BUFFALO

Engineer

2019

IMPROVING WATER QUALITY

Researchers explore new method of treating wastewater

University at Buffalo
School of Engineering and Applied Sciences

Onion Studio, Inc.

Rajan Batta, PhD
Interim Dean, School of Engineering and Applied Sciences

MESSAGE FROM THE DEAN

Dear Friends of UB's School of Engineering and Applied Sciences,

Welcome to this year's issue of Buffalo Engineer magazine. In these pages, you will read stories that highlight how our faculty, students and alumni are working together on projects that impact our community, both locally and globally.

Our research portfolio has climbed an impressive $10 million over last year, including a record number of nine Early CAREER research awards from the National Science Foundation. It is this type of recognition, together with the countless other impactful projects taking place in our school, that will help UB reach its goal to become one of the top 25 research institutions in the country.

We are also working with our industry partners to bring more research-based discoveries to market. In this issue, you will read about how a team of environmental engineers is collaborating with government and industry partners to find innovative methods to reduce wastewater pollution.

Another point of pride is our designation as a national leader in diversity and inclusiveness by the American Society of Engineering Education's Diversity Recognition Program. This first-ever award recognizes our commitment to fostering a more diverse culture by integrating equity and inclusiveness into all aspects of our school community.

As the search begins for our next dean, we bid a fond farewell and thank you to our former dean, Liesl Folks, who has left UB to serve as the senior vice president for academic affairs and provost of the University of Arizona. Under her leadership, the school experienced significant growth – hired an additional 75 faculty members, grew the student population by 2,700—a more than 50% increase, and increased faculty research expenditures by 35%. We wish her all the best in her new endeavors.

Thank you for your continued support.

BUFFALO ENGINEER

Buffalo Engineer is published by the UB School of Engineering and Applied Sciences to showcase the excellence of our faculty, staff, alumni and students.

Editor
Jane Stoyle Welch

Contributing Writers
Nicole Capozziello, Sarah D'Iorio, Charlotte Hsu, Peter Murphy, Cory Nealon, Tracy Puckett, Rebecca Rudell

Design
Lucy Maier, Newbird LLC

Photography
Maximilian Kapitonoff, Meredith Forrest Kulwicki, Douglas Levere, Onion Studio, Inc., Nancy Parisi

University at Buffalo
School of Engineering and Applied Sciences

Support Our School

Your philanthropic support helps to fund a variety of student programs. Please use the enclosed envelope or visit *buffalo.edu/campaign/seas* to make your contribution. Your participation at any level is appreciated.

Address Changes

UB Alumni should update their address through UB Connect: *alumni.buffalo.edu/alumni-connections*. All others should email *seascomm@buffalo.edu* or clip the address label and return it with the correct address to: Buffalo Engineer, School of Engineering and Applied Sciences, University at Buffalo, 438 Bell Hall, Buffalo, NY 14260.

Facebook
@ubseas: School of Engineering and Applied Sciences

Twitter
@UBengineering: UB Engineering News

Instagram
@ubengineering (UB SEAS)

YouTube
UBengineering: youtube.com/user/UBEngineering

LinkedIn
University at Buffalo Engineering and Applied Sciences

Sign up for our Newsletter
engineering.buffalo.edu/news

contents

Onion Studio, Inc.

18

IMPROVING WATER QUALITY

Researchers explore new method of treating wastewater

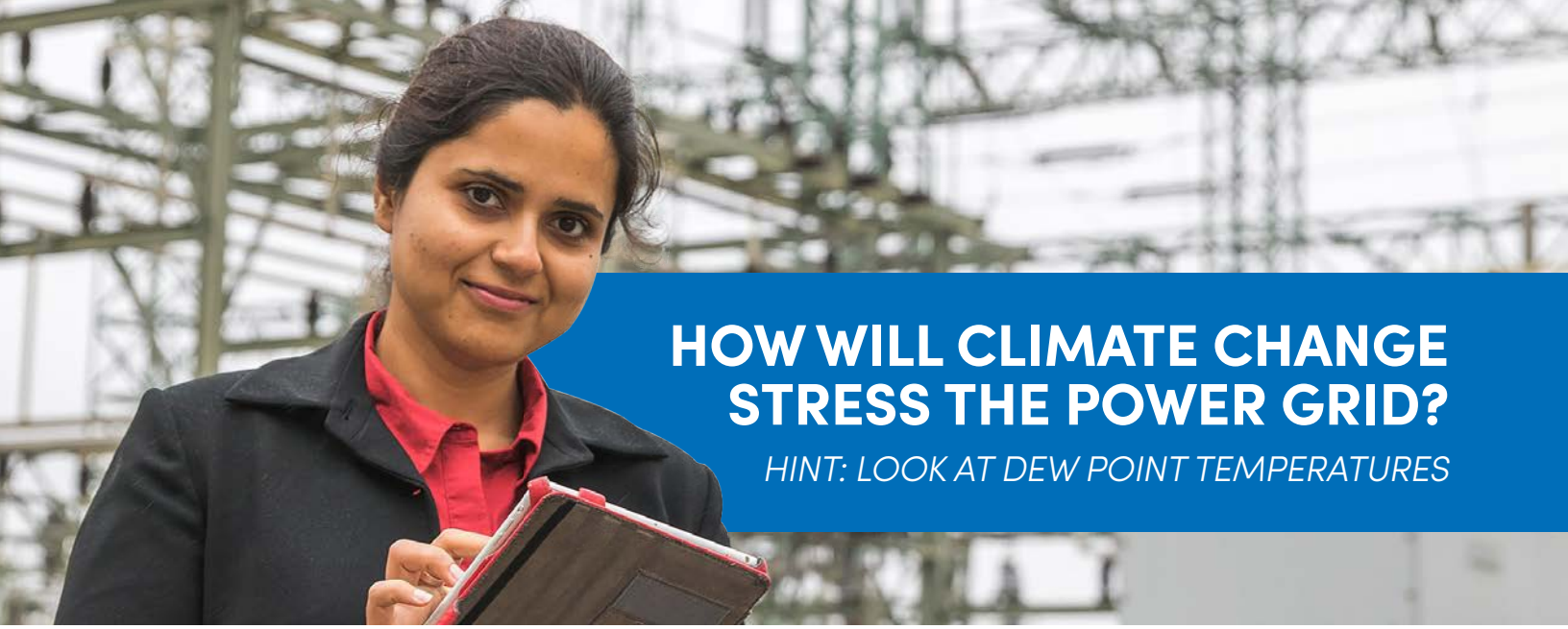
Environmental engineering faculty and students collaborated with the Erie County Division of Sewerage Management and PeroxyChem to explore a novel and more sustainable method of wastewater management.

24

ENGINEERING THE PERFECT TRIBUTE

Alumni use engineering skills to memorialize young woman

A group of community-minded civil engineering alumni teamed up with the Alix Rice Foundation to build a state-of-the-art skatepark.



HOW WILL CLIMATE CHANGE STRESS THE POWER GRID?

HINT: LOOK AT DEW POINT TEMPERATURES

A new study by Sayanti Mukherjee, an assistant professor in the Department of Industrial and Systems Engineering, suggests the power industry is underestimating how climate change could affect the long-term demand for electricity in the United States.

It describes the limitations of prediction models used by electricity providers and regulators for medium- and long-term energy forecasting. And it outlines a new model that includes key climate predictors — mean dew point temperature and extreme maximum temperature — that researchers say present a more accurate view of how climate change will alter future electricity demands.

"Existing energy demand models haven't kept pace with our increasing knowledge of how the climate is changing," says Mukherjee. "This is troublesome because it could lead to supply inadequacy risks that cause more power outages, which can affect everything from national security and the digital economy to public health and the environment."

> **"Existing energy demand models haven't kept pace with our increasing knowledge of how the climate is changing."**
>
> *—Sayanti Mukherjee*
>
> *Assistant professor of industrial and systems engineering*

LIMITATIONS OF EXISTING MODELS

One of the most common energy modeling platforms used to predict future electricity demand — MARKAL, named after MARKet and ALlocation — does not consider climate variability.

Another common energy-economic model, the National Energy Modeling System (NEMS), does consider the climate; however, it is limited to heating and cooling degree days.

While there are different ways to measure heating and cooling degree days, they are most often calculated by adding the day's high and low temperature, and then dividing the sum by two.

The trouble with this approach is that it doesn't consider time. For example, it could be 76 degrees for 23 hours and 60 degrees for one hour — yet the average temperature that day would still be recorded as 68 degrees.

DEW POINT TEMPERATURE IS THE KEY

To address these limitations, the researchers studied more than a dozen weather measurements. They found that the mean dew point temperature — the temperature at which air is saturated with water vapor — is the best predictor of increased energy demand. The next best predictor was the extreme maximum temperature for a month.

The researchers combined these climate predictors with three other categories — the sector (residential, commercial and industrial) consuming the energy, weather data and socioeconomic data — to create their model.

They applied the model to the state of Ohio and found that the residential sector is most sensitive to climate variabilities. With a moderate rise in dew point temperature, electricity demand could increase up to 20%. The prediction jumps to 40% with a severe rise.

By comparison, the Public Utility Commission of Ohio (PUCO), which does not consider climate change in its models, predicts residential demand increases of less than 4% up to 2033.

The situation is similar for the commercial sector, where demand could increase to 14%. Again, PUCO's projections are lower, 3.2%. The industrial sector is less sensitive to temperature variability; however, researchers say the demand could still exceed projections.

While the study is limited to Ohio, researchers say the model can be applied to other states.

The research was published in the journal **Risk Analysis** and was funded in part by the Purdue Climate Change Research Center and the National Science Foundation.

— CORY NEALON

AIR SIMULATIONS PAVE WAY FOR QUIETER SUPERSONIC FLIGHT

If you've ever been to an air show, or lived near an Air Force base, you're familiar with sonic booms. These deafening noises are created by aircraft exceeding the speed of sound, roughly 767 mph. They explain, in part, why passenger airliners cruise the skies at slower and less auditorily offensive speeds.

James Chen

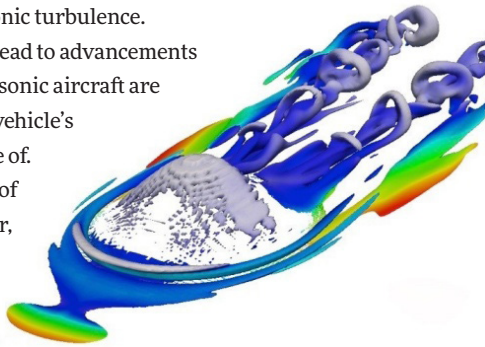
Aerospace engineer James Chen is working to solve problems associated with exceeding the sound barrier, and is the corresponding author of a study published in the **Journal of Engineering Mathematics**. The study extends classical kinetic theory into high-speed aerodynamics, including hypersonic speed, which begins at 3,836 mph or roughly five times the speed of sound.

"Reduction of the notorious sonic boom is a just a start. In supersonic flight, we must now answer the last unresolved problem in classical physics: turbulence," says Chen, whose work is funded by the U.S. Air Force's Young Investigator Program.

To solve these complex problems, researchers have historically used wind tunnels, which are research laboratories that replicate the conditions vehicles encounter while in the air or space. While effective, these labs can be expensive to operate and maintain.

As a result, many researchers, including Chen, have pivoted toward direct numerical simulations (DNS). His work centers on morphing continuum theory, which aims to provide researchers with computationally friendly equations and a theory to address problems with hypersonic turbulence.

Ultimately, the work could lead to advancements into how supersonic and hypersonic aircraft are designed, everything from the vehicle's shape to the materials it is made of. The goal, he says, is a new class of aircraft which are faster, quieter, less expensive to operate and safer.



This image is a 3-D computer simulation of air flowing over a hill creating turbulence at transonic speed. The ring-like features are eddies of air.

UB PARTICIPATES IN NSF STEM FOR ALL VIDEO SHOWCASE

Adrienne Decker, assistant professor in the newly formed Department of Engineering Education, participated in the 2019 **STEM for All Video Showcase**, a virtual poster competition that was held from May 13–20.

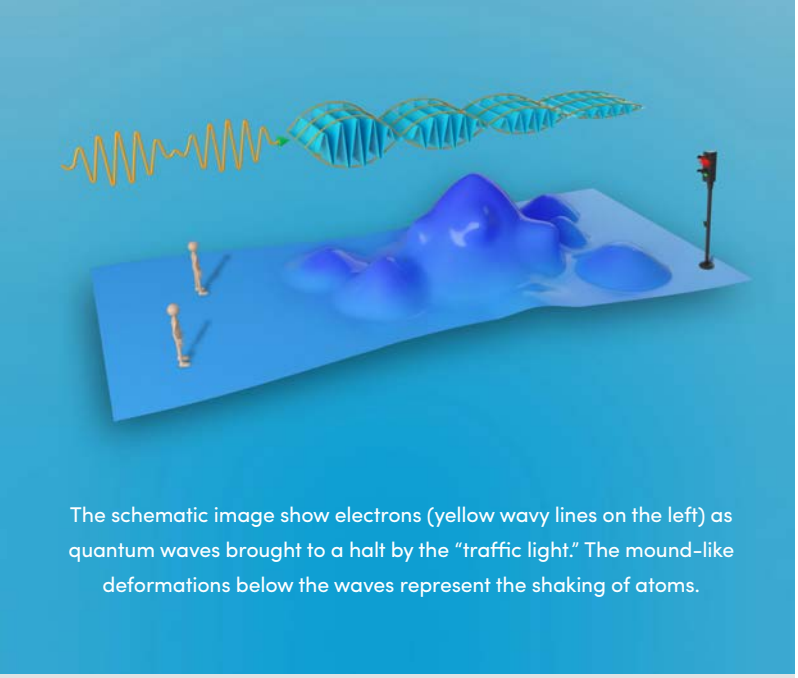
The annual event, sponsored by the National Science Foundation, featured over 240 innovative projects aimed at improving STEM learning and teaching that were funded by NSF and other federal agencies. Centered around the theme of "Innovations in STEM Education," the video presentations addressed a wide range of topics, including science, mathematics, computer science, engineering, cyberlearning, citizen science, maker spaces, broadening participation, research experiences, mentoring, professional development, NGSS and the Common Core.

Decker had two presentations in the showcase that focused on different aspects of computing education research. "csedresearch.org: Resources for K-12 Computing Education," gives an overview of csedresearch.org, a resource center for K-12 computing education information. The project is a joint effort between Decker and Monica McGill of Knox College.

Adrienne Decker

"Using Subgoal Labels to Improve Learning Outcomes in CS1" presents information on using subgoal labeling, a technique created in education psychology to help improve the teaching in introductory programming courses. It is a joint project between Decker and Briana Morrison of the University of Nebraska Omaha, and Lauren Margulieux of Georgia State University.

The **STEM for All Video Showcase** was created and hosted by TERC (terc.edu), a non-profit research and development organization located in Cambridge, Mass.



The schematic image show electrons (yellow wavy lines on the left) as quantum waves brought to a halt by the "traffic light." The mound-like deformations below the waves represent the shaking of atoms.

University at Buffalo

UNLEASHING THE POWER OF QUANTUM TECHNOLOGY

Advancements could lead to improvements in computing, data processing

University at Buffalo researchers are actively engaged in research that is laying the groundwork for a wide variety of future technologies, whose performance is accelerated by exploiting the quantum realm.

For example, a team led by Jonathan Bird, professor and chair of the Department of Electrical Engineering, and Jong Han, professor of physics, has developed a microscopic "traffic light," an approach that can bring quantum waves to a halt. The advancement could be key to harnessing the potential of the atomic world, eventually leading to breakthroughs in computing, medicine, cryptography, materials science and other applications. The study was published in **Physical Review Letters** and the work was funded by the Department of Energy's Office of Basic Energy Sciences, Division of Materials Sciences and Engineering.

Jonathan Bird

Other research is focused on quantum computing and communication, quantum sensing and advanced transistor concepts.

In addition, UB researchers are collaborating with others from SUNY, including Stony Brook University, SUNY Polytechnic Institute and the University at Albany, as well as the Advanced Science Research Center at the City University of New York, to form a statewide research center in response to the NSF's Quantum Leap Challenge Institutes program.

Learn more at buffalo.edu/quantum.

NEW ENGINEERED TISSUE MODEL MIMICS BLOOD CLOTTING PROCESS

Blood clotting is one of the most critical processes in human physiology. When something goes wrong, either because there is too much clotting, leading to a stroke, or not enough, leading to internal bleeding, the outcome can be catastrophic.

Now, a team led by Ruogang Zhao, associate professor of biomedical engineering, has established an in vitro model of this process that will help clinicians improve presurgical planning and care for patients with certain bleeding disorders, especially defects in platelets and those affecting the patient's ability to form clots. The work is providing a picture of what might happen between platelets and blood vessels with unprecedented detail.

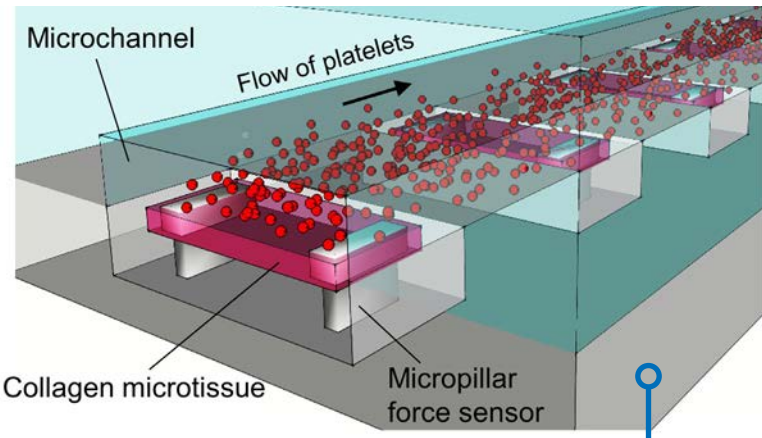
Ruogang Zhao

Published in **Nature Communications**, the paper reveals how the model mimics the complexity of what happens when blood clots at an injury site.

