The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

2024-2025

PULSE

AN ANNUAL PUBLICATION OF THE DEPARTMENT OF BIOMEDICAL ENGINEERING

Kenya

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Kenya

HIV Diag

PAEDIATRIC TRAINING AND CLINICAL CENTER
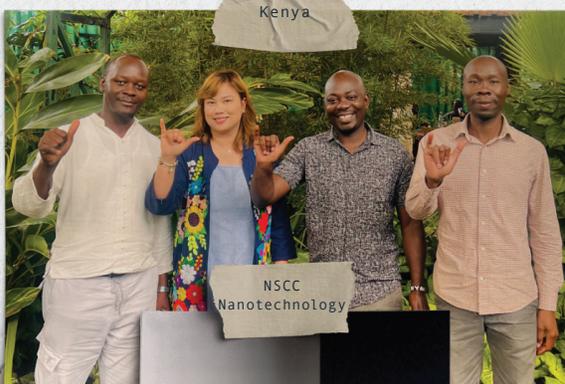
NSCC Nanotechnology

NPHL

Thailand

Austin HOOK 'EM!

TRANSFORMING HEALTH CARE EQUITY
MORE ON PAGE 10

Power of Clinical Collaborations
Pg 20

Giving 100 Per-Stent for Women's Health
Pg 16

DEAR FRIENDS, As chair of the Department of Biomedical Engineering at The University of Texas at Austin, I witness our innovation on a daily basis. Our faculty are leading projects to broaden the capabilities of hydrogels for stem cell transplants, harness the power of AI for cancer detection, and lead externally funded multidisciplinary projects to develop novel, contrast-free MRI methods for the quantitative assessment of kidney function.

Several other faculty were awarded grants to support research in biophotonics, computational medicine, cell-based therapeutics, and neuroengineering.

Faculty also have been celebrated for their impactful contributions to biomedical engineering, including election to the status of fellow of the American Institute of Medical and Biological Engineering (AIMBE), recognition from the Gene Editing & Gene Delivery Focus Group, appreciation with the Shu Chien Achievement Award, and selection for the prestigious CAREER Award from the National Science Foundation.

We welcomed a new faculty member that is pioneering novel materials designed to stimulate an effective immune response against solid tumors. This will continue our effort to expand our research portfolio and to broaden course offerings.

Our NIH-sponsored training program in imaging sciences provides our students with a unique graduate education experience designed to prepare them to be leaders in the development of biomedical imaging platforms.

We attract undergraduate students that graduate in the top 5 percent of their class and our state-of-the-art labs provide them with unique, functional learning experiences.

Biomedical engineering is impacting society in unimaginable ways as we work with departments across UT to redefine cancer prevention, allow quadriplegics to regain control of their lives, and adapt AI into health care for treatments that will change the future of medicine.

Hook 'Em,

TYRONE M. PORTER
Chair, Department of Biomedical Engineering
Donald J. Douglass Centennial Professorship in Engineering

NEW DOORS TO DRUG DEVELOPMENT

The world of pharmaceuticals is evolving fast, and the graduate portfolio program in pharmacoengineering is at the forefront of this change, training the next generation of pharmacoengineers who will revolutionize the way we approach therapeutics and diagnostics.

The mission? To harness the power of technology to develop innovative, personalized treatments that change lives. Imagine receiving the exact dosage of medication, delivered precisely where it's needed in the body—this could mean fewer side effects, better outcomes, and a personalized approach to health care.

Students in the program dive into a range of skills that are essential for tackling complex challenges. They explore data-driven approaches to drug design and learn how to model interactions between drugs and their targets on multiple levels. And they develop innovative drug delivery strategies, figuring out how to ensure medications reach their intended destinations effectively.

These essential tools tackle problems such as reducing research and development costs while simultaneously developing new, safer treatments for patients.

Biomanufacturing systems can reduce dependence on costly, hard-to-find materials while innovations in targeted drug delivery and mRNA vaccines improve the patient experience and increase protection against disease.

LEARN MORE

With bold, cross-disciplinary training unlike anything offered at The University of Texas at Austin—or anywhere else in the nation—this is more than a graduate program; it's a launchpad for those ready to lead the next big breakthrough. ■

FACULTY UPDATES

Our faculty are gaining recognition for their innovative research and contributions to the field.

EVAN WANG: Recipient of the ASEE Biomedical Engineering Teaching Award

NICHOLAS PEPPAS: Recipient of a honorary doctorate from The Universidad de la Lengua

JAMES TUNNELL: Elected as a fellow member of Optica

ELIZABETH COSGRIFF HERNÁNDEZ: Selected as a National Academy of Inventors class of 2025 senior member and recipient of the 2025 Acta Materialia Mary Fortune Global Diversity Medal ■

5 QUESTIONS ? 5 QUESTIONS ? 5 QUESTIONS ? 5 QUESTIONS ? 5 QUESTIONS ?

5

5 QUESTIONS WITH '25 UNDER 25' HONOREE

JEONGWOOK "LUKE" YUN

Jeongwook "Luke" Yun is making waves for his work to bring artificial intelligence to health care. The biomedical engineering senior was recently named to The Austin Business Journal 's prestigious "Austin Inno Under 25" list. The annual awards "recognize young entrepreneurs and technologists who are already making their mark on the city's tech community."

Initially, Yun and his team developed a virtual assistant that provided tailored live-code suggestions for creating medical algorithms and pertinent related research. They took part in a startup accelerator program called Antler, which has less than a 1% acceptance rate.

Through this program, they learned that large tech companies have developed similar, highly proficient tools. They also learned about the critical nature of privacy in health care, inspiring them to refocus on developing AI solutions to test the security and privacy of medical AI models before and after they are implemented into health care systems.

1

What is your current involvement with AI?

I have worked as a medical AI researcher at Harvard Medical School/ Dana Farber Cancer Institute for nearly two years now working

remotely on various models for early pancreatic cancer detection with AI.

2. Tell us about how you got to this point.

During my junior year summer, I was an AI medical affairs intern at Pfizer in New York City where I developed AI algorithms for sentiment analysis of Pfizer's drugs on social media. During my sophomore year summer, I was a machine learning/artificial intelligence intern at Merck in New Jersey where I conducted research on the personality and biases of large language models.

I also did research at NYU's School of Global Public Health where I explored discrimination in health care settings. After my first year, I worked as a process engineering intern at a pharmaceutical startup called QuVa Pharma in Houston where I worked on automating warehouse data pipelines.

3. Do you have any extracurricular activities that you enjoy?

Throughout my time at UT, I was a member of the Beta Upsilon Chi fraternity and a volunteer at UT Student Engineers Educating Kids. I recently founded and am serving as president of Texas Health AI, an organization that aims to get UT undergraduates to work with local Austin health care systems on AI projects.

