2017 | 2018

The University of Texas at Austin
Petroleum and Geosystems Engineering
*Cockrell School of Engineering*

# ENERGY ONE

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## ABOUT **ENERGY ONE**

The University of Texas at Austin Department of Petroleum and Geosystems Engineering publishes stories and news about innovative research, student excellence, alumni accomplishments and leadership annually in magazine format.

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# WHAT'S *Next*

I was able to travel and visit quite a few alumni and friends this past year, some of you "freshly minted" and others "more experienced." In every conversation I was struck by how much everyone cares about the success of our students, particularly with respect to how they are maneuvering the current job market. I want to personally thank all of you, especially those who have reached out and given our graduates a chance to prove themselves through an internship or a permanent job.

I encourage all of you to keep looking to Longhorns for your staffing needs. At UT PGE, we promise to pursue excellence and innovation in the classroom and laboratory, constantly fine-tuning our mix of fundamentals and practicality. Our goal is to keep the department's graduates performing at a high-level the day they step off the campus and in the years to come.

You may have heard the university president describe UT Austin as the "university of what's next." In this annual edition of Energy One, you will see how UT PGE is a leader in that mission. Discover how our students are using their drilling expertise to help NASA find water on Mars, learn how a professor is using magnets and nanoparticles to efficiently clean up oil spills and find out how a group of students is implementing an Energy Olympiad to bring together the biggest ideas from around the country to enhance the energy landscape. Finally, you will see how the intuition and critical thinking skills of two prominent alumni helped establish the Permian Basin as one of the world's most productive plays.

These stories would not be possible without the support of our passionate alumni. I sincerely thank you for your commitment to enriching the Longhorn community.

*Hook 'Em and Enjoy Reading!*

**Dr. Jon Olson,** *Department Chair*

*Lois K. & Richard D. Folger Leadership Chair*
*Frank W. Jessen Professor*

# INDUSTRY VETERAN JOINS UT PGE: Q&A

After spending more than a decade in industry, new associate professor Michael Pyrcz joined UT PGE in the fall of 2017. The innovative knowledge he brings from working with one of the largest oil and gas companies will benefit the UT PGE research program as well as our students in the classroom. Pyrcz, who received a Ph.D. in mining engineering from the University of Alberta, is a world-renowned expert in geostatistical reservoir modeling and has a passion for outdoor activities.

### WHY DID YOU CHOOSE UT PGE AS YOUR NEXT CAREER MOVE?

I have very much enjoyed my last 13 years at Chevron Energy Technology Company. The opportunity to conduct and deploy research, and practice geostatistical reservoir characterization and modeling with world class data sets and professionals has been a professional honor. Yet, I always suspected that I would return to academia.

My knowledge of UT PGE came through the work of professors Larry Lake and Sanjay Srinivasan (now at Penn State), previous interns, consortium meetings and guest lecture opportunities. The department is highly recognized, attracts top talent for faculty and students and is known for excellent relationships with industry. In addition, I appreciate the collaborative atmosphere in UT PGE and the chance to live in Austin, Texas. I feel UT PGE offers the best opportunities to reach my professional and personal goals.

### WHAT DO YOU HOPE TO ACHIEVE IN THE DEPARTMENT?

I will enhance the knowledge of UT students that will soon enter industry, lead a research consortium that will address industry challenges focused on the Texas energy industry, grow graduate students that will assume leadership roles and collaborate with faculty. Geostatistical reservoir modeling is a central, integrated component of reservoir management; therefore, knowledge concerning this topic is a multiplier on the potential impact of UT graduates within industry reservoir asset teams.

Many challenges remain for reservoir characterization and modeling. Unsolved problems include, limited ability to model subsurface complexities, gaps in data integration in conventional reservoirs and underdeveloped unconventional workflows. Solutions to these problems will impact profitability. Graduate students with highly specialized knowledge will fill positions in academic, industry R&D and expert consulting roles. There are many opportunities to collaborate with other UT PGE R&D programs such as rock mechanics, enhanced oil recovery, $CO_2$ storage, and unconventional resources.

### WHAT KNOWLEDGE ARE YOU BRINGING FROM INDUSTRY TO UT PGE?

Benefiting from 13 years in a centralized subject expert role with responsibility for developing and delivering an entire R&D portfolio for assets worldwide, I know what has been done in industry and academia and what opportunities remain. I understand how to conduct and communicate research such that deployment and impact is maximized. My high level of energy, excitement and creativity were fueled in industry and will continue at UT PGE.

### WHAT DO YOU CONSIDER YOUR GREATEST ACCOMPLISHMENT?

Over the past years, I have contributed to the scientific community, changed modeling practice in industry and grown through mentoring opportunities. I have enjoyed the opportunity to contribute to the scientific community through various publications, a textbook, keynote talks and as an associate editor. This has impacted the state of geostatistical reservoir modeling (e.g. novel technology for modeling geologically complicated and unconventional reservoirs). Ultimately, I take greatest pride in the many students and professionals that I have taught and mentored.

### WHAT ARE YOUR PASSIONS AND HOBBIES OUTSIDE OF THE LAB?

Fitness and outdoor activities are my passions. I feel that these activities support my professional and academic goals by providing inspiration, enforcing discipline and supporting overall health. Hiking, running, mountain biking, kayaking and working out are regular parts of my schedule. Photography fits in when possible. Sharing these with my children is a joy.

# *Experts' Take:*
# SOLVING INDUSTRY'S PRODUCTION CHALLENGES

PROFESSOR **MUKUL SHARMA**

**CHALLENGES:**

Depletion of reservoir pore pressure, due to prior production, results in fractures from infill (child) wells often hitting the parent well. Depletion can also be a big issue when refracturing wells. Industry is looking for ways to eliminate these problems to maximize production from infill wells and refractures.

