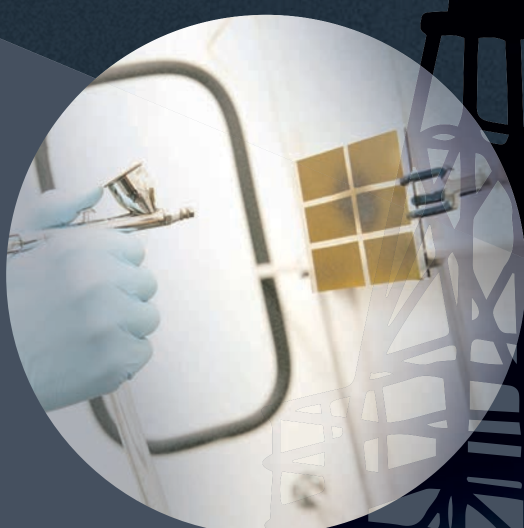
FALL 2016

TEXAS ENGINEER

THE MAGAZINE OF THE COCKRELL SCHOOL OF ENGINEERING AT THE UNIVERSITY OF TEXAS AT AUSTIN



THE MAKING OF THE ENERGY UNIVERSITY

Follow our journey shaping the energy landscape PAGE 14

RAISE THE ROOF

The sounds of jackhammers and trucks backing up are in full force on the eastern end of the Forty Acres. Construction is moving swiftly on the Cockrell School's new flagship building, the Engineering Education and Research Center, which opens in fall 2017. When completed, the building will add new classrooms, student project centers and collaborative makerspaces to the Texas Engineering campus.

⟶ FOLLOW CONSTRUCTION PROGRESS AT **ENGR.UTEXAS.EDU/EERC**

THE EYES OF TEXAS ARE UPON ENGINEERING

Today, the Cockrell School of Engineering at The University of Texas at Austin is evolving—and excelling—before our eyes. Rising U.S. News & World Report program rankings reaffirm our status among the very best in the nation for both undergraduate and graduate education. And with the 430,000-square-foot Engineering Education and Research Center opening next year, the launch of a new 10-year strategic research plan, and the continued expansion of a project-based curriculum, we are advancing our priorities and cultivating an environment that will prepare students for the challenges of the future.

In the spirit of this advancement, I am pleased to present the Fall 2016 issue of *Texas Engineer* magazine, which offers a glimpse into the culture of innovation that has inspired and propelled our engineering community since 1882. Read about our remarkable history of leadership in energy, learn valuable lessons in entrepreneurship from one alumna's successful journey, and find out how our Innovation Center is helping more faculty launch startups.

Great stories are easy to find in the Cockrell School, and I am excited to share just a few of them in this publication. Thank you for your belief in our students and faculty and for your continued investment in their future.

Hook 'Em Horns!

Sharon L. Wood, *Dean*
Cockrell Family Chair in Engineering #14
Jack and Beverly Randall Dean's Chair for Excellence in Engineering

The University of Texas at Austin
Cockrell School of Engineering

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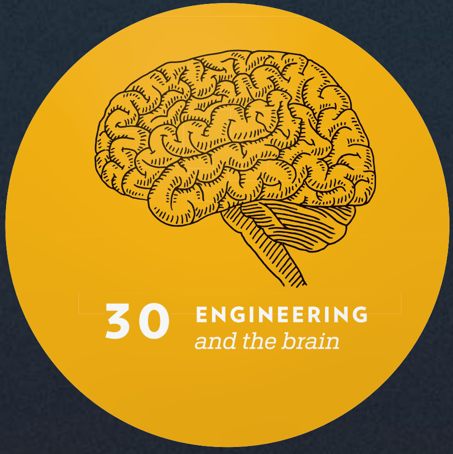


WE BUILT WHAT?

PHOTO: © JOHN WHALEN, NEWPORT NEWS SHIPBUILDING, A DIVISION OF HUNTINGTON INGALLS INDUSTRIES

> *"This has been an extraordinary achievement for UT Austin and for our Center for Electromechanics — to see the team's expertise and years of collaborative work come to life aboard such a technologically advanced ship. We're proud to be contributors to the work our dedicated servicemen and servicewomen do for this country."*
>
> —**BOB HEBNER,** DIRECTOR OF THE CENTER FOR ELECTROMECHANICS

THIS YEAR, A NEW STATE-OF-THE-ART aircraft carrier joined the U.S. Navy's fleet. The USS Gerald R. Ford (CVN 78) is a marvel, the first in a new class of aircraft carriers that have been redesigned and reimagined. It is the most technologically advanced carrier ever built. And one of the most critical mechanisms aboard the USS Ford was developed by engineers at UT Austin—the aircraft launch generator.

From 1999 to 2009, the university's Center for Electromechanics partnered with General Atomics and joined the U.S. Navy on a quest to replace their traditional steam-powered aircraft launch systems with modern, efficient technology. The result is the revolutionary Electromagnetic Aircraft Launch System (EMALS), a multi-megawatt electric power system with an 80,000-HP electric motor and an advanced technology closed-loop control system with diagnostic health monitoring.

The newly designed system provides better control of applied forces, improved reliability and maintainability, reduced staffing workload and increased operational availability. It will allow the U.S. Navy to launch more aircraft than ever before and larger and heavier aircraft that will be designed in the future.

RESEARCH VISUALIZED

Awe-inspiring experiments, tiny devices and otherworldly materials are just a few of the fascinating things on display in Texas Engineering laboratories.

LET'S TAKE AN UP-CLOSE LOOK ⟶

TURBULENT FLAME

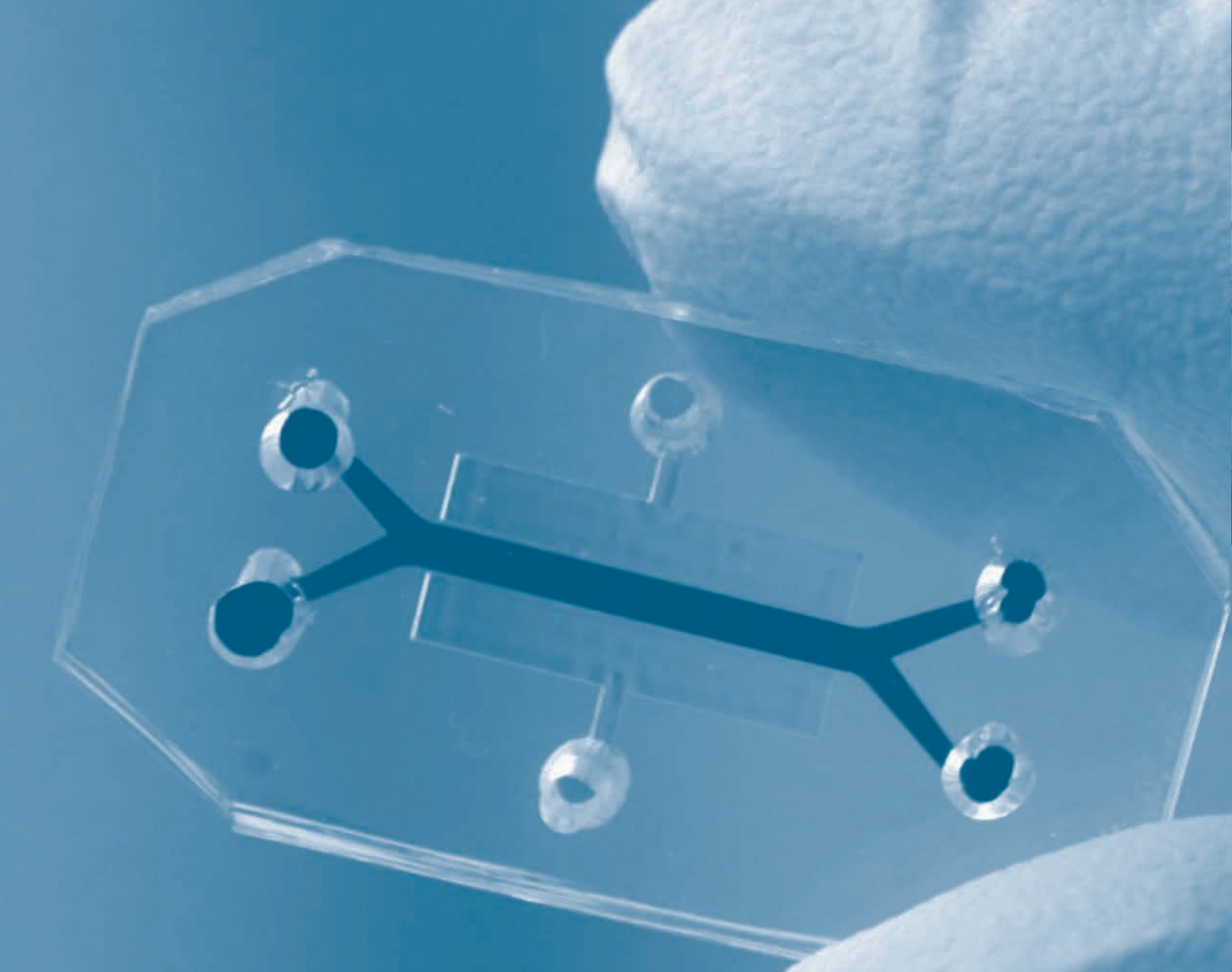
This chaotic flame, which is burning jet fuel in Noel Clemens' Flowfield Imaging Laboratory, helps to assess the sooting characteristics of new types of fuels, like those derived from natural gas. Clemens, who serves as chair of the Department of Aerospace Engineering and Engineering Mechanics, says the soot that remains unburned as it leaves the flame creates smoke in the atmosphere, and that smoke can present a health hazard to people living near military bases and airports.

SILICON NANOFABRICATION

Among many other areas of focus, the NSF-funded NASCENT Nanosystems Engineering Research Center, led by mechanical engineering professor S.V. Sreenivasan and chemical engineering professor Roger Bonnecaze, is adapting silicon nanofabrication processes to the world of flexible electronics and photonics — technologies with broad and important societal applications including displays, mobile devices and nanoparticles for drug delivery. Here, a glass substrate with sub-100 nanometer etched patterns is assessed before being loaded onto a roll-to-roll patterning tool that can transfer the etched structures into flexible plastic films.

POLI THE ROBOT

Inside the Cockrell School's Socially Intelligent Machines Lab, led by electrical and computer engineering associate professor Andrea Thomaz, a new robot named Poli (pronounced Paul-ee) is coming to life. Built for practicality, Poli was designed with one arm that can slide up and down on a pole for better manipulation of its workspace. Thomaz's vision is to develop robots that can help people in need with simple daily tasks, such as doing the dishes or delivering blankets, in hospitals or in homes.



GUT-ON-A-CHIP

This groundbreaking device developed by biomedical engineering assistant professor Hyun Jung Kim in collaboration with researchers at Harvard's Wyss Institute, is the first "gut-on-a-chip," a technological breakthrough that uses a human's microbiome to mimic the gastrointestinal tract environment to help diagnose and treat intestinal diseases, such as Crohn's disease. The thumb-nail-sized synthetic micro-gut is able to emulate peristalsis, the rhythmical contractions that happen in our gut as food passes through, and deliver more accurate information than other commonly used biomedical testing platforms.

A COMMUNITY-WIDE COMMITMENT

Chemical Engineering Raises $28 Million to Complete Historic Campaign

For the last 70 years, one man has embodied the spirit of the chemical engineering community at The University of Texas at Austin: John J. McKetta Jr. His passion for teaching and love of the university are infectious — inspiring generations of students and faculty alike.

This spring, the John J. McKetta Jr. Department of Chemical Engineering successfully completed the "Challenge for McKetta," an ambitious fundraising effort aimed at advancing the department and honoring McKetta's tremendous impact.

The campaign, which raised $28 million from Texas Engineering alumni, friends and corporate partners over the last six years, exceeded its goal of $25 million and set a new record for departmental fundraising campaigns in the Cockrell School of Engineering.

Campaign funds will support new academic initiatives, upgrade chemical engineering facilities and provide critical resources to advance research projects. Many donors also established endowed student scholarships, graduate fellowships and professorships, all of which are critical to the department's efforts to continue to attract the world's top students and faculty.

"Completing the campaign is an extraordinary accomplishment for our department and for the Cockrell School," said Thomas Truskett, chair of the McKetta Department of Chemical Engineering. "I am extremely proud of how our chemical engineering community — from new undergraduate students to the most accomplished alumni — came together in an effort to honor Dr. McKetta, who has helped shape this department for decades."

