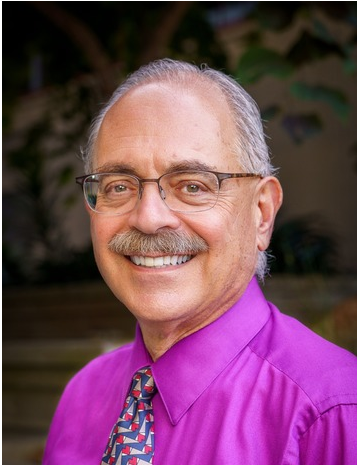


Future, Present and Past



As an engineering dean, I am future focused; AND I am well aware that our future plans and current successes here at the Jacobs School of Engineering are built on rock-solid foundations from the past.

Last year, for instance, we put up \$256M in research expenditures. This is up nearly five percent from the year prior – and higher than it has ever been. You don't just put up these kinds of research funding numbers overnight, or even over a decade. So where did the research strengths reflected in this number come from?

UC San Diego put down its deep roots in the 1960s thanks to incredible faculty who took a chance on a new vision for a university. Their efforts have translated into the forward-looking powerhouse of a university that we have today. One of our early engineering leaders who has been on my mind a lot lately is Professor [M. Lea Rudee](#) – he served as the first dean of engineering here at UC San Diego. Lea passed away recently. He did so much important work to bring UC San Diego's incredible strengths in applied mechanics, engineering sciences, electrical engineering and computer sciences together under the umbrella of a new Division of Engineering. And he did it without losing sight of the humanity of everyone involved.

Lea, thank you for being an incredible role model and inspiration to so many. We will miss you, and we will continue the important work of building on your legacy. You have inspired us in our pursuit of engineering and computer science for the public good. [The grand prize at our Research Expo](#) is in Lea's name, and soon we hope to honor him with the founding of a Lea Rudee endowed chair.

Over the years, I have learned the art of aligning the future, present and past to make the boldest positive impacts possible. I felt the alignment of our Jacobs School's future, present and past particularly strongly while we hosted the ASEE Engineering Deans Institute here in San Diego this month. The positive feedback we received for our efforts to maximize the circulation of people and ideas in Franklin Antonio Hall – and for the people and ideas themselves – inspires me.

I also felt the alignment of future, present and past all across UC San Diego particularly strongly during Chancellor Pradeep K. Khosla's keynote at the ASEE Deans Institute banquet. It is gratifying to be on a campus where the campus-wide and engineering leadership are working together on the future of education and cross-disciplinary

research. And in fact, part of my role as Special Adviser is to accelerate this cross-campus work.

Chancellor Khosla, for example, talked about the importance of working to cultivate the analytical and problem-solving skills in our future leaders – regardless of their majors. To make sense of our fast-changing world, students from all majors and disciplines will need new tools and new opportunities to deepen their ability to bring problem-solving, quantitative reasoning and other analytical skills to the critical challenges facing society that are relevant to their areas of study.

It is gratifying to be on a campus where future, present and past align to prepare all our students for our innovation-driven world. I am working hard to nurture, strengthen and expand the communities inside and outside the Jacobs School that are inspired and compelled to come together to invent a better future – with deep understanding of the past and a firm grounding in the present.

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



Injectable Hydrogel Mitigates Damage to the Right Ventricle of the Heart

For the first time, an injectable biomaterial therapy has been evaluated to mitigate right ventricular heart failure. The hydrogel is intended for children born with a condition that leaves them with an underdeveloped, nonfunctional left ventricle, and will be tested in a clinical trial in pediatric patients in the coming months. The study, by a research team including bioengineers from UC San Diego, Georgia Tech and Emory University, was conducted in rodents. In 2019, this same

hydrogel was shown to be safe in humans through an FDA-approved Phase 1 trial in people who suffered a heart attack. As a result of the new preclinical study, the FDA approved an investigational new drug application to start a clinical trial with the hydrogel in pediatric patients.

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Computational Tools Fuel Reconstruction of New Bird Family Tree

An international team of scientists has built the largest and most detailed bird family tree to date—an intricate chart delineating 93 million years of evolutionary relationships between 363 bird species. The advance was made possible in large part thanks to cutting-edge computational methods developed by electrical engineers at UC San Diego, combined with the university’s state-of-the-art supercomputing resources at the San Diego Supercomputer Center. These technologies have enabled researchers to analyze vast amounts of genomic data with high accuracy and speed, laying the groundwork for the construction of the most comprehensive bird family tree ever assembled. Read news coverage of the paired *Nature* and *PNAS* papers in [Science](#) and in [Popular Science](#).

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Faculty Earn MURI Awards for Digital Twin, Neural Compute, Multi-agent System Tech

Jacobs School of Engineering faculty are part of three research teams selected to receive Multidisciplinary University Research Initiative (MURI) awards from the US Department of Defense. Since its inception in 1985, the MURI program has been instrumental in advancing crucial technologies for military and civilian purposes. Faculty from our Departments of Mechanical and Aerospace Engineering and Computer Science and Engineering are part of research teams that will advance digital twin, multi-agent systems and neural wave-based computational technologies.