The system imitates the dynamic process of how platelets adhere to the injured blood vessel walls and form clots while providing real-time information on the mechanical properties of the clot that has formed. It thereby models both clot formation and clot mechanics during shear flow.

Zhao and his colleagues did this using microfabrication technology, creating mechanical sensing platforms that allow simultaneous control of both the formation of the clot and the clot mechanics, mimicking the stiffening process.

The key innovation of the UB system is the development of flexible micropillars that allow the stiffness of clots to be measured.



This diagram demonstrates how the engineered tissue model works to mimic the clotting upon blood vessel injury. Platelets adhere to the collagen microtissue that represents the collagen layer in the blood vessel. The micropillars that support the microtissue sense the stiffness of the microclots that form when exposed to different flow rates, which mimic venous or arterial flow in the body.

ON TWITTER, 'SUPERSHARERS' SPREAD MAJORITY OF FAKE NEWS

Study finds that less than 1 percent of users shared 80 percent of fake news

A new report on the influence of social media during the 2016 election found that a massive amount of fake news was produced and consumed by a very small amount of users.

The report, published in the journal **Science**, was co-authored by Kenny Joseph, assistant professor in the Department of Computer Science and Engineering.

Joseph said he was surprised "at how far a small number of people went to promote fake news."

"We suspect some people used automation tools typically reserved for large organizations in order to share large volumes of fake news," said Joseph. "While it is necessary to study how foreign and state actors influenced the spread of fake news, it is equally as important to understand why these seemingly ordinary people decided to heavily promote and embed themselves within this content."

WHAT IS FAKE NEWS?

There is not widespread agreement on what constitutes "fake news." The research team defines it as a "subgenre of misinformation," calling it "information regarding the state of the world that's constructed with disregard of the facts and invokes the symbols of existing truth-tellers. It misinforms by appealing to the very worst of human nature, and undermines truth-tellers at the same time."

WHO ARE THE 'SUPERSHARERS'?

In the study, the researchers found that 5 percent of political news generated in 2016 came from fake news sources. On Twitter, 0.1 percent of users shared 80 percent of that fake news. And they shared it with a very concentrated group of users. About 1 percent of users were exposed to 80 percent of the fake news shared on Twitter.

To track the prevalence of fake news among people on Twitter, the research team matched U.S. voter registration records to Twitter accounts. Using this method, they could sift out bot accounts and focus solely on human users. After an additional vetting process, the researchers were left with more than 16,000 accounts linked to real, voting U.S. residents that they used for the study.

The researchers found that these "supersharers" of fake news sources were people from across the country but "disproportionately aged 50 or above, Republican, and female," the report reads.

In general, "superconsumers," or the people who had high proportions of information from fake news sources in their newsfeeds, were "more likely to be right-leaning." The research doesn't specifically delve into why right-leaning users tend to share and consume more fake news than their left-leaning counterparts.

HOW CAN WE STOP FAKE NEWS?

Since this research shows that it's a small group of people who generated most of the fake news leading up to the 2016 election, one way to curb its spread in the future is to put a limit on the amount of times a user can post in a given amount of time.

Available tools like muting and blocking can also be used to prevent fake news from ever crossing a user's screen by cutting off the account that's sharing it in the first place.

"Our work suggested that the most useful things that platforms like Twitter can do to reduce the spread of fake news are to develop better tools to monitor and demote content from highly active automated accounts, to focus on removing content from the few websites that are responsible for the vast majority of fake news, and to leverage measures of audience overlap between websites to identify when new fake news sources are emerging," said Joseph.

— MOLLY CALLAHAN AND CORY NEALON

SEAS RECOGNIZED AS NATIONAL LEADER IN DIVERSITY AND INCLUSIVENESS

The School of Engineering and Applied Sciences is a recipient of a Bronze Award in the first year of the American Society of Engineering Education Diversity Recognition Program. Bronze was the only level available in the program's inaugural year and first-ever round of review.

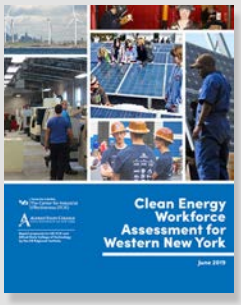
In addition, UB was one of only 29 engineering programs to be recognized as Exemplar. Exemplar status was granted to programs with initiatives or outcomes that were deemed by the reviewers as significant. It allows the school to resubmit for a higher classification (Silver) later this year.

In the last few years, SEAS has undertaken several initiatives focused on diversity, including: appointing a Diversity Officer and establishing the STEM Diversity Programs office, developing a comprehensive diversity plan, increasing faculty diversity, strengthening recruiting practices, disseminating diversity resources via a revamped website, and establishing new and strengthening existing K-12 partnerships. Learn more at engineering.buffalo.edu/diversity.

Onion Studio, Inc.

REPORT DETAILS WESTERN NEW YORK'S CLEAN ENERGY WORKFORCE LANDSCAPE

One of five jobs in Western New York are in industries with ties to clean energy. Yet 54% of workers in clean energy industries are aged 45 or older, signaling that the sector has not been effective in attracting younger workers.



These two data points skim the surface of the region's clean energy landscape, which receives full scrutiny in the "Clean Energy Workforce Assessment for Western New York" report. The comprehensive report details the opportunities, challenges and key considerations surrounding five subsectors of clean energy.

The report stems from an effort led by UB and Alfred State College that aims to close critical workforce gaps of the clean energy sector in Erie, Niagara, Cattaraugus, Chautauqua and Allegany counties. The effort is funded by a two-year, $760,000 Performance Investment Fund grant from SUNY, via Governor Cuomo's Climate Jobs NY initiative.

AI EXPERT **DAVID DOERMANN** TELLS CONGRESS 'DEEPFAKES' THREATEN ELECTIONS

Artificial intelligence expert David Doermann testified before Congress on June 13, outlining the national security challenges posed by manipulated forms of digital media.

The hearing, before the House Intelligence Committee, focused on deepfakes, which are manipulated videos and other digital content produced by AI that yield seemingly realistic but ultimately fabricated images and sounds.

David Doermann

"For more than five centuries, authors have used variations of the phrase 'Seeing is believing.' But in just the past half-decade we've come to realize that's no longer always true," said Doermann, director of UB's Artificial Intelligence Institute.

Doermann, who also serves as an Empire Innovation Professor in the Department of Computer Science and Engineering, previously oversaw a Defense Advanced Research Projects Agency (DARPA) effort to combat evolving image and video manipulation technology. At the hearing, he said deepfakes and other manipulated digital content could be used to influence upcoming elections and spread false information.

SEAS OFFERS ONLINE MASTER'S PROGRAM IN ENGINEERING MANAGEMENT

Program is one of several interdisciplinary graduate options

This fall, the School of Engineering and Applied Sciences is offering its first fully online graduate degree program in engineering management. Designed to accommodate industry professionals, the program is a unique opportunity for those who want to boost their educational credentials and achieve greater success in leadership positions. Courses are taught completely online and students can study full-time or part-time depending on their individual needs. The 30 credit hour program can be completed in one year. Other multidisciplinary programs offered by the school include:

Computational and Data Enabled Sciences PhD: This program integrates large computing, data sciences and domain sciences to tackle research problems in a wide variety of disciplines.

Data Sciences and Applications MPS: This program trains students in analytics, including standard methods in data mining and machine learning.

Artificial Intelligence (Engineering Sciences) MS: The focus of this program is on machine learning and other AI concepts.

Clean Energy (Engineering Sciences) MS: This program is for students looking for careers in the energy sector and the renewable energy industry.

Data Science (Engineering Sciences) MS: Students obtain knowledge and training in data collection and management, data analytics, scalable data-driven discovery, and fundamental concepts.

Robotics (Engineering Sciences) MS: Students learn about robotics and expand their knowledge in automation, leading to employment opportunities in automated manufacturing or continued education at the doctoral level.

Sustainability (Engineering Sciences) MS: This program trains students in the core areas of sustainability fundamentals, renewable energy, economics, environmental quality and engineering practice, ethics and manufacturing.

Sustainable Transportation and Logistics MS: This program is for students who want to assume leadership positions in transportation and logistics.

To learn more about these programs, visit engineering.buffalo.edu/grad/multidisciplinary.

NEW DEPARTMENT OF ENGINEERING EDUCATION KICKS INTO GEAR

Could colleges and universities do a better job teaching engineering and computer science? Educational research says they can, and UB leaders agree, which is why the university has launched the Department of Engineering Education.

Carl Lund

An academic unit of the School of Engineering and Applied Sciences, the department officially formed last year. It offers more than a dozen undergraduate courses ranging from technical communication to ethics in engineering and computing. It is working toward establishing doctoral and graduate certificate programs, as well as faculty training programs and workshops.

"We're creating a new interdisciplinary department to help transform how engineering students are taught," says the department's inaugural chair, SUNY Distinguished Teaching Professor Carl Lund. "To begin doing this, we've gathered a diverse roster of faculty members with academic backgrounds that range from English literature and television news production to mechanical engineering and higher education."

> **"We're creating a new interdisciplinary department to help transform how engineering students are taught."**
>
> *—Carl Lund*
>
> *SUNY Distinguished Teaching Professor and chair, Department of Engineering Education*

Located on the first floor of Capen Hall, the department is focused on the "scaling and translation" of engineering education research findings into classroom practice.

"We are now in the process of adding faculty with demonstrated expertise in diversity, inclusiveness and persistence; the methods and practice of teaching; the science of learning; and assessment and engineering epistemology. The resulting fusion of content and education expertise will position the department to profoundly impact engineering and computing education," says Lund.

Learn more about the Department of Engineering Education at engineering.buffalo.edu/dee.

MANGANESE MAY FINALLY SOLVE HYDROGEN FUEL CELLS' CATALYST PROBLEM

Manganese is known for making stainless steel and aluminum soda cans. Now, researchers say the metal could advance one of the most promising sources of renewable energy: hydrogen fuel cells.

In a study published in the journal **Nature Catalysis**, a research team led by Gang Wu, associate professor of chemical and biological engineering, reports on catalysts made from the widely available and inexpensive metal.

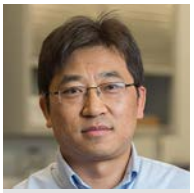
The advancement could eventually help solve hydrogen fuel cells' most frustrating problem: namely, they're not affordable because most catalysts are made with platinum, which is both rare and expensive.

"We haven't been able to advance a large-scale hydrogen economy because of this issue involving catalysts. But manganese is one of the most common elements in the Earth's crust and it's widely distributed across the planet. It could finally address this problem," says Wu.

For more than a decade, Wu has been searching for alternative catalysts for hydrogen fuel cells. He has reported advancements in iron- and cobalt-based catalysts; however, each wears down over time, limiting their usefulness, he says.

In previous work, Wu discovered that adding nitrogen to manganese causes internal changes to the metal that makes it a more stable element. In experiments reported in the study, he devised a relatively simple two-step method of adding carbon and a form of nitrogen called tetranitrogen to manganese.

The result was a catalyst that's comparable in its ability to split water — the reaction needed to produce hydrogen — as platinum and other metal-based alternatives. More importantly, the stability of the catalyst makes it potentially suitable for hydrogen fuel cells. This could lead to wide-scale adoption of the technology in buses, cars and other modes of transportation, as well as backup generators and other sources of power.



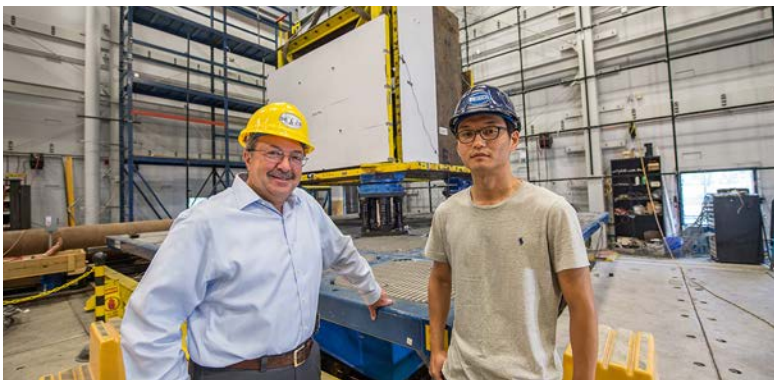
Gang Wu

Wu plans to continue the research, focusing on improving the catalyst's carbon microstructure and the method in which nitrogen is added. The goal, he says, is to further enhance the catalyst's performance in practical hydrogen fuel cells.

The research was supported the UB RENEW Institute, National Science Foundation and Department of Energy.

Douglas Levere

NSF Director France Córdova (right) and Chunming Qiao, SUNY Distinguished Professor of Computer Science and Engineering, take a look at the driving simulator in the Motion Simulator Laboratory in Furnas Hall. Cordova spent the day at UB on April 3, and her visit to the School of Engineering and Applied Sciences included a demonstration of UB's autonomous vehicles, lunch with UB's recent NSF CAREER award recipients, and a tour of the Nanosatellite Laboratory.



Onion Studio, Inc.

CIVIL ENGINEERING PROGRAM RECOGNIZED AS 4TH BEST IN THE COUNTRY, 11TH IN THE WORLD

UB's civil engineering program is ranked number four in the country and 11th in the world according to the Academic Ranking of World Universities (ARWU), or Shanghai Ranking. This is the second consecutive year UB's civil engineering program has ranked inside the top five nationally and top 15 globally.

The Shanghai Ranking Consultancy is an independent organization that distributes rankings of institutions across 54 subjects in engineering and life, medical, natural and social sciences. Over 4,000 universities were ranked in 2019.

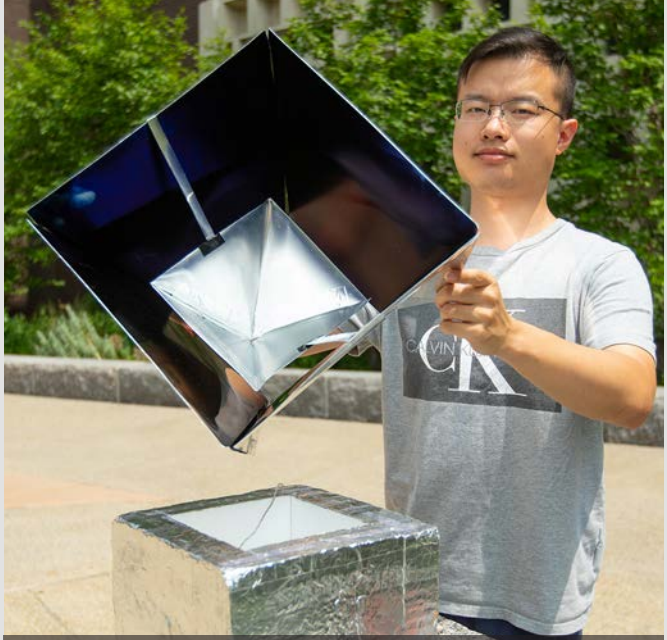
To be eligible for the civil engineering ranking, universities must have a minimum of 100 research publications for the period of 2013-2017. The full 2019 ARWU report and methodology is available here: bit.ly/2KqENgW.

THIS ELECTRICITY-FREE TECH COULD HELP COOL BUILDINGS IN METRO AREAS

Engineers have designed a new system that can help cool buildings in crowded metropolitan areas without consuming electricity, an important innovation at a time when cities are working to adapt to climate change.

The system consists of a special material — an inexpensive polymer/aluminum film — that's installed inside a box at the bottom of a specially designed solar "shelter." The film helps to keep its surroundings cool by absorbing heat from the air inside the box and transmitting that energy through the Earth's atmosphere into outer space. The shelter serves a dual purpose, helping to block incoming sunlight, while also beaming thermal radiation emitted from the film into the sky.

"One of the innovations of our system is the ability to purposefully direct thermal emissions toward the sky," says lead researcher Qiaoqiang Gan, associate professor of electrical engineering. "Normally, thermal emissions travel in all directions. We have found a way to beam the emissions in a narrow direction. This enables the system to be more effective in urban environments, where there are tall buildings on all sides. We use low-cost, commercially available materials, and find that they perform very well."



Lyu Zhou, PhD candidate in electrical engineering holds the solar shelter.

Douglas Levere

Taken together, the shelter-and-box system the engineers designed measures about 18 inches tall, 10 inches wide and 10 inches long. To cool a building, numerous units of the system would be installed to cover a roof.

The study was published in **Nature Sustainability** and funded in part by the National Science Foundation.

WOMEN IN SCIENCE AND ENGINEERING PROGRAM MOVES TO SEAS

Since 2014, WiSE (Women in Science and Engineering) has been connecting female students in STEM with crucial support and stimulating extracurricular opportunities. Launched as a collaboration between the School of Engineering and Applied Sciences and the College of Arts and Sciences, the program has officially moved to SEAS, where it is now under the guidance of program coordinator Chelsea Montrois.

"The heart of WiSE is fostering a sense of belonging," says Montrois. "And in my role, I'm so excited to keep that going and grow the reach and impact of WiSE even more."

A cornerstone of the program is supporting female students in STEM majors– even before they arrive on campus. With the WiSE Early Move-In Program, incoming freshwomen settle into campus early and then connect with their peers, participate in teambuilding activities, and network with faculty members.

WiSE hosts a variety of events throughout the year to engage, educate and build community, from alumni-student dinners, which drew about 25 students and 25 alumni this fall, to movie nights, to the WiSE Coffee and Conversation series, where students engage in discussions led by female faculty members over coffee and donuts.

