UCI Samueli
School of Engineering

University of California, Irvine

DIFFERENCE MAKERS

2021-22 DEAN'S REPORT

FROM THE DEAN

Occasionally when people hear that I am an engineer, someone will say, “I could never be an engineer since I am more of a creative type.” I disagree. Engineering is profoundly creative! In fact, what makes engineering research so much fun is that we get to imagine what our future society might look like. We get to envision how yet-to-be-created technologies can be used to improve the human condition by making the world a better, more healthy, productive, clean and equitable place. Health of the planet and its people are the central themes that drive us in the UCI Samueli School of Engineering. Our researchers and faculty are at the forefront of imagining what this future could look like, and this magazine is a testament to the creativity, imagination and fearlessness that can be found everywhere in our labs and classrooms.

Our research is pushing the boundaries of knowledge and as a result, we are increasingly called upon to share our findings with a broader audience. When we started to plan this issue of the Dean’s Magazine, we wanted to focus on our widening impact. Initially, we planned “Newsmakers” as the theme, but recognized it did not encompass all of the myriad contributions that our faculty make. We pivoted to “Difference Makers.” Here, you will meet a sampling of our faculty who are making a difference. For instance, read about how a professor raised funds to help displaced Ukrainian academic researchers, another who developed neurorehabilitation technologies that help people with movement disabilities, and one who helped create a course for the UCI community called “Empathy and Interconnectedness: The Path Forward.” I hope you will enjoy reading these stories as much as I did.

On a personal note, I recently wrapped up my first year as the Stacey Nicholas Dean of Engineering and it has been a fun and high-energy ride. During the past year, we rolled out several new initiatives, including the UCI Engineering-Los Alamos National Laboratory Fellowship program and the budding “Looking South” partnership with universities in Latin and South America. It was also a record-breaking year in terms of sponsored research, with an impressive 24% increase over the previous year.

I have particularly enjoyed getting to know the Samueli School of Engineering community during my inaugural listening tour, where I met with students, faculty, staff, alumni, industry partners and friends of the school. One thing that came across loud and clear during these meetings is how much people care about our school, and it was a source of comfort to me how supported I felt as I embarked on my journey as dean. Thanks for making me feel welcome to Southern California, to UCI and to the Samueli School!

Magnus Egerstedt, Ph.D.
Stacey Nicholas Dean of Engineering

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2021-22 DEAN’S REPORT

The award-winning ***Dean’s Report*** is produced annually by the Samueli School’s Communications Department.

Director of Communications: Shelly Nazarenus

Communications Manager: Lori Brandt

Principal Writer & Editor: Tonya Becerra

Contributing Writers: Brian Bell, Yuika Yoshida, Rachel Karas, Roy Rivenburg, Kaitlin Aquino, Dhanika Pineda

Photography: Steve Zylius, Debbie Morales, Julie Kennedy

Design: m2design group

NUMBERS AT A GLANCE

STUDENT ENROLLMENT

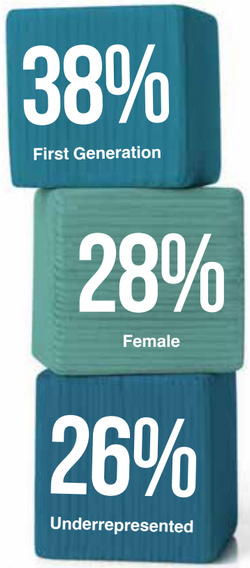
Fall 2021

3,734
Undergraduate

996
Graduate

UNDERGRADUATE DIVERSITY

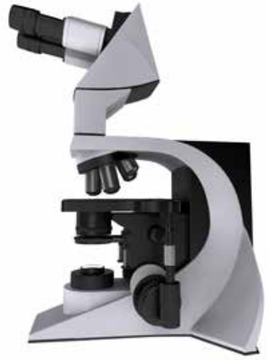
Fall 2021



DEGREES GRANTED

2021-22

996	39	169	84
B.S.	M.Eng.	M.S.	Ph.D.



NEW SPONSORED RESEARCH

2021-22

$75.7M

FACULTY

160

DONOR SUPPORT

2021-22

$4.7M
Raised

363	435
Donors	Gifts

RANKINGS

24TH
Public University Undergraduate

21ST
Public University Graduate

BEST COLLEGES U.S.News & WORLD REPORT RANKINGS

6 DEPARTMENTS

- Biomedical
- Chemical and Biomolecular
- Civil and Environmental
- Electrical Engineering and Computer Science
- Materials Science and Engineering
- Mechanical and Aerospace Engineering

STUDENT ACHIEVEMENTS

WATER UNITED

YIAN (ANNE) SUN, civil and environmental engineering doctoral student, was awarded the Canham Graduate Studies Scholarship ($25,000) from the Water Environment Federation at its annual WEF Technical Exhibition and Conference. There, she presented her work on developing new methods of detecting and characterizing microplastics in wastewater, especially during the stages of water reclamation.

The scholarship will help with educational expenses as Sun completes her doctoral thesis research on microplastics property, fate and removal in water reclamation. Her overarching mission is to contribute to the one water concept, which views all water – drinking water, wastewater, stormwater, greywater, etc. – as resources that must be coordinated holistically and sustainably.

“Under a one water management system, all those water resources will be managed in an integrated way,” said Sun. “So instead of having different agencies and utilities who do not communicate with each other, they would all work under one umbrella so we can manage our water more sustainably.”

NOURISHING PROCESS

For the past three years, a UCI engineering student team has been designing an indoor hydroponics system that grows plants in a nutrient-rich liquid rather than in the ground – and hopes to grow fresh produce for the campus food pantry.

ZotPonics 3.0: A Smart and Scalable Hydroponics Network is one of the engineering senior design projects that was featured at the 2022 Winter Design Review and a recipient of the Dean’s Choice Award. Computer science and engineering majors **DANIEL LOWE , MELINDA TRAN, MEGHA KAK** and **RASHMI SHARMA** worked on the team under the guidance of faculty mentor Quoc-Viet Dang, assistant professor of teaching.

The full ZotPonics system includes a vertical rack holding several plant basins on shelves with tubes connected to a water reservoir that provides plants with the nutrients they need to grow. The system also employs wireless technology for a hands-off experience for users. The ZotPonics 3.0 team worked on code and built the shelves for the physical system. There was also a large amount of testing involved, from testing the hardware design to connecting the app to the physical system and ensuring the two worked together as intended.

The hydroponics project first materialized in 2020 when EECS students wanted to apply their passion for sustainability and demonstrate what they’ve learned. Dang has overseen graduating seniors train incoming seniors to continue their progress throughout the multiyear project. “It is primarily student recruited, trained and improved upon each year. We have gone from a simple prototype to a wirelessly connected multi-shelf system in just three years,” he said.

A working prototype is installed at the UCI FRESH Basic Needs Hub, though it’s not operational yet. “It was a good learning experience, and we did end up creating more documentation on what we did so that future teams would have less trouble getting started,” said Tran.

FIRST-GEN NAVIGATOR

Being a first-generation college student, **A. LILI CASTILLO** overcame obstacles to get to where she is today. The mechanical engineering major was the student speaker for the Samueli School of Engineering’s 2022 Commencement Ceremony. The themes in her speech closely related to identity and how she found her pathway as an engineer.

Castillo was raised by a single mother who immigrated from Mexico and works as a house cleaner. From a young age, Castillo stepped up as a translator and helped her mother with managing finances. Castillo and her family spent around five years living in someone else’s garage to cut rental costs until they were able to move into a new home and stabilize financially. During that time, they earned extra income by cleaning their church’s restrooms and collecting recyclable bottles.

When it came time for applying to college, Castillo found herself navigating the complexities of filling out the Free Application for Federal Student Aid on her own.

“I see how higher education provides an opportunity for people of low socioeconomic status to rise up to a different tax bracket or different lifestyle, which I think is something my mom has really pushed for,” said Castillo. “Two of the big reasons she has been an advocate for higher education was knowledge and financial stability. I think with being an engineering major, I’ve seen opportunities for both. As I complete my studies and get my own professional job, I hope to give back to my mom.”

Castillo realized she wanted to major in engineering as a junior in high school during a tour of a spine realignment company where she met a female engineer who told her about the need for more women in the field.

Prior to enrolling, she wasn’t aware that UCI was a Hispanic-Serving Institute, meaning at least 25% of full-time undergraduate students are Hispanic or Latino. This opened up a wide set of resources, including programs geared toward first-generation students like herself such as TRIO Scholars and the Student Achievement Guided by Experience Scholars. These groups provided her with a sense of community with those who have undergone similar obstacles, coming from immigrant families or single-parent households.

Many of her favorite experiences come from her time serving as president of the UCI chapter of the Society of Women Engineers, participating in outreach events and working with young girls.

While navigating being a first-generation student, Castillo published her first-authored paper and was accepted to graduate school. She will pursue a doctorate in engineering education at Arizona State University where she will continue her current research in identity formation, specifically in Latino/a/x and first-generation students, and how institutions can create a welcoming environment to better support diverse students.

For other first-generation students who may be experiencing imposter syndrome, Castillo offers a quote she heard at student orientation during her freshman year. It has stuck with her ever since: “I hope you all know that you’re all meant to be here because even when you don’t believe in yourself, someone else did. Someone believed that you could be successful not only at UCI, but also as an engineering major, which is why you were accepted in this major.”

HUMANITARIAN HELP

DE'VON JENNINGS earned his doctorate in civil engineering earlier this year and was awarded an American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellowship (STPF).

The STPF provides opportunities for outstanding doctoral scientists and engineers to learn firsthand about policymaking while contributing their knowledge and analytical skills to the federal policymaking process. Fellows serve yearlong assignments in Washington, DC.

Jennings will work for the U.S. Agency for International Development's Bureau for Humanitarian Assistance. He will focus on infrastructure, natural and water resource management for international disaster assistance.

"Receiving the AAAS fellowship means that I will have the opportunity to utilize and expand on my engineering knowledge on a global scale to help manage and solve humanitarian infrastructure crises including roads, water and agriculture," Jennings said. "I hope to make great connections and bonds with people and leaders in the developing nations. Ultimately, I want to have a career working as a civil environmental engineer building infrastructure on a global scale and interacting with many people from all across the world."

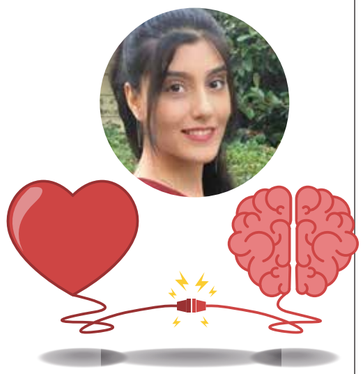
SIGN OF THE FUTURE

Imagining a more inclusive future compelled **BEVERLY QUON**, doctoral candidate in computer engineering, to develop her passion project called Keyboardless, ASL-inspired Programming Interface (KAPI). The American Sign Language-inspired programming interface makes computer programming more accessible for people who have difficulty typing or using a keyboard, including children, older adults and disabled individuals.

KAPI employs emerging low-code platforms, computer vision and machine learning so that people can use ASL to code with only a webcam. KAPI means "monkey" in Sanskrit and has become the project's logo, a cute, friendly creature meant to welcome anyone into computer programming.

The innovative approach won Quon and collaborator Asha Makwana, a Northeastern University graduate student, the 2022 Microsoft Imagine Cup Epic Challenge for the Americas region.

"Eliminating the need for a keyboard removes a barrier to entry for computer programming," explained Quon. "Regardless of the competition, we hope that this kind of reinvigorates and pushes more research toward sign language and other technology that promotes accessibility."



THE HEART-BRAIN CONNECTION

NINAZ VALISHARIFABAD has fallen in love with the heart and the brain.

After graduating from UCI's undergraduate biomedical engineering program in 2020, Valisharifabad is continuing her studies as a UCI graduate student. Her main interest is the way the heart and brain function together.

