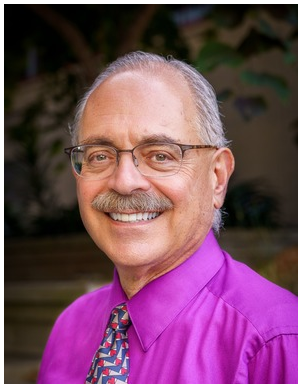
UC San Diego
JACOBS SCHOOL OF ENGINEERING

NEWS
February 2025

Virtuous Research Cycles



In engineering and computer science, there are virtuous cycles that move between **fundamental** and **applied** research. I've talked about these cycles before, but it bears repeating. Fundamental research often prompts highly relevant applied research questions which, when pursued, uncover new lines of fundamental research. These are the virtuous cycles of technology research. One type strengthens the other. Their interactions advance engineering and computer science in ways that improve lives and give the country's industrial sectors competitive advantages. In this context, I have also seen generation after generation of students get inspired by relevant research challenges at the cutting edge and go on to exciting and satisfying careers.

To make the greatest positive impact on society, these research cycles require deep partnerships across universities, government and industry. Historically, the Jacobs School of Engineering has had a strong mix of government and industry funding, which has empowered us to be relevant in both research and workforce development.

This year, for the first time, the Jacobs School reported almost equal amounts of industry and government funding across our $316M research enterprise. This near parity in research expenditures (47% industry and private support / 49% government support) is a result of our industry funding growing faster than our government funding – though crucially – both sources of research funding rose last year. I welcome this development because it affirms one of our long standing mantras: "the great engineering schools of the next decade will collaborate their way to relevance". And via our industry relevance, we have built that industry collaboration.

There is a nuance here that I want to clarify. Our ability to secure industry funding is so often driven by our incredible research ecosystem which exists thanks to the decades of sustained government-funded research support writ large. This includes funding for specific research projects and also funding for research infrastructure, for graduate students and postdocs, and for so many other critical aspects of the academic research enterprise. Put another way, our ability to engage in relevant research and workforce development with our industry partners across the country is intrinsically linked to the strength of our overall research enterprise.

As an engineering Dean, I am keenly aware of the ever-present need to articulate the real-world positive impacts that our fundamental and applied research ecosystem provides to the general public and to our country's private and public sectors. I make the connections as often as I can.

There is often a lag time, however, between the research, educational and entrepreneurship efforts within engineering schools and the tangible positive impacts for the general public. This is for a variety of reasons, and perhaps I'll dive into some of them in the future. But for today, I'll just say that this time lag makes it even more important for us to articulate our positive impacts.

Here at the Jacobs School, I do my best to tell these stories, but I'm well aware that there are many positive-impact stories that I'm not aware of. To our Jacobs School community, I would be grateful if you would share with me details of these kinds of positive outcomes from our Jacobs School research, education and entrepreneurship enterprise. DeanPisano@ucsd.edu is a good address.

I can't promise I'll reply to every email right away, but I will look at every response. My team and I will use any insights we glean to strengthen our efforts to articulate the many ways that the Jacobs School directly and indirectly improves human lives, strengthens the industrial foundations of this country, and enhances our national competitiveness. Together we make **bold** possible.

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

Sincerely,

Al

Albert ("Al") P. Pisano
Dean, UC San Diego Jacobs School of Engineering
Special Adviser to the Chancellor for Campus Strategic Initiatives

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$3M Gift Celebrates Entrepreneurship at the Jacobs School

The gift from Aiiso Yufeng Li (Jeff) and his wife DongDong Li (Doreen) celebrates the Jacobs School's ongoing efforts to empower researchers to translate their innovations to the marketplace. In recognition of the donation to the Jacobs School, a physical space on the first floor of UC San Diego's Franklin Antonio Hall that is currently programmed to support entrepreneurs has been named the Aiiso AL21 Space. Thank you, Jeff and Doreen!