"The gender imbalance in STEM may still mean that a WiSE student is the only woman in one of her classes, but she is certainly not alone at UB," says Montrois. "Helping students connect the dots and identify their network from day one can mean the difference between isolation and belonging."

72
million dollars in annual research expenditures
(FY 18/19)

20
percent increase in number of awards since last year

6
awards over $1 million this year
(FY 18/19)

36
percent increase in funding for new awards over last year

9
new National Science Foundation CAREER Awards this year
(2019)

9 SEAS FACULTY MEMBERS RECEIVE NSF CAREER AWARDS

Nine SEAS faculty members have received National Science Foundation (NSF) CAREER awards this year, one of the nation's most prestigious honors for early-career faculty.

The grants, which total $4,579,007, will support research in artificial intelligence, cybersecurity, autonomous robots, 3-D printing, computer science, wireless communication networks, optoelectronics and photonics, materials science and other fields.

The funding will also enable the recipients to grow their respective research labs, bringing some of the world's most sought-after graduate students to the Buffalo Niagara region.

Douglas Levere

Peter Liu, assistant professor of electrical engineering, is using his career award to investigate sensing and imaging techniques that could drive the development of new technologies in health care, environmental protection, homeland security, renewable energy and more.

TOP 10 IMPACTFUL RESEARCH PROJECTS

1 **BioXFEL**, UB's first National Science Foundation (NSF) Science and Technology Center, was awarded $22.5 million from NSF to continue its groundbreaking work developing **advanced imaging techniques for critical biological processes** that are difficult, if not impossible, to see with conventional methods. BioXFEL, which is short for Biology with X-ray Free Electron Lasers, is led by Edward Snell, president and CEO of Hauptman-Woodward Institute and a professor in the Department of Materials Design and Innovation. Partners include Arizona State University, University of Wisconsin-Milwaukee, Stanford University, Cornell University, Rice University, University of California-San Francisco and Miami University.

2 **Haiqing Lin**, Department of Chemical and Biological Engineering, is the PI of a $3.8 million Department of Energy project to **develop carbon capture technology**. The multi-institution project will develop materials called membranes that can separate carbon dioxide (CO2) from other gases – a technology that factories and power plants could easily install to cut down on the amount of carbon they release.

3 **Training cybersecurity experts** is a $2.39 million grant from the National Science Foundation to educate the next generation of experts who will protect the United States from cyberattacks. The five-year award is led by **Shambhu Upadhyaya**, Department of Computer Science and Engineering.

4 **Rudiyanto Gunawan**, Department of Chemical and Biological Engineering, is leading a $2 million project called MEMONET. The project is expected to shed light on the complex inner-workings of the brain, as well as to **pave the way for transformative brain-inspired electronic devices** for information processing, data storage, computing and decision making. Collaborators include the University of Alabama, Virginia Polytechnic Institute and State University, University of California-San Diego and the University of Rhode Island.

5 **Shenqiang Ren**, Department of Mechanical and Aerospace Engineering, has been awarded a $1.875 million Department of Energy grant to develop a **new, inexpensive insulating material** that could be used in homebuilding, space travel and other areas. Partners include Mark Swihart, Chi Zhou, Jason Armstrong and Chris Janson, all from UB; Unifrax Corp. and Tapecon Inc.

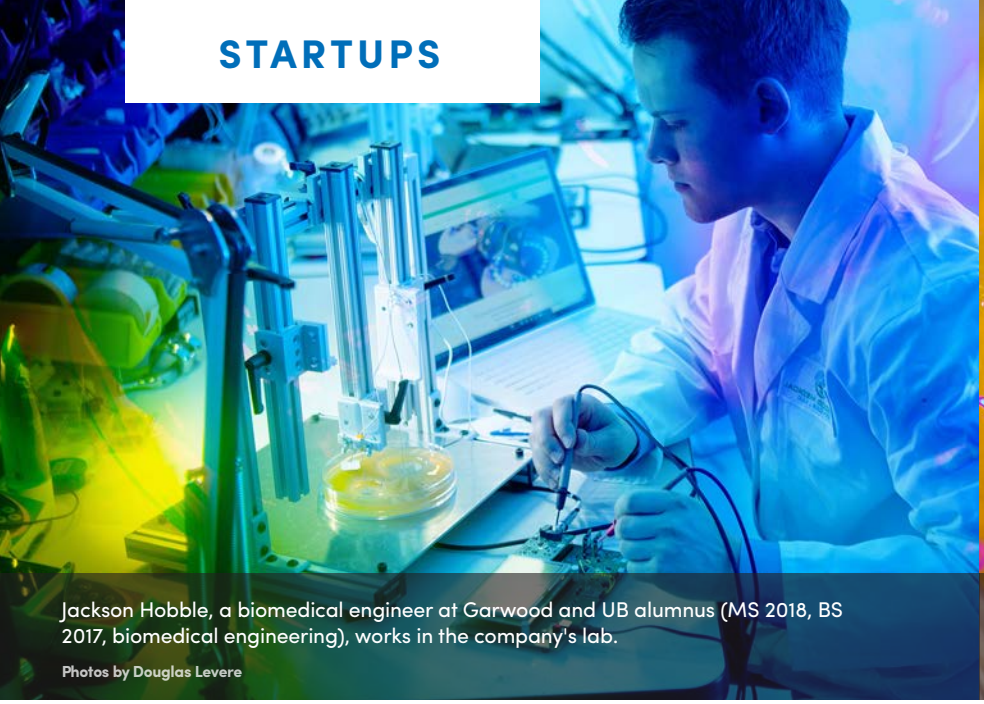
6 **Andrew Whittaker**, Department of Civil, Structural and Environmental Engineering, is the PI on a $1.4 million project that is developing tools and technology to protect a wide range of safety-class **nuclear equipment using seismic isolation and damping devices**, to quantify the improvements in safety and possible reductions in capital cost, and to qualify equipment using hybrid simulation. Key outcomes will be proposed as provisions and commentary for inclusion in the next revisions of ASCE Standards 4 (2021) and 43 (2024).

7 A team of UB researchers led by **Uttam Singisetti**, Department of Electrical Engineering, received a $1 million award from the National Science Foundation to help fund the purchase of a **new electron beam lithography system**. The system will spur research and economic development in photonics, quantum technology, life sciences and more.

8 A team led by **Rahul Rai**, Department of Mechanical and Aerospace Engineering, has been awarded a $1 million DARPA grant to **combine physics-based models with conventional, data-driven AI methods**. The goal is to provide AI systems, which work within specific frameworks and lack tools to explain their reasoning process, with a broader foundation of knowledge through physics. In theory, this will allow for more streamlined, efficient and adaptable AI systems — ideal traits for defense systems such as unmanned aerial vehicles (UAVs), which operate in uncontrolled environments.

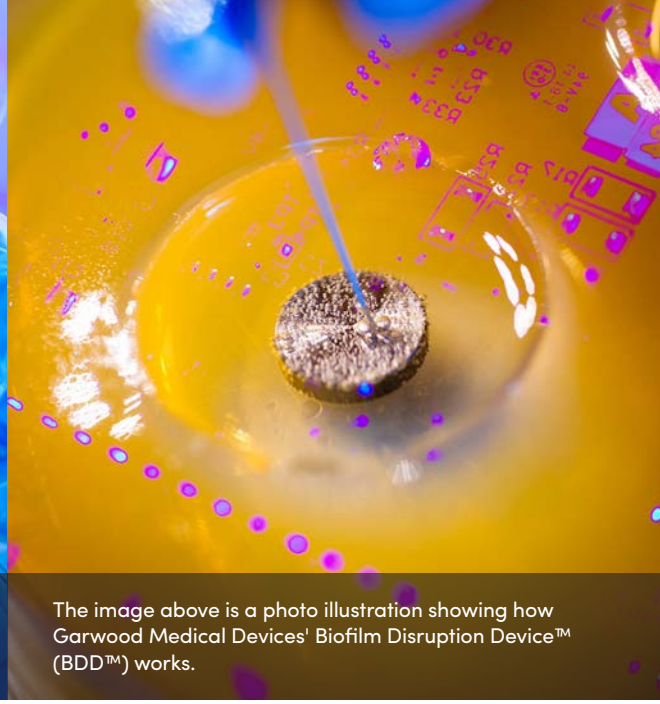
9 **Adrienne Decker**, Department of Engineering Education, received a $674,375 grant to create the resources and tools necessary for identifying and disseminating **best practices for determining the long-term impact of pre-college computing activities** on participants, including analyses of data based on gender and ethnicity. The project is a collaboration with Knox College.

10 POP Biotechnologies Inc. (POP BIO), a UB spinoff, has received a $600,000 contract from the National Institutes of Health to pursue development of a **vaccine against HIV** in collaboration with Scripps Research. **Jonathan Lovell**, associate professor of biomedical engineering and co-founder of POP BIO, developed the vaccine delivery platform.



Jackson Hobble, a biomedical engineer at Garwood and UB alumnus (MS 2018, BS 2017, biomedical engineering), works in the company's lab.

Photos by Douglas Levere



The image above is a photo illustration showing how Garwood Medical Devices' Biofilm Disruption Device™ (BDD™) works.

JOINT REPLACEMENT INFECTION?
ELECTRICAL STIMULATION COULD FIX IT

Buffalo startup Garwood Medical Devices aims to reduce implant failures

You probably know someone with a knee or hip replacement. If not, chances are you will, as demand for these surgeries is expected to continue growing.

While widely successful, not all joint replacements go as planned. Infections are a serious problem, often requiring costly and painful follow-up surgery.

This could become much less common.

Researchers are developing a medical device that delivers low-voltage to a joint replacement or any metal inserted into the body. The electric signal creates an antibacterial environment that stops infections before they become problematic.

TECH STARTED IN PROFESSOR'S LAB

The seed for the innovation — called Biofilm Disruption Device™ (BDD™) — was born in the laboratory of Mark Ehrensberger, associate professor in the Department of Biomedical Engineering.

Ehrensberger developed the electrical stimulation method that Garwood licensed from UB. To bring the technology to market, Garwood partnered with BIG (UB's Institute for Genomics and Data Analytics), NYS Center of Excellence in Materials Informatics, UB Center for Advanced Technology in Big Data and Health Sciences, and the UB Center for Computational Research.

HOW THE DEVICE WORKS

The BDD™ system includes two electrode skin patches, a machine that generates low voltage electricity and a needle (about the size of a sewing needle) that carries the electricity to the joint replacement. The needle is inserted into the body until it reaches the implant or metal hardware. The electric stimulation then triggers a chemical reaction at the surface of the implant, producing a surrounding microenvironment that promotes the killing of bacteria.

Tested in animal models, the technology BDD™ is based upon has eradicated up to 98% of harmful bacteria associated with joint replacements. The advancement is important because infections affect roughly 1 of every 100 knee replacements and there is no simple and effective way to treat them.

Often infections prompt the need for replacement surgeries, which cost at a minimum tens of thousands of dollars. And some studies suggest the rate of infections following joint replacements will increase.

"Biofilm Disruption Device™ is an elegant and minimally invasive solution to a growing problem that causes pain and suffering in hospitals across the nation. It also could save the health care system billions of dollars," says Ehrensberger, who also directs the Kenneth A. Krackow, MD, Orthopaedic Research Laboratory at UB.

OTHER PROJECTS

Garwood is further developing another product, an electronic bandage called EnerAid™. Like a conventional bandage, EnerAid™ helps to treat wounds. The device advances medical care by emitting electricity and magnetic pulses that stimulate blood flow to promote healing. It also will connect wirelessly to the cloud, providing real-time information on a patient's condition to the physician and nursing staff.

The project is a collaboration with Albert Titus, professor and chair of UB's Department of Biomedical Engineering.

— CORY NEALON

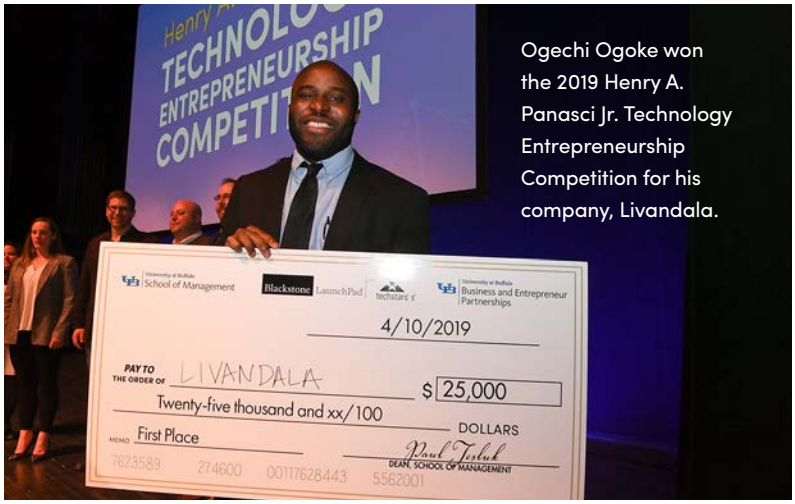
FACULTY PATENTS

Albert Titus received two patents for a "Microfabricated Calorimeter for RF Power Measurement," which has lower loss than traditional RF power measurement methods, making it more accurate and resulting in a much smaller size, enabling portable measurements.

Jonathan Lovell received a patent entitled "Compositions and method for light triggered release of materials from nanovesicles," which describes a light-triggered drug release technology. The patent is licensed to UB spinoff, POP Biotechnologies.

Jonathan Bird received a patent entitled "Magneto-Electric Logic Devices Using Semiconductor Channel with Large Spin-Orbit Coupling," which describes a new class of transistors that exhibit enhanced performance over existing silicon technology.

Michael Langberg received two patents: the first enhances communication systems with novel technology that allows independent encoders to cooperate prior to their outgoing transmissions, while the second one offers a new technology for storage on flash memory devices.



Ogechi Ogoke won the 2019 Henry A. Panasci Jr. Technology Entrepreneurship Competition for his company, Livandala.

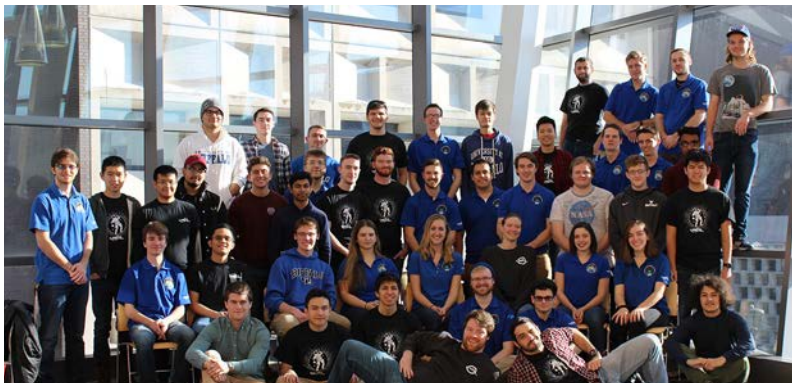
Nancy Parisi

PROPOSAL FOR LIVER TRANSPLANT ALTERNATIVE WINS UB ENTREPRENEURSHIP COMPETITION

A doctoral student in chemical and biological engineering took first place in UB's Henry A. Panasci Jr. Technology Entrepreneurship Competition for a patient-specific cell therapy that can be used as an alternative to a liver transplant.

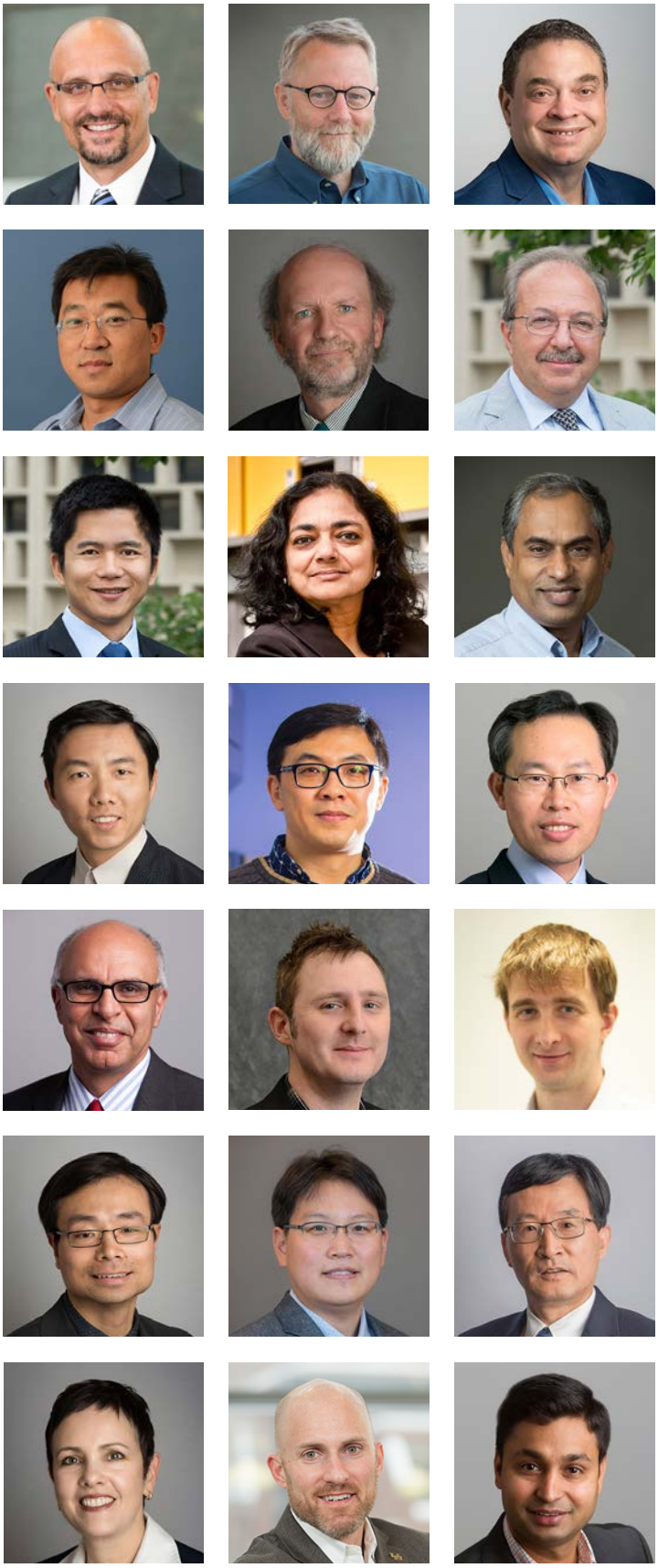
Ogechi Ogoke, who is also a Western New York Prosperity Fellow, received $25,000 in startup capital and in-kind services valued at $27,000 for his company, Livandala.