**SOLUTIONS:**

We have built a poroelastic model (Multi-Frac-3D) that can simulate fracture propagation, allowing us to compute the changes in pore pressure and stresses that occur as the reservoir depletes. The workflow includes estimating the fracture geometry and history matching the production from the parent well. The distribution of pore pressure and stresses can then be used to evaluate the likelihood of fracture interference in a child well. This model has also been used to evaluate different strategies for avoiding heel dominated fractures during refracturing and fracture hits in parent wells.

PROFESSOR **CARLOS TORRES-VERDIN**

**CHALLENGES:**

The hydrocarbon industry is continuously meeting extraordinary demands for (1) new exploration frontiers, (2) mitigating exploration risks, (3) low environmental footprint, (4) improved recovery factors, (5) efficient reservoir access and low lifting costs, and (6) rapid, efficient, and safe deployment of production facilities. Low oil-price conditions make it extremely important that all of the above factors be addressed to render new short- and long-term projects financially viable. The industry can no longer operate with "shielded" technical silos of expertise to approach today's demanding projects.

**SOLUTIONS:**

Modern geophysical and formation evaluation methods make it possible to "navigate" new wells not only to safely and efficiently access hydrocarbon reservoirs, but also to optimize production. Furthermore, new borehole geophysical sensors and measurements are making it possible to instrument and monitor wells to track in real-time primary and secondary production processes taking place in spatially heterogeneous rocks.

My research focus is working at the intersections of geology, geophysics, signal processing, petrophysics, and multi-phase fluid flow in rocks to develop new measurements and interpretation procedures that can improve hydrocarbon recovery processes. This is a radically new approach that articulates geology, geophysics, drilling, reservoir engineering, and production into one single organized, measurement-driven discipline.

ASSOCIATE PROFESSOR **MATT BALHOFF**

**CHALLENGES:**

Most of the original oil in place in conventional reservoirs is left unproduced, even after waterflooding. Enhanced oil recovery (EOR), including chemical EOR, is an effective method to improve recovery but is not always cost efficient, applicable at reservoir conditions, or effective enough for large-scale implementation.

**SOLUTIONS:**

We have optimized the rheology, salinity, and injection conditions of polymer flooding to recover up to 20 percent more of the original oil in place. In fractured carbonate reservoirs, we have used surfactants to lower the interfacial tension and create viscous microemulsions to induce crossflow into the matrix. Recoveries of over 60 percent (with low surfactant retention) have been observed despite being oil wet and having large fracture-matrix permeability ratios. Finally, novel micromodels with 3D features are being used to understand pore-level flow behavior and develop new EOR methods.

# *Lab Launch:* DR. RYOSUKE OKUNO

In May 2017, assistant professor Ryosuke Okuno opened a state-of-the-art research lab focusing on unconventional oil. The core purpose is to accurately measure phase behavior of oil and enhanced oil recovery (EOR) agents, including $CO_2$, solvents and surfactant solutions at or near reservoir conditions.

With this PVT equipment, Okuno and his five graduate students have the opportunity to discover fundamental data, increasing their understanding of EOR mechanisms and developing novel EOR methods. The equipment can be used at temperatures almost as high as 500 degrees Fahrenheit and pressures over 5,000 psi.

*State-of-the-art*

# EQUIPMENT

*A closer look*

# DRILLING ON MARS

Dr. Pradeep Ashok and Ben List

*NASA made a significant discovery in 2015 that has the potential to alter our ability to live beyond Earth, making a segment of science fiction a reality. Scientists found strong evidence that liquid water flows intermittently on present-day Mars, increasing the chances of the Red Planet serving as a permanent home for humans in the future. Furthering that finding, NASA recently discovered what are thought to be large ice deposits just under the surface of Mars.*

With this information, NASA turned to the best and brightest college students with a strong knowledge of drilling to participate in its first-ever Mars Ice Challenge. The University of Texas at Austin's petroleum and mechanical engineering graduate students as well as a UT PGE research scientist, Pradeep Ashok, took advantage of the opportunity.

Breaking down their drilling robot and packing it into suitcases, the UT Austin engineers left the Forty Acres for NASA's prestigious Langley Research Center in Hampton, Va. They participated in a three-day program, June 13-15. The competition, the Revolutionary Aerospace Systems Concepts – Academic Linkages (RASC-AL) Mars Ice Challenge, aimed to enhance the ability to recover water on Mars, enabling humans to live on the planet.

"NASA has really been focused on trying to get all the pieces in place to get to Mars," said Richard Davis, assistant director of science and exploration at NASA's Science Mission Directorate's Planetary Science Division in Washington, D.C. "There are a lot of resources on Mars, but water is the driver."

The competition highlighted that the race to Mars will need an "all hands on deck" approach — including petroleum, mechanical and aerospace engineers. UT Austin mechanical engineering student Conor McMahon found it fascinating that an application for petroleum engineering has significance for aerospace engineering.

"They are two wildly different industries, with one focused above Earth and the other below the Earth's surface, but some of the challenges translate to both fields," McMahon said.

Teams from across the country submitted proposals, and only the best eight university teams were selected to take part in the final round of the Mars Ice Challenge. Before the drilling competition began, the engineers attended talks with NASA's scientists and private-sector robotic companies.

"It was an amazing experience to hear leaders from NASA talk about where they think the water is on Mars and their thoughts on how to recover it," said Ben List, a UT PGE graduate student. "It was nice to see that we are working on a high-impact project."

In addition to the presentations, the students participated in a poster session. They had the opportunity to present their robotic strategy to the competition's judges.

"The NASA judges are all involved in the drilling challenges, so they wanted to pick our brains about how we developed our robot and how it performs," List said. "They are interested in the path-to-flight, so what design changes we would need to make it work on Mars. The judges want to ensure it is not just an Earth-based system."

On the first day of the competition, the teams were tasked with setting up their robot and then receiving the all-clear from the judges. The rules required that the robots met all the mass, volume and power constraints.

The competition's goal is to drill through 16 inches of simulated Martian soil and then through another 16 inches of solid blocks of ice. The team that could recover the most water during the challenge would win.

