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

2023-2024

PULSE

AN ANNUAL PUBLICATION OF THE DEPARTMENT OF BIOMEDICAL ENGINEERING

FROM CAIRO TO COCKRELL TO CURE CANCER USING AI

MORE ON PAGE 12

FROM THE CHAIR

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PULSE

Pulse is published annually for alumni and friends of the Department of Biomedical Engineering in the Cockrell School of Engineering at The University of Texas at Austin.

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EDITORIAL

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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 AIMBE College of Fellows, 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% 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.

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

KOENIG HONORED WITH CAREER ACHIEVEMENT IN RESEARCH AWARD

Alumnus Steven C. Koenig is the recipient of the 2023 University of Louisville School of Medicine's Career Achievement in Research Award.

Koeing was awarded his doctorate in biomedical engineering from UT Austin in 1996 and is now a professor and endowed chair of cardiac implant sciences in the University of Louisville's Department of Bioengineering as well as a professor in the Department of Cardiovascular and Thoracic Surgery.

Koeing received the Career Achievement in Research Award due to his incredible achievements leading the Advanced Heart Failure Research Program at UL, where he and his team develop and test mechanical circulatory support devices for the treatment of end-stage heart failure. ■

FACULTY UPDATES

Associate professor EVAN WANG received the 2023 Young Investigator Award from the Gene Editing & Gene Delivery Focus Group and the 2024 NSF CAREER Award.

Professor NICHOLAS PEPPAS received the 2024 CAB Global Biomaterials Leadership Award and the 2024 Biomedical Engineering Society CMBE Shu Chien Achievement Award.

Professors JAMES TUNNELL and MICHAEL SACKS received the 2023 ABME Best Paper Award.

Associate professor SAMANTHA SANTACRUZ received the 2023 Outstanding Young Alumni Award from Rice University.

Professor NANSHU LU was elected into the 2024 AIMBE College of Fellows.

TOM YANKEELOV received the 2023 Accessibility Champion Award from the UT Austin Disability and Access and Disability Cultural Center.

SAPUN PAREKH was promoted to tenured associate professor.

TIM YEH was promoted to tenured full professor.

LIFE IN BME

FIGS: A First-Year Interest Group (FIG) is a small group of students who attend a weekly seminar led by a peer mentor. ***The "F" in FIG also means fun***, as students develop a sense of community with their fellow first years.

Peer Advisors: The ***Peer Advising Office*** is always a great space to drop in for some snacks, laughs, study time, and a positive boost from fellow biomedical engineers!

Fall Gathering: The annual Fall Gathering is always full of sweets, smiles, and surprises as the official 2023 Department of Biomedical Engineering t-shirt is revealed!

Texas Engineering World Health: This project-based organization is centered around ***creating innovative medical solutions to unmet needs in developing nations***, with an

(*From left to right*): Arslan Amin, Satyajit Balial, Andra Keierleber; Marissa Wechslet.

(cont.)

emphasis on developing its members' technical skills through the hands-on process of prototyping.

Biomedical Engineering Society: From Seattle to Baltimore and beyond, every year we join more than 100 other biomedical engineering departments nationwide to showcase why we are among the top programs in the country.

AlumNight: BME graduates stopped by for AlumNight 2023 ***to share their stories*** as a NASA design engineer, a surgical trauma fellow, cell therapy workflow development leader, and assistant biomedical engineering professor.

Short-Term Study Abroad: BME offers a four-week term between the spring and summer, allowing students to study abroad and take a course that counts toward their degree. This year, students traveled to ***Barcelona, Spain*** for a course in micro and nanotechnologies taught by associate professor ***Tim Yeh***. ■

OUTSIDE THE LAB

5 QUESTIONS WITH NEW FACUTY MEMBER

QIAN YIN

For many years, Professor Qian Yin has been on a mission to develop advanced cancer immunotherapies and universal vaccines for influenza or SARS-CoV-2 viruses. She joined the Department of Biomedical Engineering in January 2024, where she will continue her immunology research and leverage her expertise to create a unique research program at UT.

What was your previous position and where?

I was an instructor in the Institute for Immunology, Transplantation, and Infection at Stanford University.

What is your research area and what does it aim to achieve?

My research lies at the intersection of engineering and immunology, employing a biomaterials-centric approach to precisely modulate the immune system and develop efficient therapies. I have designed material tools that enable answering fundamental questions in immunology and developing advanced therapies against cancer and infectious diseases.

What is your current specific research focus?

