

WPI

JOURNAL



SPACECRAFT ENGINEER *allan sword '04* PUSHES TECHNOLOGY INTO SPACE

planetary vision



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IN MEMORY OF ALUMNI, FACULTY, AND OTHER MEMBERS OF THE WPI COMMUNITY.

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BUGGY ENCOUNTER

While reading the Winter 2017 issue of *WPI Journal*, I remarked to my wife, “I wonder if I know anyone in this edition.” Next page, Lauren [Stratouly] Baker ’82 is staring back at me. [“Lifesaving Approval”]

This triggered a memory of a visit to Lauren’s nice home that involved the WPI crew team, circa 1990. Back then our vehicle to get home from practice (we ran about three miles to the boathouse) was a repurposed early ’80s Consortium Shuttle packing a Ford 351 Windsor engine that smoked like Mount St. Helens. When the van hit 60 mph the roof would suddenly lower by about 8 inches accompanied by a distinctive tympanic “bang” that haunts its former passengers to this day. The van’s roof supports had failed years before, victims of ice plunging off one of Tech’s slate roofs onto the not-primo parking area reserved for dumpsters, rendering vats, and crew vans.

Lauren and her husband had invited us over to their house and the only transport we had was the Crew van. As we drove around pleasant neighborhoods looking for their home, belching smoke like a 1950s Soviet tank factory, we came upon a well-dressed woman innocently walking her pedigreed dog. As she reflexively tensioned the leash to protect the dog from the looming wall of toxic smoke billowing from the back of the van, I waved casually out of the driver’s window and said, “Just fogging for mosquitoes, ma’am.”

Thanks for the memories!

— Brian Tarbuck ’92



Brian included a photo of the 1991 Textile Regatta heavyweight crew.

Engage with your university magazine community through your own letter to the editor by sending your thoughts on our printed pages to dmanning@wpi.edu.

Letters may be edited for length and clarity.

PRESIDENT LAURIE LESHIN TALKS ABOUT PROJECT INCLUSION WITH MICHELLE JONES-JOHNSON

[A CONVERSATION WITH THE *president*]

Last year WPI initiated Project Inclusion, a three-year process of examining how the university approaches diversity, inclusion, and equity, and how it is incorporating those ideals into its strategic plan. Project Inclusion examines what the university is doing and how it can improve, and ensures that the proper initiatives are established so changes result in long-lasting impact. President Leshin and Michelle Jones-Johnson, vice president for talent & inclusion and chief diversity officer, recently spoke about Project Inclusion's goals and how each member of the WPI community plays an essential role in its success.

LL Michelle, let's talk about a subject that's very near and dear to my heart—diversity and inclusion—and the enormous undertaking we're calling Project Inclusion.

To fill our readers in, Project Inclusion is all about making WPI a place where *everyone* can thrive. Of course, everybody knows we've been working hard on our gender parity numbers. We had the most women ever in the recent first-year class, and we've been hiring excellent and diverse faculty. However, Project Inclusion is about something bigger than just the numbers. What can you tell us about it?

MJJ It is absolutely more than just the numbers. Project Inclusion is a three-year initiative to bring together our community stakeholders to help us assess where we are as a community in terms of diversity, inclusion, and equity.

The beauty of Project Inclusion is that it isn't just someone from the top saying, "Here's our plan." It's how WPI will move toward the impactful and meaningful goal of a more inclusive community.

LL Tell us about the work involved in Project Inclusion.

MJJ Our first step was working with external facilitators to understand where we are as a community on these issues and to help us determine that we were indeed ready to engage in this work as a community.

Next, we put together a great steering committee, which includes [HUA professor] Peter Hansen and [internal liaison for diversity and inclusion] Bonnie Walker. The extended committee was then able to come together and really think about the six dimensions of this effort: WPI's philosophy and mission; faculty and student support; staff engagement and involvement; work around curriculum and research; administration; and leadership.

LL What has the steering committee been working on? I know the first part is the assessment phase, but that's not the problem-solving phase, right? It's hard because we always want to jump in and fix it *right now*.

MJJ Exactly. We're using the data we have in each of those dimensions and a rubric that outlines the criteria to assess where we are on that continuum. But, the process takes time. Individual steering committees for each dimension have formed and have looked at data related to that particular rubric. And we've just finished our mid-year updates.

The thing I love about Project Inclusion is how truly inclusive the process is—it really does speak to people across the entire campus. But it's challenging. Sometimes we learn things that are difficult to hear, but that need to be said. In addition, I've been very impressed with the group and how they've

taken this on as a huge opportunity for our community. They're asking, "How do you feel about what's going on?" and "Where are we headed?" Those are such important questions to ask.

The beauty of the approach we're taking is that there's a lot of discussion, a lot of understanding, and a lot of influence on how we think through things. Even disagreements within a committee means we have meaningful conversations with each other around making sure people are heard. We ask, "How do we make sure we keep moving forward? How do we deal with dynamics that may be occurring in those groups and still stay committed to the goal?"

I think it's going really well. We've brought together a group of people who are passionate about this issue and passionate about making cultural and structural change in the institution.

This process is so valuable because we are the ones holding up a mirror to ourselves. Ultimately, the changes we need to make us as inclusive a community as we can be are up to all of us. We have to take the time to do this right. Like any complex organization, our challenges took a long time to create, and they're going to take time, and dedication, to solve.

LL So each of us in our community now has the opportunity and accountability for making sure this work gets done. And the committee will continue to work on Project Inclusion's goals that are so important for the university. After so much thoughtful work, it's going to be great for WPI.

MJJ I think so too!

To see a video of this interview in its entirety, visit wpi.edu/news/wpjournal.



PHOTO MATT HEALEY

Homecoming 2018

October 26 & 27

wpi.edu/+homecoming



DENMARK

[GLOBAL*impact*]



ILLUSTRATION JONATHAN REINFURT

O

n the surface, the project seemed straightforward enough. But typical of IQPs, the solution required deep research, questioning, and much grappling with the implications of technology on society.

Its intent was to understand big data and how it could be applied in a waste setting, according to Akshaye Shah '19, Copenhagen Project Center team member. It evolved to understand what social boundaries and privacy laws are in place and how various organizations feel about collecting data that is quite sensitive.

By the end of A-Term 2017, Shah and his teammates had provided a list of recommendations for using big data to improve waste management in Denmark and a corresponding set of suggestions to protect Danish citizens from that data's being misused.

The team's sponsor—the Danish Waste Association—was so impressed, it invited the students to present their findings before a group of industry leaders.

That kind of close working relationship and real-world impact is common at the Copenhagen Project Center, according to current director Steve Taylor. In its 20 years, IQP students have worked on issues as diverse as sailing technology, techniques for the visually impaired,

the viability of stereolithography to reproduce fragile artifacts, and bicycle theft in Denmark. The center has proven so popular, it has added a second term.

The big data team was among six in Copenhagen last fall. The others focused on researching environmental sustainability education in Amager; helping establish an open source business model toolkit to encourage innovation in the manufacturing industry; designing a business model for a flood protection company; looking at reducing noise and waste in Copenhagen; and creating a website to attract more sponsors to the Copenhagen Project Center.

Diane Celaj '19 says she was intrigued by the opportunity to experience Denmark and excited about working on the big data project. Her team learned that Denmark produces more waste per capita than other European country and has room to improve its 68 percent recycling rate.

The students visited waste management companies, recycling plants, and municipalities in rural and urban areas, learning how each operates and the types of data they collect. The team realized that for data to be helpful, it would have to include such specifics as the type and quantity of trash that individual

households generate. Yet, this level of detail would raise alarming privacy issues. Insurance companies, for example, could raise rates for people who throw away a lot of liquor bottles, Celaj points out. "When you dig a little deeper, you realize there's so much that can go wrong with having that kind of data."

The team spoke with cybersecurity experts and surveyed Danish citizens. They factored in the country's cybersecurity laws and the effect of the European Union's newly passed General Data Protection Regulation.

"The students embraced it completely," says computer science professor Hugh Lauer, co-advisor with Fabio Carrera of the Center.

And the students were embraced by their sponsors. As professionally satisfying as it was to be invited to present their findings at an industry conference, Celaj says it was as gratifying to be accepted as equals by their Danish hosts. The sponsors treated them like co-workers, even inviting them to participate in their annual 5k race.

"There's a sharing and a community going on," Taylor notes. "Even when the organization is very small, the students become part of the community."

—Sharron Kahn Luttrell



ILLUSTRATION TIAGO GALO

WPI WORKS TO KEEP ASTRONAUTS COOL

One day when astronauts are breezing to Mars without burning up in an overheated spacecraft, they'll be able to thank a WPI professor for their cool transport.

Jamal Yagoobi, head of the Mechanical Engineering Department, has been working with NASA since 1992. His current

project features a new non-mechanical, low-cost way to cool high-powered electronics in space — one that could be used in satellites, robotic rovers, and manned spacecraft. It is critical research for the future of space exploration, as solar radiation as well as heat produced by

astronauts and electronics, can produce uncomfortably high temps.

A prototype of Yagoobi's technology has been undergoing a test on the International Space Station for the past year. Recently deemed a success, the project has been given an extension that will

allow scientists to receive data from another six months of operation. In the meantime, Yagoobi is preparing another, far more complex, experiment (scheduled for launch in 2021) that will further propel his space research.

—Sharon Gaudin

THE POWER OF WASTE

A TEAM OF SCIENTISTS IS TAKING ON THREE MAJOR GLOBAL PROBLEMS WITH JUST ONE RESEARCH PROJECT.

Michael Timko, associate professor of chemical engineering, is leading a team of researchers tackling issues like climate change, food waste, and our dependence on crude oil by creating a better way to convert food waste into environmentally friendly biofuels.

Funded by a one-year, \$168,373 SBIR [small business innovator research] grant from the U.S. Department of Energy, the project is focused on developing an economical way to transform spoiled or otherwise discarded food into biofuel to power schools, restaurants, grocery stores, and even entire communities. Timko envisions reactors set up at businesses and large cafeterias that will process their food waste to generate a liquid fuel they could use to generate power, saving money and helping the environment. And by keeping food waste out of landfills, where it decomposes to produce greenhouse gases and water pollution, the process will have more significant environmental benefits.

Timko and his team are improving a process known as hydrothermal liquefaction, which involves cooking the waste at high temperatures and under pressure. By adding catalysts, they found that they could get more of the carbon compounds to transform into biofuel.

Just being able to make use of food waste would offer great benefits. About a third of all food produced for human consumption is lost or wasted. That's approximately 1.3 billion tons per year, or a loss of approximately \$161 billion, according to the Food and Agriculture Organization of the United Nations. Thirty million tons is wasted each year in the U.S. alone.

Alex Maag, a graduate student in chemical engineering, coordinated the lab experiments for the project and oversaw the contributions of an MQP [Major Qualifying Project] team.

—Sharon Gaudin

COACH OF THE YEAR, DECADES OF DEDICATION

A standout wrestler from the time he arrived on campus as a freshman, **Steve Hall '87** continued his devotion to the sport after he graduated, serving as assistant coach to his mentor, Phil Grebinar, for four years.

Hall left WPI in 1991 to pursue a career in electronics manufacturing automation. Two decades later, after retiring as president of EKRA America, he returned to WPI to take on the mantle of head coach. He retired from WPI in May, after being honored as the National Wrestling Coaches Association's NCAA Division III Northeast Region Coach of the Year, the New England Wrestling Association (NEWA) Coach of the Year, and the Massachusetts College Coach of the Year by the state's chapter of the National Wrestling Hall of Fame.

In his final season, bolstered by seven regional place-winners, the wrestling team collected a second-place finish at the 17-team regional tournament; Tyler Marsh '20 represented the team at the NCAA Division III Wrestling Championships. WPI also boasted four Scholar All-Americans.

During the dual-meet season, the nationally ranked Crimson and Gray went 18-4. Those 18 wins rank third in program's history – the most wins since the 1993–94 campaign. The year began with the RIT Invitational team title before WPI finished a program-best third place at the NEWA Dual Meet Championships.

Hall says he will remain available as a consultant to help the program through the transition to his successor. "The WPI wrestling program was one of the most important contributors to my success," he says. "I am incredibly fortunate to have been able to give back to the program, and I hope I've provided the same type of experience and support to WPI's student-athletes."

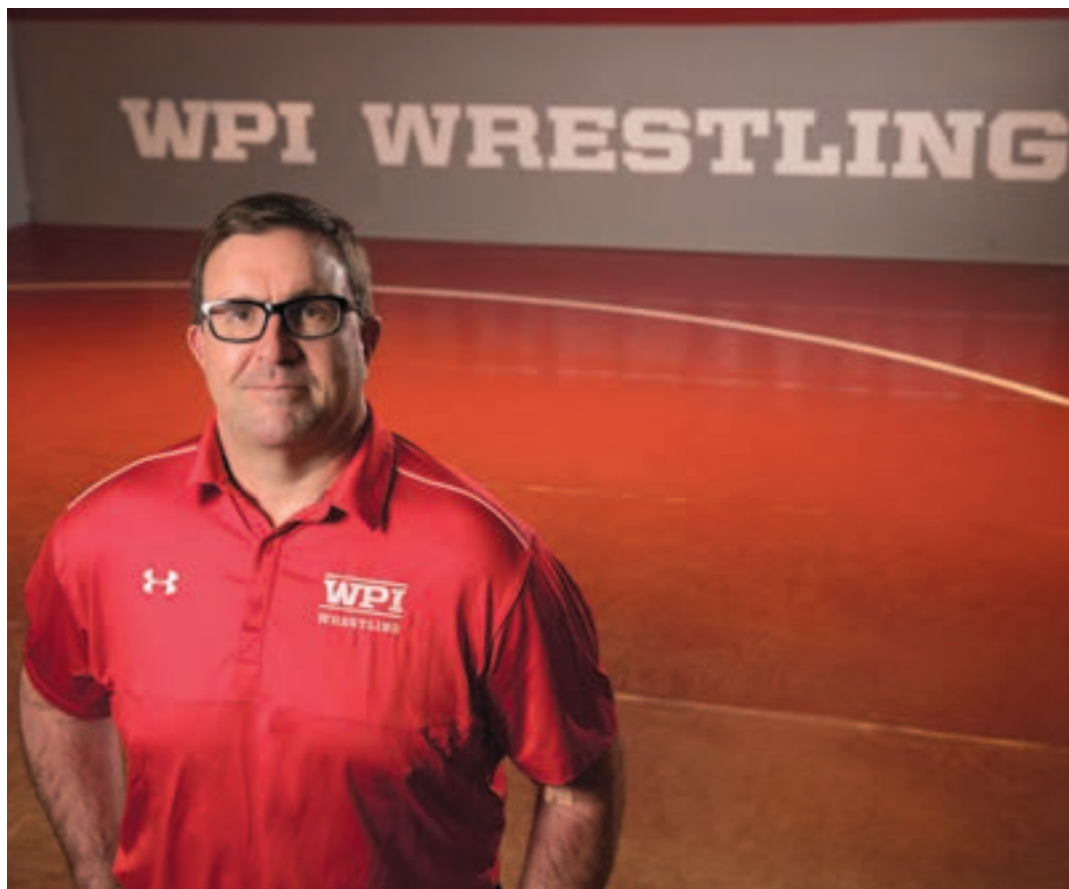


PHOTO PATRICK O'CONNOR

Q&A THE ROBOTS ARE COMING. DON'T FREAK OUT!

Jing Xiao joined the faculty in January as director of the Robotics Engineering Program. She comes to WPI from the University of North Carolina at Charlotte, and is a former program director for the National Science Foundation's Robotics and Human Augmentation Program. Her research includes haptics (the science of enabling machines to feel or communicate through touch) and making robots interact better with people.

What attracts you to robotics?

I always liked the idea of artificial intelligence, and robotics is about an intelligent machine or artificial being with physical capabilities. With robotics, it's not just an artificial brain but a physical embodiment of that intelligence.

Has the industry come as far as you expected when you started in the field 30 years ago?

We have a lot of promising prototypes, but we really need more research and technology transfer to get robots out there in human-centered environments. In 2018 we have laundry-folding robots in the lab but not in our homes. A robot system in the lab can be very fragile—it's not robust enough to function in the real world. Thirty years ago robotics was just about factory automation. Today we're looking at robots entering everyday life and taking different shapes, like an intelligent chair or an intelligent bed.

What do you see as the biggest strides?

Algorithms and mechanisms. Algorithms for intelligent robot motion have come a long way. That's coupled with advances in sensing and perception technologies—vision sensing and depth sensing, for instance—and in computing power. The next milestone will be the co-robot concept: robots helping the elderly, or working side-by-side with people, not just in a fenced-in area.

