PAGE 8
THE COOLING EFFECT
Improved laser technology for cellular surgery

PAGE 24
DIGITAL TWINS
Explore applications of the emerging technology

PAGE 25
NSF FELLOWSHIP WINNERS
Meet the newest class of NSF graduate fellowship recipients

TEXAS Mechanical Engineer 2024

MEDICINE, MEET MECHANICAL ENGINEERING

PAGE 18

The University of Texas at Austin
Walker Department of Mechanical Engineering
Cockrell School of Engineering

TEXAS MECHANICAL ENGINEER

Texas Mechanical Engineer is published annually for alumni and friends of the J. Mike Walker Department of Mechanical Engineering in the Cockrell School of Engineering at The University of Texas at Austin.

—

EDITORIAL

Katherine Spiering
Senior Communications Coordinator

CONTRIBUTORS

DESIGN
Kendra Lewellyn

WRITING
Nat Levy, Katherine Spiering

PHOTOGRAPHY
Jack Myer, Katherine Spiering

WANT TO SUPPORT TEXAS ME?

GIVE ONLINE
me.utexas.edu/connect/giving

—

ON THE COVER

UT is one of a handful of institutions with more than one da Vinci surgical robot to test new medical technologies.

DEAR FRIENDS

Welcome to the latest issue of the Texas Mechanical Engineer Magazine! I'm now midway through my third year as chair of the Walker Department of Mechanical Engineering. During this time, it's become abundantly clear that I have the privilege of serving an exceptionally vibrant department. I'm sure this vibrancy will be evident to you as well as you scan the many updates regarding our students, faculty, and staff contained within this issue.

To kick things off, I'd like to highlight a few noteworthy items:

» Following a year's worth of data gathering and discussions with students, faculty, and staff, a new strategic plan for the department has been developed. It was approved in August 2023 and guides our activities through 2030. The plan touches on all aspects of the department's operations and describes opportunities for growth and improvement in four pillars: Community, Research, the Undergraduate Program, and the Graduate Program. Two cornerstone priorities include expanding access to the Humanitarian Engineering Program and dramatically improving facilities for Cockrell School of Engineering-based student teams (such as Longhorn Racing and TREL) by building an Engineering Teams Innovation Center. A summary of the plan is available on the department's website.

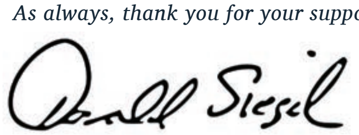
» We are fortunate that the Texas Legislature has provided significant financial support for two cutting-edge research programs led by ME faculty. First, Nuclear and Radiation Engineering faculty members Kevin Clarno and Derek Haas received $18M to build computer models — specifically, a "digital twin" – of a new generation of nuclear reactors based on molten salt technology. Secondly, the Texas Institute for Electronics, led by ME professor S.V. Sreenivasan, received $552M in state funds to support R&D in semiconductor science and manufacturing. A significant fraction of those funds is being used to enhance UT laboratories at the Montopolis Research Center and at the Pickle Research Campus.

» On a more somber note, I'm saddened to report that our colleague, professor John Goodenough, passed away on June 25, 2023, at the age of 100. As I'm sure you know, John shared the 2019 Nobel Prize in Chemistry for his contributions to developing lithium-ion batteries. John joined UT ME in 1986, after 'retiring' from the University of Oxford, and remained active in research until his passing. Aside from his monumental intellectual influence, John was an extremely generous individual — his positive impact will continue to be felt through his support of the John B. and Irene W. Goodenough Endowed Research Fund in Engineering.

Of course, that's not all! In the pages that follow you will hear about many other happenings within the department, including: our newest faculty members, a graduate student creating his own medical device startup, and how one of our researchers is using a 3D-printed cup to purify drinking water.

Before I close, I want to advertise that I'm always eager to hear and share updates about developments in the lives of our ME alums. If you have a milestone you'd like to share, please submit it using the link on page 16.

As always, thank you for your support of the Walker Department of Mechanical Engineering,



DON SIEGEL
CHAIR, WALKER DEPARTMENT OF MECHANICAL ENGINEERING

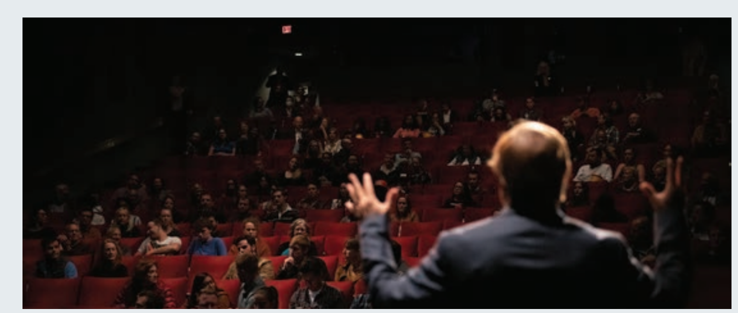


TABLE OF CONTENTS

HUMANITARIAN ENGINEERING

EDUCATING BOLD, RESPONSIBLE, INNOVATIVE ENGINEERS

11 COUNTRIES VISITED

18,300 PEOPLE SERVED

The Humanitarian Engineering Program, led by professor Janet Ellzey, provides undergraduate students with rewarding, multidisciplinary opportunities to focus their learning around communities that need their help the most.

The program includes:

- Certificate in Humanitarian Engineering
- Projects with Underserved Communities course
- Humanitarian Product Development course
- Technology Needs of Refugee Communities in Greece Maymester course
- Uganda Innovation Lab

"THESE TRIPS WILL OPEN UP YOUR EYES TO A DIFFERENT SIDE OF ENGINEERING. AS ENGINEERS, WE TEND TO FOCUS ON GOING IN AND FIXING A PROBLEM INSTEAD OF TRYING TO FIND OUT WHY THAT PROBLEM OCCURRED. I LEARNED TO LISTEN TO WHAT THE COMMUNITY NEEDED FIRST,"

—Anna Peralta, mechanical engineering student

Learn more and apply

STRATEGIC PLAN

FOR MECHANICAL ENGINEERING

Over the next seven years, the Walker Department of Mechanical Engineering aspires to solve the most pressing challenges of the 21st century through world class research, unsurpassed student education, and dedicated service to the community.

MISSION

- To develop and nurture leaders in mechanical engineering through outstanding education and professional development
- To create, explore, and develop innovations in engineering science and technology through leading edge research
- To serve the local, state, national, and international communities by addressing critical engineering challenges

VALUES

- **Impact:** We tackle the most important engineering challenges
- **Scholarship:** The creation and dissemination of knowledge is of paramount importance
- **Integrity:** Our research, teaching, and learning is conducted with unwavering honesty and for the betterment of humanity
- **Diversity:** We are receptive to diverse opinions and value all members of our community
- **Collaboration and Inclusivity:** We value an environment where all members of the department can realize their full potential, and where working together is celebrated

4 PILLARS:

- **COMMUNITY**
- **RESEARCH**
- **GRADUATE PROGRAM**
- **UNDERGRADUATE PROGRAM**

FOR MORE DETAILS ON THE PLAN, PLEASE SCAN THE QR CODE.

LINFORD SCHOLARS

Right: Michael and Erika Linford with Cockrell School Dean Roger Bonnecaze.

A transformational investment will ease the financial burden for generations of students beginning their journey as engineers at The University of Texas at Austin.

Cockrell School of Engineering alumnus Michael Linford, and his wife, Erika, have created a scholarship endowment to support high-potential Texas Engineering students who are Pell Grant-eligible.

"We are so grateful to Michael and Erika for this incredible gift to Texas Engineering," said Roger Bonnecaze, dean of the Cockrell School. "This investment will change the lives of so many of our students, removing the financial barriers to receiving an engineering education. This gift will impact engineering students for years to come and it is a testament to the strength of our Cockrell School community."

The endowment will provide need-based scholarship support for high-potential students from low- and middle-income families and will support approximately 100 engineering students per year. The inaugural class included 20 students from the Walker Department of Mechanical Engineering.

"These scholarships are already strengthening the Cockrell School's ability to recruit and graduate the very best students to the engineering school, regardless of socioeconomic status," Bonnecaze said. "And, it will enable the Cockrell School to recruit even more students from historically underrepresented backgrounds in engineering to pursue their dreams at UT."

The Linfords attribute their professional successes to their foundations in engineering and science. Michael, who was inducted into the Mechanical Engineering Academy of Distinguished Alumni in fall 2023, earned his bachelor's degree in mechanical engineering from UT Austin in 2005. Erika holds a bachelor's degree from the California Institute of Technology and received her master's degree from the Massachusetts Institute of Technology, both in chemistry. They believe that "access drives excellence" and, as scholarship recipients during their education, are passionate about supporting the future engineers who will go on to change the world.