4. What made you decide you wanted to major in biomedical engineering?

Coming into college, I wanted to work in the medical space due to the large, immediate impact that medicine can have on someone. This desire combined with my interests in math and technology, especially computers and artificial intelligence, pushed me to choose biomedical engineering as my major.

I believed that learning hands-on skills of programming and hardware would give me the ability to create practical products to improve patient diagnosis, care and outcomes. Technology is a core component of health care, and I had a strong conviction that understanding technology at a deeper level would allow me to leverage tools more effectively and to generate practical ideas towards improving various aspects of health care. Biomedical engineering's essence of intersecting technology and biology provided me an opportunity to lay a solid foundation towards my goals of becoming a world leader and expert in health care technology.

5. What are your plans after graduation?

I will be building a startup that addresses critical needs in the medical AI infrastructure space in Silicon Valley. There are a plethora of companies developing amazing, cutting-edge tools for health care, but there is a shortage of services that lay down the infrastructure foundations to support the emerging medical AI space.

I will continue to participate in the research I am currently doing at Harvard Medical School and the University of Oxford. This will help me prepare for my long-term future and my short-term goal of matriculating into medical school in two years. ■

WHERE ARE THEY NOW

From launching startups to leading the nation's top biotechnology companies, our alumni have gone on to change the world. Yet no matter where their journey takes them, they always find time to return to where it started. *(Top to bottom)*

Dr. Alex Harding, M.D.
B.S. Biomedical Engineering 2009
Baylor University
Assistant Professor, Emergency Medicine

Grace Hicks, Ph.D.
B.S. Biomedical Engineering 2013
Veno Stent Inc.
Senior Product Development Engineer

Tushar Sharma, Ph.D.
M.S. Biomedical Engineering 2010,
   Ph.D. Biomedical Engineering 2015
Vivifi Medical
CEO & Founder

Malisha Pattanaik-Epili, M.S., C.C.D.S.
B.S. Biomedical Engineering 2007
Boston Scientific
Field Clinical Manager

ADVANCING CARE
AFTER BREAST CANCER

THE NEW EFFORT AIMS TO HELP PATIENTS RECOVERING FROM RECONSTRUCTIVE SURGERY.

Texas Engineers are teaming up with a multi-institutional research group to design custom molds for breast cancer patients undergoing reconstructive surgery.

Backed by a grant from the National Institutes of Health (NIH), the project aims to make breast reconstruction more personal—going beyond simply recreating a patient's pre-surgery look. The focus is on helping patients feel comfortable and confident in their new bodies, supporting both physical recovery and emotional well-being.

*It's all part of the **Multidisciplinary Breast Reconstruction Research Program at MD Anderson Cancer Center**.*
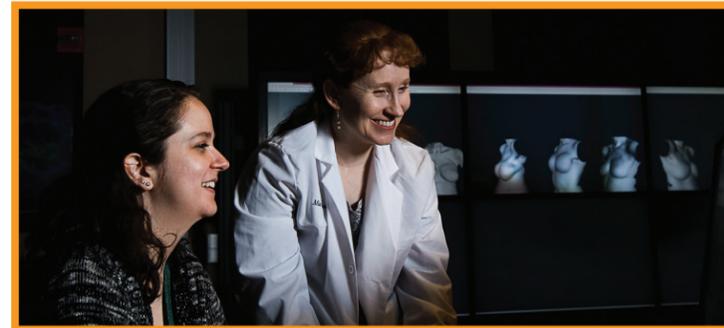
> "APPEARANCE CHANGES DUE TO MASTECTOMIES TAKE A TREMENDOUS MENTAL TOLL ON BREAST CANCER PATIENTS WHO HAVE ALREADY BEEN THROUGH SO MUCH," SAID MIA MARKEY, PROFESSOR IN THE DEPARTMENT OF BIOMEDICAL ENGINEERING AND A LEAD RESEARCHER ON THE PROJECT.

While previous studies have shown that using patient-specific molds to shape breast tissue is possible, there hasn't been enough thorough research to measure their true impact. This new study is taking a big step forward with a randomized controlled clinical trial.

Typically, breast reconstruction involves autologous procedures—where surgeons use skin, fat, blood vessels, and muscle from another part of the patient's body to rebuild the breast. It's a reliable method with long-term benefits, but it's no walk in the park. These surgeries are complex and time-consuming, often requiring follow-up procedures to refine the shape and size.

That's where the research team's work comes in. They're developing smart clinical decision-support algorithms to design custom breast molds—making the process more efficient and reducing the need for multiple surgeries. The goal? Less pain, fewer risks, and a smoother path to healing.

Past approaches relied on simple molds that copied the size and shape of the patient's original breast or mirrored the remaining breast in cases where only one was removed. But many patients want something different post-mastectomy, and a cookie-cutter approach doesn't always cut it.

"Our approach in developing the clinical decision-support algorithms is informed by our experience in image perception, machine learning, image processing, and shape modeling and conducting a thorough evaluation in a randomized controlled clinical trial," said Fatima Merchant, department chair of engineering technology at the University of Houston (UH) and a project leader.

Together, this talented team is pushing the boundaries of breast reconstruction, blending technology and compassion to help breast cancer survivors reclaim their confidence and comfort. ∎

MULTIDISCIPLINARY BREAST RECONSTRUCTION RESEARCH PROGRAM

Fatima Merchant department chair of engineering technology at the University of Houston (UH) and a project leader. Fatima Merchant leads the team at the University of Houston along with Ann Chen, Weihang Zhu, and Elizabeth Rodwell.

Mia Markey leads the team at UT Austin along with Xiomara Gonzalez, a Ph.D. candidate in the Department of Biomedical Engineering.

Ashleigh M. Francis leads the team at The MD Anderson Cancer Center along with Deepti Chopra, Z-Hye Lee, Christopher Parham, Gregory P. Reece, Margaret Roubaud, Mark Schaverien, and John Shuck.

TRANSFORMING HEALTH CARE EQUITY

A JOURNEY TO IMPROVE DIAGNOSTIC TESTING

The newest faculty member in The University of Texas at Austin's Department of Biomedical Engineering traveled the world improving health care for those who need it most—*and her journey is only getting started*.

Shaped by personal experiences across the globe, assistant professor Nuttada Panpradist considers herself a "lifelong learner" and is on a mission to tackle health care disparities.

Her academic quest began in her home country of Thailand with a Bachelor of Engineering in petrochemical and polymeric materials. The degree focuses on the science of transforming petroleum-based raw materials into everyday essentials—such as plastics, synthetic fibers and coatings.