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This Program Accelerates Early-Career Faculty Research

Six cross-disciplinary teams from the Jacobs School have been awarded funding through a unique program designed to help early-career faculty develop new research directions to the point that they are competitive for external funding. This is how it works: two graduate students from two faculty labs are funded for two quarters in order to get a new cross-disciplinary research program up and running. This year, all six teams are already making use of artificial intelligence and machine learning, or plan to as their projects develop. Thank you to Irwin Jacobs and his late wife, Joan, whose generosity and vision make this unique program possible!

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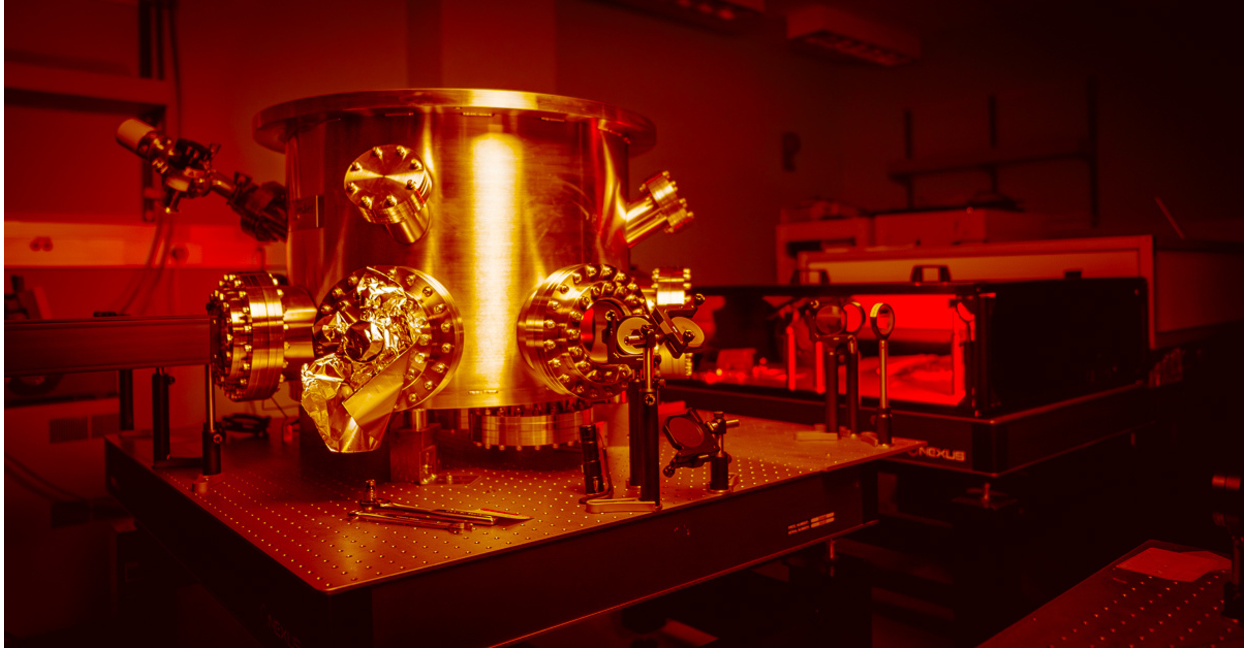

We Are Part of New Fusion Engineering Project Led by General Atomics

Led by General Atomics and funded by the U.S. Department of Energy, the Target Injector Nexus for Experimental Development (TINEX) project aims to overcome critical obstacles in developing and scaling up inertial fusion power plants. At UC San Diego, the research will be led by mechanical engineering professor Farhat Beg, co-director of the Jacobs School's Fusion Engineering Institute, in collaboration with the San Diego Supercomputer Center. The work will focus on the fuel targets and high-powered lasers necessary to achieve fusion in a power plant.