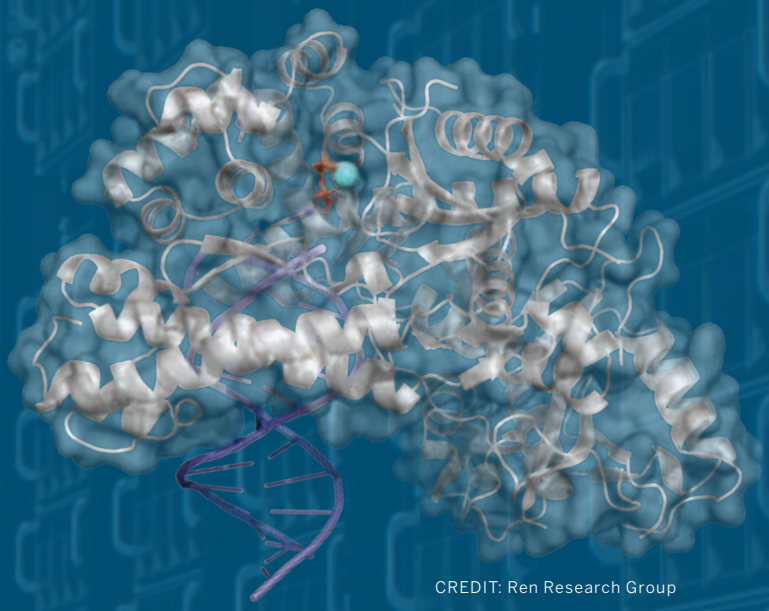
I will leverage my expertise in both engineering and immunology to create a unique research program at UT Austin. Specifically, I will employ the biomaterials I developed to address the fundamental questions related to anti-tumor immune responses in glioblastoma or germinal center responses in vaccination. Then, I will apply the obtained knowledge to optimize my technologies for developing new cancer immunotherapies and universal vaccines for influenza or SARS-CoV-2 viruses. I will also establish human tumor and immune organoid models in my lab to advance these therapies to treat human diseases.

Where did you obtain your degrees and previous educational experience?

I obtained my Ph.D. in materials science and engineering at University of Illinois at Urbana-Champaign in 2015. I obtained my bachelor's degree in chemistry at the University of Science and Technology of China in 2010. My work as a postdoc and later as instructor at Stanford University has led to three patent applications.

Any publications and or notable awards?

I have 11 first-authored publications in prestigious journals. I am the recipient of the CPRIT First-Time, Tenure Track Faculty award, Stanford Cancer Institute Fellowship/ Ellie Guardino Research Fund, NCI CCNE-TD Pilot Project award, CRI Lloyd J Old Memorial Fellowship and Irvington Postdoctoral Fellowship, NCI M-CNTC Fellowship, Nadine Barrie Smith Memorial Fellowship, Beckman Institute Graduate Fellowship, 3M Graduate Fellow, and Racheff-Intel Award. ■



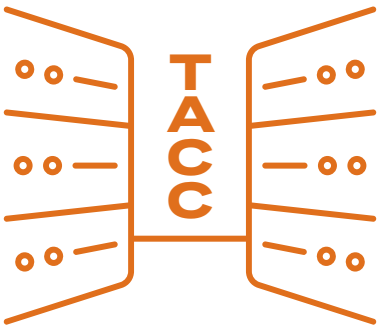
CREDIT: Ren Research Group

REVOLUTIONIZING BIOMEDICAL ENGINEERING WITH A

COMPUTATIONAL POWERHOUSE

—

Over the last 200 years, computers have become an integral part of our daily lives, and biomedical engineering is no exception. A far cry from the 19th Century mechanical calculating machines, computers today help biomedical engineers tackle health care challenges and consequently improve the lives of patients. Researchers can advance medicine with complex molecular modeling, computational biomechanics, bioimaging, and programming to combine clinical data with patient-specific genotyping.



8300
Intel Cascade Lake Xeon nodes

#1
Home of the nation's fastest supercomputer at any U.S. university

90
graphics processing unit (GPU) nodes of NVIDIA Quadro RTX 5000

Computation possibilities are almost endless on the Forty Acres with the Texas Advanced Computing Center (TACC) — home to the fastest academic computer in the United States and the 19th most powerful supercomputer in the world. Known as Fronterra, this petascale computing system opens up new doors in biomedical engineering by providing a computational capability that allows researchers to tackle larger and more complex challenges.

Biomedical engineering professor Tom Yankeelov is the director of the Center for Computational Oncology at UT Austin. The MD Anderson Cancer Research Center, the TACC, and the Oden Institute for Computational Engineering and Sciences are collaborating in oncological data and computational science research. The strategic initiative creates a unique opportunity to align mathematical modeling and advanced computing methods with oncology expertise to bring forward new approaches that can improve outcomes for patients with unmet needs.

AT UT AUSTIN, COMPUTATIONAL BIOMEDICAL ENGINEERING RESEARCH FOCUSES ON:

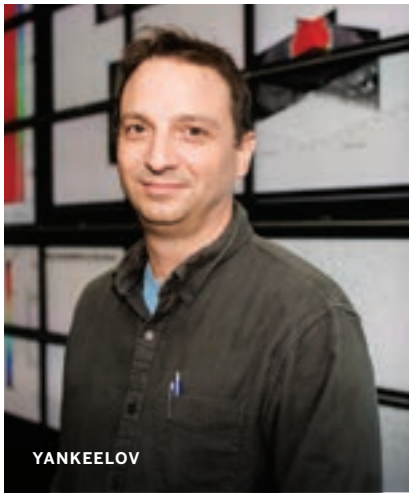
- Computational oncology
- Computational cardiology
- Multiscale modeling and simulations
- Biomedical informatics, artificial intelligence, and machine learning

On an individual level, our faculty develop advancements in digital twin technology, improved drug delivery, and breakthroughs in disease detection.

As the Department of Biomedical Engineering builds a computational powerhouse, the promises of artificial intelligence are taking center stage. The integration of AI into biomedical engineering continues to evolve, offering immense potential to enhance the ability, efficiency, and accuracy to create individualized treatment plans for patients.