What will it take to get to that point?

In order for a robot to serve people, the social interaction is important. A robot will need to be able to communicate with a human supervisor in a human-friendly fashion. We'll need contributions from social sciences to get robots to that point.

There has been discussion, even from the likes of entrepreneur Elon Musk and the late physicist Stephen Hawking, that there is a lot to fear from artificial intelligence and robotics. What do you think about that?

Artificially intelligent systems already are smarter than humans in some things, like analyzing vast amount of data or playing games like Go. But it's different, physically, for robots. We are trying to make robots that will not be threatening to people physically so they can co-exist with people and be controlled by people. Because people have concerns, that should make researchers more mindful about being responsible for human well-being. Scientists are increasingly thinking about that. It's a major area of robotics ethics. Ultimately, we want robots to be helpful to people.

How long before we have robots doing more than vacuuming in our homes?

Within five years we could get robots that can do specific tasks, but not one robot that can do all kinds of tasks. We'll have telepresence robots monitor patients' or elderly people's physical or mental state and report back to caregivers who cannot be available physically. That's actually not very far away at all. They are becoming available.

— Sharon Gaudin

Read the full interview at wpi.edu/+robothelper.



PHOTO MATTHEW BURGOS





PLANT PARENTHOOD

The Biology and Biotechnology Department greenhouse atop Salisbury Labs blooms year-round, whatever the weather. At the start of each term, the BBT Plant Parenthood Program invites students to take in a bit of greenery—and take on a bit of responsibility. They adopt plants to take home and care for. They also get a hands-on lesson on propagating cuttings, and then start new plants that will be adopted by other students in the future. Above, Barbara Milanese explains the care and feeding of *Albuca bracteata*, commonly known as “pregnant onion” because of the small bulblets that form from the initial bulb scales, like babies in utero. “It’s an easy plant to care for,” she tells the students. “It can withstand drought—or at least go without watering when you leave for term break.”

CREATING AN APP TO STAVE OFF AMPUTATIONS

An interdisciplinary team of researchers at WPI hope their work will ultimately mean fewer people will need life-altering foot or leg amputations.

Backed by a four-year, \$1.6 million award from the National Institutes of Health, the smart-phone app will allow patients and their caregivers to track and assess chronic wounds, helping lower costs associated with frequent doctor and hospital visits, as well as recognizing serious complications before they lead to hospitalizations and amputations.

Machine learning algorithms built into the app will measure wound assessment metrics, including size, depth, and color, which indicate how the wound healing is progressing. The algorithms will compare the readings over time to determine if the wound is shrinking or expanding, or if there are other changes that could indicate complications.

The app will also compute a healing score and suggest one of three actions: stay the course, consult a wound specialist for advice, or seek immediate care.

A 2017 study found that chronic, non-healing wounds affect 5.7 million people in the United States alone, or about 2 percent of the population, at an annual cost of \$20 billion. The cost of just transporting chronic wound patients to medical visits is estimated at about \$200 million per year.

“Wounds, wound management, and amputations have a huge cost, both financially and physically, for the people who suffer from them, as well as for their families,” says **Emmanuel Agu**, associate professor of computer science and principal investigator for the project “I like to work on real problems that make a difference for people.”

—Sharon Gaudin



J! BUZZ

Alli Ross '20 represented WPI in the Jeopardy! 2018 College Championship, which aired in April. A powerhouse contender, she won her quarterfinal match with a score of nearly \$20,000, and held a \$3,000 lead in the semi-finals at the conclusion of the Double Jeopardy round. Her victory was shattered by a by a Final Jeopardy! question involving translation of a Latin phrase.

WPI was present in the finals though—through the accomplishments of its third president, Thomas Corwin Mendenhall. A Double Jeopardy! clue was the glacier in Alaska named for him.

Ross shared an inside view of the show in an interview with WPI's *Daily Herd* along with some tips for prospective contestants:

Buzzer strategy is everything. Click along with the TV show, using a retractable pen (or the springy end of a toilet paper holder) for practice.

Milliseconds matter. Don't buzz in too early, or you'll be locked out for a quarter of a second, and that quarter of a second is huge when people's reflexes are on fire.

Think Global. Ross says she made a concerted effort to learn all the world's capitals.

Read the full interview at wpi.edu/+jeopardy.



ASK THE ARCHIVISTS

Q. This year marks the 50th anniversary of women undergrads at WPI. What are some other firsts for women here?

A. Although female students were not seen on the WPI campus until the fall of 1968, it was never the intent of the founders to rule out women students. When the Institute opened in the fall of 1868 and parents asked about enrolling their daughters, Principal Charles O. Thompson pleaded lack of space for female students. However, he did hire its first female instructor, Harriet Goodrich, (above, left) who had worked with Thompson at Arlington (Mass.) High School, and was his sister-in-law.

WPI's first librarian, Elizabeth K. Francis, (right) was hired by President Thomas Mendenhall in July 1895 at a yearly salary of \$450. He called her the "Professor of Civilization" and made it quite clear to the faculty that the librarian was to be in charge of the library.

The first women's vocal group on campus, WPI Women's Chorale, was established in 1978 after a group of students convinced the admin-

istration to hire Malama Robbins (above, right) as their director. The students met Robbins when they were bused over to Anna Maria College to sing in its choir. The group was renamed Alden Voices, and along with the Technichords and the Ketones, today comprise WPI's all-female vocal groups.

The first female undergraduate students accepted by WPI were Lesley Small and Jayne Rossetti. Because the decision to admit women came late in the academic year, housing was not available and the two women had to live off campus for the first year. (Lesley "Lee" Small Zorabedian graduated in 1972 with a BS in mathematical sciences.)

It may have taken 100 years for women to take their place on campus, but the influence of women has been instrumental in shaping the past and building the future of WPI.

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.





PHOTO: MATTHEW BURGOS

HOW TO BUILD A BLOOD VESSEL

WPI biomedical engineer **Marsha Rolle** and her team, including recent PhD recipient Hannah Strobel, have developed a method for building engineered blood vessels. With a recent \$437,700 award from the National Institutes of Health, they are using the technique to create a model system for testing new drugs for intimal hyperplasia, a common and sometimes deadly complication of cardiovascular surgery.

Injury to the blood vessel wall or lining (endothelium) triggers a biochemical response that leads to the proliferation of smooth muscle cells, which can ultimately cause the blockage of the blood vessel. There are no animal or tissue models that accurately mimic this condition, which has hampered the development of new drugs to treat it. Rolle's method may offer a solution.

Here's how it works:

Blood vessels are tubes of smooth muscle lined by endothelium and connective tissue. To build these tubes, Rolle places smooth muscle cells in small wells with posts in the middle.

Microbeads with growth factors are added to control how the blood vessels take shape. For this study, some rings have beads with a factor (called PDGF) that causes smooth muscle proliferation, mimicking intimal hyperplasia.

The muscle cells self-assemble into rings, which are stacked inside a small tube holder with growth media that stimulates them to fuse into tubes. Since PDGF-seeded rings grow faster, the tubes will be dominated by abnormally proliferating cells.

In another bioreactor, endothelial cells are added to form the lining for the vessels and mechanical forces are applied to mimic blood flow and stimulate proper growth.

The finished vessels can now be treated with drugs to test how well they halt effects of intimal hyperplasia. Lab tests will gauge how well the drugs work in preventing smooth muscle cell proliferation.

WiDS WIN

WHAT HAPPENS WHEN TWO WPI DATA SCIENCE STUDENTS TAKE ON SOME OF THE WORLD'S TOP DATA SCIENTISTS? A FIRST PLACE WIN.

Xi Lui and **Ye Wang**, graduate students in WPI's Data Science program, beat out more than 200 teams composed of students, faculty, and professional data scientists from 26 countries in the inaugural Women in Data Science (WiDS) Datathon.

The event was a joint effort among the Institute for Computational and Mathematical Engineering at Stanford University, Kaggle, Intuit, West Big Data Innovation Hub, and InterMedia. The challenge took place online during the month of February. Teams had to analyze how women in India use traditional and mobile financial services through a dataset collected by InterMedia. Competitors had to wrangle 45,000 lines of data to build machine learning and statistical models that would predict the gender for each line of data. By identifying which resources are available and used by women, the data can help predict which tools will allow them to participate more in their local economies. WPI's team was successful in identifying the patterns and creating the best predictive model.

The winning team was announced during the third annual Global WiDS Conference, held March 5 at Stanford. More than 100 regional events hosted by WiDS ambassadors brought young women together with highly successful professionals to encourage and prepare them to join the important technology pathway in data sciences. One of the events, the WiDS Central Mass Conference, was hosted by WPI.

—Colleen Wambach



BETTER WITH AGE

LAST YEAR MARKED THE 50TH ANNIVERSARY OF THE GEORGE C. GORDON LIBRARY.

Over the years it has steadily built a reputation as one of the busiest buildings on campus—an indispensable resource offering a wealth of information, classes, and tutorials—and occasionally as the setting for a sleepless night or two during finals week.

Here's a glance into how WPI's center of knowledge has changed over those 50 years.

Print's (Not) Dead: Having begun with 61,500 print books in 1967, the library is now the home of a quarter million books.

No Papercuts, No Problems: With each year comes new technology, and Gordon Library has taken full advantage of that—it now offers patrons over a million eBooks.

Accommodating for All: WPI has taken important steps forward when it comes to inclusivity on campus, and with its nursing room for new mothers and a multi-stall gender-neutral restroom—the first of their kinds on campus—Gordon Library is leading the charge.

Roll Tech: While public computers took up a whole room back in the '60s, the library now has rooms full of them—125 workstations to be exact.

Vital Visit: A few years after Gordon Library's opening, about 5,000 visitors passed through its stacks per week. That number is now about 16,000.

Here's to you, Gordon Library—you don't look a day over 25.

—Allison Racicot



DIGITIZING WORCESTER, REVISITING HISTORY

What began as an effort by the Worcester Historical Museum to make its collections more accessible has flourished into Digital Worcester. The online collaborative not only digitizes old portions of Worcester history (directories, maps, sketches, photos), but offers members of the community an opportunity to contribute their own memories and histories.

“We’re giving people a sense of control, that their stories matter, because the past of the city is

collectively all of our stories,” explains **Joseph Cullon**, associate teaching professor of history at WPI and the main curator behind the project. Over the past few years he has worked with several IQP teams to bring the idea of a digital collection to life. In addition to applying their software skills to the project, students consider how things are designed and shared online, creating the most effective and accessible presentations possible.

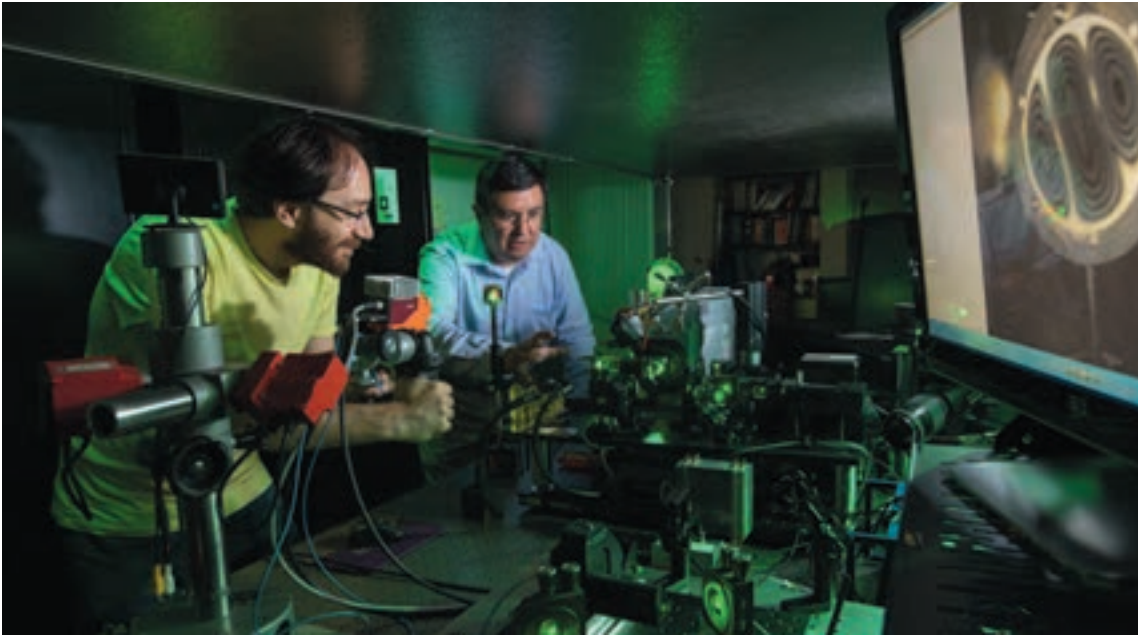
Cullon and his students have digitized thousands of submitted images so far, and they show no signs of slowing down anytime soon. In collaboration with Clark University and Holy Cross, LGBTQ in the Woo (a sister website detailing the LGBTQ experience in Worcester) is in the works; he’s hoping to create a way for audio and visual performances to be submitted.

“The standard of success for historians is to write a book and have it ensconced on a shelf,”

Cullon says. “[The archive] is a way of changing those rules – of saying that history doesn’t have to be just what’s been preserved and deemed important by collectors or libraries or governments. History is the stories of people who were sometimes marginalized and forgotten in the way we collected artifacts of the past. [This] gives us the power to share those stories.”

—Allison Racicot

Learn more at digitalworcester.com.



CASTING LIGHT ON HEARING DISORDERS

According to the National Institutes of Health (NIH), more than 400 million people worldwide suffer from some type of hearing disorder. Current technology for probing the ear for clues to the causes of hearing problems is “qualitative and rather subjective,” says mechanical engineering professor **Cosme Furlong**, director of WPI’s Center for Holographic Studies and Laser micro-mechaTronics. With continuous support from the NIH, Furlong has been working for more than a decade on new ways to image the middle- and inner ear using holographic techniques.

In this photograph Furlong, right, and postdoctoral researcher **Payam Razavi ’18** (PhD) work on two current prototypes of their technology. Both use a combination of acoustic stimulation and holographic interferometry to create high-resolution measurements of the shape of the entire ear canal

and the eardrum (or tympanic membrane) and of the vibrations of the membrane in response to sound. The measurements are made using two interacting laser beams that create fringe patterns that can be translated into data about three-dimensional shape and vibrations down to the nanometer scale.

Coupled with sophisticated data mining and analysis, this quantitative information could be used to identify mechanical problems in the ear that underlie various pathologies, including defects in the membrane or in the bones of the inner ear that link the membrane to the cochlea. One prototype is a lensless holographic otoscope that captures the interaction of light at every point within the ear, making it possible to explore changes in the ear in three dimensions over time with high resolution. The other uses a high-speed camera that can record up to two million frames

per second, making it possible to observe the response of the ear and ear drum to sound pulses, nanosecond by nanosecond.

Furlong’s clinical partner is Mass. Eye and Ear hospital in Boston, where he and his team have tested previous prototypes and conducted basic research on the mechanics of hearing. As the current prototypes progress, a major challenge will be developing ways to miniaturize the technology and package the electronics and photonics, work that will be aided by WPI’s participation in the AIM Photonics Institute (“One Giant LEAP,” *WPI Journal*, Spring 2018). Furlong says the ultimate goal is to produce a hand-held imaging system that can be used in a hospital or doctor’s office. He believes such a device will be able to provide diagnostic information in seconds.

—Michael Dorsey

[QUOTABLE]

“We were just scribbling some numbers in a notebook. Nothing too adventurous, no cliff jumping, no eating beetles, just some dimensional analysis. I remember feeling such a special type of happiness in that moment. There I was, using what I learned in class and applying it to **ACTUALLY MAKE A DIFFERENCE.**”

—Engineers Without Borders member Rosa Reynoso ’20, on the group’s mission to create a new water project in Ecuador. The students calculated water volume with nothing but a conversion table from the back of a composition notebook. The WPI-EWB Chapter has been working in Central America since 2009.



Initially **CELESTE MARSAN '19** wasn't sold on WPI as her choice for an undergraduate destination. But after spending a day touring the campus and interacting with the community, the university began to stand apart for its collaborative nature.

Applying as a biomedical engineering major, she quickly switched gears to chemical engineering when it became clear that biopharmaceutical engineering was where she felt most excited. Because of the switch, she now feels she can “take an advantageous interdisciplinary approach in confronting biopharmaceutical problems,” allowing her to think differently from colleagues and approach issues with new perspectives.

Initiated into Tau Beta Pi last fall, Marsan is now vice president of the engineering honor society at WPI. Throwing her hat into the ring of officers was inspired by her strong belief that interdisciplinary science is the best approach to current problems.