South Africa

OLA-Simple prototype

Africa

HIV Diagnositcs
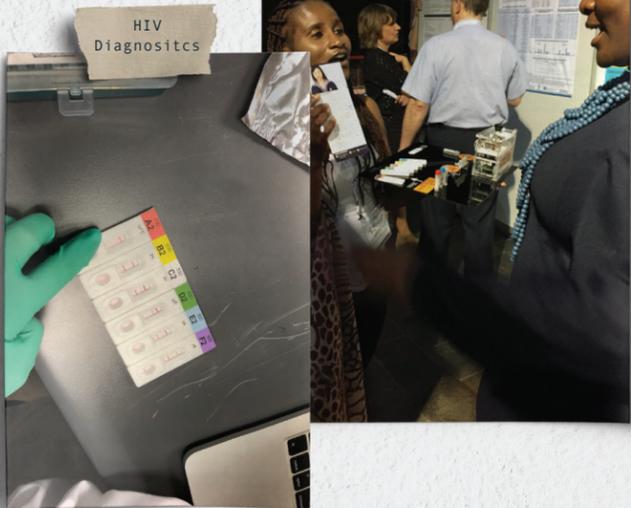
"I BEGAN THINKING OF WAYS TO MAKE MEDICAL DEVICES MORE AFFORDABLE AND ACCESSIBLE AND QUICKLY REALIZED THAT I NEEDED MORE TRAINING TO MAKE A REAL IMPACT. THAT'S WHEN I STUMBLED UPON THE FIELD OF BIOMEDICAL ENGINEERING—A PERFECT BLEND OF TECHNOLOGY AND HEALTH CARE," SAID PANPRADIST.

At the time, Thailand didn't offer a Ph.D. in her newfound field of interest, so she chose to pursue her passion in the U.S.

Panpradist uprooted her life, landing in Seattle for a Ph.D. program in bioengineering at the University of Washington with the goal to make health care accessible and affordable for all. Foreshadowing her future journey, she was advised by associate professor Barry Lutz, an alumnus of the McKetta Department of Chemical Engineering at UT.

"I remember the beginning of this journey as if it were yesterday, even though it was 15 years ago. During my interview for an intern position, I arrived with a chart outlining my 10-year plan, making the case for how this internship would be a crucial step in preparing for my Ph.D. application. I confidently argued that with a Ph.D., I would become a professor in bioengineering—a career that, to me, represented the perfect intersection of innovation, mentorship, and impact," said Panpradist.

Now her dreams slowly started to become realities. Panpradist developed diagnostic testing for HIV drug resistance (HIVDR), tuberculosis (TB) infection, adherence to TB treatment, and, most notably, for COVID-19. Her "OLA-Simple" HIVDR test was deployed in three laboratories in Kenya

Despite graduating near the top of her class, she discovered the extent of how restrictive the job market was, particularly the barriers for women in engineering.

"'Male, under the age of 35'—that was a common requirement in job descriptions for petrochemical engineering positions. I couldn't change the reality that these opportunities were out of reach for reasons beyond my control. It felt unfair, but at the time, there wasn't much I could do," said Panpradist.

Undeterred by gender or age barriers, she started working in medical sales and found an unrealized passion for health care. Panpradist was amazed by how medical devices could improve lives, but it was tough to see that only a few people could afford them.

and her 'Harmony COVID-19' test was licensed for commercial use by Anavasi Diagnostics.

As she traveled the world developing these products, Panpradist achieved another milestone. She became the first bioengineering student at UW to earn a graduate certificate from the Global Center for Integrated Health of Women, Adolescents, and Children.

The program provided invaluable exposure to real-world contexts and allowed her to learn directly from clinicians and global health researchers. One particularly impactful experience came during a global health/bioengineering seminar course.

"I was paired with Dr. Diana Marangu, a Kenyan clinician and MPH student at the time. Together, we explored the idea of developing urine-based diagnostics for TB—a concept that led to multiple funded proposals and active projects," she said.

Over time, Panpradist's team successfully demonstrated the most sensitive TB DNA diagnostic from clinical urine specimens to date, marking a significant advancement in TB detection.

To bridge the ever-prevalent gap in academia between concept and practice, she turned to the path that all biomedical engineers eventually take—an interdisciplinary collaboration.

HIV PRESENTATION AT WHO
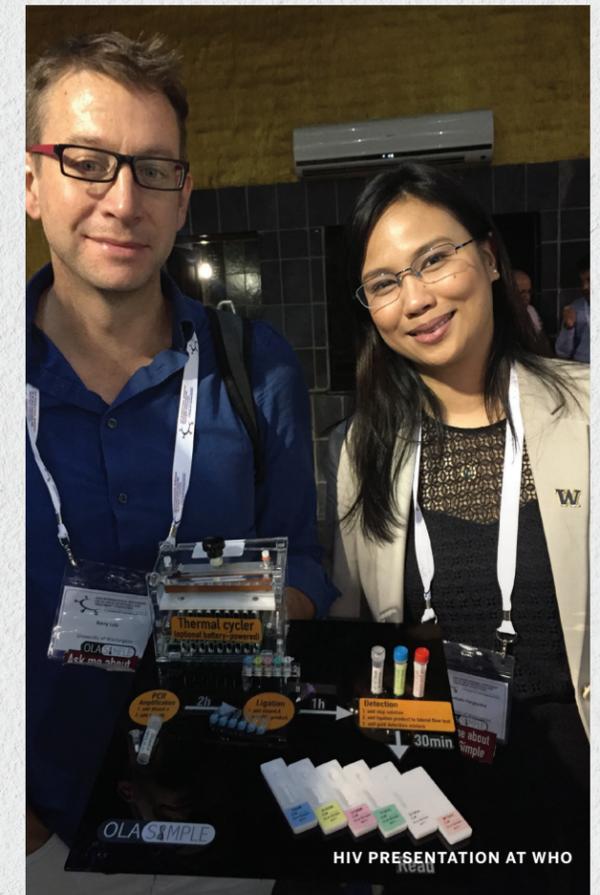
"A pivotal moment in my Ph.D. journey was the opportunity to take the OLA-Simple prototype—quite literally—onto the stage at an international conference in South Africa. This gathering brought together experts and WHO representatives from around the world to discuss advancements in HIV diagnostics and care," she said.

A Creative Triple Play

"When I became a diehard Seahawks fan, I went all in—painting everything in Seahawks colors. Now that I'm at UT Austin, I'm fully embracing Longhorn football. Give me some time to gather art supplies, and you'll probably start seeing everything in burnt orange soon," said Panpradist.

Now it was time to bring this product to the people that needed it. Panpradist's team identified Mexico as their first pilot country due to the pivotal need for a low-cost HIV drug resistance test. At that time, HIV drug resistance was rising, with the World Health Organization recommending a shift to a new drug regimen for countries where resistance exceeded 10%.

WITHIN A YEAR, THE RESEARCHERS PROVED THE OLA-SIMPLE'S PERFORMANCE MATCHED THE GOLD-STANDARD RESULTS FROM THE COUNTRY'S TOP WHO-CERTIFIED HIV LAB.