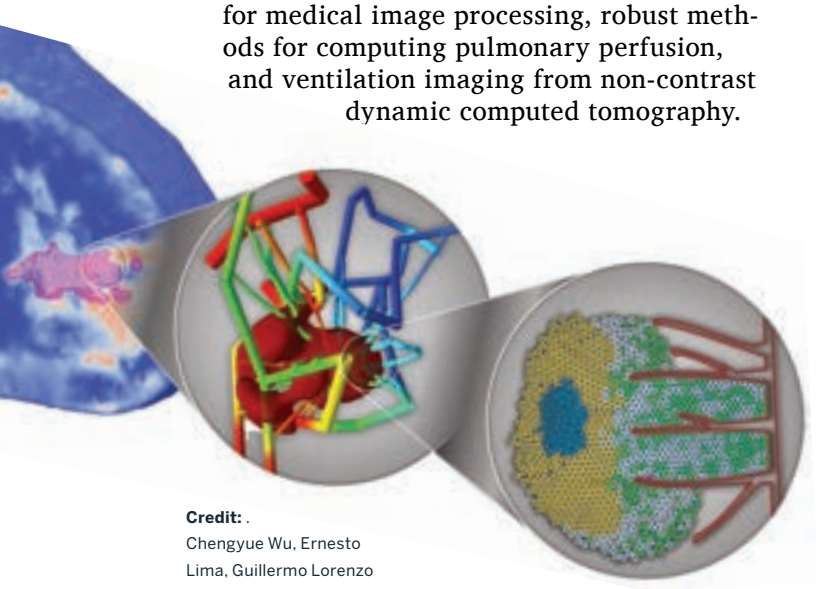

CASTILLO


REN


YANKEELOV

Biomedical engineering professor Pengyu Ren is leading the way with his groundbreaking advancements in computational biomolecular engineering. Researchers in professor Ren's lab use advanced simulations as well as AI-enhanced medicinal chemistry to develop novel drug candidates. Simultaneously, they are creating innovative drug delivery methods. Ren is the co-founder of Qubit Pharmaceuticals, which uses supercomputers and cutting-edge software to carry out computations for drug discovery at a quantum level of accuracy.

Last but not least, computational biomedical engineering has the ability to take imaging research to new heights. Associate professor Ed Castillo develops deep learning methods for medical image processing, robust methods for computing pulmonary perfusion, and ventilation imaging from non-contrast dynamic computed tomography.



Credit: . Chengyue Wu, Ernesto Lima, Guillermo Lorenzo

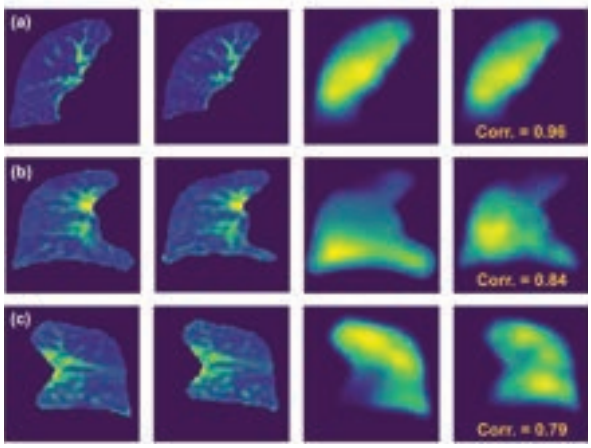


Figure: Qualitative results with inhale and exhale CT images, the corresponding SPECT-P image and the predicted SPECT-P image from the trained model, provided by Castillo lab.

Ultimately, a computational biomedical engineering powerhouse paves the way for health care innovation. The application of computational technology coupled with biomedical engineering research opens doors for personalized medicine, state-of-the-art diagnostic tools, and innovative therapies.

As our computational powerhouse evolves, it will lay the foundation for innovative discoveries by revolutionizing health care, improving patient outcomes, and providing hope for a healthier world.■

Figure: Illustrates a multi-scale model that links tumor (left), vascular (center), cellular (right) features; provided by Yankeelov lab.

STUDENT-LED PROGRAM FOR TEACHING ASSISTANTS

BUILDS COMMUNITY

An award-winning program led by biomedical engineering graduate students strives to promote inclusion for teaching assistants and encourage open communication.

Now in its second iteration, curating department specific peer-led teaching assistant support is designed to help TAs feel connected and part of a community. The program focuses on encouraging open communication, sharing positive learning practices, and developing strategies to manage being a TA with the multitude of other responsibilities that graduate students must juggle.

Throughout the semester, group discussions with structured presentations are held while allowing TAs to share "roses and thorns" about their experiences. This includes what has and has not worked for them, what they are excited or anxious about and past or present experiences.

"One of the most tangible impacts of this program is the honest conversations we have in our check-ins. It's almost like a group therapy session where we get to talk about problems we encounter and share advice on how to handle difficult conversations and topics. To me, the peer leadership of this program is its biggest impact," said Nikhith Kalkunte, program founder.

Ph.D. candidate Noah Stern currently leads the program.