The provisional patent uses a patient's own stem cells to repair and regenerate specific types of liver damage. In addition to eliminating the need for a liver donor, the therapy reduces the cost and takes much less time than a transplant, enabling patients to recover more quickly.



UB NANOSATELLITE LABORATORY STUDENTS WIN ASTROPRENEUR AWARD

The UB Nanosatellite Lab (UBNL), specifically the GLADOS mission, received the first Astropreneurship award from Space & Satellite Professionals International (SSPI) and the New York Space Alliance. Matthew McGovern, Olivia Gustafson, Nicholas Phillips and Evan Sandler traveled to New York City to accept the award as part of SSPI and New York Space Alliance First Astropreneurship Day. The award recognizes entrepreneurs or individuals whose efforts have made the commercialization of space in New York State a reality. The UBNL was one of only three award recipients, and the only student group.



FACULTY AWARDS

Chemical and Biological Engineering: Stelios Andreadis received the Excellence in Graduate Student Mentoring Award from UB; David Kofke received a Distinguished Postdoc Mentor Award from UB; Mark Swihart was named a Fellow of the American Institute of Chemical Engineering; Gang Wu was named a Highly Cited Researcher by Clarivate Analytics.

Civil, Structural and Environmental Engineering: Michel Bruneau received a lifetime achievement award from the American Institute of Steel Construction and was named a SUNY Distinguished Professor; Michael Constantinou was named a Fellow of the American Society of Civil Engineers; Teng Wu won the IABSE Prize from the International Association for Bridge and Structural Engineering.

Computer Science and Engineering: Bina Ramamurthy received a SUNY Chancellor's Award for Excellence in Teaching; Shambhu Upadhyaya received a SUNY Chancellor's Award for Excellence in Scholarship and Creative Activities; Junsong Yuan was named a Fellow of the International Association of Pattern Recognition.

Electrical Engineering: Qiaoqiang Gan received a SUNY Chancellor's Award for Excellence in Scholarship and Creative Activities; Kwang Oh received the President Emeritus and Mrs. Meyerson Award for Distinguished Undergraduate Teaching and Mentoring from UB and a Qualcomm Faculty Award.

Industrial and Systems Engineering: Rajan Batta was named interim dean of the School of Engineering and Applied Sciences, and received the Koopman Prize from INFORMS; Matthew Bolton received the William C. Howell Young Investigator Award from the Human Factors and Ergonomics Society; Alexander Nikolaev received the Impact Prize from INFORMS; Jun Zhuang received a Volunteer Service Award from INFORMS.

Materials Design and Innovation: Jung-Hun Seo received a Young Investigator Grant from the Korean-American Scientists and Engineers Association; Quanxi Jia was named a Fellow of the National Academy of Inventors.

Mechanical and Aerospace Engineering: Francine Battaglia was named a Fellow of the American Society of Thermal and Fluids Engineers and was named Acting Associate Dean for Faculty Affairs of the School of Engineering and Applied Sciences; Kemper Lewis received the Donald N. Zweip Innovation in Education Award from the American Society of Mechanical Engineers; Rahul Rai was recognized with a 2019 Best Paper Award from the Prognostics and Health Management (PHM) Society.

LEWIS NAMED INAUGURAL MOOG PROFESSOR OF INNOVATION

Onion Studio, Inc.

Kemper Lewis, chair of the Department of Mechanical and Aerospace Engineering, has been named the first Moog Professor of Innovation.

Long a loyal supporter of the university, Moog Inc.'s $1.5 million gift supports the creation of the professorship, a three-year appointment of a highly regarded faculty member who demonstrates a strong track record of research, teaching and industry collaboration in areas of mutual interest to Moog and UB.

Lewis is a renowned expert in design theory, advanced manufacturing, systems optimization, tradespace modeling, and machine learning in design, with a proven track record of productive collaboration with industry.

He is a Fellow of the American Society of Mechanical Engineers (ASME) and director of UB's Community of Excellence in Sustainable Manufacturing and Advanced Robotic Technologies (SMART), an initiative that harnesses the strengths of faculty across the university to develop advanced manufacturing processes including autonomy, intelligence and materials technologies that enable cost-effective design of highly customizable, high-quality products.

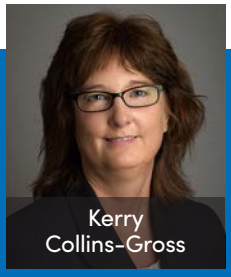
Under this collaboration, representatives from Moog and the school will meet and communicate regularly to cultivate ideas and new initiatives. The collaboration is designed to go beyond the discipline of engineering and will include cross-functional teams from areas such as architecture and planning, and medicine.

It also opens avenues for UB students to gain experience through internships, co-ops and fellowships, in addition to possible eventual employment at Moog.

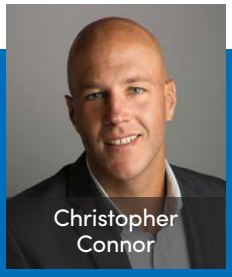
"Moog has enjoyed a strong and productive relationship with the university from collaborating on research projects and serving on advisory boards to guest lecturing and designing online courses," said Moog CEO John Scannell. "UB is a wonderful training ground for tomorrow's engineers, and we are pleased to expand our involvement. It is also a testament to the university that so many UB alumni are employed here at Moog."

4 SEAS STAFF MEMBERS RECEIVE SUNY AWARDS

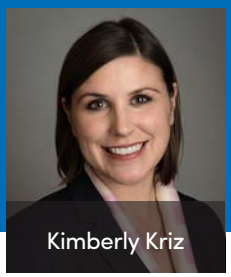
Kerry Collins-Gross, assistant dean for undergraduate education, Christopher Connor, assistant dean and chief enrollment officer for graduate education, and Kimberly Kriz, director of administration, Department of Electrical Engineering, were honored with the SUNY Chancellor's Award for Excellence in Professional Service. Lori DuVall-Jackson, academic secretary, Department of Chemical and Biological Engineering, received the SUNY Chancellor's Award for Excellence in Classified Service.



Kerry Collins-Gross



Christopher Connor



Kimberly Kriz

Lori DuVall-Jackson

WEBER TO SERVE AS INTERIM PROVOST

A. Scott Weber, vice president for student life, and professor and former chair of the Department of Civil, Structural and Environmental Engineering, has been named interim provost and executive vice president for academic affairs. Weber will serve as interim provost until a permanent successor is named to replace Charles F. "Chip" Zukoski, who left UB to become provost and senior vice president for academic affairs at the University of Southern California on Oct. 1.

UB Blockchain Buildathon grand prize winners pose with representatives from M&T Bank and faculty member Bina Ramamurthy.

Maximilian Kapitonoff

BUILDATHON CHALLENGES STUDENTS TO DEVELOP SOLUTIONS USING BLOCKCHAIN TECHNOLOGY

About 100 students took part in the 2019 Blockchain Buildathon—an annual event that brings together local businesses and School of Engineering and Applied Sciences students to develop a solution to a problem, or use case, utilizing blockchain technology.

"The Blockchain Buildathon is a valuable experience for students, who are empowered to engage with and solve real-world problems," says Bina Ramamurthy, organizer of the annual event, professor of teaching in the Department of Computer Science and Engineering, and director of the Blockchain ThinkLab. "Best of all, this kind of focused interaction between sponsoring businesses and student participants is only possible at such events."

On the first day of the buildathon, students formed 17 teams and were randomly assigned use cases that had been developed by the sponsors. M&T Bank's use case concerned blockchain-enabled property title search, ValueCentric's pertained to tracking pharmaceutical drugs using blockchain, and Blue Cross Blue Shield's dealt with personally identifiable information on blockchain.

On the second day, the teams convened to analyze their cases, and design and develop blockchain-based solutions. After presenting their final project solutions, the winners were announced. The Grand 1st Prize ($500) went to Dana Moukheiber, Abhijit Joshi, Vikram Karthikeyan, Emmanuel Johnson and Saiyam Pravinchandra Shah. The Grand 2nd Prize ($300) went to Ethan Sachse, Timothy Chase and Anthony Introne.

Moukheiber, a biomedical engineering student, said her group worked on creating a platform to look for liens on one's property—whether it be unpaid property taxes to the government, loans from the bank or even judgments from court.

"I really appreciated all the time and effort Dr. Ramamurthy, the volunteers and sponsors put into making such an event possible. The experience helped me put the components of a blockchain system into perspective. I encourage anyone interested in fabricating new technology to give it a try," says Moukheiber.

ValueCentric, an Engineering Partner and local technology company that provides services to health care organizations, was excited to again be involved in the Blockchain Buildathon. Representatives from the company, including a few UB alumni, consulted with student teams throughout the day.

> **"As a business leader, it was fantastic to engage with so many students and experience the energy of the buildathon."**
>
> *—Judy Feldman*
>
> *Executive vice president and CIO, ValueCentric*

Judy Feldman, executive vice president and chief information officer at ValueCentric, said the event allows companies exploring blockchain to provide real world scenarios, such as the Drug Supply Chain Security Act (DSCSA), and meet bright and creative students in the process.

"As a business leader, it was fantastic to engage with so many students and experience the energy of the buildathon," says Feldman, who sits on the SEAS Dean's Advisory Council. "The winning team had an elegant technical solution, but more importantly, explored the business problem and was able to articulate how their solution solved the DSCSA problem."

Held on April 12-13, 2019, this year's event was sponsored by M&T Bank, ValueCentric, and BlueCross BlueShield, who provided funding and acted as mentors and judges throughout the two days.

— NICOLE CAPOZZIELLO AND SARAH D'IORIO

Onion Studio, Inc.

ACV AUCTIONS NAMED CORPORATE PARTNER OF THE YEAR

This year's Corporate Partner of the Year is ACV Auctions, a Buffalo-based start up founded in 2015 by UB alumni. The company employs innovative technology and values-driven customer service to revolutionize the used car auction market.

ACV Auctions provides financial support to student clubs, sponsors UB Hackathon events, and contributes to the UB Scientista Fund, which empowers underrepresented groups in engineering and applied sciences. ACV's executive team also serve in advisory capacities for SEAS and the School of Management.

Accepting the award were Dan Magnuszewski (BS '05 computer science), co-founder and Chief Technology Officer, and Phil Schneider (PhD '18, electrical engineering), a research engineer manager.

"All along the way in my own career, it's been important to me to figure out ways that the university and industry could play together better and be more integrative," said Magnuszewski.

"Our motto so far has been to 'just say yes to everything' because we really want to help take UB to the next level. The more we can do to make UB better and more attractive to top-tier students, the more we all benefit."

Shown in the photo from left are: Schneider, SEAS interim dean Rajan Batta, Magnuszewski, Wes Csendom (BS '17 computer science), Dennis Fedorishin (BS '20 computer science and engineering) and Michael Pokora (all from ACV Auctions except Batta).

AIAA MEMBERS PARTICIPATE IN CONGRESSIONAL VISITS DAY

Eleven students from the UB chapter of the American Institute of Aeronautics and Astronautics (AIAA) attended Congressional Visits Day with funding from the Engineering Partners Program and AIAA. The event brings together scientists, engineers, researchers, educators, and technology executives to raise visibility and support for science, engineering and technology.

While in D.C., the students had the opportunity to visit 16 NY Congressional district offices, attend a dinner with Richard M. Obermann, the Chief of Staff for the Committee on Science, Space and Technology, and tour the White House, the Lockheed Martin visitor center and the National Air and Space Museum's Steven F. Udvar-Hazy Center.

2019 Engineering Partners

To become an engineering partner, contact **Nick Lane** at (716) 881-8051, *nmlane2@buffalo.edu* or **Christine Human** at (716) 645-4374, *chuman@buffalo.edu*.

Gold Partners

Linde – Making our world more productive
SAFRAN
nationalgrid
ASCENT AEROSPACE GEMCOR
U&S SERVICES – Your buildings. Our solutions.
UNIFRAX
NORTHROP GRUMMAN
LOCKHEED MARTIN
ATTO – The Power Behind the Storage
valuecentric
MOOG

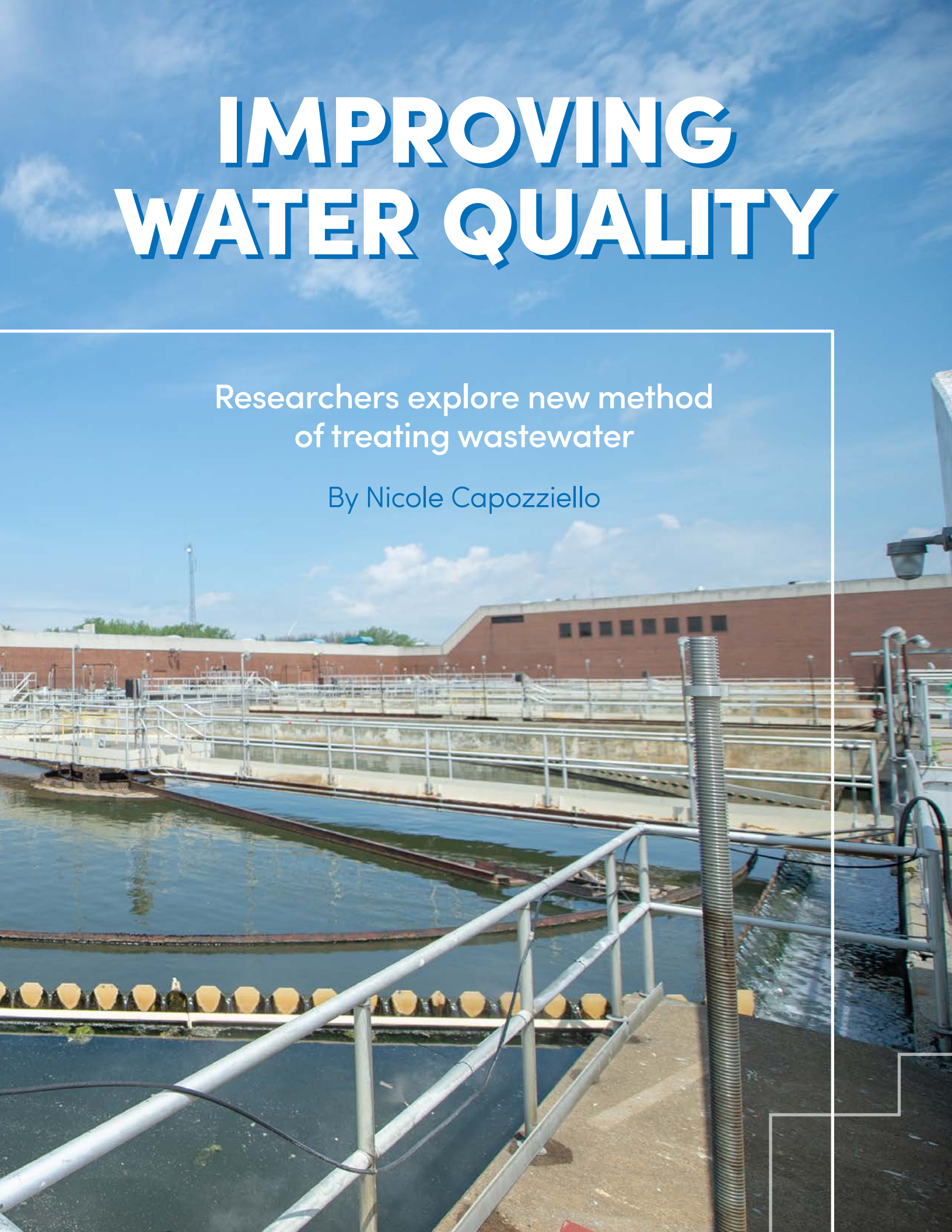
Silver Partners

NIAGARA SPECIALTY METALS
CURBELL MEDICAL
ASTRONICS 50 YEARS OF INNOVATION & COLLABORATION

IMPROVING WATER QUALITY

Researchers explore new method of treating wastewater

By Nicole Capozziello



It's a sunny spring day and a group of environmental engineering students are 19 miles south of UB's North Campus, just inland from Woodlawn Beach State Park. "There's nothing like being out in the field. I love getting to talk to people about this project," says Abdulrahman Hassaballah, a PhD student in environmental engineering, looking down a six-meter length of piping. He takes a sample from one of the pipes, and then does tests on it a few feet away.

It's here – at the Southtowns Advanced Wastewater Treatment Facility – that this team of researchers, comprised of undergraduate and graduate students, led by Ning Dai and Lauren Sassoubre, assistant professors in the Department of Civil, Structural and Environmental Engineering, spearheaded a pilot program to explore a novel method of wastewater treatment. The two-year project was a collaboration between UB, the Erie County Division of Sewerage Management, and PeroxyChem, a Tonawanda-based chemical company, and was supported by the New York State Pollution Prevention Institute.