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Three New NAE Members

Three members of our Jacobs School community have been elected to the National Academy of Engineering (NAE). Congratulations to Robert W. Heath Jr., Richard Sandstrom and Doug Cameron! Electrical engineering professor Robert W. Heath Jr. is being recognized by the NAE for contributions to the theory and practice of wireless communication. Alumnus and friend Richard Sandstrom ’72, PhD ’79 is being recognized for contributions and leadership in the development of commercial quality microlithography EUV lasers, enabling nanoscale chip manufacturing. Biomanufacturing advisor Doug Cameron is being recognized for driving the chimerical development of a synthetic, biology-based, environmentally friendly bioprocess for biofuels, food security, and industrial chemicals. Congratulations!

More Info

Fusion Engineering in California

A recent workshop at UC San Diego was organized by the University of California Office of the President, with support from our campus, including the Jacobs School’s Fusion Engineering Institute. Discussions focused on how California and the nation can emerge as the global leader in fusion engineering. Pulling together the talents of engineers from academia, national laboratories, and industry emerged as a top priority. The event included talks by researchers at UC San Diego, UCLA, UC Berkeley, UC Davis and UC Irvine, as well as the Lawrence Livermore, Lawrence Berkeley and Los Alamos national laboratories. The industry panel consisted of General Atomics, Pacific Fusion and Blue Laser Fusion.

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Bioengineer Awarded Sony Women in Tech Award with Nature

Bioengineering professor Kiana Aran is one of the three researchers in the world to receive the Sony Women in Tech Award with Nature, which was launched this year. She was recognized for her work on CRISPR technology. Aran and her team found a serious quality control gap for the accuracy and efficiency of CRISPR-based therapies. They decided to pivot to CRISPR quality control, which allowed them to analyze the real-time activity of CRISPR reagents and optimize gene-editing workflows. Aran holds appointments in our Shu Chien-Gene Lay Department of Bioengineering and UC San Diego School of Medicine.

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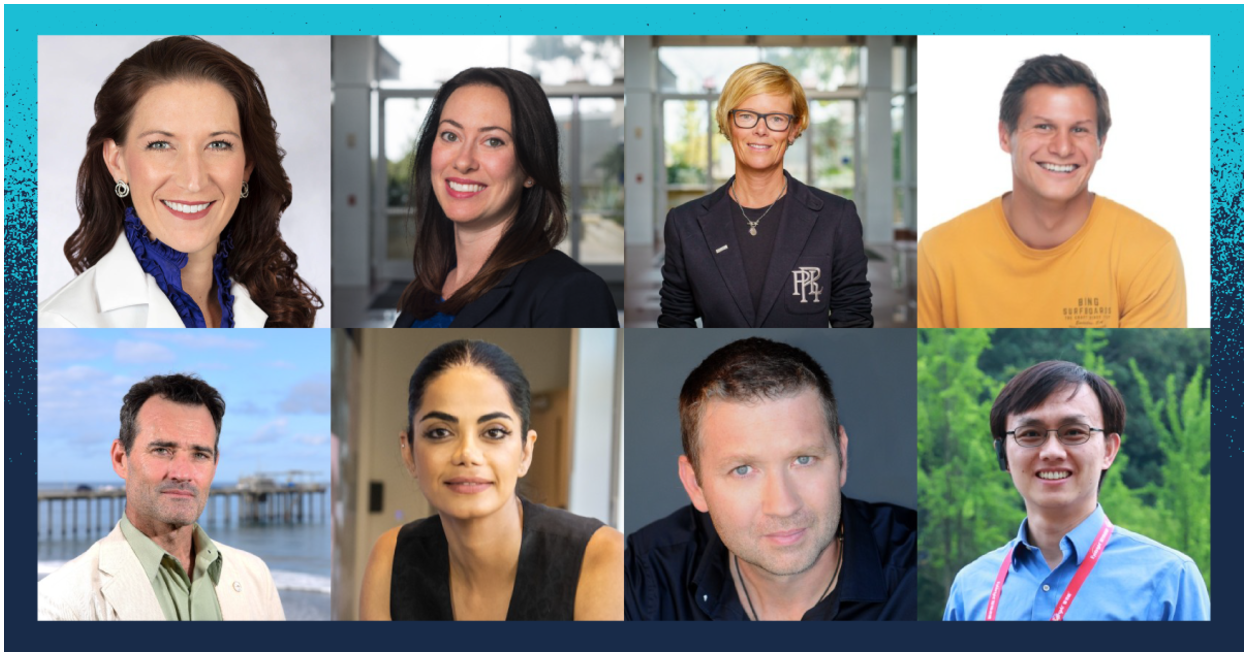

