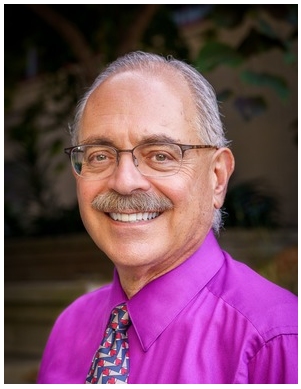
UC San Diego
JACOBS SCHOOL OF ENGINEERING

NEWS

May 2025

Future-Proofing the Innovation Economy



Engineering schools are critical for future-proofing the innovation economy of California and the nation – and we do it one student at a time. In this way, engineering and computer science schools are unusual – even magical – places of personal and technological transformation with outsized positive impact.

People come to engineering schools to be transformed – to BECOME engineers. Students arrive with a strong desire to do constructive things in the physical world. They want to have positive impacts on others. Computer science education is equally transformative – our digital worlds are, indeed, ever more tightly bound to the physical world.

Federal funding for engineering and computer science research is critical for future-proofing our innovation economy over the long term. I am deeply concerned about the current federal research funding uncertainties. This month, I am looking at this issue in terms of our students. When they graduate, they become the workforce that future-proofs our innovation economy. This cycle repeats year after year, with each graduating class.

Perhaps you hold concerns about federal funding cuts and about our ability to continue to future-proof the innovation economy. If you do, now is the time to share those concerns – and for whatever ways you can support us, I will be grateful.

Together as a campus community, we are working hard to communicate the importance of federal funding through the UC San Diego Behind Every Breakthrough initiative. More broadly, actionable UC Advocacy efforts are outlined here.

Read my full Dean's column here.

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

Early Onset Colorectal Cancer Tied to Gut Bacteria

Once considered a disease of older adults, colorectal cancer is now on the rise among young people in at least 27 countries. Its incidence in adults under 50 has roughly doubled every decade for the past 20 years. Now researchers may know why. An international study led by UC San Diego bioengineers shows that early childhood exposure to a bacterial toxin in the gut called colibactin leaves behind specific patterns of DNA mutations that could be a driving force behind early-onset colorectal cancer. This study, published in *Nature*, is the first to demonstrate a substantial enrichment of colibactin-related mutations specifically in early-onset cases. Read coverage in NPR, NBC News, and The Economist. Watch the related Behind Every Breakthrough video.

Read More

AI Tutor Helps Students Learn and Won't Give Away Answers

Researchers at UC San Diego developed an AI tutor designed to give students an alternative to off-the-shelf AI tools, so that students not only get help but actually learn course-relevant information at the same time. The AI tutor is trained on materials—notes, podcasts and more—for the specific courses where it is deployed, and is trained to never give students the answers to a problem. Instead, the tutor asks questions that lead students to the right answer and encourages them when they do get it right. Now the UC San Diego team has joined forces with researchers at SDSU and Palomar College to bring the AI tutor to higher education institutions throughout San Diego County for further testing and improvements. That effort is funded by a $1.5M grant from the State of California.

Read More

Swallow One Capsule: Different Drugs Released at Different Times

Managing complex medication schedules could soon become as simple as taking a single capsule each day. Engineers at UC San Diego have developed a capsule that can be packed with multiple medications and can release different drugs at designated times throughout the day. The technology could help improve medication adherence and potentially reduce the risk of missed doses or accidental overdoses.

Read More

Could an IV Therapy Prevent Heart Failure after a Heart Attack?

Bioengineers have developed a new therapy that can be injected intravenously right after a heart attack to promote healing and prevent heart failure. The therapy both prompts the immune system to encourage tissue repair and promotes survival of heart muscle cells after a heart attack. Researchers tested the therapy in rats and showed that it is effective up to five weeks after injection.