"We have a strong belief that science and engineering make the world better, so investing in future engineers and scientists seemed like an obvious fit to us," Michael and Erika Linford said. "Students shouldn't have to skip out on an education simply because they don't have the financial means. We want to ensure those with the skills and ambition to succeed have the support they need."

> "OUR GOAL THROUGH THESE SCHOLARSHIPS IS TO SUPPORT STUDENTS WITH THE SKILLS, EXPERIENCES, AND POTENTIAL TO CHANGE THE WORLD FOR THE BETTER. WE HOPE THAT ACCESS TO THE BEST EDUCATION IN THE WORLD CONTINUES TO EXPAND TO THE BEST STUDENTS."
> - MICHAEL AND ERIKA LINFORD

The investment from Michael and Erika Linford supports UT's What Starts Here fundraising campaign — one of the largest campaigns in Texas higher education history. The university publicly launched the campaign in March of 2022, with a goal to raise $6 billion, with $1 billion earmarked for scholarships and student support. ■

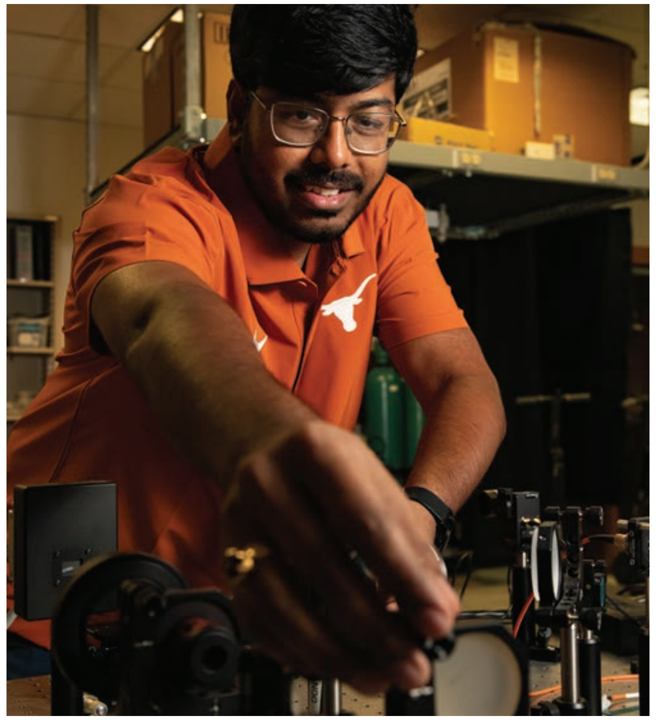
Left: The inaugural class of Linford Scholars.

THE COOLING EFFECT

LASER TECHNOLOGY COOLS THE WAY FOR CELLULAR SURGERY AND DRUG DELIVERY

Imagine a laser so gentle it can cradle nanoparticles, biological cells, and even drive drug-delivering microscopic vehicles to sick cells without causing harm. This isn't science fiction; it's a new innovation led by a team of scientists at The University of Texas at Austin.

In a world driven by nanotechnology and the quest for better drug delivery methods, optical tweezers have been a game changer. These precision instruments use lasers to trap and manipulate minuscule objects down to the nanoscale, but their high energy requirements and potential to damage fragile materials like nanoparticles and biological cells limit their use.



Recent graduate Pavana Siddhartha Kollipara.

Researchers at The University of Texas at Austin have recently overcome this long-standing problem to revolutionize biotechnological applications of optical tweezers to cell surgery and drug delivery areas. The technology, called Hypothermal Opto-thermophoretic tweezers (HOTTs), uses an ingenious environmental cooling strategy combined with precise laser heating to achieve the impossible: trapping nanoparticles, cells, and drug-carrying vesicles at sub-ambient temperatures, all without causing harm and limiting their physiological conditions.

HOTTs work by harnessing a temperature gradient: they create a cool environment while using a focused laser to generate localized heating. This temperature difference creates thermophoretic forces that gently guide and manipulate objects within the laser's grasp.

"Our work is overcoming all the current limitations of opto-thermal tweezers. By cooling the sample and combining it with laser heating, we can maintain the cell at a suitable temperature while trapping and moving it, irrespective of what the solvent or concentration is," said Pavana Siddhartha Kollipara, a recent Ph.D. graduate from Walker Department of Mechanical Engineering associate professor Yuebing Zheng's research group, who led the research published in *Nature* in August 2023[1].

"This is an important step for the industrialization of opto-thermal tweezers that push it into practical applications of controlled cell surgery and drug delivery."

Kollipara, who joined Advanced Micro Devices full time after graduation, also won the Ben Streetman Prize for his groundbreaking research. This award, a University-wide prize, is given each year for outstanding research by a graduate student in electronic and photonic materials and devices. He credits the academic freedom that he experienced during his time at UT Austin for allowing him the ability to explore different applications of his research and learn a wider range of skills.

1. Kollipara, P.S., Li, X., Li, J. et al. Hypothermal opto-thermophoretic tweezers. Nat Commun 14, 5133 (2023). https://doi.org/10.1038/s41467-023-40865-y

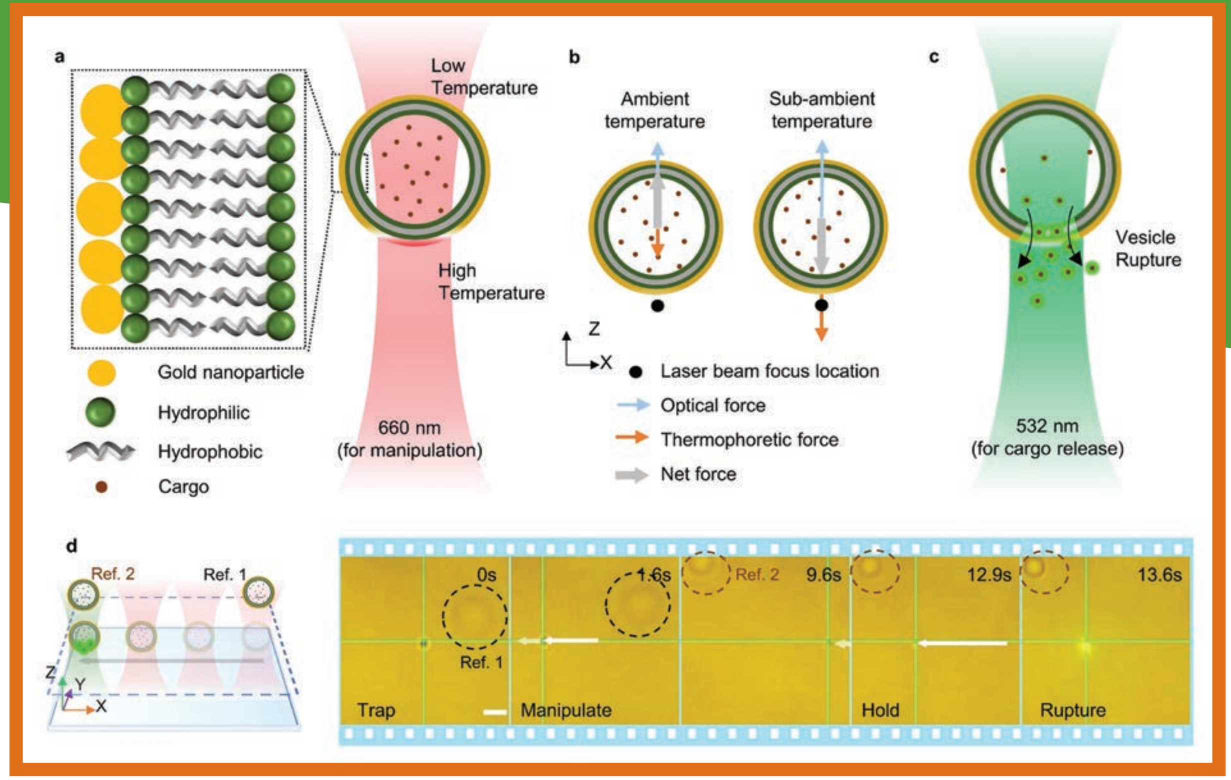


Figure: Cells can be trapped and manipulated while also maintaining their temperature using HOTTs.

WHAT'S COOL ABOUT HOTTS?

Gentle on materials: Traditional optical tweezers often damage or even destroy delicate materials, but HOTTs offer a non-invasive, low-power alternative. This clears the way to work with more sensitive materials.