Bringing Innovations to Market Faster

From early cancer detection, to using plants to deliver genes virally, to wearable ultrasound patches for fetal monitoring and better stroke care, researchers at the Jacobs School received a boost for their projects from UC San Diego's Accelerating Innovations to Market program. The Jacobs School awarded projects were: A Novel Small Molecule Therapy to Differentiate Cancer Stem Cells; Plant Viral Gene Delivery; Nature-Inspired Materials for Coastal Protection and Climate Change Mitigation; Accelerating Early Cancer Detection through Advanced Multiomics Technology; Fetal Monitoring Using a Wearable Ultrasound Patch with Autonomous Vessel Tracking; HoloStroke-CTA: Revolutionizing Stroke Care with 3D Vascular Visualization in XR; and Low-cost Infant Suckling Diagnostics to Improve Breastfeeding Outcomes.

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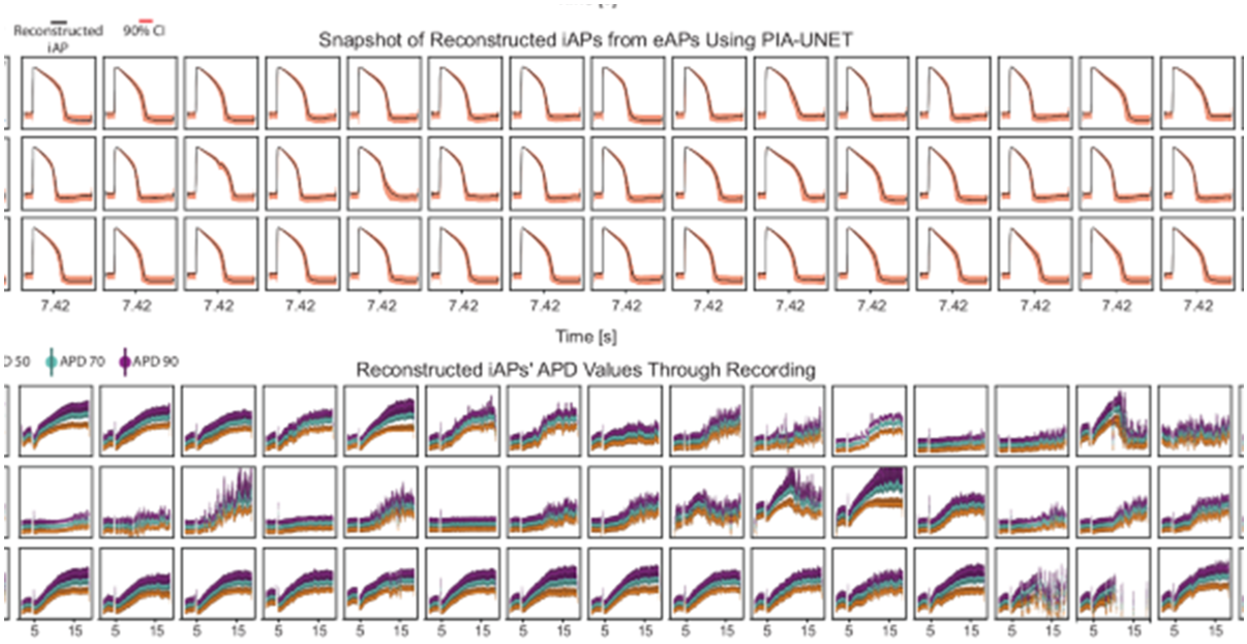