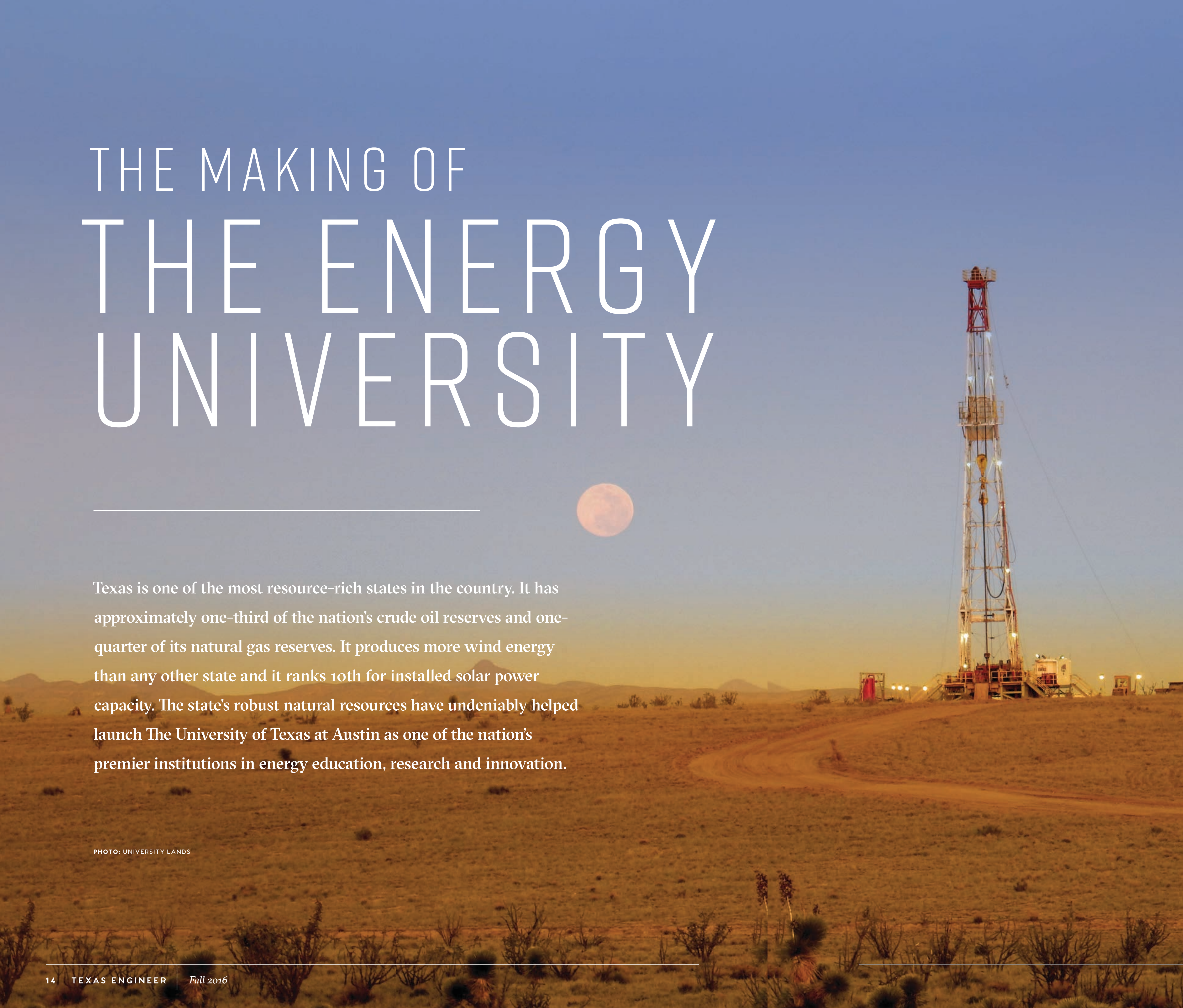
The Challenge for McKetta was launched in 2010 at an event celebrating McKetta's 95th birthday. When the campaign hit the $10 million mark in 2012, the department was officially renamed in his honor.

"I've always considered students and members of this department family, and it means the world to me that we've come together to ensure the continued success of the department — and, more importantly, the future success of its students," McKetta said.

DONOR SPOTLIGHT

Dennis Griffith (B.S. ChE 1970) and his wife, Louise Richman (B.A. Romance Languages 1969), made a generous multi-million dollar gift to the Challenge for McKetta through their estate to establish the largest senior faculty chair in the department. Their donation marks the largest individual gift in the history of the McKetta Department of Chemical Engineering.

"Dr. McKetta has always been a joyful and inspiring presence at The University of Texas at Austin. He is a great advocate for the university and the profession of chemical engineering, but, most importantly, he has always put students first — that's his greatest legacy," Griffith said.



THE MAKING OF THE ENERGY UNIVERSITY

Texas is one of the most resource-rich states in the country. It has approximately one-third of the nation's crude oil reserves and one-quarter of its natural gas reserves. It produces more wind energy than any other state and it ranks 10th for installed solar power capacity. The state's robust natural resources have undeniably helped launch The University of Texas at Austin as one of the nation's premier institutions in energy education, research and innovation.

PHOTO: UNIVERSITY LANDS

"Our pipeline of oil and gas leaders and innovations strengthens industry, ultimately increasing the profitability of our own land. And those profits then benefit our students and faculty. It's our unique story—a story that keeps going."

—**MICHAEL WEBBER,**
PROFESSOR OF MECHANICAL ENGINEERING AND DEPUTY DIRECTOR OF THE ENERGY INSTITUTE

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In the early days of the oil boom, wildcatters picked drilling locations based on instinct. When they did strike oil, they were only able to collect 10 to 20 percent of the so-called liquid gold. The industry desperately needed skilled engineers who could drill strategically and increase in-place oil recovery.

So, in 1930, UT Austin created the Department of Petroleum Engineering and built the nation's first academic building dedicated to the field of study. The department produced some of the first oil well drilling devices and recovery methods and developed the earliest expert materials on the subject, including the first petroleum engineering textbook, written by the department's first chair, Frederick Plummer.

With a history rooted in oil and gas, it may be surprising that, today, about half of UT Austin's energy research is in areas outside of hydrocarbons. The Cockrell School of Engineering is now a recognized leader in renewable energy, nuclear energy and batteries—and it continues to be a leader in oil and gas, with the nation's No. 1-ranked petroleum engineering program at both the undergraduate and graduate level.

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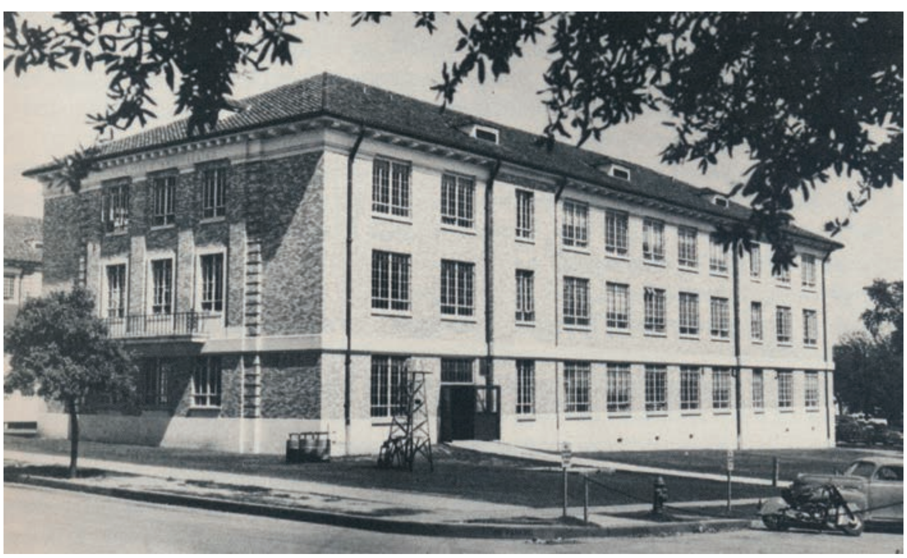
With 23 energy-related centers and labs and a dedicated Energy Institute that fosters multidisciplinary collaboration and propels energy education efforts, the university boasts an infrastructure for energy education and research that is virtually unmatched.

For nearly a century, students and faculty in the Cockrell School have been driving energy innovation — from developing early tools for oil production to creating sophisticated instrumentation for nuclear fusion. Each year, Texas Engineers continue to create cutting-edge technologies and solutions that shape our energy future.


CREDIT: PERMIAN BASIN PETROLEUM MUSEUM

THE SANTA RITA OIL WELL, UNIVERSITY LANDS



THE PETROLEUM ENGINEERING BUILDING AT THE UNIVERSITY OF TEXAS, CIRCA 1930

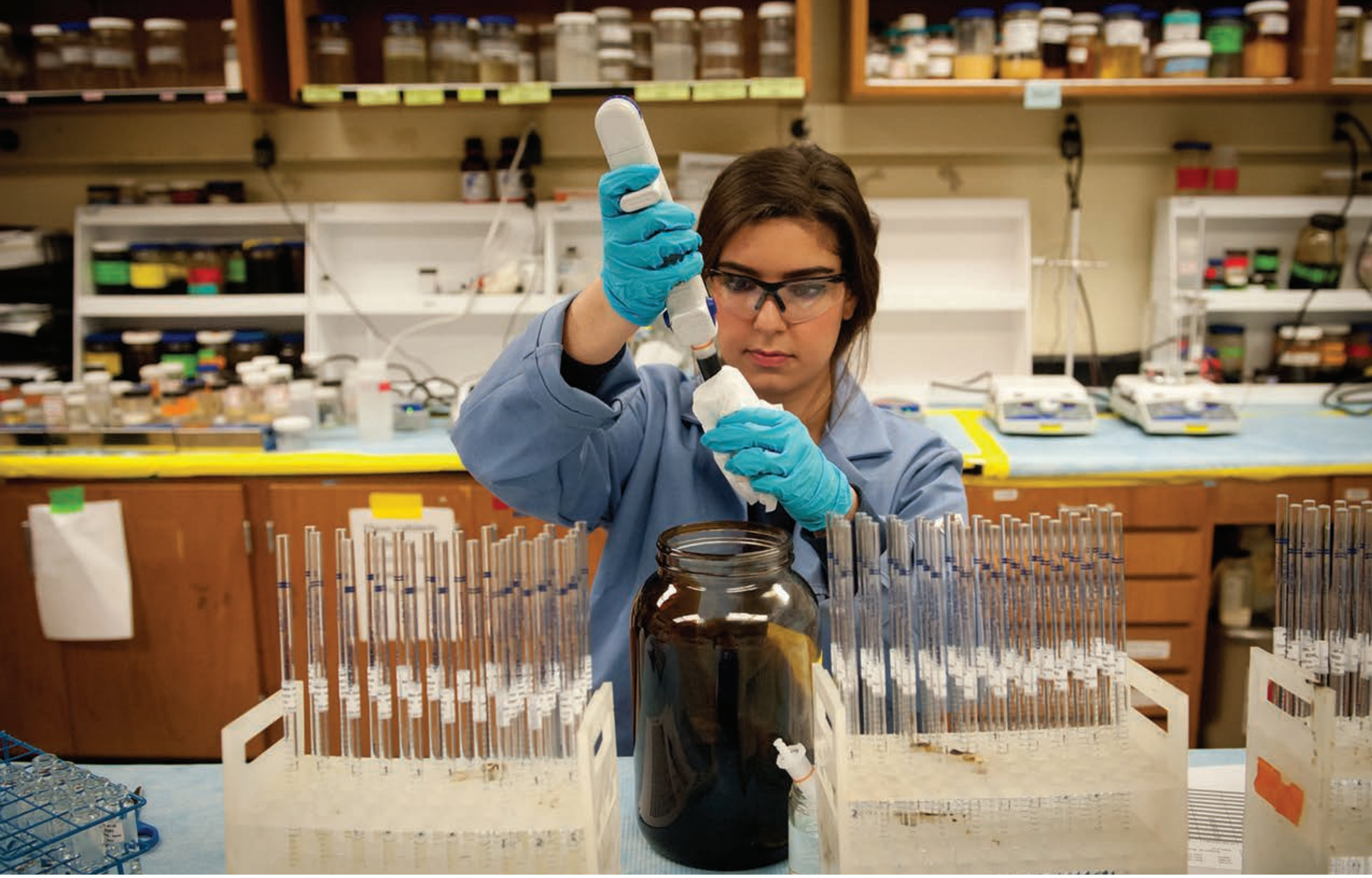
ADVANCING MODERN OIL RECOVERY

After more than 100 years of oil and gas production in the U.S., resources have become more difficult to retrieve. Texas Engineers are leading the way in creating technologies and methods that help industry to extract more oil from existing reservoirs and tap into new, hard-to-reach areas.

Enhanced oil recovery methods developed by Cockrell School researchers allow industry to recover up to 65 percent of in-place oil by utilizing steam, heat and chemicals to bring more oil to the surface.

"We have led the nation in this area for the last three decades, and our expertise is unparalleled," said Larry Lake, professor of petroleum engineering and program manager of the university's enhanced oil recovery research program. "We have developed many technologies and new chemicals, foams and polymers that increase the flow of oil when injected in order to get every bit of it that we can from a reservoir."

In 1997, Texas Engineering alumnus Nicholas Steinsberger (B.S. PE 1987), then an engineer with Mitchell Energy,



developed a new approach to hydraulic fracturing. He injected an extra watery fluid to tap into shale formations. His "slick water" fracturing approach helped launch the shale gas revolution, which led to the development of new oil fields across the country, including the Eagle Ford Shale in southwest Texas. It also reopened the Permian Basin, the largest and most productive oil field in the state.

Building on our alumnus' breakthrough, Cockrell School faculty are creating new tools to make hydraulic fracturing more effective, more environmentally friendly and less expensive.

Mukul Sharma, petroleum engineering professor and former department chair, and his team of researchers are currently building next-generation models to simulate the growth and impact of complex hydraulic fractures, as well as a downhole tool for fracture diagnostics.