Biological applications: The ability to manipulate biological cells in their native environments without disrupting their function is key to applications in biomedical research. The gentle nature of HOTTs means researchers can now delve deeper into cell behavior and interactions without compromising cell viability, and unlike predecessor technologies, this can be achieved irrespective of the cells without inducing any damage — an important criterion for implementing the technology for practical use in the biomedical industry.

Drug delivery: Imagine precise, controlled drug delivery at the cellular level for targeted cancer therapeutics. HOTTs make this a reality by allowing scientists to manipulate plasmonic vesicles. These vesicles, coated with gold, have unique properties that can be harnessed for various medical applications.

With HOTTs, scientists could precisely position these vesicles and release drugs on demand — which would present targeted drug delivery and pave the way for personalized medicine.

Surgical applications: Using HOTTs, cells can be manipulated into preset positions, and then cut open by the simple means of increasing laser power. By trapping human red blood cells in varying tonicities without causing damage, scientists will be able to study diseases like sickle cell anemia and malaria more effectively. ■

Kollipara and associate professor Yuebing Zheng in their lab in ETC.

WELCOME NEW FACULTY

YIJIN LIU
Associate Professor

RESEARCH AREA: ADVANCED MATERIALS SCIENCE & ENGINEERING

Yijin Liu joined the department in August 2023 as an associate professor. Liu comes to UT from SLAC National Accelerator Laboratory, where he was a lead scientist. He was also a postdoctoral scholar at Stanford University. He holds a B.S. and Ph.D. in optics from the Physics Department at the University of Science & Technology of China. He currently leads the Energy & Functional Materials Lab in the department.

HOW WOULD YOU DESCRIBE YOUR RESEARCH?

My group develops novel X-ray characterization methods and the associated data mining approaches. These tools are very broadly applicable to a wide range of research fields. Throughout my career, I have worked on research projects in the areas of renewable energy, industrial analysis, oil recovery and refining, materials under extreme conditions, etc. At UT, my group will focus on battery research with an emphasis on manufacturing, degradation, safety, and failure analysis. We aim to address real-world industrial challenges by conducting fundamental laboratory research that will lead to mechanistic insights.

WHAT HAVE YOU ENJOYED MOST ABOUT JOINING UT?

I've had a great time in my daily interactions with colleagues and students at UT. Through interacting with individuals from diverse research fields, interesting ideas often have taken shape over casual moments, such as lunch breaks or over a cup of coffee. The high levels of engagement and proactiveness among my colleagues is very beneficial and truly enjoyable. ■

MARYAM TILTON
Assistant Professor

RESEARCH AREA: ADVANCED MANUFACTURING AND DESIGN, BIOMECHANICAL AND BIOMEDICINE ENGINEERING

Maryam Tilton joined the department in August 2023 as an assistant professor. Tilton comes to UT from the Biomaterials and Regenerative Medicine Laboratory at the Mayo Clinic where she was a NIH-T32 musculoskeletal research postdoctoral fellow. She holds a Ph.D. in mechanical engineering from The Pennsylvania State University.

HOW WOULD YOU DESCRIBE YOUR RESEARCH?

I am interested in understanding how aging leads to musculoskeletal tissue degeneration and using the biomechanics to develop new minimally invasive treatment strategies. Central to my research is the application of advanced, visible light-induced digital light processing, not only for crafting structural and functional scaffolds, which we use for tissue regeneration applications, but also for developing in vitro 3D tissue mimetic models. Currently, our focus is on combatting age-related bone loss and associated fragility fractures, along with addressing intervertebral disc degeneration — conditions that impact the lives of millions of Americans annually.

WHAT HAVE YOU ENJOYED MOST ABOUT JOINING UT?

I would say one of the most enriching aspects of my time at UT has been the abundance of growth opportunities for faculty, particularly for early career investigators like myself. I appreciate the support from the department and colleagues who generously make time for discussions and mentoring junior faculty members. I should also acknowledge the vibrant food scene in Austin, which has added a delightful flavor to my overall experience! ■

ELENA ZANNONI
Assistant Professor

RESEARCH AREA: NUCLEAR AND RADIATION ENGINEERING

Elena Zannoni joined the department in January 2024 as an assistant professor with a courtesy appointment in the Department of Diagnostic Medicine at the Dell Medical School. Zannoni comes to UT from the University of Illinois Urbana-Champaign, where she was a research scientist. She holds a Ph.D. in bioengineering from the University of Illinois Urbana-Champaign and an M.S. from the University of Pisa. She currently leads the Advanced Radiological Imaging and Instrumentation Lab in the department.

HOW WOULD YOU DESCRIBE YOUR RESEARCH?

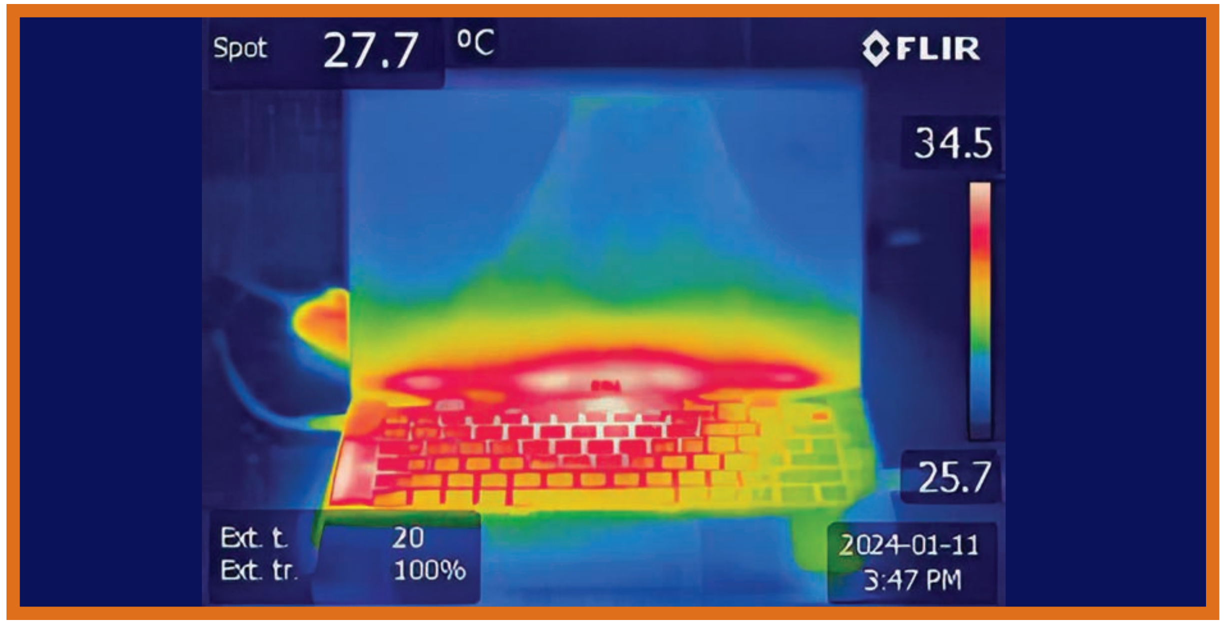
My research focuses on the development of nuclear medicine imaging instrumentation and data analysis techniques for clinical and preclinical applications in radiological science and molecular imaging. I am particularly interested in developing adaptive and intelligent high-energy imaging systems that will adapt in real time to the imaging task and application, interfacing with clinical personnel and patients. This will allow for new optimized theragnostic procedures, and it will expand the medical applications of nuclear imaging, such as molecularly targeted precision surgery and image-guided interventions.

WHAT HAVE YOU ENJOYED MOST ABOUT JOINING UT?

The best part has been meeting the fabulous students, faculty, and staff at UT that have been extremely supportive and available since day one. The students' associations in the department also gave me a warm welcome that I really appreciated. I am also enjoying teaching a brand-new course in radiological imaging and instrumentation that is receiving good feedback from the students. ■

FuSE & CHIPs

The Future of Semiconductors Starts with FuSE



Above: A laptop seen through an infrared camera shows just how hot your devices are getting.

Li Shi, professor in the Walker Department of Mechanical Engineering, and electrical and computer engineering professor Xiuling Li make up one of two research teams in the Cockrell School taking part in a massive semiconductor grant program from the National Science Foundation that includes funds from industry leaders and the federal CHIPs Act.

The projects are part of the NSF Future of Semiconductors (FuSe) program through a public-private partnership between NSF and four major tech companies: Ericsson, IBM, Intel, and Samsung. FuSe aims to enable rapid progress in new semiconductor technologies and manufacturing as well as workforce development.

