicycles). That was my first major construction by myself, where I learned that two people could not push up a 24-foot wall! Visitors are welcome to come and see the beauty of an island that has attracted folks from major cities, as well as movie stars. We have a great range of people here in Islesboro and it is a wonderful place to grow old by staying active!"

1955

Bob Holden writes, "I'm trying to get the San Diego ACLU to file my case in Holden vs. the Electoral College, to declare the Electoral College unconstitutional, since it violates *Wesberry vs. Sanders*. (It requires House seats to be of equal population!). I read the case in 1964 while taking a constitutional law class. I also got an MA in history from San Diego State University in 1995. The Electoral College was added in 1787 by anti-democracy Hamilton at the request of smaller slave states,

according to MSNBC's Rachel Maddow. Call or write ACLU national director Anthony Romero in New York City."

1957

24. **Mike Stephens '57** brought Gompei along for a patriotic salute to the U.S. military on Memorial Day 2017.

Spike Vrusho writes, "As fundraising chair for the Unitarian Universalist Fellowship in Vero Beach, Fla., I organized and raised \$4,500 with a yard sale, and \$16,901 from an auction. As my contribution to the auction I offered to prepare a Greek dinner and a New Orleans shrimp dinner, which brought in \$900."

1958

Bill Rabinovitch writes, "A European art magazine is now preparing a six-page piece about my career. That prompted my posting on Facebook the *WPI Journal* piece from the 1990s that the NY art world never saw. I linked to my painting that hangs in Fuller Labs at WPI. My FB audience is steadily giving 500 to 1,000 reactions a week, according to notifications—a lot of exposure globally."

Senior Menu at Friendly's, the waiter checked her ID to be sure she was 'of age.' Then he glanced at me and grumbled, 'You're OK.'

"Another question: Does anyone remember the name of Carm's short-term freshman-year roommate, the one who 'lost' the door to his dorm room?"

1963

Carl Stoutenberg writes, "In 2001, after 34 years and several patents, I 'retired' from The Stanley Tools Product Engineering department in New Britain, Conn. I needed to devote more time to a hobby business that was becoming a full-time job. It was Good Friday and as luck would have it, Friday the 13th. For me a very good Good Friday. A. G. Backeast (datatags.com) was started in 1982 to service antique and special interest automobiles. The business was moved from Connecticut to Colorado in 2005 and expanded to include muscle cars and trucks. Today it enjoys a worldwide market as there are car and truck collectors pretty much everywhere. Recently my son Brett moved from Connecticut to the Western Slopes of Colorado, bringing new ideas and efficiencies to the operation and possibly allowing me to finally retire permanently. Time will tell."

1966

John Lauterbach writes, "A week after graduating from WPI, I enrolled in the chemistry graduate program at The Ohio State University, receiving my MS in 1968 and my PhD in December 1970 under the direction of the late Professor Derek Horton, a noted researcher in carbohydrate chemistry. For many years, Horton's research group was housed in the "Sugar Alley" section of the chemistry department complex. The building housing the original "Sugar Alley" was razed in the early 1980s. In 2012, Ohio State broke ground for the Chemical and Biomolecular Engineering and Chemistry Building, which houses a new "Sugar Alley." My son and I were at Ohio State for both the groundbreaking ceremony and for the grand opening ceremonies in April 2015. I was one of the major contributors to the new "Sugar Alley." When I approached the Division of

Carbohydrate Chemistry of the American Chemical Society (ACS) about an award in Professor Horton's memory for Distinguished Achievement in Industrial Carbohydrate Chemistry (with my company doing the sponsorship for at least the first few years), my idea was well received. On Aug. 21, 2017, the first Derek Horton Award in Industrial Carbohydrate Chemistry will be presented to Dr. Francis Berti of GSK Vaccines, Sienna, Italy. At the award symposium I will present "Banded paper: An important example of contemporary industrial carbohydrate chemistry."

1968

Ken Battle writes, "My wife, Jeanette, and I are days away from selling our South Jersey house that we have owned for 21 years. We are moving full-time to our lake house on Cayuga Lake, in New York's Finger Lakes region, which we have owned since 2011. A small expansion is planned. I continue to work part-time for Jacobs Engineering and do some consulting projects as well. I have been adjunct faculty for Drexel University's Chem E department in the past and hope to establish a relationship with Cornell's program. I am still into cars and currently own a 1984 Ferrari 400i and a 2003 M-B E55 AMG set up as a track car for Watkins Glen. Jeanette and I enjoy wine and touring wineries in the Northeast; the lake house has a large wine cellar fitted with racks."

Cary Palulis writes, "Turned 71, and still working full-time as VP of sales for recycling company Heritage-Crystal Clean. Survived open-heart surgery in May to replace my leaking aortic valve. Now six weeks into recovery, and so far so good. Susan and I live in Avon, Conn., and Port Saint Lucie, Fla. I golf and fish in my spare time. I attended a Hall of Fame induction for my track coach at Cheshire Academy and gave the acceptance speech. Talked two different HS students into attending WPI instead of RPI and MIT. They love it at our school! I am looking forward to our 50th class reunion in 2018!"