By determining the "propped" fracture dimensions, the principal driver for well productivity, the tool could improve oil and gas recovery, reduce costs and help minimize the environmental footprint. Their project is funded by a $1.6 million grant from the U.S. Department of Energy.

Jon Olson, chair of the Department of Petroleum and Geosystems Engineering, says innovators like Sharma and Lake are at the heart of UT Austin's leadership in energy.

"The energy riches found under University Lands built the foundation that propelled us to the forefront of research and education in oil and gas," Olson said. "But it is our incredible people — our expert faculty and talented students — who are the reason why we continue to lead the nation in this area."

MAKING RENEWABLE ENERGY ECONOMICALLY VIABLE

In the 1970s, energy crises drew attention to the United States' dependence on foreign oil, and a burgeoning environmental movement shed light on the need for additional sources of energy. Since then, Texas Engineering has attracted top talent and significant investments in renewable energy research from both industry and the U.S. Government.

In the Center for Electromechanics, engineers are working on a global initiative to build new wind turbines that are wound with superconducting wire instead of regular copper wire to conduct electricity. Bob Hebner, research professor of mechanical engineering and director of the center, says that this

project aims to dramatically increase the profitability of wind energy.

"These turbines would be smaller and lighter, which would make the entire structure simpler and drive down costs," he said.

Texas Engineers are also improving offshore wind turbines, which are able to generate massive amounts of power from strong winds over the ocean.

Several nations in Europe and China are benefitting from regional offshore wind farms. The United States, however, only recently completed its first permanent offshore wind farm—a small project off the coast of Rhode Island. U.S. construction is limited due to the threat of hurricanes, which create complex wind, waves and currents that can severely damage large and expensive offshore turbines.

But civil engineering professor Lance Manuel and his team of researchers have been working to assess the risks of this type of storm damage in order to inform new design standards for safe and reliable offshore wind turbines. They are currently collaborating with the National Renewable Energy Laboratory and the University of Miami's Rosenstiel School of Marine & Atmospheric Science on a project funded by the DOE. The team's findings were recently published in a DOE report.

REINVESTING IN FUTURE ENERGY LEADERS

A STUDENT IN ONE OF THE FIRST PETROLEUM engineering classes, Ernest Cockrell Jr. graduated with both his bachelor's and master's degrees in 1936. He applied his education toward a successful career in the oil business—founding both an oil company, Producer's Oil, and a drilling workover company.

Cockrell greatly valued his education at UT Austin and believed that great institutions of higher education are built on dedicated faculty and talented students. He and his wife, Virginia, left generous bequests to the university's engineering program through their family foundation. They established the school's largest endowments for undergraduate scholarships and graduate fellowships, as well as more than half of the school's endowed faculty chairs. Additional contributions, made each year by The Cockrell Foundation, further strengthen the power of the endowments by providing continuous support to faculty and students—now and for generations to come.

In July 2007, the Board of Regents of The University of Texas System renamed the College of Engineering the Cockrell School of Engineering in honor of their generosity.

"By increasing our understanding of the physical impact of these storms, we hope to help advance the development of wind turbines that can harness the immense power of offshore wind," Manuel said.

In solar energy, Cockrell School researchers have partnered with an Austin-based startup, Applied Novel Devices, to develop a flexible solar cell technology at UT Austin's Microelectronics Research Center.

Sanjay Banerjee, electrical engineering professor and director of the center, says that these solar cells could have a dramatic impact on the prevalence of solar power in Texas.

"These efficient, less expensive and mechanically flexible solar cells could go around more aesthetically appealing curved tiles on rooftops, or they could be used in large-scale solar electricity farms in West Texas," Banerjee said.

Biofuels are another energy source that can significantly reduce carbon emissions by reusing CO_2 to grow new plants. Texas Engineers have developed a new, mutant yeast strain that could allow for the more efficient and cost-effective production of these fuels.

Hal Alper, associate professor in chemical engineering, and his team engineered a special type of yeast cell, *Yarrowia lipolytica*, and significantly enhanced its ability to convert simple sugars into oils and fats, known as lipids, that can then be used in place of petroleum-derived products.

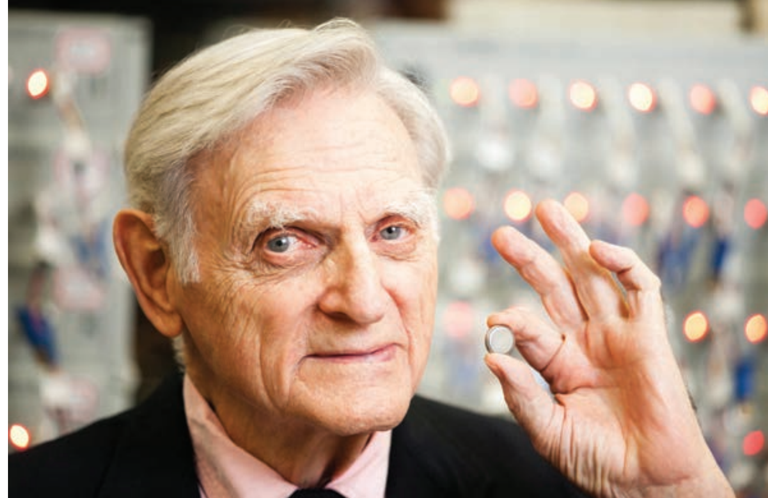
"Our re-engineered strain serves as a stepping stone toward sustainable and renewable production of fuels such as biodiesel," Alper said. "Moreover, this work contributes to the overall goal of reaching energy independence."

SHAPING THE FUTURE OF NUCLEAR POWER

Since the 1950s, when the Cold War turned the U.S. Government's attention to nuclear energy, engineers at UT Austin have been working to make nuclear power more economically viable.

Dale Klein, professor of mechanical engineering, associate vice chancellor for research at the UT System and former chairman of the U.S. Nuclear Regulatory Commission, has been a key player in the university's efforts in nuclear power, as well as in the nation's efforts to safely generate nuclear energy and monitor the use of nuclear power for weapons. He says that nuclear power is one of the cleanest, most efficient ways to create base-load electricity.

"Nuclear energy has the ability to generate base-load electricity around the clock, seven days a week, and it has no CO_2 emissions," Klein said. "It's a very compact form of energy and it provides electricity in an environmentally friendly way."



REVOLUTIONIZING ENERGY STORAGE

For the past 30 years, the Cockrell School has been home to one of the most influential inventors and energy storage experts in the world. John Goodenough, professor of mechanical engineering and electrical and computer engineering, is best known for having developed the cobalt-oxide cathode, which led to the creation of the world-changing lithium-ion battery. But at 94 years old, Goodenough is still not satisfied with his success — he's working on his next big breakthrough.

In 2015, Goodenough's team identified a new safe and sustainable cathode material for sodium-ion batteries, a promising new type of rechargeable battery. Sodium-ion batteries are a low-cost alternative to lithium-ion batteries, because sodium is abundant and inexpensive.

Today, Goodenough is hard at work developing a new battery configuration with M. Helena Braga, a visiting scientist from Portugal. The breakthrough technology, which Goodenough plans to unveil soon, is safe and of high enough energy density to power an electric car and store electric power from wind and solar energy.

Erich Schneider, associate professor of mechanical engineering, is investigating how to store large amounts of nuclear energy when it's not immediately needed for power. With a grant from the U.S. Department of Energy's Office of Nuclear Energy, he is developing energy storage plants that would allow nuclear energy to play a more flexible role as part of the electricity grid.

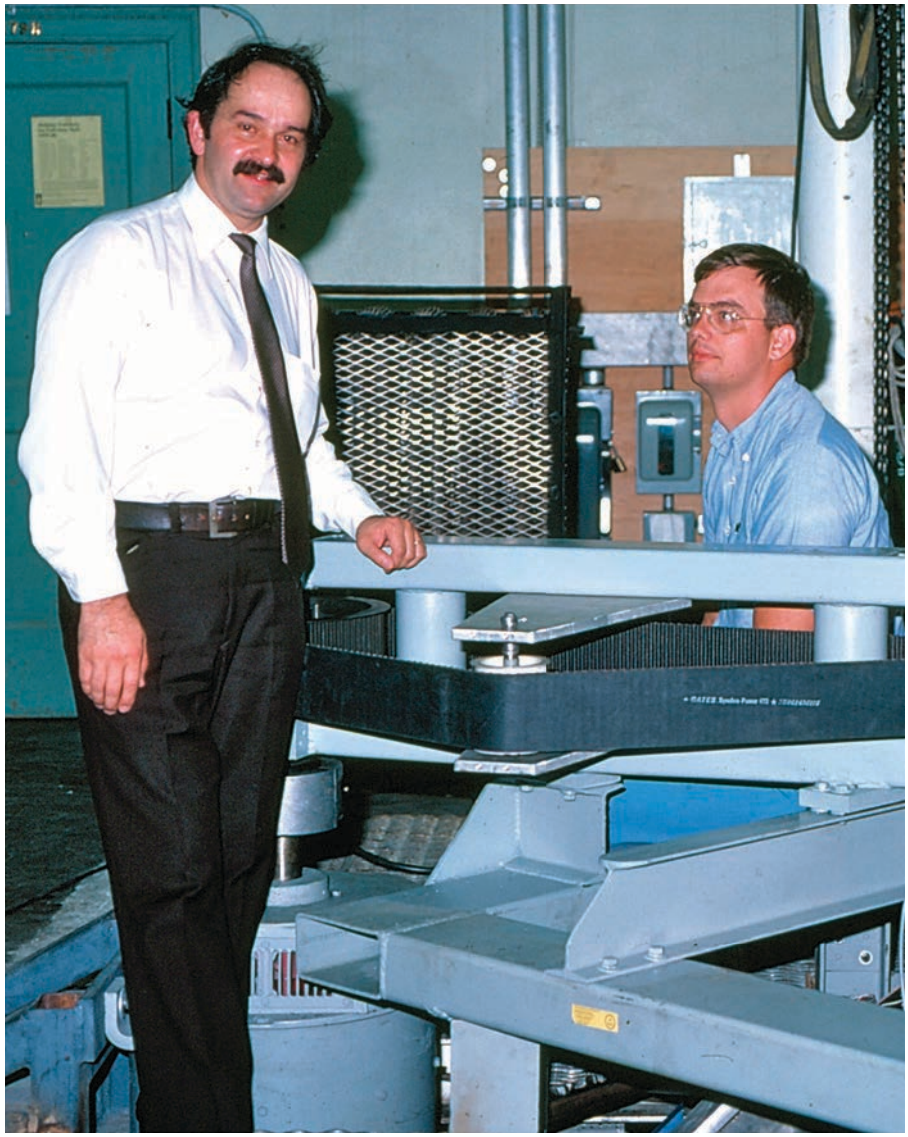
"By coupling a reactor to thermal energy storage, we can put energy on the grid when it's most needed, making nuclear power more economically competitive as a vital component of a low-carbon electricity grid," Schneider said.

To generate electricity, nuclear power plants use nuclear fission, a process that creates energy by splitting atoms apart to form smaller atoms. But Texas Engineering researchers have been involved in nearly three decades of work to create energy through nuclear fusion, the process of combining atoms together.

Since 1979, researchers in the Center for Electromechanics have provided power supplies and instrumentation for fusion projects. To this day, no one has been able to create power through nuclear fusion, but Hebner says the years of research are worth it.

"The world keeps investing in fusion because it is expected to be the cleanest, cheapest and most sustainable way of getting energy. But harnessing the processes that power the sun has proven to be a daunting task," he said.

Currently, the Cockrell School is working with the College of Natural Sciences to develop instrumentation for ITER (International Thermonuclear Experimental Reactor), an international nuclear fusion research and engineering megaproject, which will be the largest magnetic confinement plasma physics experiment in the world.



RESEARCHERS AT THE CENTER FOR ELECTROMECHANICS, 1979

"If these global projects eventually succeed, they will have undoubtedly helped change the world," Hebner said.

UT AUSTIN'S ENERGY CYCLE CONTINUES

Today, out in West Texas, oil jacks are pumping, the sun is shining and wind is whipping across University Lands. And, because of Texas Engineering innovations, industry is capitalizing on those resources, providing energy for the nation and, ultimately, generating critical funding for The University of Texas at Austin.

As we look ahead, the Cockrell School's skilled researchers, passionate teachers and talented students will continue to propel the university forward as they develop the next solutions that will transform the energy landscape. Energy helped create UT Austin's past, and energy will help drive its future.

POWER VISIT

In April, Secretary of State John Kerry paid a visit to UT Austin's renewable energy research facilities, giving Cockrell School faculty and student researchers an opportunity to show off their progress and technological advancements. From solar cells, to grid infrastructure, to biofuels, Texas Engineering innovation was on display. Kerry's 90-minute stop included a tour of the Microelectronics Research Center and solar farm and a roundtable discussion with local business leaders and university researchers.

"The story of Texas' energy transformation is one of the examples of where this world of ours is going and how economies are going to change over the course of the next years. Smart investments are in technology. We have the know-how, we have the savvy, we have the innovators," Kerry said.

UT AUSTIN PRESIDENT GREGORY L. FENVES, JOHN KERRY AND ELECTRICAL AND COMPUTER ENGINEERING PROFESSOR SANJAY BANERJEE TOUR THE UNIVERSITY'S SOLAR FARM AT THE J.J. PICKLE RESEARCH CAMPUS.