Shi and Li along with researchers from The University of Texas at Dallas, University of Michigan-Ann Arbor, and The Ohio State University, are leading a project focused on heterogeneous integration of two types of semiconductors, gallium nitride and boron arsenide. Boron arsenide conducts heat much more efficiently than current-generation materials and can help to prevent overheating in electronic devices. This overheating is the most important challenge facing the industry because it can not only cause discomfort, like when your laptop gets hot to the touch, but can also lead to these devices running slower and even malfunctioning.

The integration of the boron arsenide substrate came out of Li's work with the Office of Naval Research's Multidisciplinary University Research Initiative. His team was focused on creating materials that could compete with diamond, which has the highest thermal conductivity.

The FuSe project also includes workforce training components, such as new materials and courses on semiconductor materials and devices, annual Semiconductor Day with Industry, and the Women in Semiconductors Club, to provide training to students from diverse backgrounds and prepare them for the next generation technologies of the semiconductor industry.

There is currently a significant push to improve semiconductor manufacturing, innovation, and research in the U.S. in the wake of pandemic-era supply chain shortages that impacted everything from medical devices to automobiles. Additionally, researchers around the world are working to improve semiconductor capabilities to support next-generation technologies such as artificial intelligence, autonomous vehicles and more. ■

USING SOUND TO MEASURE

CARBON CAPTURE UNDERWATER

Texas Engineers will lead a new project on marine carbon dioxide removal, capture and storage as part of a larger research push from the U.S. Department of Energy (DOE).

Preston Wilson, professor in the Walker Department of Mechanical Engineering, along with the proposal team, will develop an acoustic sensor network to quantify ecosystem activity and how effectively carbon is stored in shallow seagrass beds, an important sink in the coastal blue carbon cycle.

Wilson is an expert in acoustics, and he has done significant oceanic studies based on sound. In this case, when the seagrass takes in sunlight and carbon dioxide the plants exhale oxygen. They do so by emitting bubbles into the surrounding water through the leaves and emitting bubbles into the sediment through their roots and rhizomes.

"Just like blowing bubbles through a straw into a glass of water, the seagrass respiration emits sound," Wilson said. "Sound emitted is directly related to the amount of seagrass respiration, which is in turn directly related to the amount of bioproductivity, which is in turn related to carbon sequestration. So, we listen to the seagrass respiration and relate that to carbon dioxide sequestration."

Preston Wilson
Professor and acoustics expert.

Wilson's project received $2 million in funding. DOE awarded a total of $36 million for 11 projects across eight states for research on marine carbon capture dioxide removal.

Team members on the project include professor Ken Dunton, from the College of Natural Sciences' Marine Science Institute, and Megan Ballard and Kevin Lee from UT's Applied Research Laboratories.

Marine carbon capture techniques take advantage of the ocean's natural carbon capture and storage processes and, together with other carbon dioxide removal methods, have the potential to mitigate and remove hundreds of millions of tons of harmful carbon dioxide emissions per year. This technology represents an important part of the U.S. government's push to achieve a net-zero emissions economy by 2050. ■

IN MEMORIAM

UT Mourns Lithium-Ion Battery Inventor and Nobel Prize Recipient John Goodenough

John B. Goodenough, professor at The University of Texas at Austin who is known around the world for the development of the lithium-ion battery, died June 25, 2023, at the age of 100. Goodenough was a dedicated public servant, a sought-after mentor, and a brilliant yet humble inventor.

His discovery led to the wireless revolution and put electronic devices in the hands of people worldwide. In 2019, Goodenough made national and international headlines after being awarded the Nobel Prize in Chemistry for his battery work, an award many of his fans considered a long time coming, especially as he became the oldest person to receive a Nobel Prize.

"John's legacy as a brilliant scientist is immeasurable — his discoveries improved the lives of billions of people around the world," said UT Austin President Jay Hartzell. "He was a leader at the cutting edge of scientific research throughout the many decades of his career, and he never ceased searching for innovative energy-storage solutions. John's work and commitment to our mission are the ultimate reflection of our aspiration as Longhorns — that what starts here changes the world — and he will be greatly missed among our UT community."

Goodenough served as a faculty member in the Cockrell School of Engineering for 37 years, holding the Virginia H. Cockrell Centennial Chair of Engineering and faculty positions in the Walker Department of Mechanical Engineering and the Chandra Family Department of Electrical and Computer Engineering. Throughout his tenure, his research continued to focus on battery materials and address fundamental solid-state science and engineering problems to create the next generation of rechargeable batteries.

"Not only was John a tremendous researcher, he was also a beloved and highly regarded teacher. He took great pride in being a mentor to many graduate students and faculty members who benefitted from his wisdom and encouragement," said Provost Sharon L. Wood.

> "THE WORLD HAS LOST AN INCREDIBLE MIND AND GENEROUS SPIRIT. HE WILL BE TRULY MISSED AMONG THE SCIENTIFIC AND ENGINEERING COMMUNITY, BUT HE LEAVES A LASTING LEGACY THAT WILL INSPIRE GENERATIONS OF FUTURE INNOVATORS AND RESEARCHERS. I AM HONORED TO HAVE KNOWN AND WORKED WITH JOHN."
>
> **—Sharon Wood, Provost**

Goodenough identified and developed the critical cathode materials that provided the high-energy density needed to power electronics such as mobile phones, laptops and tablets, as well as electric and hybrid vehicles. In 1979, he and his research team found that by using lithium cobalt oxide as the cathode of a lithium-ion rechargeable battery, it would be possible to achieve a high density of stored energy with an anode other than metallic lithium. This discovery led to the development of carbon-based materials that allow for the use of stable and manageable negative electrodes in lithium-ion batteries.

"John was simply an amazing person — a truly great researcher, teacher, mentor and innovator," said Roger Bonnecaze, dean of the Cockrell School. "His joy and care in all he did, and that remarkable laugh, were infectious and inspiring. What an impactful life he led!"

Born in 1922 in Germany, Goodenough grew up in the northeastern United States and attended the Groton School in Massachusetts. In 1944, he earned a bachelor's degree in mathematics from Yale University. After serving as a meteorologist in the U.S. Army, Goodenough returned to complete a master's degree and Ph.D., in 1952, both in physics from the University of Chicago. At the University of Chicago, he studied under Nobel laureate Enrico Fermi and John A. Simpson, both of whom worked on the Manhattan Project. His doctoral adviser was renowned physicist Clarence Zener.

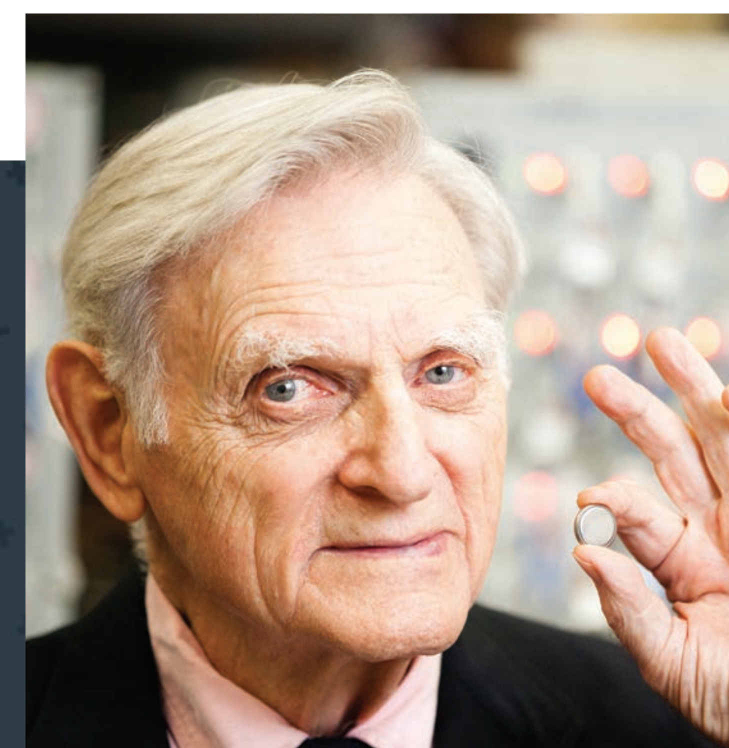
Goodenough began his career at the Massachusetts Institute of Technology's Lincoln Laboratory in 1952, where he worked for 24 years and laid the groundwork for the development of random-access memory (RAM) for the digital computer. He emerged as a pioneer of orbital physics and one of the founders of the modern theory of magnetism, developing what became known as the Goodenough-Kanamori Rules. These rules provide guidance in understanding magnetic materials and have had a large impact in developing devices for telecommunications.