Looking to make friends within her new major, she also joined – and soon became VP of – the campus chapter of the American Institute of Chemical Engineers (AIChE). “One of the main reasons ... was for the mentorship opportunities, and chances to interact with faculty members.”

A smaller – but favorite – organization she's thrown herself into is the International Society for Pharmaceutical Engineering, of which she is currently president. The student chapter has a good relationship with the regional ISPE Boston chapter, says Marsan, “which presents great opportunities for networking and workshops with professionals who are working the jobs that we want five, ten, or more years after graduation. It has allowed me to build my professional network in a much greater way than any other organization.”

Marsan is targeting a PhD in biochemical engineering at WPI, with the hopes of performing research in biopharmaceutical engineering. In order to gain more experience in the field she's so enamored with, the inspired student decided to forego an internship; instead, she's been volunteering in Professor Eric Young's ChE lab group since sophomore year.

Throughout all her accomplishments at WPI, the biggest surprise for this exceptional undergrad wasn't discovered in a lab or textbook, but rather within herself.

“When I was filling out my college applications, I had no idea what to write about. I had never developed a real passion for anything,” she recalls. “At WPI, I've been able to explore various fields and organizations, and have built a passion for research, biotechnology, and helping others. It's so cliché to say that I “found myself” at WPI, but my experiences here have allowed me to grow an incredible amount, both personally and academically.”

HONORABLE MENTIONS: GOLDWATER SCHOLARSHIP NOMINEE • AIChE SOPHOMORE ACADEMIC EXCELLENCE AWARD • AIChE CHAPTER VP • ISPE PRESIDENT • TAU BETA PI VP • NATIONAL RESIDENCE HALL HON. PRESIDENT/FOUNDER • RESIDENCE HALL COUNCIL VP-MEMBERSHIP • WOMEN'S ULTIMATE FRISBEE VP, INTERIM PRESIDENT • STUDENT ACTIVITIES OFFICE LEGACY LEADER

LUCAS MANCINELLI '19

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Captain, WPI Club Hockey Team
Member, Greek Diversity and Inclusion Committee**

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WPI

CAREER PATHS

**NINE
REMARKABLE
JOURNEYS**

**ONE
SINGULAR
HONOR**

For young
tenure-track

academics, establishing an original and sustainable research program is a priority. And particularly in the STEM fields—where robust research programs can require materials, supplies, expensive equipment, and support for graduate students—winning external funding can be essential for career advancement.

Recognizing this challenge and wanting to help promising early-stage faculty members build a firm base for later achievements, a number of federal agencies and private foundations offer special early career awards—often multiyear grants that are designed to help rising faculty stars establish a trajectory for their careers as educators and researchers.

The Department of Defense's Young Investigator Awards, the Department of Energy's Early Career Research Program awards, and NASA's Early Career Fellowship programs are prime examples.

One of the best-known and most coveted young faculty honors is the five-year CAREER Award from the National Science Foundation (NSF). (CAREER is not an acronym, but is instead shorthand for the NSF's Faculty Early Career Development Program). Highly competitive (between 8 and 24 percent of proposals were funded in 2017, depending on the discipline), the CAREER Award recognizes men and women “who have the potential to serve as academic role models in research and education and to lead advances in the missions of their organizations,” according to an NSF webinar.

BY MICHAEL DORSEY | ILLUSTRATIONS CHIARA VERCESI

While the primary focus of a CAREER Award is research, recipients must demonstrate how they will integrate their scholarship with their teaching and public outreach. With the goal of helping develop outstanding scholar-educators, the NSF advises prospective applicants that it seeks to promote the kind of cross-fertilization “in which the process of discovery stimulates learning and assures that research findings are quickly and effectively communicated in a broader context and to a larger audience.”

WPI faculty members have received a steady stream of CAREER Awards since the mid-1990s, when the CAREER program was launched, typically at a pace of one or two awards per year (in recent years, a number of new faculty recruits have arrived with the prestigious awards already in hand, bringing the total of current faculty members who have earned the honor to 31). The past three years have brought a particularly impressive bounty, with eight new awards bestowed on WPI researchers. During the same timeframe, the university received its first U.S. Air Force Young Investigator Award.

WPI’s unusually strong recent showing in early career honors can be attributed, in part, to the university’s success over the past decade in recruiting exceptionally talented young faculty members, many of whom completed advanced degrees at the nation’s top research universities and most of whom had already built well-established and funded research programs, notes Bogdan Vernescu, vice provost for research.

“While focused on the promise of discoveries and innovations yet to come,” Vernescu says, “these very competitive awards also recognize talented researchers with demonstrated track records as researchers and educators. WPI’s recent success in winning these awards reinforces the judgment of the *Wall Street Journal*, which in 2016 ranked WPI No. 1 in the nation among universities with more than 1,000 students that do the best job of combining scholarly research with classroom instruction.

“These talented women and men have the experience, skills, and innovative spirit necessary to develop practical solutions to significant scientific, technological, and societal problems. I look forward to seeing what they do next.”

Here’s a brief look at WPI’s nine recent early career award recipients and the work they’re doing with their career-establishing grants.



Exposing Fakers

A famous *New Yorker* cartoon

shows two dogs at a computer. One says to the other, “On the Internet, nobody knows you’re a dog.” In fact, determining who is behind the information we encounter online and deciding whether we should trust it is becoming more difficult all the time.

With his award, Lee is attacking one of the practices behind the spread of malicious online content, including phony online news stories, fake likes on social media posts, and misleading reviews on online shopping sites. It’s called “crowdturfing,” and it involves recruiting confederates on crowdsourcing sites, where anyone can hire workers to complete small tasks for pay, to carry out the dirty work of planting fake information. Lee is developing algorithms that will cast light on these secretive activities, identifying the organizations that post the tasks, the websites the confederates are told to target, and even the hired hands, themselves. The hope is that by exposing the crowdturfers, he can help make the Internet a more trustworthy place.

Kyumin Lee, PhD
Computer Science
\$441,000
CAREER Award





Scarlet Shell, PhD
Biology and Biotechnology
\$1.1 million
CAREER Award

Bacterial Defenses


To treat many infectious diseases, doctors must do battle with a wily adversary. Over millennia, bacteria have gained the ability to endure all sorts of threats, including extreme cold and heat and the lack of food, water, and oxygen. Unfortunately, for afflicted patients, they have also acquired strategies for thwarting attacks from the immune system and the onslaught of antibiotic drugs. Shell, who gained first-hand exposure to the human cost of ailments like malaria and tuberculosis when she spent time as a graduate student in clinics in Peru, is using her award to probe the molecular changes that bacteria undergo when under stress. One of the most common survival strategies is to simply stop growing, a behavior that seems connected to modified instructions sent by the bacteria's genes in the form of messenger RNA. A better understanding of these and other genetic changes that bacteria undergo could lead to advanced treatments for diseases that take millions of lives each year.

Greener Fuels

Decades of burning fuels refined from crude oil have taken a toll on our environment and accelerated climate change. While it is unlikely that the demand for liquid transportation and heating fuels will go away anytime soon, Timko thinks there is a greener way to produce them. Locked into the biomolecules that make up the inedible portion of plants – known as lignocellulosic biomass after its two primary components, lignin and cellulose – are the ingredients for a new generation of biofuels, he believes. While methods exist for transforming that tough material into sugars that can then be refined into fuels, they are complex and costly, and require the use of highly toxic liquid acids. With his award, Timko is working to demonstrate that the breakdown of lignocellulosic biomass can be simplified by substituting solid acids, catalyze have long been used in chemical production and petroleum refining. Using solid acids to catalyze reactions in solid materials presents significant challenges, but if they can be overcome, Timko says, it may well be possible to produce biofuels that are competitive with, if not less expensive than, fossil fuels.

Michael Timko, PhD
Chemical Engineering
\$536,000
CAREER Award






Lyubov Titova, PhD
Physics
\$530,000
CAREER Award

Remarkable Materials

Since graphene, which consists of a single layer of carbon atoms, was first isolated in 2004, a number of other so-called two-dimensional materials have come to light. Many have intriguing optoelectronic properties that suggest potential applications in such areas as photovoltaics and chemical sensors. With her award, Titova will examine a new class of environmentally stable two-dimensional materials made from the Earth-abundant elements germanium, selenium, sulfur, and tin. These compounds are believed to have extraordinary properties, including high electric conductivity and robust room-temperature ferroelectricity (a spontaneous electric polarization that can be reversed by the application of an external electric field), which would make them prime candidates for new types of solar cells. Titova and her team will study the relationship between the structure of these unusual substances and their response to light using ultra-fast spectroscopic techniques that can capture events in the sub-picosecond and nanosecond timeframes. The research may help uncover new properties that could lead to a host of new applications.

Domestic Security



Through our two-way portals to the Internet, we bring a flood of news, entertainment, and information into our homes. If not properly guarded, those same doorways can let in unsavory characters, like hackers looking to steal our private information or turn our computers into “bots” with which to launch online attacks. Few homeowners have the knowledge needed to mount a robust defense, which is why the nation’s 54 million residential computer networks are among the Net’s weakest links. Shue wants to fix that. With his award, he is developing a groundbreaking approach to security that will use cloud-based providers and deployable security solutions to take the task of defending home networks out of our hands and outsource it to experts. The system will install updates to make our Internet routers smarter, and then compare the sites we try to reach—or those that try to connect to us—to a constantly updated list of bad actors. Like an algorithmic bouncer, it will let our friends in and keep our enemies at bay.

Craig Shue, PhD
Computer Science
\$508,000
CAREER Award



Ivon Arroyo, PhD
Social Science
and Policy Studies
\$587,000
CAREER Award

Playful Learning

In most elementary school classrooms, there is a time for play and a time for learning. But research by Arroyo, a computer scientist whose work embraces cognitive and educational psychology, shows that games can be a powerful tool for enhancing learning in mathematics. Arroyo has demonstrated that embodied games, which require students to move and gesture as they solve puzzles or tackle team-based math puzzles, can help students absorb and retain concepts better than more traditional classroom lessons. Engaging the muscles and the senses adds a new dimension to learning and appears to be particularly effective in keeping girls and underrepresented minorities, the students most likely to get turned off by math early on, from disengaging. In this project, students will play embodied games in groups while a software “engine” monitors their progress and their affect, offering instructions, feedback, hints, and encouragement through wearable electronic devices. The system will also track each student’s progress to help teachers visualize students’ performance, have open discussions, and personalize instruction.

Origami Robots

When most people picture robots, they see machines with rigid parts. The robots Onal develops are soft, which makes them safer to operate around people and capable of performing tasks that rigid robots can’t, like snaking through rubble to search for survivors. But the unique properties of soft robots – their ability to bend in many axes and change their shape – make them unable to carry heavy loads. With his award, Onal will build a new class of soft robots that marry the advantages of soft and rigid structures. To do so, he will draw on the techniques of origami, or paper folding. The robots will be built from modules made of thin sheets of plastic with carefully designed fold lines. The sheets’ rigidity will give the modules the ability to carry loads, while the folds will let them bend and be compressed. Onal envisions robots made up of multiple modules working alongside people in fields as diverse as medicine, manufacturing, and home healthcare.

Cagdas Onal, PhD
Mechanical Engineering
\$500,000
CAREER Award





Sarah Olson, PhD
Mathematical Sciences
\$400,000
CAREER Award

Modeling Marathoners

It's a race that dwarfs the largest marathons. To reach and fertilize a human egg, a spermatozoon must outrace about 200 million competitors and successfully navigate a course that spans about 1,000 times its own length. With her award, Olson is developing computational techniques that can provide greater insight into the challenges that sperm encounter on this journey. For example, many sperm seem to bind to the oviductal wall, which can slow them down, but the conditions that favor binding or that free sperm at the right time so they can continue on their way are not well understood. Important factors seem to include the cells' response to fluid flow in the reproductive tract and chemical and hormonal cues, so the mathematical models Olson is developing must combine physical and chemical inputs, which is challenging. The tools she's building will not only help illuminate the normal reproductive process, but provide clues about possible new treatments for infertility.



Networked Autonomy

In 2016 Cowlagi became the first WPI faculty member to receive a Young Investigator Award from the U.S. Air Force Office of Scientific Research. With the award, he is developing methods that will allow teams of unmanned aerial and terrestrial vehicles (UXVs) to cooperate as they respond to emergencies, including natural disasters. Cowlagi says UXVs are expected to play critical roles in emergency response in the future, performing two key jobs: mapping the extent of damage with aerial surveys and delivering food, water, medical supplies, and other items needed by victims. The tasks are interrelated, as maps can help delivery vehicles avoid flooding or other impassable hazards, so the algorithms that Cowlagi and his team will develop will integrate these functions through what is known as interactive planning and sensing. The research will address some of the fundamental challenges of getting vehicles to work together in uncertain or unknown environments so they can make the best decisions and reach the best outcomes with limited resources.

Raghendra Cowlagi, PhD
Aerospace Engineering
\$360,000 Air Force Young
Investigator Award



UNIVERSITY OF SAN FRANCISCO BIOLOGY PROFESSOR JULIET SPENCER '93 SITS ATOP LONE MOUNTAIN, ONE OF THE CITY'S HISTORIC HILLS THAT OVERLOOKS THE CAMPUS.

ON
THE
TRAIL
OF
A

**JULIET
SPENCER '93**

AIMS TO DETECT BREAST
CANCER BEFORE IT
BECOMES DEADLY.

BY ERIN PETERSON

PHOTOGRAPHY MATT FURMAN

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very year more than a quarter million American women are diagnosed with breast cancer. Another 40,000 will die of it. One in eight women will be diagnosed with the disease during their lifetimes.

But even for the millions of women who sidestep the disease, keeping tabs on cancer's whereabouts is a demanding and disagreeable task: women over 40 typically undergo uncomfortable mammograms every year or two. Millions receive "abnormal" results, requiring additional appointments, invasive biopsies, and weeks of stress from the uncertainty—even though a full 80 percent of those further test results are benign.

Ask University of San Francisco biology professor Juliet (Vescio) Spencer and she'll tell you that this messy, anxiety-producing process is ripe for change. And thanks to her groundbreaking biomedical research, she just may be the one to accomplish it. "My long-term dream is to develop a screen with a blood draw that women would have done when they get their mammogram. It would be as ordinary as a Pap smear," she says, referring to the routine test that has dramatically reduced the incidence of cervical cancer. "Those two pieces of information, the mammogram and the blood test, would provide a picture of what's going on in a much less invasive way than a biopsy."

A START IN BIOTECHNOLOGY

If she could not have exactly predicted that she would spend her career searching for ways to diagnose deadly diseases, she could at least see the hazy outlines when she applied to WPI.





SPENCER TEACHES GENERAL MICROBIOLOGY IN THE LO SCHIAVO CENTER FOR SCIENCE AND INNOVATION AT USF.



S

pencer, who grew up in Rome, N.Y., a few hours from WPI's campus, was drawn by the university's program in biotechnology, one of the first of its kind. She was also intrigued by its practical, project-based approach to learning. "I liked the small classes and great lab activities," she recalls. "We really got to do science."

She quickly saw success with this approach. As part of her MQP, she worked in the lab of biology professor David Adams, where she and a team of students helped clone the gene that produces a protein known as ependymin in an animal model. The protein is linked to memory formation and nerve survival, and several biotech companies were interested in exploring the possibilities it offered. "We eventually went on to identify, clone, and sequence the human version of that gene," Adams recalls. "It was a very exciting time in the lab."

That spark of excitement generated from real, hands-on work on relevant research was exhilarating. It guides much of the work she does today at USF. "I try to give my own students a similar experience by including them as we work on cool techniques, having them help with research projects, and giving them opportunities to develop marketable skills," she says.

DISEASE RESEARCH DESIGNED TO MAKE A DIFFERENCE

Spencer furthered her education at the University of Virginia, where she earned a PhD in microbiology. She specialized in virology, and was particularly interested in the

herpes simplex virus. Fascinated by the way the virus assembled and replicated, she used skills she'd acquired in electron microscopy and molecular work to explore its mechanisms.

While her work was basic foundational research, the undercurrent of potential practical applications buzzed just beneath the surface. "I wasn't screening for drugs, but I could imagine what that might look like," she says. "I could imagine the significant therapeutic potential for slowing down virus replication in people who are infected. That was something I liked."

The idea that her research could ultimately have a positive impact on human health fueled her. At a conference in California, she met up with a friend who worked at a start-up drug discovery company in San Francisco. "By the way," the friend said when they met, "we're hiring herpes virologists."

Spencer laughs when she recalls the conversation now. "Trust me, you don't hear that every day," she says. She applied for—and got—the job.