ENERGY EDUCATION AND RESEARCH AT UT AUSTIN

AT A GLANCE

Nº 1
PETROLEUM ENGINEERING PROGRAM IN THE NATION
—U.S. NEWS & WORLD REPORT

100%
OF UT AUSTIN ELECTRICITY AND HEATING
IS PROVIDED BY THE CARL J. ECKHARDT COMBINED HEATING AND POWER COMPLEX, THE LARGEST MICROGRID IN THE U.S.

400 **MWH PER YEAR** GENERATED BY UT AUSTIN'S SOLAR FARM ON 1 ACRE OF LAND

$75 MILLION
ANNUAL EXPENDITURES IN **ENERGY RESEARCH**

ONE **TRIGA** TEACHING NUCLEAR REACTOR

24%
OF **TEXAS ENGINEERING** B.S. GRADUATES WENT TO WORK **IN ENERGY FIELDS IN 2015**

ONE **HANDS-ON** OIL WELL **DRILLING SIMULATOR**

23
ENERGY-RELATED RESEARCH CENTERS AT UT AUSTIN

STARTING FROM SCRATCH

After years of planning, UT Austin's Dell Medical School — the first to be established at a Tier 1 research university in more than 50 years — proudly welcomed its first class of students this year. Dr. Clay Johnston, who moved from San Francisco in 2014 to serve as the school's inaugural dean, gives us an insider's perspective on the critical health challenges facing society today and the important role engineers play in improving health care.

You spent most of your life on the West Coast, but you're a Texan now. What has been your impression of Austin?

I've loved getting to know Austin and Texas. I've never lived in a place with such a strong sense of community. Austin really is unusual in its flavor and in the diversity of perspectives. It has some of the vibrancy and youthfulness of San Francisco but without the dominance of short-term residence, in spite of the large student population. People come to Austin and want to stay and make it a better place.

You were an established leader at the University of California, San Francisco, serving as a faculty member, center director and associate vice chancellor of research. Why did you decide to make the move to UT Austin?

The opportunity here was just too great to pass up. I loved my job in San Francisco, but here we had all the stars aligned to do something really big and really important in health care and medical education.

Why is it important for UT Austin to have a first-rate medical school, and why is it also important for residents with no affiliation to the university?

There is already a lot of great health-related research going on across UT Austin. We are helping to provide channels and bridging expertise to invigorate and extend that work. With the support of the medical school, the university has an even greater likelihood of producing important and measurable impact on health.

For those with no affiliation with UT Austin, we hope to enable improvements in health and health care throughout the region. It will take longer to see this impact, but it is an important piece for us that we hope will become more obvious to people in a few years.

> *"Engineers have created effective solutions to a variety of major problems. They are pragmatic and results-oriented. We need a lot more of this in medicine."*

When you first arrived on campus as dean — before you had any students, faculty or facilities — what was the biggest challenge you faced?

The greatest challenge then and today is the same: It's working through partnerships to enable a better system. Our partners, whether large entities like Seton Healthcare Family or Central Health, the Travis County health district, or smaller ones like individual community physicians, have been doing great work in health care for years. So we are asking ourselves: How do we make things even better for them, and for our patients, understanding their concerns about moving away from the current models?

Tell us about the experience of building a new medical school from scratch. What lessons have you learned during this process?

It's been a fabulous ride — great fun but also not without some scary parts. Medical school taught me nothing about real estate development or the variety of legal structures for nonprofit entities. I'm learning fast!

What do you feel is the most critical problem affecting health care in the U.S. today?

We pay way too much for mediocre outcomes. We should have the best health and health care system in the world but instead, by World Health Organization rankings, we're ranked between Cuba and Costa Rica. We need to be more focused on society's desire for health.

How can engineers contribute to the solution?

Engineers have created effective solutions to a variety of major problems. They are pragmatic and results-oriented. We need a lot more of this in medicine.

In a few words, what is your vision for the Dell Medical School?

To enable a vital, inclusive health ecosystem.

In what ways can the Cockrell School provide value as you realize this vision?

We are already collaborating with Cockrell School faculty in a variety of areas related to education, research and the actual provision of health care. This will increase dramatically over the next few years. We hope to accelerate the work of the great faculty already here and also work together to recruit even more superstars.

What are some of the collaborative, cross-campus initiatives and opportunities that you are most excited about?

Informatics is going to be a huge win for health but it needs to be much more sophisticated. People are focused on large, simple datasets but we need to move now to large, messy data and prove how we can use it to enhance health.

The Dell Medical School's inaugural class of students started earlier this year. How will their educational experience be different from others across the country?

We spend a lot more time focusing on population health, entrepreneurship, leadership and system change. We even carve out the whole third year of the curriculum for these things.

What truly makes the Dell Medical School extraordinary?

We are fully taking advantage of a fabulous opportunity to start from scratch to align academic medicine around society's desire for health.

WHAT MAKES A CITY SMART?

The world has smart water, smart cars and even smart appliances, so it shouldn't come as a surprise that attention has now turned to developing smart cities. Recently, the smart cities movement has gained momentum, pushed forward by federal and state political leaders, city planners, scientists, engineers and perhaps most notably, the residents of cities themselves. But what exactly is a smart city?

"We sometimes focus on transportation when we talk about smart cities," said Richard Corsi, chair of the Department of Civil, Architectural and Environmental Engineering. "It's certainly an important aspect of cities, but you also have water infrastructure, energy infrastructure, telecommunications infrastructure and more. Each of these has typically existed in its own silo, but the aim of the smart city is to better integrate this infrastructure using sensors, evolving data bases, advanced models and cutting-edge visualization tools that allow the whole to be smarter than the sum of its parts."

An evolving and debated concept, a smart city is widely defined as an urban development designed to integrate information systems and technology solutions across multiple community assets, including schools, hospitals, power plants, water supply networks and transportation systems. And according to many, the smart city is simply about leveraging the latest technology and common-sense solutions in order to help people — especially some of the most vulnerable in society — become safer and healthier and lead better lives.

Smart cities are not determined only by the things we can see and feel — our buildings, streets, neighborhoods and offices — but by the entire environment around, above and below us, and by the information we can garner and then put to use. From the sky to the subsurface, experts in the Cockrell School are working hard to determine what truly makes a city smart.

RICHARD CORSI

UP IN THE AIR

Assistant professor Joshua Apte, an air pollution expert, is taking a top-down view of the smart city.

"When we start talking about more intelligent ways to build cities, there are several areas where air pollution comes into effect," Apte said. "One is building cities where there is less air pollution in the first place."

Apte believes that the ongoing transformation in energy and transportation fuels is going to have an important impact in the air quality that we see in cities. And there's something else that he's particularly excited about — new low-cost technologies for measuring air pollution in cities and providing people with information. In the last few years, there has been a revolution of lower cost stationary sensors that could be mounted on lampposts, inside buildings, indoors and outdoors. The technology is not 100 percent accurate, Apte said, but it's come a very long way in the past five years, and it's getting better.

JOSHUA APTE

"There is real potential to deploy networks of these sensors to supply data to a variety of different users, such as municipal air quality agencies and perhaps agencies that control traffic," Apte said. "So you can think of rerouting vehicles from polluted parts of the city in real-time as spikes in pollution occur."

The hope is that connections that exist between air pollution and health may better inform the design of cities. "One way is to design cities so less air pollution is emitted, and that means finding ways to make cities more walkable and bikeable," Apte said. "A lot of that is good engineering, but also just sensible, old fashioned urban planning. Sometimes old solutions are the best ones."

"A lot of that is good engineering, but also just sensible, old fashioned urban planning. Sometimes old solutions are the best ones."

ON THE STREET

Jen Duthie, a researcher in the school's Center for Transportation Research (CTR), is interested in designing smart cities that are accessible to all people, regardless of their socio-economic status.

"A smart city is one in which everyone can access all of the opportunities that they need and want," Duthie said. "We want to make sure technology is something that enables a better quality of life."

JEN DUTHIE

Earlier this year, Duthie led a team of UT Austin researchers who collaborated with the city of Austin on the Department of Transportation's Smart Cities Challenge, a competition to become the country's first city to integrate innovative technologies, including self-driving cars, connected vehicles, smart sensors and more. Austin was one of seven finalists that competed to win $40 million in federal grant money, which ultimately went to Columbus, Ohio.

Although Austin didn't win the competition, it jump-started an effort that brought together experts from across the city. A centerpiece of their plan is CTR's DataRodeo.org, a long-term transportation data storage site that allows access to cross-agency regional data, visualization tools and analytics — so that leaders and the public can make better decisions about funding and policy.

CTR created the DataRodeo, in collaboration with the university's Texas Advanced Computing Center and regional partners like the Capital Area Metropolitan Planning Organization.

The effort also helped highlight the innovative transportation projects that CTR researchers and researchers from the Cockrell School's Wireless Networking Communications Group are working on.

For instance, associate professor Todd Humphreys and his students unveiled a lane-keeping technology, which relies on centimeter-accurate GPS to help both conventional and driverless cars stay within their lane in challenging weather conditions. And assistant professor Christian Claudel and his students are working on creating networks of transportation-focused wearables, leveraging augmented reality tech to help protect pedestrians and avoid accidents.

"We are definitely at a turning point when it comes to transportation," Duthie said. "We expect to see a lot more data flowing between the vehicle and the infrastructure in what we call a connected system."

Duthie said she expects the transportation system to look quite a bit different in the not-so-distant future.

"I expect that 20 years from now we won't own cars, and mobility will be a service where you order transportation based on needs. If you're transporting kids by car, you'll order a bigger vehicle. It will be safer as well," she said.

IN OUR BUILDINGS

Associate professor Fernanda Leite thinks that in order to truly reach the smart city vision, there needs to be better integration between various systems—and she's starting with the construction and maintenance of buildings.

FERNANDA LEITE

"We are all very siloed in the construction sector, and each group is speaking a different language," Leite said. "How do we create a common language to enable smart cities, so that all of it is connected?"

Leite, who is the current chair of the American Society of Civil Engineers' (ASCE) Visualization, Information Modeling and Simulation (VIMS) Committee, said that one of the biggest challenges ASCE members are faced with is bringing together data from architecture, engineering, construction and facilities management—areas that typically work independently.

For her part, Leite's research focuses on developing 3D models to simulate construction projects. On top of 3D modeling the to-be-built structures, the simulation adds other layers, including time and safety. This creates a so-called 4D safety model that allows for a safety component that doesn't exist with 3D modeling. By showing the construction project in real time, construction managers can see potential dangerous work situations.

Leite is also making sure engineering students are adept and comfortable working with different visual and mapping systems.

"In my Building Information Modeling (BIM) course, I really am software agnostic when I teach, and the reason is that I want students to come out and learn different applications. I want them to be able to use different resources, ask questions and fully understand the fundamentals," she said.

UNDER OUR FEET

For assistant professor Salvatore Salamone, a smart city starts with making sure the infrastructure—bridges, concrete structures and pipelines for gas and hazardous liquids, for example—are secure and running at optimal levels.

SALVATORE SALAMONE

"Infrastructure systems are complex systems," Salamone said, "and unfortunately, many of these structures are facing an increasing number of challenges that can jeopardize their safety and serviceablity. Some of the challenges, such as aging and maintenance, are life cycle-related and expected. Other challenges are manmade hazards or natural events that are not expected and can weaken and destabilize a structure."

Salamone's Smart Structures Research Group is focused on advancing next-generation technologies and methodologies for the structural health monitoring (SHM) of civil, mechanical and aerospace structures.

In one project, Salamone and his team are designing SHM technology to detect, evaluate and monitor the progression of corrosion in pipeline systems. Corrosion is a leading cause of failure in metallic pipelines that carry gas and chemicals. He's using a similar approach to monitor corrosion progression in concrete structures. He's developed a vision-based SHM system that relies on 2D images to retrieve surface or subsurface patterns that can provide a quantitative measure of damage.

"SHM can be utilized as a platform for construction of a 'smart city,' that is, a city which structures have instruments with integrated sensing and processing capabilities that could inform decision makers on the need for repair and ultimately ensures the safe and reliable operation of infrastructure," Salamone said.

EXTREME MEASURES

5 QUESTIONS WITH LYDIA CONTRERAS

LYDIA CONTRERAS studies very small organisms, but seeks to answer big questions: how does our environment affect our chemical makeup, and what can we do to improve our response to environmental stress? An assistant professor in the McKetta Department of Chemical Engineering, Contreras sat down with us to discuss how her work could affect human health.

1. Tell us about your research and the problems you're looking to solve.

I study the way living organisms' cells react to their environment to find out how we can apply those responses in human cells. One of the ways we do this is by studying organisms called extremophiles, which live in extreme conditions like places with very hot weather, high radiation levels or water containing toxic metals. We try to find out what features these organisms have at the molecular level that allow them to live in a stable condition.

2. How could your work impact human life?

Our work is very fundamental and has many possible applications, from helping people be more resistant to seasonal allergies to providing more foundational treatment for diseases (such as some cancers) that are caused by environmental factors. It could lead to new pharmaceuticals that alter the way our cells sense and react to things like air pollutants or radiation. This work could also have huge implications for human survivability after disasters such as nuclear explosions.

3. Which organisms do you study?

We study three main models. The first is an extremophile called *Deinococcus radiodurans*, which is known for being very radiation-resistant. It's nicknamed "Conan the Bacterium" because it's resistant to so many stresses like drought, acid and metals.