What started as a research prototype became a practical tool addressing a critical need, proving that sometimes, the right partnerships and a bit of boldness can make all the difference.

With these remarkable accomplishments as well as a Ph.D. under her belt, Panpradist returned to her No. 1 passion: honing her research in the field of biomedical engineering, with a focus on developing sustainable diagnostic testing for underserved areas around the globe.

"I'm excited to bring my expertise and experience to expand our research efforts in addressing health disparities in Texas. While cities like Austin boast incredible advancements in technology, many Texans still lack access to essential medical diagnostics. Bridging this gap is a challenge—but one that I'm eager to take on," she said.

HIV WORKSHOP IN CAPE TOWN

Drawn by Austin's rising reputation and UT's mission to become the highest-impact research institution in the world, Panpradist knew she had found the perfect academic home. Bringing her expertise to a place where innovation thrives felt like a natural fit—after all, UT's motto couldn't resonate more with her own passion: *What Starts Here Changes the World.*"

With an extra nudge of encouragement from her Ph.D. advisor and former Longhorn, Panpradist took off from the Emerald City and followed the Yellow Brick Road to the Live Music Capital of the World — launching her "innovative, inclusive and sustainable global diagnostics research program" as part of her lab at UT.

It focuses on four key areas, each tackling critical global health challenges:

- Rethinking technology transfer for equitable research
- Safeguarding health through environmental screening
- Bringing diagnostics closer to patients
- Pushing boundaries with engineered chemistry

Through these four interconnected areas, Panpradist's program isn't simply advancing science—it's reimagining how global health solutions are created and shared, ensuring innovation reaches those who need it most.

"I'VE COLLABORATED WITH MULTIPLE, GLOBAL LEADERS IN HEALTH CARE AND CONDUCTED RESEARCH IN SIX LOW- AND MIDDLE-INCOME COUNTRIES. IT'S ALL PART OF MY MISSION TO CREATE MEANINGFUL CHANGE IN BIOENGINEERING AND GLOBAL HEALTH," SAID PANPRADIST.

Beyond the breakthroughs and accolades, her mission is clear: to leave a legacy of tangible change that empowers communities and elevates global health for generations to come. In the pursuit of equity, she's not only advancing science—she's rewriting the future of health care itself. ■

How did you get the nickname Professor Panda?

I've always loved pandas, especially Po, the Kung Fu Panda. As the trilogy unfolded, I realized how closely it mirrored my own journey. In *Kung Fu Panda 1*, Po, a non-traditional warrior, reflected my path from intern to Ph.D. student. *Kung Fu Panda 2* showcased teamwork, just like my experience with a multidisciplinary team. In *Kung Fu Panda 3*, Po transitioned from student to teacher, much like I did as I moved from Ph.D. student to mentor. Despite all this, I did not feel like a true "Panda" until a few years ago—when I (obtained my Ph.D.). After all, it's simply the first and last word of my name: **Pan**pradist, Nutta**da**. Now, at UT, I can only imagine where the title Professor Panda will take me next!
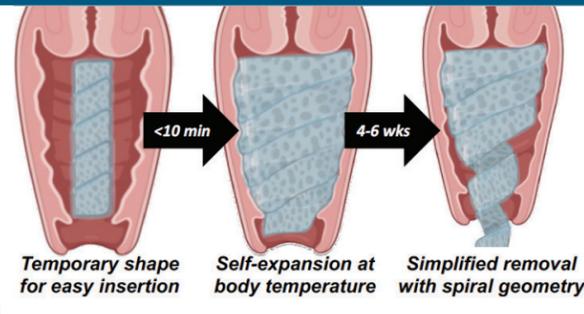
COSGRIFF-HERNÁNDEZ
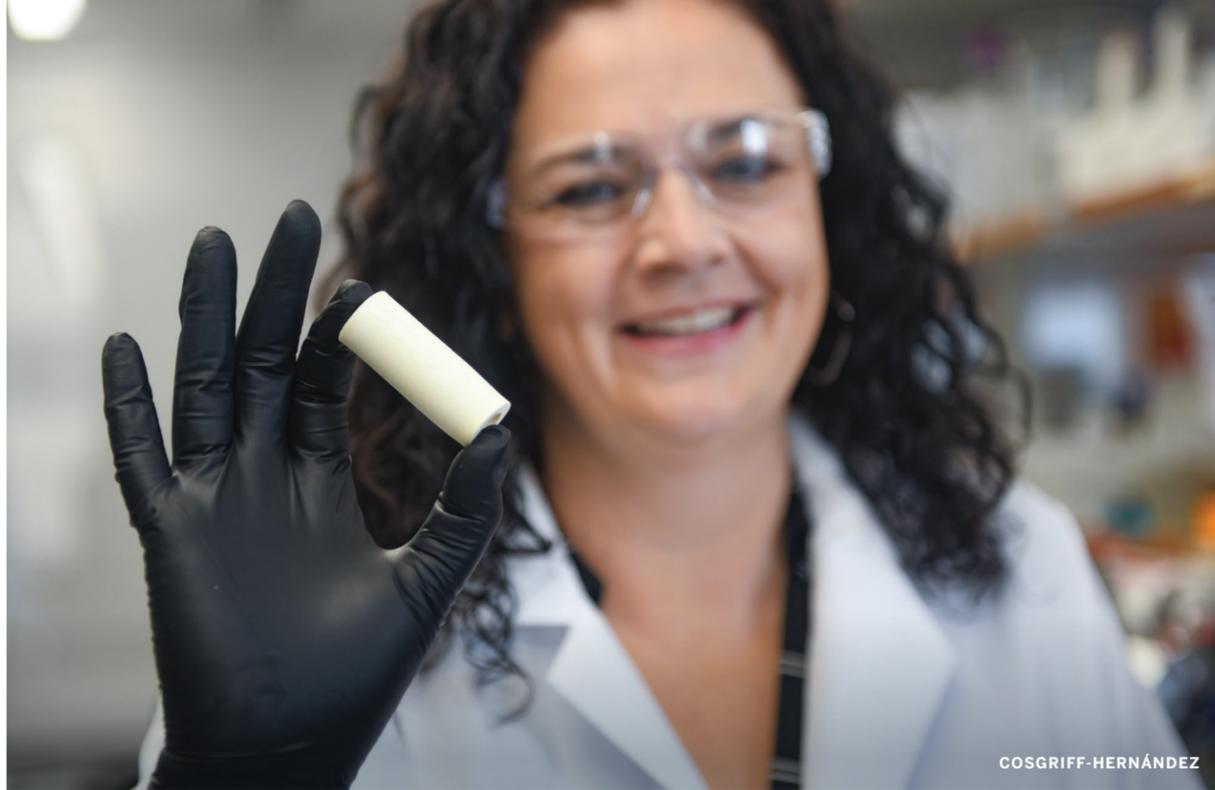
GIVING 100 PER-STENT

FOR WOMEN'S HEALTH

*Experts across Texas have teamed up to tackle a serious, yet often overlooked, women's health issue: **Vaginal stenosis**.*

75%
of patients who undergo pelvic radiation experience vaginal stenosis

<10 min   **4-6 wks**

Temporary shape for easy insertion   **Self-expansion at body temperature**   **Simplified removal with spiral geometry**

Elizabeth Cosgriff-Hernández, a biomedical engineering professor, secured a five-year grant from the National Institutes of Health's Eunice Kennedy Shriver National Institute of Child Health & Human Development. The project, titled "model-directed design of vaginal stents to prevent post-radiation stenosis," aims to break new ground in women's health research.