1969

Steve Legomsky has retired after 34 years as a law professor at Washington University in St. Louis, specializing in immigration, refugee, and human rights law. During that time, he took a leave of absence to serve the Obama Administration as chief counsel of U.S. Citizenship and Immigration Services. Shortly after retiring, he returned to Washington to serve as senior counselor to the Secretary of Homeland Security. He has been called to testify before Congress many times while in the private sector, and has served as a consultant to the transition teams of Presidents Clinton and Obama, the first President Bush's commissioner of immigration, the U.N. high commissioner for refugees, and several foreign governments. His latest book, *Immigration and Refugee Law and Policy* (now in its sixth edition), has been a required text at 185 law schools since its publication.

Since retiring, Steve has been occupied almost full-time with media interviews, appearing several times on PBS NewsHour, NPR, and other national and overseas TV, radio, print, and online media, as well as volunteering with various nonprofits. Last spring he wrote his first novel, a sci-fi-neuroscience psychological thriller, in which "no right-thinking publisher would have even a glimmer of interest," he writes. "Retirement has freed up more time to spend with my wife of almost 40 years, Lorraine Gnecco, my two wonderful daughters, and my two perfect grandchildren. I highly recommend retirement for everyone."

1973

Roger Heinen reports that much of his time is devoted to a single project: building a \$4M municipally owned 1-gigabit broadband internet access system for the 650 homes and small businesses of Islesboro, a small Maine island community. "It's no secret that small rural towns in the U.S. are dying a slow death of a thousand cuts as they are trapped on the wrong side of the digital divide—too small or too isolated for incumbent investment," he writes. "Islesboro is unique in that it has a long history of self-reliance. I am a member of the small group that convinced the

voters to tackle this local problem with a locally driven answer. However, navigating an entrenched system and implementing the solution on a small island served by a daily ferry has proved 'educational.'" Roger also serves as a director of Monotype Imaging (NASDAQ:TYPE), in Woburn, Mass., a supplier of typefaces and corporate branding technology. He is chairman of the Community Foundation of the Florida Keys, which nurtures a charitable network of donors and nonprofits up and down the Keys.

Attorney **Peter McDermott** gave a talk on IP strategies at WPI's Foisie Business School in April. A graduate of Suffolk University Law School, he returns to his undergraduate alma mater regularly to share his expertise with students in Professor Jim McKenna's business law course. "Peter was tremendous—again," says McKenna. "Not only does he have an exceptional knowledge (he is ranked as one of the best intellectual property attorney in the world), but he was able to illustrate the concepts with stories drawn from his experience. I asked the students what they thought, and the uniform consensus was that, even beyond the substance, he connected with them extraordinarily well."

Michael Peterson writes, "After completing my career with National Grid's energy efficiency group, I have now retired. But, recently I went back to the energy efficiency field as a consultant. Life is good, and helping to make a better future for our kids is a great feeling. International travel has been a part of my recent years, with visits to Nepal and India. There is a great big world out there just asking for us to visit."

Mark Whitley writes, "After four years in retirement, I have gone back to work and started a new oil and gas company. I am president and CEO of Chisholm Energy, located in Fort Worth, Texas. Our company specializes in acquiring assets in mature fields and adding value through the application of industry leading horizontal drilling and fracturing technologies. We are buying our first asset in the second quarter of 2017. Our plans are to drill several hundred wells on this property."

1974

4. **Ed Gordon** writes, "I took my Flat Gompei photo to show what I normally do: Sit back and surf the net in my Man Cave nest in Austin, Texas."

1975

Judy Nitsch's firm, Nitsch Engineering, ► took first place among the medium-sized companies on the *Boston Globe's* 75 Top Places to Work list for 2016. Of the 2,021 companies invited to participate, 332 went all the way through the process. More than 70,000 employees rated them on factors such as direction, execution, connection, management, work, pay, and benefits. Alumni employees who joined Judy in a toast at the company celebration included **Maddie (Willer) DeClerck '14** (right, front), **Coleman Horsley '16** (right, rear), and **Steve Farr '88** (not pictured).



1978 ▶ R

After 32 years with Lockheed Martin, **John Bourassa** has accepted a senior test engineer position with CACI at Aberdeen Proving Ground.



1977

Mike Abrams writes, "We had a good contingent of Riley dorm dwellers of the Class of '77 at John Nowosacki's annual chili cook-off at his home in North Reading, Mass. Attending were (in photo, left to right, front to back) **Jerry Yelle, Eric Blom, Chuck Dreyfus, and Brian Tremblay, Erik Macs, John Nowosacki, Scott Shurr, Bruce Baldwin, Mike Abrams, class president Raymond Baker, and Chuck D'Ambr.** ►



1980

Martin Rowe writes, "Spent a week in Austin at the annual NIWeek Conference, but I had a little down time when the conference ended. So what do you do in Austin? Well, play guitar, of course. A local friend took me on a tour of the city's guitar shops, including South Austin Music, where we paused for a photo. ▲

1982

Thomas Harley joined Louis Berger as vice president and New England regional transportation manager, working out of the firm's Rocky Hill, Conn., office. He was previously with the Connecticut Department of Transportation.