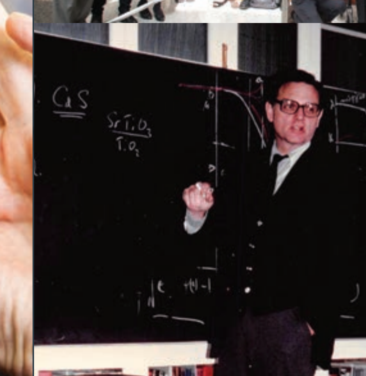
After MIT, Goodenough became a professor and head of the Inorganic Chemistry Laboratory at the University of Oxford. During this time, he made the lithium-ion discovery.

He came to UT Austin in 1986, setting out to develop the next battery breakthrough and educate the next battery innovators. In 1991, Sony Corp. commercialized the lithium-ion battery, for which Goodenough provided the foundation for a prototype. In 1996, a safer and more environmentally-friendly cathode material was discovered in his research group, and, in 2020, a Canadian hydroelectric power company acquired the patents for his latest battery.

"John's seven decades of dedication to science and technology dramatically altered our lifestyle, and it was truly a privilege to get to work with him for so many years," said Arumugam Manthiram, professor in the Cockrell School who was a longtime friend and associate of Goodenough's and joined him at UT in the 1980s. Manthiram, a battery pioneer in his own right, delivered the Nobel lecture in Stockholm on behalf of Goodenough. "John was one of the greatest minds of our time and is an inspiration. He was a good listener with love and respect for everyone. I will always cherish our time together, and we will continue to build on the foundation John established."

In 2022, in honor of his 100th birthday, scientists and engineers in the global battery and solid-state science communities came together on the UT Austin campus for a symposium to share stories of Goodenough's impact and discuss challenging problems in condensed matter physics and chemistry and the next generation of battery research. Plans are currently underway to install a permeant Goodenough memorial in the Engineering Teaching Center that can serve as a reminder of his personal and professional legacy. ■





A CLOSER LOOK AT

MECHANICAL ENGINEERING

In 2023, our department continued its commitment to educating courageous engineers, hiring exceptional faculty, and expanding research pursuits.

ALUMNI

15,072 *alumni around the world*

180 *Members of the Academy of Distinguished Alumni*

OUR GRADUATES ARE LEADERS IN:

- research
- government
- industry
- academia
- military
- and more

Are you one of the more than 15,000 alumni from the Walker Department of Mechanical Engineering at UT Austin? Scan the QR code to take a short survey and we might feature your story in our next magazine!

STUDENTS

ENROLLMENT

UNDERGRADUATE	**1,262**
Women	316
Black	46
Hispanic	339
GRADUATE	**504**
Women	130
International	170

DEGREES AWARDED 2022-23

Bachelor's	285
Master's	138
Doctoral	72

FACULTY

TENURE/TENURE-TRACK FACULTY 63

HONORS AND AWARDS

1 **Nobel Laureate**
4 Members, *National Academy of Engineering*
30 Winners, *National Science Foundation CAREER Award*

FACULTY AWARDS

We recognize the outstanding accomplishments of our esteemed faculty:

DEPARTMENTAL AWARDS

- **John Hasenbein**, Outstanding Teaching by a Professor or Associate Professor
- **Tanya Hutter**, Outstanding Teaching by an Assistant Professor
- **Wei Li**, Outstanding Research by a Professor or Associate Professor
- **Yuanyue Liu**, Outstanding Research by an Assistant Professor
- **Guihua Yu**, Outstanding Research by a Professor or Associate Professor

EXTERNAL AWARDS

- **Joseph Beaman**, Honorary Membership, American Society of Mechanical Engineers
- **Matt Hall,** Lockheed Martin Aeronautics Company Award for Excellence in Engineering Teaching
- **Arumugam Manthiram,** National Academy of Inventors Fellow
- **Richard Neptune,** Jim Hay Memorial Award, American Society of Biomechanics
- **Marissa Nichole Rylander,** 2023 Texas 10
- **S.V. Sreenivasan,** Billy and Claude Hocott Distinguished Centennial Engineering Research Award
- **Junmin Wang,** Institute of Electrical and Electronics Engineers Fellow
- **Guihua Yu,** Finalist in the 2023 Blavatnik National Awards for Young Scientists
- **Yuebing Zheng,** Optica 2024 Class of Fellows

RANKINGS IN THE U.S.

NO. 7 *Cockrell School, Graduate Program*

NO. 11 *Cockrell School, Undergraduate Program*

NO. 11 MECHANICAL ENGINEERING GRADUATE PROGRAM

12 MECHANICAL ENGINEERING UNDERGRADUATE PROGRAM

RESEARCH ON THE RISE

RESEARCH AREAS

$37.1M *in research expenditures*

- Acoustics
- Advanced Manufacturing & Design
- Advanced Materials Science & Engineering
- Analytics & Probabilistic Modeling
- Biomechanical & Biomedicine
- Clean Energy Technology
- Complex Systems
- Computational Engineering
- Engineering Education
- Nano & Micro-scale Engineering
- Nuclear & Radiation Engineering
- Robotics & Intelligent Mechanical Systems
- Thermal Fluids Systems & Transport Phenomena

STAFF

Our staff continue to be recognized by the college and the University for their exemplary service. We appreciate their hard work and dedication to the department.

- **Mary Cantu-Garcia,** Student Program Coordinator, 2023 Student-Facing Staff Award for Contributions to Equity in Engineering
- **Jessica Dai,** Travel & Entertainment Payment Associate, 2023 Cockrell School of Engineering Staff Excellence Award
- **Katherine Spiering,** Senior Communications Coordinator, 2023 Cockrell School of Engineering Staff Excellence Award

10 YEAR STAFF SERVICE AWARDS IN 2024

- **Kelly Frazer,** Graduate Program Administrator
- **Jennifer Horsak,** Senior Financial Analyst
- **Sarah Laney,** Chair's Assistant

MEDICINE, MEET MECHANICAL ENGINEERING

There has long been a connection between the fields of engineering and healthcare. In the Walker Department of Mechanical Engineering, our faculty and students are working to make that connection even stronger. Engineers of all disciplines research new technologies, invent new devices, and practice new techniques that can be used by healthcare professionals to save lives.

Surgineering

One of the most notable collaborations is surgineering: an emerging research field that sees engineers working closely with surgeons to solve problems in the operating room. This could be through new tools and devices, better ways to use existing technology, and new ways to prepare surgeons before they ever work on a human patient.

The Dell Medical School at UT Austin is leading the charge with partnerships that bring together robotics experts and longtime physicians to create simulation tools that can better train new surgeons and minimize errors.

"Engineers speak their engineering language, and surgeons speak their surgical language. There's an opportunity to create a new field that bridges this gap, and it just needs a critical mass of individuals on both sides to cross over and learn how to speak their colleagues' language," explains Ann Majewicz Fey, an associate professor in the Walker Department of Mechanical Engineering.

Fey, who joined the University in 2019 to direct the Human-Enabled Robotic Technology Laboratory, has been working with Dell Medical School's Yvette Williams-Brown, to create a new device for simulating a trocar insertion.

The trocar is a pen-shaped instrument used in laparoscopic procedures that includes a sharp point and hollow tube to provide a path for devices to follow during surgery. Installing a trocar is often the first step in a surgery, and a place where mistakes can happen. Less experienced surgeons, Fey says, may push the device too far into the body and potentially damage organs.

Fey, with input from Williams-Brown, is working on a way to practice placing trocars using a haptic simulator that allows users to feel tissue resistance and understand how hard they have to push to deploy the trocar. And there are ways to modify the haptic feedback of the device for all different types of patients, each of whom require a different level of force to get the trocar into the body.

> "ANY ERRORS IN A PATIENT'S CARE CAN BE CATASTROPHIC, SO IT'S EXTREMELY HIGH STAKES," FEY SAID. "PEOPLE EXPECT EXCELLENCE IN THEIR SURGEONS, SO THE MORE WE CAN DEVELOP TECHNOLOGY TO SPEED UP THAT LEARNING CURVE AND ACHIEVE HIGHER LEVELS OF MASTERY, THE MORE WE CAN ONE DAY IMPROVE PATIENT CARE."

The Dell Medical School at UT Austin is leading the charge with partnerships that bring together robotics experts and longtime physicians to create simulation tools that can better train new surgeons and minimize errors.

Another major surgineering partnership is with MD Anderson Cancer Center. The world-renowned institution launched a pilot fund in 2021 that pairs a UT researcher and an MD Anderson oncologist to develop transformative research projects to help improve cancer patient outcomes.