The start-up world in the Bay Area was particularly fizzy in the early 2000s, and it wasn't long before she landed another job working on similar problems, this time linked to cancer.

Again, she didn't stay long. It was 2002, the bubble that had kept so many companies afloat had burst, and Spencer saw the writing on the wall. But what she did take away from the experience has helped propel much of the rest of her career: an interest in a powerful and sometimes devastating protein known as CMV IL-10. (short for human cytomegalovirus interleukin 10).

ON THE HUNT FOR BREAST CANCER

Spencer enjoyed her time in the

start-up world, but she never forgot that her real goal was to get back to the academic lab. When a position opened at the University of San Francisco, she landed a coveted appointment that came with a small start-up package to launch her lab. There, she launched new research into CMV IL-10.

Unlike its helpful cousin IL-10, whose job includes sounding the alarm bells to prevent tumors in our body from spreading, this protein baddie tells our immune system that everything's just fine—even when it's not. While CMV itself—the virus that leads to the production of CMV IL-10—is quite widespread in humans, its troublesome side effects are seen primarily in immunocompromised people.

Spencer spent the first few years in her labs characterizing the protein, but she eventually got to wondering if there was a way to measure CMV IL-10 in blood. Could such information provide clues to diagnose—or track the progression of—certain diseases?

She landed a prestigious National Institutes of Health grant to pursue early work with cells in culture linked to this idea. Her research suggested that certain levels of CMV IL-10 could be useful for early detection of breast cancer.

The results were so promising that the Avon Foundation signed on in 2014 to have her lab develop a blood test that could measure CMV IL-10 and try to detect breast cancer.

The idea was clear and straightforward. But as in so much of scientific research, translating that idea to reality has proved a rocky path, Spencer acknowledges. The test itself was challenging to create, and working with local breast cancer support groups to collect blood samples has been time-consuming. When an unex-

pected shortage of samples made it difficult to analyze her data, she tracked down a store of samples through the U.S. Army's Breast Cancer Research Program—only to learn that getting all the approvals to use the information would take 18 months. She has met every hurdle with dogged optimism, recognizing that it's simply the price for accomplishing even bigger goals. "Reality is messy," she says. "But the results have the potential to take us to another level."

Spencer's resilience seems baked right into her DNA, says her husband, Jesse Spencer '93. "She's not afraid of failure," he says. "She treats it as an opportunity to learn and improve for next time."

It's that sense of persistence in the face of obstacles—and the overarching sense of the work's larger purpose—that she tries to instill into the many students she mentors, particularly the women. She makes introductions, suggests internships, and takes students to conferences, providing the connections and knowledge they need to excel at their next steps.

Spencer was instrumental not just in helping Katie Arnolds, a former student who is working on a PhD, learn the technical skills of her work, but also teaching her how to present her work as effectively as possible. Spencer would go through Arnolds's presentations slide by slide, making sure that each one had a clear and cohesive story. "She encouraged me to push myself, to take risks, and work hard," Arnolds says. "Following her guidance and being trained by her has given me a tremendous amount of confidence in my abilities to learn new things and really excel in the field."

Another of her former students, Carolyn Tu, says that Spencer's relentless focus on the potential impact of the work kept her



inspired—even when the work itself got frustrating. “Being a grad student in Dr. Spencer’s lab helped me keep sight of the bigger picture,” says Tu. “She’s always reminded us of the importance of connecting our research to public health.”

Spencer says that having an impact on the next generation of biologists is often just as rewarding as creating an elegant experiment or getting promising data from her work. “A big part of my job is being a cheerleader—to provide encouragement and support,” she says. “And I take that seriously.”

She’s been recognized for it, too. In 2009 she received the Ellen Weaver Award for mentoring women in science, an honor presented by Northern California Chapter of the Association of Women in Science.

As Spencer looks ahead, she is eager to make further strides to diagnose breast cancer early—research that has the potential to affect millions of women. While her most important work is in process, she is optimistic about its direction. “We still need to finish the data analysis and do rigorous statistical analysis, but the trends we’re seeing look promising,” she says.

For a disease like cancer, where early diagnosis and treatment can be the difference between life and death, the urgency and importance of her work couldn’t be clearer. “The more information we can provide to help women and their doctors monitor their health, the better,” Spencer says. “The goal, for me, is to use what we know to prevent disease, treat disease, and improve human health.” **J**

“IT’S MY PRIDE AND JOY,” SPENCER SAYS OF HER LAB’S LASER SCANNING CONFOCAL MICROSCOPE, A ZEISS LSM 700. FUNDED BY A GRANT FROM THE FLETCHER JONES FOUNDATION, WHICH PROVIDED NOT ONLY THE MICROSCOPE BUT HELPED RENOVATE THE LAB AND PURCHASED THREE MAIN INSTRUMENTS FOR HER STUDENTS AND HER RESEARCH TEAM.



Game Changer

INTERACTIVE MEDIA AND GAME DEVELOPMENT COMES OF AGE

BY JOAN KILLOUGH-MILLER | ILLUSTRATION MATTHEW MILLER

When the WPI faculty grappled with the idea of creating a new major in Interactive Media and Game Development (IMGD), some interesting conundrums arose.

Should we consider game development a threat to our existing programs, or should we consider game development an interesting new area of academic study?

One difficult issue was what to name the new major. There was some support for avoiding the word “game” in the title ... [to] avoid resistance on the part of parents.

WPI launched one of the nation’s first undergraduate degree programs in 2005, with graduate-level offerings soon following. Today, with more than 500 colleges offering courses in game design, and academic journals and conferences devoted to the discipline, some misperceptions still linger.

“When people think of this program, they picture the console games kids love to play,” says associate professor Jennifer deWinter, who serves as program director. “Society still has a stereotype of the gamer as a 17-year-old socially inept boy.” At admissions events, deWinter sometimes encounters dubious parents. “They only see the fact that their child enjoys playing *Halo*, for example—they don’t see the broad application of interactive media.” While IMGD students are usually passionate gamers, they are also artists, storytellers, musicians, and skilled computer scientists, preparing for professional roles in an industry that is defining new ways to engage with the world.

What follows is a mere sampling of the kinds of learning taking place in this space—and a few mind-bending games.

BE YOUR AVATAR (Adventures in the Multiplayer Classroom)

Professor of practice Lee Sheldon starts his class on writing characters by quoting from the classics: Plato, Homer, and Aristotle. He doesn’t lecture long. His students are soon swept away to the jungles of Costa Niebla, a made-up country in Central America. The class takes the form of a multiplayer adventure game, with the students swept up in a quest for relics of an ancient civilization. Their first task is to recreate themselves as avatars, which they describe in a short paper, then introduce in class. “Do not merely read,” the instructions for this assignment demand. “Be your avatar. Dress accordingly.” Props are encouraged. Real names are left behind.

They are playing to win from the start, accumulating XP (Experience Points) as they work their way up toward Level Eight (to pass the course), through written assignments and presentations. Working solo and in “guilds,” they solve puzzles, navigate hazards, and respond to unforeseen events. The smart ones have already scored 5 XP for having the book (print or digital) by the first day of class. The text is Sheldon’s *Character Development and Storytelling for Games*.

Sheldon has also shared his “class as a game” methodology with the world through his book *The Multiplayer Classroom*. “They’re learning almost without realizing it,” he says. “We have yet to discover a class that cannot be taught this way.”

PLAYING FOR CHANGE (Justice and Inclusion—Through Games)

Using games to raise social awareness isn’t a new notion. The classic

board game *Monopoly* (called “The Landlord’s Game” in the original 1903 version) was created to expose unfair economic practices. In the 21st century, assistant professor Alexandrina Agloro’s students are asked to look into their own presumptions about the world they inhabit, and to put computer games to use in the fight against injustice.

They begin by considering questions like “When did you first know you had a race?” They make board games about their families’ journey to the United States. They formulate games that factor in the needs of different people’s bodies. Agloro’s goal is to help them understand that what seems normal, or neutral, to them is not to someone else. “Every media piece is embedded with social commentary of some sort, with the biases and interpretation of the maker,” she says. “There’s no such thing as a neutral artifact.”

Making assumptions about what’s normal can be disastrous in engineering. For example, airplane cockpits were originally designed for a pilot of “average” height—a one-size-fits-all approach that caused many crashes, until adjustable seats or pedals became standard. Agloro notes that facial recognition software was initially unable to read darkly pigmented skin.

In class, they critique each other’s game pitches in a Project Runway-type showdown. Winners are exempted from creating and presenting a new game design the following week. (The seven-week term is too short to build a playable game, but the students write them up as game design docu-



Society still has a stereotype of the gamer as a 17-year-old socially inept boy.

ments—which serves as valuable career preparation.) “It would be our failure as educators not to prepare them for the market as it exists and see how they can be different in it, and demand difference,” says Agloro.

For the last two years, WPI students have been selected to attend the prestigious Game Developers Conference as Different Games ambassadors. WPI recently became the new home of the Different Games Conference to be held Oct. 12–14, a celebration that brings together those working toward diversity and inclusivity in games and game culture.

“We are creating critical thinkers,

*We are
creating
critical
thinkers,
not just
mindless
entertainment.*

not just mindless entertainment,” says Agloro. It’s the immersive nature games, she says, and the process of making choices that make you think about something greater than yourself.

“Everything I do in my work is aimed toward ‘How do we emancipate people? How can we work toward liberation of oppressed people?’ To me, games have the ability to have that impact.”

**VIRTUAL GREASE MONKEYS
(Looking under the Hood of
Interfaces—and the Industry)**

The joy of playing games is quite different from the work of building them. WPI computer science

instructor/lecturer Jeff Kesselman puts it this way: “It’s like teaching filmmaking to somebody who loves movies, who has only ever gone to movies, but has never been behind the camera.” He points out that IMGD majors in the technical track learn to write solid, efficient computer code, and that a number of computer science majors choose to minor in IMGD. “What we do,” he says, “is layer the ‘special sauce’ on top.”

Kesselman’s students explore virtual reality and the devices that interface between the human body and the computer. In class they analyze high-end commercial interfaces that make adventure games



*The only reason to do
games as a career is
because you can't imagine
doing anything else.*

so exhilarating, and programs like *Rock Band* so resonant. Then they design and craft their own. They learn basic electronics skills, draw circuitry diagrams for their concepts, and use a prototyping system to assemble their gadgets. Their dreams are made of \$10 microcontrollers and plywood—or even a cardboard box as housing.

“Not everyone gets to the point of a durable, solder-wired product,” he says, and that’s fine with him. “They get a B just for getting it working.”

Teams have produced a self-contained sonar sweep module, and an interactive screen version of the old pencil-and-paper game *Hangman* that lets you select letters and draw the gallows.

It’s not enough for developers to know how to use a game engine, Kesselman says. The game industry needs expert software engineers who know how it’s built, and where to look when things go wrong. “If you’re a trucker, you’d better understand the basics of engines,” he says. “On the road, that truck might fail, and you may have to get out of the cab and lift the hood and get it running again—at least enough to get it to a garage.”

He predicts that this crop of students will graduate positioned

for an explosion in the VR market, driven by more affordable headsets and other devices. But he tempers that with the wisdom from his 25 years in the industry. “The only reason to do games as a career is because you can’t imagine doing anything else. You wake up in the morning thinking about it. You go to bed thinking about how to do it better.”

THE HUMAN FACTOR

While other schools teach game development as a computer science discipline, deWinter points out that WPI’s IMGD program is a joint venture between humanities and arts and computer science. True to the WPI Plan, the curriculum integrates technology, vision, and aesthetics, and also requires students to understand how their technological innovations will affect users. “From the start, we felt very strongly that videogames and interactive media were expressive technologies, and that the human was the center of it. What experience do we want the human to have? And how do we create systems to allow that those experiences? Those are ultimately humanities-based questions.” **J**

MADE AT WPI

GEOSTAGE

MAKER: BRIAN KEELEY-DEBONIS

Described as “the ultimate social gaming experience,” GeoStage allows you to play tag with your friends, no matter how far away they live. The positions of the other players are translocated to your perspective, making it appear to each player that the activity is taking place at his or her location. The current platform supports two variations: Battle Royale and Assassin.

GOTTA GO

MAKERS: LEO BUNYEA, BRIAN RUBENSTEIN

After a long flight to Raleigh-Durham International Airport, characters with different gender identities and personalities must find a restroom they can comfortably use before their bladders explode. The game blends humor with the difficult scenarios posed by “Bathroom Bills.” Built as a board game, Gotta Go showcased at last summer’s Games for Change Festival in New York City, with a lightning talk by Professor Lee Sheldon on the powerful analog games created by his students.

PALACE OF THE MONARCH

MAKERS: JING XIONG, BOLIN ZHU


Set in a Ming-era palace, with haunting Chinese music, this game brings Chinese history, aesthetics, and design to a U.S. audience. Players follow clues to solve the mystery of what happened at the palace. “But don’t stay too long. The night is not what you want!” the screen cues warn. The VR aspect heightens the sense of an eerie but magical environment.

STEP SYMPHONY

MAKERS: MARCO DURAN, LILYANNE LEWIS, SIENNA MCDOWELL

Developed at WPI’s Osaka, Japan, Project Center, this location-based augmented reality app introduces users to Central Kyoto. Players use their phones to locate and catch runaway creatures known as *kyobubou* (short for “musical candy.”) By following the music of the hidden creatures—and then playing tunes with them—players can subdue the colorful animals and lead them back to where they belong. Along the way, users learn about different Japanese musical traditions and historical sites in the region.





Ntohmchukwu Izuchi '09 (management engineering) and '11 (biomedical engineering) is the son of Nigerian immigrants who met in the US. His professor father and microbiologist mother had high expectations for NT (as he's called). And although his path has shifted from engineer to internet marketing guru, they have every right to be proud of his young career.

NT arrived at WPI from STEM-focused O'Bryant School of Math and Science in Boston. It was basketball coach Chris Bartley who offered what he felt could be a long-term leadership role within the WPI community. "Committing to WPI wasn't a very hard decision when Chris recruited me to play for and represent the university as a student-athlete," he recalls.

Initially drawn to a management engineering degree due to its dynamic curriculum, he was exposed to a multitude of business-related disciplines, especially ones with an entrepreneurial spirit. "It was a physiology and engineering class taught by Professor [Glenn] Gaudette, mixed with a bit of encouragement from my super-supportive parents, that really solidified my desire to dive deep into biomedical engineering and take it on as a second major."

Upon graduation, Izuchi entered the engineering field, earned a master's degree from Brown, and added "ghostwriter" for an executive leadership team to his growing resume. "While each experience helped me grow as an individual and taught me invaluable lessons," he says, "they also left big question marks about my life goals and the impact I wanted to make."

During this turning point, Izuchi looked back on the lessons learned at WPI. From the classes he took, to those who mentored him along the way, he says he realized that although diligence and relentless dedication to your personal development is essential, contributing to the growth of others is a much more attractive characteristic.

"I believe one of the distinguishing factors between good engineers and great ones is the ability to see the challenges at hand from an unconventional perspective," he says, "and to reverse engineer the current solutions to create better, more innovative ones that address the direst of challenges."

Now as a video content influencer, he helps entrepreneur coaches and consultants create video content for social media to broaden their reach and establish themselves as credible experts in their respective industries. "I'm a firm believer in doing things that you love and enjoy," he says. "It's also doing those things with passion, and—from a personal standpoint—digital marketing, using social media to deliver powerful messages, personal growth, and leadership development all fall into that category."

A mission-critical task for Izuchi at the moment is to continue to grow his business coaching practice at by way of guiding and presenting others with the opportunity to make their passion and life-calling a career. He is also seeking mentors, mentees, public speaking engagements at business events such as Hubspot's Inbound 2018 "or," he points out, "anywhere that my message may inspire people to be the best version of themselves."

Learn more about NT at ntizuchi.com.



SO FAR, 35 SATELLITE MODELS HAVE BEEN PRODUCED, EACH ITERATION BUILDING ON LIKENESS AND DURABILITY OF USE. THE MODEL ALLAN IS HOLDING IS PLANET'S 1:1 SCALE MUSEUM VERSION.



Planetary vision

SPACECRAFT ENGINEER **allan sword '04** PUSHES TECHNOLOGY INTO SPACE BY AMY CRAWFORD | PHOTOGRAPHY MATT FURMAN



HANGIN' OUT IN THE PLANET LOBBY.

the

first photograph of Earth from orbit, taken nearly 60 years ago from an altitude of 17,000 miles by NASA's Explorer 6 satellite, showed a crescent of sunlight gleaming off the Pacific Ocean. It was a major milestone, although to an untrained eye the blurry black-and-white image, which took 40 minutes to transmit to scientists on the ground, didn't look like much.