"There were some heated moments on the first day as we were doing a lot of trouble shooting," List said. "We were able to drill through all the dirt on the first day, so we felt good about our progress."

On the second day of the competition, the teams faced an additional challenge – they were no longer able to manage the robots by hand. They could only be remotely operated, making it a more realistic simulation.

The UT Austin team prepared for the second day by creating a simple system rather than taking the "bells and whistles" route. Their philosophy was "The fewer points of failure, the better."

"THE NASA JUDGES ARE ALL INVOLVED IN THE DRILLING CHALLENGES, SO THEY WANTED TO PICK OUR BRAINS ABOUT HOW WE DEVELOPED OUR ROBOT AND HOW IT PERFORMS."

"We were in a great rhythm, drilling through the first 12 inches of ice, but then we reached our capacity," List said. "Unfortunately our heater broke down as well. I think if it would have survived, we could have won the competition."

Despite not taking home the golden robot, the students are proud of their work. They increased their leadership skills and ability to work under pressure, which will make them stronger engineers. McMahon said he is excited to see what the future holds for creating a base for humans on Mars.

"I think this is an important project. In the case that something catastrophic happens on Earth, we would have a back-up plan," he said.

# MAGNETIC *Attraction*

When oil mixes with or enters into water, conventional methods of cleaning the water and removing the oil can be challenging, expensive and environmentally risky. But UT PGE researchers believe they may have developed a better method.

In a study published this spring in the Journal of Nanoparticle Research, the researchers used magnetic nanoparticles to separate oil from water through a simple process that relies on electrostatic force and a magnet. The engineers believe their new technique could improve water treatment for oil and gas production, more efficiently clean up oil spills and potentially remove lead from drinking water.

Today, nanoparticles, which are tiny particles that can be coated with different chemicals such as polymers, are used in a wide variety of areas and industries including medicine, energy and electronics. The versatility of nanoparticles inspired the Texas team to explore how the particles could be applied to oil production to lessen its environmental footprint and increase efficiency in both onshore and offshore drilling. They believe their technique could also be used to treat the millions of gallons of fresh water used in hydraulic fracturing and to help clean drinking water.

Modern oil production methods separate 95 percent of the oil from produced water but leave behind small oil droplets that are difficult to extract, which makes water treatment and disposal more challenging and environmentally risky.

"This new technique is really aimed at removing that little bit of oil in that water that needs to be removed before you can consider it treated," said Saebom Ko, a research associate and lead author on the study. "The advantage of employing magnetic nanoparticles is that the small oil droplets that attach to the nanoparticles are much more quickly separated from water than traditional physical separation processes because magnetic force can be orders of magnitude larger than gravitation."

Ko worked with a team including UT PGE assistant professor Hugh Daigle, biomedical engineering professor Thomas Milner and researcher Chun Huh to design surface coatings for magnetic nanoparticles that could be used for the removal of oil. They employed a technique, called high gradient magnetic separation, that has been used in mining to remove metals and in the food industry to remove toxic particles.

The team's key advancement is designing surface coatings for nanoparticles that are able to adhere to oil droplets using electrostatic force. The team coated the magnetic nanoparticles with polymers whose surface charge is positive. The positively charged magnetic nanoparticles then latch on to the negatively charged oil droplets through electrostatic attractive force, similar to how a dust-trapping cloth picks up dust. The process — which takes seconds in laboratory tests— could also happen in reverse. If the target substances have positive surface charges, the magnetic nanoparticles could be coated with negatively charged polymers to attract the target.

"It's a simple idea," Daigle said. "We are leveraging the magnetic properties of these nanoparticles to get them to stick to the oil droplets and essentially magnetize the oil droplets so they can be pulled out with a magnet."

The ease of the technique and the flexibility of magnetic nanoparticles have motivated the researchers to consider different applications.

"The applications can extend far beyond the oil field because, with an appropriate surface coating design, you can take your magnetic core and coat it with whatever chemical you choose on the outside to stick to the target and pull it out with a magnet," Daigle said.

The researchers have envisioned designing a method for using these nanoparticles to clean up oil spills in the ocean. They are also exploring how magnetic nanoparticles can be used to remove lead and other contaminants from drinking water, with plans to test their ideas this summer.

For oil and gas production, the team plans to develop a treatment system that would have the capacity to rapidly handle a high volume of oil and water, which would be crucial for onshore and offshore oil drilling sites.

"We are currently developing a chemical-free regeneration process to reuse nanoparticles. Other regeneration methods use chemicals to extract the oil, resulting in production of other hazardous waste," Ko said. "We believe that by recycling and reusing nanoparticles, it could not only reduce operational costs, but it could be an environmentally friendly process that reduces hazardous waste."

# CELEBRATING EXTRAORDINARY LEADERS

## *2017 Distinguished Alumni Program*

*For nearly a century, UT PGE has educated leaders who have shaped the oil and gas industry. In 2010, the department launched the Distinguished Alumni Program to recognize the best among them — company executives, technological innovators and shrewd entrepreneurs who display an extraordinary commitment to the industry and our UT PGE community. This year, we will recognize five Distinguished Alumni and one Rising Star for their outstanding contributions.*

UT PGE's Distinguished Alumni Program Committee is proud to announce the 2017 award recipients:

### DISTINGUISHED ALUMNI

**MALCOLM ABEL*** (BSPE '47)

**FRASER ALLEN*** (MSPE '43, PHD PE '47)

**HELGE H. HALDORSEN** (PHD PE '83)

**TIM TAYLOR** (BSPE '70, MSPE '72, PHD PE '79)

**PEYTON YATES JR.** (BSPE '65, MSPE '66)

### RISING STAR

**GABE MUONEKE** (BSPE '02)

Among them, these honorees have built a number of successful companies as well as led production and exploration efforts around the world. Collectively, their insights and bold ideas have significantly advanced the oil and gas industry. They have also invested in UT PGE — providing much-needed scholarship funding and advancing groundbreaking research — helping to pave the way for students eager to follow in their footsteps. These individuals will join an elite community of industry legends, including Ernest Cockrell Jr., Jeff Hildebrand, Scott Sheffield and W.A. "Tex" Moncrief Jr.

