

Experience provides context, magic doesn't

While I was in high school, I worked on cars. I had a working knowledge of carburetors well before I took my first engineering course in college. So when my professor lectured on the basics of fluid flow, I was able to think about carburetors and why they work the way they do. And because I had real experiences on which I could ground my education, I was able to extract a lot of value from that fluid dynamics course.

Technology in that era was often simple enough that a patient eye and a curious mind could discern the basics of its operation. If you were motivated and you paid attention, you could get pretty far on your own. Through careful observation and tinkering, I was able to construct context. That context helped me absorb the math and engineering I would be introduced to in high school and college.

As a sophomore in college, I was lucky to get the one undergraduate student job in the engineering machine shop. That job gave me opportunities to shift from being an observer to becoming a creator of form and function in technology. I was now designing and making the very things that I would subsequently test in order to deeply understand the way they work.

Today, in our everyday lives, we are surrounded by incredible feats of engineering and computer science. These feats, and the technologies behind them, are more and more invisible to the untrained eye. What Arthur C. Clarke said about "sufficiently advanced technology being indistinguishable from magic" feels increasingly true. Unfortunately, those incredible feats of engineering and computer science, now indistinguishable from magic, are unable to provide sufficient context for students to absorb fundamental math and engineering concepts. And so, for the benefit of individual lives and careers, and for the long-term health of our innovation-driven economy, we need to offer engineering and computer science students more opportunities to experience the math and engineering behind today's incredible technological feats.

This is why I'm so grateful for the relevance-obsessed engineering and computer science educators out there. This is also why experiential education, and school-wide efforts such as our IDEA Engineering Student Center and EnVision Arts and Engineering Maker Studio here at the UC San Diego Jacobs School of Engineering are so real to me. Their value is not a theoretical or bureaucratic exercise. They represent some of our concrete efforts to encourage students to connect personally and emotionally to the coursework.

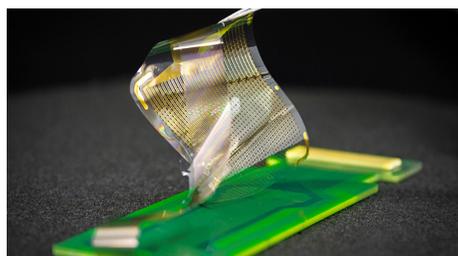
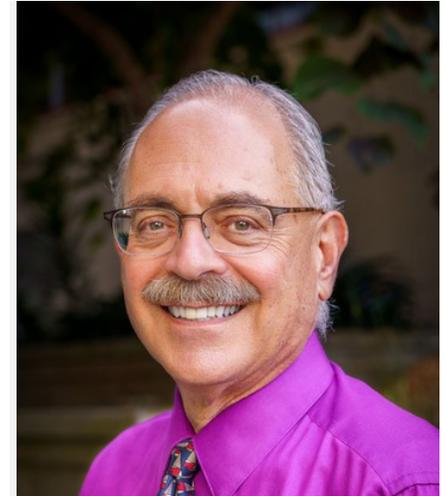
I was never a student who absorbed theoretical material immediately or came to deep understandings without practice. I respect, laud and honor the people who do. But that's not me, and I'm not alone. I strongly feel that as a community, it is our joint responsibility to ensure that every incoming engineering and computer science college student has opportunities to connect personally with the math and engineering and computing theory and fundamentals that will fuel their careers. Despite economic pressures, here at the Jacobs School of Engineering, we continue to strengthen these efforts.

I'm pleased to share the 2020-2021 Annual Report of our IDEA Engineering Student Center. This Center engages with the entire Jacobs School of Engineering, both in terms of building community, and in terms of empowering and inspiring ALL of our students to connect personally with the theoretical coursework that will fuel their careers, unlock social mobility, and make engineering and computer science for the public good a concrete reality.

