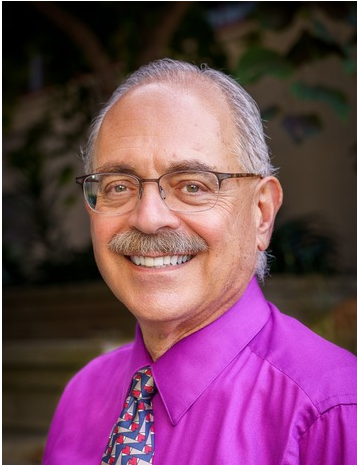


## 1.76 billion is a powerful number



UC San Diego's intertwined education, research and innovation enterprise is too dynamic, varied and fast-moving to be captured in any one statistic. But one number that does say a lot is \$1.76 billion. This is the amount [our UC San Diego campus expended on research last year](#). The Jacobs School of Engineering is a significant part of this powerful number, and one of my goals is to help the campus continue to grow and strengthen our collective research enterprise – and all the critical education and innovation that is inherently part of academic research for the public good.

Across our wildly collaborative research environment here at the Jacobs School, we are now engaged in a deliberate process of renewal. We are taking stock of the great strengths that have allowed us to grow our engineering and computer science research over the last decade. But what we are doing is far more than a strengths inventory. Instead, we will map our strengths to the new research needs that we foresee emerging in the next five years. This effort requires the collective brainpower of our nearly 300 faculty. To this end, I have engaged faculty groups in each of our six academic departments. Together, we will identify forward-looking breakout moves for research in the public interest for each of our departments.

I'm calling these breakout opportunities Leviathans. I use this mythical term to capture the sense that these emerging opportunities are huge, powerful targets that we can only win by working together – more strategically and fiercely than ever before. This is a project that will link internal and external collaborators in new and exciting ways. We can't – and shouldn't – do this alone.

I look forward to giving updates on this effort in the coming months. As always, I can be reached at [DeanPisano@ucsd.edu](mailto:DeanPisano@ucsd.edu).

Sincerely,

Al  
Albert ("Al") P. Pisano, Dean  
UC San Diego Jacobs School of Engineering

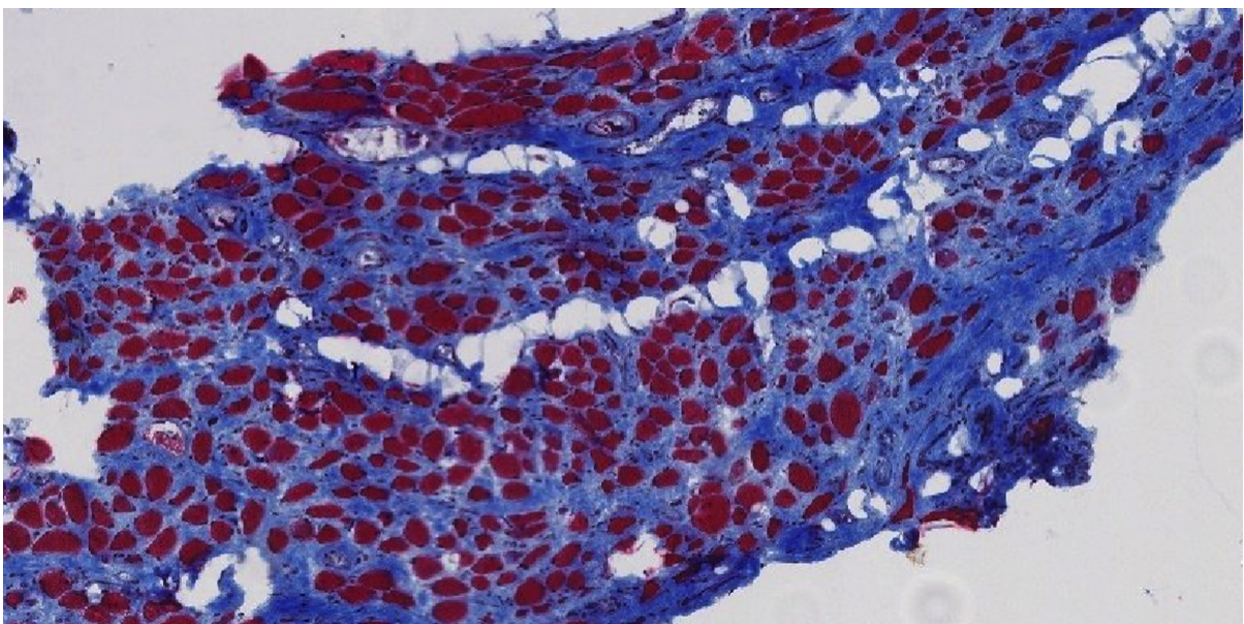
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## **\$1.76B in UC San Diego research expenditures**