The eighth-annual event will take place on **Friday, Nov. 10 at 6 p.m. at the Four Seasons Hotel in Austin.** Visit bit.ly/pgeda17 to learn more about the event and read the honorees full bios.

**deceased*

# *The* POWER *of the* PERMIAN

In late 2014, oil prices plummeted from $100 to $50 a barrel. Over the next three years, domestic onshore rig activity dwindled, and hundreds of thousands of workers lost their jobs across the country. Yet, production continued to grow in one domestic oil shale play: the Permian Basin.

Lying underneath the cities of Midland and Odessa and stretching into New Mexico, the Permian is about the size of New Jersey and spans more than 8,700 square miles. Oil and gas production has occurred in the region for nearly a century, but in 2007, activity exploded as hydraulic fracturing and horizontal drilling allowed operators to tap into the region's unique, liquid-rich shale formations.

After production persisted through the latest downturn, the Permian is now home to half of the nation's onshore rigs. Over the last 14 months, the U.S. oil and gas industry has shown signs of recovery. Onshore rig activity has doubled, rising from approximately 400 to 950 rigs at the time of publication, and experts predict prices to improve through the end of this year.

Scott Sheffield (BSPE '75), chairman and former CEO of Pioneer Natural Resources, believes we have only seen a fraction of what the Permian is capable of producing.

"In the early 1970s, production in the Permian Basin peaked at 2 million barrels of oil per day. Now, it is hitting up to 2.5 million barrels a day even after the latest downturn," he said. "The Permian has turned the U.S. into an energy superpower again, but this is just the beginning. Based on estimates from the U.S. Energy Information Administration, it is growing by 800,000 barrels per year, and it is on its way to reaching 8 to 10 million of barrels of oil per day in the next 10-15 years. Natural gas production will similarly skyrocket — increasing from 8 billion cubic feet per day to over 25 billion."

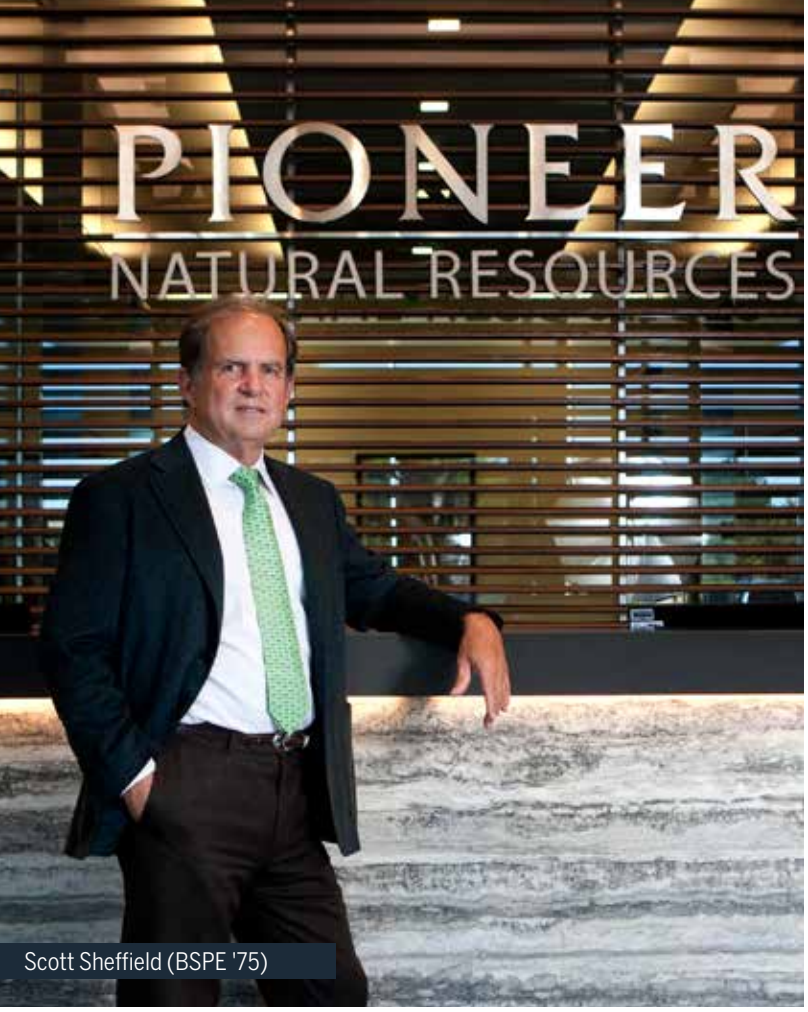
U.S. Geological Survey estimates the Permian to be the largest recoverable oil field in the nation and the second-largest in the world — behind only the Ghawar field in Saudi Arabia. It is also the second-largest natural gas field in the country.

## **THRIVING** IN A LOW-PRICE MARKET

For generations, UT PGE alumni have spearheaded exploration and advanced production in the Permian. As the U.S. industry strengthens and the shale boom returns, Longhorns are still leading the way.