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

-Albert P. Pisano, Dean

UC San Diego Jacobs School of Engineering



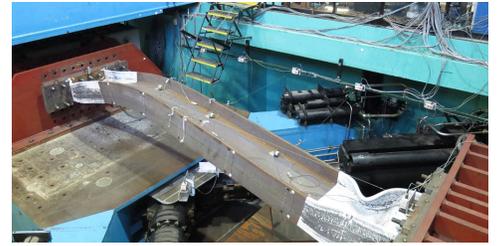
Reading human brains in record-breaking resolution

New sensor grids can record human brain signals with 100x higher resolution than today's clinical tools. These electrocorticography sensors could improve neurosurgeons' ability to remove brain tumors safely, and surgically treat drug-resistant epilepsy. The high-resolution brain sensor grids are thin, flexible, plastic-like films densely packed with thousands of platinum nano-rod sensors. They are placed directly on the surface of the human brain during surgery. Engineers, neurosurgeons and medical researchers from UC San Diego, Massachusetts General Hospital, and Oregon Health & Science University collaborated on the NIH and NSF-funded research.

Learn more: bit.ly/BrainSensorsScienceTM

Earthquake resilience through full-scale seismic testing

Using a UC San Diego earthquake simulator, engineers identified potential vulnerabilities in a type of steel column that has become prevalent in buildings on the West Coast. The engineering researchers from the National Institute of Standards and Technology (NIST) and UC San Diego identified these vulnerabilities after putting full-sized beams through actual shake tests that simulate earthquakes. Based on the results, the researchers devised new limits for column slenderness. Read the NIST report and a paper published in the Journal of Structural Engineering. The column slenderness limits have been adopted into the draft American Institute of Steel Construction standards for earthquake-resistant steel buildings.



Learn more: bit.ly/SteelColumnStandard

Why Alzheimer's drugs fail

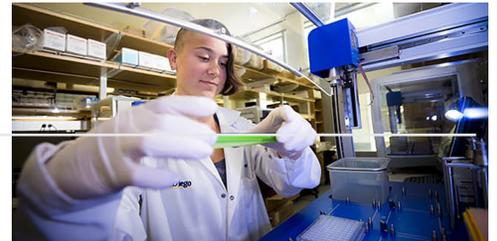


Researchers have developed a new method to screen drugs for treating Alzheimer's disease. Their work sheds light on why Alzheimer's drugs so far have been ineffective at curing or reversing the disease, and identifies new targets for drug development. "What we are seeing is that fixing amyloid plaque formation does not reverse the disease in any way. It turns out that [plaque formation] is way downstream, so it's too late. Once neurons de-differentiate into non-neurons, they lose their synaptic connections, which leads to loss of memory and cognition and as a consequence, dementia," said bioengineering professor Shankar Subramanian who led this work in collaboration with colleagues in bioengineering and UC San Diego Health Sciences. This research project is being expanded to include organoids and could help pave the way for new therapeutic approaches to treating Alzheimer's.

Learn more: bit.ly/ADEndotypes

\$14M Microbiome and Metagenomics Center

UC San Diego received \$14 million from the NIH to drive precision nutrition with gut microbiome data. The Center is part of a national effort to predict individual responses to food and inform personalized nutrition recommendations. A current challenge in precision nutrition is the inability to combine the many factors that affect how individuals respond to diet into a personalized nutrition regimen. These potential factors include the microbiome, metabolism, nutritional status, genetics and the environment. The new Microbiome and Metagenomics Center is co-lead by UC San Diego professors Rob Knight and Jack Gilbert, and includes additional faculty from the Center for Microbiome Innovation located at the UC San Diego Jacobs School of Engineering.



Learn more: bit.ly/MetagenomicsCenter

Introducing the second cohort of Racial Equity Fellows



Seven UC San Diego Jacobs School of Engineering students have been selected to serve as Racial Equity Fellows. In this role, they will act as student advocates on the Jacobs School Student and Faculty Racial Equity Task Force, each bringing their demonstrated interest in diversity, equity and inclusion to the Task Force. These students represent undergraduate and graduate perspectives from all six academic departments at the Jacobs School.

Learn more: bit.ly/2021RacialEquityFellows

Sign up to receive the Jacobs School monthly newsletter: bit.ly/JacobsSchoolMonthlyNews

Contact newsletter editor, Daniel Kane: dbkane@ucsd.edu

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