David Rubinstein was named CEO of Nizhniy Health in Somerville, Mass. He brings more than 30 years of executive operations experience to the home health agency.

1983 ▶ R

Mark Besse sends greetings from Texas. "My Dell Division was bought by NTT Data, so I moved with them to a great IT company, where I'm still supporting document imaging and medical processing. My 19-year-old son is completing his second year at John Brown University, while my two girls are still busy with our homeschooling. Just celebrated 22 years with Kristy on April 1."





1984

Desiree Awiszio was honored at the IEEE-USA National Professionalism Awards Ceremony in Charlotte, N.C., in April, along with MathAltitude School of Mathematics principal Olga Serebrennikov. “We won the K-12 STEM Literacy Educator-Engineer Partnership Award,” writes Desiree. “It was an unforgettable experience, with 800 people in attendance.”

1986

Donna Barone writes, “On May 17, my ▲ son Jonathan Viens Jr. graduated from WPI. He and his uncle, **Nick Barone ’65**, (center in photo, with me and Jack) are both FIJs. It was a very special day for all.”

1988

Bill Noel writes, “I have returned to PwC in a new capacity, as VP of product management in PwC’s New Ventures team. This group is chartered with introducing new business models, offerings, and products.”

1989

Fran Hoey joined his son **Conor ’18** (civil engineering major) in Australia, after he wrapped up his IQP at the Melbourne Project Center. Their tour included Port Campbell National Park, where they paused for a father-and-son photo at a stop known as Twelve Apostles along the Great Ocean Road. ◀

1991

Lisa DiFrancesco, board-certified plastic surgeon, joined the prestigious Haute Beauty Network, which is affiliated with luxury lifestyle publication *Haute Living*.

1992

17. From Scottsdale, **Marc Licciardi** sends a photo of himself “representing WPI in the Arizona sun.”

Donald Peterson was appointed to lead the Northern Illinois University College of Engineering and Engineering Technology as the third dean in the college’s history. He was previously dean of the College of Science, Technology, Engineering, and Mathematics at Texas A&M University-Textarkana. The announcement referred to him as “an accomplished researcher who straddles the line between engineering and medicine.”

8. **RJ Ramirez** shares, “Will be celebrating my 18th year at Intel Corp. in October, while also celebrating our 4th wedding anniversary and welcoming our 2nd child.”

1993

Edward Diamantis reports that’s he has taken a leave of absence from his post as senior IT program manager for Charter Communications and is serving full-time as lieutenant colonel in the Army Reserve as Battalion Commander of the 310th Military Police Battalion, on Long Island, N.Y., as the unit prepares to deploy to Guantanamo Bay, Cuba. “I was commissioned in 1993 from WPI’s ROTC program, the Bay State Battalion, and became a member of Pershing Rifles – eventually,” he adds.

1994

Lenny Belliveau (MS FPE ’97, MS MTI ’04) and **Robin Juchnevics** (Assumption College ’94) were married on April 9, 2017, at The Harding Allen Estate in Barre, Mass. “Our honeymoon was spent in Belize,” Len writes. He is a senior fire protection engineer and vice president of strategic accounts in the Framingham office of Jensen Hughes. ▶

Jason Johnson writes, “At the end of a long Memorial Day weekend, it was nice to relax, supervised by Gompei.”

1995

Col. **Spence Cocanour**, USAF, reports a Change of Command from the 720th Special Tactics Group at Hurlburt Field, Fla., to the 24th Special Operations Wing, where he serves as vice wing commander. “The 720STG and 24SOW provide forces specializing in precision strike, global access, and personnel recovery in numerous combat theaters around the globe,” he notes. “Here I am prior to a High Altitude-Low Opening (HALO) parachute jump from the C-130.” ▶

6. **Lisa (Cigal)** and **Roy Schletzbaum** started off their summer with a trip to Fenway Park with their boys, Karl (14) and Konrad (12). “Our family is on a quest to visit all 30 Major League Baseball stadiums,” writes Lisa. “We started the journey in 2014 and now have five left to go.”

1996

On Valentine’s Day of 2017, **Mike Caprio** proposed to **Diana Felicia Rodriguez** of Freeport, Long Island, at the Brooklyn diner where they first met just over six years prior.

Joseph Maraia, a partner at www.burnslev.com Burns & Levinson, was named to the “Intellectual Property Trailblazers” list by *The National Law Journal*. According to the magazine, the real-world, practical experience he gained as a master electrician has helped him focus on the engineering and biotechnology sectors. He received his JD from Suffolk University Law School.