> "LEADING THIS PROGRAM ALLOWS ME TO GIVE BACK AND ENSURE THAT THE COMMUNITY I FELT APART OF WHEN I WAS IN NEED IS ALWAYS THERE FOR THE NEXT GENERATION OF TAs. GRADUATE SCHOOL IS HARD AND COMES WITH A LOT OF UNFORESEEN CHALLENGES, SO I VIEW ANY TYPE OF SUPPORTIVE COMMUNITY BUILDING AND OPEN DISCUSSION THAT WE CAN MAKE SPACE FOR AS A HUGE WIN," SAID STERN.

The program now serves as a model for other departments within the Cockrell School of Engineering. ■

FROM CAIRO TO COCKRELL TO CURE CANCER

HARNESSING THE POWER OF ARTIFICIAL INTELLIGENCE

More than 10 million people die of cancer every year around the world, with millions more affected by the passing of family members. For Alaa Melek, the disease transformed her life and educational career.

The 28-year-old UT biomedical engineering Ph.D. candidate lost her aunt to breast cancer when she was 11 years old and her father to colon cancer when she was 15 years old.

“I remember witnessing the struggles, pain, and emotional toll that having cancer had on them. I remember how all the family members shared this pain as well. I wanted to help others who might face the same pain. I wanted to make a difference in the oncology research area and not become a physician so that I could help as many people as possible and leave a legacy to my Dad,” Melek said.

Additionally, Melek considers herself to be a "numbers girl,” thus biomedical engineering made the most sense to start her journey.

Driven by a Texas-sized level of initiative and fueled by an unwavering dedication to helping others, Melek paved her own path that took her from the University of Cairo to The University of Texas at Austin where she now aims to tackle cancer using the hottest technology of the moment: ***artificial intelligence***.

MELEK IN CAIRO ALONG NILE RIVER

MELEK IN AUSTIN ALONG COLORADO RIVER

Born and raised in Egypt, Melek obtained her Bachelor of Science in biomedical engineering from Cairo University.

After undergrad, her next accomplishment was to obtain her master's degree in the United States and UT's national reputation caught her eye. While time wasn't in her favor, for Melek it wasn't a goodbye to the Live Music Capital of the World but rather a 'See you soon.'

She shook it off and without missing a beat, got back on her feet, and returned to Cairo University for her Master of Science in biomedical engineering — often completing her research at her favorite hideout in the city.

While attending a medical imaging conference, she met a Ph.D. candidate from the Chandra Family Department of Electrical and Computer Engineering. With UT already on her radar, meeting a Longhorn re-ignited her interest in coming to Texas for her Ph.D.

"PROFESSORS LIKE MARKEY AND CASTILLO WERE ALWAYS THERE WHEN WE NEEDED SOMETHING OR FACED CHALLENGE. EVEN WHEN I DIDN'T SAY I WAS STRESSED, ED WOULD WALK UP AND SAY 'OK, RELAX.'"

In a full-circle moment, where the stars at night were big and bright, Melek was accepted into the Cockrell School of Engineering's Department of Biomedical Engineering Ph.D. program deep in the heart of Texas, 7,088 miles away from where she grew up. Now, the time had come to leap out of her comfort zone, from the country where she spent her entire life, and ride up into Austin, the cradle of the west, as the great Ray Benson would say.

With her life packed into bags, she set foot on the UT campus ready to change the world using the most influential technology of the moment, artificial intelligence, and applying it to cancer, which impacted her family like so many others

Melek already conquered what can be a massive early hurdle for people settling in a new country.

"I was fortunate that my English was understandable. A lot of international students have this language barrier, but I was fortunate in this way where I could already communicate easily with other people," she said.

Language aside, the transition to a new city, a new country, and a new culture was by no means a casual walk in Zilker Park. Due to visa complications, she missed the orientation for international students in the Fall of 2023. Yet, Melek found a plethora of other resources across the Cockrell School and especially within the walls of the biomedical engineering department.

"When I got here after orientation week, people always checked in on me and let me know I could reach out if I needed anything," she said. "Professors like Mia Markey and Ed Castillo were always there when we needed something or faced challenge. Even when I didn't say I was stressed, Ed would walk up and say 'OK, relax.'"

Castillo often senses homesickness among international students, but it hasn't been the case with Melek.

"It's a culture shock and they miss where they came from," he said. "That's totally understandable and some of them need some prodding to get out into the UT community. I say, 'You know, there's definitely other groups of people or other students around here who are going through what you are going through. And it would be good if you met with them and you can support each other.' And I've had to prod the others, but with her, she took the initiative. She got involved with all sorts of stuff. Most recently the GAIN (Graduate and Industry Networking) thing. I said, 'How did you do that?'

And she said, 'Well, I thought it was interesting and I wanted to help.' And there you go, that's Alaa," said Castillo.

This combination of initiative and motivation drives both her academic and personal success. Castillo recognizes that Melek likely

AI IN ACTION
Castillo and Melek assess lung tumors.

experienced some adjustment issues similar to other international students, yet her approach was unique and highly effective.

"The way that she dealt with it was by getting integrated into the UT community and the research community in particular. I haven't seen that before. At the same time with her, she was going through all of that at the beginning and you could see the toll it was taking on her mentally. Yet she also felt like she needed to hit the ground running with her research and immediately start making contributions to the lab. And I had to tell her, 'Get settled, get your legs underneath you first. You have already done way more than I would expect anyone to do, take a breath!' And I think that she needed to hear that because she is trying to get acclimated and at the same time trying to cure cancer on her first go. And I told her, 'You are going to do great things, you don't have to do them all in the first semester,'" said Castillo.