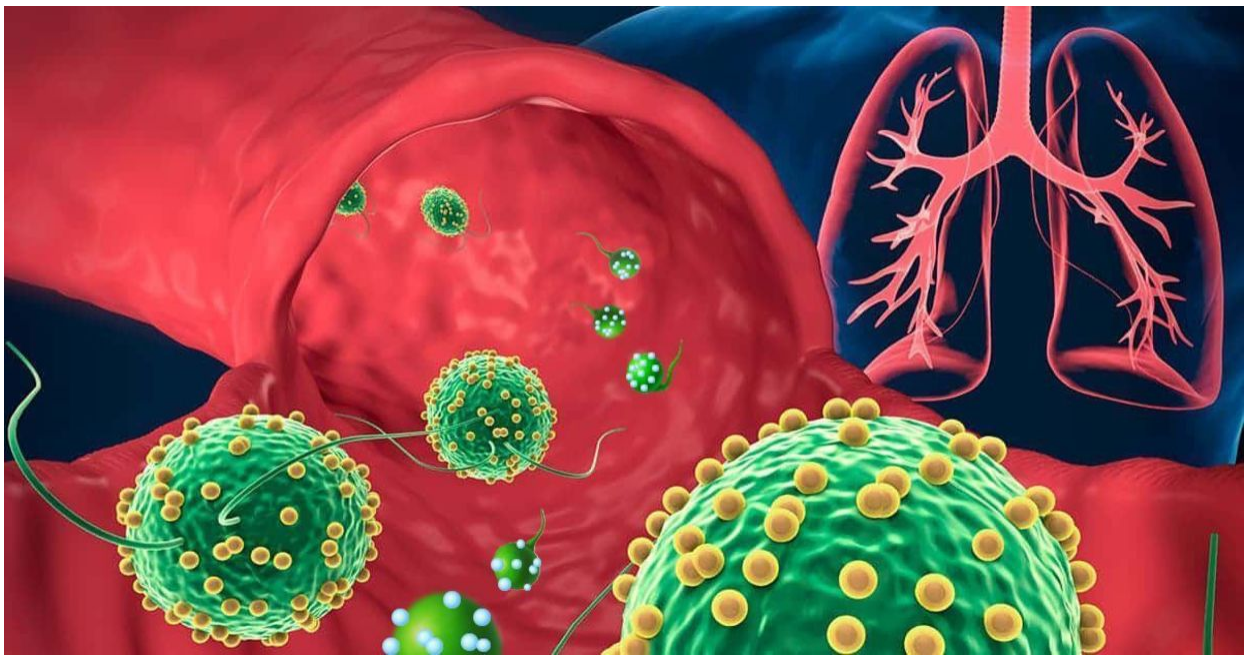
Read More

Compressed Air Curiosity Leads to Battery Breakthrough

UC San Diego materials science and engineering alumnus Cyrus Rustomji reflects on how curiosity about a can of compressed air, along with support across campus and the federal research funding landscape, fueled an innovation in battery technology. The result: South 8

Technologies, a battery company that is solving tough challenges for U.S. private and public sectors. South 8's claim to fame is a patented Liquefied Gas Electrolyte technology that enables their batteries to have a world-record, wide-temperature range of -60 degrees Celsius to +60 degrees Celsius.