WHY IT MATTERS

Up to 75% of patients who undergo pelvic radiation treatment experience vaginal stenosis—a

< PATIENT-CENTERED DESIGN: The combination of shape memory foam and antifouling coating allows for both comfort and healing for patients—preventing the common post-radiation stenosis.

condition that causes the vaginal canal to narrow and stiffen, drastically impacting quality of life. Despite its prevalence, it remains under-researched and poorly understood. That's where Cosgriff-Hernández and her team come in. They're designing a patient-first vaginal stent to help maintain the vaginal opening and prevent stenosis from taking hold.
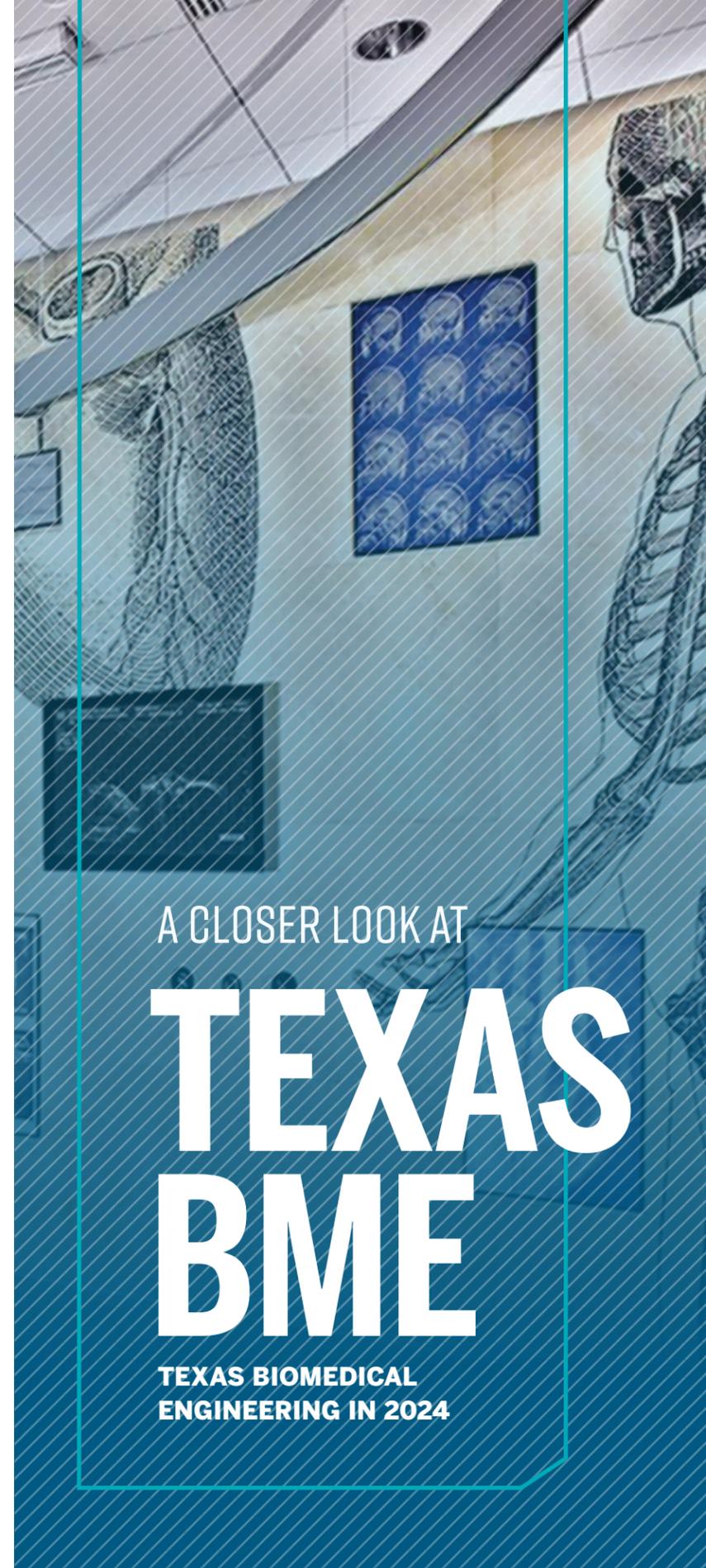
But they're not stopping there. This project will also push the boundaries of gynecological device design, creating advanced models and testing methods to uncover fresh insights into preventing and reversing the effects of vaginal stenosis.

"BY INTEGRATING A PATIENT-CENTRIC DESIGN, INNOVATIVE MATERIALS SCIENCE, AND COMPUTATIONAL MODELING, WE CAN OVERCOME CRITICAL GAPS IN CURRENT CARE TO RESTORE FUNCTION AND IMPROVE QUALITY OF LIFE FOR THESE UNDERSERVED PATIENTS. THIS INNOVATIVE APPROACH IS DRIVEN BY THE POWER OF CLINICIAN-ENGINEER PARTNERSHIPS AND TEAM SCIENCE," SAID COSGRIFF-HERNÁNDEZ.

It's a true team effort, with co-investigators Dr. Julie Hakim, assistant professor of obstetrics and gynecology at Baylor University; Melissa Grunlan, professor of biomedical engineering at Texas A&M University; and Manuel Rausch, associate professor of aerospace engineering and engineering mechanics at UT Austin.

Cosgriff-Hernández holds the Cullen Trust for Higher Education Endowed Professorship in Engineering No. 2. Her research bridges polymer science and bioengineering, developing innovative biomaterials to enhance medical devices and support healing in orthopedics, cardiovascular health, chronic wound care, and women's health.