"When Ning approached us about a potential collaboration, I was thrilled," says Joe Fiegl, Deputy Commissioner of the Erie County Department of Environment and Planning. The department operates seven sewer districts throughout the county, managing all the assets, including sewers, manholes, pumping stations, and treatment plants, within each district. The Southtowns plant, built following the Clean Water Act of 1972, has been operating since 1980 and serves a population of over 90,000 in the suburbs south of Buffalo.

"The county is always interested in exploring better solutions for sustaining water quality, protecting public health, and delivering the services that we provide. And by working with UB, we can draw on expert resources in our own backyard."

—Joe Fiegl

Deputy Commissioner of the Erie County Department of Environment and Planning

"The county is always interested in exploring better solutions for sustaining water quality, protecting public health, and delivering the services that we provide," says Fiegl. "And by working with UB, we can draw on expert resources in our own backyard."

Dai has been making connections in the local environmental community since coming to Buffalo in 2014. On campus, she advises student clubs, and off campus, she facilitates student tours of local plants, and takes part in professional organizations. It was through one of these organizations, the Western Chapter of the New York Water Environment Association (NYWEA), a non-profit educational group that focuses on protecting and enhancing our water resources, that Dai met Fiegl.

"Joe is very forward-thinking – he's a visionary," says Dai of Fiegl, who asks questions like, how do we optimize the treatment plants to balance the environment, costs and people? How do we upgrade and maintain our facilities in a way that also improves environmental protection? And how can this all be achieved in the long-term?

"The fact is, we as a society – entities from little kids up through large corporations – produce a lot of pollution. And if this pollution is discharged into our environment untreated, we have major problems. What we do at our treatment plants is we take that pollution and eliminate it.
We produce clean effluent that's protective of water quality and protective of public health," says Fiegl. "But for us to be able to do that takes a lot of energy and money."

Erie County has long disinfected the wastewater received at the Southtowns Facility using sodium hypochlorite, or chlorine, which is the most common method of wastewater disinfection in the United States. Effluent from the facility is treated using a specific dose of chlorine for the required contact time, before being discharged into Lake Erie through an outfall pipe. While chlorine removes pathogenic organisms, like enterococci and fecal coliform, it also produces byproducts that, if in too high of concentration, can be toxic to aquatic life.

In 2012, the Southtowns Facility received a new State Pollutant Discharge Elimination System (SPDES) permit that included new, lower regulations for the total residual chlorine allowable in wastewater effluent. This meant that Erie County, like many others across the country, would need to find a way to lower the chlorine levels in its wastewater. Simply using less chlorine was not a possibility – the bacteria levels would remain too high. This left three options: continue using chlorine and add sodium bisulfate, a dechlorination compound, at the end of the process, disinfect the water using UV radiation, or disinfect the water using peracetic acid (PAA), an emerging method in wastewater recycling. Working with PeroxyChem and Erie County, the UB team conducted a crucial test of PAA's effectiveness here in Buffalo.

"Whenever we need to make major upgrades, we go through our full range of options," says Fiegl.
The department's first step was to hire engineering consultants to provide a preliminary exploration of the three options, including the capital costs, such as the needed equipment and construction, and the ongoing and operational costs of each.

> **"The fact is, we as a society – entities from little kids up through large corporations – produce a lot of pollution."**
>
> *—Joe Fiegl*
>
> *Deputy Commissioner of the Erie County Department of Environment and Planning*

For UV radiation, there are costs associated with the new equipment, ongoing electrical costs, as well as the replacement of the UV bulbs. For chlorine and PAA, the major expense is the initial investment of and then the ongoing cost of the chemicals, another reason why finding the appropriate dosage is so important. When weighing options, Fiegl commented that looking solely at capital costs and ignoring ongoing operation and maintenance may adversely impact ratepayers.

"We don't want to implement a short-term fix," says Fiegl. "When analyzing and assessing the various options, it's important that we look at the life cycle costs – the capital costs, plus the ongoing and operational costs over a 20-year period."

William Goodridge collects samples to help determine the effectiveness of peracetic acid on treating waste water.

In addition, Fiegl and his department consider potential short- and long-term costs to public health and the environment, such as each option's carbon footprint. Referred to as "triple bottom line," finances are evaluated along with the social and ecological impacts as part of a holistic analysis.

For sodium hypochlorite and PAA, this includes the electricity it takes to produce each of these chemicals, as well as the fuel costs of the tankers that truck them in.

When Erie County initially looked at the various options, the results of the consultants' bench study on PAA were ultimately inconclusive, though it pointed to PAA being the most expensive of the three options. Enter UB researchers, who in partnership with PeroxyChem, began a pilot program, a larger scale test that would be more representative of what could be installed.

"We set out to determine what dosage of peracetic acid would provide us with the needed kill on the bacteria," say Sassoubre and Dai, who launched the program in 2016. They assembled a team of environmental engineering students: Christine Hart, Benson Chen, Jeremy Nyitrai, William Goodridge and Abdulrahman Hassaballah. The students worked closely with maintenance, laboratory and field operations staff at the Southtowns facility. (Editor's note: Lauren Sassoubre has since left UB.)

"All of our partners and collaborators are amazing people," says Hassaballah, who had previously done laboratory-scale testing on wastewater treatment.

---

1. Ning Dai and her team of environmental engineering students arrive at the treatment facility to collect field samples for laboratory testing at UB.

2. Benson Chen and Christine Hart measure disinfectant concentration onsite.

3. Abdul Hassaballah tests the samples for bacteria.

4. Farima Loghmani and Ning Dai filter samples for analysis of trace anthropogenic compounds.

5. Left to right (all from UB unless noted): William Goodridge, Ning Dai, Kenneth Brown (Chief of Maintenance, Erie County Division of Sewerage), Robert Klosko (Senior Chemist, Erie County Division of Sewerage), Lauren Sassoubre, Christine Hart, Abdul Hassaballah, Benson Chen and Jeremy Nyitrai.

All photos by the Onion Studio, Inc.

> **"The success of this project would not have been possible without such a committed and well-rounded team."**
>
> *—Abdulrahman Hassaballah*
>
> *Environmental engineering PhD student*

"The success of this project would not have been possible without such a committed and well-rounded team." This collaborative pilot scale study and its results serve as vital components of Hassaballah's dissertation, which explores alternative disinfectants for wastewater treatment.

The team conducted the pilot study over a four-week period from May 14 to June 8, 2018 at the Southtowns facility. The pilot reactor was provided by PeroxyChem, with the main part comprised of PVC pipes that were 27.7 meters, or about 91 feet, in total length. The pipes were arranged in four six-meter sections connected by three 180-degree turns, also known as a "serpentine" pipe arrangement. Wastewater flowed at a flow rate of 20 gallons a minute through the reactor. The PAA solution was continuously pumped through a peristatic pump and mixed into the wastewater stream via an inline static mixer. The piping approximated a plug flow reactor and had six sampling taps along its length, each corresponding to a different contact time. The study also included the installation of a low-pressure UV lamp at the end of the pilot reactor on day 18.

Ultimately, the team found that PAA disinfection is able to meet the disinfection requirements. In the next phase, the consulting team will rerun the economic logistics associated with the life cycle costs of PAA and see how it compares to the other options. If deemed the most all-around effective, the benefits are numerous and wide-reaching; the adoption of PAA would not only provide safe, cost-effective wastewater treatment, but would also be a boon for local company PeroxyChem and establish Erie County as being at the cutting edge of PAA technology.

The potential benefits of using PAA in wastewater treatment may go beyond disinfection. Current treatment facilities are designed to remove bacteria but as more and more pharmaceutical compounds enter our environment, many are evaluating the oxidation properties of PAA as well, which removes other contaminants from the water. While pharmaceutical compounds are not regulated yet, some preliminary research has shown promise for PAA in removing some of these compounds.

"It was a pleasure working with UB. From students to professors, everyone was accommodating, professional and worked well with our staff," says Fiegl. "As soon as the project was done, I said to Dr. Ning, 'what's next?'"

ENGINEERING THE PERFECT TRIBUTE

Alumni use engineering skills to memorialize young woman

When Alix Rice, an avid longboarder from Amherst, N.Y., was killed by a drunk driver in the summer of 2011, her heartbroken friends and family wanted to celebrate her life. They thought that the best way to do that was to build a skatepark in her honor. One that would provide others like her with a safe haven to enjoy the sport they love.

But they needed help. So a small group of UB civil engineering alumni, led by Steve Federico (MS '03, construction management, MBA '02, BS '02, civil engineering) helped turn their vision into a reality.

It began back in 2013, when Federico heard the Alix Rice Foundation members talking about their "dream project" on the radio. He contacted them immediately – as he knew his education and training in engineering and construction would be a boon to getting the skatepark built –and joined the foundation as their Director of Construction.

"The project was in its infancy," says Federico, who serves as vice president of facilities and construction for Calspan's new business, Calspan Development and Construction, which performs real estate development and construction services for external clients. "We didn't have all the funding or even a location. My background is in construction/real estate, so I'm familiar with managing projects through design, as well as the municipal approval processes. I was able to help the foundation carry the project from 'Hey, we want to do a skate park' to having a 10,000 square foot facility."

Federico explains that the foundation worked with a consulting firm from Seattle, called Grindline, who designs skateparks. But since there was also a significant amount of civil and structural design required, from sidewalk layouts to drainage solutions, he called on fellow alumni Jason Havens (BS '05, civil engineering), a project manager at Clark Patterson Lee (CPL), and Francis Mahaney (BS '12, civil engineering), previously a civil engineer with CPL, and now a civil engineer/project manager at WSP USA. James Panepinto (BS '92, civil engineering), president/ CEO and third-generation owner of Pinto Construction Services, was also recruited to help with excavation and grading, and to place all the concrete features.

"I love being a part of a project like this and giving back, paying it forward," Panepinto says. "We've all had benefactors and people helping us out along the way, and when you see someone as passionate about something as Steve was about this... It's tough to say no to someone like that. He's not asking for something for himself, he wants to better the community."

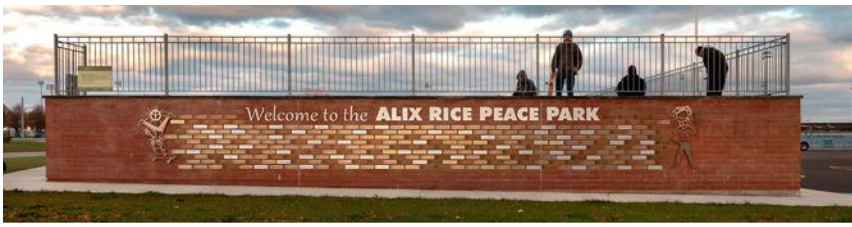
> **"You can't find anything like this in the area. The closest one is probably in Pittsburgh or Toronto."**
>
> *—Steve Federico*
>
> *Vice president, Calspan Development and Construction*

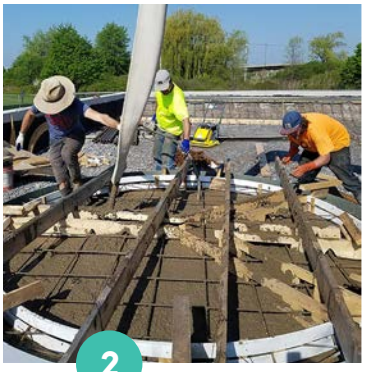
After years of funding, planning and coordinating, the Alix Rice Peace Park broke ground in July 2017. The finished skatepark, located at the Northtown Center (a multipurpose sports facility) across from UB's North Campus, is a California-style park with two bowls, as well as stairs, ramps and rails. "You can't find anything like this in the area. The closest one is probably in Pittsburgh or Toronto," says Federico.

When asked what the most challenging and most rewarding aspects of the project were, Federico said: "I have the same answer for both. Networking and finding folks who were willing and able to help out. It's not an easy task, but it was worth it." He says they raised over $300,000 and in-kind donations of labor, material, equipment and services, but that getting all those volunteers and donors together for such a complex project was difficult at times.

"Coordination was the biggest challenge," Havens explains. "We watched Steve struggle with getting certain aspects of the project finished because there was a lot of picking up and putting

> **"I love being a part of a project like this and giving back, paying it forward"**
>
> *—James Panepinto*
>
> *President and CEO, Pinto Construction Services*





1. Concrete skate park features being formed and poured.

2. Forming and pouring the "peace park" symbol. The peace symbol meant a lot to Alix, which led to the official name of the park.

3. Jason Havens, Jim Panepinto and Steve Federico collaborated to help turn the vision of Alix Rice's family into reality. The trio spend countless hours volunteering their time, energy and talents to create the Alix Rice Peace Park, located in Amherst, N.Y.

back down, and trying to get everyone on the same page. I tip my hat to what he was able to achieve."

On August 4, 2018, the Alix Rice Peace Park was complete and more than 500 people – friends, family, and fellow skaters – attended the grand opening.

Mahaney describes how he felt that day: "Typically, for engineers, you can see the final product. People drive over your roads or use the sewer system you designed, but they never say, 'This is really great!' But being there and seeing and hearing everyone really appreciate the skatepark was amazing."

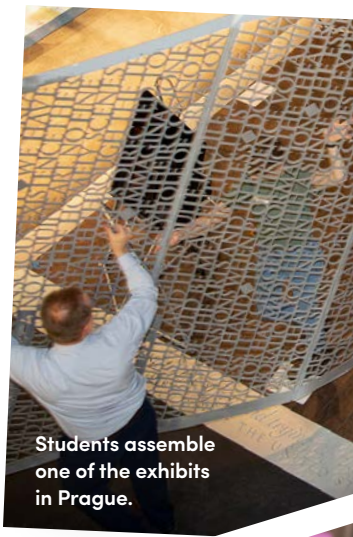
— REBECCA RUDELL

ENGINEERING + THEATRE

Students combine skills to build sets for international competition

Mechanical engineering student Katherine Metzler works on an exhibit for the Prague Quadrennial of Performance Design and Space.

Computer science student and theatre major Luke Tarnow- Bulatowicz assembles an exhibit in Prague.



Students assemble one of the exhibits in Prague.

Nearly every large event that people attend, from concerts to plays to commencement ceremonies, relies on engineering. But what most attendees don't think about — unless something goes wrong — is that the technology behind theatre is essential, skilled work.

"In any field of technical theatre, the audience should be so enrapt in the show itself that your role kind of gets brushed over," says Alex Poulin, a senior majoring in mechanical engineering and minoring in theatre. "The story is the most important thing and good technical theatre supports that, helping the overall production feel natural."

Jon Shimon, an assistant professor in the Department of Theatre and Dance and a UB alumnus, specializes in technical theatre — the behind-the-scenes work that exists at the intersection of art and function. It is a world in which theatre and engineering come together in precise, beautiful and extraordinary ways.

Over the years, a number of students from UB's School of Engineering and Applied Sciences have participated in this world, beginning by taking Shimon's Introduction to Technical Theatre Course, and going on to provide technical direction and support for shows of all kinds.

This past school year, the long hours of creative problem-solving paid off when a group of students got the opportunity of a lifetime: to build two sets for the Prague Quadrennial (PQ), an international event showcasing the best in performance design, scenography and theatre architecture, which took place June 6-16.

"It's an honor to be able to represent the United States in this way," says Shimon, who travelled to Prague along with the group of students and others from the Department of Theatre and Dance. Shimon also points out that it's an unprecedented opportunity for a group of undergraduate students; UB is the first school without an MFA in theatre to be chosen for this distinction.

Interested students applied to be on the team in the fall; many of them had been working with Shimon for years and had taken a spring 2018 special topics class, which focused on the pre-production details for the Prague Quadrennial and used it as a case study.

He and the UB team built two exhibits: the emerging professional entry, designed by a Chicago-based collaborative, and the professional entry, designed by a team out of Houston.

The team of nine students tasked with bringing these designs to life over more than 3,500 hours of work included Poulin and

Meredith Forrest Kulwicki

two others from the School of Engineering and Applied Sciences: Katherine Metzler, who recently graduated with a double major in theatre and mechanical engineering; and Luke Tarnow-Bulatowicz, a senior majoring in theatre and minoring in computer science.

"We didn't just take the drafts and hand them off," says Poulin, who often moonlights in the UB Nanosatellite Laboratory. "We got to take the project from a piece of paper to building it in real-life."

The sets had their first public viewing at the Center for the Arts in late January at the Upstate New York Regional Section of the U.S. Institute for Theatre Technology winter meeting and jobs fair. People had the opportunity to appreciate and interact with the team's work, from the painting to the LED pixel tape lighting.

"In computer science, you build your program, test it out, and get to see it on the website – that's the end," Tarnow-Bulatowicz says. "Here, I got to draft the floor, build the floor, draft the kiosks that go on the floor, build the kiosks, build the software that goes in to the kiosks, and then I get to see everybody interact with it."

GROWING NEED FOR CROSSOVER BETWEEN ENGINEERING AND THEATRE

The need for crossover between engineering and technical theatre is growing nationally, with several universities introducing formalized programs in the field. This year, Purdue will host the first-ever "Symposium on Education in Entertainment and Engineering," at which Metzler will present. At UB, about a third of the students in Shimon's Introduction to Technical Theatre class are engineering students.

Metzler came to UB knowing that she loved to be around creative people, and wanted to use her technical talents to carry out their vision. Metzler initially thought she would pair civil engineering with architecture, but after taking Shimon's intro class, discovered that technical theatre was an exciting synthesis of her passions and skills.

She later switched to mechanical engineering, and used her involvement in the PQ as the basis for her senior capstone project, a culmination of her training in both departments.