1998

Jeff Alderson left his role as principal analyst at Eduventures for a new career closer to home in Natick, Mass. He leads Online Learning Product Marketing for MathWorks, launching new products to help STEM faculty integrate MathWorks products such as MATLAB into academic courses to train the next generation of scientists and engineers. Jeff and his wife, Sara, continue to use their science and education skills to support their local town. Jeff campaigned for Natick School Committee (albeit losing by only seven votes), and Sara volunteered with the Solarize Mass Natick program, a project that resulted in 156 new homes getting solar installations. ▶

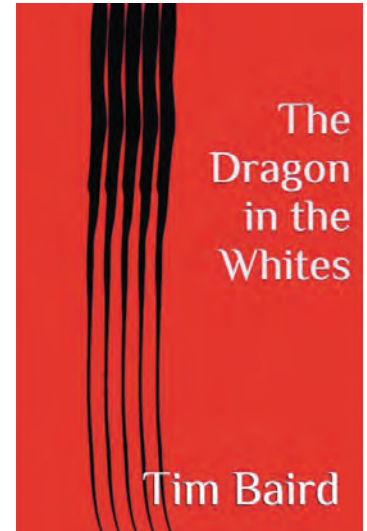


Ian Catlow was promoted in April to vice president at Tighe & Bond. He brings more than 20 years of water and wastewater design experience throughout New England, including combined sewer separation work in Boston and water reuse systems at Gillette Stadium. He also managed Tighe & Bond's award-winning Sturbridge wastewater treatment facility upgrade, which was the first ballasted biological flocculation treatment system in the United States. His recent work includes numerous low-level nitrogen and phosphorous removal projects across the region.

Jason Hutt sends this update. "In February, I was selected as the Orion Crew Systems Integration Lead in the Vehicle Integration Office of NASA's Orion Program. I am responsible for the development of the cockpit of NASA's Orion spacecraft, which I manage as chair of the Cockpit Working Group. We ensure that every piece of equipment, every crew interface, and the cockpit environment meet NASA requirements and ensure mission safety and success. We're busy reviewing hardware designs and verifying requirements in preparation for the first crewed flight of the Orion spacecraft, currently expected to launch in 2021. That mission, Exploration Mission 2 (EM-2), will perform a low-altitude flyby of the Moon, similar to Apollo 8, and will return astronauts to the moon for the first time in almost 50 years.

2000

12. On July 6, 2017, Lt. Col. **Daniel Murphy**, USMC, took command of MCAF Quantico, Va., the airfield that supports HMX-1 and the Presidential Support mission. He is a CH-53E Helicopter Pilot and has deployed five times to the Horn of Africa, Iraq, and Afghanistan in support of the Global War on Terrorism and Operation Iraqi Freedom. Prior to assuming command, he graduated from the School of Advanced Warfighting, Marine Corps University with a master's degree in operational studies. He is currently enrolled at Northeastern University for second master's degree – in International Relations and Global Politics. He resides in Stafford, Va., with his wife, Diana, and their four children.



2004

Tim Baird ('08 MS ME) recently self-published his first full-length novel, *The Dragon in the Whites*. "It's a dragon-themed fantasy novel that takes place in and around the White Mountains of New Hampshire," he writes, "and is available for download or purchase on Amazon." ▲

In its May edition, *Consulting-Specifying Engineer* honored founder and principal and senior fire protection engineer **Brian Thompson (MS FPE)**, as one of 40 building industry professionals age 40 and younger with demonstrated commitment to excellence in academic, professional, personal, and community involvement.

2005

Catherine Desmarais graduated in 2016 with a doctorate of public health (DrPH) in epidemiology from Tulane University School of Public Health and Tropical Medicine.

William Herbert sends this update. "I graduated from Harvard University Extension School in May with my master's degree (concentrating in software engineering). I was promoted in July by KAYAK to senior software engineer, where I'll also be celebrating my two-year anniversary in August. I currently reside in the West End of Boston."



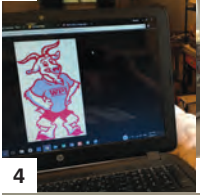
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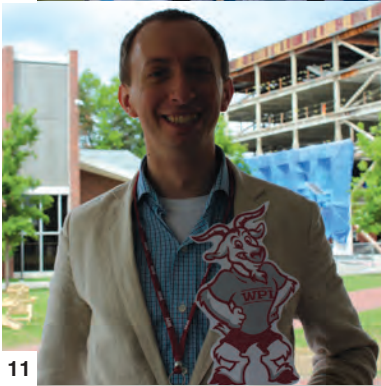
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13



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11



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16



17



18



OUR SUMMER CLASS NOTES CONTEST WITH FLAT GOMPEI WAS A BIG SUCCESS! SEE IF YOU CAN RECOGNIZE ANY FAMILIAR FACES FROM THOSE WHO SENT US IN THEIR SELFIE WITH GOMPEI. LOOK FOR MORE PHOTOS IN OUR UPCOMING WINTER ISSUE.