"I love it, honestly," she said. "If we figure out how these two function, then we can solve a lot of problems. It's going to be really helpful because, right now, the understanding is limited."

Valisharifabad received the 2021 Maxine E. Nevin Leider Scholarship in the Environmental Leaders category. The Leider scholarships are endowed by Maxine E. Nevin Leider, who donated over $3 million to UCI for both undergraduate and graduate scholarships.

"This scholarship will help me focus on my career and conduct research and develop new ways to help people," she said. "It has encouraged me to continue my education, help others and give back to the community."

Her interest in biomedical engineering comes from her grandfather, who passed away three years ago after a long fight against the aftermath of a surgery gone wrong. "And so that was the time I said, 'I wish I could do something for him,'" Valisharifabad recalled.

She's enjoyed her UCI experience so much that she influenced her younger brother, current undergraduate mechanical engineering major Khashayar Valisharifabad, to attend UCI as well.

IMMIGRANTS' INNOVATIONS

Biomedical engineering graduate student **ALEXANDER (OLEK) PISERA** is one of 30 graduate students nationwide named a 2022 Paul & Daisy Soros Fellow.

The Soros Fellowships for New Americans is a merit-based graduate school program for immigrants and children of immigrants. Fellows are selected for their potential to make significant contributions to the United States.

Pisera studies the application and development of new technologies, specifically enabled by developments in DNA synthesis and screening. He conducts research in the lab of Chang Liu, associate professor of biomedical engineering, where he is building a synthetic biological system that could allow for discovery of antibodies against classes of mammalian cell surface proteins that have been inaccessible with current technologies.

Pisera was born in the United States to parents who emigrated from Lodz, Poland.

AUTONOMOUS SURVEYING

JENELLE KING, graduate student in civil and environmental engineering, plans to drive her startup SpikePen to success emulating the concept behind self-driving cars for building structures like bridges, buildings and dams.

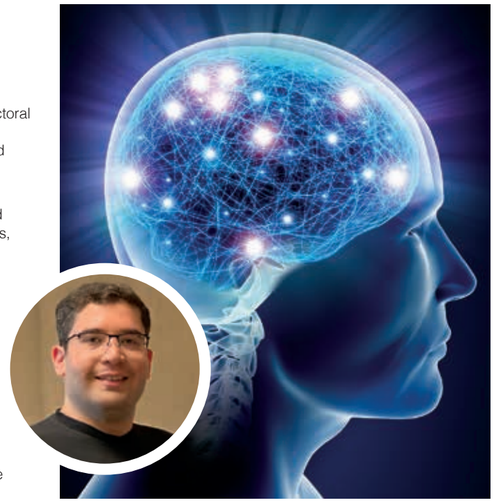
"I'm creating robots that are beneficial for engineers so they can use them to 3D or 2D map different terrains," said King. "So civil engineers, land architects and land surveyors would use this."

Even though King spent her undergraduate at UCI studying autonomous vehicles, she said she was more interested in ways to translate this science into her civil engineering interests.

"There's not a lot of technology in the field of land surveying. They use a lot of manual equipment, and it takes a long time. I want to cut down on that time and make the data more precise and reliable."

The robot King is constructing is autonomous where the user enters information into an app about the area they want surveyed, and the robot creates a 2D or 3D map of the surrounding elevation and landscape.

INNOVATIVE FELLOW



AHMADREZA DANESH, a doctoral student in electrical engineering and computer science, has been awarded a 2022 UCI Beall Applied Innovation Graduate Fellowship.

The program offers UCI graduate and doctoral students, as well as postdocs, opportunities related to innovation, entrepreneurship, and the translation and commercialization of university research. It also includes a $5,000 stipend and access to special events and networking opportunities. Fellows are encouraged to work on the commercialization of their research. This dovetails well with Danesh's goals as he works on an innovative process to significantly improve the sensitivity and usability of noninvasive brain signal acquisition systems.

IN-PERSON REVIEW

It was a welcome scene March 11, as engineering seniors converged on Engineering Gateway Plaza to present their capstone design projects at the 2022 Winter Design Review. More than **1,000 STUDENTS** participated, showcasing 190 projects at the annual event, which because of the large numbers was divided into two sessions.

The senior design program provides students with hands-on learning experience and professional development through innovative projects that bridge academic fundamentals with real-world challenges. After working in teams on their projects for two quarters, students are then able to present their ideas by displaying or demonstrating them to a wider audience.

"I love that we are here in person for Winter Design Review," said Dean Magnus Egerstedt. "This is where the rubber meets the road. I invite our guests to check out all the innovative ideas from our student teams and challenge them with tough questions."

Industry guests along with faculty and staff browsed the projects and visited with students. Projects included devices to assist people who are visually impaired, ways to scale up growth of E. coli and thereby production of insulin for people with diabetes, and best options for treatment of water containing long-lasting PFAS chemicals in groundwater well design.

GIFTED GRADUATES

From fuel cells to spacesuits, four Anteater engineers have received 2022 Graduate Research Fellowship Program awards from the National Science Foundation. The highly competitive program recognizes and supports outstanding students who are pursuing research-based graduate degrees in science and engineering and provides three years of annual funding.

2022 NSF GRFP awardees are:

A. LILI CASTILLO, '22 mechanical engineering with a minor in biomedical engineering, will continue investigating engineering identity formation, specifically Latino/a/x and first-generation college students at Arizona State University.

AMY HUYNH, '21 mechanical and aerospace engineering, will research spacesuit materials and textiles with an interdisciplinary focus on space policy and sustainability at MIT.

CHRISTOPHER PANTAYATIWONG LIU, chemical engineering graduate student, studies fuel cells, specifically, the wettability of gas diffusion layers for polymer electrolyte fuel cells, which are the fuel cells in vehicles like the Toyota Mirai.

SAMER SALEH, chemical and biomolecular engineering graduate student, focuses on metabolic engineering and synthetic biology.

#IAMUCI

She has a penchant for dad jokes, adventurous hikes and twisting her ankle. "Literally every single time I go hiking, I sprain my ankle," said **CLAUDIA FLORES**. But even as she limped through UCI, the first-gen transfer student managed to help lead the Society of Hispanic Professional Engineers and the chassis, body and ergonomics squad on UCI's Baja racing team. In her spare time, Flores loves going to church, singing and socializing with friends. She grew up in Santa Clarita, moved to Palmdale about 15 years ago, and graduated from Palmdale High School and College of the Canyons before heading to UCI.

What is your favorite memory at UCI?

An all-nighter with friends that had nothing to do with studying. It started around 5 p.m. on the last day of winter-quarter finals in 2020. I had recently been elected as director of operations for UCI's Society of Hispanic Professional Engineers, and the club's old and new executive boards were meeting to plan out the spring quarter. Five hours later, when the meeting ended, a few of us had the bright idea to get food and watch three movies in a row in the lounge. The movies were "Honey, I Shrunk the Kids," "A Haunted House" and "The Package," and we laughed the whole time. Now it's almost 4 a.m., and like typical Anteaters, we thought, "Let's go to Seaside Donuts Bakery." We were chilling on the sand when two of our friends decided to run into the water, and yes, I have it on video. I took pictures throughout the night, and some still pop up as memories on my phone, which is pretty nostalgic. After that, some of the group went home. The rest of us, however, were like, "It's almost 6 a.m.; we can watch the sunrise." So after picking up a few more friends, we hiked up Turtle Rock Trail. It was really nice to see the views and to do it with friends. Unfortunately, some snaily souls were accidentally crushed on that mountain, but we made a funeral for them. We stayed up there for about an hour, took pictures, played around and then got breakfast to go at a diner, and everyone went home. To start the morning, I may or may not have fallen asleep eating my food, but it was delicious.

What are your plans after graduation?

I'm applying for an internship to get more experience in different aspects of engineering. I eventually want to work for a company that incorporates most, if not all, of my passions. I'll live wherever my future job is located, but I want to stay in the So Cal area as long as possible. And before any of that, I will take some time to travel to different states and possibly revisit El Salvador and another country. Hiking is a must, so I'll definitely be making a trip back to Wyoming to enjoy the areas I didn't get to last time. I want to soak it all in before the time comes when my busy schedule won't let me.

Where do you see yourself in five years?

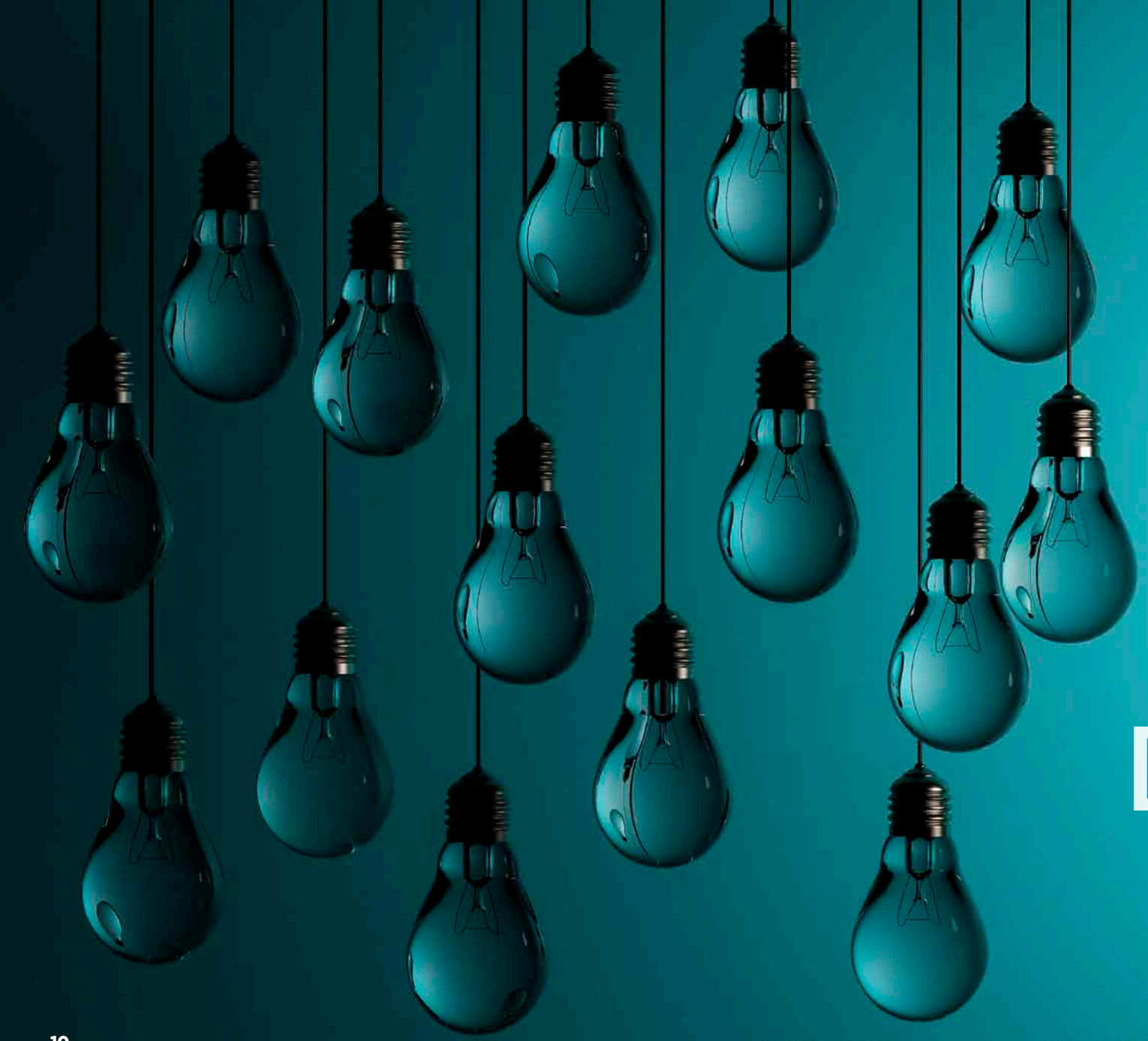
With so much going on in my life and plans that sometimes change week to week, envisioning where I'll be in five years is challenging. But I do my fair share of daydreaming about it. My career dream is to work at a company on projects that encompass civil, automotive or aerospace engineering, the three areas most closely related to my mechanical engineering studies. Romantically, I wouldn't mind having the love of my life by my side, on our way to becoming successful professionals. I see myself spending more time with family and making the most of the moments I have with them, especially when we go to church. I still plan on telling jokes, no question about it. And, quite possibly, I may get started on a teaching credential, as I one day want to teach high school. God only knows how it might turn out, but no matter what, I'll be happy.