Under Sheffield's leadership, Pioneer became one of the largest acreage holders in the Permian and one of the top producers in Texas. Efficiency gains and technological

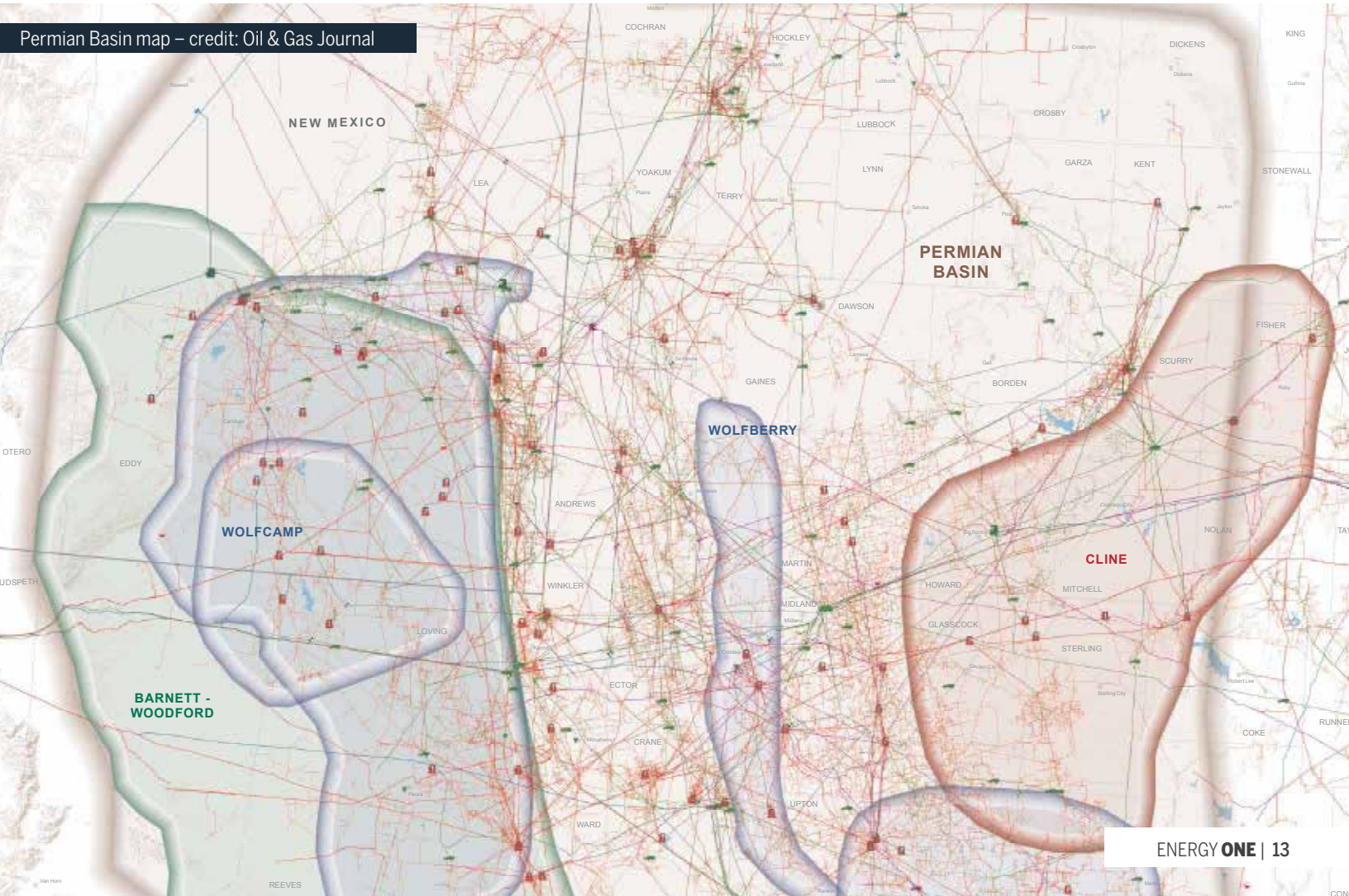
> *The Permian Basin is UT Austin's backyard. If production predictions over the next 10-15 years hold true, then the university and its students stand to be the beneficiaries of this migration of capital away from other basins around the world and across the U.S. to the Permian.*



Scott Sheffield (BSPE '75)


Gene Shepherd (BSPE '81; MBA '86)

Permian Basin map – credit: Oil & Gas Journal



advancements have allowed the company to continue to thrive in the face of low prices.

"Today, we are drilling out 10,000 feet instead of 5,000 feet, and that is doubling and tripling the size of our frack jobs," Sheffield said. "We are also drilling really good wells. That's allowed us to compete in a $40-50 price environment. And that is why the Permian can now compete with Middle Eastern countries such as Kuwait, Saudi Arabia, Iran and Iraq."

For Sheffield, the basin's low break-even costs and robust industry infrastructure make it one of the best places to operate in the world.

"I have operated in Africa, Argentina, Alaska and Canada, but the Permian is a very special place," he said. "The people of West Texas understand the oil and gas industry. It contributes to about 90 percent of the Midland and Odessa economies, as well as a significant portion of the Texas economy."

Gene Shepherd (BSPE '81; MBA '86), CEO of ATX Energy Partners, has also found the Permian to be the ideal environment for success.

"It is a unique region, and the sheer magnitude of the basin means that there is always an incumbent base of employees," he said. "That is critical for the shale industry, which is very logistics-focused and people intensive."

As CEO of Brigham Resources before its sale to Diamondback Energy in February 2017, Shepherd helped grow the company's position to more than 80,000 net acres in the Permian's Southern Delaware Basin. His team established a skill set and aptitude for developing shale plays in the Bakken Formation. When the company came to the Permian, they worked with incumbent operators who had been drilling verticals for decades and helped them take their plays horizontal.

"Compared to other onshore shale plays, the optionality in the Permian is much greater," Shepherd said. "You have five to six drilling objectives in the Southern Delaware Basin, as opposed to the Williston Basin, where you have one to two drilling objectives. There is a lot more running room."

## **CONFRONTING** SCARCITIES

As operators find success in the Permian's layer-cake shale, they also face a number of challenges. The biggest issue is water.

Due to severe droughts and the needs of robust farming, ranching and oil and gas industries, the fresh water table in West Texas has been dropping. Therefore, companies like Pioneer have turned to other sources to find water for hydraulic fracturing.

"We have made investments with the cities of Midland and Odessa in order to use non-potable, effluent water," Sheffield said. "We also use recycled water and look to non-potable zones located deeper than the fresh water table."