But satellite imagery has changed considerably since then. And today one WPI alumnus is helping the technology advance well beyond anything NASA scientists could have imagined back in 1959.

Allan Sword is a spacecraft engineer at Planet, a San Francisco-based start-up that sends flocks of miniature satellites into space to provide continuous, detailed coverage of the Earth. Lightweight and cheap to launch, yet equipped with advanced optics, some of the satellites capture photographs at a resolution high enough to show vehicles on a highway. Because there are so many of them in orbit—nearly 200 at last count—Planet's satellites can image the entire Earth's land mass every day. Their potential services range from mundane—helping retailers track traffic flow in their parking lots—to crucial, such as monitoring toxic waste spills and refugee camps.

"The way satellites have worked in the past is that someone decides where a satellite should look, and a satellite is pointed there and takes a picture as it passes over," he explains. "That can take a while. But our satellites allow for a much faster pace—you can track changes on the ground daily, and even more often in some places."

Since joining Planet last year, Sword's focus has been on streamlining the process for environmental testing and integrating new hardware into the company's testing facility. He has spent most of his career designing and testing sensitive equipment for use in perhaps the toughest environment imaginable: space. It's not exactly where he thought he would end up with his mechanical engineering degree, but the summer before his senior year, an internship hooked him on the unique challenges of designing and building spacecraft.

"With spacecraft, you're often trying to push technology past where anyone else has taken it," Sword says. "And it needs not only to work, but to work for several years in an environment where you can never go back and fix a mistake. That has always been fascinating to me."

HANDS-ON

In space, temperatures fluctuate between scorching heat and bone-chilling cold, while damaging solar radiation batters anything that ventures beyond Earth's protective atmosphere. And before a spacecraft even gets into orbit, it must withstand the intense vibrations and pressure that comes with launching at thousands of miles per hour. That means anything built to go into space must be tested extensively, to ensure that it can withstand the extreme conditions.

Some of the equipment in Sword's environmental testing lab might be familiar to anyone who has spent much time in Higgins Labs—vibration and shock tables, strobe light testers, vacuum chambers, and equipment for inducing extreme temperatures. A typical day involves meeting with the team to plan for tests and discuss whether they need to develop new technology to assess the latest generation of satellites. It's a hands-on job, although he says that will likely alter-

nate between more design work as the needs of the growing start-up evolve. Today, however, as much as 80 percent of his time involves working with hardware—something, he reflects, for which WPI prepared him well.

"Probably the most valuable thing I gained from my undergrad years at WPI was the hands-on experience," he says. "There's just a lot of things that aren't obvious until you actually try to do it with your hands."

In fact, it was at WPI that Sword first realized a fundamental truth of mechanical engineering: It is possible to design something that may be impossible to build.

"It's actually very easy," he says. "And one of the only ways to learn that lesson is to do it—start to build something and you may realize that this thing that seemed like a great idea on the computer or on paper doesn't work when you [try to] build it."

That first dawned on him when he was working as a research assistant in a WPI lab, where he was asked to build a fixture that would hold a laser and keep it from vibrating during use. He created a design in CAD, then built it in the machine shop. He tried to put it together—but it didn't fit. After struggling to modify the apparatus, he sat down with his advisor, Professor John Sullivan, who went over the process and helped him figure out how he could have done things differently.

"I tried again," he says, "and by understanding some of the parameters I skipped over the first time, I made it work. I had spent days trying to modify the previous version, but it turned out that if I had spent a few extra hours up front, I would have saved a lot of time in the end. That was the first time I went through that. It was actually a great experience."

Sword had come to WPI intending to study nuclear engineering—an interest that had been sparked when two nuclear engineers visited his high school to give a talk. But he soon decided a broader base would serve him better if he changed his mind about his career path, so he chose to major in mechanical engineering. His internship assignment—at MIT's Lincoln Laboratory, the research and development lab that focuses on aerospace and other areas of importance to national defense—also served as his MQP. He worked with a partner designing a fixture to hold equipment for shock and vibration testing.

"For what it's worth," he notes, "that fixture is still being used at Lincoln Lab for testing rack-mounted hardware."

The internship/MQP led to a post-graduation job, and Sword spent much of the next decade as a thermal engineer at Lincoln Laboratory, where he analyzed designs and managed environmental testing for satellite payloads, flight hardware, and other equipment.

He then set his sights west, first taking a job at Ball Aerospace in Colorado and then (after picking up a master's degree in space systems engineering at Johns Hopkins) joining Google, where he worked on unmanned aerial vehicles and delivery drones.

Along the way, he picked up another fundamental principle of engineering: the art of good enough.

"The right answer isn't often the perfect answer," he explains. "That could lead to over-design. Understanding when you've reached the right level of effort to get what's needed is better than getting something that's perfect but took twice as long. That's especially important



for spacecraft, because we're usually trying to push the technology, to make it lighter or cheaper. But you need to understand what the goal is, and work toward that goal, rather than working to the pinnacle of that particular technology. That's something I wish I'd learned earlier in my career."

At Planet, smart design and the art of the good enough—a focus on technology that is small, cheap, and quick to build—has helped enable the company's team of engineers to rapidly expand the number of satellites observing Earth. Until recently, only nine satellites were taking high-resolution images for the commercial market. And that market was controlled primarily by the U.S. government, which demanded priority over anyone else who might want to order a satellite image. That meant that for a company, academic institution, or non-governmental organization, it could take months to get a picture of a specific spot.

Planet, which was founded in 2010 by former NASA scientists and which launched its first satellites in 2013, has already changed that. Its signature Dove satellites are about the size of a shoebox, with wing-like solar panels that give the technology its name. Its SkySats, acquired when Planet purchased Google subsidiary Terra Bella in 2017, are the size of a dorm room refrigerator. While the company will not say how much they cost to build, it's clear that Planet's technology is much easier to get into space than traditional satellites, which can be as large as a truck. Dozens of Doves can be packed into a single payload, and more are being launched all the time.

Each Dove captures and transmits 10,000 photos a day, and the company's imagery is available to clients from many different industries, including defense, insurance, and energy. Academic and nonprofit clients can gain access for free.

"To me, one of the coolest things is being able to help farmers optimize their crops," says Sword. "If you were able to take pictures only once a month, farmers could see what had happened last month, but that may not be good enough to be able to keep up with the changes they would need to make in irrigation or harvesting schedules. We can provide a completely new level of access, and it's something that no one would have spent a lot of time or effort on in the past because of the cost. But when you think about it, what's more important to our society than food production?"

For Allan Sword, it's thrilling to think that spacecraft he has tested and perfected over the past 15 years are still orbiting thousands of miles overhead, continuing to function in the harsh environment of space—in large part because his environmental testing proved they could. While much of his past work is classified because it involved government contracts, the technological advances he has helped bring about have doubtless added much to our understanding of both outer space and life on Earth.

"I don't know exactly where a lot of what I've worked on is now," he says, "but it's definitely interesting to think about everything we've been able to learn from sending that technology into space." **J**



[FACULTY *snapshot*]



PHOTOS PATRICK O'CONNOR

Patricia Stapleton Director of the Society, Technology, and Policy Program

ON TRICIA'S BULLETIN BOARD:

THANK YOU CARD FROM THE MODEL UN TEAM I ADVISE THE MODEL UN CLUB ON CAMPUS, AND THIS WAS A NOTE FROM THE OUTGOING PRESIDENT, THANKING ME FOR MY SUPPORT IN HELPING THE CLUB MEMBERSHIP GROW OVER THE LAST SEVERAL YEARS.

2017 FACULTY CONVOCATION PROGRAM LAST YEAR, I WAS THRILLED TO BE AWARDED THE ROMEO L. MORUZZI YOUNG FACULTY AWARD FOR INNOVATION IN UNDERGRADUATE EDUCATION AT WPI. THE AWARD COMMITTEE RECOGNIZED THE WORK I PUT INTO DEVELOPING AN INTERNATIONAL RELATIONS SIMULATION FOR WPI STUDENTS.

"EVERYTHING COMES TO HIM WHO HUSTLES WHILE HE WAITS."

I KEEP THIS THOMAS EDISON QUOTE VISIBLE FROM MY DESK AS A REMINDER THAT SUCCESS COMES FROM HARD WORK, NOT FROM WAITING FOR GOOD THINGS TO COME TO YOU.

WOMEN ALSO KNOW STUFF

STICKER THE GOAL OF THE WOMEN ALSO KNOW STUFF INITIATIVE IS TO PROMOTE AND PUBLICIZE THE WORK AND EXPERTISE OF SCHOLARS IN POLITICAL SCIENCE WHO IDENTIFY AS WOMEN. I JOINED THE BOARD THIS YEAR, AND AM EXCITED TO BE WORKING TO HELP REDUCE GENDER BIAS IN MY DISCIPLINE.

URSINUS COLLEGE STICKER

MY UNDERGRADUATE ALMA MATER. I LOVED THE SMALL CAMPUS AND THE COMMUNITY IT SUPPORTED. I SEE THAT TYPE OF COMMUNITY HERE, AND IT'S WHAT DREW ME TO WPI.

NEWSPAPER CLIPPING OF OPINION PIECE FROM THE WORCESTER TELEGRAM

I PUBLISHED AN OPINION PIECE DURING THE FALL HURRICANE SEASON, DRAWING UPON MY RESEARCH ON RISK MANAGEMENT AND MAJOR STORMS, TO URGE AMERICANS TO SERIOUSLY CONSIDER THE IMPACTS OF CLIMATE CHANGE AND TO TAKE ACTION TO REDUCE THEIR SEVERITY.



EARTH WITNESS BUDDHA

A WOODEN STATUE OF THE BUDDHA, IN THE MOMENT OF ENLIGHTENMENT, WHEN HE CALLS UPON THE EARTH TO BEAR WITNESS. IT NOT ONLY SYMBOLIZES STEADFASTNESS, BUT ALSO OUR CONNECTEDNESS TO THE EARTH AND TO NATURE, WHICH IS A THEME THAT FREQUENTLY APPEARS IN MY ENVIRONMENTAL STUDIES RESEARCH.

GLASS LADYBUG FROM THE ISLAND OF MURANO

A SOUVENIR FROM A TRIP ACROSS NORTHERN ITALY WHILE I WAS WORKING ON MY DOCTORAL RESEARCH ON FOOD SAFETY REGULATION IN THE EUROPEAN UNION.

PAPERWEIGHT / NAMEPLATE

THIS NAME PLATE WAS MY DAD'S AT HIS FIRST JOB. HE DIED BEFORE I FINISHED MY PHD, SO MY MOM HAD MY NAME PUT ON IT AS A GRADUATION PRESENT AND A REMINDER THAT HE WAS PROUD OF MY ACCOMPLISHMENTS. AS A FIRST GEN COLLEGE STUDENT, IT MEANS A LOT TO SEE SOMETHING REPRESENTING MY FAMILY BACKGROUND ON MY DESK EVERY DAY.

ALDEN SOCIETY MEMBERSHIP DRIVE

In 1966 Floyd Wyczalek '46 and his team developed the world's first hydrogen fuel cell vehicle, the GM Electrovan.

Today, Wyczalek inspires a new generation of WPI students through the Floyd A. Wyczalek Science & Engineering Technology Scholarship.



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?*

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

***"It is incumbent upon
WPI alumni to attract and
inspire potential STEM
undergraduates."***

– Floyd Wyczalek

FOR MORE INFORMATION

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

FROM THE
DESK OF
David Wheeler '93, '04 MS
Alumni Association President

TO DO-

- ✓ Review all the fun from Alumni Weekend-
wpi.edu/+alumniweekend
- ✓ Make your gift to the WPI Fund before
June 30-wpi.edu/+give

CONGRATS TO-

OUR ALUMNI AWARD RECIPIENTS! (SEE PAGE 48)
CLASS OF 2018-newest members of the WPI Alumni
Association!

ALUMNI ATHLETES who participated in the Goat
Nation Giving Challenge and raised \$30,000 for the WPI
Fund for Athletics! (see page 49)

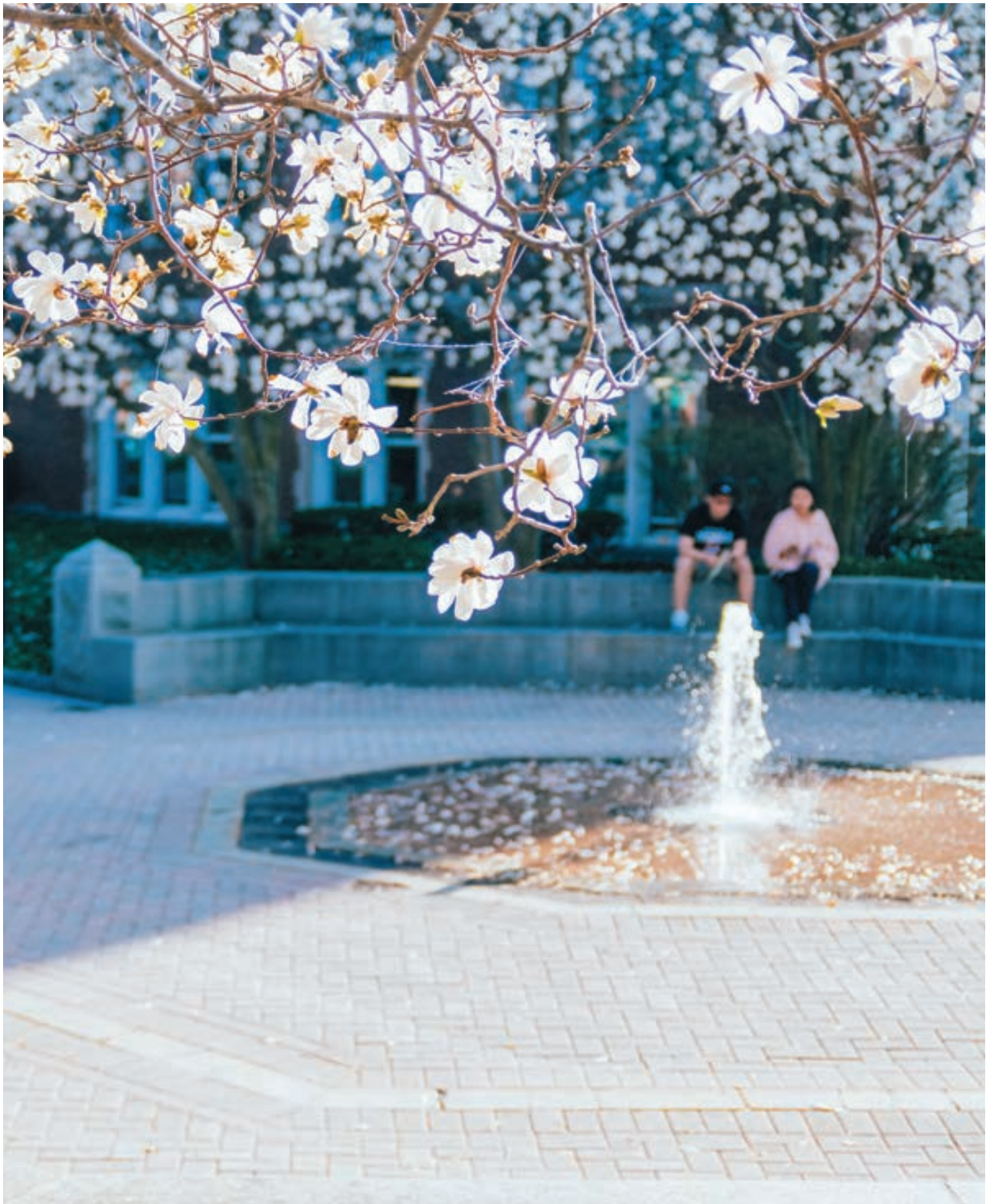


ENJOY THE SUMMER!

DW '93'04
wheelerda@alum.wpi.edu

COMING SOON-

✓ HOMECOMING,
OCT. 26 AND 27-
SAVE THE DATE!



\$12 Million Anonymous Gift

SUPPORTS WPI'S STRATEGIC PRIORITIES

WPI has received a historic \$12 million commitment from an anonymous donor. It supports the university's endowment and is unrestricted, meaning the university can apply the endowment earnings from this gift for its highest priorities and aspirations.

"We are honored and deeply grateful to this donor for such generosity," says President Leshin. "A gift of this magnitude has the potential to truly transform WPI. To entrust the university with these funds demonstrates this donor's confidence in WPI's reputation and our potential for even greater positive impact on the world."

"This gift raises WPI's sights for philanthropy," adds William McAvoy, vice president for university advancement. "This donor is an inspiration to our community to participate in WPI's long and proud

tradition of philanthropy."

