UC San Diego
JACOBS SCHOOL OF ENGINEERING

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Context emerges when we do the work

As an engineer, I'm obsessed with context. For me, doing the work to understand the context is critical for problem solving. As an engineering dean, I see nearly everything through the lens of context. In terms of research, context connects to relevance. Empowering our faculty to engage with industry on the toughest challenges no lab, company or industrial sector can solve alone motivated our launch of 14 new agile research centers and institutes at the Jacobs School of Engineering since 2014

I've recently been engaging the Jacobs School's strong academic and industry ecosystems on big questions—context questions—about the future of wireless communications. The topic is so incredibly broad that each time we drill down, we find ourselves stepping back and seeing more of the context. In June, we extended this ongoing series of conversations to national and international ecosystems through a National Academy of Engineering (NAE) member-led event which I was honored to co-organize.

The events prompted forthright, unvarnished conversations. We connected people between and among large and small companies across many industries, with people at universities and in research funding agencies.

I won't get into details of the meeting here, but I do want to make a brief comment. The future of wireless will literally be part of the future of nearly all industries. The separations are disappearing as the communication and computational fabric of the nation become more and more knit together. This critical convergence drives the need for a new kind of engineer, and so the talent and technology flows coming directly or indirectly from engineering schools will be essential.

As an engineering dean, I take all this to mean that we need to keep up the hard work of encouraging conversations among many different industries and groups that will shape, and be shaped by, the future of wireless. The wisdom gained from these conversations allows us to better train our students.

I believe that we took a useful preliminary step last month in this direction regarding the future of wireless via the NAE member-led event. I also firmly believe in the motto of "practice what you preach." The Jacobs School's strength comes from our willingness and ability to provide education and perform research that is both fundamental and relevant. I expect the same of my activities as dean. As engineers and computer scientists, we must keep up our quest for context. Without context, there is no wisdom.

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

-Albert P. Pisano, Dean

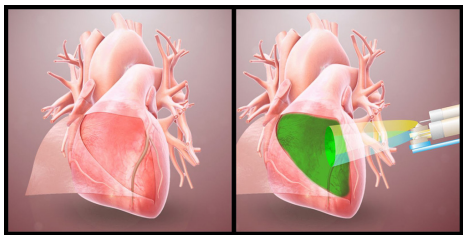
UC San Diego Jacobs School of Engineering

Translating a bird's brain activity into song

It is possible to re-create a bird's song by reading only its brain activity, shows a first proof-of-concept study from UC San Diego. The researchers, including electrical engineers and neurobiologists, reproduced the songbird's complex vocalizations down to the pitch, volume and timbre of the original. This study lays the foundation for building vocal prostheses for individuals who have lost the ability to speak.

Learn more: bit.ly/TranslatingBirdBrain

Gel protects the heart from adhesions after surgery



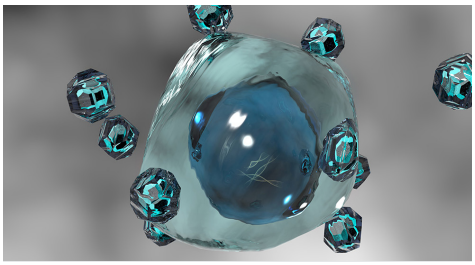
A hydrogel that forms a barrier to keep heart tissue from adhering to surrounding tissue after surgery was developed and successfully tested in rodents by a team of UC San Diego researchers. The team of engineers, scientists and physicians also conducted a pilot study on porcine hearts, with promising results. "Our work is an engineering solution driven by a medical problem," said bioengineering professor Karen Christman, who co-founded a company, Karios Technologies, to bring the hydrogel into the clinic. "And now it's poised to significantly improve cardiac surgery, both for adults and children."

Learn more: bit.ly/NatureCommshydrogel

Eye contact in Zoom classrooms

UC San Diego researchers developed an automated system to allow educators to make 'eye contact' with individual students in Zoom classrooms by letting the student know when they are the focus of the teacher's attention. The collaboration between musicians, computer scientists and electrical engineers produced a system that recognizes changes in the location where the teacher is looking. The system then determines the identity of the student and tags them on screen so everyone in the virtual class knows who the teacher is focusing on. The researchers piloted the system in a virtual music class at UC San Diego. In related work, a team led by computer scientists at UC San Diego recently presented work on improving virtual learning environments.

Learn more: bit.ly/ZoomEyeContact

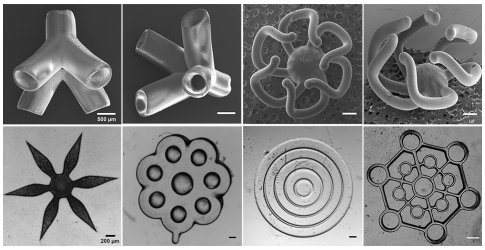


Nanoparticles deliver drugs directly to inflamed lung cells

Nanoengineers at UC San Diego have developed immune cell-mimicking nanoparticles that target inflammation in the lungs and deliver drugs directly where they're needed. As a proof of concept, the researchers filled the nanoparticles with the drug dexamethasone and administered them to mice with inflamed lung tissue. Inflammation was completely treated in mice given the nanoparticles, at a drug concentration where standard delivery methods did not have any efficacy.

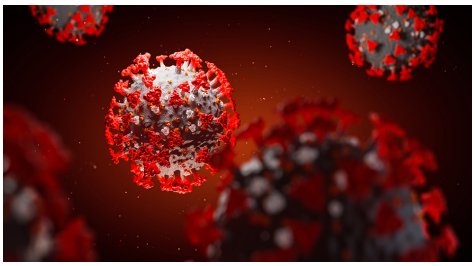
Learn more: bit.ly/EngineeredNanoparticles

Rapid 3D bioprinter could help speed up drug development



A 3D printer that rapidly produces large batches of custom biological tissues could help make drug development faster and less costly. Nanoengineers at UC San Diego developed the high-throughput bioprinting technology, which 3D prints with record speed. It can produce a 96-well array of living human tissue samples within 30 minutes. Having the ability to rapidly produce such samples could accelerate high-throughput preclinical drug screening and disease modeling.

Learn more: bit.ly/3DBioprinter



AI predicts severity of viral infections

Computer scientists and physicians at UC San Diego used an artificial intelligence algorithm to sift through gene expression data — which genes are "on" or "off" during infection — to look for shared patterns in patients with past pandemic viral infections, including SARS, MERS and swine flu. The researchers found that a set of 166 genes reveals how the human immune system responds to viral infections. A second set of 20 signature genes predicts the severity of a patient's disease: for example, the need to hospitalize or use a mechanical ventilator.

Learn more: bit.ly/InfectionSeverity

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