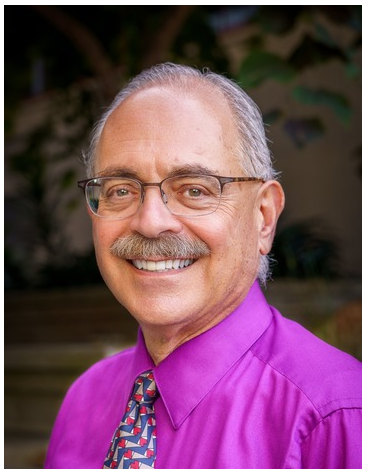
Combined skill sets drive relevance



Behind the scenes, I'm working to help finalize a new effort to bring STEM problem-solving skills to non-STEM undergraduates at UC San Diego. At the same time, we are working to create new options for STEM students to develop digital storytelling skills. Watch this space for updates in early 2023. This kind of work energizes me. I've seen again and again that when engineering and computer science students have opportunities to learn and combine disparate skill sets, they are better able to accomplish their personal goals.

Thinking about the value of combined skill sets inevitably pulls me toward well-trodden family lore. As a high school junior, I introduced my dad to just enough math to win a $20 bet with his supervisor at work. I had recently learned to compute the volume of conic sections, and I showed my dad how to use this skill to calculate the amount of sand stockpiled at a worksite and determine whether more sand was needed. My dad won the bet with his supervisor, and I got real-world positive feedback encouraging me to keep taking math seriously – despite the fact that I was in a high school where excitement for advanced math and engineering was not the norm.

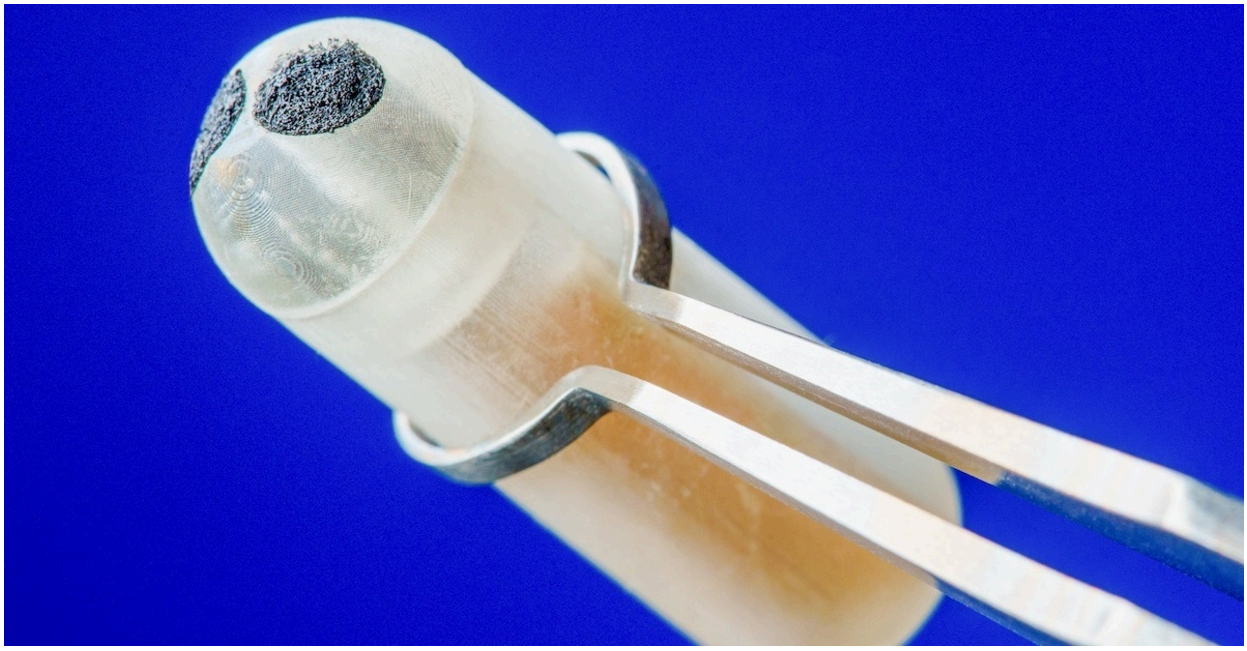
Teams with diverse skill sets will always be important, but we also need to do a better job of empowering our engineering and computer science undergraduates to acquire and combine diverse skill sets within themselves. That's one of the projects I'll be carrying into 2023. At times, I have described these skill sets as languages of engineering. Math fluency, artificial intelligence and machine learning, engineering theory, and practical problem solving are just a few examples. Digital storytelling will be another important skill undergraduates at the Jacobs School will have access to.