19



20



21



22



23



24



25



26

Pamela (Giasson) Lynch joined the board of directors of Youth Villages in Massachusetts and New Hampshire.

26. Erica (Abrahamsen) Sabia writes, “My husband, Jay, and I welcomed our first son, Miller John Sabia, in January 2017. We’ve just returned from his first vacation in Colorado to see another WPI grad, his auntie **Lauren Abrahamsen ’02 (MENGR ’03)**. We live in Wilbraham, Mass.”

research presentation, and a team interview. The RoboHillers competed in Kentucky in April in the VEX IQ World Championships with teams from all over the globe.” Amy, who also holds a master’s degree in education and biology from Worcester State University, is the Project Lead The Way teacher at Hopkinton.

3. Michael Freeman took Gompei along on a family vacation to Disney this year.

surrounding Antarctica seems to be increasing, despite climate model predictions to the contrary. Even with frigid temperatures, constant darkness, and wild storms, the first winter voyage to the Ross Sea in nearly 20 years is going very well.” Julian recent took Flat Gompei out onto the Antarctica sea ice to snap a photo while the science team was setting up an ice sampling station.

changes! I think back on the old days very fondly.”

Priya Jayachandran graduated with high honors from UCSF with her doctorate in pharmacy and was inducted into Phi Lambda Sigma, the national pharmacy leadership society. She also received the Dean’s Award for Outstanding Research for her studies on warfarin in healthy volunteers. Priya earned her MS Che at UC Berkley in 2009. She helped bring the Precision Medicine Curriculum promoted by President Obama’s White House to UCSF, and has been published in the school’s newspaper, *Synapse*. After completing an 8-week internship with the FDA, she is now a postdoctorate fellow, doing NIH-funded research in clinical pharmacology.

11. Jaris Wicklund shares, “Came back for Alumni Weekend and had a great time seeing everyone and how much the campus has changed over the last ten years!”

2008

25. Jen Hosker checked off a lifelong dream and became a Red Sox season ticket holder.

Andrea (Hevey) King writes, “Three ► future engineers came into the world in March from three WPI couples! And the moms have kept in touch, moving on from trading stories about being orientation leaders at WPI, to now swapping advice about motherhood.” They are **Siobhan (Fleming) and Matt Conway** (daughter Aibhlinn), **Erin (Vozzola) and Ryan Kendrick** (daughter Audrey), and **13. Andrea (Hevey) and Matt King ’10** (daughter Alexis).

2009

Owlchemy Labs, founded by **Alex Schwartz**, was acquired by Google in May. “We set out on a journey over six years ago to build the kinds of games we wanted to see exist,” Alex writes on the Owlchemy blog, thanking fans and supporters who believed in the company early on. “We’re insanely excited to join the Google family and we cannot freaking wait to show you what we’re concocting next.”



2006

Amy Borges is currently teaching at Hopkinton (Mass.) Middle School where she offers a VEX Robotics VRC program for 8th grade students and teaches other technology and engineering courses as well. “I brought our middle school RoboHillers teams to the VEX IQ Challenge Southern New England Championship, where they won several awards,” she reports. “Team 1715B won the Teamwork Champion Award and the STEM Research Project Award, and team 1715A won the Design Award and the Teamwork 2nd Place Award, which qualified them both for participation in the World Championship. The events involved tele-operated control, autonomous programming, a STEM

Rocco Lore was hired as a dispensary assistant at Tufts Medical Center’s dental facility in March.

19. Julian Race spent part of her summer onboard the RVIB *Nathaniel B. Palmer* on a 65-day mission to the Ross Sea, Antarctica. He is supporting a research project called “PIPERS” (Polynyas, Ice Production and Seasonal Evolution in the Ross Sea), which involves spending two months on the icebreaker during the austral winter. “Using a combination of on-ice observations and samples, UAS and UAV missions, buoy arrays, and traditional oceanographic sampling techniques,” he writes, “the science team hopes to better understand the processes that drive sea ice production in the Ross Sea during the winter, and why the annual ice

On March 3, 2017 **Greg Ratner ’06** got married to **Jamie Julian** in Tamarindo, Costa Rica. They live together with their two dogs in Williamsburg, Brooklyn. ▲

2007

5. Vanessa Castro joined Derive Systems as a project manager, where **Richard Welch ’80** serves as chief operating officer. “We enjoyed posing together holding some of Derive’s best known products,” she writes, “— and then Gompei just wanted to stop in and say hi!”

15. Russell Grossman writes, “My wife, Amy, and I celebrated our sixth wedding anniversary. It was great being back on campus for our reunion. Lots of



2011

Colleen Heath accepted the Young Professional of the Year Award from the Massachusetts chapter of the American Council of Engineering Companies on March 15. This annual award recognizes engineers under the age of 30, highlighting their interesting and unique work, and the resulting impact on society. Her projects at CDM Smith have contributed to the protection of wildlife and the environment without limiting water suppliers and the areas they serve. Her work has also helped communities meet public safety standards and mitigate water quality issues.