The second organism, *Zymomonas mobilis*, produces high levels of bioethanol. It helps us anticipate problems in applying our work in biotechnology. Most organisms will die when you start producing high levels of a chemical, so if we can figure out how some organisms can tolerate high production of chemicals of interest to us, then we can create better production systems in other organisms.

Lastly, we study human lung cells. We expose them to chemicals that we could encounter in the air and see how they react to help us determine how to equip people who suffer from allergens or better predict early cellular behaviors that can lead to lung cancer.

4. What inspired you to focus your research in this area?

My interest in human health and solving many of the health disparities that exist in the world today led me to chemical engineering. I want to figure out how environmental factors like pollution and contaminated water can affect the body over time so we can better predict how to help people remain healthy.

Also, I became interested in biology from a systems engineering perspective. Biology is rapidly changing; you can now look at the body in terms of whole systems — all 20,000 to 25,000 genes — instead of studying just one gene at a time as traditionally done. From an engineering perspective, what you really have is a huge network that you can begin to understand by interrupting it and seeing how those interruptions affect the whole process.

5. In addition to your work, you also teach introductory engineering classes. How does teaching fit into your research?

Teaching is great for my research; I'm required to be up-to-date with current knowledge as I am challenged daily by our highly inquisitive students — you have to be aware of changes to fundamental concepts in the field. I also bring my research into the classroom and offer students real-world applications to what they're learning. I love working with the students here — we have extremely talented student engineers in the Cockrell School.

This interview is part of an ongoing "5 Questions" series, where we ask Texas Engineers about their lives and research.

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PHOTO: © STEPHEN GRIFFIN, LOCKHEED MARTIN

IT'S ALL IN THE DELIVERY

BY JOHN G. EKERDT

ASSOCIATE DEAN FOR RESEARCH, COCKRELL SCHOOL OF ENGINEERING

I ONCE VISITED A THIRD-GRADE CLASS to talk about my job for career day. My presentation was sandwiched between that of a neurosurgeon—who showed off a model of a human skull, to great applause, of course—and a firefighter. How, as a chemical engineer, was I supposed to compete with *that*? And further, how do you make niche, often technical research compelling—or even understandable—to a group of children?

Even after that day concluded, I couldn't stop thinking about these questions. I knew that if I could find a way to communicate the impact that my research has on human life, I could open their minds to the excitement of STEM at an early age, and then maybe—just maybe—I could inspire more curiosity and discovery as they grow up.

It occurred to me that the types of problems that brain surgeons and firefighters solve are immediately relevant to almost anyone because they are directly saving lives, and that resonates with people for obvious reasons. With something like chemical engineering, we solve critical societal problems by helping to develop pharmaceuticals, reduce pollution and improve food production, for example, but those problems are solved incrementally. Thus, a lot of our time is spent working on the small building blocks of larger solutions.

This sets up a major communication hurdle in engineering and academia: we are rarely forced to step outside the nuts and bolts of our work—the minutiae of technical papers, research proposals and lab findings—to prove its value to someone who isn't already familiar with how we're approaching these problems. But as professionals and as good citizens, we need to be able to have these conversations. We must be able to deliver a clear value proposition for our research.

Too often, we engineers underrate the importance of effective communication, yet deep down we all know that communication is actually critical to advancing our research projects and building our careers. We spend a lot of time applying for grants, publishing papers and developing presentations to attract funding and build new corporate partnerships. These endeavors can be much more successful when we articulate our impact in a way that meets the needs of our many audiences.

As I learned after career day, we have a responsibility to educate and inspire future generations. We also have a responsibility to show the public, and our funding agencies and partners, how and why our research matters. This often requires us to translate our "engineeringese." Below are five key communication strategies for anyone who might be struggling with this translation.

"We must be able to deliver a clear value proposition for our research."

1. IDENTIFY YOUR AUDIENCE AND THEIR MOTIVATIONS

Who are you talking to and how much technical understanding do they have (or do they want to have)? Is your audience going to take the information you give them and use it to make a decision, or—like the third-grade class—are they simply there to listen and learn? If you can put yourself in their shoes and understand their goals, then it will be easier for you to help them not only understand, but care.

2. COME UP WITH A RELATABLE VISUALIZATION OF YOUR RESEARCH

The brain processes visuals thousands of times faster than text, so for both non-technical and technical audiences, being able to picture the work can be illuminating. As an example, I study the growth of very thin films and nanostructures. I was talking about atomic layer deposition to a friend, and he responded, "So it's like you're making molecular lasagna!" And it really is. Those kinds of easy-to-grasp visuals will really help your audience understand the mechanics of your work.

3. CRAFT YOUR "ELEVATOR PITCH"

It's a tried-and-true method of distilling your work into the key elements that people want to know: "Here is the problem I'm trying to solve, here is how I'm solving it and here is the impact this work is going to have." The elevator pitch helps someone quickly get the essence of a topic. Even better, it's short and sweet—if your audience wants to know more, they'll ask.

4. PRACTICE MAKES PERFECT

Like any skill, practice leads to perfection. Start by trying to explain your research to your parents or by getting your niece or nephew interested in the problem you're trying to solve. If you can get someone interested to the point that they not only understand your work but also are informed enough to ask questions about it, you're on the right track.

5. UNDERSTAND THE THEMES THAT RESONATE

Quality of life, security and financial benefit are topics that provide tangible context to nearly anyone. If you can explain your field of study in the context of themes like these, your research quickly becomes relevant to society. By making it clear how you are solving these real-world problems, you may even convince a third-grader that being a chemical engineer is just as cool as being a firefighter.

ENGINEERING AND THE BRAIN

It is our most complex organ—one that literally controls our every move. The brain is the command center of our bodies that, if attacked by disease or impacted by injury, can change a person's life forever.

Preventing these diseases and injuries, and developing future treatments that can save and improve lives, requires diverse expertise from across the STEM spectrum. Brain health is not just a priority for research scientists or medical doctors; it is also a fundamental area for engineers, who play a crucial role in discovering and implementing many groundbreaking solutions that improve brain health.

In the Cockrell School of Engineering, teams of faculty and students are focusing on the brain—drawing on their problem-solving skills and creating new technologies to tackle, among others, four of the most common life-threatening brain conditions.

BRAIN TUMORS

Whether benign or malignant, brain tumors are abnormal tissue masses that put pressure on the brain. They can lead to vision problems, physical ailments, behavior changes and, in many instances, devastating tragedies, and they are the most common cause of cancer-related deaths in people aged 15–39.

Patients are typically treated with surgery, radiation and systematically delivered chemotherapy, which delivers chemotherapy drugs to the entire body. But new, more targeted therapy methods are currently being tested, including one that involves surgically removing a piece of bone from the skull and using a single-port catheter to directly inject chemotherapy drugs into the brain tumor. However, single-port catheters often do not provide enough coverage in delivering the drugs to the tumor, which can lead to tumor recurrence.

That's why Chris Rylander, mechanical engineering associate professor, and Ph.D. student Egleide Elenes have developed a new catheter that has the ability to deliver chemotherapy drugs to a brain tumor in different places and at a large volume, which could decrease tumor recurrence and the need for multiple insertions in the skull.

The arborizing catheter has biocompatible microneedles made from optical fibers that can spread out like branches on a tree, allowing it to cover more area as it delivers chemotherapy.

"Current standard treatment just isn't effective enough," Elenes said. "We are really trying to develop a product that will impact the lives of people suffering from brain tumors."

Before pursuing clinical trials, the researchers are working to incorporate the catheter into an MRI imaging system that will help surgeons better analyze and monitor the effectiveness of the therapy.

ALZHEIMER'S DISEASE

The most common form of dementia, Alzheimer's disease is one of the most mysterious brain conditions. Nerves in the brain degenerate for uncertain reasons and cause progressive problems with memory, judgment and thinking as a person ages. It is the sixth leading cause of death in the U.S., and it is estimated that more than 5 million Americans are living with Alzheimer's disease.

Using the retina as a test-bed, a team of Cockrell School faculty and students are partnering with alumni and biomedical engineers at The University of Texas Medical Branch to take an outside-the-box approach to the detection of the disease. The team, which believes that the same nerve cell and neuron changes that occur in the brain of someone with Alzheimer's may also be occurring in the retina, is working to build innovative instruments that may help doctors detect Alzheimer's in the eye.

Led by biomedical engineering professor and ophthalmologist Dr. Grady Rylander, the team has developed an imaging device that uses scattering angle diverse Optical Coherence Tomography (OCT) to infer whether the retinal ganglion cells are changing in the retina. OCT provides imagery at a much higher resolution than other imaging techniques, such as MRI or ultrasound. The team is also using a high-powered fluorescence microscope developed by biomedical engineering professor Thomas Milner to see what's actually triggering the changes.

"Alzheimer's is a devastating disease that needs new tools for detection," Rylander said. "If we can gain better insight into the mechanism and progression of Alzheimer's, we can improve intervention and better manage degenerative conditions much earlier in the process."

STROKE

When a stroke occurs, blood flow and oxygen are interrupted to an area of the brain causing the affected tissue to start deteriorating. The body parts and functions that are controlled by the damaged cells — such as speech and physical movement — can become impaired.

Cell repair and patient recovery often depends on where the stroke occurred in the brain and how much damage occurred, but more than two-thirds of survivors will have some type of disability.

With an eye toward improving blood restoration medication and rehabilitation methods for stroke patients, Cockrell School engineers are collaborating with a neurosurgeon at St. David's HealthCare on a new approach. Biomedical engineering professor Andrew Dunn and his team are developing a laser-based technique, called multi-exposure speckle imaging (MESI), that can be used to accurately measure blood flow after a stroke. The technique expands a laser to illuminate an entire area of the brain at once. When the laser reflects off of tissue, it provides a grainy or speckle pattern, allowing doctors and researchers to analyze the fluctuations in the speckles and convert that information into a motion map that identifies blood flow and blocked arteries.

"By gaining a better understanding of how the brain is remodeling itself, we hope to use MESI as a tool to inform stroke rehabilitation strategies and help patients recover faster," Dunn said.

In looking to improve the physical rehabilitation for people who have suffered from a stroke, Rick Neptune, mechanical engineering department chair and director of the Cockrell School's Neuromuscular Biomechanics Lab, analyzes those with post-stroke hemiparesis, or weakness of one side of the body. Neptune studies a person's gait and walking abilities through musculoskeletal modeling, computer simulation and experimental analyses. His research also involves designing and building custom orthotic devices that have helped people live better and more active, independent lives after a stroke.

"A stroke can have devastating effects that can lead to long-term disabilities," Neptune said. "Our goal is to tailor and personalize rehabilitation programs, develop devices and create technologies that improve a patient's physical abilities and overall quality of life."

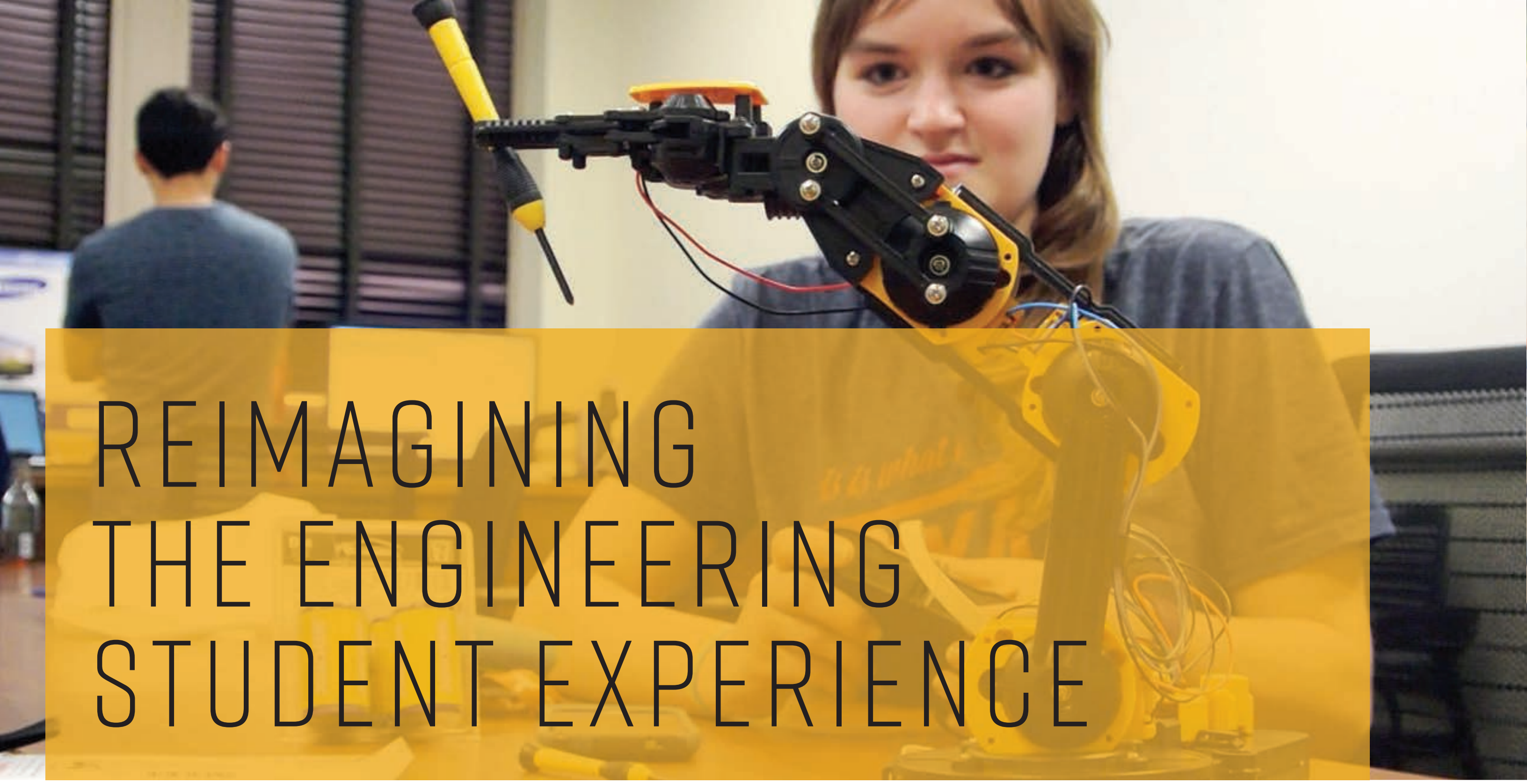
TRAUMATIC BRAIN INJURIES

Traumatic brain injuries are most often caused by sudden blows or bumps to the head. The bruising and damaged blood vessels and nerves can result in the brain functioning abnormally and can lead to significant mental impairment.