With the reminder that biomedical engineering research is a marathon and not a sprint, Melek took the time to find her community and a support system that she built from the ground up, providing her the freedom to dive into the research she holds so close to her heart.

STUDENTS SUPPORTING STUDENTS
Melek volunteering with international orientation.

THE NEXT STEPS:

As a second-year Ph.D. student at UT, Melek's research is centered around improving health care with AI. Her interest in the technology flourished during graduate school as the core processing technologies behind AI and the datasets it uses to learn grew exponentially. Computer vision was always a step ahead of health care and medical imaging.

Her thesis focused on applying AI and computational methods to breast cancer detection. — largely inspired by the Baheya Foundation, a local hospital that was the first breast cancer early detection and treatment hospital in all of Egypt. The foundation is named for an Egyptian woman, Baheya Wahby, who was diagnosed with breast cancer and couldn't find the necessary scans nor the needed treatment in Egypt at that time.

Now, Melek will use her technical knowledge of AI to help physicians better take care of their patients.

"For me it means a lot; this is my first big research project and my first collaboration with health care," said Melek. "I spent a lot of time shadowing and collecting data for my master's and later as a psychological support volunteer in this hospital. I am particularly proud because I was the one to visit and come up with a research proposal and start this collaboration from the ground up."

As an Archer Fellowship recipient, Melek will travel to Washington D.C. in the summer of 2024 to work on public policy revolving around AI in health care.

"I would like to see my research used in the clinic. Regulating AI in general is a really hot topic right now in the U.S. You can see there are a lot of people with technical backgrounds right now in the process, so maybe something like that will help me to break into a new area that I never considered before UT," she said.

For Melek, her principal focus is local, trustworthy, and ethical applications of health care AI.

"We need to make sure that what we develop in the lab is actually serving our patients and not making the situation worse," she said.

A BOND NEVER BROKEN:
Alaa Melek and her late father Nabil Melek

The applications of health care AI are an open road, as the transformative potential of the technology promises a future where advanced algorithms enhance detection accuracy, create personalized treatments, and improve efficiency — resulting in unprecedented growth for positive patient care outcomes.

"I still have this dream to have a cutting-edge research center for oncology named after my late dad, I even had a name for this institution before graduating high school 'Nabil Melek Memorial.' One of my unspoken, yet biggest dreams," she said with a smile. ■

MAKING GAINS

Graduate and Industry Networking (GAIN) is an annual flagship event at UT Austin. It opens doors for engineering graduate students to network and create meaningful connections with industry leaders. In turn, recruiters can learn about the outstanding research work performed by UT graduate students, recruit candidates, and foster industry-academia collaborations.

IN RECOGNITION OF GRADUATES WHO HAVE MADE A CONSIDERABLE CONTRIBUTION TO THE FIELD OF BIOMEDICAL ENGINEERING AND UT AUSTIN.

Academy of Distinguished BIOMEDICAL ENGINEERS

REBECCA RICHARDS-KORTUM

Professor of Bioengineering, Rice University

A former professor in the UT Austin Chandra Family Department of Electrical and Computer Engineering, Rebecca Richards-Kortum specializes in creating new technologies to provide health care to vulnerable populations, including methods for diagnosis of cancers, methods for treating jaundice in newborns, and a bubble continuous positive airway pressure machine for premature infants unable to breathe on their own. In recognition of her work, Richards-Kortum received a MacArthur Fellowship in 2016. She was elected to the National Academy of Engineering in 2008 and the National Academy of Sciences and the American Academy of Arts and Sciences in 2015. In 2016, she received the Pierre Galletti Award, the highest honor from the American Institute for Medical and Biological Engineering. She has received more grants than any other Rice University professor.

GRACIE VARGAS, PH.D. BME 2001

Professor, University of Texas Medical Branch

After receiving her Ph.D. in biomedical engineering from The University of Texas at Austin, Gracie Vargas joined The University of Texas Medical Branch in 2002, where she serves today as a professor. An elected fellow of the American Institute for Medical and Biological Engineering, Vargas is an internationally recognized expert in biomedical optics/biomedical engineering with committee service that guides the direction of national research in medical imaging and bioinstrumentation. In addition to her outstanding record of scientific innovation, Vargas is dedicated to mentoring the next generation of scientists and strengthening the diversity of the biomedical workforce. Her mentoring and research have enduring value, and she is a highly valued and respected member of UTMB and the community at large. ■