Additionally, in the face of growing production, there are not enough pipelines to get product — including crude oil, natural gas liquids, natural gas and methane gas — out of the basin to the Gulf Coast.

"Over the last few years, we have been trying to convince more midstream companies to get aggressive about building new pipelines so we can export our product," Sheffield said. "There are promising plans and expansions in the works, but their success often depends on commodity prices."

## A **PROMISING** FUTURE

Despite the challenges, Shepherd and Sheffield agree that the outlook in the Permian is bright.

As the industry continues to stabilize, supermajors are returning to the basin after abandoning the region in the 1990s, believing it to be dried up. In January 2017, ExxonMobil acquired 275,000 acres in the New Mexico portion of the basin. But Shepherd says that local independents that have been the dominate Permian players over the last several decades have two key advantages: local knowledge and flexibility.

"Our organization is staffed with professionals with significant experience in the Permian," he said. "Further, our company is very flat and nimble, and our ability to move quickly and deploy capital is a huge leg up. Once an area is determined to be prospective by other operators and capital providers, then it is an arms race to see who can get in and build a position."

*We will still have booms and busts in the industry, but times — and technology — have changed. The busts will be a lot more stable in the Permian.*

With heavy production forecasts in the future, Sheffield and Shepherd believe opportunities will abound for UT PGE graduates.

"The Permian Basin is UT Austin's backyard," Shepherd said. "If production predictions over the next 10-15 years hold true, then the university and its students stand to be the beneficiaries of this migration of capital away from other basins around the world and across the U.S. to the Permian."

And for those who are unsure of the production outlook given the recent downturn, Sheffield says that from here on out, so-called busts won't hit the Permian as they have in the past.

Midland and Odessa now have the world's second-largest oil field underneath and around their cities," he said. "That will bring and keep a tremendous amount of people in the area."

# *In the Lab:* SURI SPOTLIGHT

In its ninth year, the Summer Undergraduate Research Internship (SURI) continues to attract top talent from around the country and within the department to conduct game-changing research alongside UT PGE faculty for 10 weeks. Emilie Wille, a junior, joined the program from the University of Wisconsin - Madison and worked with Dr. Hugh Daigle on a follow-up project to his nanoparticle research that removed oil from water.

"I am using iron oxide nanoparticles with different coatings to remove lead from water," Wille said. "The nanoparticles are inexpensive to make and can be regenerated multiple times. What is exciting about the application is that it extends past cleaning wastewater from petroleum processes to cleaning any type of water."

# *May the* BEST YOUNG INNOVATOR WIN

***What is the future of energy?*** This question dominates conversations among international leaders, top scientists and company executives. Yet, young people — those who will be most affected in the long term — have limited power in the decision-making process.

UT PGE juniors Karan Jerath and Himchand Persad seek to change that aspect. The ambitious duo is partnering with UT Austin's Energy Institute and the United Nations Youth Envoy to launch the university's inaugural Energy Olympiad, an innovative competition focused on energy related projects and technologies.

"Young people have ideas for solutions to problems they want to see solved," Jerath said. "We are hoping this competition will bring together energy leaders and youth and allow them to discuss what they want to see in the future."

This fall, project submissions from high school and college students across Texas will be evaluated by a committee of leading UT Austin faculty and industry experts. Olympiad finalists will come to campus during the 2018 Energy Week in February to pitch their ideas to angel investors, venture capitalists and distinguished energy leaders.

"Energy is one of the world's most fundamental problems," said Michael Webber, deputy director of the Energy Institute. "This Olympiad turns students into central stakeholders who can move us from identifying problems and complaining about them to actually solving them."

Persad and Jerath, who is a member of the inaugural class of United Nations Young Leaders for the Sustainable Development Goals, developed the competition to inspire energy innovation, promote the UN's Sustainable Development Goals and help foster a culture of entrepreneurship on campus.

"We hope the Energy Olympiad will support the UN's global call to action, while also advancing UT Austin President Greg Fenves' vision to establish UT as 'the university of what's next,'" Jerath said.

The competition includes two divisions: Youth Energy Summit and the Longhorn Energy Challenge, which is open to UT Austin students only.

"The Youth Energy Summit will target high school students — we are looking for some of the brightest young people across Texas interested in energy innovation," Persad explained. "This competition will help spotlight UT as a top academic choice for students interested in energy."

Despite their young age, Jerath and Persad bring a wealth of experience to this endeavor. Persad created Opportunity Foundation, which provides orphans from his native home of Trinidad and Tobago with tutoring services and opportunities to build their entrepreneurial skills. Jerath, a former high school innovator himself, developed a subsea deepwater containment device that landed him on the Forbes 30 Under 30 Energy list during his freshman year at Texas. He believes that the earlier students begin cultivating their ideas, the better.

"We are the next generation and we are going to have to face these issues that are being discussed," he said. "To make real change, you have to find what you believe in and work hard to try and find solutions."

Persad's advice to students hoping to participate is to find intelligent partners who share a commitment and drive to make a difference.

## UT AUSTIN ENERGY HIGHLIGHTS

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

**23** ENERGY-RELATED RESEARCH CENTERS

**300** SCIENTISTS AND ENGINEERS ARE RESEARCHING ENERGY

*"Entrepreneurship is a team effort. You have to learn to harness the potential of those around you and keep at it until you reach success."*

# *Excellence & Accolades*

## *Maša Prodanović Named Texas Exes Top 10*

Associate professor Maša Prodanović is a 2017 Texas Exes Top 10 professor recipient. Started in 2011, the Texas 10 is an annual list of inspiring professors, nominated by alumni and selected by the Alcalde magazine. These are professors that their former students, upon reflection and with the benefit of hindsight, consider to have made a lasting impact on their lives.