While falls are the most common cause of traumatic brain injury, sports injuries are one of the most high profile. For instance, chronic traumatic encephalopathy (CTE), a disease caused by repeated concussions, has appeared in headlines after studies linked it to football-related head trauma. Acknowledging that the problem is in desperate need of a new solution, one group of Cockrell School engineers are working to prevent CTE and other traumatic brain injuries from happening at all — combining extraordinary materials with innovative design to offer better protection.

Associate professor Carolyn Seepersad, research scientist Michael Haberman and their team have developed new impact-absorbing structures — negative stiffness (NS) honeycombs — that bounce back into shape after an impact. Conventional honeycomb structures lose their protective properties after only one impact. The team's NS honeycomb structures, insular panels of repeating cells in a variety of shapes and configurations, are capable of elastic buckling, allowing them to recover their shape after repeated impacts.

"Whether you're serving our country in uniform, playing in a big game, or just driving or biking to work, the potential for multiple collisions or impacts over time — however big or small — is a reality," Seepersad said. "We believe that this technology, when constructed in future helmets and bumpers, could reduce or even prevent many of the blunt-force injuries we see today." TE



REIMAGINING THE ENGINEERING STUDENT EXPERIENCE

Two years ago, the Cockrell School community watched as its outdated Engineering-Science Building — a relic of the days of chalkboards and vacuum tubes — crumbled to the ground in a pile of rubble, making room for the Engineering Education and Research Center (EERC). It was September 2014, and the transformation of engineering education on the Forty Ares was just beginning.

In today's workplace — where a colleague in Singapore is just a video chat away and a complex machine part can be fabricated using a 3D printer in a matter of hours — the role of the engineer is much different from even a decade ago. To thrive in industry, engineering students need to learn more than just the technical fundamentals — they must also gain strong communication and problem-solving skills, as well as be prepared to lead diverse teams, all in four short years.

From changes to curriculum across all majors, to increased opportunities for leadership development, to the opening of a new makerspace, the Cockrell School is creating an educational culture centered on student projects and multidisciplinary collaboration.

And when the 430,000-square-foot EERC opens next year, Texas Engineering will have a state-of-the-art facility fit for a new era of engineering education.

"This building will change everything," said Dean Sharon L. Wood. "Our students will be able to work on more projects and share ideas in open, architecturally stunning spaces. And — for the first time in the Cockrell School's history — students will have one building that is not tied to a specific discipline, where they can learn and collaborate with peers from every department. This multidisciplinary environment is essential if we want to expand students' learning experiences."

SPACE FOR CREATING, MAKING AND DOING

After more than two decades as a civil engineering faculty member in the Cockrell School, Wood understands that engineering students need a place to experiment, design and build. In fall 2014, she worked with mechanical engineering professor Desiderio Kovar to create the Longhorn Maker Studio, the university's first dedicated makerspace for inspiring engineering student innovation.

Inside, students learn to push the limits. They break things and rebuild them. They develop their ideas and learn from their mistakes. They solve problems without textbook answers.

Equipped with the latest technologies, this makerspace provides 1,700 square feet of space where students can create prototypes for class or work on independent projects simply because they have an idea. With more than 7,000 student visits last year, it has become

STUDENTS LEARN COMPLEX SYSTEMS ENGINEERING CONCEPTS THROUGH HANDS-ON AIRCRAFT DESIGN PROJECTS.

the undisputed hub for creative activity within the Cockrell School.

Since the maker studio opened, the school has added a wood shop and hired a new director, Scott Evans. Evans, who received his Ph.D. in mechanical engineering from the Cockrell School, said the makerspace is crucial to helping students make the most out of their engineering education.

"I want to challenge freshmen to make something that works—to help students see themselves as engineers sooner," he said. "When that happens, courses take on a new role for the students; they are more like resources to become better engineers."

Next year, the maker studio will move into the EERC's 23,000-square-foot National Instruments Student Project Center. With access to even more space, tools and technologies, students will be able to work on projects every semester. Through the center's glass walls, everyone passing through the EERC's atrium will see students hard at work on their creations.

"It's time to take our students' projects out of our basements, closets and hallways," Wood said. "Everyone who visits the Cockrell School should see their incredible work and experience our community's creative energy."

RETHINKING THE TRADITIONAL LECTURE

Formulaic problem sets and by-the-book lab reports are rare in industry. That's why the Cockrell School is offering more opportunities for hands-on learning in the classroom each semester. One capstone design project during a student's senior year just isn't enough.

"By presenting students with open-ended problems throughout their education, we encourage them to communicate, to work together and to seek out new information and ideas," Wood said. "Those are the skills they will need to succeed in today's engineering careers."

Across disciplines, faculty are reducing lecture time to focus on generating discussion and guiding students as they collaborate on projects.

Armand Chaput, senior lecturer in the Department of Aerospace Engineering and Engineering Mechanics, was recently recognized by the American Society for Engineering Education for his approach to teaching systems engineering through hands-on aircraft design projects.

"We are teaching systems engineering as a fundamental principle of design—not as a separate, theoretical subject," Chaput said. "Once students see how systems engineering applies to and enables success in projects, they quit thinking about it as an abstract concept and start applying it to everything they do."

Professors are also utilizing the Longhorn Maker Studio for class assignments. For example, students are building autonomous robots in electrical engineering's Real-Time Operations course and designing miniature cars in mechanical engineering's Machine Elements course.

In preparation for the dramatic increase in project space in the EERC, Wood is supporting department-wide initiatives and allocating academic development funds to help faculty revamp their courses to focus on hands-on learning.

The Department of Electrical and Computer Engineering recently proposed a curriculum transformation to introduce more open-ended design courses and integrate liberal arts courses that strengthen students' writing and communication skills. The Department of Petroleum and Geosystems Engineering is working to enhance its educational model by leveraging new classroom technologies and hiring professors with industry experience to educate students on real-world challenges in oil and gas.

As the students' academic experience continues to evolve, Wood is thinking about what's next in engineering education, especially after encountering joint-degree programs between engineering and fine arts or liberal arts at other universities.

"Though it would be difficult to implement for a variety of reasons, I could see value in allowing students to design their own degrees that reflect their individual interests and goals," Wood said. "As large-scale, open-ended projects become more and more a part of our students' educational careers, this type of hyper-individualized education could really amplify those experiences."

Maybe one day, no two Cockrell School students will graduate with exactly the same degree.

IN INTRODUCTION TO EMBEDDED SYSTEMS, FIRST-YEAR ELECTRICAL AND COMPUTER ENGINEERING STUDENTS WORK TOGETHER TO CREATE NEW HAND-HELD GAMES.

WHEN STUDENTS LEAD THE WAY

Some of the most exciting projects are initiated and led by students outside of the classroom. The Cockrell School's more than 80 student organizations prove this every semester.

They act on their ideas by designing and building prototypes — like the planetary rover created by Women in Aerospace for Leadership and Development — and they compete in national and international competitions — like the team of biomedical engineering students who won first place for their low-cost patient monitoring device at Engineering World Health's design competition.

Courtney Koepke, a biomedical engineering and Plan II senior who helped develop the device, said she learned the value of patience and communication while leading her team to success.

"The experience taught me the importance of having compassion for yourself and others. No one is perfect and, as a project leader, you have to trust your teammates to do their best — and ask for and offer help when needed," Koepke said. "I'm so proud of not only our team's success, but also how much each of us developed as individuals and as engineers."

Student organizations and outside competitions also give future engineers the opportunity to partner with their peers in fine arts, liberal arts, business and natural sciences, teaching them new approaches.

For example, a team of three undergraduate mechanical engineering students partnered with a design student in the College of Fine Arts to create a traveling Disney attraction. The engineering students gained insight into user experience and the visual elements of the project, and the team's attraction won second place in the Walt Disney Imagineering Imaginations Design Competition this past spring.

Cockrell School leadership hopes that the EERC's student project center, ample meeting rooms and centralized student support offices will encourage even more students to participate in organizations and competitions.

With a wealth of technology and resources in the Longhorn Maker Studio and a strong pool of talented peers across disciplines, students are also developing robust inventions that have the potential to turn into marketable products.

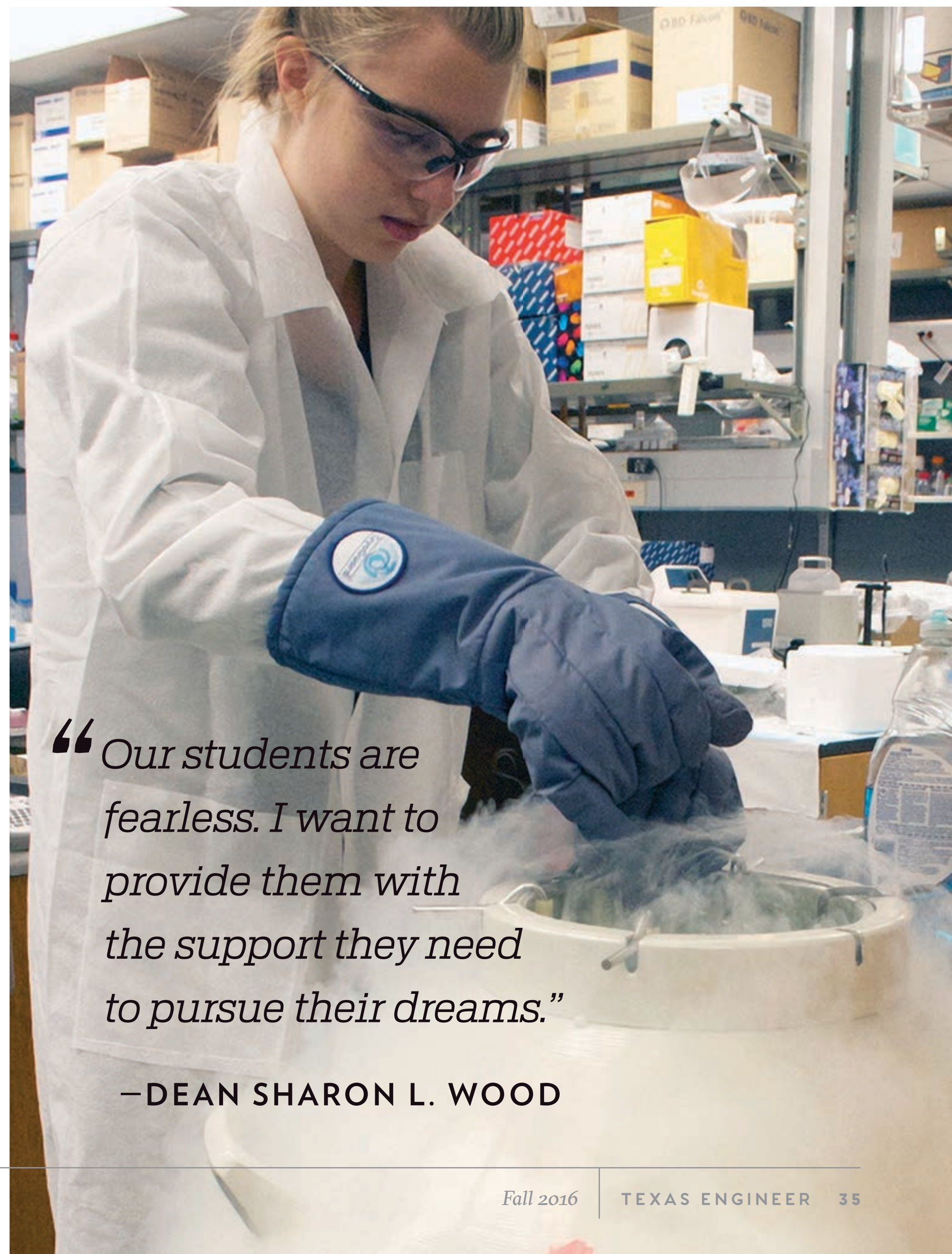
"The Cockrell School's culture of entrepreneurship is a product of our tight-knit, creative community and our efforts to encourage more hands-on experimentation," Wood said.