Read More



Microrobots Made of Algae Deliver Medicine to the Lungs

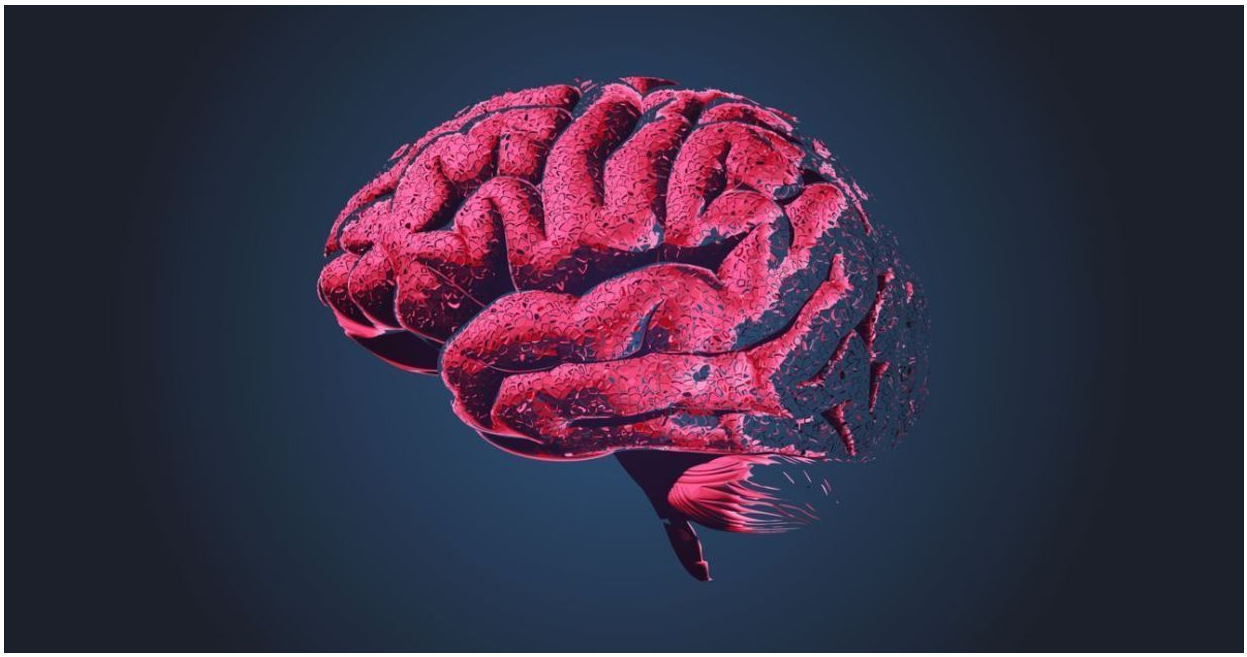
Our lungs are fairly susceptible to diseases—unlike most other organs, the lungs are in direct contact with the outside world when we breathe. Yet getting therapeutics to where they're needed in the lungs can feel like breaking into a vault. Chemical and nano engineers at UC San Diego discovered that breathable algae offer a new path. Microrobots made of algae are the new medicine delivery drivers: they are tiny enough to float in inhalable liquid particles and travel deep inside the lungs of mice, where they drop off drugs to fight pneumonia. Years of research with federal and industry funding are converging, and clinical trials for these microrobots are getting closer.

Read More

Better Grid Connectivity in Western U.S. Could Save Billions

A new study led by mechanical engineers at UC San Diego offers a first-of-its-kind look at how deeper coordination among Western U.S. states could lower the cost of decarbonizing the electric grid—and speed up the clean energy transition. Published in *Nature Communications*, the paper models how 11 Western states might build out clean energy infrastructure between now and 2050 under different climate policy scenarios and levels of power sector coordination.

Read More



AI Helps Unravel a Cause of Alzheimer's Disease

A new study found that a gene recently recognized as a biomarker for Alzheimer's disease is actually a cause of it, due to its previously unknown secondary function. Bioengineers at UC San

Diego used AI to help both unravel this mystery of Alzheimer's disease and discover a potential treatment that blocks the gene's hidden role.

Read More

Self-assembling Molecules Take the Spotlight at Research Expo

Materials science and engineering Ph.D. student Liya Bi won the grand prize at the 43rd annual Jacobs School of Engineering Research Expo for his work studying how molecules organize themselves into highly ordered patterns on metal surfaces—patterns that may one day influence the development of advanced materials and transform the way microchips are manufactured. Research Expo is unique in challenging students to present not only the technical rigor of their research, but to also clearly explain its impact and significance to a non-technical audience. Thank you to premier sponsors Leidos and Viasat; partner sponsor Qualcomm; contributor sponsor UC San Diego Extended Studies; and to all Jacobs School Corporate Affiliates Program (CAP) companies.

Read More

Newsletter editor, Daniel Kane: dbkane@ucsd.edu