This collaboration is more than just science—it's a bold step forward in addressing women's health concerns and breaking barriers in biomedical research. With their combined expertise and passion, this team is set to make a lasting impact. ∎

A CLOSER LOOK AT

TEXAS BME
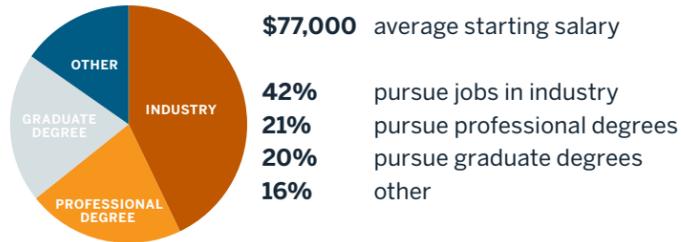
TEXAS BIOMEDICAL ENGINEERING IN 2024

TEXAS BME

GRADUATE NEWS

Christina Lin received the American Heart Association Predoctoral Fellowship.

Yanxing Wang and **Kevin Tang** were awarded University Continuing Fellowships.

Wang

Ashley Hicks was awarded the department's TA of the Year award.

Hicks

Natalie Simonian won the best student presentation award at the 19th Annual Symposium on Computer Methods in Biomechanics and Biomedical Engineering.

UNDERGRADUATE NEWS

Mrigayu Ghosh earned a Tau Beta Pi Scholarship.

Ghosh

Laurenz Quinto won the 2024 Outstanding First-year Interest Group (FIG) Mentor Award.

Jeongwook "Luke" Yun made Austin Business Journal's Austin Inno Under 25 list.

Quinto

STUDENTS

UNDERGRADUATE

560	enrolled undergraduate students
1440	average SAT score of admitted students
54%	secure internships
80%	work in research groups or labs
30%	participate in study aboard programs
131	degrees awarded in 2024

AFTER GRADUATION

$77,000 average starting salary

42%	pursue jobs in industry
21%	pursue professional degrees
20%	pursue graduate degrees
16%	other

OUR B.S. GRADUATES ARE ACCEPTED TO TOP SCHOOLS, INCLUDING
- Georgia Tech
- MIT
- Rice
- UC Berkley
- UC San Diego
- Johns Hopkins
- Washington University
- Duke
- Cornell

GRADUATE

8	enrolled Master's students
133	enrolled Ph.D. students
3.7	average GPA of admitted students
8	National Science Foundation fellows
34	master's degrees awarded in 2024
18	doctoral degrees awarded in 2024
49	have major university or external fellowships

ALUMNI

2,290

biomedical engineering alumni around the world

OUR GRADUATES FIND POSITIONS AT TOP COMPANIES, INCLUDING:
- Biosense Webster
- Capital One
- Epic
- GE Healthcare
- Medtronic
- Merck
- Proctor & Gamble
- Stryker

FACULTY

TENURE/TENURE-TRACK FACULTY

25	core faculty
20	endowed faculty positions
33	affiliated faculty around the world

HONORS AND AWARDS

18	American Institute for Medical and Biological Engineering fellows
8	National Science Foundation CAREER Award recipients
5	American Association for the Advancement of Science fellows
4	National Academy of Inventors fellows
2	National Academy of Engineering members
2	National Academy of Medicine members
2	American Academy of Arts and Sciences members

RESEARCH

RESEARCH AREAS

- Biomaterials
- Biosensors and instrumentation
- Cell and tissue engineering
- Computational biomedical engineering
- Drug discovery & delivery
- Imaging and image-guided interventions
- Multiscale biophysics and biomechanics
- Neuroengineering

RESEARCH CENTERS

- James T. Willerson Center for Cardiovascular Modeling and Simulation
- Center for Computational Oncology
- Center for Emerging Imaging Technologies
- Institute for Biomaterials, Drug Delivery and Regenerative Medicine

PAPERS AND PATENTS

196	research papers and publications in 2023-24
45	patents issued in 2023-24

$13.2M

in total expenses on sponsored funds in 2024

OUR FUNDING SOURCES INCLUDE:
- National Science Foundation
- National Institutes of Health
- U.S. Department of Defense
- University Fellowships

RESEARCH ON THE RISE

Amy Brock received a three-year Cancer Prevention Research Institute of Texas (CPRIT) grant for her work on "Heterogeneity of resistance to endocrine therapy and Cdk inhibition: An integrated systems biology approach to biologically-informed treatment regimens.

Elizabeth Cosgriff-Hernandez received a five-year NIH R01 grant for her work on "Model-directed Design of Vaginal Stents to Prevent Post-radiation Stenosis.". ◼

FACILITIES
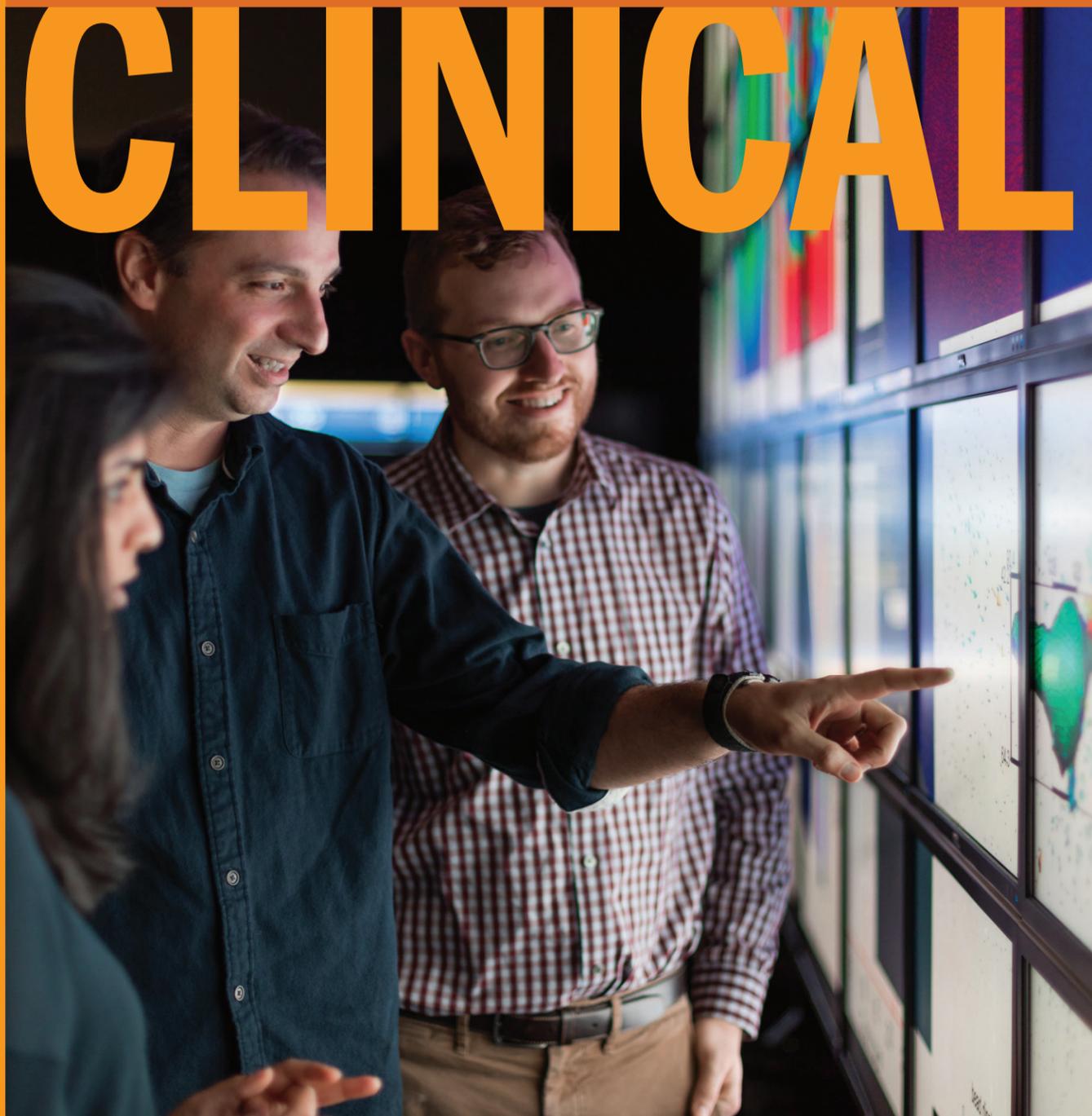
Biomedical Engineering Bldg
- 106,000 square feet
- LEED Silver certification
- Opened doors in 2008