Rebecca Trojanowski ('14 MS ME) received the Best Young Researcher Award in Biomass at the 2017 World Sustainable Energy Days conference Wels, Austria. She notes, "When I was completing my bachelor's degree in chemical engineering at WPI, I would have never guessed I'd be burning wood for my research, but over the past few years I've come to realize how important this work is."

Kristen Garza and Harold Reader got married in Punta Cana, Dominican Republic, on May 27. Classmate **Brendan Gove** recited "Footprints in the Sand," as part of the ceremony. A number of other WPI friends made the trip to celebrate with the couple. Surrounding them in the photo are **Brendan Gove, Tom Cucinotta, Kat Kulzer '12, Jean Friend '13, Katie Partridge, Maggie (Fulton) Pringle, Tom and Nicole (Comosa) Izzo, and Ryan Stock.** ▲

2012

Nick Gardiner writes, "Time flies! Despite growing up in New England, after graduation I moved to the Midwest, along with my wife and now two kids, for a job at Oshkosh Defense (military trucks, not kids clothes!). My time at WPI gave me the tools and confidence needed to succeed in my career. As a lead manufacturing engineer, I now lead a team of engineers building trucks to protect soldiers all around the world. How awesome is that? Don't worry, I still have plenty of time to build hot rods on the side."

Honoring the Rev. Peter J. Scanlon



If you walked the campus between 1969 and 2006, you most likely heard the booming voice of Father Scanlon, who touched countless lives while serving as WPI's first full-time chaplain.

Father Pete dearly loved his home city of Worcester. He served 58 years as a Roman Catholic priest for the Worcester Diocese, was a devoted guardian of the Worcester Fire Department, and seemed always to be wherever he was needed. He became WPI's full-time chaplain in 1969 and spent the better part of his life serving as faith coach, advisor, confidant, mentor, matchmaker, community service advocate, friend, and strong shoulder to lean on for thousands of college students, alumni, and area residents.

Following his passing in September 2015, Alex Papianou '57 and Deborah (Foley) McManus '97 began a fundraising effort to establish the Rev. Peter J. Scanlon Endowed Scholarship, to ensure Father Scanlon's legacy would live on for generations to come. Father Scanlon exemplified leadership and community service, and these qualities are also among the qualifying requirements for the new endowed scholarship established in his memory. The scholarship fund has surpassed \$50,000 and will soon benefit academically qualified undergraduate students from Worcester and Worcester County with financial need—thus honoring Father Scanlon's love of Worcester and WPI.

Contributions to the Rev. Peter J. Scanlon Endowed Scholarship can be made through Lisa Maizite, assistant vice president for development, at 508-831-5073, lmaizite@wpi.edu.

Katherine Larson joined Burns & Levinson in Providence, R.I., as a patent agent. She received her certification in 2016 and earned her PhD in biomedical engineering from Brown University this year.

Thomas Lextrait and **Nhi Vo-Lextrait** had their first baby, a daughter named Camelia.

Christopher Sanchez writes, "The last five years have gone by so quickly. It truly feels like yesterday when I last walked through the WPI campus as an undergraduate. Now that I finished my master's in manufacturing engineering, I feel that there are more doors open for me to grow and develop as an engineer. Since transitioning into the delivery assurance team at Pratt & Whitney, I have become more involved in solving manufacturing and production issues for the Externals parts on the GTF commercial engines. From providing drawing clarifications and changes, to visiting with suppliers both in the U.S. and abroad, it has been a never-ending challenge. I know that the learning I gained from my classes and projects through WPI has prepared me to face these tasks, to deliver the best product to our customers. Our engines are not only responsible for bringing passengers to their destinations safely, but also for ensuring that we provide the best power plant to protect our nation. I cannot thank WPI enough for helping me become a better engineer, and being able to take 'Theory and Practice' and apply it to my work every day."

2014

7. Michael and **Laura (Sandford) Burns** have gone from living in Institute Hall freshman year, to recently celebrating their first wedding anniversary.

21. Nichole Holman writes, "I've been a mechanical engineer at Mercury Systems in Hudson, N.H., since I graduated."

Emily Lurier received a Fulbright Scholarship and the Whitaker International Fellowship to study in the Netherlands. She is a PhD candidate in bioengineering and biomedical engineering at Drexel University and expects to graduate in 2018.

2015

16. Tori Miller and **Tyler Alexander** got engaged on the top of the Cliffs of Moher in Ireland this May.

Kirsten Reed shares, "Every Monday we go to trivia at Tijuana Garage in Atlanta to grab some drinks and tacos and expand our minds!" This summer, Flat Gompei came along for the nachos.

2016

22. Julianne Flynn writes, "After graduating in 2016, I began working at Pratt & Whitney in the Manufacturing Engineering Rotational Program. I enjoyed being back on campus for Alumni Weekend!"