INNOVATING
HEALTH CARE
THROUGH

IMAGING & INFORMATICS

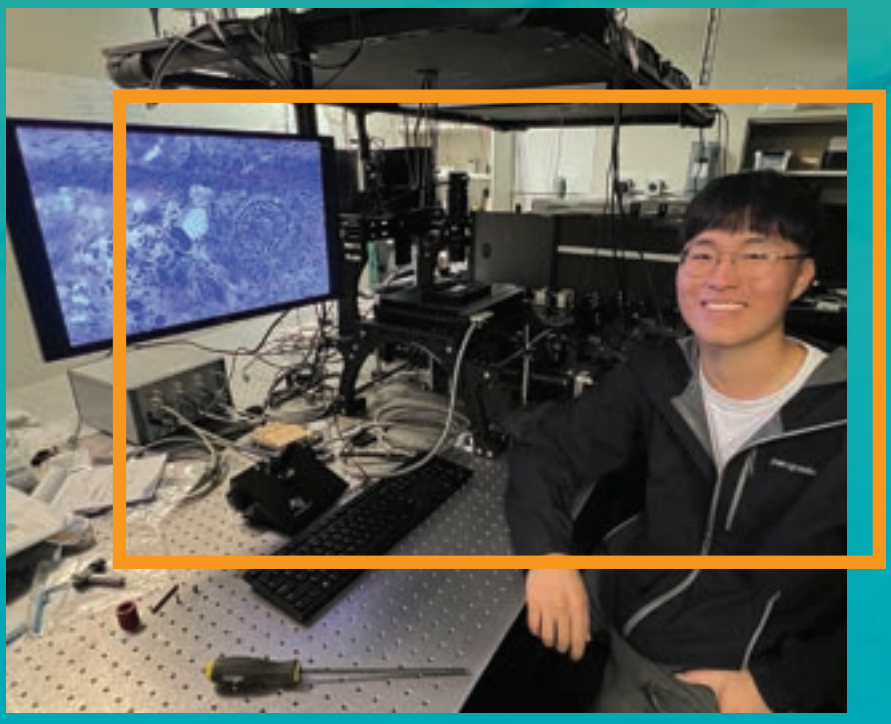
A PREDOCTORAL TRAINING PROGRAM BOLSTERED BY STATE-OF-THE-ART EQUIPMENT, PRESTIGIOUS STUDENTS AND FACULTY SUPPORT.

Imaging and informatics stand as indispensable pillars of modern health care, revolutionizing diagnostic processes, treatment planning, and patient care.

Health care professionals gain unprecedented insights into the human body through sophisticated imaging technologies like MRI, CT scans, and ultrasound.

This enables them to detect abnormalities, assess disease progression, and guide therapeutic interventions with remarkable precision precisely guide therapeutic interventions.

However, the true power of imaging lies not only in its ability to capture anatomical details but also in its integration with informatics systems. By harnessing the vast amounts of data generated by imaging modalities and employing advanced informatics tools, healthcare providers can streamline workflows, enhance collaboration among interdisciplinary teams, and deliver personalized treatment strategies tailored to individual patient needs.



PH.D. CANDIDATE BRIAN LEE

Brightfield images of H&E stained skin cancer tissue margins.

The Imaging Science & Informatics Predoctoral Training Program at UT Austin is a unique academic adventure that trains comprehensive imaging scientists in the skills necessary to use these technologies to improve the prevention, detection, diagnosis, and treatment of human diseases.

THE PROGRAM FOCUSES ON FOUR CORE AREAS:

- **Instrumentation, devices, and contrast agents**
- **Image processing**
- **Modeling and visualization**
- **Informatics**

STATE-OF-THE-ART IMAGING
An Ultima IV upright microscope specifically arranged for imaging whole tissue specimens using either multiphoton microscopy or confocal microscopy for imaging thick tissue samples without needing to physically section them.

A variety of students enter the program every year, each with a different specific interest and all carrying the same passion of healthcare innovation through imaging.

Brian Lee is a first-year Ph.D. student in the Biophotonics Lab led by professor James Tunnell. His research interests in photonics and optical imaging made the program an ideal fit for him to advance as an imaging scientist.

"I believe what I have learned so far, and lessons I will learn during this fellowship, will be essential in becoming a noteworthy imaging scientist in the future. I intend to continue working in the optics field, and the topics covered in the imaging fellowship are great opportunities for me to excel my aptitude and expand my skill set in this field," said Lee.

Haidyn Ogg is a second-year Ph.D. student working with Laura Suggs. Her primary research interest is the development of biomaterials for stem cell and tissue engineering. She said the Imaging Science & Informatics program piqued her interest since it seemed like a good opportunity to broaden her knowledge beyond the "cells on gels" world.

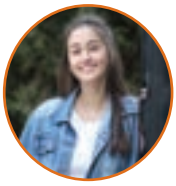
> "I PLAN TO USE THIS EXPERIENCE TO NOT ONLY HELP INCORPORATE ADVANCED IMAGING TECHNIQUES INTO MY RESEARCH, BUT ALSO TO HELP ME TACKLE SOME OF MY ENGINEERING WEAKNESSES THAT HAVE DEVELOPED AS SOMEONE WHO HAS ALWAYS PURSUED "WET-LAB" RESEARCH, SUCH AS CODING AND MODELING," OGG SAID.

Graduates of the program have gone on to become assistant researchers, staff engineers, and employees at startups. ■

A FEW FACES OF IMAGING & INFORMATICS

Ayesha Bharadwa Das is interested in quantifying hypoxia noninvasively using MRI and developing the technology's imaging applications.

Blake Evans has an interest in developing imaging systems and imaging processing techniques for clinical translation.



Dominique Jordan is interested in regenerative medicine, medical devices, and membrane-based therapeutics—making the program an ideal fit.