Who was your biggest influence at UCI?

My friends in the Society of Hispanic Professional Engineers. SHPE is literally how I found my home away from home. I've gained some incredible friendships and professional connections that I'm sure will last a lifetime. My friends keep me in check and support me whenever I need it. Being far away from family, they understand the hardships of being an independent, first-gen student studying engineering. Having to work so hard for our goals and always striving to be better are a few of the characteristics we all have in common. They helped me grow as a person and as a leader.

What do you know now that you wish you had known before coming to UCI?

As a transfer student, I was already exposed to some form of college life. I commuted 2.5 hours each day, went to classes, joined a club (SHPE), went to the bookstore, had my talk with administration, and ate my food whenever I could. But at UCI, the dynamic was 10 times more hectic. Looking back, I wish I knew where the best places to live on campus were, which clubs I should join, and that teaching assistants are there to help you and not just grade your work. I also wish I'd known more about the resources on campus for people like me: a first-gen, low-income Hispanic woman majoring in engineering. But I'm grateful for my experience because it led me to where I am today: a soon-to-be alumna.



How do engineers make a difference? In many ways; some are obvious, some are not. At the UCI Samueli School, our engineering faculty are innovative and bold. They develop qualities throughout their life and apply them to their own unique circumstances to improve the world around them. They make positive impacts on their students, in their professions and in their communities.

To be an individual who makes a difference, makes all the difference in the world.

DIFFERENCE MAKERS

HOW FIVE UCI SAMUELI SCHOOL ENGINEERS SHINE BRIGHTLY

IRYNA ZENYUK | HOMELAND ADVOCATE

IF YOU HAD A SUPERPOWER, WHAT WOULD IT BE?

Time travel

RECOMMENDED READING?

"Greenlights" by Matthew McConaughey

ADVICE FOR THE NEXT GENERATION OF DIFFERENCE MAKERS?

Find difficult problems to solve, and even if you cannot solve them, your effort might inspire someone to do more about these problems.

Soon after the Russian army invaded Ukraine in February 2022, Iryna Zenyuk, associate professor of chemical and biomolecular engineering, began thinking of ways to help her homeland. For the associate director of UCI's National Fuel Cell Research Center, the conflict is personal. Zenyuk was born in the western Ukraine city of Ivano-Frankivsk and moved to the U.S. when she was a teenager. She still has relatives and many connections in the country. Instead of helplessly watching the horrors of war unfold on her TV screen, she consulted with other UCI professors and decided to commence an effort to bring Ukrainian academics to campus so they could continue their work in relative safety.

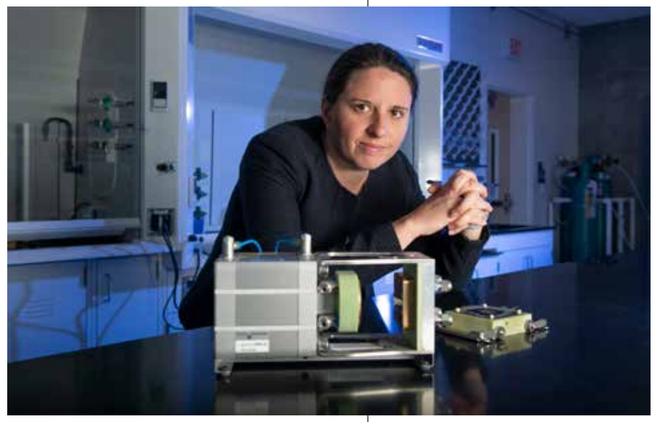
AS TOLD TO BRIAN BELL IN A MAY 2022 UCI PODCAST.

It's a sad situation, and I'm very angry about this Russian war against a sovereign nation. I went back this past August to visit Kyiv because it was the 30th birthday of Ukrainian independence, so I had the last chance to see the city as it was before all the bombing and destruction and human casualties.

I have family in Ukraine, including an aunt in Kharkiv, where there has been a lot of action. My cousin had to hide out in a basement while the city was getting shelled for hours each day. She had to leave her husband, who was with his parents in a town that was occupied by Russian forces.

The best universities are in Kyiv and Kharkiv, and those cities are being bombed the most. As this bombing of infrastructure happened, I realized, okay, we have a lot of academics and students who will not be able to come back to where they used to work, where they studied, where they were teaching. And I thought, can we do something to help them until it's safe for them to go back?

And that's how I got involved with the Scholars at Risk program at UCI. I sought and received advice on how to get started from the chair of a UC-wide coordinating committee, Jane O. Newman, UCI professor of comparative literature. UCI SAR, established in 2017, has enabled displaced academic researchers from Afghanistan, Cameroon and Turkey to come to work on the Irvine campus.



I started fundraising and doing all these things to bring Ukrainian scientists, at least temporarily, to U.S. research labs, specifically here to UCI.

We've been quite lucky and successful in raising over $240,000. A large portion of it comes from the UCI administration – the provost's office, the vice chancellor for research and the 11 deans have committed funds. Through fundraising and the official ZotFunder, we have gathered more than $65,000. And there was a concert by the School of Arts that has helped. It's just incredible how supportive the campus community has been in this effort. And we have one scholar so far who is in the process of being admitted into UCI's master's program in European studies.

"At the moment, my main concern is preserving Ukraine's research culture and the lives of those who make up the nation's educational infrastructure so that there will be a foundation on which to rebuild in the future."

My work involves renewable energy technologies, including fuel cells, hydrogen electrochemistry and electrolyzers. There is a connection between my work and the broader geopolitical strife occurring throughout the world, and I feel like this war has presented a major setback toward us reaching our net-zero emission goals.

As associate director of the National Fuel Cell Research Center, my goal is to develop renewable energy technologies based on hydrogen; electrochemical technologies that don't produce any CO^2 emissions. So unlike fossil fuel technologies such as natural gas or oil that produce CO^2 and pollute the environment, I'm pro renewable energy. Essentially Europe is heavily reliant on Russia's natural gas. In Germany, for instance, 55% of its natural gas comes from Russia. They have to either double down on getting renewable energy faster, which is not an easy thing to do, or they have to resort to coal, which would be much worse for the environment because burning coal produces more CO^2 than burning natural gas. So, now is a really challenging time for all of us who are proponents of renewable energy because the transition is not fast enough.

I hope the war ends soon and that countries will use this opportunity to transition faster to renewable energy to shift this geopolitical balance we have currently, specifically with Europe and Russia, and through this transition, enable a more democratic way of energy sourcing.

At the moment, my main concern is preserving Ukraine's research culture and the lives of those who make up the nation's educational infrastructure so that there will be a foundation on which to rebuild in the future.

FAVORITE MUSIC TO "ENGINEER" TO?

Indian classical music

RECOMMENDED READING?

"Ministry of the Future" by Kim Stanley Robinson and "Creativity: Flow and the Psychology of Discovery and Invention" by Mihaly Csikszentmihalyi

ADVICE FOR THE NEXT GENERATION OF DIFFERENCE MAKERS?

Learn how to learn fast; learn how to balance persistence and flexibility.

PRAMOD KHARGONEKAR | SEASONED MENTOR

Pramod Khargonekar, UCI's vice chancellor for research, has more than four decades of experience as a scholar, educator and leader in academic institutions and government organizations. A Distinguished Professor of electrical engineering and computer science, Khargonekar is an expert in control and systems theory, cyberphysical systems and applications in manufacturing, renewable energy and biomedical engineering. He sits on the California Council on Science and Technology's board of directors.

At UCI, he manages to not only lead the university's half-billion-dollar research enterprise, but also to teach an advanced level graduate course and mentor undergraduate engineering students. Each year, Khargonekar works with one or two undergraduate students on research projects and advises several student teams working on their senior engineering design projects.

KHARGONEKAR SHARES HIS VIEW ON GUIDING YOUNG ENGINEERS.

Q: Why do you continue to make time for teaching and mentoring students?

A: I entered the academic profession for my love of teaching. My parents were high school teachers, and I knew from a relatively young age that I would be an educator. Thus, the origins of my passion for education are very deep. I believe educating and mentoring students is an important contribution I can make.

What are the rewards?

My reward is to see young students grow and develop as highly competent engineers and well-rounded human beings. I aim to increase their self-confidence and their own expectations from their lives. They will have 50 or more years of productive life and their potential to advance our society is simply unlimited. It is good to feel that I have made a small contribution to their development at a pivotal stage in their life journey.

Do any of the design teams stand out for you as good examples of innovation or creativity?

Over the last four years, I have mentored more than 10 senior design teams. There were two teams last year that were exceptionally innovative. One team was motivated to assist blind people by building a system of wearable glasses with camera sensors and a machine vision system that could interpret the scene in front of the person. It was quite an amazing team of students and their project won a Dean's Choice Award for the tremendous work. Another team was motivated by sustainability concerns and decided to address seaweed farming. Their project was to build a submersible autonomous drone that could be remotely controlled to reduce the cost and barriers to seaweed farming. They also won a Dean's Choice Award. Besides excellent technical engineering work, both teams showed exceptional commitment to human welfare.

I am very proud that we are graduating such outstanding students. There is no doubt they will change the world.

How does a student or team go about obtaining you as a mentor?

Most commonly, they contact me with their idea by email. If I find a good match between what they want to do and my capacity, I accept them.

What is your impression of UCI engineering students today, and is there anything that surprises you?

We have outstanding students. They are highly talented, work hard and have passion for technical excellence. I am surprised to see the very high level of commitment to societal contributions. Their highly developed social conscience gives me a lot of hope for the future.

What are some of the key messages you impart to engineering students facing today's challenges?

Technological progress driven by engineering creativity has had tremendous impact on our society. We have created amazing technologies such as airplanes, electric power, computers, internet, etc. For the most part, the impact is very positive as can be seen in increased longevity and higher living standards.

But there are significant societal problems that have arisen, at least in part, from this technological progress and resulting economic growth. We face a climate crisis caused by the use of fossil fuels in our energy, transportation, manufacturing, housing and agriculture. We face a crisis in our democracy and governance caused, in some part, by social media enabled by internet and web technologies.

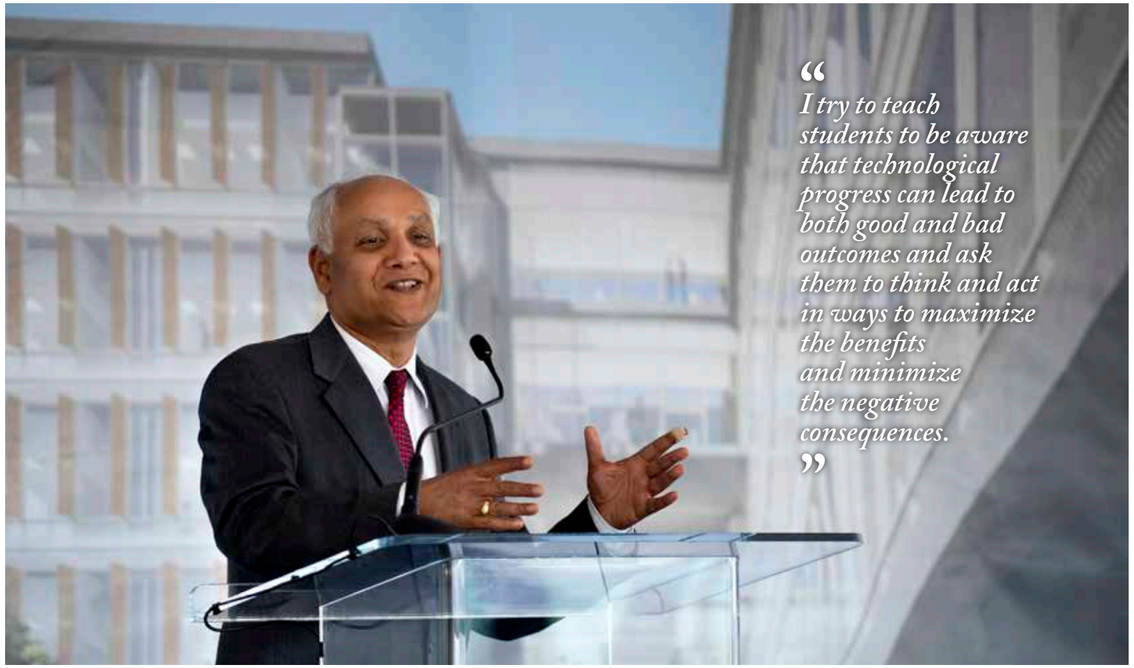
I try to teach students to be aware that technological progress can lead to both good and bad outcomes and ask them to think and act in ways to maximize the benefits and minimize the negative consequences.