The donor wishes to remain anonymous. However, Lisa Maizite, assistant vice president for development, notes that his story is typical of so many WPI graduates and supporters: he was recommended to WPI by a high school dean, and once here found the rigorous curriculum quite challenging; his career included military service and then he followed in the footsteps of a parent; he is a professional committed to substance over accolades; and his planning and investing acumen resulted in sizeable savings. He has come to every reunion since his 20th, and with no other beneficiaries, there was one clear choice as to where to direct his savings.

"WPI has a special place in my heart," the donor says. "It was the best option for me to make my contribution."

Phil Ryan '65, WPI trustee emeritus, former Board chair, and longtime supporter of the university, sees in this generous act the donor's appreciation for his WPI experience and what the university has meant to him over the years.

"Here is someone showing his gratitude and paying it forward in a most impressive way," says Ryan, adding that the anonymity of the gift is among the highest forms of philanthropy.

Ryan hopes the WPI community is inspired by this show of support for the university.

"WPI is making such a huge impact on its students – with its research, through its Global Projects Program, and in so many other areas – that it has earned the right to ask its alumni and friends for their support of time, talent and treasure," he says. "This gift is a

tremendous demonstration of such support."

In expressing his appreciation, executive vice president and chief financial officer Jeffrey Solomon emphasizes the importance of unrestricted gifts to the university. Such donations, he says, enhance WPI's financial flexibility "to allocate resources to our most strategic priorities."

"Unrestricted gifts of this magnitude enable WPI to invest in existing innovative programs as well as support new ideas to further enhance the educational experience for our undergraduate and graduate students," says Solomon.

"The university is humbled that this donor has chosen to support his alma mater in such a significant and meaningful way," adds Maizite. "His thoughtfulness and generosity will forever be remembered."

**"A gift of this magnitude has
the potential to truly transform WPI."**

–Laurie Leshin

THE WPI ALUMNI ASSOCIATION CONGRATULATES ITS

2018 ALUMNI AWARD RECIPIENTS

These individuals have distinguished themselves in their profession and in their service to the university. They bring pride to the entire WPI community.

JOHN BOYNTON YOUNG ALUMNI AWARD
for Service to WPI

Arly C. Dungca '08

WILLIAM R. GROGAN AWARD
for the Support of the Mission of WPI

John H. McCabe '68

ROBERT H. GODDARD AWARD
for Outstanding Professional Achievement

Maria Elisa Carvajal '88
Lynn M. Foden '03 MBA
Bari Hamami '93
Steven P. Vassallo '93
Wesley P. Wheeler '78
Robert D. Woog '68

HERBERT F. TAYLOR AWARD
for Distinguished Service to WPI

George F. Gamache '68 (posthumously)

ICHABOD WASHBURN YOUNG ALUMNI AWARD
for Professional Achievement

Jeevan Ramapriya '98
Nina Simon '03

THESE AWARDS WERE PRESENTED ON SATURDAY, JUNE 2, DURING ALUMNI WEEKEND 2018.

Find highlights of the awards ceremony and the weekend at wpi.edu/+alumniweekend.

Visit wpi.edu/alumni/awards to learn more about the awards and to nominate someone for recognition.

Alumni Benefits & Resources

Take advantage of these services and programs offered by the Alumni Association and Office of Alumni Relations, including a variety of insurance products through Liberty Mutual.

Centennial Walkway • Alumni Career Services • Alumni Directory
Insurance Program • Gordon Library • WPI Ring Program • WPI Merchandise

More at wpi.edu/+alumnibenefits



WPI



CELEBRATING DONOR IMPACT

Annual Scholarship Dinner Highlights Meaning of Philanthropy and Gratitude

“All I ask is that someday when you’re able, please give back and support the next generation of WPI students.” The year was 1996, and Edward Sydor ’50 spoke those powerful words to industrial engineering major (then a junior) Deborah Foley. Twenty years later, that is exactly what Deb Foley McManus ’97 has done.

McManus, a supporter of the Rev. Peter J. Scanlon Endowed Scholarship, was a featured speaker at this year’s Scholarship Dinner, held recently in the Rubin Campus Center. The annual event celebrates WPI’s scholarship donors with an evening of recognition and gratitude.

The granddaughter of immigrants and the first in her family to attend college, McManus explained that she could not have attended WPI without scholarship support and added that she was so grateful she maintained a friendship with Sydor and his

wife, Millie, for the remainder of their lives. Today McManus develops solutions to some of the world’s most pressing security challenges and credits her donors and WPI with much of her success.

“The aftermath of 9/11 called for tremendous change in security detection and screening technology,” remarked McManus, “and I thank my scholarship donors and WPI for preparing me to be a part of that change.”

Biomedical engineering major Jacquelyn Claveau ’18 addressed the crowd next, sharing that as a personal care attendant for a below-the-knee amputee, her goal is to improve the prosthesis experience for users. A recipient of the J. Honor Tracy Endowed Scholarship, Claveau offered that donor investments in a WPI education yield returns well beyond the campus borders. Speaking on behalf of her fellow scholarship recipients, she said, “The tenet of theory, practice, and impact takes root in WPI students, enhancing all facets of research and innovation, as we

bring meaningful contributions to our professions of choice worldwide.”

Stephen Foley ’18 closed the evening’s program with an impassioned promise to pay his scholarship support forward. The biochemistry major is the recipient of the Leonard and Ann White Endowed Scholarship. Although his donors have passed away, Foley had the opportunity to thank their son, David White ’73, and his wife, Shirley, who attended the dinner. With plans to earn his PhD and MD, Foley described the great rigors of WPI’s curriculum as both challenging and rewarding for himself and his peers. Acknowledging that scholarship support is the reason he and the majority of his fellow scholarship recipients are able to attend WPI, Foley closed the evening with a moving message to every WPI donor: “Your support demonstrates that you are in our corner for the long run. On behalf of the entire WPI community, thank you for believing we can – we promise we will.”

—Sira A. Naras



GOATS GIVE BIG

For 12 days in March alumni student-athletes participated in the first-ever Goat Nation Giving Challenge—and they gave big. Some 544 alumni raised over \$30,000 for the WPI Fund for Athletics.

The five teams with the highest alumni giving rates won a share of \$10,000 for their teams:

M/W Rowing: 21%, \$3,000

W Soccer: 18%, \$2,500

Field Hockey: 14%, \$2,000

W Basketball: 12%, \$1,500

W CC/Track&Field: 11%, \$1,000

“To have more than 10 percent of our alumni athletes participate in this giving challenge is a great response and speaks volumes about the value they place on their WPI athletics experience,” says Dana Harmon, director of physical education, recreation, and athletics. “Our student-athletes and athletic programs are able to achieve excellence because of the ongoing support from our alumni and friends.”



REBECCA BRENNER AT HOME IN PENNSYLVANIA WITH HER FATHER'S SCULPTURES AS AN IMPRESSIVE BACKDROP.

FORGING FRIENDSHIPS

BY ANDREW FAUGHT

When retired Drexel University humanities professor Bernard Brenner died in 2004, a letter of condolence arrived in his daughter's mailbox in Mohnton, Pa. The sender's name was unfamiliar to Rebecca Brenner. But it wouldn't be for long.

Behind the sentiments was one of her father's former students, Diran Apelian, now the Alcoa-Howmet Professor of Mechanical Engineering and founding director of the Metal Processing Institute at WPI. As an undergrad at Drexel, Apelian had taken a sculpture course from the man he credits with opening his eyes and his heart to the world of art.

"Bernie encouraged me to pursue my sense of aesthetics and style," he says. "His words and encouragement changed my world and provided an enriched dimension of life."

Soon the daughter and the protégé would strike up a friendship. But Apelian's note, which was as much thanks as it was consolation, would amount to something far greater. In 2008 Brenner, after a discussion with Apelian, and with his assistance, gifted 73 of her father's sculptures — most of them welded, forged steel and cast bronze — to WPI. The works can be found across campus, the largest display forming the Brenner Sculpture Collection at Gordon Library.

"They just gratefully received the pieces and established the permanent collection," Brenner says.

She's taking her connection with WPI a step farther. Last year she established the Bernard Brenner Endowment for the Metal Processing Institute, which Apelian founded and directs. She is now in the process of creating the Bernard Brenner Endowed Scholarship Fund for student tuition assistance.

"I'm the remaining member of my family, and I don't have children of my own," Brenner says. "I've been driven by the need to leave the Bernard Brenner mark someplace."

Her father, she says, was driven by a compulsion to create at his Arcola, Pa., home, which included a foundry. "Any artist will tell you they 'just have to do' their art. He taught so that he would have income to support the family, but he was always working in his studio and he was totally absorbed in that work. It's a great part of his persona."

Many of WPI's Bernard Brenner sculptures were forged between the late 1950s and the mid-1990s, his daughter says. "They are abstract, although strongly figurative," she adds. "He was fascinated by mythology, warriors, and other cultures. He loved experimenting with many different kinds of media, but it was always the steel and the bronze that he would come back to."

In a 1973 Drexel publication, Bernard Brenner was asked to identify his favorite piece.

"He said his favorite is 'the next one,' always the next one," she says. "That says something about the compulsion of always being on a quest."

Brenner frequently opened his studio to students and members of the public who wanted to explore their own artistic sensibilities. At Drexel, he won the Best Teaching Award on multiple occasions, something Apelian highlighted in his letter. His daughter remembers his tutelage as well, including his showing her how to pour molten metal into hardened plaster molds. "That [the pouring of bronze] was always a fascinating and magical time," she recalls.

Bernard Brenner bartered for services in exchange for sculptures. His daughter's orthodontia, for example, was paid for with artwork. "He was prolific," she says, estimating the number of pieces he completed in his lifetime to be "in the four figures." She donated slides of a wide body of her father's work to WPI, "in the event that someone wants to research my dad."

The gifts — the sculptures and the endowments — are an appropriate way to honor her father's legacy, Brenner says.

Apelian agrees. "Bernie loved metals, he loved the processing of metals, and he gave metals a life of their own," he says. "His impact will be with us forever."

If you would like to reach Ms. Brenner about acquiring a Brenner sculpture and making a contribution to the Brenner MPI Endowment or the Brenner Scholarship funds, contact Lynne Feraco, executive director of gift planning, at lferaco@wpi.edu or 508-831-6675.

To view WPI's Bernard Brenner Sculpture collection, visit wpi.edu/+brennersculpture.



PHOTO MATT FURMAN

Engineering a Legacy

JORGE CARVAJAL '62 AND HIS CHILDREN SHARE A COMMON BOND IN WPI—BUT THEIR PATHS DIVERGE FROM THERE.

BY MICHAEL BLANDING

It's common for children to follow their parents to their alma mater—but it's unusual to do it on the scale of the Carvajal family.

All three of Jorge Carvajal's children attended WPI, all are successful in their careers. In Jorge's native Colombia, the name Carvajal is synonymous with the family's printing company, where Jorge is vice president of industrial services. His offspring, however, have taken different tacks—Maria '88 is vice president for global marketing communications at Colgate-Palmolive; Santiago '89 is director of consumer electronics research strategy at Bose Corporation; and Hernando '93 is director of Latin America sales for BMW.

"My principle is that they will be much happier doing what they want," says Jorge, "and I think they all made very good choices."

When Jorge entered WPI in 1958, he was drawn to mechanical engineering—in an effort to learn more about chemical printing processes in order to contribute to his family's business. He soon became interested in computers, learning to program an early IBM 1620.

"In physics, we had to find the half-life of a radioactive material, and we took about 800 measurements over a period of time," he says. "My classmates did it on graph paper, but I was able to show them how to do it on the computer."

He took that computer interest back to Colombia, introducing processes for printing electronically rather than with slower lead linotype, leading the firm to become the first in the country to print using a scanner.

Growing up around printing presses, Maria inherited Jorge's love of engineering. Although she was accepted to several engineering schools in the US, "...my dad was adamant that I go to WPI," she says. Arriving in Worcester, sight unseen, Maria remembers quickly feeling at home, forming tight friendships with the sisters of Phi Sigma Sigma (who are still among her closest friends), and appreciating the practical engineering focus in the chemistry lab.

"The analytical approach to problem solving has been the key for success in my career," she says. After WPI, she earned an MBA at Babson College and then joined Colgate-Palmolive, where she has been responsible for overhauling its digital strategy.

Santiago followed a year later, having already fallen in love with WPI while visiting his sister. He, too, developed a tight group of friends, including fellow Latin American students from Argentina, Brazil, Peru,

and Mexico. Studying electrical engineering, he was heavily influenced by a class with acoustics professor Richard Campbell.

"A good friend of his was the sound guy for the Grateful Dead," he remembers. When the band came to the Worcester Centrum, Campbell took his class for a tour, showing how sound engineers optimized the sound in the arena of massive concrete walls. "I remember being completely amazed at how much work went into making the arena sound good," he says.

For his senior project, Santiago created his own small-scale automatic equalizer, which was coming into vogue at the time. After graduation, he joined the family business for a few years, but soon followed in his sister's footsteps with an MBA at Babson before joining Bose in Framingham, Mass. There he worked closely with Amar Bose during the introduction of the famous Wave Radio; after managing several product lines for Bose, Santiago moved to Research, where he has been instrumental in connecting the output of the Research organization to the Consumer Electronics Division of the company. During his time at Bose, Santiago has pioneered new products like TVs with built-in home theatre sound and, most recently, a new augmented reality system incorporating Bose sound technology.

When it came time for Hernando to decide on a school, it was a no-brainer. "Being around the family and seeing what it did for my dad, it wasn't a difficult choice," he says. Three years younger than his brother, he came to WPI to study fluid mechanics, and conducted a study of the canals at the Venice Project Center. He and a team of students also constructed their own remote-control carbon fiber flying wing, which they demonstrated for NASA.

"We ended up crashing it," he admits, "but we did fly it for a little bit first." Hernando has taken that firsthand knowledge of vehicle engineering to BMW, where he is now in charge of sales and marketing for all of Latin America. "I have to talk to the press quite a bit," he says, "so it's important to understand the technical side and how things come to fruition."

Although the four Carvajals have taken different paths since their time in Worcester, they share a love of technology and a deep curiosity about the world. "I do like the fact that we all have such different careers," says Hernando. "Nevertheless, we were all shaped in the same mold. Going to the same school brings it all a bit closer to home."

2018 COMMENCEMENT CEREMONY





WPI's Commencement ceremony dates back to 1871 when the school sent the 16 young men of its first graduating class out into the world.

This year WPI celebrated its graduates and undergraduates at ceremonies on May 10 and 12, respectively, with more than 1,000 taking their final walk as students over Earle Bridge to receive their bachelor's, master's, or doctoral degrees.

Marcia McNutt, president of the National Academy of Sciences, gave the graduate address, and Margot Lee Shetterly, author of best seller *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race*, the undergraduate address. WPI awarded honorary doctorates to Phil Ryan '65 and Glenn Yee '74.



WPI PRIDE ABOUNDS AT ALUMNI WEEKEND



NEARLY 1,000 ALUMNI AND FRIENDS RETURNED TO THE HILL MAY 31–JUNE 3 to enjoy Alumni Weekend festivities. Alums celebrated their traditions, their achievements, their service to their alma mater, their golf skills, their philanthropy, and—most of all—their friendships and shared WPI experiences. One highlight was the announcement of a \$12 million gift from an anonymous alumnus, adding to the palpable sense of Crimson and Gray pride throughout the weekend.



1953

Thomas Rothwell's daughter, Amy Gray, writes to share the sad news of his passing on April 3, 2018.

1957

Chris and **Boakfar Ketunuti** send their greetings to old friends. "Seasons change and friends leave. Life doesn't stop for anybody but takes you to where there are friends, memories, and life."

Mike Stevens stands proudly with his granddaughter, Samantha Robinson '18, She was captain of the Pep Band's color guard, and in the photo is wearing Mike's original 1957 varsity letter sweater. He adds that Samantha spent the spring in Sweden completing her MQP, and already has a good job offer.

1960

Richard Brewster writes, "My part in the construction of the new Mercy Ships hospital ship is finished. The exterior and much of the internal machinery is essentially complete. We will be leaving China this spring, expecting to return for Sea Trials and Maiden Voyage in a year or so. It has been a fantastic opportunity to have a part in this amazing project as well as getting to know some of China and its wonderful people. I hope to attend one of the alumni gatherings in the future."

Evelyn Miller, widow of **Fred Snively ('62 MS EE)**, writes of his passing last year. "He died quite suddenly of cardiac arrest on Sept. 21, 2017, in Oregon. Fred and I were married in 1981; he had no children." A registered control systems engineer, Fred focused on the design of feedback control systems for rocket, spacecraft, and instrumentation applications. He later taught at San Jose State University in the College of Engineering and the Meteorology Department. In 2007 he earned his master's degree in meteorology.