In FY 2023, UC San Diego spent \$1.76 billion on research, up from \$1.64 billion the previous year — a more than 6% increase. This marks more than a decade of sustained growth in research funding. “Our continued growth as a global research powerhouse can be seen in the increasing and continued investments from government and state agencies, corporations, private industry, nonprofits, foundations and individual donors,” said Chancellor Pradeep K. Khosla. In fact, [campus raised \\$565.7 million in private support last fiscal year](#). Philanthropy to UC San Diego was stronger than ever last year, with donors making a difference in areas including scholarships and fellowships to broaden access and research driving discoveries that will affect billions.

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## **New insights on pelvic floor damage**

Pelvic floor disorders impact close to 25% of women in the U.S. And yet, there is much that clinicians and biomedical researchers don't know about the fundamentals of these disorders. A team of bioengineers and physician-scientists at UC San Diego is addressing this lack of fundamental knowledge – and they have pre-clinical results pointing to a new treatment approach. Their latest findings appear in *Science Translational Medicine*. “Understanding the natural pelvic floor muscle response after birth injury is crucial for developing and applying regenerative medicine approaches,” said Pamela Duran, the first author on the paper who earned a bioengineering PhD at UC San Diego. Seed funding for this project came from UC San Diego’s Galvanizing Engineering in Medicine (GEM) Awards program. [Get more context from Live Science.](#)

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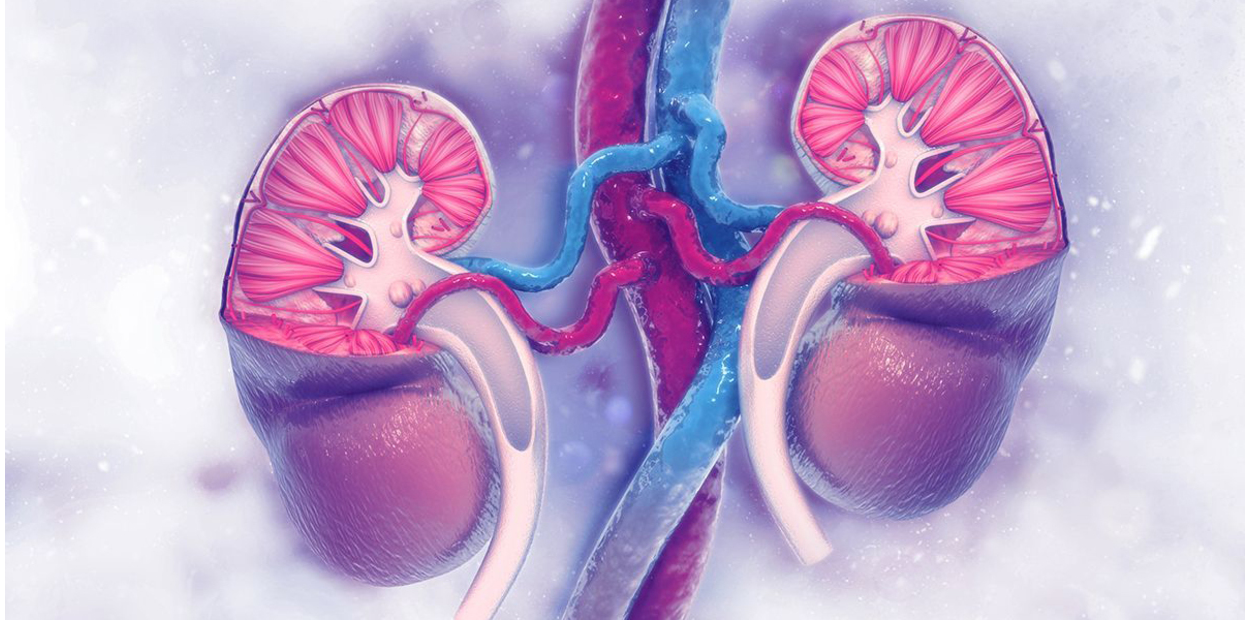
## Roadmap to diversify faculty hiring in biomedical engineering