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Solid-state Lithium-sulfur Batteries with a Healable Cathode

Researchers have moved one step closer to making solid-state batteries from lithium and sulfur a practical reality. A team led by nanoengineers at our Sustainable Power and Energy Center developed a new cathode material for solid-state lithium-sulfur batteries that is electrically conductive and structurally healable—features that overcome the limitations of these batteries’ current cathodes. In *Nature*, the researchers describe how inserting iodine molecules into the crystalline sulfur structure drastically increased the cathode material’s electrical conductivity by 11 orders of magnitude, making it 100 billion times more conductive than crystals made of sulfur alone.

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Working Towards Toxic-Free AI

Computer scientists at UC San Diego have found a better method to detect and prevent toxic prompts cloaked in benign language in large language models. Unlike existing work, which relies on training data from social media examples, the new benchmark, named ToxicChat, is based on examples gathered from real-world interactions between users and an AI-powered chatbot. ToxicChat is able to weed out queries that use seemingly harmless language but are actually harmful, queries which would pass muster with most current models. ToxicChat is now part of the tools that Meta uses to evaluate Llama Guard, a safeguard model geared towards Human-AI conversation use cases. ToxicChat has been downloaded more than 12,000 times since it became available on Huggingface.

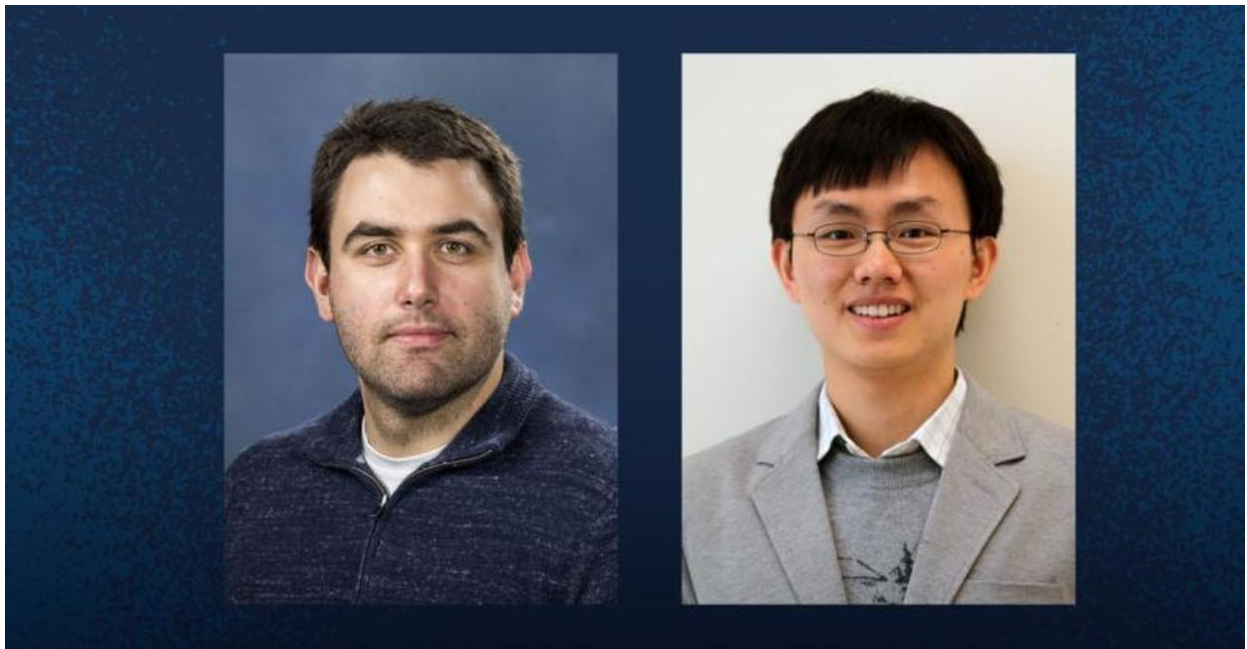
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Using AI to Build Better Wireless Networks

Tara Javidi, Jacobs Family Scholar and professor of electrical and computer engineering at UC San Diego, is using principles from AI to build better, faster and more ubiquitous wireless communication networks. Javidi explains more about how she applies AI to wireless communications, robotics, navigation and monitoring use cases in this University of California TV episode. Bonus: She's interviewed by Jacobs School alumna Saura Naderi, who is now the Outreach Director at the Halicioğlu Data Science Institute at UC San Diego.

[Watch the Video](#)



Engineers Inducted Into AIMBE College of Fellows

Bioengineering professor Ludmil Alexandrov and nanoengineering professor Sheng Xu were among the 162 new Fellows inducted into the American Institute for Medical and Biological

Engineering (AIMBE). Election to the AIMBE College of Fellows is among the highest professional distinctions accorded to medical and biological engineers, comprised of the top two percent of engineers in these fields. Alexandrov was recognized for his work to discover new insights into how human cancers develop and grow. Xu was recognized for his work to build soft, stretchable ultrasound sensors that can be comfortably worn on the skin to track physiological signals deep inside the body.

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Chemical Engineering Alumna Becomes Newest NASA Astronaut

Deniz Burnham, who earned a bachelor's degree in chemical engineering at the Jacobs School of Engineering, became one of NASA's newest astronauts on March 5. Burnham, who is part of NASA's 23rd class of astronauts, graduated from two years of basic training and earned her wings, meaning she is now able to serve on missions to the moon, the International Space Station, and even Mars. She joins a storied group of three other UC San Diego alumni—all women—to complete training and serve in NASA's astronaut corps. The University of California has now sent more women to space than any other university on the planet.

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