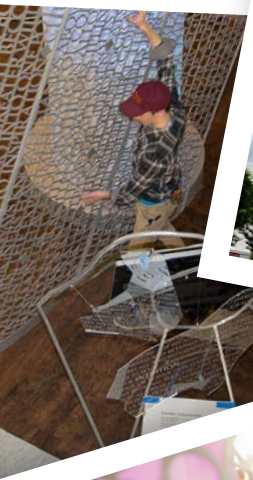
ARRIVING IN PRAGUE

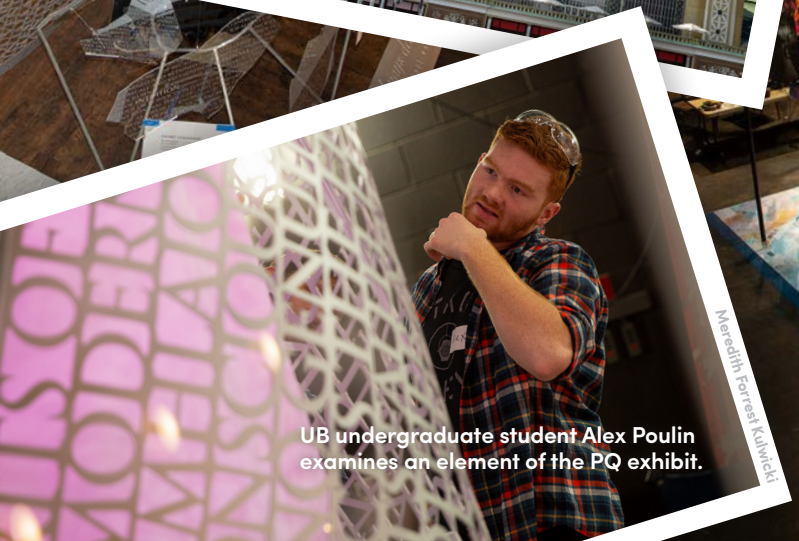
Upon arriving in Prague, the team had two days to set up their exhibit for the final time. Then, they had an opportunity to check out innovative work in technical theatre, connect with industry greats and see the international audience interact with their work.

"When we look at the set all put together, we can say that all of us built all of that together," says Poulin. "It's been a once-in-a-lifetime opportunity."

— NICOLE CAPOZZIELLO

One of the sites of the 2019 Prague Quadrennial.





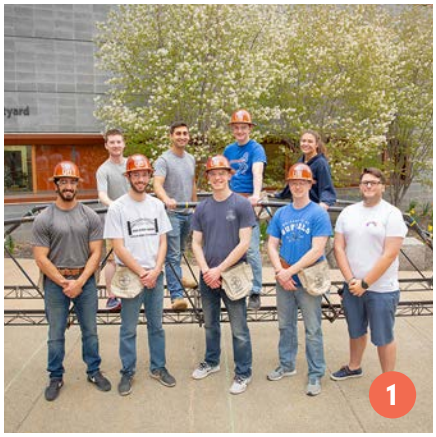
UB undergraduate student Alex Poulin examines an element of the PQ exhibit.

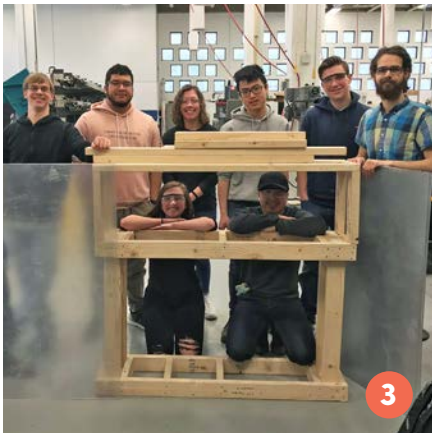
Meredith Forrest Kulwicki

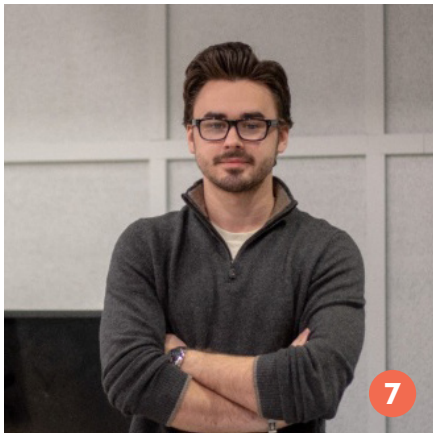
UB students worked more than 3,500 hours to complete the project.

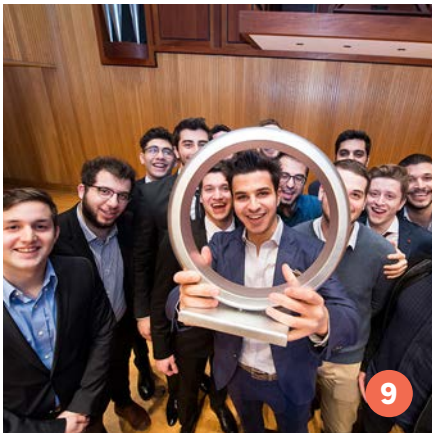
Photo by Meredith Forrest Kulwicki

STUDENTS









1. UB ASCE's student club took 4th place at the National Student Steel Bridge Competition, and received 2nd place for construction speed.
2. Computer science major Dennis Fedorishin won a Goldwater Scholarship. The prestigious national scholarship is awarded to sophomores and juniors who are engaged in research and plan to pursue a PhD.
3. UB's Engineers for a Sustainable World (ESW) club and its president, Austin Izzo, received awards from the national ESW for outstanding chapter and outstanding member. The club will host the 2021 national conference in Buffalo.
4. PhD student Chen Song poses with SUNY Chancellor Kristina Johnson and NYS Health Commissioner Howard Zucker at NYS's Aging Innovation challenge competition. Song was a finalist in the competition.
5. Leah Nolan is the first UB student to be named a Brooke Owens Fellow, a prestigious award that recognizes and supports extraordinary undergraduate women in the aerospace field.
6. Kennedy Colon earned the "Defender of Potential" award for her mentoring work from the WNY chapter of Big Brother Big Sisters.
7. Fatak Borhani, a senior in the Department of Mechanical and Aerospace Engineering, was named one of Aviation Week's 20 Twenties.
8. Two environmental engineering graduate students earned bronze in the World's Challenge Challenge Global Final at Western University for their sustainable beef alternative. From left are Anish Ajay Kirtane, Olivia Burgner (business administration) and Abdulrahman Hassaballah.
9. Seniors in the Dual Diploma Program between UB's Department of Civil, Structural and Environment Engineering and Istanbul Technical University show off a large-scale steel ring at the Order of the Engineer ceremony.

QURESHI EMPOWERS WOMEN ENGINEERS IN PAKISTAN AND BEYOND

How one PhD student is revolutionizing support for women in STEM

As a young girl in Pakistan, Ramla Qureshi, a PhD candidate in the Department of Civil, Structural and Environmental Engineering, dreamt of being a fighter pilot, and then a lab scientist.

Over time, her aspirations shifted to becoming an engineer, a discipline that is made up of only 11% women internationally. On her first day of engineering school in Pakistan, a "benevolent" professor told the class that "civil engineering is not for girls" and without missing a beat, Ramla, one of three women in the room, blurted out, "You know, that's what we're here to prove wrong."

This mantra continues to drive her as a PhD student, and her unwavering commitment to empowering other women in Science, Technology, Engineering, and Mathematics (STEM) disciplines. By day, Ramla works on her PhD, and then goes home to work on her organization, Women Engineers Pakistan (WEP), late into the night. "It's always daytime somewhere," she laughs.

Ramla, who's also a Fulbright Scholar, started WEP in 2013 in response to the discrimination and gaps in resources for women that she saw within her field. Working as a civil engineer in Pakistan, Ramla wondered, how can we let girls and women know the door to STEM careers is open? How can we help them advocate for themselves once they get there? And what resources do they need to stay in the field?

> **"My dream for Women Engineers Pakistan is to be put out of business. I want an engineer to be called an engineer, not a female engineer."**
>
> *—Ramla Qureshi*
>
> *Founder, Women Engineers Pakistan*

WEP aims to help women overcome the barriers Ramla and other women in STEM disciplines often face, from a K-12 schooling system that might discourage girls from going into STEM fields,mightto universities where female students are in the vast minority, to a workforce where sometimes there isn't even a restroom for women in the building.

Leveraging the powers of technology, WEP connects undergraduate women with resources for the job market, from presentation and soft skills development to CV screenings and mock interviews. Members also get connected with job opportunities at a host of organizations, who pay to post on the WEP site. Most services are free for WEP members, and others are provided at minimal cost. WEP then asks women to pay it forward by doing STEM outreach in schools, creating a resource cycle that is sustainable and rewarding. Women in WEP go into schools to talk to girls about STEM disciplines, all the while modeling that it's possible for a girl to grow up to be an engineer.

By asking for 20-40% male participation at their university chapters, WEP calls upon men to advocate for their friends and classmates –and the future. "If you understand what we're doing then you better join us because we need your help," Ramla says to the guys. Of course, this collaboration also fosters a culture shift, with men playing a role in creating space for women in these male-dominated fields.

"I always say, we didn't start an organization," says Ramla. "We started a revolution." After only four years, they're in 13 universities throughout Pakistan, in seven cities. "It's been incredible."

More recently, WEP partnered with the World Bank and is now expanding their game-based learning STEM intervention and outreach sessions internationally. Earlier this year, WEP gave a STEM outreach workshop to more than 100 students in Nepal and Qureshi will soon be flying to the Philippines to present the program's progress to the Asian Development Bank and strategic partners of the World Bank's WePOWER initiative.

"My dream for my organization is to be put out of business. I want there to be no more need for Women Engineers Pakistan," says Ramla. "I want an engineer to be called an engineer, not a female engineer."

To learn more, visit womenengineers.pk/.

— NICOLE CAPOZZIELLO

UB ALUMNI ASSOCIATION ACHIEVEMENT AWARDS

Stephen Still (BS '76, civil engineering) received UB's highest honor, the Samuel P. Capen award. He is the managing director and co-founder of Seabury Consulting, now part of Accenture, and has more than 35 years of experience in consulting and management of transportation systems, including hands-on experience in aviation planning.

In 2017, Still created an endowment at UB to support the Institute for Sustainable Transportation and Logistics (ISTL), a center that unites the engineering and management schools to address the growing new field of transportation, logistics and supply-chain management. To recognize his generous gift to the Boldly Buffalo campaign, UB renamed the institute in his honor.

"This university changed my life," Still said. "I have been blessed far beyond my expectations and the origins can be traced back to this very place. From the faculty who taught with passion and commitment to the lifelong friends made here, this place was truly transformational."

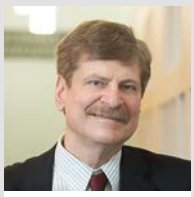
Mark Schulz (PhD '93, MS '84, mechanical engineering), a professor of mechanical and materials engineering at the University of Cincinnati, received the Clifford C. Furnas Memorial Award. He is also co-founder and co-director of Nanoworld Laboratories, a series of research and teaching laboratories at the University of Cincinnati; co-founder of General Nano LLC, a nanomaterials company; co-founder of Inovasc LLC, a medical device start-up company; and deputy director of the National Science Foundation Engineering Research Center for Revolutionizing Metallic Biomaterials.

"Being a graduate student at UB was challenging. The curriculum was demanding, the faculty held high standards and I took courses in different departments which was important, because it helped me be successful in the interdisciplinary research we do now," said Schulz.

OBITUARY: EDWARD FURLANI

Edward Furlani (PhD '82 and MA '80, physics; BS '77, electrical and computer engineering), UB engineering professor and Fellow of the National Academy of Inventors, whose pioneering work in microfluidics, inkjet systems, optoelectronics and other fields is recognized worldwide, died unexpectedly on July 3, 2018. He was 65.

A UB faculty member since 2011, Furlani held appointments in the Department of Chemical and Biological Engineering and the Department Electrical Engineering.



Edward P. Furlani

Karen Furlani, in a tribute to her late husband, created an endowed fund to provide two annual scholarships to deserving undergraduate students who plan to go on to graduate school to pursue a career in research. Each year, one student from chemical and biological engineering and one from electrical engineering will be selected in recognition of Ed's dedication and love for his students. Chemical engineering student Joshua Hazelnis received the scholarship earlier this year at the CBE awards banquet. The Department of Electrical Engineering will present the scholarship to one of its students later this year.

Chemical engineering student Joshua Hazelnis (center) received the inaugural Edward Furlani scholarship. With Joshua is Mark Swihart and Karen Furlani.

ALUMNA **KAY STANNEY** ELECTED TO NATIONAL ACADEMY OF ENGINEERING

Election to the academy is one of the highest professional distinctions an engineer can receive

Kay Stanney, CEO and founder of Design Interactive Inc. and an alumna of the Department of Industrial and Systems Engineering, has been elected to the National Academy of Engineering.

Stanney was inducted based on her contributions to "human factors engineering through virtual reality technology and strategic leadership." Stanney's company, Design Interactive Inc. in Orlando, Fla., is a woman-owned small business specializing in human systems integration and committed to developing innovative solutions that accelerate human performance.

For over two decades, Design Interactive (DI) has remained on the cutting edge of solving pressing human performance challenges for customers across the DoD, Federal, and commercial markets. DI's award-winning, engaging augmented and virtual reality training solutions ultimately improve business processes, advance public safety and empower consumers.

> **"It seems UB was ahead of its time in encouraging women to pursue a STEM career that fuels our country's innovation and technological advancement."**
>
> *—Kay Stanney*
>
> *CEO and founder, Design Interactive Inc.*

The impact of Design Interactive's work is far-reaching, from leveraging technology to help individuals manage anxiety to improving drone pilot performance using an augmented reality command and control system. DI's work has also led to the development of industry best practices to support the proliferation of virtual and augmented reality technologies.

"Our faculty and students are all very happy for Kay and as a member of the human factors community, I am especially pleased that her leadership and contributions to advancing virtual and augmented reality have been acknowledged with such a prestigious honor. Her successful election to the Academy is a significant event for the entire human factors profession," says Victor Paquet, professor and chair of the Department of Industrial and Systems Engineering.

Stanney attended UB from 1981 to 1986, graduating with a BS in industrial engineering.

"One of the things I treasure most about my time at UB was the significant number of women studying engineering alongside me, including my three college roommates," says Stanney. "Given that even today only about 20% of undergraduate engineering students are female, it seems UB was ahead of its time in encouraging women to pursue a STEM career that fuels our country's innovation and technological advancement. I am very proud to be a UB ISE alumni."

After graduating from UB, Stanney worked for Intel Corporation as a manufacturing/quality engineer. She went on to earn an MS and PhD in industrial engineering, with a focus on human factors engineering, from Purdue University in 1992.

From 1992 to 2008, Stanney served as a professor in the Department of Industrial Engineering at the University of Central Florida, during which time she won both the National Science Foundation CAREER Award and Office of Naval Research Young Investigator Award.

Stanney founded Design Interactive Inc. in 1998. In 2018, DI was awarded the Department of Homeland Security (DHS) Small Business Achievement Award for the quality of work done in support of DHS. DI was recognized for its quality work developing the Pat-Down Accuracy Training Tool (PATT), utilized by the DHS Science and Technology Directorate and the Transportation Security Administration (TSA).

Individuals in the newly elected class were formally inducted during a ceremony at the NAE's annual meeting in Washington, D.C., on Oct. 6, 2019.

— NICOLE CAPOZZIELLO

SPACE ADVOCATE, ENTREPRENEUR **BRADLEY CHEETHAM** RETURNS TO UB

For Bradley Cheetham (BS '09, mechanical and aerospace engineering), his time at UB was more than the classes he took, the club he started or the experiments he conducted. It was about the relationships.

Cheetham, CEO and co-founder of Advanced Space, a company focused on flight dynamics and operations software, reflected on these relationships during a recent visit to UB.

"The talks with your professors, chats with advisers or mentors, they seem trivial in the moment," he shared with students. "But what you don't realize [at the time] is that in the long run, everything you do depends on the people."

Take it from Cheetham, a three-time entrepreneur and lifelong commercial space advocate who has built a career on showing people that he can solve their biggest problems. That means improving mission planning and operations for clients like NASA, the U.S. Air Force and commercial operators and startups across the space industry. It means involvement in six of the past eight U.S. spacecraft missions to the moon, and a hand in the sustainable exploration, development and settlement of space.

Cheetham returned to UB as the featured guest in the Blackstone LaunchPad's "How I Built This" series, a forum in which successful entrepreneurs answer questions and share best practices for starting a business and getting it off the ground.

As an entrepreneur, he has founded companies focused on drone software and conference management technology, and Advanced Space, where he leads strategy to deliver flight dynamics and operation software to space industry clients.

It was a natural journey for a person who loved space as a child and as an undergraduate at UB, where his path to industry took flight. "For me, space was always something I was really excited about," Cheetham said. "What changed for me at UB is that before [I came here], I didn't think I could actually do it. But the opportunities to meet and learn from other people made it more approachable, and then I realized I could be a part of it. I didn't know exactly how ... but I learned to just chase it and do the exciting thing," he said.

Cheetham excelled academically but seized every extra moment to conduct experiments between classes, co-found the UB chapter of Students for the Exploration and Development of Space (SEDS), and cultivate relationships that mattered, with professors like Paul DesJardin from the Department of Mechanical and Aerospace Engineering.

While at UB, Cheetham visited DesJardin's Combustion and Energy Transport Laboratory, where the two reminisced about the experiments that gave Cheetham his start. An undergraduate research project, funded by the Center for Undergraduate Research and Creative Activities (CURCA), allowed Cheetham to measure fuel propagation speed and compare it to theory.

A visit to the SEDS lab allowed him to see not just the students' rockets and handmade parachute, but also how the club has evolved since his days selling coffee in the Student Union to raise funds. For the past two years, the club has traveled to New Mexico to launch rockets in the Intercollegiate Rocket Engineering Competition.