Bioengineers at UC San Diego are part of a team from 16 top engineering programs that established a roadmap for hiring diverse faculty members into biomedical engineering departments. The team is led by researchers at UT Austin. The roadmap, published in *Nature Biomedical Engineering*, details six major steps necessary to increase diversity in faculty hiring, based on evidenced-based best practices as well as experiences in their own institutions.

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## New resources to study kidney disease in humans

Why do some people's kidneys recover after a sudden decline in kidney function while others don't? A new study in *Nature* co-led by bioengineers at UC San Diego could lead to answers—at the level of individual cells. The researchers constructed the largest single-cell atlas of the human kidney to date. It maps healthy and diseased cell states across more than 90 patients. The atlas is intended to serve as a foundation to better understand the progression of kidney disease after acute kidney injury, a condition in which the kidneys suddenly lose their ability to filter waste from blood. [Read a \*Nature\* news story.](#)

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## Bacteria detect tumor DNA

Researchers have engineered bacteria that can detect the presence of tumor DNA in a live organism. The innovation, which detected cancer in the colons of mice, could pave the way to



new biosensors capable of identifying infections, cancers and other diseases. Bioengineers and biologists from UC San Diego and colleagues in Australia published this work in *Science*. "The detection of gastrointestinal cancers and precancerous lesions is an attractive clinical opportunity to apply this invention," said Jeff Hasty, a bioengineering and biological sciences professor at UC San Diego. [Watch an animated video](#) and read more in [StatNews](#).

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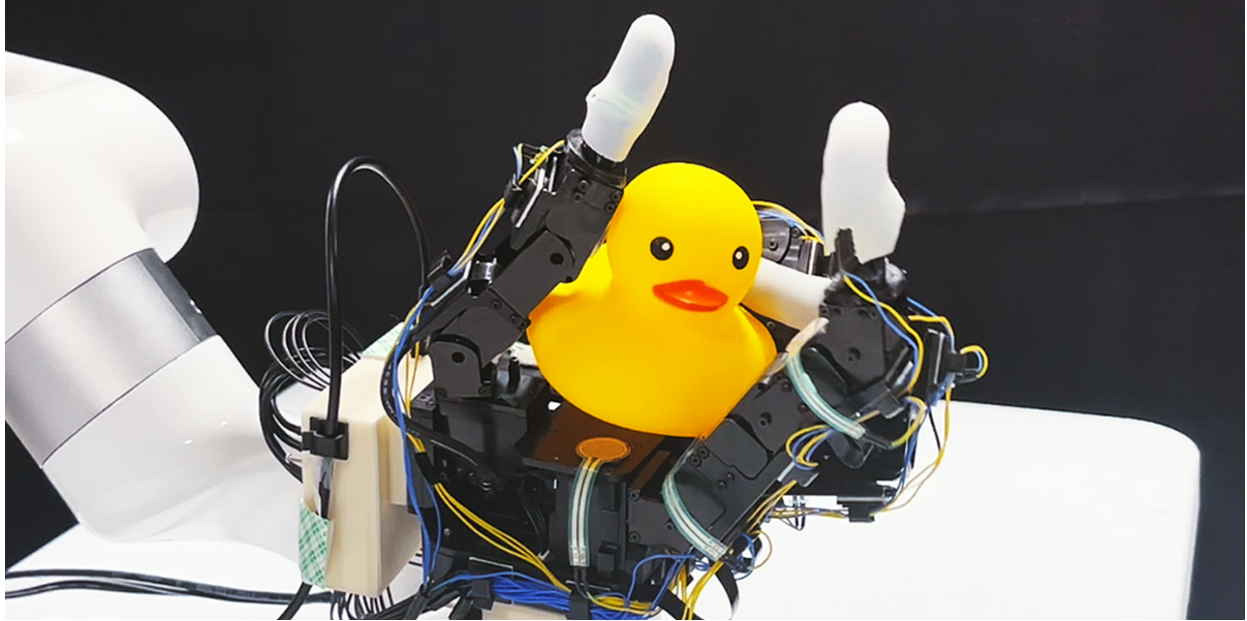