Today, students interested in entrepreneurship can enroll in the Longhorn Startup seminar, join UT Austin's related student organizations and work with seasoned entrepreneurs and faculty advisors in the Cockrell School's Innovation Center.

Whether working independently on a new prototype, leading a student organization or debating the direction of a class project, Texas Engineering students are gaining the skills they'll need to thrive in industry and to truly change the world. As we look to the future, the Cockrell School will continue to strive to foster their talents and passions.

"Our students are fearless," Wood said. "I want to provide them with the support they need to pursue their dreams." TE

ABOVE: IN THE LONGHORN MAKER STUDIO, STUDENTS HAVE ACCESS TO SOPHISTICATED EQUIPMENT FOR DESIGNING AND BUILDING, INCLUDING 3D PRINTERS AND SCANNERS, LASER CUTTERS AND MACHINES FOR FABRICATING ELECTRONIC CIRCUIT BOARDS.



"Our students are fearless. I want to provide them with the support they need to pursue their dreams."

—DEAN SHARON L. WOOD

DEFINED BY SERVICE

Alumnus has dedicated his career and life to helping others

Nearly 10 years ago, engineer and U.S. Air Force Major Josh Aldred was stationed in the small Iraqi village of Hawr Rajab where Sunni militiamen previously fought against the United States military. The local village was destroyed. But Aldred and his team of engineers began teaching the residents practical construction skills to help them rebuild, and, in the process, Aldred's team discovered another critical need.

"As we were showing them how to build their houses, we realized many of the residents couldn't read or do basic arithmetic, so we decided to bring in some of our interpreters to teach them these skills," Aldred said. "It was amazing, and it became an extremely rewarding program."

This kind of service has become a common theme for Aldred, who has dedicated his life to helping others. As a result of his hard work and dedication, the National Society of Professional Engineers named him the 2016 Federal Engineer of the Year.

Aldred received his M.S. and Ph.D. in civil engineering from the Cockrell School in 2010 and 2015 respectively. He joined the Air Force after completing his bachelor's degree in civil engineering at Northern Arizona University in 2003.

Unsurprisingly, Aldred is on a teaching track in his military career and has already taught several civil engineering courses at the U.S. Air Force Academy in Colorado Springs, CO. After completing his military assignments, he plans to teach civil and environmental engineering courses at the academy.

CLASS PHOTO OF STUDENTS IN VILLAGE OF HOPE PROJECT, HAWR RAJAB, IRAQ

"One thing I've come to learn as an engineer is that we have unique skills that can really benefit society."

"I haven't taken a traditional career path for an engineer in the Air Force," Aldred said. "I never really anticipated going back to school and getting my master's degree or Ph.D., but I have a deep desire to learn and to pass knowledge on to other people, so it was a good career path for me to go back to school and teach as well."

Aldred has been stationed in South Korea at Kunsan Air Base since August of 2015. Within eight months of arriving, he and a team of 170 engineers installed more than $6 million in HVAC equipment at the airbase. Aldred oversees the entire team, which includes both Air Force military and Korean civilian engineers, and is responsible for the sustainment and repair of all facilities on the installation.

"We maintain the airfield, all the facilities, the infrastructure and the utilities here," Aldred said. "It's pretty hectic. There has been a lot of work to do, and I'm proud of what my team has been able to accomplish here."

When deciding where to go for his master's and Ph.D. as part of his teaching track, Aldred chose UT Austin because of the prestige of its civil engineering program.

"I have seen the program's reputation continue to improve, which makes me really proud to be an alum," he said. "I feel like I bought stock in Apple!"

During his time at the Cockrell School, Aldred worked closely with Richard Corsi, who is now the chair of the Department of Civil, Architectural and Environmental Engineering, on research projects focused on improving indoor air quality. Aldred said he gained a new appreciation for research and lab methods that he has since carried with him throughout his career.

"In the end, gaining those research skills also provided me with some really great critical thinking skills, which are extremely useful not only in research but in life," he said.

When he is not on assignment, Aldred lives at home in Austin with his wife, Vanessa. He continues to serve his community by volunteering for programs like Mobile Loaves and Fishes, which delivers prepared meals to the homeless. Their two dogs, a shelter rescue and former military working dog in training, keep them busy in their free time.

"One thing I've come to learn as an engineer is that we have unique skills that can really benefit society, so I would urge students to look for opportunities to serve early on," Aldred said. "I'm trying to serve through the military now, and later I want to use my engineering skills to teach and serve other folks as well."

RISKING IT ALL, AND REAPING THE REWARDS

YOU'VE PROBABLY NEVER HEARD OF CPLEX. But for more than two decades, diverse industries around the world have used this business-to-business resource allocation software to do everything from scheduling airline fleets to optimizing financial trading systems. Texas Engineering alumna Janet Lowe is the woman behind it all.

"Being out in nature helps me clear my mind, and it has a way of putting things into perspective."

After graduating from the Cockrell School with a chemical engineering degree in 1979, Lowe began her career as a process engineer for Shell. But it didn't take long for her to turn her focus to entrepreneurial ambitions. In 1986, she attended Rice University as an MBA student to gain a background in business. There, Bob Bixby, research professor of management and professor emeritus of computational and applied mathematics, approached her with an idea for linear programming software.

After helping him reformat his product, Lowe developed the business plan and together they launched CPLEX. Lowe led the company through its sale to ILOG SA, a publicly held French company, and then stayed on as vice president of strategy and mergers and acquisitions for 10 years. In 2007, she negotiated ILOG SA's sale to IBM, which still sells CPLEX to this day. Lowe has also founded and built two other profitable companies, all in partnership with her husband, Todd. Today, they are both consultants and private investors, frequently funding startups.

We sat down with Lowe to gain insight into the realities of entrepreneurship and the keys to her success.

What was the biggest risk you took as an entrepreneur?

Leaving my career at Shell was very difficult. My parents thought I was out of my mind, and they were vocal about it! When I made the decision to leave, and to start my own company, I had a really good job and career with Shell. I was highly rated, making really good money and on an executive path. But my husband and I wanted to be able to live near the mountains and have the opportunity to follow our passions. This is what ultimately drove us to entrepreneurship. In the end, it was all worth it.

There are many ups and downs in the life of an entrepreneur. How did you deal with the challenges?

Our first house in Lake Tahoe was on the edge of a forest that backed up against a steep mountain. On difficult days, my husband and I would leave from our house after work and go on a hike straight up. We worked through our biggest problems and made most major decisions while hiking in those woods. Being out in nature helps me clear my mind, and it has a way of putting things into perspective.

What is the best part of owning your own company?

When you're working for somebody else and there's a success — even if you were the cause of that success — you don't really own it. And you definitely don't own the financial rewards. But when it's your own company, you really own the success and the rewards. That being said, the reality is that you also own your own failures. It cuts both ways.

What has been your greatest professional success?

CPLEX, the product we not only developed, but also made commercially successful, is still used around the world in a lot of mission-critical applications. There aren't many software products that are still around 20–25 years later. I'm also very proud of the impact the company has had on our employees. Most of them put their children through college or bought homes with the bonuses and options proceeds they earned. Lots and lots of kids went to school because of CPLEX.

What do you think is the most commonly held misconception about startups?

Many people think that if you have a successful product, you're all set. That couldn't be further from the truth. The most important thing is the business model — you have to have a successful way to bring it to people and make money. Engineers, in particular, can get too focused on the product.

Also, many people start their own businesses because they don't want to work for somebody else. They might be surprised by the reality. In a startup, you work for your customers and for your employees. I felt more beholden to them than I ever did to a boss.

What is the key to succeeding as an entrepreneur?

We invest in a lot of companies, and we have had some that weren't successful. But we have never seen a startup fail because the product wasn't good. They end up running out of money because of a problem with the business model. It is vital that you develop a sound and strategic business model.

The other key to success is persistence. I know many accomplished entrepreneurs who are all different kinds of people — introverts and extroverts — but the one thing they all have in common is persistence.

What is your advice for engineers who are also aspiring entrepreneurs?

It's much easier for someone with a technological degree to learn business than for a business person to learn technology. Pursue internships, jobs and assignments that build skills, and try to get deep into a domain that interests you so you can start looking for opportunities early. And get broad experience on the business side, especially in sales and marketing. Many engineers underestimate the importance of understanding how and why customers buy something. If you can't acquire those business skills, find a partner who has them.

Lowe and her husband live on the northeast shore of Lake Tahoe near Incline Village, NV, and have two daughters, Kristen and Corinne. In her free time, Lowe is a helicopter pilot and also skis, sails and hikes. She has completed the 170-mile Tahoe Rim Trail and summited Mount Kilimanjaro.

PHOTO: © JOHN DAVIDSON, SILICON HILLS NEWS

WELCOME TO THE INOVERSITY OF TEXAS

FIVE YEARS AGO, the Cockrell School of Engineering brought in a bold tech visionary who has made it his mission to create and inspire innovation and entrepreneurship at UT Austin. Bob Metcalfe, inventor of the Ethernet and the 2003 recipient of the National Medal of Technology, spends his days mentoring faculty, students, alumni and others as they take their ideas and research and turn them into startups.

"At UT Austin, and at universities across the country, we are sitting on a massive under-exploited resource — ideas and creativity," said Metcalfe, who holds the title of Professor of Innovation at UT Austin. "I believe that with a modest change in university culture, faculty can make a significant impact by commercializing their research using startups as the vehicle for commercialization."

Metcalfe is aiming to create a university that is focused on identifying the research and ideas that can be commercialized, bringing them out of labs and spinning out companies that enable faculty and students to make the greatest impact. "We are working to reshape the research university of today into an innovation university of tomorrow — or what I like to call an 'inoversity'," he said. "At an inoversity, when a professor creates a startup, it is celebrated — and valued — rather than being viewed mostly as a conflict of interest."

Metcalfe also serves as the faculty director of the Cockrell School's Innovation Center, which, along with managing director Louise Epstein and their team of entrepreneurs-in-residence, works closely with professors and others to mentor them through the startup process.

The Innovation Center has expanded its programs to foster professor and student startups. Every month, Metcalfe's Startup Studio features three professors and their new companies. And just this past spring, the Innovation Center launched an Innovation Grants program that provides critical funding to bridge the gap between research and commercialization.

The Innovation Center helps to mentor and advance new companies in their pre-commercialization stage, assisting the "protostartups," as Metcalfe refers to them, with their plans and facilitating strategic connections that lead to new partnerships and funding opportunities. And he doesn't want to stop there. "Universities have been inclined to send startups off campus and end their support at just the wrong time," he said. "With increased funding of these protostartups, and with our new vision for an inoversity, I am hoping we can change this trend and allow our protostartups to stay and mature longer."

METCALFE'S RECIPE FOR ADVANCING THE INOVERSITY

ENCOURAGE ENTREPRENEURSHIP

"We have 3,000 faculty members at our university, and a surprisingly small number consider starting a company. Many are interested but don't know where to start."

MENTOR, MENTOR, MENTOR

"We established the Longhorn Startup Program to educate, inspire and assist undergraduate students and their startups. But we now also support faculty, graduate students and post-docs. We have a broad and talented community, and there are many mentoring resources (in addition to the Innovation Center) that people can take advantage of on campus, including the Austin Technology Incubator, Texas Venture Labs, the new Catalyst Program in the Dell Medical School and more."

CONNECT UT WITH AUSTIN

"We hold a monthly Startup Studio with professors from across the university who have launched or are in the process of starting companies. The Greater Austin Chamber of Commerce hosts the studio, and we invite experts and entrepreneurs across Austin to listen to professors present their technology and startup plans and to give them feedback and advice."

BRIDGE THE 'VALLEY OF DEATH' WITH GAP FUNDING

"We've detected a 'valley of death' between successful university research and the funding required for commercializing technology. Potential investors look for the results of testing, prototyping, customer discovery, etc., in order to assess whether the protostartups represent lucrative opportunities. The Innovation Center now provides gap funding to faculty in the form of Innovation Grants ranging from $5,000 to $50,000 so professors can take the necessary steps to be investor-ready. Awardees not only receive the financial support, but they benefit from the ongoing mentorship, advice, connections and resources that we offer."

LEVERAGE OUR TALENT

"We don't want professors to start companies and then leave the university; we want them to keep teaching and doing research. A lot of professors worry that they don't have time to start a company, engage in research and teach effectively. We believe that their graduating students and post-docs are an underutilized resource, and that *they* can run the companies. You want your students to become the chief technology officers, CEOs and founding members of your companies. This helps create jobs for them, and it allows professors to serve on their startups' boards or as consultants, so they can continue their teaching and research and work on the next startup.

SET AGGRESSIVE GOALS

"I recently asked how many startups were spun out of the university last year, and I was told there were about six. Based on the fact that we feature 24 protostartups in our Startup Studio every year, we believe there are many more professors and students just waiting for the right guidance and opportunity. With this number in mind, and now that we're even more active in our efforts to raise money for Innovation Grants, I want our Innovation Center to have the capacity to be an effective resource for 24 startups in the coming year."

UNSUNG HEROES

We already know that Texas Engineering faculty and students are changing the world, but behind the scenes, staff and administrators are the ones keeping things running smoothly. From alumni outreach to student life programming, staff members dedicate themselves to improving and advancing the Cockrell School. Read about two of our many "unsung heroes," and find out what inspires them to build a better Texas Engineering experience for the next generation.