Engineering Education & Research Ctr
- 430,000 square feet
- Multidisciplinary research lab
- Student project center
- Opened doors in 2017

CLINICAL COLLABS

When research meets real-world medicine, magic happens. That's exactly what's unfolding through the ongoing partnership between the Department of Biomedical Engineering and the UT Dell Medical School—where ideas leap from lab benches to hospital beds, transforming education and patient care alike.
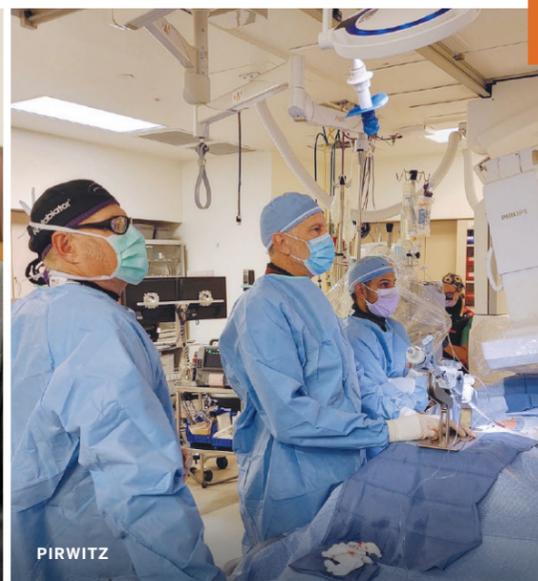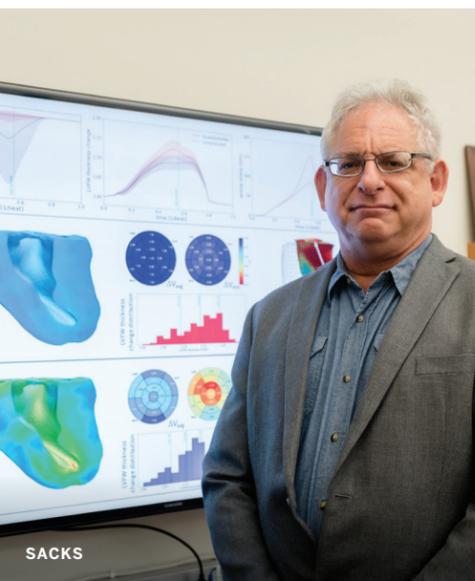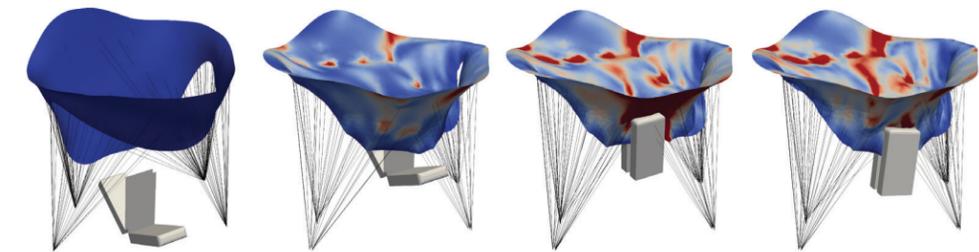
WHERE DELL-MED MEETS BME

Since its inception, the department has steadily strengthened its partnerships with Dell Med, expanding to three powerful programs involving renowned physicians.

6
MD/MSE GRADUATES
AS OF SPRING 2025

5
FACULTY
SPANNING FIVE SPECIALTIES

TURNING RESEARCH INTO REALITY

Michael Sacks is a biomedical engineering professor and director of the James T. Willerson Center for Cardiovascular Modeling and Simulation. The collaboration opens many doors for his group to conduct its research—benefitting both the careers of graduate students and eventually the quality of life for patients.

Sacks and his team are working with Dr. Mark Pirwitz, chief of the Division of Cardiology at Dell Med, to tackle mitral valve repair. This heart procedure involves doctors fixing a tiny "door" in a person's heart—called the mitral valve—that helps blood flow the right way.

Researchers share heart imaging data with surgical teams, pushing the boundaries of these repairs using virtual simulations. This lets doctors plan the best way to repair the valve, making the real-life procedure more precise and personalized.

"Working with the physicians at Dell Medical School has been an incredible learning experience as a graduate student," said Natalie Simonian, a Ph.D. candidate in Sacks' lab. "I have the rare chance to watch heart repair procedures up close in the hospital, which is both inspiring and eye-ope-