## Qualcomm Innovation Fellows at UC San Diego

Four UC San Diego teams of computer scientists, electrical engineers and roboticists have been awarded prestigious Qualcomm Innovation Fellowships for North America in 2023. The Qualcomm Innovation Fellowship program is focused on recognizing, rewarding, and mentoring innovative PhD students across a broad range of technical research areas, based on Qualcomm's core values of innovation, execution and teamwork.

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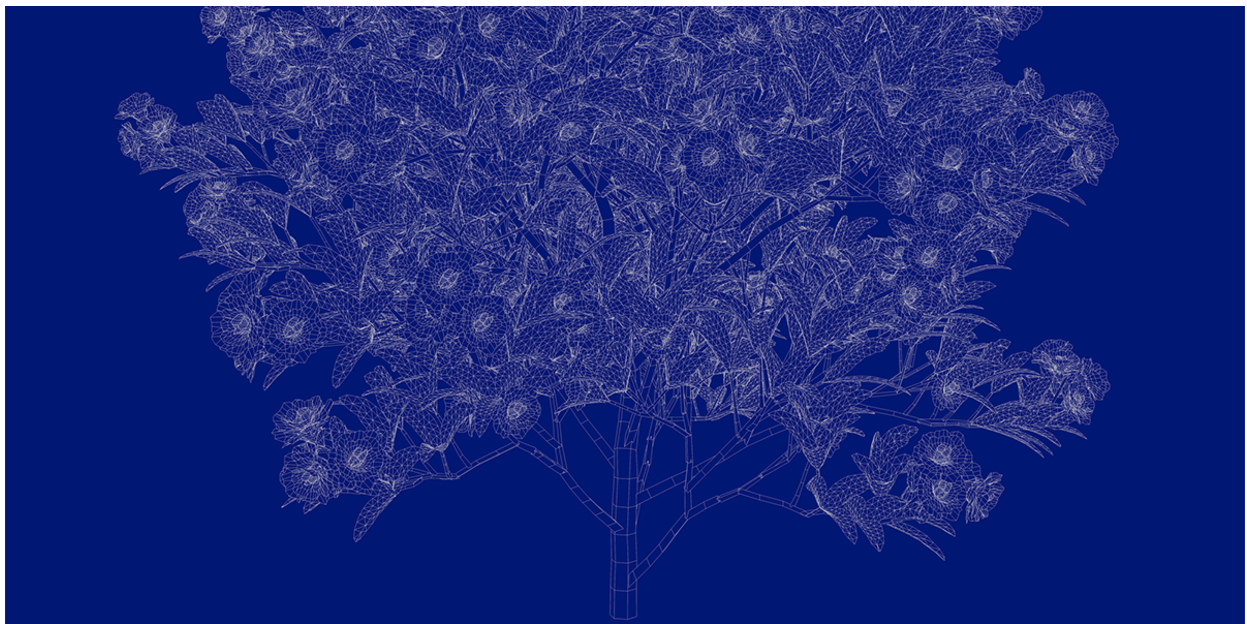
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## Robotic hand rotates objects using touch, not vision

A robotic hand can rotate objects solely through touch, without relying on vision. A research team led by electrical engineers at UC San Diego made the advance which could aid in the development of robots that can manipulate objects in the dark. Using their technique, the researchers built a robotic hand that can smoothly rotate a wide array of objects, from small toys, cans, and even fruits and vegetables, without bruising or squishing them. To build their system, the researchers attached 16 low-cost touch sensors to the palm and fingers of a four-fingered robotic hand. Read coverage in [Scientific American](#), and [watch the robotic hand in action](#).