JOHN C. HALTON

TITLE: ASSOCIATE DEAN FOR SCHOOL AND ALUMNI RELATIONS

YEARS AT THE COCKRELL SCHOOL: 30

John Halton has certainly made his mark on the Cockrell School community. Over the past three decades, he has spent countless hours, often traveling all over the country, to visit with thousands of alumni and friends of the school and help gain their loyal support—both figuratively and financially.

Throughout his tenure as the school's chief fundraiser, two new engineering buildings have been built, a new department has been established, and thousands of Texas Engineering students have received scholarships and fellowships that have changed their lives.

Halton plans to retire during this academic year. While he looks forward to spending more time with his family, especially his granddaughters, and logging more hours on his kayak, he says he hopes to use the experience gained at the Cockrell School to help other organizations that don't have the resources to hire a fundraiser.

"I have truly enjoyed the work I've done here at UT Austin," Halton said. "The world runs on volunteers—those who step up to build something better, raise money for others or lend a helping hand. I'm just grateful to have been able to do my part for this outstanding community."

"There are thousands of people who work together to make this school as great as it is—I just have the privilege of being one of many, doing my small part in making this a top-tier engineering school."

—JOHN C. HALTON

"It's so rewarding to see the immense change in a student over four years—they enter the school as young adults, and you get to see the transformation they make into ambitious, driven professionals. The fact that I get to have a hand in that is just so cool."

—SARAH KITTEN

SARAH KITTEN

TITLE: ACADEMIC ADVISING COORDINATOR, AEROSPACE ENGINEERING AND ENGINEERING MECHANICS

YEARS AT THE COCKRELL SCHOOL: 10

As academic advising coordinator, Sarah Kitten does a lot more than simply offer advice about what classes to take. She also administers course scheduling, assists with curriculum development, spearheads student recruitment and retention, facilitates scholarships, supervises peer advisors and oversees a robust student advisory council.

And students have clearly benefited from her efforts. Throughout Kitten's office are letters, photos, artwork and knick-knacks from former students. One particular photo of an aircraft that refuels other planes mid-flight was given to her by a student saying it reminded her of Kitten always being there to cheer her on during difficult days as an undergraduate.

Kitten also has assisted with campaigns to increase female and underrepresented minority retention rates and, as a result, has seen the department's female retention rate double in the past five years.

"The most important thing to me is making certain that we're creating a welcoming environment that allows all students to get the absolute most out of their time here and have access to what they need to be successful people and engineers," Kitten said.

ALUMNI NOTES

Texas Engineering alumni lead industries, launch companies and help develop solutions that improve lives around the world. We're proud to share just a few of their accomplishments from the past year.

1970s

James Truchard (Ph.D. ECE 1974), co-founder, president and CEO of National Instruments (NI), celebrated his company's 40th anniversary. Austin Mayor Steve Adler declared May 14, 2016 "NI Day" to recognize the Austin-born company's success, and NI held a free day of hands-on learning at the Thinkery, the Austin children's museum. Truchard plans to retire from his position in January.

Scott Sheffield (B.S. PE 1975) is retiring from his position as CEO of Pioneer Natural Resources. He plans to remain board chairman through 2017 and will stay on as a director after that.

Michael Piana (B.S. ChE 1976) is leading a new entrepreneurship elective course in the Cockrell School's McKetta Department of Chemical Engineering. Piana manages a private consulting firm in Houston, focused on the oil and gas industry.

Rudolph Bonaparte (B.S. CE 1977) recently joined Georgia Institute of Technology as a faculty member in the School of Civil and Environmental Engineering. He also received the 2016 American Society of Civil Engineers Outstanding Projects and Leaders award. As president, CEO and senior principal for Geosyntec Consultants in Atlanta, he oversees more than 1,000 employees and is currently developing cleanup strategies for polluted waterways in New York City.

Jim Rawlings (B.S. ChE 1979) was elected to the National Academy of Engineering. Rawlings is a chemical and biomedical engineering professor in the College of Engineering at the University of Wisconsin-Madison. His research interests include chemical process control, state estimation and monitoring, chemical reaction engineering and virus modeling. He has authored two textbooks and helped create the Octave computational software tool used in chemical engineering education and research.

1980s

Jack Broodo (B.S. ChE 1980) was promoted to global president for feedstocks and energy at Dow Chemical Co.

Sara Ortwein (B.S. CE 1980) has been promoted to president of XTO Energy, an ExxonMobil subsidiary. Over her more than 25 years with ExxonMobil, she has held a variety of roles and previously led the development of high-impact technologies as president of ExxonMobil Upstream Research Company.

Alan Stern (M.S. ASE 1980) was named one of Time Magazine's "100 Most Influential People." He also received the American Astronautical Society's 2016 Carl Sagan Memorial Award in recognition of his contributions to space exploration. As leader of the New Horizons mission, Stern helped launch NASA's fastest spacecraft to gather data and images of Pluto.

Sudhakar Yalamanchili (M.S. ECE 1980; Ph.D. ECE 1984) was promoted to regents' professor in the School of Electrical and Computer Engineering at the Georgia Institute of Technology.

J.J. Roger Cheng (M.S. CE 1981; Ph.D. CE 1984) was recognized by The Association of Professional Engineers and Geoscientists of Alberta with the 2016 Centennial Leadership Award for his work as chair of the Department of Civil and Environmental Engineering at the University of Alberta.

CREDIT: SOCIETY OF PETROLEUM ENGINEERS

C. Susan Howes (B.S. PE 1982), vice president of engineering at Subsurface Consultants & Associates LLC, won the DeGolyer Distinguished Service Medal from the Society of Petroleum Engineers.

Jim Patek (M.S. Environmental Health Engineering 1983) has been promoted to senior project manager at RPS Klotz Associates. Patek has more than 30 years of experience in environmental engineering, chemistry, aquatic biology and surface water hydrology.

Michael Watkins (B.S. ASE 1983; M.S. ASE 1985; Ph.D. ASE 1990), a former faculty member in the Department of Aerospace Engineering and Engineering Mechanics and director of UT Austin's Center for Space Research, was appointed director of NASA's Jet

Propulsion Laboratory and vice president of the California Institute of Technology.

Dan Crowley (B.S. ME 1985; M.S. Manufacturing Systems Engineering 1991) was named CEO of Triumph Group Inc, an international supplier of aerospace components and systems.

Gary L. Priest (B.S. EE 1986) was awarded NASA's Outstanding Leadership Medal for his exceptional leadership and achievements in his role as a technical assistant in the Johnson Space Center's International Space Station Division, Safety and Mission Assurance Directorate. He currently serves on the Human Systems Risk Board and the Flight Activities Control Board, which are involved in the advancement of human space flight.

1990s

Thomas Schuessler (B.S. CE 1991) has been promoted to president of ExxonMobil Upstream Research Company.

Wade Benton (B.S. CE 1994) has been promoted to senior project manager at RPS Klotz Associates. Benton has worked to develop solutions in municipal transportation, drainage and infrastructure for more than 20 years.

Jennifer West (M.S. BME 1994) was elected to the National Academy of Engineering. She is a professor of biomedical engineering, mechanical engineering and materials science, and cell biology at Duke University and is using biomaterials and tissue engineering to address a wide array of biological problems, from glaucoma to cancer.

Sara Brand (B.S. ME 1996) launched True Wealth Innovations, a venture capital fund that invests in women-led companies that design and develop consumer health and sustainable products and technologies.

2000s

Kristel Franklin (B.S. ME 2003) left her position as senior vice president of resources at Jones Energy and is now special projects consultant at Three Rivers Operating Co.

Vincent LaCourt (B.S. ASE 2003) is one of five new flight directors selected by NASA to manage International Space Station operations.

Haiqing Lin (Ph.D. ChE 2005) received the National Science Foundation's CAREER Award. Lin is an assistant professor in the University of Buffalo's Department of Chemical and Biomedical Engineering.

Maria Portillo (M.S. PE 2005) recently assumed the role of technology coordinator on Chevron's Applied Reservoir Management Team in Luanda, Angola. Previously, Portillo was the manager of Resources to Reserves to Production (R2R2P) and Technology in Chevron's Southern Africa Strategic Business Unit in Houston, as well as leader of the core team of the Reservoir Engineering Community of Practice.

Blair Brettmann (B.S. ChE 2007) joined the School of Materials Science and Engineering at the Georgia Institute of Technology as an assistant professor.

Natalie Weiershausen (B.S. CE 2008) has been promoted to project manager in the public works department at RPS Klotz Associates. She has nearly 10 years of experience managing projects in water and wastewater planning, utility relocation and design, flood plain analysis, roadway design and other areas.

2010s

Jason Stith (Ph.D. CE 2010) was named Young Engineer of the Year by the National Society of Professional Engineers. Stith is a structural engineer for Michael Baker International and has led a number of landmark bridge repair and construction projects throughout Kentucky, including the Kentucky Lake Bridge, which replaced the Eggner's Ferry Bridge that was struck by a cargo ship in 2012.

Karolyn Williams (B.S. ME 2010) joined Walt Disney as an engineering manager in Anaheim, CA. In this role, she tests all theme park rides in Disneyland and California Disney Adventure and manages crews to resolve any issues before the parks open.

Sergio Martinez (M.S. CE 2014) became director of transportation and infrastructure in the Office of the Secretary of Mobility in Bogota, Colombia.

Dimitris S. Papailiopoulos (Ph.D. ECE 2014) received a Signal Processing Society Young Author Best Paper Award for a paper co-authored with Cockrell School electrical engineering associate professor Alex Dimakis. Papailiopoulos is a postdoctoral researcher at the University of California, Berkeley.

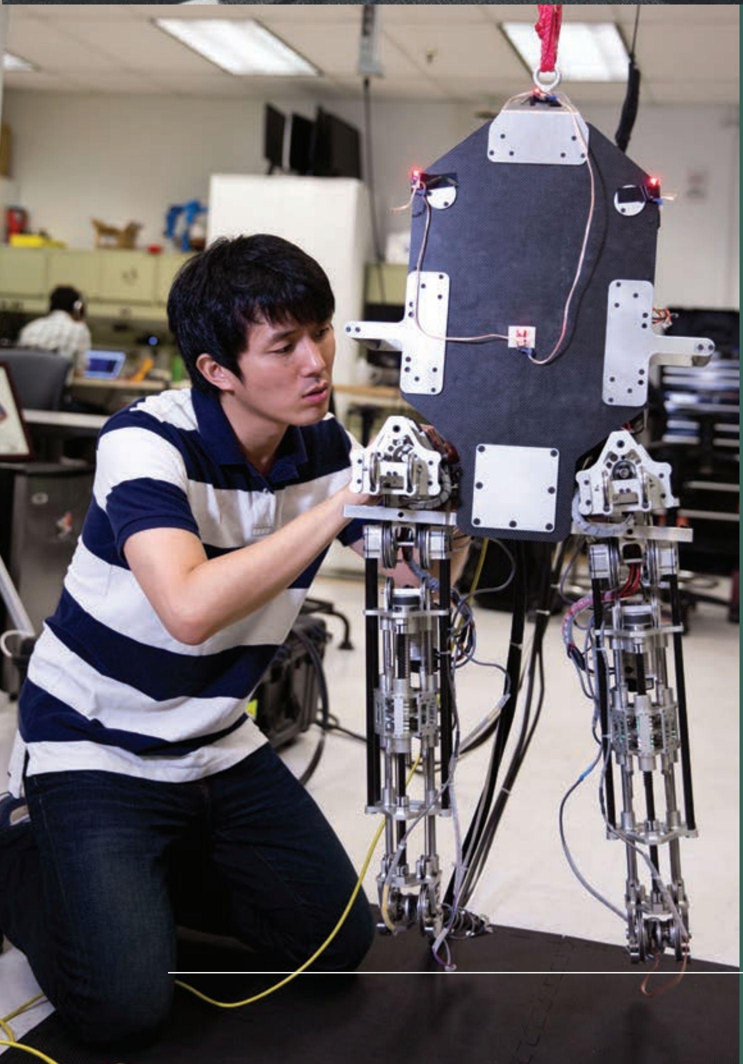
Zach Smith (Ph.D. ChE 2014) is joining the Department of Chemical Engineering at MIT as an assistant professor.


DESIGNED FOR LEARNING

On the third floor of Ernest Cockrell Jr. Hall, a new hub for architectural engineering occupies a bright and open space along the perimeter.

THE DATUM ENGINEERS DESIGN STUDIO, made possible by the support of Thomas W. Taylor (B.S. ARE 1959) and his wife Dane (BBA 1975), opened in spring 2016 and features a virtual design lab, studio space and a collaboration center. Inside, architectural engineering students will be designing the buildings of the future. (It should come as no surprise, then, that these students even helped design the studio that they occupy.) With the latest equipment and a cutting-edge learning environment, the Datum Engineers Design Studio will benefit Texas Engineering students for generations to come.

UT AUSTIN ROBOTICS RESEARCH LAB, CIRCA 1985–86



TEXAS ENGINEERING: THEN & NOW

THE RISE OF ROBOTICS

Robotics research within the Cockrell School has expanded significantly over the past four decades. Today, the Human Centered Robotics Lab is advancing the bipedal robot Hume (*left*), which mimics human-centered hyper-agility skills—such as free running on a variety of terrain—to help researchers explore how to build machines with locomotive capability on par with humans.

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