What are your hopes for students in the future?

I expect they will be great leaders and help society overcome major challenges. They certainly have the innate capacity, and I hope the education they receive at the UCI Samueli School of Engineering will provide a strong foundation for building to their maximum potential.

Anything else you would like to add?

I would like to wish each and every one of our students a long life of good health, success, meaning and fulfillment.



DAVID REINKENSMEYER | INSPIRED INVENTOR

David Reinkensmeyer studies neural control of movement. He takes what he learns and applies it to neurorehabilitation technologies that help people with movement disabilities.

BY LORI BRANDT

The Samueli School professor of mechanical and aerospace engineering, who also is a professor of anatomy and neurobiology in the UCI medical school, discovered at 8 years old that he wanted to be an inventor. His third grade teacher in Wichita, Kansas, had inspired him with an invention contest.

"She was excellent at stimulating creativity. I made a marble maze game, and I loved the process," he said. He continued creating in high school: board games, computer games, mechanical toys, a robot dog. But it wasn't until graduate school that he saw the potential for mechanical inventions to be useful in neurorehabilitation.

Reinkensmeyer puts his imagination to daily use in his Biorobotics Laboratory, where his team develops robotic and sensor-based devices that enhance human movement, motor learning and rehabilitation. His inventions over the past two decades have helped thousands of people recover arm, hand and leg movement after a stroke or spinal cord injury. Reinkensmeyer figures his group has developed 25 to 30 devices during his UCI career. Two have been spun into successful companies, two have attracted popular attention in commercial videos, others have been widely cited in research.

IF YOU HAD A SUPERPOWER, WHAT WOULD IT BE?

Superspeed

FAVORITE MUSIC TO "ENGINEER" TO?

The Current, an alternative music station streaming from 89.3 Minnesota Public Radio

ADVICE FOR THE NEXT GENERATION OF DIFFERENCE MAKERS?

Pick a hard problem, think laterally, build fun teams, never give up.

These inventions have made a difference in patients' lives as well as inspired the next generation. Reinkensmeyer shares his enthusiasm for robots with students, mentoring high schoolers during the summer and teaching a popular undergraduate lab in mechanical systems each spring in which the final project is the design, testing and building of a robotic device.

"The best part of my job is working with and mentoring the students in my lab," said Reinkensmeyer. "Hopefully, I am for them like my third grade teacher was for me."

"The best part of my job is working with and mentoring the students in my lab. Hopefully, I am for them like my third grade teacher was for me."

Here is a list of Reinkensmeyer's top five neurorehabilitation technologies making a difference in people's lives.

T-WREX

A spring-driven, gravity-balancing exoskeleton rehabilitation device used to retrain the arm and hand after stroke, spinal cord injury, cerebral palsy, multiple sclerosis and orthopedic injury. T-WREX supports functional upper extremity movements by integrating a grip sensor that allows detection of even trace amounts of hand grasp. It helps people with weakened arms to practice using their arms in simulated activities of daily living in a virtual world. T-WREX incorporates a suite of engaging computer games that approximate the movements needed for cooking, shopping, bathing and cleaning. It was co-invented with doctoral student Robert Sanchez, and commercialized by the Swiss company Hocoma as ArmeoSpring. Currently, there are more than 1,000 devices installed in rehabilitation hospitals and clinics worldwide.

MUSICGLOVE

A glove-like device with fabric sensors that serves as a rehabilitation tool designed to help individuals regain lost hand function after an injury. The device senses the finger and thumb movements used for lateral and key pinch grips and allows users to practice these movements while playing a fun, therapy-based music game. The game also tracks performance over time, making it easy for users to reach their goals. It was co-invented with doctoral student Nizan Friedman, who went on to start Flint Rehab. There are now more than 5,000 devices installed in the homes of patients and rehabilitation hospitals and clinics worldwide.

PAM *(Pelvic Assist Manipulator)*

A six degrees of freedom parallel pneumatic robot that attaches to the pelvis and can be used to assist a person with a severe spinal cord injury in walking on a treadmill. It's featured in the video "I Need a Doctor" by Dr. Dre and Eminem, which has been viewed over 460 million times on YouTube.

BONES

A pneumatic exoskeleton that supports four degrees of freedom in arm, wrist and forearm movement. It uses a unique parallel mechanism to allow naturalistic arm movement with low inertia and high force. Experiments with BONES revealed that rehabilitation arm training conducted with more degrees of freedom is not more effective than simpler forms of joint-based training. It's featured in a Cisco Systems commercial with Ewan McGregor that aired during the NBA Finals and World Series.

BOOST

A dynamic armrest that replaces the common manual wheelchair armrest, allowing patients to exercise their arm by moving the armrest back and forth. It can also engage the wheelchair wheel letting a person with arm weakness bimanually drive the wheelchair. Boost was co-invented with Danny Zondervan, a doctoral student, and Marti Comellas, a visiting scholar from Spain as part of the Balsells program. It is in the process of being commercialized by Flint Rehab.

TIMOTHY DOWNING | MINDFUL EXPERT

Timothy Downing, assistant professor of biomedical engineering, explores what makes us who we are – and who we have the potential to become.

Through his epigenetic research, he dives into the body at one of its smallest scales – the single molecular level of DNA – to study how our behaviors and environment can cause changes that affect the way our genes work. Downing labors to understand the role of extracellular signals on epigenetics as well as the relationship between epigenetic mechanisms and cellular function, with an eye toward applying that understanding to cell and tissue engineering. His discoveries have larger implications in the field of biomedical engineering, including regenerative medicine, and his research has caught the attention of many in his field.

Downing is also deeply concerned about how we relate to each other externally, psychologically – especially during the recent challenging times. He was inspired to create a course for the UCI community called "Empathy and Interconnectedness: The Path Forward."

AS TOLD TO TONYA BECERRA

The empathy course was heavily developed through collaboration with two mindfulness instructors, Cayce Howe and Dr. Monisha Vasa, hired through the Susan Samueli Integrative Health Institute (SSIHI) whom I had the pleasure of meeting through their course on Mindfulness Based Stress Reduction (MBSR).

UCI sponsored these classes during the peak of the pandemic campus shutdown, and the course was in session at the time of George Floyd's death. I realized that by helping me build a deeper awareness of "the self," the MBSR course really enabled me to navigate a relatively new job with lots of new responsibilities and find inner peace and empathy for myself and others during what were clearly unprecedented, chaotic times.

With that in mind (and during a time when so many of the narratives permeating our society seemed to be centered around polarized views of "other" groups of people – e.g., Red vs. Blue, Trump vs. Not Trump, Black lives matter vs. All lives matter, Vaxxed vs. Anti-vax ...), I reached out to SSIHI and my mindfulness instructors to co-develop a course that uses the teachings and practice of mindfulness meditation to build skills and literacy in mindfulness and enhance self-awareness to cultivate empathy and compassion (for the self and others). I also hoped to highlight the nature and importance of our interconnectedness as a UCI community and society as a whole.

And actually, the bigger motivation for the course, especially at the time, was to start something that could help prevent or

IF YOU HAD A SUPERPOWER, WHAT WOULD IT BE?

To listen really well and understand everyone.

WHAT WAS YOUR FIRST EUREKA MOMENT AS AN ENGINEER?

That science is still so much about storytelling

ADVICE FOR THE NEXT GENERATION OF DIFFERENCE MAKERS?

Trust the genius inside of you.

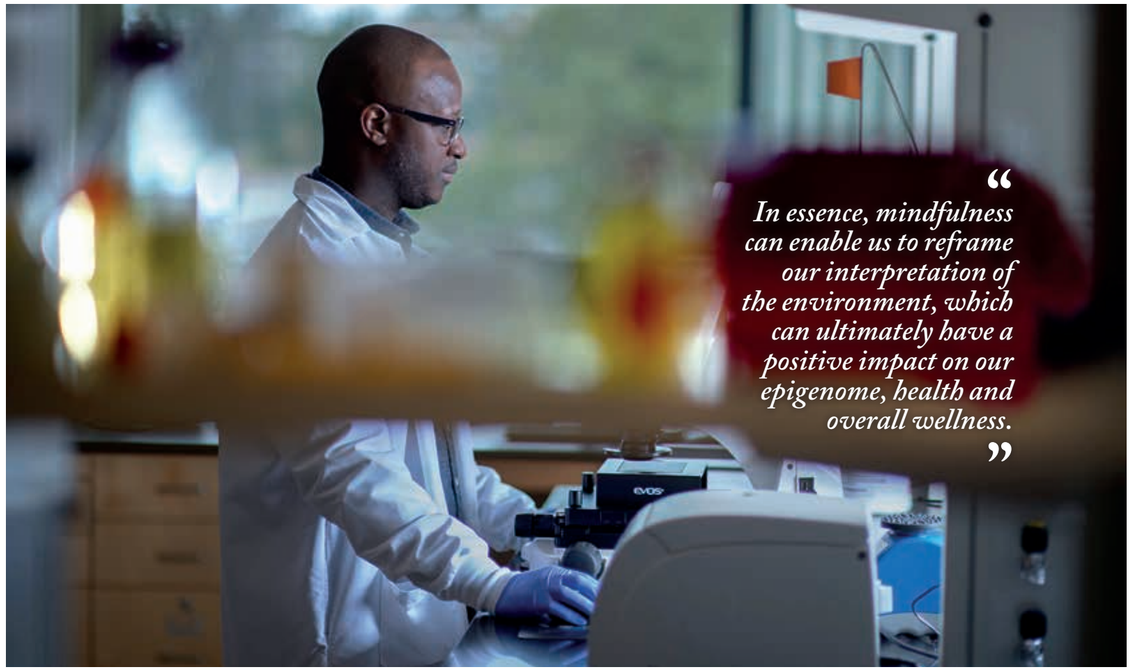
dampen what was starting to look like the early stages of a sort of "civil war." From our discussions, which included Jessica Drew de Paz, SSIHI director of Mindfulness Programs, we came up with a pilot program for a class that could be further developed and implemented in the Samueli School of Engineering or on campus more broadly. The course was six weeks long, titled, "Empathy and Interconnectedness: The Path Forward," and launched last summer (2021). We had seats for 30 people (faculty, students and staff), but the waitlist was near 100. So, we were all excited to see a lot of interest for this content at UCI.

The course instructors, Cayce and Monisha, have just started a larger effort with a team of mindfulness and mental health experts and advocates that I am a part of. It's called Sustainable Caring and is available to the general public *(www.sustainablecaring.com)*. They hope to expand their reach in some of these efforts across several domains of life and society.

I absolutely think MBSR and empathy are related to my epigenetics research. There are many ways to view this, but the most compelling to me is that unlike our genome, our epigenome is dynamically changing throughout our lifespan, and those changes can be impacted by our lifestyle and environment (smoking, diet/nutrition, environmental pollutants, etc.), which can then lead to changes in how DNA is regulated and genes expressed inside the cells of our body. And these changes can have meaningful impacts on our own biology.