## *UT PGE Receives Record Number of SPE International Awards*

Five UT PGE professors won six SPE International awards – the most of any year in department history. Professor Mukul Sharma won the John Franklin Carll award, which recognizes distinguished contributions in the application of engineering principles to petroleum development and recovery. Associate professor Quoc Nguyen took home two awards: The Lester C. Uren award, which recognizes engineers under 45 who have made a significant impact on the technology of petroleum engineering, and the Distinguished Member award.

Professor Eric van Oort won the Drilling Engineering award. Assistant professor Zoya Heidari, and her former graduate student, received The Cedric K. Ferguson Medal for the best SPE paper among members younger than 36. Associate professor Matt Balhoff earned the Distinguished Member award.

## *Hugh Daigle Named Outstanding Reviewer by AGU*

Assistant professor Hugh Daigle is working to ensure scientific integrity remains intact as he was honored by the American Geophysical Union (AGU) as a 2016 Outstanding Reviewer.

## *Torres-Verdin Wins Two International Awards*

Professor Carlos Torres-Verdin is the recipient of two prestigious international awards. Torres-Verdin is receiving the European Association of Geoscientists and Engineers (EAGE) Conrad Schlumberger Award as well as the Society of Exploration Geophysicists (SEG) is awarding Torres-Verdin with the organization's second highest award - Honorary Membership.

The Conrad Schlumberger Award is presented to a member of EAGE who has made an outstanding contribution over a period of time to the scientific and technical advancement of the geosciences, particularly geophysics. As the first UT PGE professor to receive Honorary Membership from SEG, which currently has 27,000 members, the honor requires unanimous approval by the Honors and Awards committee and the Board of Directors of the SEG.

## *Associate Professor Receives SPE Regional Award*

Associate professor Matt Balhoff won the 2017 SPE Regional Reservoir Description and Dynamics award for his innovative research on shale EOR and polymer flooding. The award was presented to him last spring at a reception in Midland, Texas.

## *UT PGE Graduate Selected as a 2017 Texas Exes Distinguished Alumnus*

Created in 1958, Texas Exes Distinguished Alumnus Awards are granted annually to alumni who have distinguished themselves professionally and through service to The University of Texas. UT PGE graduate Michael L. "Mickey" Klein, BS '58, JD '63, Life Member, who is an independent oil and gas producer in Midland, Texas, is a 2017 honoree.

## *Alumnus Honored as 2017 Distinguished Engineering Graduate*

Gene Shepherd received the Cockrell School of Engineering Distinguished Graduates award in 2017. Shepherd is a founder and the chief executive officer of ATX Energy Partners LLC. Prior to that, Shepherd was a founder and chief executive officer of Brigham Resources LLC from 2013 until its sale to Diamondback Energy Inc. in early 2017. He earned his bachelor's degree in petroleum engineering in 1981 and his MBA in 1986, both from The University of Texas at Austin.

## *Three UT PGE Students Receive Cockrell School Student Leadership Awards*

Out of eight recipients, two undergraduate students, Christina Wang and Iris Jing, and one graduate student, Chiranth Hegde, received the 2017 Cockrell School Student Leadership awards. The students were recognized for exhibiting professional leadership roles in the Cockrell School. The honorees are selected by a student committee that considers organizational leadership, school service, innovation and scholarship.

## *Professor Wins Prestigious Cockrell School of Engineering Teaching Award*

Professor Carlos Torres-Verdin won the Texas Engineering Lockheed Martin Aeronautics Company award for excellence in engineering teaching. The award is one of the highest teaching honors from the Cockrell School.

To read more about the accolades visit: ***pge.utexas.edu/news***

# KELLY WANG

Since she can remember, Kelly Wang (BSPE '17) has been fascinated by technology and how it continues to develop — particularly since she grew up in close proximity to Silicon Valley. With this passion, she knew engineering would be the perfect degree path for her as she is analytical, detail-oriented and has a problem-solving mindset. She also recognized that in addition to those skills she would need to develop strengths in leadership and mentorship to excel in the technology and engineering fields.

Wang's father, a petroleum engineer at Chevron, introduced her to the oil and gas industry at a young age.

"As someone who admires my dad's work opportunities, I am inspired by him and strive to achieve his success," Wang said. "He taught me about the importance of making sure health and safety are priorities — a lot of the advice stemmed from industry's safety protocols."

Seeing her dad's achievements, she knew she would need to hit the ground running from day one at UT PGE. Luckily, she was a part of the first class to participate in the inaugural off-campus Freshman Fall Retreat (now First-year Fall Retreat) held a couple days before classes start. The retreat serves as an excellent opportunity for incoming students to make connections with classmates, UT PGE faculty and staff, and industry representatives. Appreciating the support she received in her first year and wanting to guide younger students, Wang became a UT PGE PEN Pal mentor for three years.