Now in its fourth cycle, funding has been awarded to three mechanical engineering faculty members: Farshid Alambeigi, Emma Fan, and Tanya Hutter. In addition to this funding opportunity, the University announced it will open The University of Texas at Austin Medical Center consisting of two hospital towers — The University of Texas MD Anderson Cancer Center and a UT Austin hospital — further solidifying the partnership.

Alambeigi, assistant professor in the Walker Department of Mechanical Engineering, and MD Anderson assistant professor and surgical oncologist Naruhiko Ikoma are designing a soft robotic endoscope for colonoscopy and gastroscopy procedures that will enable doctors to "feel" tumors and polyps through very sensitive haptic feedback sensors and machine learning. This device, a version of which is already being used on patients at MD Anderson Cancer Center, will lead to early diagnoses for various gastrointestinal cancers.

Commercializing Medical Innovation

Researchers like Alambeigi are also seeing a real need for commercialization of their research for wider use. He describes wanting his work going forward as director of the Advanced Robotic Technologies for Surgery Lab to take a three-pronged approach: engineering mechanics, clinical need, commercialization ability.

Working with Jordan Amadio, a neurosurgeon at Dell Med, Alambeigi has created a prototype for his steerable drilling system used in procedures like spinal fusions, where vertebrae are fused together for different purposes such as bone recovery and to relieve back pain. Along with that is a flexible implant or 'bendable screw' that is being 3D printed in the Center for Additive Manufacturing and Design Innovation (CAMDI) at UT Austin.

Left: Students in Alambeigi and Fey's labs get hands on experience in the emerging field of surgineering; medical professionals testing the Trinity Tube prototype.

Today, because of the rigidity of surgical tools, the path for inserting screws must be a straight line, which means the screws may not be able to reach the best spots for connecting vertebrae. His devices aim to improve this long, labor-intensive process.

In order to help bring his creations to market and in front of clinicians, Alambeigi has been working with Discovery to Impact at UT Austin, a team that oversees the University's technology transfer and corporate-sponsored research functions as well as two start up incubators.

UT Austin has a long history of supporting student lead startups in a wide range of industries. Ph.D. candidate Iman Salafian has created two neonatal devices, Trinity Tube and Palm Reader, that he hopes to bring to market.

Entrepreneurship was always a goal for Salafian, so after working for several years in the manufacturing industry he decided to pursue a different passion, inventing medical devices, by applying for his Ph.D. at UT Austin.

Below: Iman Salafian pitching his medical device startup.

He was able to find the perfect fit in his advisor, associate professor Chris Rylander, who heads the Medical Device Laboratory in the Walker Department of Mechanical Engineering. Rylander is also the co-founder of ClearCam, which created ClearScope, a disposable lens cleaning device that can be used in laparoscopic procedures without having to remove the scope from the body. Together with his partners, Rylander also worked with Discovery to Impact to develop the startup.

The two devices that Salafian has created both seek to serve an underrepresented group, preterm infants and those in the neonatal intensive care unit (NICU). Currently there is a large gap in technologies designed specifically for these fragile patients.

In collaboration with Alan Groves, associate professor in the Department of Pediatrics at Dell Med, Trinity Tube was created as a less invasive way to monitor various health statuses such as heart rate and temperature of preterm infants in the NICU. Traditionally this data is monitored via multiple patches and wires attached to the baby's skin. The device utilizes the existing feeding tube by adding vital sign sensors to create a multi-functional smart tube while eliminating the need for excessive wires.

"THIS IS A HUGE IMPROVEMENT IN CRITICAL CARE THAT HELPS REDUCE THE NURSE PER PATIENT RATIO AS WELL AS THE OVERALL COST NEEDED TO MONITOR THESE BABIES," SAID SALAFIAN.

To date Salafian has received funding awards from organizations such as Texas Venture Labs, Texas Health Catalyst, the National Science Foundation's Innovative Corps, and the FDA through Discovery to Impact.

"I love leadership and I love innovation. Throughout the years I thought it could be helpful to use my engineering knowledge with my leadership experience to build something better for our society."

Additive Manufacturing in Healthcare

The Walker Department of Mechanical Engineering is a pioneer in the world of additive manufacturing. And this technology is becoming more common in manufacturing medical devices like Alambeigi's flexible implant. Even more cutting edge is the idea of bioprinting, which utilizes 3D printing techniques using biomaterials to fabricate biomedical parts that can imitate natural tissue characteristics.

Maryam Tilton, one of the newest assistant professors in the department, will create 3D tissue models and bio-functionalized scaffolds to understand how age and chronic disease can change its biomechanics. That knowledge will then lead her to ways to enhance minimally invasive tissue regeneration.

Tilton plans to collaborate with Dell Med on this research to bridge the gap between innovative technologies and practical healthcare applications. She hopes this will enhance bench-to-bedside research between the two groups.

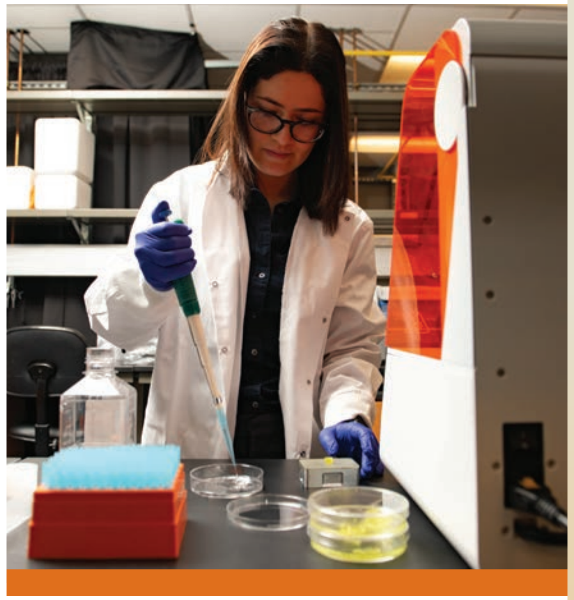
"The unmet clinical challenges underscore the importance of an interdisciplinary approach," said Tilton.

"Current clinical strategies for degenerative musculoskeletal diseases address symptoms but fail to target underlying causes. Investigating fundamental degenerative mechanisms affecting biochemical properties across tissues can help us develop novel, targeted, and effective disease-modifying strategies that are minimally invasive."

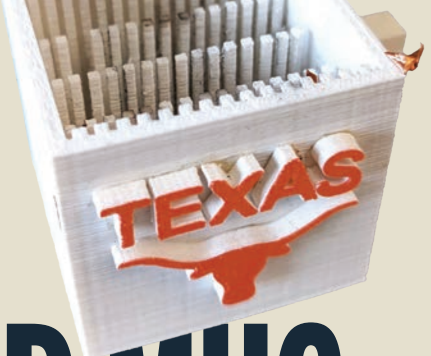
Alambeigi is also diving into the bioprinting space which he affectionately calls his sci-fi project. He hopes to create a robotic bioprinting system to print live cells directly onto the body in real time, just like you'd see in old sci-fi movies.

With funds from the National Institutes of Health Director's Pioneer Award, which seeks out breakthrough technologies, he aims to actually regenerate parts of the musculoskeletal system instead of using the traditional approach of creating an external wearable robot.

Ultimately, the bond between engineers and healthcare professionals is more critical than ever. Without the end users, clinicians and patients, new engineering research and technology cannot reach its full potential. At The University of Texas at Austin we hope to continue supporting students and faculty who identify impactful problems, create change, and improve the lives of future generations. ■



Left: Trinity Tube protoype.
Above: Maryam Tilton with her 3D bio printer.



DISINFECTING CREEK WATER WITH A
3D-PRINTED MUG

A rash of storms in Texas in recent years — from Hurricane Harvey in 2017 to the deep freeze in 2021 — has put big chunks of the population in danger and left millions without electricity or water for long periods.

These calamities also served as motivation for a researcher at The University of Texas at Austin to refocus her work on innovations that can help communities respond to severe weather events. Her latest project is a mug-sized device that can quickly clean water using a small jolt of electricity to fish out bacterial cells. In lab experiments, the device was able to remove 99.997% of E. coli bacteria from 2- to 3-ounce samples taken from Waller Creek in Austin in approximately 20 minutes, with the capacity to do more.

"We are able to clean water using very little energy because we steer the bacterial cells with electric fields, and most bacterial cells are natural swimmers who propel themselves to electrodes and get captured alive," said Emma Fan, a professor in the Walker Department of Mechanical Engineering, who led the research published recently in *ACS Nano.*

The key to the device is a "branched" electrode that the research team previously created. The patented electrode's structure is based on a root system in a tree with branches traveling in several directions.