Where I think mindfulness and practices like MBSR intersect is in the space where it's not just about the environment alone shaping our epigenome, but also our own interpretation of our environment that plays a key role. For example, stress is often a response that results from some force or experience external to the body that can have negative impacts on the epigenome and facilitate negative effects on human physiology. Mindfulness and MBSR are tools that can be used to potentially build resilience to certain types of stresses, particularly those that arise from a particular way of thinking. In essence, mindfulness can enable us to reframe our interpretation of the environment, which can ultimately have a positive impact on our epigenome, health and overall wellness.

The Downing Lab has a motto: "Have you hugged your epigenome today?"



"In essence, mindfulness can enable us to reframe our interpretation of the environment, which can ultimately have a positive impact on our epigenome, health and overall wellness."

ATHINA MARKOPOULOU | PRIVACY WARRIOR

In Greek mythology, Athena is the goddess of wisdom and war. UCI's Athina Markopoulou aspires to live up to her namesake. Her weapons are computers and keyboards rather than shields and swords but no less effective in her fight: protecting data privacy.

Since arriving at UCI in 2006, Markopoulou has made her mark at the school and in her discipline. A professor of electrical engineering and computer science, Markopoulou is director of ProperData, a five-year, $10 million NSF project. The ProperData Center addresses the urgent need for protection of personal data flow on the internet. Under her leadership, a multidisciplinary team of researchers is building fundamentals, creating new technologies and informing policy to improve the transparency and control of personal data.

MARKOPOULOU SHARES INSIGHTS ON PRIVACY AND DATA TRANSPARENCY.

“The public’s attitude about privacy has changed dramatically. Fifteen years ago, we thought nothing of giving away personal data in exchange for free services. Today, we understand that collection, sharing and use of data affects not only individuals, but also our society as a whole.”

Q: How would you describe your research?

A: My research is about privacy and data transparency. Simply put, we want to shed light on where personal data are sent, how they are used, and give more control to people and regulators over that data flow.

In my group and at ProperData, we are developing tools – methodologies, software, architectures – that allow consumers, policymakers and regulators to understand and control data collection, sharing and use practices. We also interact with privacy policy experts, nonprofits and regulatory agencies to exchange information and make our tools available for auditing and enforcement.

Why is this important?

When people access an online service (via browsers, smartphone apps, smart TVs, smart home devices, etc.), their personal data are stored, shared and used by several different entities, behind the scenes. Even activities in the physical world, such as being within range of WiFi or other mobile devices, surveillance cameras, etc., are routinely recorded and become part of our online profiles. These data are then used to provide personalization and other services (location-based services, for example, track location). However, the main drive behind this data collection is monetization via targeted advertising, risk assessment and other methods. This data tracking and monetization ecosystem is widely known as “surveillance capitalism.” It is pervasive, complex and nontransparent.

What is the impact of your research?

The public’s attitude about privacy has changed dramatically. Fifteen years ago, we thought nothing of giving away personal data in exchange for free services. Today, we understand that collection, sharing and use of data affects not only individuals, but also our society as a whole. These practices affect how information spreads and how our democracy works. They affect patterns of engagement and our mental health. They have security and safety implications, such as data breaches leading to identity theft, ransomware and worse. They enable profiling, which in turn enables differential treatment of people and resource allocation. This goes beyond online advertising – like qualifying for loans or employment. In fact, much of the privacy community today is emphasizing fairness and algorithmic bias. Data feeds the training of machine-learning algorithms, which increasingly decide many aspects of our life.

Lawmakers are pushing data-protection laws, such as the California Consumer Privacy Act (CCPA)/California Privacy Rights Act (CPRA), General Data Protection Regulation (GDPR) in Europe and several sector- and state-specific laws on emerging technologies, like facial recognition. However, we need researchers and technologists to inform them and provide tools for compliance, auditing and enforcement.

What do you hope to accomplish with the ProperData Center?

ProperData will complete its second year in October 2022. We are training a cohort of 50 to 60 graduate students and postdocs who will contribute to the privacy research community. Many collaborations have begun, and we know we have more impact talking to stakeholders as a group rather than as individual researchers.

I would like to see ProperData become the go-to place for privacy-enhancing technologies – where consumers, developers and regulatory agencies look for principled approaches to understanding data collection and use, and for learning to take control over it.

California is leading the country in privacy laws with the landmark CCPA and the upcoming CPRA. These laws specify consumer rights and company duties, and they dictate data collection, usage and sharing practices. ProperData can become the premier privacy research center that informs those developments. There is also commercialization potential for our technologies. Beyond end users, companies and regulators can benefit from using our tools for auditing and compliance.

What advice could you offer people about privacy and data security?

It is such an uneven battle right now between the end user and the “surveillance capitalism” ecosystem. Current practices are based on the framework of notice-and-consent, where companies display a long, incomprehensible privacy policy, and we have to agree if we want to use their services.

This being said, people should follow common-sense good practices. For example, take cybersecurity training (learn to change passwords, use VPN, etc.). Opt out as much as possible from data collection. Use an adblocker on browsers, including privacy-preserving browsers and search engines. Uninstall apps you don’t need. Restrict permissions of apps. Restrict privacy controls on social media. Think twice before using virtual assistants or smart home gadgets; and if you do, check all privacy controls and settings. Go over kids’ devices and check all their apps and settings. And, if we (ProperData) ask you to participate in user studies, exercise your privacy rights under CCPA/CPRA, or test our privacy-enhancing tools, and then please consider participating!

IF YOU HAD A SUPERPOWER, WHAT WOULD IT BE?

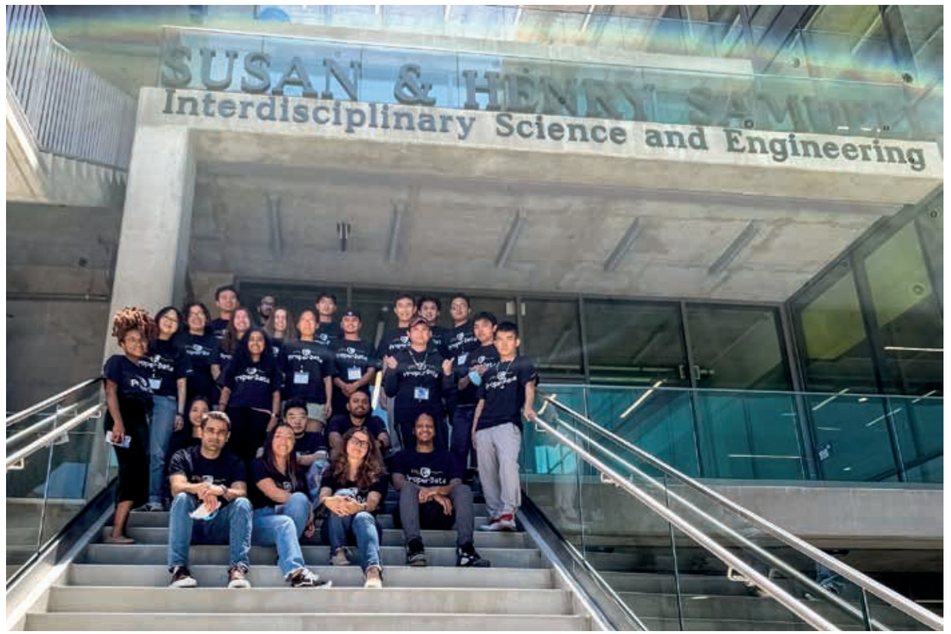
I already have a super power – multitasking! It started with parenthood, then evolved into an extreme sport.

RECOMMENDED READING?

“The Age of Surveillance Capitalism” by Shoshana Zuboff and “Who Owns the Future?” by Jaron Lanier

ADVICE FOR THE NEXT GENERATION OF DIFFERENCE MAKERS?

If we want to make a difference, we must pick important problems that matter to society.



MEDIA WATCH

A SAMPLING OF UCI ENGINEERING EXPERTS MAKING NEWS

The New York Times

For many, hydrogen is the fuel of the future – new research raises doubts

JACK BROUWER, director of the National Fuel Cell Research Center at the University of California, Irvine, said that hydrogen would ultimately need to be made using renewable energy to produce what the industry calls green hydrogen, which uses renewable energy to split water into its constituent parts, hydrogen and oxygen. That, he said, would eliminate the fossil and the methane leaks.

The Washington Post

South Asia's scorching heat wave comes as climate action stalls

"Heat waves happen more frequently now and they are spread around throughout the year," **AMIR AGHAKOUCHAK**, a UCI professor of civil and environmental engineering, told my Capital Weather Gang colleagues. "This is the new normal and most likely it will only get worse in the future unless we take serious actions."

science FRIDAY

The cephalo-inspired technology of the future

"Cephalopods are such exciting sources of inspiration," says **ALON GORODETSKY**, a materials scientist at the University of California, Irvine. "The things they do, how they move, even their brains — it's like science fiction stuff." In this segment, Ira chats with Gorodetsky and other technologists about an array of cephalopod-inspired innovations, from adaptive camouflage to self-healing materials.

The Weather Channel

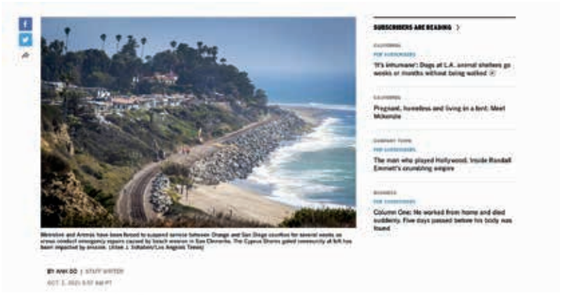
Crews race to contain California oil spill

KRISTEN DAVIS, UCI associate professor of civil & environmental engineering and principal investigator at Coastal Dynamics Lab, said, "The spill has a local effect, while that is a visible effect that we will be dealing with it for years, as far as wildlife and the cleanup, I also think it is important to realize that the effect of fossil fuels is much broader than the spill that we are seeing here today. And that we have a big challenge ahead of us as we go into the COP26 international climate talks in Glasgow next month. I hope that this spill is a wakeup call to get serious about getting off of fossil fuels."

Los Angeles Times

Coastal erosion in San Clemente threatens railroad tracks, pricey homes

After decades of development that destroyed countless acres of coastal marsh, Southern California's environmental "bank account" is empty, said **BRETT SANDERS**, professor of civil and environmental engineering at UC Irvine. For Sanders, San Clemente is an ideal place for a project that rebuilds beaches and ultimately protects the railroad track and houses. But it will take quick action from regional leaders, he said.



Just how much hotter and drier is Southern California's 'new normal' weather?

The timing of the hotter, drier conditions is particularly unfortunate for wildfire season. … "Those are perfect conditions for wildfires, definitely," said **TIRTHA BANERJEE**, an assistant professor of civil and environmental engineering at UC Irvine who studies how fires move. … The question needs to be, "How do we live with fire?" Banerjee said. "We cannot afford to lose lives or property, so how do we manage ecosystems better?"

THE ORANGE COUNTY REGISTER

OC REGISTER

KTLA 5

UC Irvine engineers create high-tech fabric that lets wearers pay for purchases with a high-five

"If you've held your smartphone or charge card close to a reader to pay for a purchase, you have taken advantage of near-field signaling technologies. Our fabrics work on the same principle, but we've extended the range significantly," said **PETER TSENG**, UCI assistant professor of electrical engineering and computer science. "This means you could potentially keep your phone in your pocket, and just by brushing your body against other textiles or readers, power and information can be transferred to and from your device."

THE CONVERSATION

Insulin was discovered 100 years ago – but it took a lot more than one scientific breakthrough to get a diabetes treatment to patients

JAMES P. BRODY, UCI professor of biomedical engineering, writes, "I'm a biomedical engineer, and I teach a course on the history of the treatment of diabetes. With my students, I emphasize the importance of unrelated basic research in the development of medical treatments. The story of insulin illustrates the point that medical innovations build on a foundation of basic science and then require skilled engineers to get a treatment out of the lab and to the people who need it."