18. Bo Pierce writes, "After graduating in February 2017 with my MS in management, I co-founded The Hum with **Tim O'Neil '14** and **Dave Powers '17**. We are a digital media company that crafts content for young entrepreneurs. We are working with anyone outside the 9-5 to promote innovation and entrepreneurship."

2017

1. Norma Bachman shares, "I am going with flow, living life to its fullest! Learning as much as I can and identifying what my passions are. My brain feels like a sponge. My first adventure is working as a manufacturing engineer at a contract manufacturing medical device company. Goat Big or Go Home! :)"

20. Just after graduation, **Michael Beinor** shared his plans. "Starting work at Pratt & Whitney like so many, but first competing in the Henley Royal Regatta and then a trip around Europe."

Eric Fast reports, "I will be starting flight school with the Navy, looking to go faster and higher than ever before."

Giovanni Greci shared some quality time with Gompei at Reunion.

14. Cameron Jones writes, "Moved on to MathWorks in Natick, Mass. Enjoying not having homework and assignments anymore!"

23. Erin Leger writes, "Right out of WPI I started working for Softbank Robotics America in Boston, which is a company I'd had my eye on since before I started school. Less than a month after I began they asked me to go to the Aldebaran office in Paris to upgrade Pepper robots! I love my job and the places it will take me!"

10. A shout-out from **Miguel Enric Escuer Velásquez**: "We did it! From here on, the world is in our hands... so watch out! Something good is about to happen!"

9. Saluting Gompei at Reunion, **Hasson Harris Wilcher** relates, "Newly minted WPI graduate here! Taking a short break and jumping headfirst into the work world. Excited for the opportunities and new chapters of my life."



ALDEN
SOCIETY

HAVE YOU INCLUDED WPI

in a will or trust?

in a life income gift?

*as a beneficiary of life insurance,
IRA, or other retirement account?*

**The Alden Society is always
accepting new members,
please join today to help
ensure WPI's future!**

Membership is about giving you
recognition NOW for your plans to
support WPI in the FUTURE. To join
visit **plannedgiving.wpi.edu**.

Let us know if you've made
arrangements for WPI and we'll
welcome you into the Alden Society.

FOR MORE INFORMATION

Contact Lynne Feraco
Director of Planned Giving
888-974-4438
lferaco@wpi.edu

Membership Drive

Join today!

Lawrence D'Addario '90 decided to make a planned gift to help future engineering students benefit from a WPI education. Through his involvement in TAN (Tech Advisors Network) and his planned gift, Lawrence is also helping young entrepreneurs get off to a strong start. "I am pleased my planned gift will help future students enjoy the WPI experience as much as I did. WPI is a key path that led to many of my successes," says Lawrence. "It's a win-win situation."



[COMPLETED *careers*]



Leonard Redon '71, trustee emeritus, died May 9, after a battle with cancer. He was 65. His death was announced by the mayor of Rochester, where Redon had served as deputy mayor under two succeeding administrations, stepping down due to health concerns in 2011. He began

his career at Eastman Kodak in Rochester as a photographic product development engineer, and led several divisions and subsidiaries during his 28-years there. He told the *WPI Journal* in 1991 that he was the first non-white employee to serve as assistant to Kodak's chairman and presi-

dent. He later retired from Paychex Inc. as vice president for western operations.

Redon was elected to the WPI Board of Trustees in 1992 and served for 18 years, including two years as vice chairman. WPI honored his service with the Herbert F. Taylor Alumni Award for Distinguished Service in 2013. He was a member of Lambda Chi Alpha fraternity and Skull. His interest in the arts (he was an accomplished guitarist and singer who performed with the BureauCats, a band made up of Rochester city employees) led him to join WPI's Arts and Sciences Advisory Board.

Redon and his wife, Denise, gave \$75,000 to support WPI's graduate programs in the life sciences and bioengineering. In recognition of the gift, a conference room was named for the Redons in the Life Sciences and Bioengineering Center. In addition to his wife, he is survived by their children, Jason and Jennifer.

Longtime assistant coach **Byron Menides** died on July 20, 2017, at age 85. He leaves his wife, former WPI English professor Laura Jehn-Menides, two children, and many nieces and nephews.

A graduate of Dartmouth College, where he earned a degree in international relations, he went on to earn an MBA from the Amos Tuck Business School. His career spanned the worlds of business, sports, and higher education. He served as senior vice president and chief financial officer of Global Power Networks Ltd, founded Byron Menides Management Company, and held top executive roles and a number of public companies. At WPI he taught courses in the former School of Industrial Management and parlayed his success as a high school defensive and offensive tackle (and later, line coach for the Lynn English School junior varsity team) into a role as assistant coach. Menides continued coaching until he was 83 and remained a steadfast presence on the sidelines of home games of WPI's football and basketball teams.