When electrified, the device creates a field that the E. coli cells are attracted to. They willingly "swim" into the electrode branches.

The electrode is made of graphite foam, compatible and durable in electric fields, and can continuously work for many hours. In addition to its efficiency, the device is inexpensive — it costs less than $2 to create the foam-encased electrode.

It also is simple to use. First, dip the electrode-filled cup into water. Next, give it an electrical jolt; wait, and let the electrodes filter out bacteria. Then, wait and remove the water, which is now drinkable.

The researchers are now looking into ways to commercialize and streamline the design of the cup. The one used to clean water from Waller Creek is a 3D-printed prototype. And they want to further simplify the process of inserting and removing the electrodes.

Of the several different current methods for simple, commercial water filtration, each has a significant flaw. Disinfecting pills can release oxidants that can be harmful if ingested. Reverse osmosis systems require high water pressure, and solar steaming needs consistent sunlight, which is unreliable amid natural disasters.

Furthermore, the use of electrical power allows integration with batteries and can be easily used at home, in the office, or in a car. The energy cost is also much less than those of various emerging technologies, e.g., a thousandth as much as that for solar steaming.

The electrode used in the device was originally created for supercapacitors. Estimates that Texas' population would double by 2050 and the need for research to address resilience after Hurricane Harvey motivated Fan to focus her work on natural disasters. In the case of a power outage or a boil-water notice, a person who owned a device with this technology could drive to a creek or a stream, hook it up to the car battery through a simple DC-AC converter, and purify water to bring home as a drinking supply. It can also be powered using solar panels with the same principle.

"When our water infrastructure is down — no water, no gas and no electricity — we need point-of-use devices for cleaning water we can get out of ponds, streams or rivers," Fan said. "We believe our device can someday fill that need." ■

Emma Fan

You Tube

Watch video to learn more
youtu.be/FYTrzmcZCSo

ICYMI
DIGITAL TWIN

In case you missed it, digital twin technology is popping up all over the world of engineering. ***So, what exactly is a digital twin?***

Like the name suggests, a digital twin is a virtual representation of an object or system that spans its entire lifecycle through regular real-time data updates provided by sensors. Using simulations, machine learning and other decision-making technologies, digital twins can help predict future performance and behavior.

HOW ARE ENGINEERS USING DIGITAL TWINS?

- Modeling nuclear facilities like molten salt reactors
- Extreme weather modeling
- Tracking energy usage on UT's campus
- Aircraft design
- Developing materials applications for next-gen semiconductors

MEET OUR NSF WINNERS

Five graduate students in the Walker Department of Mechanical Engineering have accepted the 2023 National Science Foundation's Graduate Research Fellowship. The five-year fellowship includes three years of financial support including an annual stipend.

Briana Cuero

Research Area: Nanotechnology and Heat Transfer

What does receiving this fellowship mean to you? Receiving the NSF Graduate Research Fellowship has shown me how much my hard work and dedication throughout my time at UT has paid off. When I went to Gone to Engineering in 2018, I was unsure if I would succeed because I had no prior experience in engineering and I was afraid that I was taking someone's spot who was more deserving. This fellowship showed me that I am an engineer; I belong here. I am excited to continue researching with this prestigious fellowship, and I hope to come back to UT as a professor! Next up, I will be pursuing my Ph.D. at Massachusetts Institute of Technology.

Benjamin Davis

Research Area: Haptics and Physical Human-Robot Interfaces

What does receiving this fellowship mean to you? New engineering developments have vastly increased the possibilities for human assistance and augmentation in fields like VR, prosthetics, teleoperation, and education, but these technologies are limited by their interface with the user. I'm interested in creating more seamless, compelling experiences for users by deepening our understanding of human perception and implementing more intuitive feedback systems. The NSF Graduate Research Fellowship will support me as I pursue this research goal and provide me with professional development opportunities during my Ph.D. The fellowship is a recognition of my past work and research potential, and I'm very thankful for my PIs (Ann Fey and Nanshu Lu), postdocs, and graduate students who provided guidance throughout my application and undergraduate research.

Mark Hamalian

Research Area: Thermal/Fluid Systems

What does receiving this fellowship mean to you? Receiving this fellowship is an honor, and I am extremely grateful for the opportunity to devote my full time to research projects.

Karey Maynor

Research Area: Thermal/Fluid Systems

What does receiving this fellowship mean to you? Receiving the NSF GRFP is a huge honor, and I'm very grateful for the award. Winning the fellowship is validation in my abilities to produce meaningful research that can have a positive societal impact while pursuing my Ph.D. and throughout my career. I'm excited to continue working on tackling climate change through carbon capture and sequestration and building the hydrogen economy. If not for the support of my advisor, Vaibhav Bahadur, lab mates, friends, and family, this achievement would not be possible — thank you all for your continued support and guidance.

Job Ramirez

Research Area: Human-Robot Interaction; Biomedical Engineering

What does receiving this fellowship mean to you? It feels incredible to receive national-level recognition for my thought process and commitment to improving society through engineering. Being awarded this fellowship validates my vision to assist individuals with physical and neurological disorders and further motivates me to continue this challenging but meaningful endeavor. ■

FILIPPO MANGOLINI

5 QUESTIONS ? 5 QUESTIONS ? 5 QUESTIONS ?

We sat down for a conversation with assistant professor Filippo Mangolini about his research in advanced materials science and engineering and life as a Longhorn.

1 **EXPLAIN YOUR RESEARCH WITH THE MANGOLINI RESEARCH GROUP, APPLIED SURFACE SCIENCE LABORATORY?**
The overarching goal is to develop a physically based understanding of the chemical reactions and structural transformations occurring on material surfaces under extreme environments. This will aid in the rational design and synthesis of functional materials that can withstand harsh conditions, and also enhance sustainable development through the reduction of the economic and environmental impact of tribology and corrosion. Over the last few years, we have focused on the nanoscale evaluation of the physical phenomena at ionic liquids/solid interfaces. Our research attempts to bridge the gap in understanding how to predict, control, and improve them for next-generation technologies.

HOW DO YOU FEEL THIS RESEARCH CAN MAKE AN IMPACT IN OUR WORLD? 2
A cornerstone in achieving sustainability of America's energy use is the improvement of energy efficiency. In manufacturing, this relies on the elimination of hazardous waste, while increasing energy efficiency. In transportation, the need to enhance engine efficiency is demonstrated by the fact that approximately 30% of the fuel used in internal combustion vehicles is employed to overcome friction in the engine, transmission, tires, and brakes. Improved approaches for friction and wear management could not only result in enormous energy savings and benefits for safety and industrial productivity, but also lead to drastic reductions in greenhouse gas emissions.

3 **WHAT HAS BEEN YOUR FAVORITE ASPECT OF BEING A LONGHORN?**
UT Austin is such a unique place, where you are surrounded by not only research groups having complementary expertise to mine, performing cutting-edge research, and open to collaborations, but also faculty members truly devoted to the teaching mission of the University. I have been so inspired by them over the last few years. Being part of the UT community is thus so uplifting and constantly pushes me to broaden my horizons in my research, teaching, and service activities. Last, I have to mention the students, who are truly remarkable in so many ways, both at the undergraduate and graduate levels.

WHAT DID IT MEAN TO YOU TO EARN NATIONAL SCIENCE FOUNDATION'S CAREER AWARD IN 2021? 4
It was a great honor. The award has allowed us to boost our research on the multiscale investigation of ionic liquid/solid interfaces, while also enabling us to combine them with activities that aim to enhance STEM education. For example, I established an elective undergraduate course "Enhancing Sustainability through Tribology", as part of the new ME "Sustainable Engineering" Career Gateway Elective track. The award has also allowed us to collaborate with Austin Community College to offer internship opportunities to veteran students interested in pursuing graduate school.