Combining skill sets offers students opportunities to use the engineering and computer science fundamentals to accomplish things they care about. It is a strategy for inspiring young people from absolutely all walks of life to pursue engineering and computer science degrees. A set of video introductions to our engineering and computer science majors here at the UC San Diego Jacobs School of Engineering highlights some of the ways combined skill sets can drive relevance. I hope you will share them with prospective students and families.

As we close out 2022, I am profoundly grateful for everything we have accomplished this year despite the headwinds that have come from multiple directions. I'd like to thank everyone who has stepped up in myriad ways to enable us to empower our students, faculty and staff and to strengthen and expand our physical infrastructure. Working together is how we make bold

As always, I can be reached at DeanPisano@eng.ucsd.edu.

Sincerely,
Al
Albert ("Al") P. Pisano, Dean
UC San Diego Jacobs School of Engineering



Self-powered ingestible sensor opens new avenues for gut research

Engineers at UC San Diego developed a battery-free, pill-shaped ingestible biosensing system designed to provide continuous monitoring in the intestinal environment. It gives scientists the ability to monitor gut metabolites in real time, which wasn't possible before. This feat of technological integration could unlock new understanding of intestinal metabolite composition, which has significant impacts on overall human health. This research was led by electrical engineers and nanoengineers in the UC San Diego Center for Wearable Sensors. Read more in the San Diego Union-Tribune.

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Experimenting in space to help prevent mudslides here on Earth

An experiment designed by UC San Diego structural engineering Professor Ingrid Tomac was launched to the International Space Station to improve our ability to prevent mudslides after a fire here on Earth. By observing how different-sized sand and soil particles behave in microgravity, researchers can better understand gravity's role in mudflows back on Earth. Data will be used to study what Tomac calls “the missing link” between known materials that form mudflows and the poorly understood fluid forces of mudslides. This investigation could help researchers create better models to predict mudflow.

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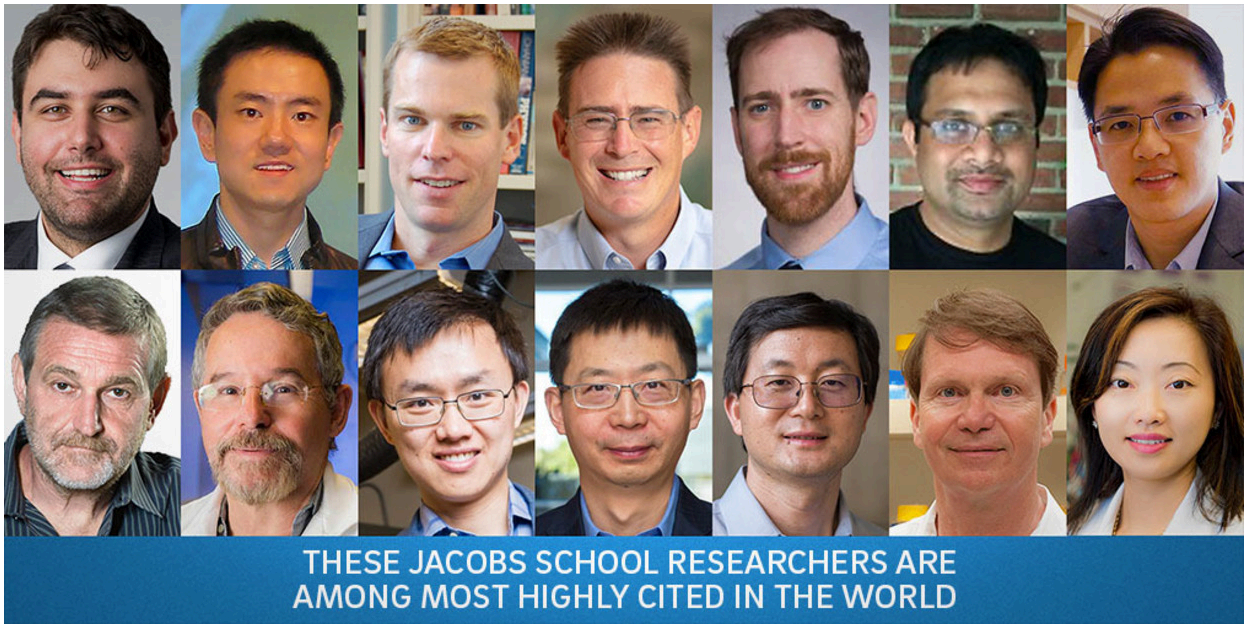