SACKS

PIRWITZ

TOP LEFT: Sacks' research, showing the progression of a patient-specific, predictive mitral valve repair simulation on a digital twin of a patient's mitral valve. The simulated procedure reproduces the procedure performed in the clinic, so the number, size, and placement of the implanted devices (in grey) matches exactly. Leaflet stresses are plotted, demonstrating how this repair can induce shifts in native mitral valve function.
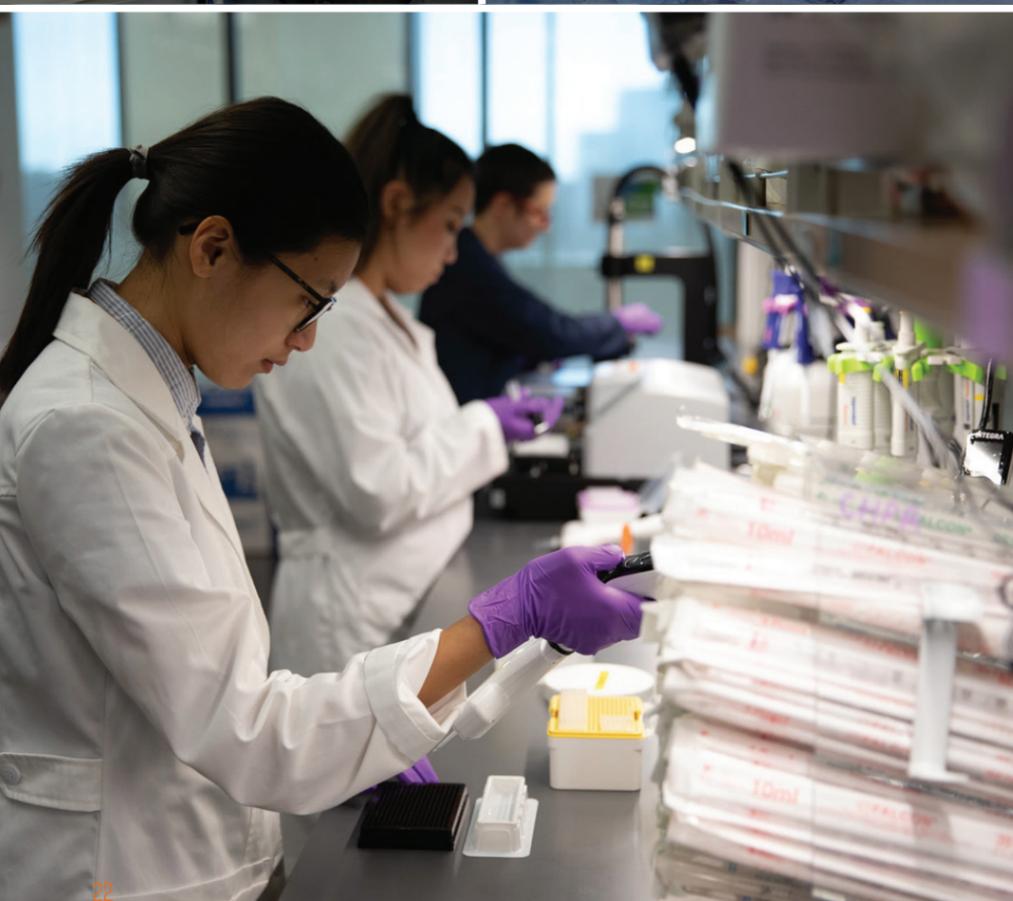
ning. Seeing the patients reminds me why this research matters—it's about improving lives. The doctors also share the real challenges they face during surgery, giving me ideas on how our simulations could help solve those problems. This collaboration has expanded my medical knowledge and keeps my work as a biomedical engineer rooted in what truly matters: real-world patient care."

CLINICAL INNOVATION DESIGN (CID)

The CID program launched in the fall of 2020. Participants in the CID program focus on understanding patient needs in health care and are involved in all aspects of medical device development and innovation, from analyzing current solutions to prototyping and business plan development.

The CID program pairs third-year medical students from Dell Med with master's students from the Cockrell School of Engineering for nine months. During the first six weeks of the program, sub-teams made up of two students observe clinical needs across a specific clinic service area.

James Tunnell, biomedical engineering professor (far right) with current CID cohort

In the spring semester, the student teams brainstorm solutions for their selected clinical need, prototype their solution and write a business plan for the medical device they develop.

"WE HAVE BEEN EXCITED TO LEAD PROGRAMS LIKE CID TO CATALYZE TRUE COLLABORATION BETWEEN THE DELL MEDICAL SCHOOL AND THE COCKRELL SCHOOL OF ENGINEERING, SPECIFICALLY THE DEPARTMENT OF BIOMEDICAL ENGINEERING. THIS COURSE PROVIDES BOTH A MODEL AND EXAMPLE OF THE POTENTIAL WHEN CLINICIANS COLLABORATE WITH ENGINEERS TO DEVELOP IMPACTFUL MEDICAL TECHNOLOGIES."

—Dr. John Uecker, Professor, Department of Surgery and Perioperative Care, Dell Medical School

INTEGRATED M.D./M.S.E. DUAL-DEGREE PROGRAM

In collaboration with Dell Medical School, the Department of Biomedical Engineering offers an MSE degree specifically designed for current medical students. Dell Medical students can choose the biomedical engineering M.S. to fulfill requirements in year three, also known as the growth year.

The overarching goal of the program is to produce physicians who can practice medicine and biomedical research with the quantitative analytical skills of an engineer.
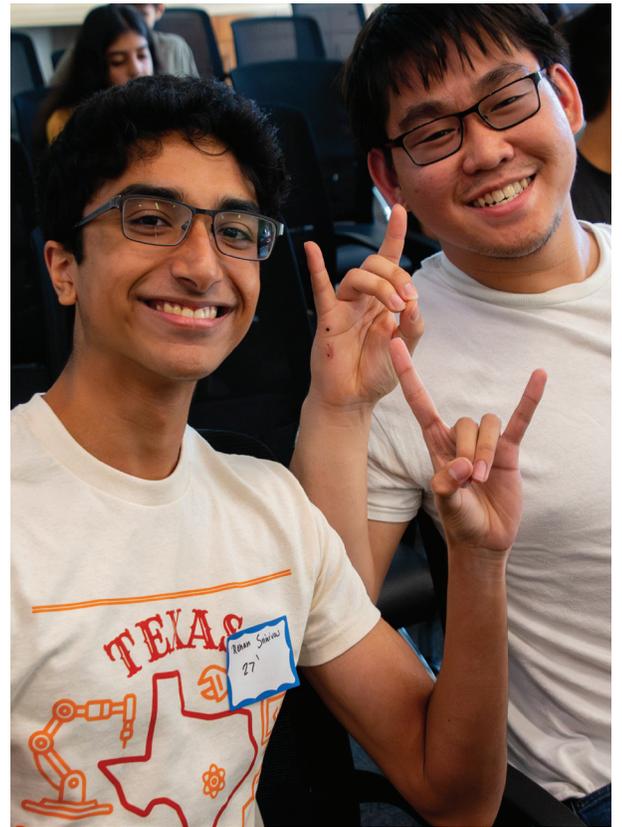
"The dual-degree program equips medical students with clinical expertise and cutting-edge biomedical engineering skills. They're not just preparing for the white coat—they're mastering the tools of innovation that set them apart on Match Day, drive their residency success, and power technology-driven patient care," said Jenny Kondo, graduate program administrator for the Department of Biomedical Engineering. ■

BUILDING BIOMEDICAL BONDS

Our students are shaping the future of health care while making lifelong friendships along the way.
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