5 **TELL US ABOUT YOUR RESEARCH THAT WAS RECENTLY PUBLISHED IN ADVANCED FUNCTIONAL MATERIALS.**
It started as an exploratory experiment that led to the development of a new oxidative scanning probe lithography technique that utilizes ionic liquids as the functionalizing material to mediate the electrochemistry at AFM tip/substrate contacts. Our results showed that this new approach allows sub-100 nanometer oxide features to be patterned on solid surfaces at low applied voltages, while also enabling the precise control of both their chemical state and morphology. Our results not only establish a methodology for creating nanoscale oxide features, but also highlight the potential of ionic liquids for synthesizing nanomaterials with controllable size, shape, and composition for several applications. ■

NEW DIRECTOR APPOINTED

FOR CAMDI

DAVID K. LEIGH BSME '91, MSME '11

CAN YOU TALK BRIEFLY ABOUT YOUR WORK EXPERIENCE AND WHY YOU THINK YOU'RE A GOOD FIT FOR CAMDI?
Having graduated from UT Austin when 3D printing was in its infancy and working in the industry since its inception, I'm excited to bring my industrial and startup experience to the Center for Additive Manufacturing and Design Innovation (CAMDI). I've had the opportunity to work with a lot of good people on several startups, including UT Austin on an additive manufacturing materials startup in the early 2000s. The main focus of my career was to bring the world of additive manufacturing to the creation of end-use parts primarily in the aerospace and automotive industries. My last few stints in the industry were as chief technology officer for 3D Systems and EOS, who are both leaders in the space. It is our desire to leverage university partnerships and leadership in the industry to help advance the technology and improve adoption.

WHAT HAVE YOU MOST ENJOYED ABOUT JOINING TEXAS ME?
I've spent my life in and around the University. I'm still very new and getting used to the new role, but I've enjoyed learning to slow down and go deeper. So much of my recent career was so high paced, you didn't ever have time to go deep. Being able to work with faculty and staff on proposals or just stop and watch the design class's battle bot competition has been a welcome change of pace.

AS A MEMBER OF THE ACADEMY OF DISTINGUISHED ALUMNI, WHAT DOES IT MEAN TO RETURN TO UT AUSTIN?
The Academy has a great group of alumni that do so much behind the scenes to help the University and department. They represent a broader group of alumni that not only impact our scientific and business communities, but also champion everything it is to be a Longhorn. We wouldn't be recognized as the university we are without champions like this. It's rare to be able to come back and serve the University in an official capacity like this, and I'm very honored to be able to do so. ■

CATCHING UP WITH ASME

The American Society of Mechanical Engineers is the largest engineering student organization at UT Austin. *The group, which is open to all majors and disciplines, is committed to aiding students in their personal and professional development and supporting the surrounding community.*

2023 Awards:

- *Most Outstanding Student Organization, The Tower Awards*
- *Best Service Organization, Swing Out Awards*
- *Finalist for Best Social Organization and Most Outstanding Organization, Swing Out Awards*

By the numbers:

815
members for the 2023-2024 school year

40
events

INTERESTED IN JOINING ASME AT UT AUSTIN?

The journey through the past, present and future of energy continued as "Power Trip: The Story of Energy" returned for a second season on PBS.

The six-part TV series, based on Michael Webber's 2019 book of the same name, premiered on PBS in September 2023. Season two of the series uncovers the hidden energy embedded in our modern way of life, revealed as the underlying force that carries us to SPACE, causes large scale energy DISASTERS, transforms WORK, CULTURE, and ENTERTAINMENT, and drives GLOBALIZATION.

To date seasons one and two of "Power Trip" have had over 7,000 broadcasts on PBS, reaching more than 95% of the United States. Season one has also been distributed in 30 countries and is included in the in-flight entertainment on American Airlines.

POWER TRIP

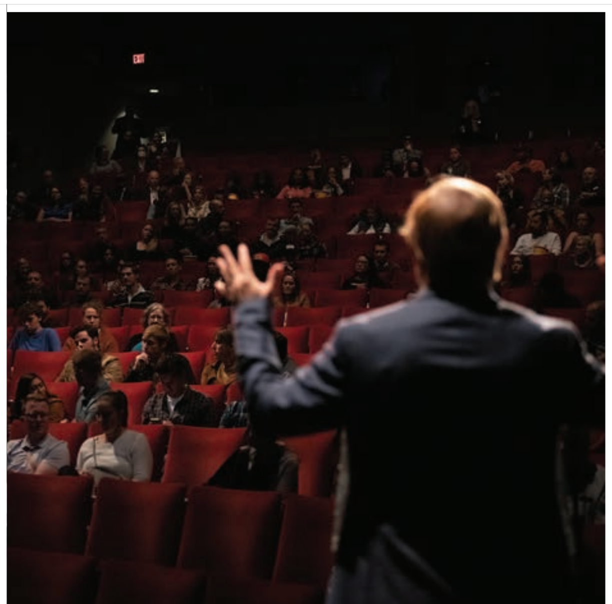
The Story of Energy Gets a 2nd Season

For years, Webber, a professor in the Walker Department of Mechanical Engineering, has been producing widely accessible educational content focused on his area of expertise — energy. He has developed TV shows and online courses that anyone can view with the sole purpose of teaching people about energy.

"It was exciting to see season one reach more than 10 million viewers in dozens of countries, so it was clear that there is a global thirst for more information on energy. And since energy cuts across every part of society, we found more stories to tell," said Webber.

Webber has been an influential voice in the energy industry for over 25 years. Fueled by his passion for increasing society's "energy fluency," he develops content that makes energy discussions accessible for all. In 2013, he launched "Energy 101: Energy Technology and Policy," a massive open online course

Left: Webber, Uzo-Okoro, Jah, and Hames at the Paramount Theatre.



that teaches about issues we face in energy. He also created and hosted "Energy at the Movies," an hour-long syndicated educational special on PBS that illustrates the history of energy using Hollywood movies as a road map.

"Power Trip" season two takes viewers on location to Iceland, Italy, Wales, England and around the world to trace the rise of modern forms of energy and transformation of everything it touches. Among 50 global experts, the series features commentary from professors and lecturers in the Walker Department of Mechanical Engineering, Ofodike Ezekoye and Yael Glazer.

To celebrate the new season, a screening of the SPACE episode was held at the Paramount Theater in Austin, Texas, presented by Itron and The Austin Forum. Guests were able to attend a panel discussion following the screening featuring Webber, series director Matt Hames, associate professor in the Department of Aerospace Engineering and Engineering Mechanics Moriba Jah, and Assistant Director for Space Policy at the White House Ezinne Uzo-Okoro. ■

Season two of "Power Trip" was made possible by generous donations from The University of Texas at Austin, The Rockefeller Foundation, Itron, and Wells Fargo, with additional funding from The Texas State Energy Conservation Office, The Tiller Family Foundation, The Alfred P. Sloan Foundation, and the Pritzker Innovation Fund. This series was directed by Matt Hames and produced by Alpheus Media with executive producers Juan Garcia and Beth Hames. Seasons one and two are currently available to stream on Apple TV and Amazon Prime.

CLASS OF 2023

ACADEMY *of* DISTINGUISHED ALUMNI

Established in 2004, the Academy of Distinguished Alumni represents the highest honor that the Walker Department of Mechanical Engineering bestows on its alumni. Including this year's honorees, 180 alumni have been selected for this award, recognizing them as highly respected professionals, dedicated engineers, and supporters of higher education.

The Academy honors alumni in four different categories: Outstanding Young Mechanical Engineer, Distinguished Mechanical Engineer, Mechanical Engineering Hall of Fame, and Honorary Mechanical Engineer.

Outstanding Young Mechanical Engineer

Daniel Nicholson
B.S. ME 2007
President & CEO
NadaMoo!

Distinguished Mechanical Engineer

Randy Charles
B.S. ME 1982, M.S. EA 2005
Asset Team Leader
Denbury Resources

Michael Linford
B.S. ME 2005
Chief Financial Officer
Affirm

Mechanical Engineering Hall of Fame

Michael Swenson
B.S. ME 1975
Retired, Power Generation and Technology Business
ConocoPhillips

Honorary Mechanical Engineer

Don DeWalch
B.B.A. Route to Engineering 1957
Principal
Thrust Drive LLC

Carolyn Seepersad
B.S. ME 1996, B.A. PPE 1998, Ph.D. ME 2004
Professor, Mechanical Engineering
Georgia Institute of Technology

Learn more about the inductees https://bit.ly/3FJ5CZc

THE UNIVERSITY OF TEXAS AT AUSTIN
204 E. DEAN KEETON ST. C2200
AUSTIN, TX 78712-1221

NONPROFIT ORG.
U.S. POSTAGE PAID
AUSTIN, TX
PERMIT #391

RETURN SERVICE REQUESTED

BATTLE OF THE BOTS

As the grand finale to the Mechanical Engineering Design Methodology course taught by professors Chris Rylander and Maryam Tilton, students must compete head-to-head until the last robot is standing. In fall 2023, the top spot went to team Collateral, L.L.C. made up of mechanical engineering students Ian Brown, Tyler Moss, Connor Padron, Truman Ross, and Vibhav Sharma.

STAY CONNECTED @UTMECHENGR