1963

Bob Magnant writes, "I just published *Writing, Iran and the Internet*, available as a free download from iTunes. It's a quick read for anyone who wants to take advantage of the power of

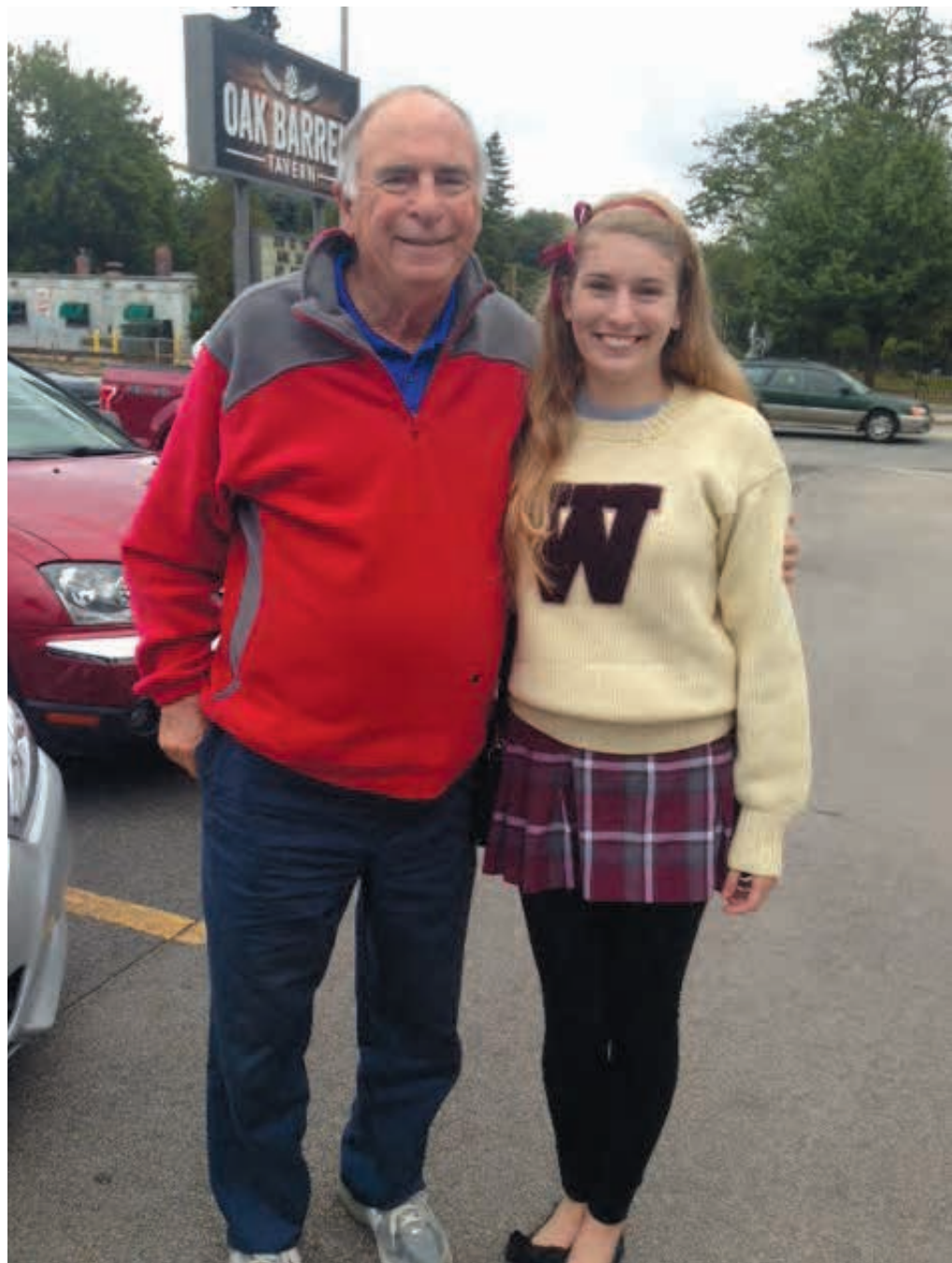
free information and the opportunities that are possible in a digital world.

It's a story of global communications (the second in the 'Fingertips' series, following *The Future Is at Your Fingertips*). My latest book describes a personal journey of someone from a small town into our cyberworld and the unlimited worlds of digital writing and information technology."

1967

Richard Gutkowski ('69 MS CE), an emeritus professor in civil engineering at Colorado State University, is writing a four-part book series on financial management. He recently published the first installment, *DEBT is a Four-Letter Word, But it Need Not Be! The College Experience*, available on Amazon. The book contains fictionalized examples of the real-life issues he saw many students struggle with, including student loans

and credit cards. It also encourages parents to get involved early to teach concepts and help students increase self-reliance. In his career he directed a structural engineering laboratory, two technology transfer and training centers in transportation engineering (one for Native American tribal entities), and a regional consortium for transportation education and research. In those capacities, he was responsible for managing budgets totaling millions of dollars.





In February, **Bill Hyatt** and his wife, Alice, were briefly in Miami. They report that they were pleased to get together with **Denis McQuillen** and his wife, Susan, who drove from Boca Raton for lunch. This was the first time in over 50 years that the classmates, soccer teammates, and Phi Gamma Delta brothers had seen each other. Bill sends this recap on Denis's life: "In 1968 Denis worked at Alden Research Labs on a WPI assistantship, got married, and after seeing a Puerto Rico poster, they sold their possessions and moved there on a lark. In Puerto Rico Denis and Susan got

jobs and found a wonderful extended 'family' with the Mendez twins, Eduardo and Orlando, who are also classmates and fraternity brothers. Denis and Susan are retired. He keeps fit by daily visits to the gym and playing computer chess."

As for Bill, he notes that he's lived in the Denver area for the last 38 years and is now "semi-semi retired." He continues playing soccer in the backyard with his two grandsons. However, he deliberately kicks the ball over the fence so that he has time to catch his breath. The photo shows the Hyatts and descendants gathered in a park south of Denver.

1968

William O'Neil writes, "On our 50th anniversary of graduation, I'll do a quick recap of where all these years have gone: Washington, D.C., Vietnam, central and northern Alaska, Boston, Michigan, upper New York State, and finally, 38 years in Oak Ridge, Tenn. The first years included adventures at the Naval Arctic Research Lab on the coast of the Arctic Ocean and on the Trans Alaska pipeline north of the Yukon, before the connecting road and bridge were completed. I then worked in

electrical power generation, including on-site construction of a nuclear plant. In the Manhattan Project city of Oak Ridge, I have worked at all the major DOE facilities – both supporting existing operations and planning for the next generation missions. With two children and two grandchildren nearby, our nuclear family is settled into the quiet pace of East Tennessee, with summers on Cape Cod."

1969

Gregory Barnhart sends this update, under his “nom de guerre,” Vandegraaff Gearhardt. “I am an award-winning artist, pioneering a new art form. I have exhibited at curated art shows in New York City, Santa Fe, San Francisco, and San Diego. I have sold over 30 pieces at an average of \$2,000 each. My new art medium is at the confluence of art and high technology. I create assemblages of old items by adding such new technology as 20,000-volt Jacob’s Ladders, fiber optics, or Bluetooth music players. I am therefore saving and re-purposing items destined for the junkyard by adding in technology. I call these pieces Sensational Assemblages.

“Even though I graduated before The Plan, there was an ethos at WPI emphasizing the practical. As an electrical engineer, I was required to take a hands-on machine shop class at Higgins Labs. This course covered everything from welding to running a lathe, and I use those skills today, 50 years on, in my art.” Find out more about Vandegraaff Gearhardt at his website, v-gearhardt.com.



1970

Vinay Mudholkar (MS CE) was the keynote speaker at Rail Tech Conference held March 22 at the DCU Center in Worcester. He delivered a talk on rail and transit training programs and job opportunities in the growing industry. The conference was attended by 250 members and guests of New England RR Club, he reports. In November 2017 he gave a CEE Graduate Seminar at WPI called “Rail and Transit Programs, Delivery and Opportunities.”

Richard Schwartz’s son **Michael ’04** informs us of his death on Feb. 15, 2018. Richard completed a master’s degree in computer science at WPI in 1972, then graduated from Suffolk Law School in 1975. He spent the majority of his technology law career with Data General and Communica. He also taught at Cape Cod Community College for several years. Survivors include his wife, Jean Canty Schwartz, and two other sons.

1974

Mark Ostergren retired from Babcock & Wilcox in November 2017 after 43 ½ years.

1977

Domenico Grasso begins a new post as chancellor for UM-Dearborn in August. He went to Dearborn from the University of Delaware, where he was a professor in the School of Public Policy and Administration in the Department of Civil and Environmental Engineering after stepping down as provost. He is also the founding director of the Picker Engineering Program at Smith College and has served as the vice president for research and dean of the Graduate College at the University of Vermont. He holds a PhD in environmental engineering from the University of Michigan.

Albert Riggieri was named senior vice president, global chief risk officer, and chief actuary for Aflac Inc. He has been with the company since 2016. Prior to that he held various actuarial positions of increasing responsibility at Unum Group.



ON THE 40TH ANNIVERSARY OF THE BLIZZARD OF ’78, **ROB COOLIDGE ’79** DUG OUT THE ROLL OF KODACHROME HE SHOT DURING THAT FEBRUARY NOR’EASTER AND SHARED SOME IMAGES OF A SNOWBOUND CAMPUS.

1978

John Contestabile writes, “I am still having fun at my ‘encore career’ at Johns Hopkins University/Applied Physics Lab after retiring from the Maryland Department of Transportation as assistant secretary. These days I am a program manager for Emergency Response Systems for Homeland Security at JHU/APL, working with DHS and FEMA. Also, I was recently appointed by Maryland Gov. Larry Hogan to a term on the Washington Metro Safety Commission.”

1979

Craig Jacobson, of Andover, N.H., was elected director of Franklin Savings Bank.

MITRE CEO **Jason Providakes (’80 MS EE)** visited campus in February, along with **Jay Schnitzer ’73**, vice president and chief technology officer, and **Pete Sherlock ’82**, who serves as senior vice president and chief operating officer. They toured the WPI-MITRE Collaboratory that opened last year, and saw some of the current MQP work being supported by MITRE. More than

230 WPI alumni work at MITRE, and many of its top leaders have WPI roots. A few years ago, MITRE and WPI began a fifth-year master's degree program that allows graduate students to complete their master's work while working at MITRE.

Speaking to students about his career trajectory and the strong relationship between WPI and the company, Providakes said, "I brought with me the fundamental learning I got from WPI. I was curious – working on projects in a multidisciplinary fashion and really caring – and that stuck with me when I went to MITRE. I like solving problems and working on projects at MITRE that deliver an impact and create a safer world."

1981

Thomas Finn was appointed president of Asia Pacific at Gerber Scientific, in addition to his position as senior vice president of global operations. He has been with the firm since 2010.

Elly (Cromwick) Tierney writes, "Thought you'd be interested to know that there is political life after a career in construction. I was elected in November 2016 as alderwoman of Ward One in Annapolis, Md., for a four-year term. My husband and I own and operate a bed and breakfast there."



1982

David Rubinstein was named president and COO of OptiRTC, a Boston-based company focused on improving water quality, preventing localized flooding, and mitigating combined sewer overflows through continuous monitoring and adaptive control of distributed stormwater infrastructure.

1983

Matthew Goldman is senior vice president of technology, TV compression, at Ericsson. In January he was part of an online presentation, "A Conversation with SMPTE Leadership: The Society Looks Forward to 2018 and Beyond." SMPTE (pronounced "simp-tee") is the Society of Motion Picture and Television Engineers; Matthew is a fellow. He has been involved in the development of DTV (digital video transport systems) since 1992 and holds six patents in the field. Four of his projects have been recognized by Technology & Engineering Emmy Awards.

John Pepper is a principal engineer at Nextremity Solutions, a privately held musculoskeletal product development company. With 28 years in the industry, he holds 60 patents. The journal *Orthopedic Design & Technology*

published his "Top Ten Design Rules for Orthopedic Device Development" in the January/February 2018 issue. Rule #1: "Thou Shall Not Design to Sawbones" (the plastic models supplied to a designer by companies). Rule #2: "Unless You Have Performed the Surgery 100 Times, Listen to the Surgeon." John's overall advice: "Unfortunately, one rule rings true above all else – there are no shortcuts to making a great system."

1984

Frank Zanghi was named a new supervisory board member for IC Federal Credit Union in Fitchburg, Mass.

1985

Alan Denko retired after 32 years of government service with the U.S. Naval Nuclear Propulsion Program. He was deputy director of the Regulatory Affairs Division for the last 17 years and was responsible for disposal of the spent nuclear fuel removed from the Navy's submarines and aircraft carriers. He was also involved in spent nuclear fuel transportation, tribal affairs, and environmental litigation, as well as environment, safety, and health, compliance. "I have moved to Holland, Mich.," he writes, "where I am involved with numerous nonprofit social and environmental organizations. I enjoy hiking, camping, kayaking, cooking, and gardening. I have four daughters and two grandchildren."

1986

Jodi (Griesman) Gernon was the keynote speaker at Elevating Women in STEM, an event held on campus April 28 to celebrate the Women's Impact Network Executive Committee and to announce this year's grand recipients. Jodi is director of the Arthur Rock Center for Entrepreneurship at Harvard Business School.

1989

Jeffrey Goldmeier writes, "WPI was represented at the NY Tech Valley FIRST Robotics competition with members of the Classes of 1989 and 2023."

The Rev. Dr. **Debora Jackson '89 MSM, ('02 MENGRI)** gave a stirring address at the Arlington (Mass.) Town Hall for the town's 30th annual observation of Martin Luther King Jr.'s birthday. Remarking on the 50th anniversary of King's assassination, she urged the audience to take a stand against ignorance and intolerance. "He could not remain silent, and you can't either," she said. Jackson is currently director of lifelong learning at Yale Divinity School.

Mark Macaulay and a group of WPI hockey alumni participated in the Frostbite Pond Hockey Tournament in Fairlee, Vt., this winter. "Due to deteriorating ice conditions, we finished as co-champions and fun was had by all!" he writes. The alumni players were (from left) **Chris Altemus '87, Bill Hamilton '89, Mark Macaulay, Mike Fitzpatrick '89, Kevin O'Connell '89, Kevin Fitzpatrick '90, and Paul Pelkey '89.**

1992

Will Katzman and some of his co-workers at CalTech LIGO appeared on the Netflix series *Bill Nye Saves the World*. They were part of Season 2, Episode 6, called "How to Travel Through Time," along with a retired astronaut, a former *Star Trek* producer, and other experts. Will started working at LIGO in 2009, as Science Ed Center manager. He is currently at the dissertation stage of earning his PhD in science education at LSU.

While reading the Winter edition of the *WPI Journal*, **Brian Tarbuck** was reminded of a humorous encounter involving the Crew Team's decrepit vehicle and the subject of one of the *Journal's* feature stories – **Lauren Baker '82**. See Letters, page 2, for the story and a photo of the 1991 Textile Regatta, heavyweight crew.

1993

Chris Ledoux's debut novel, *The Burnt Sunset*, will be published on June 21. He describes it as an adult apocalyptic fantasy novel featuring sketches and song lyrics. After uncontrolled fires scorch the countryside, toxic rain kills off the young and old, while teens suffer one of three fates: burn, daze, or evolve.



The story follows Baeran Sheridan, a Portsmouth, N.H., teen fleeing the Firegale [a windblown blaze], and Solstice Dayton, a teen from Lexington, Ky., who reveals the future in lyrical dreamvisions.

Learn more on Chris's website, intotheburntsunset.com, at [facebook.com/theburntsunset](https://www.facebook.com/theburntsunset), and at [instagram.com/theburntsunsetnovel](https://www.instagram.com/theburntsunsetnovel). You'll find Chris's poetry, computer-generated artwork, and post-apocalyptic musings. He has drafted a sequel, *The Eventide Blaze*, and is starting on the third book in the series, *The Aurora Brand*. Chris cites Professor Steven Bullock, his Sufficiency advisor, as a mentor for his writing, noting that the skills he learned in completing his Sufficiency helped him draft earlier versions of what would become the book.

1994

In December 2017 **Shane Hooker** started in a position as a principal software engineer at Casa Systems in Andover, Mass. He is developing small cell mobile access solutions that are deployed in 4G and soon-to-be 5G mobile networks. He writes, "My son, Kyle, began his freshman year at WPI with the Class of 2021 and is majoring in electrical engineering. The family is very proud of Kyle's hard work and achievements, and proud of him for making the WPI Dean's List. We're also excited for him to do his HUA project this summer in London."