DDN EXPLORING DRUG DISCOVERY AND DEVELOPMENT

Shrinking toys inspire diagnostics and wearable sensors of the future

At the height of their popularity in the 1980s, no one could have guessed that Shrinky Dinks would inspire tiny diagnostic tests or sensors to detect changes in a person's health. While these inexpensive and easy-to-access toys may have started as a childhood pastime for **MICHELLE KHINE**, a bioengineer at the University of California, Irvine, they became her inspiration for a new way to diagnose and monitor disease.

FACULTY ACCOLADES

A LISTING OF NOTABLE RECOGNITIONS AND AWARDS


JULIE SCHOENUNG


FARZAD NAEIM


EFI FOUFOULA-GEORGIOU


ANDREI SHKEL


SUNGWOO NAM


TIRTHA BANERJEE


MOHAMMAD JAVAD ABDOLHOSSEINI QOMI


ANNE LEMNITZER


TIMOTHY RUPERT

JULIE SCHOENUNG, professor and chair of the Department of Materials Science and Engineering, is elected a new member of the National Academy of Engineering, as well as a fellow of the National Academy of Inventors.

The National Academy of Engineering inducts civil engineer and Adjunct Professor **FARZAD NAEIM** into its 2022 class of members.

EFI FOUFOULA-GEORGIOU, Distinguished Professor of civil and environmental engineering, is elected to the American Academy of Arts and Sciences.

ANDREI SHKEL, professor of mechanical and aerospace engineering, is named a 2021 fellow by the National Academy of Inventors.

SUNGWOO NAM, associate professor of mechanical and aerospace engineering, receives a 2022 BRITE Pivot award from the National Science Foundation.

The National Science Foundation grants CAREER awards to civil and environmental engineers **TIRTHA BANERJEE** and **MOHAMMAD JAVAD ABDOLHOSSEINI QOMI**.

Associate Professor **ANNE LEMNITZER** wins the Thomas A. Middlebrooks Award from the American Society of Civil Engineers.

The American Society for Metals International names **TIMOTHY RUPERT**, professor of materials science and engineering, to the 2022 class of fellows.

ALON GORODETSKY, associate professor of chemical and biomolecular engineering, is designated a 2021 Director's New Innovator by the National Institutes of Health.

Four biomedical engineering faculty – **ELLIOT BOTVINICK**, **MICHELLE DIGMAN**, **CHANG LIU** and **WENDY LIU** – are inducted into the American Institute for Medical and Biological Engineering's College of Fellows Class of 2022.

SHEN DILLON, professor of materials science and engineering, is named to the 2022 class of fellows of the American Ceramic Society.

Mechanical and aerospace engineer **ZAK KASSAS** earns the Young Investigator Research Program award from the Air Force Office of Scientific Research.

The American Meteorological Society awards Honorary Membership to Distinguished Professor of civil and environmental engineering **SOROOSH SOROOSHIAN**.

Mechanical and aerospace engineering Associate Professor **SOLMAZ KIA** wins the IEEE Control Systems magazine Outstanding Paper Award.

RAMIN BOSTANABAD, assistant professor of mechanical and aerospace engineering, is selected to participate in the National Academy of Engineering's 2022 U.S. Frontiers of Engineering Symposium.


ALON GORODETSKY


ELLIOT BOTVINICK


MICHELLE DIGMAN


CHANG LIU


WENDY LIU


SHEN DILLON


ZAK KASSAS


SOROOSH SOROOSHIAN


SOLMAZ KIA


RAMIN BOSTANABAD

16 NATIONAL ACADEMY OF ENGINEERING MEMBERS

1 NATIONAL ACADEMY OF MEDICINE MEMBER

13 NATIONAL ACADEMY OF INVENTORS

1 AMERICAN ACADEMY OF ARTS AND SCIENCES MEMBER

37 NSF CAREER AWARDEES

8 NIH NEW INNOVATORS

8 PRESIDENTIAL YOUNG INVESTIGATOR AWARDEES

10 ENDOWED CHAIRS AND PROFESSORSHIPS

18 DISTINGUISHED PROFESSORS

5 CHANCELLOR'S PROFESSORS

2 CHANCELLOR'S FELLOWS

3 DOE EARLY CAREER AWARDEES

INNOVATOR OF THE YEAR

ABRAHAM LEE'S research and entrepreneurial activities are a combination of technical creativity, precision engineering and biological utility. Chancellor's Professor of biomedical engineering and this year's Innovator of the Year, Lee is among the original pioneers in the field of droplet microfluidics, consistently finding advanced technical solutions for difficult, high-impact biomedical problems. One of Lee's most successful startup companies, Aracari Biosciences, integrates his lab-on-a-chip expertise as a key component of its patented devices that mimic the heart, liver, pancreas and brain, and offer rapid, efficient preclinical screening of new drugs for those organs. As a founding director of the Center for Advanced Design and Manufacturing of Integrated Microfluidics, Lee has helped establish a strong industrial innovation ecosystem that facilitates the transition of industry-sponsored research to commercial ventures. Now in its eighth year of operation, the center is the only one of its kind devoted to the study of microfluidics.

60 ISSUED PATENTS

6 PROVISIONAL PATENTS

8 BOOK CHAPTERS

115 PEER-REVIEWED PUBLICATIONS

LAB NOTES

NOVEL OPTICAL BIOPSY TOOL

CHALLENGE »

To improve treatment for the up to 50% of women going through menopause who experience symptoms that negatively affect their general health and sexual function.

SOLUTION »

Increasingly, energy-based devices, such as lasers including CO^2 micro-ablation, are emerging to treat symptoms that include vaginal atrophy and distressing urinary symptoms.

To better understand the full effect of laser treatment on vaginal tissue, biomedical engineering researchers are developing a new noninvasive intravaginal imaging system that could serve as an optical biopsy tool, ultimately enabling individually tailored screening, treatment and monitoring for patients.

"We are working on a point-of-care, multifunctional endoscope that can obtain real-time simultaneous information on structural, vascular and biomechanical changes before, during and after vaginal laser procedures," said Zhongping Chen, professor of biomedical engineering.

The new imaging system combines optical coherence tomography and OCT angiogram into one technology and will function as an optical biopsy, providing objective, noninvasive scientific parameters to assist clinical practitioners as well as governing bodies (including the FDA) to determine best practices.

RX BURNS

CHALLENGE »

Prescribed burning of ground-level shrubs, branches and leaves is a time-tested tool to help prevent wildland fires from getting out of control, but is this practice used frequently enough?

SOLUTION »

For a paper published in Science of The Total Environment, researchers conducted an in-depth assessment of meteorological and vegetation data spanning 35 years, finding several additional periods during winter and spring in which wind, temperature and humidity levels would allow safe and effective human-set blazes.

Labeled "Rx burns" by prescribed-fire experts, these typically low-intensity blazes consume surface fuels on the forest floor while preserving trees. Controlled burns can revitalize forest ecosystems and reduce wildfire intensity during an outbreak, creating safer working conditions for firefighters.

"Limited burn windows are one of the biggest obstructions to conducting more prescribed fires in California," said study leader Tirtha Banerjee, assistant professor of civil and environmental engineering. "We hope the findings of this study will inspire policy changes to address this situation."

BIG DATA FROM LITTLE DROPLETS

CHALLENGE »

To extract quantifiable measurements from condensation droplets. Condensation is everywhere in nature and industry. While the transformation of vapor/gas to liquid is an efficient mass-transfer process in nature, it is also essential to many industrial applications such as thermoelectric and nuclear power generation, water-harvesting systems, heat exchangers and desalination plants. Using physical sensors is impractical for collecting information because it requires thousands of images with each image containing thousands of droplets, totaling more than a million data for a one-hour experiment.

SOLUTION »

Artificial intelligence and machine learning transform information from condensation droplets exponentially faster and more accurately than before.

Yoonjin Won, associate professor of mechanical and aerospace engineering, and her team, along with University of Illinois at Urbana-Champaign collaborators developed a framework for applying machine learning methods to take immense amounts of visual data and rapidly extract nuanced patterns that are unobservable with human analysis. These patterns then help to elucidate thermofluidic mechanisms previously not seen or understood.

"Our deep learning strategy has the potential to revolutionize thermofluidic sciences by providing meaningful physical descriptors and their inextricable relationships in the context of heat and mass transfer performance," Won said. "New data can pave the way to understand new principles about nucleation-initiated phase-change science, develop prediction models, and suggest design rules for next-generation surfaces."

MICRO 'WASHING MACHINES'

CHALLENGE »

Cell therapy has become a powerful tool to treat patients suffering from cancer and other debilitating diseases stemming from gene mutations. One of the critical steps to manufacturing cell therapy products is the intracellular delivery of genetic coding molecules to make cells more powerful in fighting diseases. The standard approach for intracellular delivery is to use the molecular machinery of viruses to deliver genetic molecules into cells. However, viral delivery is limited by the size of the molecules it can carry. It also suffers from unwanted side effects from the virus that can be harmful to the patient.

SOLUTION »

To address the challenges of intracellular delivery, biomedical engineering researchers led by Abraham Lee, have developed a microfluidic platform to safely and precisely deliver genetic coding molecules into cells. Called Acoustic-Electric Shear Orbiting Poration, the high-throughput nonviral intracellular delivery platform optimizes transfer of cargo sizes with poration, or pore formation, of the cell membranes.

"Our technology relies on a series of vortices, which are analogous to micro 'washing machines,' that stretch and twist the clothes (i.e., the cells) to make sure every part of it is uniformly absorbing the detergent (i.e., the genetic coding molecules)," said Lee.

HIGH-TECH TEXTILE

CHALLENGE »

Near-field communications protocol has enabled the growth in applications such as wireless device charging and powering of battery-free sensors, but a drawback of NFC has been its limited range of only a couple of inches.

SOLUTION »

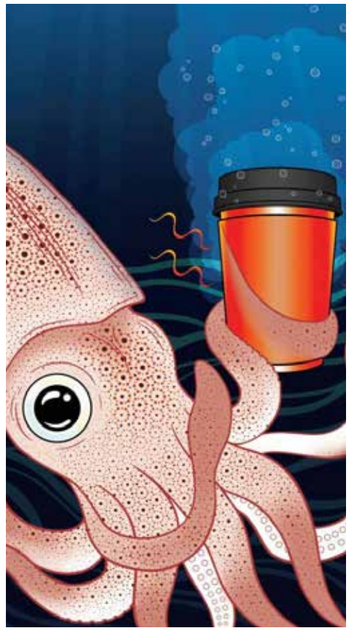
An innovative, new high-tech fabric created by UCI engineers enables wearers to communicate with others, wirelessly charge devices and pass through security gates with the wave of an arm. The new "body area network"-enabling fabric was invented by electrical and computer science engineers led by Peter Tseng, assistant professor, and graduate student Amirhossein Hajiaghajani.

In the development process, the researchers extended signal reach to more than 4 feet using passive magnetic metamaterials based on etched foils of copper and aluminum.

"With our fabric, electronics establish signaling as soon as you hover your clothes over a wireless reader, so you can share information with a simple high-five or handshake," Hajiaghajani said.

The team's innovation was designed to be highly flexible and tolerant of bodily motion. Because signals travel in the UCI-invented system via magnetic induction – versus the continuous hard-wire connections that had been state-of-the-art in smart fabrics – it's possible to coordinate separate pieces of clothing. In athletic gear, pants can measure leg movements while communicating with tops that track heart rate and other stats. The materials involved in the system are low-cost and easy to fabricate and customize, and varying lengths and branches of the metamaterial "rails" can be heat-pressed onto wearers' existing clothing.

"Our textiles are simple to make and can be integrated with interesting wearable designs," Hajiaghajani said. "We want to create designs that not only are cool and inexpensive but can reduce the burden that modern electronics can bring to our lives."