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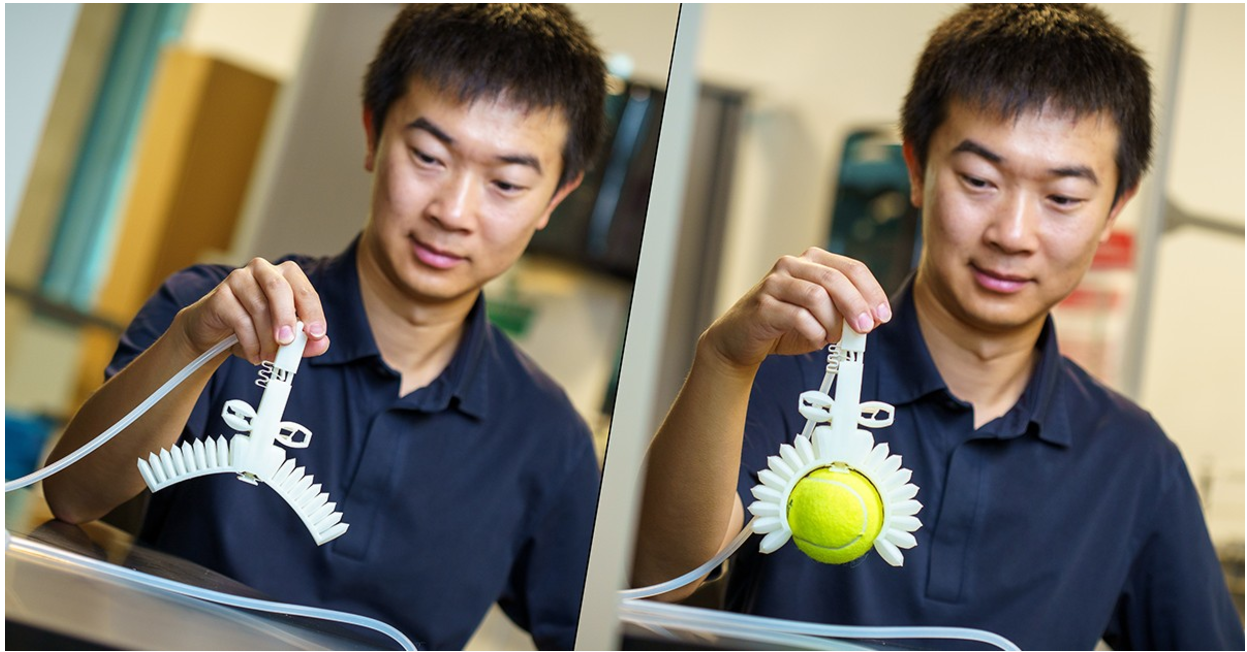


## Fitting new genomes into existing evolutionary trees

UC San Diego bioinformatics and electrical engineering researchers have developed a more scalable method for using genome sequences to build evolutionary structures called

phylogenetic trees. This advance will enable microbiologists to quickly analyze environmental samples with respect to an up-to-date view of the microbial diversity known to science, said UC San Diego electrical engineering professor Siavash Mirarab. UC San Diego researchers in professor Rob Knight's lab already used the advance to construct the [Greengenes2 database](#). Both projects, published in *Nature Biotechnology*, are tied to the [UC San Diego Center for Microbiome Innovation](#).

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### 3D printed gripper doesn't need electronics

UC San Diego mechanical engineering and robotics researchers created a soft robotic gripper that can be 3D printed in one go and doesn't need any electronics to work. The electronics-free gripper can pick up, hold, and release objects thanks to built-in gravity and touch sensors – and it is ready to use right as it comes off the 3D printer. This gripper can be mounted on a robotic arm for industrial manufacturing applications, food production or handling fruits and vegetables. It can also be mounted on a robot for research and exploration. The project, in collaboration with BASF researchers, is published in [Science Robotics](#).

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