As the students and Cheetham talked shop about payloads and propellants, Cheetham noted how UB equips students with the novel and unique opportunities that really stand out. If you can talk about them, he observed, you can show how you can contribute — here, and to space.

— SARAH SMYKOWSKI

Douglas Levere

Bradley Cheetham, a co-founder of the UB chapter of Students for the Exploration and Development of Space, visits with current club members in Furnas Hall.

BENJAMIN PAWLIK

Named 2019 Engineer of the Year

Onion Studio, Inc.

UB alumnus Benjamin Pawlik (BS '82, mechanical engineering) has the job many space enthusiasts dream about — working in NASA's Mission Control. In his over 30-year career at the Johnson Space Center, Pawlik has kept both feet firmly planted on the ground while supporting 50 shuttle missions and is currently a mission manager in the NASA Commercial Crew Office in Houston, Texas.

Pawlik, a Buffalo native, was selected as this year's Engineer of the Year by the UB Engineering and Applied Sciences Alumni Association.

> **"Sometimes facts tell you things that you don't want to know, but it should be your obligation to deal with them honestly and professionally."**
>
> *—Benjamin Pawlik*
>
> *Mission manager, NASA Commercial Crew Office*

Each year, the award goes to a school alumnus or closely affiliated person with distinguishing activities in alumni, community, business and professional affairs. A UB supporter since graduation, Pawlik has hosted many visits to NASA, sharing his expertise and connections with students, faculty and alumni from his alma mater whenever possible.

The Engineer of the Year award is presented during Engineers Week, in conjunction with the Order of the Engineer Induction Ceremony and Pledge of the Computing Professional Oath Ceremony.

All senior engineering and applied sciences students are invited to participate in the event, which focuses on professionalism, and promotes ethical and moral behavior of engineers and computing professionals as they transition to careers of service to society.

In keeping with the theme of professionalism, Pawlik talked about the tough decisions engineers can face, particularly at the intersection of business and ethics. He emphasized the importance of continuous ethics training and self-evaluation to upholding the values of good engineering, virtues demonstrated to him during his time at NASA.

"Engineers, it is your responsibility to evaluate and deal with things as they are – truths – because that is the best way to deal with design, or testing results, or failure investigations. If you deviate from using facts, you are compromising technical, ethical and sometimes even legal issues. Sometimes facts tell you things that you don't want to know, but it should be your obligation to deal with them honestly and professionally," said Pawlik.

In his current role as a mission manager, Pawlik acts as the NASA liaison between the International Space Station and Commercial Crew Offices representing the new SpaceX and Boeing crew vehicles. Prior to that, Pawik held a series of leadership roles for NASA Program Management, including shuttle launch package integration manager, space station increment payload manager, shuttle mission evaluation room manager, space station increment manager and commercial crew mission manager.

Pawlik has been the recipient of numerous NASA awards, including several Group Achievement awards, Space Flight Awareness Award, Superior Accomplishment Award and the NASA Exceptional Achievement Medal.

— NICOLE CAPOZZIELLO

Onion Studio, Inc.

UB's Engineering and Applied Sciences Alumni Association (UBEAA) named Benjamin Pawkik (right) its Engineer of the Year. Shown with Pawlik is Jordan Walbesser, president of the UBEAA.

SEAS HONORS ALUMNI, CORPORATE PARTNERS AND STUDENTS FOR GIVING BACK

Delta Award recipients Milind and Raj Ajinkya (center) with CBE faculty members Mark Swihart (far left) and Stelios Andreadis (far right).

Aaron Krolikowski (center, holding award) shows off the Mentor of the Year award with friends, family and mentees.

Outstanding Young Alumnus recipient Tom Occhino with interim SEAS dean Rajan Batta.

Volunteer Recognition Award recipient Kurt Bessel (center) with fellow UBEAA members.

On October 3, 2019, over 100 members of the SEAS community gathered in Slee Hall to honor exceptional alumni, students and corporate partners at the Sixth Annual School of Engineering and Applied Sciences Awards Night. The honorees were as follows.

1. Delta award recipients, Milind Ajinkya (PhD '75 chemical engineering) and his wife Raj, have been dedicated members of the SEAS community, demonstrated through their ten+ years of financial support and service. Their Amol Ajinkya Memorial Fund, created in honor of their son, provides fellowships to outstanding graduate students and funds a lecture series that brings renowned experts in chemical and biological engineering from across the U.S. to UB. Ajinkya, whose 35+ year career in the reaction engineering field included working at Shell and Exxon, serves on the Chemical and Biological Engineering Advisory Board.

2. This year's Mentor of the Year awardee is Aaron Krolikowski, (BS '09, social science interdisciplinary, BA '09 political science). Since moving back to Western New York seven years ago, Krolikowski has given extensively of his time and energy to UB, teaching classes in multiple departments and mentoring students in SEAS, the Office of Fellowships and Scholarships Spark program, and the Honors College. As an independent research consultant, he works with nonprofits in data visualization, impact measurement, program design, and policy analysis to bring about a more equitable, inclusive and sustainable world. He earned his PhD in geography and environment from Oxford University.

3. Tom Occhino (BS '07 computer engineering) joined Facebook in 2009 as a software engineer, where he is currently an engineering director. Through his hard work and success, Occhino has remained committed to SEAS, serving on the SEAS Young Alumni Advisory Board and as an active participant in UB's Bay Area alumni network.

4. Since graduating from SEAS over a decade ago, Kurt Bessel (MS mechanical engineering '08, BS '07 aerospace engineering; BA '07 German) has selflessly given his time and talents back to the school. He served as president of the UB Engineering and Applied Sciences Alumni Association (UBEAA) for four years, where he focused on increasing opportunities for alumni-student connections, and was a founding member of its wellness and mentoring committee. Bessel started his own Intellectual Property consulting agency in 2017, where he provides a cost-effective bridge between inventors and the patent counsel.

Howard Strauss scholarship winner Anton Buynovskiy with Stephen Cross, UBEAA board member and scholarship committee chair.

Leaders in Excellence Scholarship winners.

Photos by the Onion Studio, Inc.

5. Anton Buynovskiy received the Howard Strauss Memorial Scholarship. Buynovskiy, a senior majoring in mechanical and aerospace engineering and mathematics, has a demonstrated history of making meaningful contributions on campus and in the greater community. He is the president of the UB chapter of oSTEM, a national organization dedicated to bringing together and supporting LGBTQ people in STEM disciplines. He also volunteers his time with local high school students, serves as a testing lead in the Nanosatellite Laboratory, and works as an assistant in the Combustion Energy Transport Lab. He has held internships at Raytheon in Tuscon and Los Angeles, and in 2020, will be an intern at NASA's Jet Propulsion Laboratory.

6. Leaders in Excellence Scholarship winners (from left): UBEAA member Dan Muffaletto, Jeremy R Chapman, BS, aerospace engineering, Esther Jose, BS, industrial engineering, Jonathan Bessette, BS, mechanical engineering, Marsha Maredia, BS, biomedical engineering, SEAS interim dean Rajan Batta, UBEAA board member Stephen Cross, Anton Buynovskiy, BS, mechanical and aerospace engineering, Valerie Bevan, BS, environmental engineering, Faeze Ghofrani, PhD, civil, structural and environmental engineering, Wakil Pranto, BS, civil engineering, and UBEAA president Jordan Walbesser. Not shown are Urjitha Muthiah, BS, computer science and Oscar Lee, BS, chemical engineering.

ACV Auctions received the Corporate Partner of the Year award. See the story on p. 17.

CONGRATULATIONS TO OUR 2018 ENGINEERING AND APPLIED SCIENCES AWARDEES

Thomas Wilde (BS '80 industrial engineering) and Stephanie Wilde
Delta Award

Allison O'Connor (ME '91, mechanical engineering)
Volunteer Recognition Award

Daniel Fenz (BS '03, MS '05, PhD '08 civil engineering)
Outstanding Young Alumnus Award

Don McMahon (BS '75 civil engineering) and Mike Mann (BS '77, MS '79 civil engineering)
Mentor of the Year

ValueCentric
Corporate Partner of the Year

Maliheh Karamigolbaghi (PhD, environmental engineering)
Professor Howard Strauss Memorial Scholarship

Rishabh Bhandawat, Olivia Gustafson, Shanelle Ileto, Kathryn Lukasiewicz, Ramla Qureshi, Samantha Ring, Zachary Steever, and Daniel Wilczewski
Leaders in Excellence Scholarship

SHARMA RECEIVES HONORARY DOCTORATE FROM SUNY

Ashutosh Sharma (PhD '87, chemical engineering), secretary for the government of India's Department of Science and Technology and professor at the Indian Institute of Technology Kanpur (IITK), received a SUNY Honorary Doctorate in science at this year's School of Engineering and Applied Sciences graduate commencement ceremony.

Sharma chose UB so he could work with the world-renowned Eli Ruckenstein, Emeritus Distinguished Professor and nanoscience pioneer. After earning his PhD, Sharma spent time as a research scientist at the Erie County Medical Center in Buffalo, continuing his work in ophthalmology. He then moved back to India and began teaching chemical engineering at IITK, where he has been working ever since.

Ashutosh Sharma

In 2015, he began working for the government of India as well, helping them develop science- and technology-related policies and startups, including a new $2 billion artificial intelligence (AI) mission.

Originally from Jaipur, India, Sharma obtained his bachelor's degree in chemical engineering from IITK in 1982, his master's degree from Penn State in 1984 and his PhD from UB in 1987.

delta society

We thank our donors for their support in fiscal year 2019
(July 1, 2018 – June 30, 2019)

Delta Society Chair:
Mr. Norman Hayes, '80

Delta Society Dean's Club (annual gift of $10,000+)

Mr. Patrick F. Abrami, '75, '72
Dr. Milind B. Ajinkya, '75, '72
Mr. Jonathan Matthew Bearfield, '91
Mr. Raj K. Boveja, '74
& Mrs. Sonia Boveja
Dr. Joseph M. Bracci, '92, '89, '87
& Mrs. Kathleen A. Bracci, '91
Mr. Michael J. Cadigan, '79
& Mrs. Eileen Cadigan
Mr. Roy R. Carter
& Ms. Frances A. Cecere
Mr. James C. Chou, '84
& Mrs. Marian Chou
Mr. Brooks G. Cressman, '87
Dr. William C. Frank, '01
Mr. Andrew J. Gallatin, '92
Mrs. Karen R. Gerhardt, '64
Mr. Robert C. Girardi, '79
& Ms. Joan E. Murray
Mr. Robert G. Harrison, '83
& Mrs. Gilda T. Harrison, '86, '84
Mr. Norman M. Hayes, '80
& Mrs. Jacqueline Hayes
Mr. Robert L. Jacoby, '80
& Mrs. Carol J. Jacoby
Mr. Mun K. Lee
Mr. Lawrence J. Lukis, '74
Ms. Nadia Irizarry Shaw, '77
& Mr. Max Kay
Mr. Scott D. Stevens, '79
& Mrs. Coleen B. Stevens, '79
Dr. Stephen E. Still, '76
Dr. Steven Tsengas, '60
Dr. Thomas W. Weber
& Ms. Anne W. Maus
Mr. Thomas G. Wilde, '80
& Mrs. Stephanie Wilde

Delta Society Chair's Club (annual gift of $5,000 – $9,999)

Mrs. Lydia K. Benenson
Dr. Chandra K. Bhansali, '80
& Mrs. Sharada Bhansali, '76
Mr. Michael R. Furlani Jr.
& Ms. Suzanne Furlani
Mr. Robert Francis Hanley Jr., '90
Dr. Stanley E. Rittgers, '68

1

2

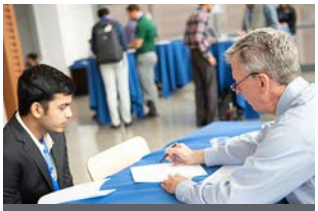
3

Delta Society (annual gift of $1,000 – $4,999)

Dr. David Anderson, '90
& Dr. Marcia Lam-Anderson, '94, '91
Mr. Brian Anger, '03, '04
& Mrs. Nicolle Anger
Mr. Arnold
& Mrs. Arnold
Mr. Michael J. Baek, '89
Mr. Wallace Bailey, '71, '68
& Mrs. Janet Bailey
Dr. Rama Balakrishnan, '97
& Dr. Sreenivas Gollapudi, '96, '94
Mrs. Michelle Benczkowski, '95
& Mr. Ronald Benczkowski, '82
Mr. David Bogart, '88
& Mrs. Melissa Bogart
Mrs. Ann Brady
& Mr. Robert Brady
Dr. William Robert Brownlie, '76, '75
& Mrs. Debra Brownlie
Dr. Andrew Cappuccino, '88
& Dr. Helen Cappuccino, '88, '84
Ms. Minmin Chen, '00
& Dr. Chunming Qiao
Dr. Amy Chih
& Dr. Samuel Chih, '79
Mr. David Chilson, '79
& Mrs. Eileen Chilson
Dr. Lunkit Cho, '75
& Mrs. Kwai Fong Cho
Mr. Dino Gomez, '86
& Ms. Martha Copello
Mr. Mamunur Rahman, '96, '01
& Mrs. Katalin Egyed
Mr. James Falsetti, '78
& Mrs. Nannette Falsetti
Dr. Lesley Weitz, '02
& Dr. M. Heath Farris
Mr. Donald Ferguson, '56
& Mrs. Elfriede Ferguson, '57
Mr. Frank Frandina, '74, '73
& Ms. Margaret Frandina
Mrs. Rosanne Frandina, '83, '81
& Mr. James Van Oss, '81, '83
Mr. James Glattly, '76, '73
& Mrs. Lynne Glattly
Dr. Mark Glauser, '82, '87
& Dr. Gina Lee-Glauser, '88, '82
Dr. Kannan Govindarajan, '93, '97
& Ms. Pavitra Kandadai
Dr. Venu Govindaraju, '92, '88
& Mrs. Padma Govindaraju
Mr. William Grappone
& Ms. Anna Stave
Mr. Brian Gregory, '96
& Mrs. Diana Gregory
Mrs. Ann Grobe, '87
& Dr. George L. Grobe, III, '89, '86
Mr. Robert Humphrey
& Ms. Kathleen Ratcliffe
Mrs. Cassandra Irwin, '00
& Mr. Christopher Irwin, '94, '92
Dr. Mark Karwan
& Mrs. Sabrina Karwan

Mr. Joseph Kessler, '93, '00
& Mrs. Lisa Kessler
Mr. Krishna Kolluri, '88
& Mrs. Vamota Kolluri
Mr. Carl Lehman, '78
& Mrs. Maria Lehman, '81
Mr. Thomas Lynch
& Mrs. Arlane Lynch
Dr. Bina Ramamurthy, '97
& Mr. Kumar Madurai, '94
Dr. Uma Mahadevan, '98
& Dr. Dandapani Sivakumar, '96
Mr. Richard Martin, '92
& Mrs. Bonnie Martin
Mrs. JoAnn McDermott, '76
& Mr. William McDermott, '75, '72
Mr. James McLernon, '50
& Mrs. Brigitta McLernon
Ms. Amanda Megan, '00
& Mr. Lawrence Megan
Mr. Jawahar Mehra, '72
& Mrs. Vatsala Mehra
Mr. Todd Minnella, '95
& Mrs. Stephanie Minnella

Onion Studio, Inc.



Rob Jacoby gives resume advice to a graduate student during the Career Perspectives and Networking Conference.

Mr. Edward Morris, '73
& Mrs. Clare Morris
Mr. James Muccigrosso, '78
& Mrs. Debra Muccigrosso
Mr. Michael Nowicki, '90
& Mrs. Susan Nowicki
Mr. Frank Puskar, '79
& Mrs. Mary Puskar
Dr. Eli Ruckenstein
& Mrs. Velina Ruckenstein
Mr. Lee Runk, '61
& Mrs. Maria Runk
Dr. Martin Sanborn, '96
& Dr. Tracy Sanborn
Dr. Mark Schulz, '93, '84
& Mrs. Marianne Simpson Schulz, '82
Dr. James Scinta, '78, '75
& Mrs. Barbara Scinta
Mr. Vince Price
& Ms. Lisa Shames
Mr. Andrew Spilsbury, '60
& Mrs. Carol Spilsbury
Dr. Mark Stachowski, '91, '85
& Mrs. Cristina Stachowski
Mr. Richard Strozyk, '78
& Mrs. Kathleen Strozyk
Mr. Michael Szczepankiewicz, ' 88
& Mrs. Gail Szczepankiewicz
Dr. Ann Bisantz, '91, '89
& Dr. Albert Titus, '91, '89
Dr. Richard Van Slooten, '70
& Mrs. Larraine Van Slooten
Mr. James Wehrfritz, '78
& Mrs. Deborah Wehrfritz
Dr. Andrew Whittaker
& Ms. Amanda Simondson
Mr. Edward Wilson, '96
& Mrs. Merida Wilson
Mr. Kenneth Young, '54
& Mrs. Marilyn Young

Maximilian Kapitonoff

M&T Bank was a gold-level sponsor of the Blockchain Buildathon, held in Davis Hall in April.

We strive to ensure that gifts are listed accurately. If any information listed is incorrect, please contact Patrizia Porcari in the School of Engineering and Applied Sciences' Office of University Advancement at *porcari@buffalo.edu.*

1 Tom and Stephanie Wilde received the Delta Award for their continuous dedication and support to SEAS. Photo by the Onion Studio, Inc.

2 Chunming Qiao talks to a local reporter at the unveiling of our newest autonomous vehicle — a white Lincoln MKZ sedan outfitted with the latest tech. Photo by Maximilian Kapitonoff

3 Stephen Still teaches a class on "Emerging Practices in Transportation, Planning, Technology and Policy" as part of the MS program in Sustainable Transportation and Logistics. Photo by the Onion Studio, Inc.