INSULATION INNOVATION

CHALLENGE »

How can insulation material be more effective, energy-efficient, cost-effective and mass producible?

SOLUTION »

Drawing inspiration from squid skin, UCI engineers invented an adaptive composite material that can insulate beverage cups, restaurant to-go bags, parcel boxes and even shipping containers.

"The combined manufacturing strategy that we have now perfected in our lab is a real game changer," said Alon Gorodetsky, associate professor of chemical and biomolecular engineering. "We have been working with cephalopod-inspired adaptive materials and systems for years but previously have only been able to fabricate them over relatively small areas. Now there is finally a path to making this stuff roll-by-roll in a factory."

The innovation is an infrared-reflecting metallized polymer film. In Nature Sustainability, the researchers describe a large-area composite material that regulates heat by means of reconfigurable metal structures that can reversibly separate from one another and come back together under different strain levels.

Chromatophore (cells that contain pigment) size changes help squids communicate and camouflage their bodies to evade predators and hide from prey. Gorodetsky said by mimicking this approach, his team has enabled "tunable thermoregulation" in their material, which can lead to improved energy efficiency and protect sensitive fingers from hot surfaces.

"There is an enormous array of applications for this material," said Gorodetsky. "Think of all the perishable goods that have been delivered to people's homes during the pandemic. Any package that Amazon or another company sends that needs to be temperature-controlled can use a lining made from our squid-inspired adaptive composite material. Now that we can make large sheets of it at a time, we have something that can benefit many aspects of our lives."

NEW THEORY OF LIFT

CHALLENGE »

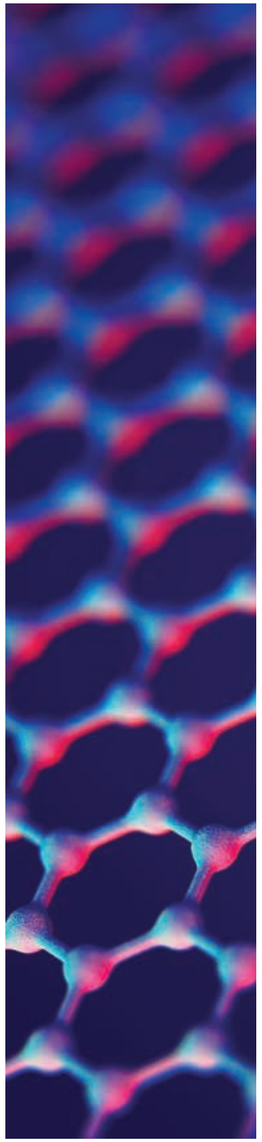
To look beyond a long-held understanding of flight and aerodynamics for new insight.

SOLUTION »

Challenging a century-old theory of flight is not an easy journey. In fact, many might consider it a pointless pursuit – especially as millions of people board airplanes without a thought about the aerodynamics that keep them in the air.

However, mechanical and aerospace engineer Haithem Taha and graduate student Cody Gonzalez followed their curiosity into what has been considered "useless" knowledge and discovered a new theory of lift, which fundamentally changes how we understand flight.

"This work solves a century-old puzzle in aerodynamics," Taha explained. "The way we solved the puzzle is not by a complex microscope, an expensive piece of equipment or an advanced computational tool/algorithm. The intellectual puzzle that lasted over a century is solved by using philosophical principles in classical mechanics that were available to the early pioneers of aviation: [Martin] Kutta, [Nikolai] Zhukovky, [Ludwig] Prandtl, [Theodore] Von Karman among others."



IMPERFECTIONS OFFER INSIGHTS

CHALLENGE »

To better understand how a material's imperfections and defects at the atomic and nano scale determine its behavior.

SOLUTION »

By engineering these defects, researchers can tune and optimize the electrical, optical, chemical and magnetic performance of materials to make better gadgets or build better technologies.

Materials science engineer William Bowman and graduate student Komal Syed conducted research demonstrating the importance of complex nanoscale materials and defects in defining the behaviors of next-generation electrical and electrochemical devices, such as fuel cells, electrolyzers and memristors (electrical components that regulate the flow of electrical current in a circuit).

The researchers explored materials created by an advanced synthesis process called exsolution, in which a starting material can be intentionally decomposed into a unique composite material containing multiple different new phases. Bowman and Syed explained that this process is gaining a lot of attention from scientists and engineers because it is a scalable approach to making a wide range of novel nanomaterials and nanocomposites with unprecedented functionality.

"In particular, the electronic conductivity of the nanocomposite was shown to increase by more than 100 times after exsolution," said Syed. "Together, these works are relevant to materials scientists and engineers motivated to design nanocomposites with superior functionality in information processing and storage."

CARDIAC DISEASE DETECTION

CHALLENGE »

To improve the diagnosis and monitoring of patients with pulmonary arterial hypertension (PAH), a rare but serious condition in which high blood pressure occurs in the arteries that carry blood from the heart to the lungs. A progressive disease, it can lead to heart failure.

SOLUTION »

Currently, to diagnose and monitor PAH, physicians conduct right heart catheterization, an invasive test to measure the pressure inside the heart and lungs. Dr. Arash Kheradvar and his biomedical engineering team have developed an alternative noninvasive imaging technology that could be used more widely to help physicians identify and follow up this condition in patients.

Kheradvar has been working over 10 years on the technology. Called echocardiographic particle image velocimetry (echo-PIV), it uses high frequency sound waves to scan the blood velocity and other characteristics of the heart.

He received an NIH five-year $3.3 million award to study the energy state of the right ventricle of patients with PAH, using echo-PIV, and to test the feasibility of this approach for monitoring disease progression and regression.

"We believe much more information regarding the hemodynamics of the right heart can be inferred from noninvasive echo-PIV, helping us understand the unidentified mechanisms of the disease," said Kheradvar, who is working with an interdisciplinary team on the project and will test the technology at Cedars Sinai Medical Center.

TURNING TRASH INTO 3D-PRINTED TREASURES

WHAT STARTED OUT AS A STUDENT PROJECT EVENTUALLY EVOLVED INTO A STARTUP CALLED CLOSED LOOP PLASTICS, A FULL-FLEDGED BUSINESS.

The 2015-17 multidisciplinary project, overseen by Jesse Colin Jackson, now associate dean of research and innovation at the UCI Claire Trevor School of the Arts, required students to produce a demo that recycled a resource. When Closed Loop Plastics co-founders Will Amos and Aldrin Lupisan created the project as UCI engineering students, they developed a system that could reuse 3D printing waste by melting old and excess prints to create the filament for 3D printers.

Today, the Closed Loop Plastics team makes and sells a recycled 3D filament inspired by their college project. But instead of using old 3D prints to make new filament, the startup uses recycled plastic waste.

Currently, at the Closed Loop Plastics facility in Long Beach, the startup takes single-use plastic cups from the San Luis Obispo landfill, grinds the waste into plastic granules, decontaminates it, dries it and then transforms it into filament. The burgeoning company then sells its filament to 3D printing retailers.

Unlike today's standard recycling processes, Closed Loop Plastics' system can recycle waste at the local level. This decentralized means of waste management allows more communities across the globe to recycle their own waste without having to use overseas recycling facilities.

"Recycling today is extremely inefficient," said Sharon To, Closed Loop Plastics co-founder, chief technology officer and UCI computer engineering alumna. "Not only is it expensive but it also generates a lot of waste in carbon emissions."

By offering a localized means of recycling plastic, the Closed Loop Plastics team hopes to create a decentralized recycling infrastructure that both reduces global pollution and eliminates the costly and wasteful process of shipping plastic waste around the world.

But before Closed Loop Plastics could open its first facility, the startup found support in UCI's faculty and entrepreneurial resources.

In 2017, the Closed Loop Plastics team won the Dean's Choice Award after presenting their renewable 3D printing recycling system at the annual Samueli School of Engineering Design Review.

"We had to find a material that was available for us to work with, because not all plastics can be made into filament," said Lupisan. "As far as materials go, polystyrene plastic [from red Solo cups] just made sense, because we were on a college campus."

Lupisan and his team then caught the attention of former ANTrepreneur Center manager and UCI social sciences adjunct faculty member David Ochi, who encouraged them to enter their project into student business competitions. In the same year, the Closed Loop Plastics team made it to the final round of the Texas Christian University Values and Ventures competition in Fort Worth, Texas. In 2018, Closed Loop Plastics received $7,500 for placing second in UCI Beall Applied Innovation's Tech Surge track of the New Venture Competition.

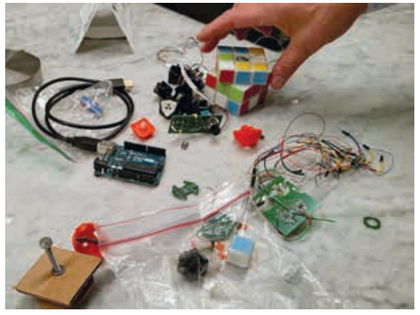
Lupisan and his team are grateful for Applied Innovation's entrepreneurial resources, such as I-Corps, Applied Innovation's market discovery program, as well as the Wayfinder incubator. The team conducted market research through the I-Corps program, made connections and improved their pitch game through Wayfinder.

"We met some really good people that helped us out," said Amos. "We learned a lot of what we didn't want to do. But we also learned how to go through that process of elimination to figure out where we did want to go."

With one facility already open in Long Beach, Closed Loop Plastics hopes to expand its locations across Southern California to further its greater goal of decentralizing the plastic recycling industry and creating a more efficient means of turning trash into 3D-printed treasure.

UCI startup Closed Loop Plastics co-founders and engineering alum, from left, Sharon To, Aldrin Lupisan and Will Amos inside their facility in Long Beach show the transformation of single-use plastics to 3D printed materials.

FUNDING ENABLES SMART CUBE OUTREACH



(top) HEYKUBE is a programmable smart cube at the center of a new outreach effort led by Quoc-Viet Dang, EECS assistant professor of teaching, and supported by a Samueli Foundation grant.

(bottom) "HEYKUBE is a perfect example of a project-based learning tool that teaches all aspects of engineering (mechanical, electrical and computer science)," said Quoc-Viet Dang, EECS assistant professor of teaching.

SOLVING THE PUZZLE OF A RUBIK'S CUBE'S MULTIPLE-COLORED SQUARES HAS FASCINATED PEOPLE FOR DECADES. Now, an upgraded version of the puzzle called HEYKUBE is at the center of a new outreach effort led by Quoc-Viet Dang, assistant professor of teaching of electrical engineering and computer science.

Made by a company called 22nd Solutions, HEYKUBE is engineered with a built-in microprocessor, accelerometer, Bluetooth, sound, sensors, low-power and gadget connectivity. Using a basic seven-step solving algorithm and flashing lights, the smart cube helps users learn to solve the puzzle. In addition, the HEYKUBE is programmable. Users can control the lights, sounds and algorithms with a Raspberry Pi and the HEYKUBE Python library.

"HEYKUBE is a perfect example of a project-based learning tool that teaches all aspects of engineering (mechanical, electrical and computer science)," Dang explained.

A tool that's also a toy makes it ideal for outreach. With a $50,000 two-year grant from the Samueli Foundation, Dang is developing a pilot engineering outreach program for middle school and high school students with HEYKUBE at the center of a series of lectures, experiments and guided activities.

The co-inventors of the smart cube, David Garrett and Mehdi Hatamian, provided UCI engineering students with an overview and training on the cube's primary features. They hope to impact middle and high school students interested in STEAM education with hundreds of free parts and cubes over the next couple of years.

"22nd Solutions was looking to expand their existing outreach efforts to middle schoolers and local Girl Scout groups, while I was looking for new opportunities for my undergraduate students to apply what they've been learning in class and inspire more students," said Dang. "Over the course of several meetings, we laid down the foundational work for our curriculum – covering everything from learning about simple circuits to connecting and reprogramming components with Python through Bluetooth – using the HEYKUBE as the centerpiece."