Monitoring Heart Cells from the Outside

Researchers have found a way to peer inside cells without actually needing to go inside. This new method, developed by UC San Diego and Stanford University engineers, relies on recording electrical signals from outside the cells and using AI to reconstruct the signals within the cells with impressive accuracy. The electrical signals inside heart muscle cells provide insights not only into how the heart functions, but also how its cells communicate and how they respond to drugs. Professor Zeinab Jahed in our Aiiso Yufeng Li Family Department of Chemical and Nano Engineering is one of the study's senior authors.

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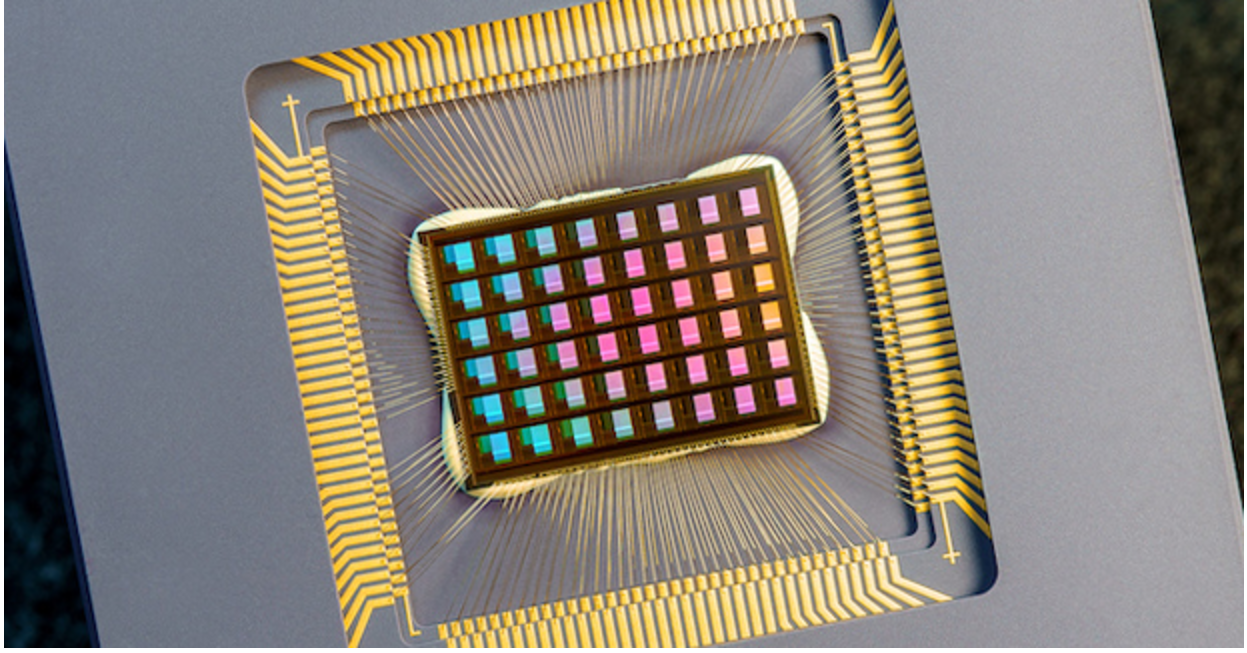

Neuromorphic Computing at Scale

Neuromorphic computing needs to scale up if it is to effectively compete with current computing methods, according to an article in *Nature* from a team of researchers, including Gert Cauwenberghs, from our Shu Chien-Gene Lay Department of Bioengineering. Building new architectures and open frameworks that can be deployed in commercial applications and working together with industry is key, the researchers write.

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