Corporations and Foundations

ACV Auctions
Apple, Inc.
Association for Bridge Construction and Design
Astronics Corporation
ATTO Technology, Inc.
Bloomberg L.P.
Centene Corporation
The Coca-Cola Company
Community Foundation for Greater Buffalo
ConocoPhillips Company
CUBRC
James H. Cummings Foundation, Inc.
Curbell
DuPuy Synthes
Dimension Fabricators, Inc.
Efferent Labs Incorporated
ETAP
ExxonMobil Foundation
Facebook

Onion Studio, Inc.

From left, Judy Feldman, Liesl Folks, Scott Terhaar and Dave Janca celebrate ValueCentric's Corporate Partner of the Year award.

Ferguson Electric Foundation
Fidelis Care New York
The Foundation for Jewish Philanthropies
Garwood Medical Devices, LLC
GE Foundation
Gemcor
Google, Inc.
Harris Beach, PLLC
IBM International Foundation
International Business Machines Corporation
Johnson & Johnson
Keysight Technologies
Susan G. Komen Breast Cancer Foundation
Lockheed Martin Corporation
Luminescent Systems, Inc.
M&T Bank
Microsoft Corporation
Minnesota Mining & Manufacturing Foundation, Inc.
Moog, Inc.
National Fuel Gas Company Foundation
National Grid
Nebo Corporation
Niagara Specialty Metals, Inc.
Northrop Grumman Foundation
Praxair, Inc.
Russell Sage Foundation
Schwab Charitable Fund
Siemens
Stark & Wayne, LLC
State Farm Companies Foundation
State Farm Life Insurance Company
Taylor Devices, Inc.
TFCI, LLC
Turner Construction Company
Twilio
U & S Services, Inc.
Unifrax LLC
United Technologies
Utilant, LLC
ValueCentric LLC
VETRO FiberMap
Watts Architecture & Engineering, P.C.
Wegmans Food Markets, Inc.
Zodiac Oxygen Systems US

class notes

[1970s]

Raymond Kach (BA 1977, mechanical engineering) served as the keynote speaker at the Society of Automotive Engineers 2019 Noise and Vibration Conference and Exhibition in Grand Rapids, Mich. Kach is a supervisor at Ford Motor Company.

[1980s]

Russell Stoll (BS 1981, civil engineering), PE, has been appointed by the Erie County Water Authority as its new executive director. Stoll, who served as ECWA's executive engineer since 2016, was selected for the position following a national search.

Martin L. Doster (BS 1982, chemical engineering) shared his insights on environmental remediation in an interview with the Buffalo News. He is the chief operating officer and senior environmental adviser at Lippes Mathias Wexler Friedman LLP Attorneys at Law. He was also an adjunct instructor in the Department of Civil, Structural and Environmental Engineering.

Seth Medwick (BS 1984, civil engineering), associate vice president and department head of bridge inspection at infrastructure firm HNTB Corp., was profiled in the Wall Street Journal. In the April 2019 article, Medwick discusses his career and some of the desirable traits for bridge inspectors.

Victor Bahl (BS 1986, MS 1988, electrical and computer engineering) received a Distinguished Service Award from the Association of Computing Machinery in recognition of his "significant and lasting service to the broad community of mobile computing and wireless networking, and for building strong linkages between academia, industry, and government agencies." He also received the Infocom Achievement Award from IEEE for his contributions to dynamic spectrum access and wireless LAN technologies.

[1990s]

Ram Kumar Krishnamurthy (MS 1995, electrical engineering) received the 2019 Mahboob Khan Outstanding Industry Mentor Award from Semiconductor Research Corporation, a worldwide consortia of silicon companies. He is the senior principal engineer and research director of high performance circuits research at Intel Labs and serves on the Department of Electrical Engineering's Industry Advisory Board. He resides in Portland, Oregon.

John C. Whitney (ME 1995, civil engineering), PE, is running for Grand Island town supervisor. Whitney served the Town of Grand Island Engineering Department from 1986 until 2017, when he retired from town engineer.

Vinodh Gopal (MS 1997, computer science) received the Intel Inventor of the Year award. Gopal serves on the Department of Computer Science and Engineering's Advisory Board.

[2000s]

Heather Platt (BS 2000, mechanical engineering), PE, a senior project manager for Dewberry in Raleigh, N.C., has been appointed to the Facility Guideline Institute's Health Guidelines Revision Committee (HGRC) for the 2019-2020 term. She represents the North Piedmont Chapter of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

David Blekhman (PhD 2002, mechanical engineering), a faculty member at Cal State LA, is the first professor in the California State University system to be named a Fulbright Distinguished Chair in Alternative Energy Technology.

Lisa Anderson (BS 2005, MS 2006, civil engineering), a senior structural engineer and seismic subject matter expert with Bechtel National, Inc., has been named a 2019 Fellow of the American Society of Civil Engineers.

Adrienne Decker (PhD 2007, MS 2001, BS 2001, computer science and engineering), assistant professor in UB's Department of Engineering Education, has been elected chair of the Association for Computing Machinery's Special Interest Group on Computer Science Education.

Matthew Alboum (BS 2008, civil engineering), PE, has been named 2019 Young Professional of the Year by the American Council of Engineering Companies' New Jersey Chapter (ACECNJ). Alboum was recently promoted to associate and serves as the assistant department manager in the bridge structures group in Dewberry's Bloomfield, N.J., office.

Rob Schiller (MS 2009, BS 2008, civil engineering) has been promoted to senior associate in the Rochester office of Erdman Anthony. Schiller is a project engineer-lead highway engineer in Erdman Anthony's transportation core business and has been with the firm since 2013.

Mulekezi Loïc Sebuharara (BS 2008, mechanical engineering,) has joined the plumbing engineering team in CPL's Binghamton office, where he will focus on the design of plumbing and fire protection systems. He was previously a mechanical engineer at Delta Engineers.

Bryan Savage (BS 2008, civil engineering), PE, senior project engineer for Passero Associates, serves on the Unmanned Aircraft System committee for the New York Aviation Management Association, which promotes the viability and business interests of New York State's airports.

[2010s]

Anne-Fleur Andrle (MS 2013, biomedical engineering), the first woman to graduate from UB's Department of Biomedical Engineering, recently launched a business travel app called Jack and Ferdi.

George Kalkowsky (BS 2013, civil engineering) was named water superintendent for the City of Oneida, New York.

Nicholas Bayer (BS 2014, environmental engineering) of Rochester has joined CPL as a civil/environmental engineer where he will focus on water and wastewater treatment design. He previously served as project engineer at Welliver.

Daniel Schlegel (PhD 2015, computer science,) of SUNY Oswego's computer science department has won a $325,000 grant from NIH's National Library of Medicine for a project to use artificial intelligence to enable computers to interpret treatment guidelines for diseases and deliver the information to caregivers.

Paul Valente (BS 2017, civil engineering) has joined SRF Associates DPC as a transportation engineer/designer. He concentrates on transportation impact studies and highway mitigation design.

Andrew Oskowsky (BS 2018, environmental engineering) has joined Walden Environmental Engineering as a project engineer.

Mohammad Atif Faiz Afzal (PhD 2018, chemical engineering) received the William Goddard Award in recognition of his outstanding effort, exceptional achievement and tireless dedication from Schrödinger, where he works as a senior scientist.

Chase LeBrun (BS 2018, civil engineering) has joined Passero Associates as a structural engineer I. LeBrun previously interned with the New York State Department of Transportation as a transportation construction inspector II.

Patrick Biver (BS/MBA 2019, mechanical engineering/business administration) started a new position as a development engineer in Moog's Space and Defense Group in the New Space Business Development Department. He has been with the company as an Engineering Co-op.

Kelsi-Amber Ellis (BS 2019, mechanical engineering) started a new position as a Product Engineer in Moog's Industrial Group in the Simulation Engineering Department. She has been with the company as an Engineering Co-op.

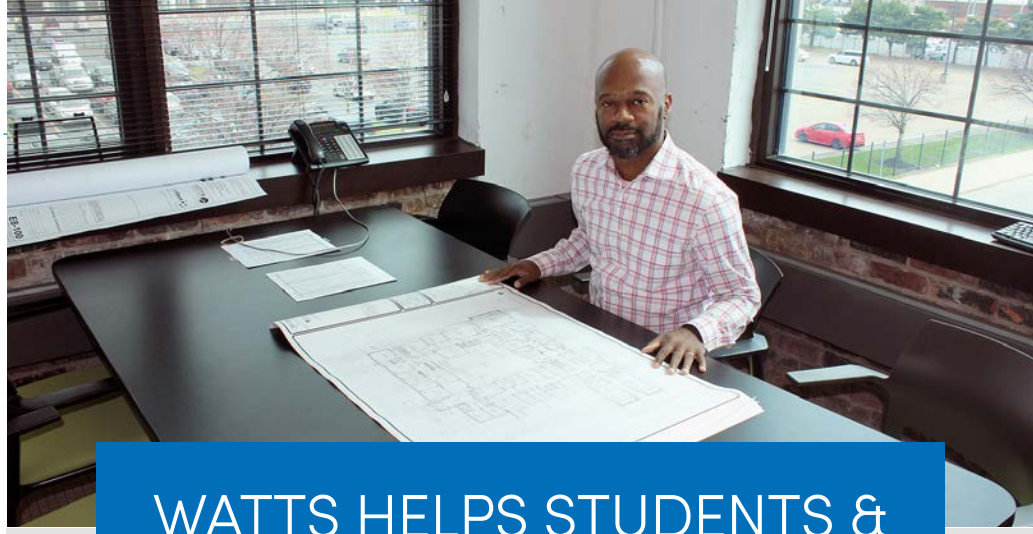
Rachel Handley (BS 2019, electrical engineering) was hired as an associate engineer into the Electronics Transition into Production department within the Aircraft Group at Moog after spending time interning during her undergraduate studies.

Stone Ingram (BS 2019, civil engineering) has been hired as a Design Engineer I at Ryan Biggs | Clark Davis Engineering and Surveying.

Juan Rodriguez (BS 2019, environmental engineering) has joined Walden Environmental Engineering in Oyster Bay, N.Y., as a project engineer.

Daniel Wilczewski (BS 2019, mechanical engineering) started a new position as a product engineer in Moog's Aircraft Group in the Military Global Sustainment Department. He has been with the company as an Engineering Co-op.

Keep in touch and network with fellow alums from our school by joining our LinkedIN page (linkedin.com/school/ub-seas). Visit UB Connect (ub-connect.com) to submit your class note, update your profile, find your friends, and learn about your benefits as a UB alumni.



WATTS HELPS STUDENTS & KEEPS HIS FATHER'S VISION ALIVE

Jonathan Watts, vice president at Watts Architecture & Engineering, came to UB as a transfer student in 1996, and went on to earn his BS in industrial engineering in 2000 and a BS in civil engineering in 2003.

Like many transfer students, Watts found it a bit challenging to adjust to a new school, which is why he became involved with helping students after graduation. He is a member of the Dean's Advisory Council, offering advice on classroom enrichment through experiential learning, the long-term vision for the school and other topics, and previously was the philanthropy chair on the schools' Young Alumni Board.

He's also on the board of Buffalo-Area Engineering Awareness for Minorities (BEAM), and works with Women in Science and Engineering (WiSE) and other student organizations, offering guidance on resume preparation, professional practice, ethical considerations and his thoughts on what life is like "on the other side," after graduation.

Previously, Watts worked in New York City and Washington D.C., but returned to Buffalo in 2015 to join the management team at Watts A & E, the firm his father Edward Watts, Sr. began in 1986 as an environmental engineering consultancy.Architecture was included in 2004, when Jonathan's brother Edward Jr., a licensed architect, returned to Buffalo to head that department.

Watts says his industrial engineering degree helped prepare him for his current role because he was exposed to numerous topics essential to running a dynamic organization.

"The industrial engineering curriculum helped me think big picture and focus on streamlining processes and operations central to a growing business," says Watts.

As vice president, Watts works with senior management to define the strategic vision for the firm, monitoring key financial metrics and directing the operations of the company to help achieve firm goals.

He and his brother also continue to offer the Watts Scholarship program, which his father began about 15 years ago, to underrepresented minority juniors majoring in civil, environmental, electrical or mechanical engineering. (There is also a Watts Scholarship for architecture students.)

"Two of our current staff members were scholarship recipients and are now substantial contributors to our firm," he says. "We plan to continue offering these scholarships because the relationship has been a great partnership between Watts A&E and the university."

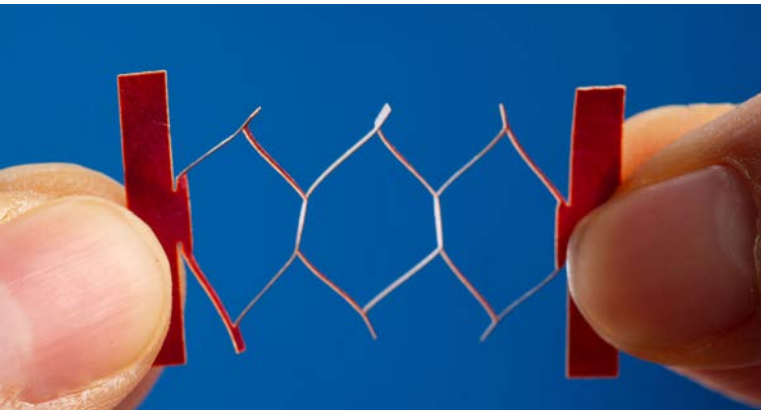
Watts received the 2019 Dean's Award for Achievement, the highest award given by the school.

— REBECCA RUDELL

ANCIENT ARTS ARE INSPIRING MODERN ELECTRONICS

After a few decades of electronics developing at a dizzying pace – from personal computers and flip phones to wearable devices, smartphones and tablets – there are signs technological breakthroughs are stalling. For instance, your new iPhone isn't that different from the previous one. And laptop computers pretty much all look – and work – alike.

Engineers need new inspirations for innovations. One source is ancient arts. My work, for example, is inspired by the kirigami, a lesser-known cousin of the folding art of origami.



CUTTING PAPER

The word kirigami is the English name for the art of paper cutting. Archeologists say kirigami can be traced back before the 17th century in Japan. It is still a popular folk art in Asian countries, where people make kirigami to celebrate the lunar new year, newborn babies, marriage and other significant events.

Typically, kirigami starts with a folded paper base, which is cut, unfolded and flattened to make the final art piece. The intricate patterns create beautiful works of art based on math and design principles that can change the mechanical behaviors of the material being cut. For example, a particular pattern can make the paper stronger or more stretchable.

AN ENGINEERING IDEA

Just as kirigami practitioners cut and fold paper, engineers can cut and fold materials that in turn can be incorporated into electronic devices.

Recent innovations in energy-efficient electronics have created portable electronic devices, high-performance electronic-ink paper, artificial electronic skin and smart fabrics. But many of these creations depend, at least in part, on traditionally printed circuit boards, which are typically made of silicon and metals. They're hard and brittle – not a good match for the human body.

The research community, as well as tech and apparel companies, is eager to make electronic devices as flexible and bendable as possible. The trick is to make sure the flexibility of these gadgets does not limit their ability to handle electricity.

TURNING TO ELECTRONICS

Recently, my research group fabricated a novel kirigami-inspired stretchable electronic device. Made of self-assembled polymers and nanowires, the device is a centimeter wide. On its own it could stretch slightly – to just 1.06 centimeters. But when cut with lasers in a pattern inspired by kirigami, the same device can stretch up to 20 centimeters, 2,000 percent larger than its unstretched form. The material's innate elasticity helps, but the pattern and orientation of the cuts is the major factor in how the device deforms.

Moreover, the cutting made the device 3,000 times more conductive of electricity, meaning the electronics can run faster, or take less time to charge.

As we refine these sorts of materials, they can eventually be incorporated into electronic skin – akin to temporary tattoos – to improve the feel of prosthetics and robots. Hospitals can also use e-skin patches to wirelessly monitor patients' vital signs, replacing wires that can get tangled or prevent people from sleeping.

Stretchable electronics are also key to Samsung's plans to release a bendable smartphone. And they could be central to smart clothing, an industry that analysts project could be worth US$4 billion by 2024. Thanks to artistic innovations hundreds of years ago, clothes and bandages may one day be able to help athletes maximize performance, monitor the health of people with chronic illnesses, and give soldiers and emergency workers important information about themselves and those in their care.

— SHENQIANG REN

Shenqiang Ren is a professor in the Department of Mechanical and Aerospace Engineering, and directs the Renewable and Emerging Nanomaterial Laboratory at the University at Buffalo. He is also affiliated with UB's RENEW Institute, a university-wide, multidisciplinary research institute that focuses on complex energy and environmental issues.

BOLDLY BUFFALO

THE CAMPAIGN FOR UB

Bold means building a better future.

Whether it's enabling more complex sensing on mobile devices for augmented reality, identifying better ways to get medicine and food to remote, underserved areas or designing sophisticated navigation and safety systems for self-driving cars, we're not afraid to do what it takes to make an immeasurable impact on our community and around the globe. The Boldly Buffalo campaign provides countless opportunities for students to discover their passions and achieve their dreams. To learn how you can help create a better world, visit **buffalo.edu/campaign**.

University at Buffalo
School of Engineering and Applied Sciences

208 Davis Hall, Buffalo, NY 14260

Phone (716) 645-2771 | seascomm@buffalo.edu | engineering.buffalo.edu

Photo Credit: Onion Studio, Inc.

WELCOME TO BUFFALO!

The School of Engineering and Applied Sciences welcomed nearly 800 entering graduate students at its annual SEAS 360° Professionalism Orientation. New graduate students had the opportunity to network with faculty, and learn from university senior leadership, SEAS alumni and current students about what to expect as a graduate student in the school.