Sixteen Jacobs School researchers among the world's most influential

A remarkable 16 faculty and research scientists at the UC San Diego Jacobs School of

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2022 Clarivate listing of Most Highly Cited Researchers in the World. The list highlights individuals at universities, research institutes and commercial organizations who have demonstrated a disproportionate level of significant and broad influence in their field of research. UC San Diego ranked 8th globally for most influential researchers.

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Algorithm predicts properties of new materials instantaneously

Nanoengineers at UC San Diego have developed an AI algorithm that predicts the structure and dynamic properties of any material—whether existing or new—almost instantaneously. The algorithm was used to develop a database of more than 31 million yet-to-be-synthesized materials with properties predicted by machine learning algorithms. This database facilitates the discovery of new materials with exceptional properties, for example materials to develop safer and more energy-dense electrodes and electrolytes for rechargeable lithium-ion batteries.

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Shake table Tallwood project nears completion

The tallest building ever to be tested on an earthquake simulator topped off at 10 stories high at UC San Diego's shake table when construction crews and a giant crane flew the last wood panel to the top of the structure on Dec. 6. The building is made from cross-laminated timber, or CLT, a material that allows for faster construction and is also sustainable. The goal of the Tallwood project, funded by the National Science Foundation, is to determine how well CLT mid- to high-rise buildings would fare during an earthquake. The Tallwood project is the first large-scale building to be tested on UC San Diego's shake table, one of the two largest in the world, since the table underwent a major $16.9 million upgrade funded by the NSF. Learn more in recent San Diego Union-Tribune coverage.

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Computer science Professor Tajana Simunic Rosing has won the 2022 University Research Award from the Semiconductor Industry Association and the Semiconductor Research Corporation for her incredible contributions to the semiconductor industry. Rosing is a leading researcher in accelerating big data in hardware using both novel machine learning techniques, such as hyperdimensional computing, and in- and near-memory and storage processing. Her work has had practical applications in optimizing data analysis in the cloud, at the edge and in the Internet of Things, resulting in systems that are significantly more energy efficient. Rosing holds the John J. and Susan M. Fratamico Endowed Chair at UC San Diego.

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Structural engineer honored with Revelle Medal

Gil Hegemier, a Distinguished Professor Emeritus in the Department of Structural Engineering, received the 2022 UC San Diego Revelle Medal, which recognizes current and former faculty members for sustained, distinguished and extraordinary service to the university. Hegemier's research includes critical contributions to innovative fiber-reinforced composite materials that are currently in use to make bridges and buildings safer during and after earthquakes and blasts. He also led the creation of a one-of-a-kind blast simulator on campus. His leadership and vision were critical for establishing the campus' world-leading Powell Laboratories, where engineers develop and test new seismic safety technologies.

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Bioengineer receives new award from Chan Zuckerberg Initiative

UC San Diego bioengineering professor Brian Aguado is one of 25 recipients of the Chan Zuckerberg Initiative's new Science Diversity Leadership program. The program, run in collaboration with The National Academies of Sciences, Engineering, and Medicine, supports the efforts of outstanding early- to mid-career researchers with a track record of promoting equity, diversity and inclusion in science through outreach, mentoring, teaching and leadership. Aguado studies sex-specific differences in disease — starting with cardiovascular disease — from the molecular scale all the way up to the organism level, and co-founded the LatinXinBME community to support diversity within the scientific community.

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