Dang said there's a fascination and natural engineering process with solving Rubik's cubes, then learning to do it faster than your friend, and eventually trying to show other people how to solve it. The initial draw of the HEYKUBE is that it will guide players in solving the cube through a series of lights and sounds on each cube face. From there, players start learning and playing more complicated games. "The engineering 'wow factor' is that anyone can connect to the HEYKUBE through Bluetooth and program their own features and functionality into the device," explained Dang. "This last step may be a bit daunting for those without an engineering or computer science background; this is where our curriculum development comes in – we plan to build and run this program for local schools and groups over the next couple of years. The majority of the development will also be open source and open access, allowing other schools and educators to utilize the curriculum all over the world."

"One of the most exciting things students will be able to do is to play and experiment with working prototype parts that are based on the actual prototypes the engineers who worked on the HEYKUBE project developed," he continued. "Our undergraduate researchers are developing case studies to help middle, high school and even community college students see more in-depth possibilities of programming the HEYKUBE. Everyone we've talked with about this project is excited to see what we can do with these smart cubes."

THE ROAD AHEAD

Iryna Zenyuk, associate professor of chemical and biomolecular engineering, sits down with guest panelists for a fireside chat at UCI's first eMobility event. Pictured with Zenyuk, right, are, from left, Brian Sisk, Harrison Lu and Aratz Pinter.

THE SAMUELI SCHOOL OF ENGINEERING AND ENGINEERING STUDENT COUNCIL HOSTED STUDENTS AND ALUMNI AT "AN AFTERNOON WITH TECHNOLOGY INNOVATORS." The event brought together electromobility leaders from Lime, Rivian and Super73 and UCI corporate partner Motive Energy for an industry outlook discussion, product showcase and networking mixer.

Dean Magnus Egerstedt opened the event by welcoming guests to what he called an experiment – an effort to build connections between the school of engineering and innovative companies by putting them all in the same room together.

"The technologies we're going to be discussing today are really interesting technologies in their own right, but they have implications for how we're going to live our lives in the future and what that future is going to even look like," said Egerstedt.

A highlight of the event was a fireside chat moderated by Iryna Zenyuk, associate professor of chemical and biomolecular engineering. The guest panel featured Brian Sisk, senior director of Energy Storage Systems at Rivian; Aratz Pinter, vice president of engineering at Super 73; and Harrison Lu, product development lead at Lime and a UCI mechanical engineering alumnus.

"Electrification will cause a major shift in the entire automotive supply chain," said Zenyuk. "As population GDP continues to grow, and if we continue relying on internal combustion engines, we'll see more emissions, more pollution and more congestion on the road. To counter this, the mobility industry is unleashing a dazzling array of innovative technologies for urban roads."

Zenyuk asked panelists about the challenges of charging availability and consumers demanding instant charging.

Lime's solution is their new concept of removable batteries. Conceived in 2019, the idea led to an experimental pilot conducted in Israel called "swap stations." The distributed charging stations charge removable batteries so anyone can switch out an empty battery from their vehicle for a fully-charged one, cutting out wait times entirely.

On the topic of issues facing eMobility, Pinter brought up sustainability and how Super73 is trying to not only recycle but also repurpose end-of-life batteries with their current project in Europe. "We have hundreds of batteries lying around. What do we do with all this? We need the industry behind these products to recycle those materials and turn them back into something we can use again."

When asked what skills UCI students need to enter the eMobility sector, Sisk recommended that students be multiskilled, specifically emphasizing the importance of adding data science to their engineering focus.

"Data allows us to develop faster, push changes, solve problems, monitor problems and understand our products in ways that would have never been possible 10 years ago. Data is going to absolutely change the game and everybody's going to be a data scientist, I think," said Sisk.

SUSTAINABLE BY DESIGN

TWO ENGINEERING GROUPS FROM UCI ARE AMONG THE 18 TEAMS CHOSEN TO ENTER THE ORANGE COUNTY SUSTAINABILITY DECATHLON 2023. One team is in partnership with Orange Coast Community College and the other is from the Department of Civil and Environmental Engineering.

The OCSD23 is a collegiate competition that challenges multidisciplinary teams from architecture and engineering schools to design, build and display innovative, net-zero energy buildings with sustainable materials and state-of-the-art technology. Teams have 17 months to produce their homes, which will then be showcased at the OC Fairgrounds in October of 2023. The houses will be judged in 10 categories related to sustainability, design, efficiency, comfort and communications/marketing.

A grant from the state of California is funding the competition, and each selected team receives $100,000 seed money to begin its project. Participants will then have to fundraise much more to build their dream designs. Both UCI teams will engage undergraduate and graduate students and involve industry partnerships.

DONOR GIFTS SUPPORT STUDENT SUCCESS

TWO ORANGE COUNTY INDUSTRY EXECUTIVES AND THEIR WIVES, INSPIRED TO CONTRIBUTE TO THE NEXT GENERATION OF ENGINEERS, HAVE MADE GENEROUS GIFTS TO SUPPORT STUDENTS AT THE SAMUELI SCHOOL OF ENGINEERING.

Patrick and Bonnie Fuscoe have donated $125,000 to establish an endowed scholarship for undergraduate students, and Katherine and John Tracy '87 (Ph.D.) have given $100,000 to endow an award for graduate students.

The Pat and Bonnie Fuscoe Endowed Scholarship will support an annual award for an undergraduate student majoring in civil and environmental engineering who is a junior or senior with a minimum GPA of 3.5.

Fuscoe, executive chairman and founder of Fuscoe Engineering, hopes the scholarship will ignite curiosity about his company as well as "help and enable recipients to achieve a degree in civil engineering," he said. "UCI is our 'hometown' university and the source of many of our employees. We need engineers, and you get what you give!"

The Victoria Alegria Tracy Endowed Graduate Student Award, named after John Tracy's mother, will support new/incoming graduate students. The Tracys hope that it will be granted to students from communities that are historically underrepresented in engineering.

"My wife and I have been interested in supporting underrepresented minority engineering and science students for many years," said Tracy, who retired from Boeing as chief technology officer and senior vice president of engineering, operations and technology. When earning his doctorate at UCI, he worked long hours as an engineer at Boeing while raising two children with his wife, Katherine.

"There is so much pressure for underrepresented minority students to get a job right after they graduate," said Tracy. "Having the option to continue through graduate school without stopping is something we wanted to support. I hope these scholarship funds will allow students to focus on achieving their academic potential and earn a graduate degree, thereby serving as a role model for all they come into contact with. Lack of money shouldn't be what keeps a brilliant young person from making their contribution to the world. Supporting these young people financially is a great way to invest in the future."

(left to right) Dean Magnus Egerstedt with 2022 engineering Hall of Fame inductees John Olivier '85, Elizabeth San Miguel '02 and Cecilia Richards '90

HALL OF FAME CELEBRATES ALUMNI EXCELLENCE

A WARM SPRING EVENING SET THE PERFECT SOUTHERN CALIFORNIA BACKDROP FOR THE 2022 HALL OF FAME CELEBRATION. Alumni, faculty and community friends of the Samueli School of Engineering and the Donald Bren School of Information and Computer Sciences gathered on May 13 at the Balboa Yacht Club in Corona Del Mar to induct three alumni from each school.

The alumni were selected for making a significant impact on their profession or bringing distinction to their alma mater. Fifty-eight engineering alumni and 46 ICS alumni have now been named Hall of Famers since it was established in 2015 to coincide with UCI's 50th anniversary.

Samueli School Dean Magnus Egerstedt was thrilled that this year's event could be held in person. "Thank you for being part of a supportive network that really has our current and future students' best interests at heart," he said.

This year's engineering honorees are John Olivier '85, bachelor's degree in civil engineering; Elizabeth San Miguel '02, bachelor's degree in computer engineering; and Cecilia Richards '90, doctorate in mechanical engineering.

Richards, the first woman in the UCI Department of Mechanical Engineering to earn a doctorate and the first woman on the mechanical engineering faculty at Washington State University, was thrilled to be inducted. "Everything, my whole career, really, started here," she said. "Scott Samuelsen [professor emeritus] was a great mentor. He taught me so much – how to be a good teacher, a good manager with my graduate students and how to organize a lab. I'm really honored to be part of this, and it has really meant a lot to me."

Olivier, president and CEO of civil engineering firm Fuscoe Engineering Inc., recalled fondly his years at UCI being involved in the student chapter of the American Society of Civil Engineers and playing water polo. "We participated in various civil engineering competitions across different schools. I also have great memories of being a student-athlete. It was a real challenge and made it more gratifying to make it through."

The final inductee and engineering featured speaker was San Miguel, who has worked in numerous capacities at Northrop Grumman for the past 18 years. "I'm very honored and humbled, especially when I consider the prestige of my fellow inductees," said San Miguel, who while at UCI served as Engineering Student Council's undergraduate student representative on the school's Undergraduate Studies Committee. "I still have lifelong friends, especially from ESC, who are still the closest people to me today. I wish they could be with me here, but they're all over the world."

IN MEMORIAM

MICHAEL BERNS, DISTINGUISHED PROFESSOR EMERITUS OF SURGERY AND BIOMEDICAL ENGINEERING, DIED ON AUG. 13, 2022. Known among peers as "the father of laser beams," he served on UCI's faculty for nearly half a century and was instrumental in the formation of the Department of Biomedical Engineering.

Berns co-founded, with Arnold Beckman, the Beckman Laser Institute and Medical Clinic in 1982, serving as its director until 2003. His pioneering work focused on the use of laser technology in medical and biological research. He developed tools and techniques for the surgical use of lasers, down to the level of manipulating single cells and individual chromosomes. He published extensively on the use of lasers in both biomedical research and medical treatment of illnesses, including skin disorders, vascular disease, eye problems and cancer.

Berns was a fellow of the Royal Society of Biology of Great Britain, American Association for the Advancement of Science, and American Institute for Medical and Biological Engineering. He recently received the 2022 SPIE Gold Medal from the International Society for Optics and Photonics. In 1994, he was awarded the UCI Medal – the highest award at UCI for outstanding career achievements.

"Michael artfully blended strong leadership with kindness, care and generosity toward budding scientists of all ages," said Zoran Nenadic, professor and chair of biomedical engineering. "He will be dearly missed."

DEDICATED TO TEAM SCIENCE

BOUND BY THE PANDEMIC'S SOCIAL LIMITATIONS, UCI LEADERSHIP INVITED A FEW ALUMNI AND FRIENDS FOR AN INTIMATE GATHERING TO CELEBRATE THE DEDICATION OF THE SUSAN AND HENRY SAMUELI INTERDISCIPLINARY SCIENCE AND ENGINEERING BUILDING.

A generous donation from the Orange County philanthropic family put in motion the construction of the six-story, 205,000 square-foot building, which houses researchers from the schools of engineering, physical sciences, information and computer sciences, and medicine.

During the event, Dean Magnus Egerstedt shared with guests his excitement about the interdisciplinary alliances that the building will support. "It allows us to not only talk about the value of multidisciplinary collaboration theoretically, but to go after it at a grand scale in practice. By having engineers and scientists engage with each other on a daily basis, even if that collaboration takes the form of a quick chat in the corridors or over a cup of coffee, I am convinced that this marvelous building will give rise to breakthroughs with far-reaching impact for our society, our nation and our planet."

From state-of-the-art laboratory facilities to a variety of breakout spaces designed for studying to high-tech conference spaces, the Susan and Henry Samueli Interdisciplinary Science and Engineering Building provides a home for more than three dozen engineering faculty to work with colleagues in solving some of the greatest challenges of our times. Naming opportunities within the building are available. If interested, please contact the engineering development office at (949) 824-5094.

UCI Samueli
School of Engineering

University of California, Irvine

5200 Engineering Hall
Irvine, CA 92697-2700

THE 2022 CLASS OF DIFFERENCE MAKERS

Samueli School Dean Magnus Egerstedt snaps an epic selfie, capturing a celebratory moment during the UCI Engineering Commencement Ceremony in June.