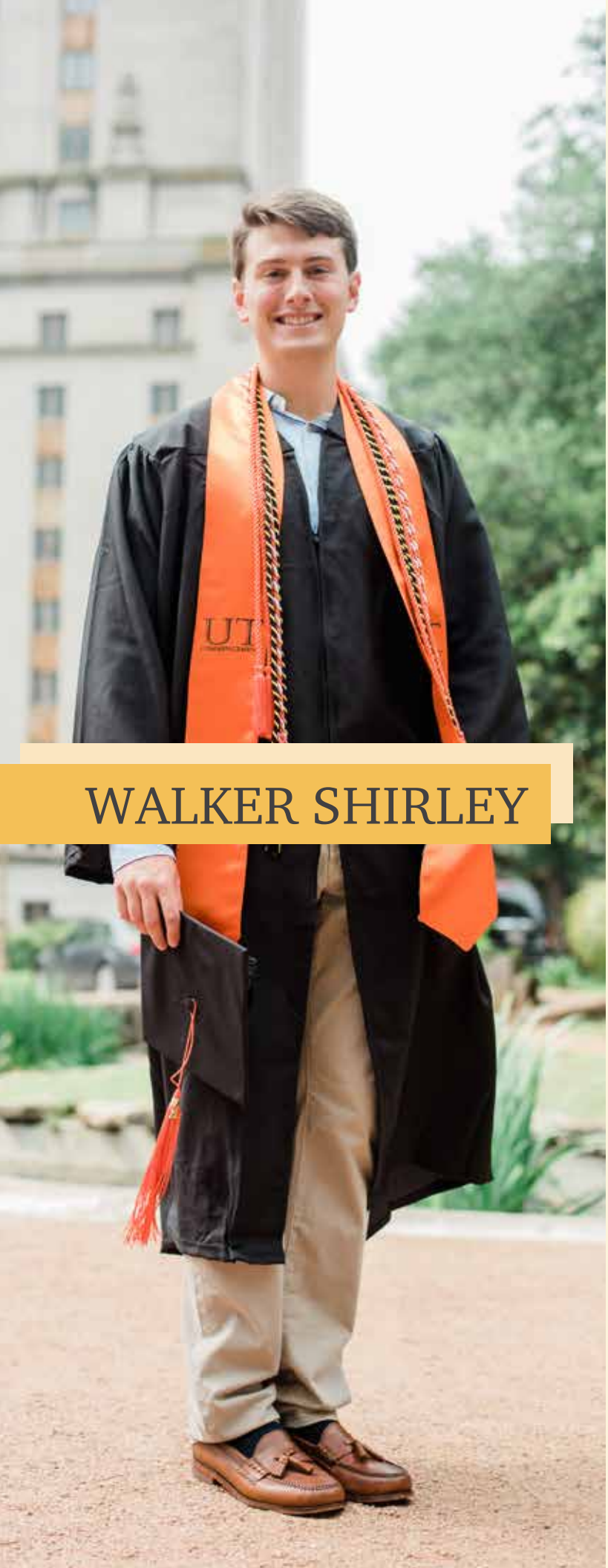
"Serving as a mentor at the Freshman Fall Retreat, I was able to pass along the great experience I had with the program," Wang said. "The mentorship lasted beyond that event into the entire first semester, where I would check-in on the first-year students to ensure they were adjusting to college life and getting involved with the department by attending student organization meetings."

Wang spotted an ideal leadership opportunity when UT PGE was assigned to lead the 2016 SPE Student Symposium in Houston and then again in Denver the following year. The program gives students the chance to enhance their knowledge of the oil and gas industry through the insights and experiences of industry leaders.

"I was responsible for coordinating the four-day schedule, which included bringing in Fortune 500 CEOs and other top executives," Wang said. "Since it was an amazing networking opportunity for petroleum engineering students around the globe, we were able to double the amount of attendees from the previous year."

With all the leadership experience Wang gained at UT PGE and her passion for the high-tech field, she was able to secure a position with Oracle as a technology consultant. She will be responsible for demonstrating the business solutions the cloud has to offer to small and large companies. With Oracle's location, she is looking forward to getting back to her roots by heading west.

"I never thought I would have the opportunity to go back to California, but now is the perfect time to take the leap and go to Oracle's Santa Monica office," Wang said. "Even though I will not be working in oil and gas, the foundation of engineering is incredibly important and it gave me a lot of confidence in my ability to problem solve."



# WALKER SHIRLEY

During his four-year tenure at UT PGE, Walker Shirley (BSPE '17) participated in three internships, became involved with student organizations and earned excellent grades – the recipe for undergraduate success. His journey began with inspiration from his family. Shirley developed his passion for petroleum engineering through his grandparents and his excitement for being a Longhorn through his parents.

"Both my grandfathers were involved in the oil and gas industry, working for ConocoPhillips, after they served in World War II, and both my parents are graduates of UT Austin," Shirley said.

The late Robert Parker Sr., a prominent UT PGE alumnus, also played a big role in Shirley's decision to major in petroleum engineering.

"After meeting Mr. Parker in Tulsa at church, he would always tell my dad and me that Longhorns need to stick together," Shirley said. "He called me one day, and we had a 30-minute conversation about the industry. Since that call I knew oil and gas was the right fit for me. He is big reason I came to UT Austin."

Once enrolled in UT PGE, Shirley knew early on it would be important to become friends with fellow petroleum engineering students. He joined a fraternity, which had nine petroleum engineering members. He also became a member of UT PGE's largest student organization – the Society of Petroleum Engineers (SPE) – giving him the opportunity to meet the majority of PE majors.

"My classmates served as great sounding boards and study partners," Shirley said. "We spent a lot of late afternoons studying together, especially for Reservoir II tests."

Shirley also discovered early on in his college career that internships are critical for gaining networking skills and knowledge as well as obtaining a job upon graduation. His first internship was working with Bobby Parker, Jr. at Parker Drilling, which introduced Shirley to the scale of the oil and gas projects that are in production worldwide. His sophomore year, he took an internship with Apache to acquire field experience and then his final internship was at EOG Resources in Denver last summer.

"My three internships allowed me to dive in and gain an understanding about petroleum engineering from the start," Shirley said. "I recommend students aim for two-three internships while at UT PGE to help set them up for success."

Shirley's hard work paid off as he secured a position at BP, which started this fall. Technically, he is working in the Houston office as a graduate wells engineer but his assignment is to rotate on offshore rigs spending two weeks on and two weeks off.

"I received support from UT PGE alumni working at BP while going through the job search, so I hope to give the same assistance to the next class of graduates," Shirley said. "I have already started by giving my brother, who is a sophomore at UT PGE, advice about making the most of his four years."

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UT PGE TAILGATE -

# JOIN US!

UT PGE is hosting its eighth-annual tailgate, which coincides with the Distinguished Alumni Ceremony, in front of the CPE building on the UT Austin campus. This year's event will be held on **Saturday, Nov. 11 from 2 p.m. – 5 p.m.** prior to the Longhorns taking on the Kansas Jayhawks. Guests will enjoy a Texas-sized tailgate with food, drinks and giveaways, while mingling with current students and former professors and classmates.

**RSVP:** *bit.ly/PGEtailgate17*

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