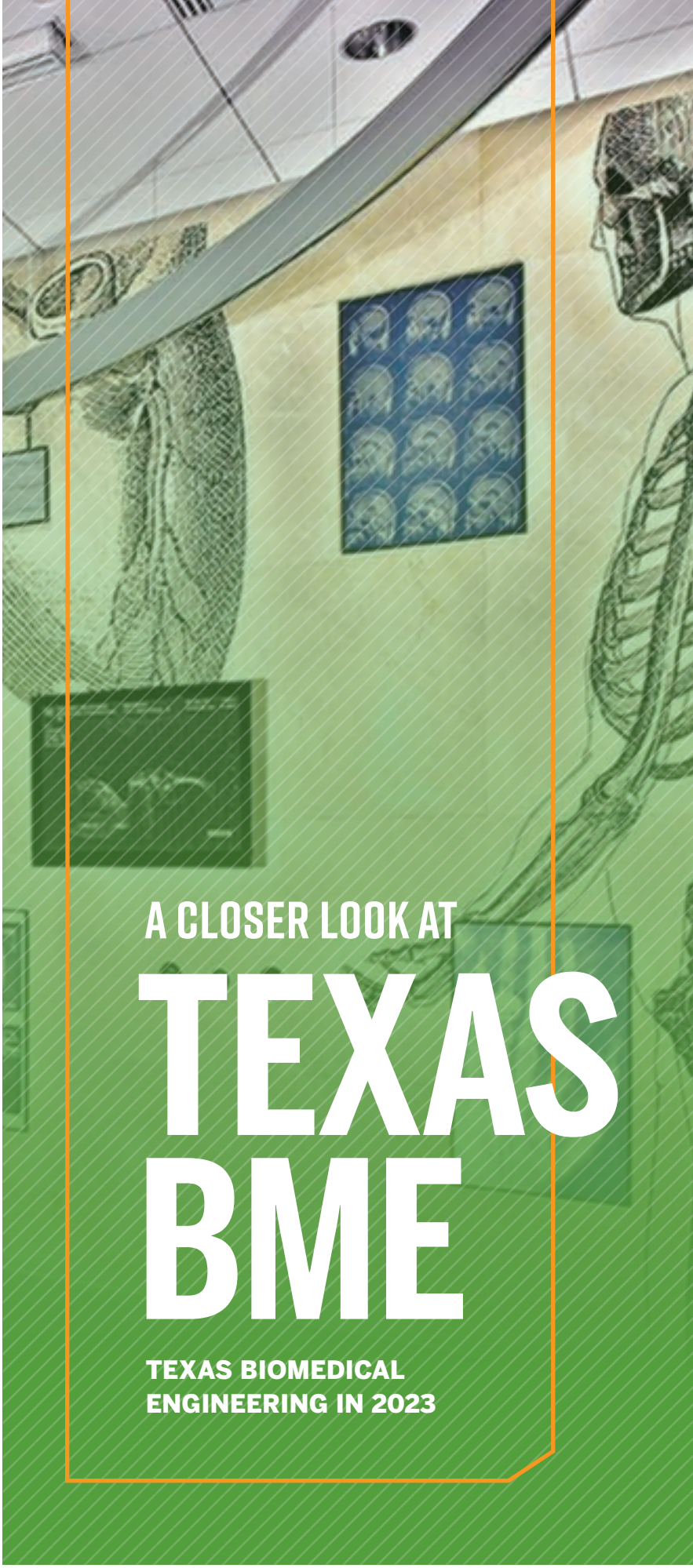
Brian Lee is interested in photonics and optical imaging which made the program's externship opportunities appealing.

Haidyn Ogg wants to merge imaging with her interest in developing biomaterials for stem cell and tissue engineering.

Gabriela Renta-Lopez is focused on developing decision support systems to improve the quality of life for breast cancer patients.

PORRAS HONORED WITH AAAS AWARD FOR PUBLIC ENGAGEMENT WITH SCIENCE

Texas BME alumna Ana Maria Porras, class of 2011, received the 2024 AAAS Early Career Award for Public Engagement with Science for her impact to engage younger and diverse communities in science. Shortly after graduating from the Forty Acres, she crocheted colorful microbes, a project that started as a solution to attract conference attendees to a trade show booth. This personal passion ended up being a wonderful tool to teach microbiology concepts and for Porras to delve into science communication, an area where her impact is anything but tiny. ■



A CLOSER LOOK AT

TEXAS BME

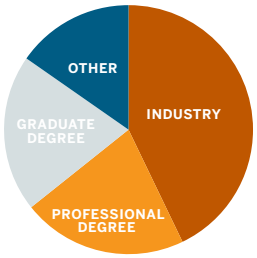
IN 2023

STUDENTS

UNDERGRADUATE

554	enrolled undergraduate students
1442	average SAT score of admitted students
54%	secure internships
79%	work in research groups or labs
32%	participate in study aboard programs
98	degrees awarded in 2023

AFTER GRADUATION



$86,848 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
3.65	average GPA of admitted students
8	National Science Foundation fellows
25	master's degrees awarded in 2023
14	doctoral degrees awarded in 2023
49 (or 40%)	have major university or external fellowships

100%
of Ph. D. students receive full funding

GRADUATE NEWS


Tasset

Ph.D. candidate **Aaron Tasset** was selected for the American Association of Pharmaceutical Scientists (AAPS) Best Abstract Award.