1995

Brian Bergeron was appointed chief technology officer and vice president of operations at Acessa Health.

David Smith retired from the U.S. Navy after 22+ years of service as a submarine officer. He is now an independent wine consultant for a Napa Valley Winery, conducting in-home wine tastings in the Hampton Roads, Va., area, as well as helping customers throughout the United States get artisan wines delivered to their door. You can find him on Facebook, Instagram, or Twitter @ [davidsmithwine](https://www.facebook.com/davidsmithwine).

1996

Michael Caprio writes of his marriage to his fiancée, Diana, on Dec. 12, 2017, in Brooklyn, N.Y. A second wedding ceremony and reception was held on Dec. 16, in East Haven, Conn. "Mr. and Mrs. Caprio still reside in the Williamsburg neighborhood of North Brooklyn with their cat, General Gau," he says.

Eric Maynard (MS ME) is a senior consultant and director of education at Jenike & Johanson. He recently presented a webinar, "Five Critical Tips to Avoid a Dangerous Dust Flash Fire or Explosion."

Brian Waehler was promoted to senior civil engineer in the Newton, Mass., office of BVH Integrated Services. His notable projects with the firm include the UMass Boston Utility Corridor and Roadway, the MIT Utility Relocation, and the Minuteman Regional Vocational Technical School. His lives in Arlington.

Shelby Walker was named head of intellectual property at CRISPR Therapeutics, a biopharmaceutical company focused on developing transformative gene-based medicines for serious diseases.

2002

Jessa (Thomas) Gagne ('03 MS FPE) writes, "We had a couple of fun firsts this year, including having a son, and my daughter's first ride on a mountain gondola. But one of the more unusually fun times was watching my 2-year-old paint her face."



Sergio Salvatore performed on campus as part of a presentation called "Music and the Brain," given by Tufts University professor Aniruddh Patel. The event also featured performances by assistant professor of music and musical roboticist Scott Barton and the WPI Jazz Ensemble.

Jody (Kenniston) Staruk joined Consigli Construction in Milford, Mass., as a project manager in 2003 and was recently promoted to project executive. Her past projects include a residence hall at Framingham State University and a residence and dining facility at Worcester State University.

2004

Joseph Bush, executive director of the Worcester CleanTech Incubator (WCTI), was interviewed by the Worcester *Telegram & Gazette* recently. He discussed the various member organizations involved in WCTI, and its partnership

with Technocopia, an alumni-run makerspace. He and **Josh Croke '14** of Action! Worcester have officially joined forces in the Printers Building in Worcester.

Meredith Furhman Smith founded MetroWest Family Acupuncture LLC in 2013. Her five-year-old practice is located in Wayland, Mass. She is also an adjunct faculty member at MCPHS University.

2005

Adam Daniels is an associate with Am Law 100 firm Polsinelli, in the firm's Los Angeles office. He was selected for inclusion in Southern California Super Lawyers Rising Stars 2018, in the category of Intellectual Property. Each year, the designation of Rising Star is limited to not more than 2.5 percent of lawyers who are 40 years of age or younger, or in practice for 10 years or fewer.

featured in Connecticut's *Darien News* in January, when the Milford Arts Council Center for the Arts hosted her "Bossa Nova Project." Inspired by the Brazilian "Golden Era" of the 1960s, its musical influences include samba, classical European influences, and American jazz. In the article, Mendes credits her mentors: Doug Weeks, Fred Bianchi, John Delorey, and Rich Falco.



2006

Phil Brault was promoted to project executive at Consigli Construction in Milford, Mass. He has been with the company for 11 years, overseeing projects including historic restoration projects at the New York state capitol building, the Boston Public Library's central library and the renovation and expansion of Harvard University's Gore Hall.

Dave DeFusco is a flight controls engineer at Sikorsky Aircraft (part of Lockheed Martin) in Stratford, Conn. He writes, "I am currently working on technology prototypes for future compound aircraft (helicopter/airplane combination) with multiple potential uses, both military and commercial. My two main programs are the S-97 Raider and the S-100 Defiant. Hopefully, the Raider will attempt a helicopter speed record later this year, and the Defiant will have its first flight this year. There are at least 25 WPI alumni (out of approximately 100 total engineers) working on these programs in small teams of hand-picked engineers trying to push the technology envelope."

Isabella Mendes has moved on from a career in structural engineering to become a full-time musician. She was

Vinnie Nogarotto and his wife, Brandi, welcomed their second son, Spencer Alexander Nogarotto, on June 6, 2017. Their first son, Mitchell, is now 6 years old and loves LEGOs, Vinnie writes. They live in Louisiana, where Vinnie works for ExxonMobil Fuels & Lubricants and Brandi works at Woman's Hospital (Baton Rouge).

James Norton of Coventry, Conn., was promoted to associate principal in the Bloomfield office of BVH Integrated Services. His work with the firm includes projects for Pratt & Whitney, Baystate Orthopedic Surgery Center, and Quinnipiac University School of Law.

2007

Sam Feller has been tinkering with transforming popular task-management systems, such as Trello or Kanban, into an offline board he uses to manage his own day-to-day workflow. Photos of the prototype are posted on his website, awkwardengineer.com, along with suggestions for personalizing the system to make it work for you. "In a nutshell: make a list of things to do, then do it in a time-controlled fashion," he writes. "The first iteration was just hacked up in

card stock, the second was laser-cut card stock, and the third was laser-cut wood. I'm currently working on a magnetic version and exploring sourcing options for a small run."

Koren Roach is completing a doctorate in bioengineering in the Department of Orthopedics at the University of Utah. Her focus is surgical treatment for osteoarthritis in the ankle. She also helps coach the South Davis Composite Mountain Biking Team at a local high school.

2008

Rachel (Pennellatore) Ramirez and her husband, Alex, welcomed their first child on Nov. 25, 2017, a son named Reichen Jace Ramirez. "All are well!" she writes.

2009

Alex Schwartz returned to campus to recount the wild ride of Owlchemy Labs, from a two-person start-up to the company's acquisition last year by Google/Alphabet. His talk, part of the IMGD Speaker Series, was called "Owlchemy Labs' Journey into Virtual Reality: Lessons Learned Building VR Games." Alex offered a behind-the-scenes look at the company's successes and failures, along with clips from some of Owlchemy's award-winning games, including *Job Simulator* and *Rick and Morty: Virtual Rick-ality*.

2010

Kevin Harrington was the lead example in a *CommonWealth* magazine article, "Worcester Comeback Seems for Real." Describing him as "following in the footsteps of Robert Goddard, inventor of modern rocketry and the so-called father of the space age," *CommonWealth* noted Harrington's commitment to staying in Worcester as robotics lab manager at WPI and as a co-founder of the makerspace Technocopia. "We have all these tools," Harrington said in the article. "But the tools aren't the product. The people are. We are essentially forming an intentional community."

2012

Alison Corriveau bought her first house in her hometown of Wallingford, Conn.

2014

Joshua Croke's organization, Action! Worcester is joining forces with the Worcester CleanTech Incubator run by **Joe Bush '04**. "Our two organizations are complementary in our efforts and now unifying behind common goals," Croke said in press release. "Action! Worcester and WCTI will work alongside each other to enhance our collaborative workspace activities while Action! Worcester continues our other work in inclusive economic growth and community engagement. Action! Worcester has relocated to the Worcester CleanTech Incubator on the 4th floor of the Printers Building at 44 Portland Street, Worcester. We'd love for you to come say Hi!"

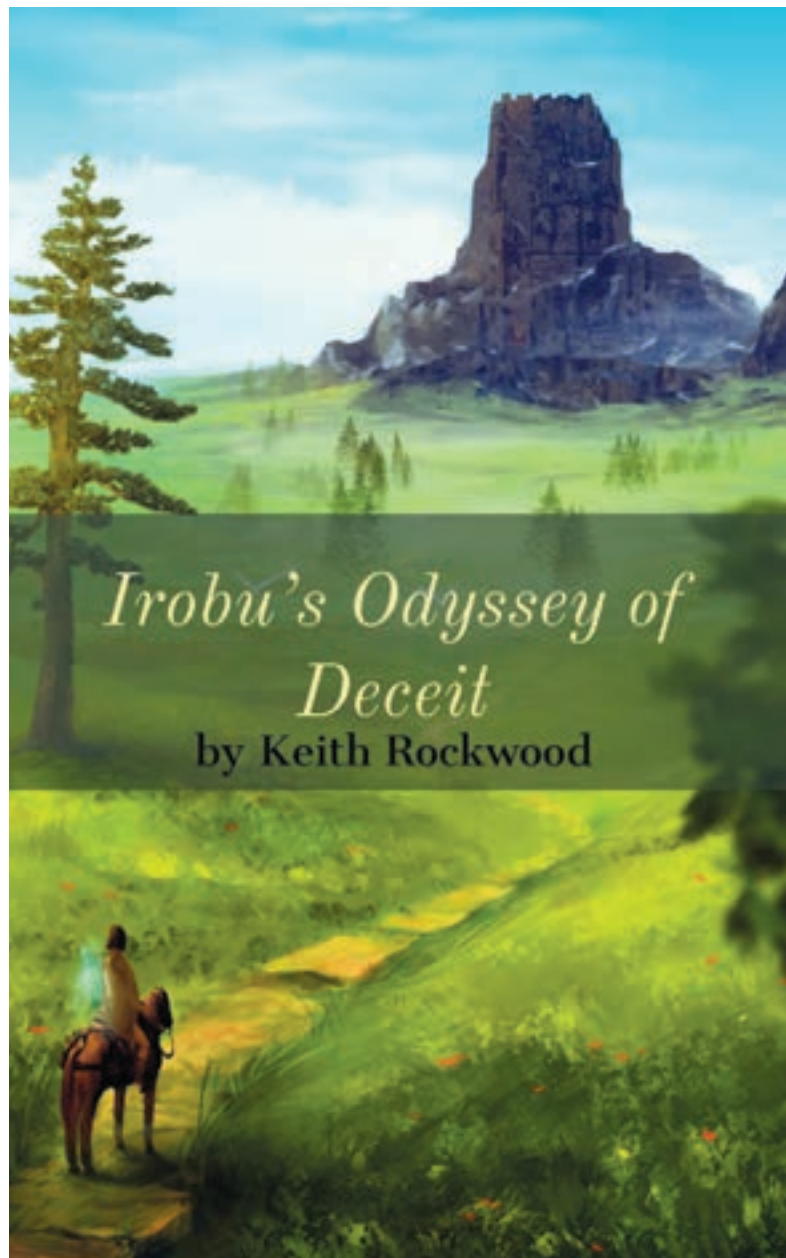
Ryan Weitz was promoted to Engineer III at the Albany, N.Y. office of Barton & Loguidice. He works in the firm's Sustainable Planning & Design Group.

2015

Nicolas Hewgley writes, "I was promoted to director of communication and development for Alpha Chi Rho National Fraternity in August 2017, and I've started doing theatre productions again! I just wrapped up *Bye Bye Birdie* and doing technical work on *Into the Woods*. Summer shows are next!"

2016

Courtney Jones affirmed the power of mentorship in a Worcester *Telegram & Gazette* article about her undergraduate mentor, **Judy Nitsch '75**. Shortly before graduation, Judy steered her into choosing her current job over a higher-paying offer. Courtney says she's still glad Judy encouraged her to accept the more exciting opportunity, based on how her face lit up when she talked about it. A year and half later, she says she is still loving her work as an engineer at Portsmouth Naval Shipyard.



2017

Keith Rockwood has completed and self-published the fantasy novel he began writing during senior year. *Irobu's Odyssey of Deceit*, available on Amazon, is about an adolescent girl who becomes possessed by the spirit of an ancient king, causing the two to share the same

body and mind. To free herself, she embarks on a journey that he describes as being in the vein of *The Hobbit*. In an interview with the *Needham Times*, Keith talked about a WPI history course that inspired him to give novel writing a shot.

COMPLETED *careers*

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 jkmiller@wpi.edu or call 508-831-5998 to request further information.

Peter Briggs Myers '46, a co-owner and developer of the Myers-Briggs Type Indicator, died Feb. 17, 2018, at age 91. In his primary career as a physicist he advanced the field of electronics and oversaw the management of nuclear waste storage for the National Academy of Sciences. One of only two Rhodes Scholars to come out of WPI, he earned his doctorate in nuclear physics at Oxford University and received several honorary degrees.

Myers came to WPI as part of the Navy V-12 program at WPI and majored in electrical engineering. In his 50th Reunion biography, he credited Professor Hobart Newell for inspiration in the field. In 1997 Myers was honored with the Newell Award, named for his mentor. In 2006 he received the Robert H. Goddard Alumni Award for Outstanding Professional Achievement.

In his early career with Bell Laboratories, Motorola, Magnavox, and other electronics firms, he received patents for advances in semiconductor circuits and electronic devices, including a transistorized telephone switch. He also contributed to the development of the facsimile machine and the single vidicon tube color television camera. In 1979 Myers moved on to the National Academy of Science, where served on National Research Council's Board on Radioactive Waste Management. He was responsible for all aspects of high-level, low-level, and transuranic nuclear wastes from both commercial and defense activities. His oversight included long-term storage of radioactive materials and the decontamination and decommissioning of nuclear facilities. He retired in 1993 as staff director.

When his mother, Isabel Briggs Myers, died in 1980, she left her son (and his then-wife) the copyright to the MBTI personality-type test



instrument she had developed with her mother, Katherine Cook Briggs. The couple funded and oversaw further development of the assessment, which is now widely known and used by many employers. They established the nonprofit Myers & Briggs Foundation that underwrites research on the MBTI and its application.

In 1996 Myers created a charitable remainder trust, with WPI among the beneficiaries. His bequest will establish an endowed fund for the Electrical and Computer Engineering department at WPI. Myers was a founding member of the ECE Advisory Committee, which he served for more than a decade. His support for WPI was unwavering, even when he wrote to request a loan of \$4 in

American currency to cover the cost of his *WPI Journal* subscription. He was studying abroad at Oxford at the time, and exporting money from Britain was forbidden by law in the years immediately after World War II.

In choosing to include WPI in his charitable remainder trust, Myers said "I owe a great deal to WPI's electrical engineering program and its wonderfully helpful faculty. My experience as a student gave me a deep respect of the Institute, as well as direction to my professional career."

He is survived by a son and two daughters, three stepchildren, five grandchildren, and one great-grandchild. He also leaves his partner, Jane "Emma" Mannes.

NORMAN TAYLOR '49 ME, SIGMA PHI EPSILON

RAY ALVEY '50 CE, SIGMA PHI EPSILON

TONY GIORDANO '51 CE, THETA CHI

CHARLIE HEDENSTAD '52 SIGMA PHI EPSILON

FREDRICK DEBOER '53 ME, SIGMA ALPHA EPSILON

TOM LEKAS '57 CHE, PHI GAMMA DELTA

CHARLIE KELLY '67 CE, PHI KAPPA THETA

RICHARD SCHWARTZ '70 MA, '72 MS CS,
ALPHA EPSILON PI

ATHAN TSOURIDES '85 SIM

PAUL HELLEN '86 MM

THE WPI COMMUNITY ALSO MOURNS THE PASSING OF **ALICE HOOGASIAN**, A FRIEND OF THE UNIVERSITY, AND **DICK HOOKER**, LONGTIME ADVISOR TO THE MASSACHUSETTS DELTA CHAPTER OF THE SIGMA ALPHA EPSILON FRATERNITY.

WOMEN'S IMPACT NETWORK

Publish & Flourish: A Women's Writers Colony at WPI

One of the eleven programs supported in the Women's Impact Network's inaugural grant cycle, the Writers Colony has enabled 60 women faculty, graduate students, and staff to work on writing to advance their academic research, scholarly publications, and curriculum development.

Learn how you can help new initiatives like this one by supporting the Women's Impact Network.

wpi.edu/+win

"Thank you for helping us make a difference! Our writers workshops and retreats allowed us to reach over 60 women writers at WPI to assist with goal setting and prioritizing writing with crazy schedules."

– WIN Impact Grant recipients Patricia Stapleton, assistant professor and director of Society, Technology, and Policy Program; and Natalie Farny, assistant teaching professor, Biology and Biotechnology





WPI

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100 Institute Road,
Worcester, MA 01609



ON THE COVER: ALLEN SWORD '04 IN
ALAMO SQUARE PARK, SAN FRANCISCO,
HOME OF PLANET. THE START-UP SENDS
FLOCKS OF MINIATURE SATELLITES INTO
SPACE TO PROVIDE CONTINUOUS,
DETAILED COVERAGE OF THE EARTH.