"Byron was one of the most lovable people I've ever met during my time here at WPI," says head football coach Chris Robertson. "He supported WPI in so many ways and loved our football program and all the players he met and interacted with over the years. He was a gentle soul with a big heart and he will be missed dearly."



PETE KOLISS '38 MS EE
 BOB NEWTON '40 ME, THETA CHI
 CHARLIE SMITH '41 ME, PHI KAPPA THETA
 FRANK JUNE '45 ME, SIM, THETA CHI
 REGIS BREAUULT '46 EE
 FRANK MAZZONE '46 ME
 STANLEY MORRIS '46 ME, ALPHA TAU OMEGA
 FRANK WOTTON '46, PHI KAPPA THETA
 BURL WATSON '49 (D. 2013)
 BOB FAVREAU '52 CHE, PHI KAPPA THETA
 WALT MACDONALD '53, CHE
 BOB PICKFORD '54, SIGMA PHI EPSILON
 EARL BLOOM '55 EE, SIGMA PHI EPSILON
 PHILIP ROTONDO '57 CE, PHI GAMMA DELTA
 WAYNE MOSMAN '58 ME, PHI GAMMA DELTA
 STEPHEN ARTHUR '60
 DONALD BOTTOMLEY '61, ME, SIGMA PHI EPSILON
 RAYMOND REC '61 EE, LAMBDA CHI ALPHA
 RALPH GRISWOLD '62 EE
 STU BOWEN '64 CE, TAU KAPPA EPSILON
 JAMES HALL '65 CE
 JOE ADAMIK '68 CE, SIGMA ALPHA EPSILON
 VIC CALABRETTA '68 CE, MS CE,
 PHI KAPPA THETA
 RAJ CHAUHAN '69 CHE
 JACK GREENSHIELDS '71 ME
 STEVE JOSEPH '72 MG, PHI KAPPA THETA
 ROBERT MARTEL '74 SIM
 JOHN STOPA '74 MA
 ROBERT BERRY '77 SIM
 TSU-HSING (ABRAHAM) SHEN '80 (MS CS)
 MICHAEL WALSH '90 EE
 JOANNA CHAPLIN '08 BB
 DAVID KOST '12 MS EVE

THE WPI COMMUNITY ALSO NOTES THE PASSING OF THESE FRIENDS OF THE UNIVERSITY:

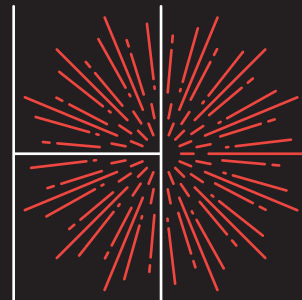
DORRANCE HAMILTON, ALICE HOOGASIAN,
 CONSTANCE HORWITZ (ASSISTANT DIRECTOR,
 CAREER DEVELOPMENT), DIANA JOHNSON (WPI
 REFERENCE LIBRARIAN), LOIS JOHNSON, JOHN
 JORSTAD, CHARLES MOSER,
 NYDIA MOSER, BYRON MENIDES,
 ANN PROUTY, AND JEANINE WETHERHEAD.

Complete obituaries can usually be found online, by searching legacy.com or newspaper websites. *WPI Journal* will share information from our files and assist classmates in contacting surviving family members. Contact jkmillier@wpi.edu or call 508-831-5998 to request further information.

CORRECTION: ABRAHAM SHEN, MEMORIALIZED IN THE PREVIOUS ISSUE AS A FRIEND OF WPI, WAS ALSO AN ALUMNUS. HE EARNED A MASTER'S DEGREE IN COMPUTER SCIENCE FROM WPI AND SHOULD HAVE BEEN LISTED IN THE COMPLETED CAREERS SECTION AS TSU-HSING (ABRAHAM) SHEN '80. OUR APOLOGIES TO THE FAMILY.



WPI HALL OF LUMINARIES



Inaugural Induction Ceremony

Wednesday, November 1, 2017

Join us to honor the members of the WPI community who have brought about the most extraordinary accomplishments to society.



George Alden, Hon. 1926*
John Boynton, Founder*
Curtis Carlson 1967, Hon. 2006
Robert Goddard 1908*
William Grogan 1946, Hon. 1990*
Dean Kamen 1973, Hon. 1992
Judith Nitsch 1975, Hon. 2015
David Norton 1962
Stephen Salisbury II, Founder*
Ichabod Washburn, Founder*
Richard Whitcomb 1943, Hon. 1956*

Induction Ceremony

3 pm

Sports & Recreation Center

Permanent Exhibit Opening & Reception

4:30 pm

Rubin Campus Center, Upper Level



Don't miss one of the most inspirational events for the WPI community!

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* deceased



WPI

Worcester Polytechnic Institute
100 Institute Road,
Worcester, MA 01609



ON THE COVER: *Robert Cruickshank '83*
pauses for a moment on the campus of
the U.S. Department of Energy, National
Renewable Energy Laboratory, in Golden,
Colorado.