Ph.D. candidate **Hugo Miniere** earned the Gold Level Research Award from Sandia National Labs.


Hong

Ph.D. candidate **Soonwoo Hong** accepted the 2023 ACS Division of Biochemical Technology's W.H. Peterson Award for best student oral presentation.


Melek

Ph.D. candidate **Leon Hsieh** was chosen for a University Graduate Continuing Fellowship.

Ph.D. candidate **Alaa Melek** received the Archer Fellowship.

UNDERGRADUATE NEWS

Nikita Villegas received a 2024 Undergraduate Research Fellowship.


Gupta

Debarghya Chaki was chosen for the DAAD RISE Scholarship.

Maanas Gupta received the 2023 Goldwater Scholarship, the 2024 Fulbright Scholarship and was a 2023 Astronaut Science Foundation Scholar.

Ellen Baik won the BMES Case Competition.

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**

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

FACULTY

TENURE/TENURE-TRACK FACULTY

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

HONORS AND AWARDS

8 National Science Foundation CAREER Award recipients
18 American Institute for Medical and Biological Engineering fellows
5 American Association for the Advancement of Science fellows
3 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 & instrumentation
- Cell & tissue engineering
- Computational biomedical engineering
- Drug discovery & delivery
- Imaging & image-guided interventions
- Multiscale biophysics & biomechanics
- Neuroengineering

$16.2M
in total expenses on sponsored funds in 2023

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 2022-23
23 patents issued in 2022-23

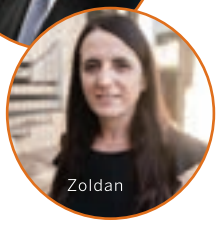
OUR FUNDING SOURCES INCLUDE:

- **National Science Foundation**
- **National Institutes of Health**
- **U.S. Department of Defense**
- **University Fellowships**
- **Diversity Fellowships**

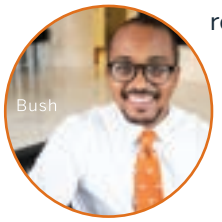
RESEARCH ON THE RISE

Evan Wang received a **$1 million grant from DARPA** for his proposal is about "Design of Wearable Neural Interfacing System for REM Sleep Restoration and Enhancement."

Janet Zoldan & **Nicholas Peppas** received a **$400,000 joint grant from the NIH** for research related to the use of hydrogels to improve stem cell transplants.



Adam Bush and **Jon Tamir**, from the Chandra Family Department of Electrical and Computer Engineering, received a five-year, **$2.7 million joint grant from the NIDDK and NIBIB** to develop novel, contrast-free MRI methods for the quantitative assessment of kidney function, especially in Black Americans. ■



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Year of AI

BREAKING BIOMEDICAL BARRIERS WITH AI

Digital twins, drug discovery, machine learning for predictive treatment modalities, and more. These are a few areas of expertise where our faculty and students are breaking down walls and innovating health care delivery with artificial intelligence. Society is at the tip of the iceberg as we witness the powerful biomedical applications of this technology to improve health care delivery, and The University of Texas at Austin is steering the ship full speed ahead.

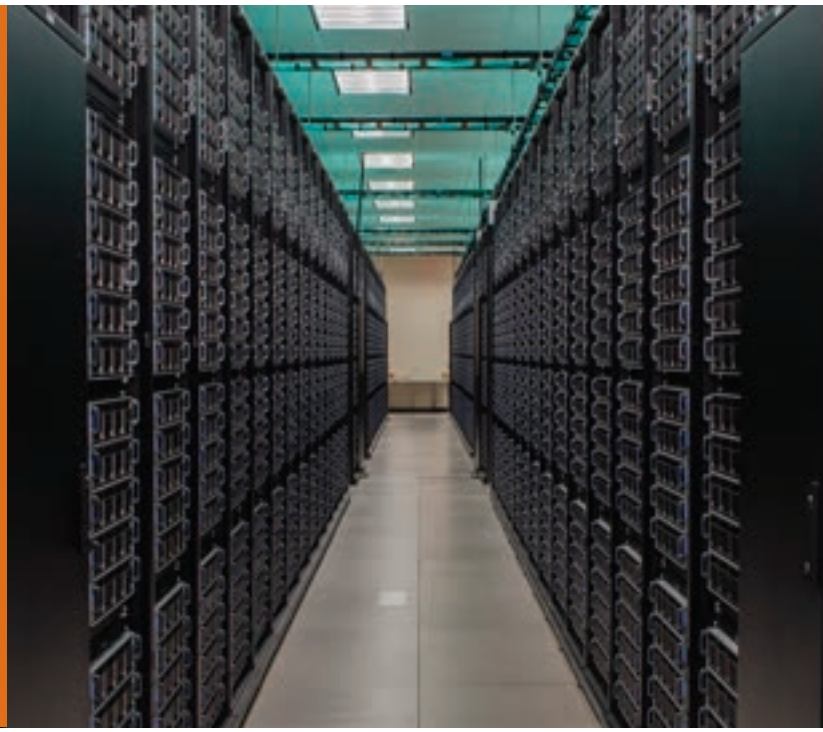

Figure: Sacks Research Group; **Photo:** TACC supercomputer

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