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UW COLLEGE OF ENGINEERING AND APPLIED SCIENCE Winter 2019, Volume 44, No. 1

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### WYOHACKATHON 2018: BREAKIN' THROUGH

The Business of Engineering Research For Wyoming

\$61,300

Average Starting Salary for Our Graduates Percentage of UW Students Who Graduate With Little-to-No Debt

THE WORLD NEEDS MORE

### INDEPENDENCE.

#### WHAT CAN A DEGREE FROM UW DO FOR YOU?

The College of Engineering and Applied Science is a nationally recognized institution of academic excellence and world-class research. Rewarding and dynamic careers await individuals who graduate from one of our areas of study. Find opportunities to learn alongside industry professionals and renowned faculty by developing real-world projects.

Studying engineering at UW provided many opportunities that serve me well in my professional career today. The rigor of UW's engineering programs helped me to develop a strong work ethic and develop strengths in problem solving, process management and collaborative work.

#### KENDRA HEIMBUCK

*Executive Director of Habitat for Humanity of the Greater Teton Area Architectural Engineering '11* 



College of Engineering and Applied Science uwyo.edu/ceas



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On the cover: Members of the Wyo Mesh team Dan Shields (left), Tommy Cox (center) and Abhir Elandasserry (right) collaborate at the WyoHackathon event. The event drew more than 400 people to the University of Wyoming.

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#### **On Taking Chances**

The commitment to creating businesses and instilling an entrepreneurial spirit within the College of Engineering and Applied Science is quite evident.

As you'll read in the following pages, the CEAS has served as fertile ground in recent years for new business ventures, and all our students are encouraged to take part in entrepreneurial challenges and think big when it comes to innovation and research.

However, as any entrepreneur will tell you, these ventures don't occur without some measure of uncertainty. How will the market respond? Is there demand for my product? But it's this type of thinking that will benefit Wyoming's economy, by leveraging existing expertise in areas such as oil and gas, and introducing new ideas to promote growth.

It's not a new type of thinking, but it's been reinforced strongly, thanks to the college leadership's commitment to the ideas.

Our students and faculty are taking chances to be entrepreneurs to more effectively serve our university and state. If our past is any indication, you've got to like their chances of success.

Sincerely,

Andy Chapman Editor, *Foresight Magazine* 



**Read** the winter issue of *UWyo Magazine*, a special edition devoted to UW entrepreneurship efforts on campus!

Subscribe today! uwyo.edu/uwyo

#### Message from Dean Michael Pishko

We're making some huge strides in the College of Engineering and Applied Science (CEAS).

**Implementation of college strategic plan:** In the last issue of Foresight, we laid out the roadmap with real metrics to measure our progress in key areas. We've sought input from key stakeholders and have established benchmarks for all areas. I'm proud to say many things are already under way, while others are not far from being implemented.

Substantial enrollment increases: Our undergraduate student total has increased since fall 2017, and now stands at 1,762 students. Freshmen enrollment is up 11 percent, and female enrollment is up 9 percent. Several programs have made strides, including architectural, civil, electrical and energy systems engineering, and computer science.

**Progress on the EERB:** The facility is on track to be available to college personnel in February 2019. Classes and research activities will begin in fall 2019.

**New programs:** The Construction Management program was under way in fall 2018, along with a cybersecurity certificate option.

**AI Summit:** In June 2018, the CEAS hosted an artificial intelligence summit with invitees from across the nation. Notable speakers included Farnam Jahanian (Carnegie Mellon), Moshe Vardi (Rice), Joseph Aoun (Northeastern), Zvi Galil (Georgia Tech) and Caroline Levander (Rice).

The summit, the first of its kind, focused upon solutions for educating the next generation of workers in areas such as health care, law and finance so that they can function effectively in an AI-enabled world.

**WyoHackathon:** In September 2018, UW was the site of a hackathon event for more than 400 developers from around the world. Sponsors included Microsoft, Concensys, IBM, and Greenhouse Data. Participants tackled blockchain challenges, and prizes were awarded to the best development teams. (For more, see page 20.)

Institute of Innovation and Entrepreneurship: In collaboration with the College of Business, the IIE was created to serve as the hub for all innovation and entrepreneurship programs across campus and the state



Dean Michael Pishko

of Wyoming. There has been significant progress, including the addition of the nation's top entrepreneurship faculty, two in the College of Business and two in the CEAS.

The IIE also provided seed funding for the Center for Business and Economic Analysis, the Center for Design Thinking, the Bioscience Hub, the Business Creation Factory, and the entrepreneurship curriculum task force. (For more, see page 30.)

The Engineering Education and Research Building will be substantially complete in February 2019, and faculty can begin moving equipment into lab spaces in preparation for research activity and fall classes. (Photo courtesy GE Johnson)



# NEWS & NOTES

#### \$2.5 Million Gift Advances UW Petroleum Engineering

Alumnus David D. Le Norman's transformational \$2.5 million gift to the University of Wyoming will support engineering, energy and STEM (science, technology, engineering and mathematics) programs, and Wyoming's economy.

The \$2.5 million gift, doubled to \$5 million through state-matching funds, will support the Le Norman Endowed Leadership Chair in Petroleum Engineering for the head of the Department of Petroleum



Students in the Department of Petroleum Engineering have access to some top-flight teaching facilities, such as the WPX Drilling Simulator.

Engineering in the UW College of Engineering and Applied Science. It also creates an excellence fund – the Le Norman Family Excellence Fund in Petroleum Engineering.

"My wife, Cory, and I are pleased with the result of the many people who worked on the project at the University of Wyoming," Le Norman says. "We are especially proud of the state of Wyoming's efforts to advance these programs with matching funds, supporting generations of future students focusing on the STEM- related fields of study.

"Our hopes are that the acknowledgment of these programs and this gift will stimulate future alumni investment across the board in many focus areas of study and research at the University of Wyoming."

As president, CEO and dedicated philanthropist, Le Norman followed in his father's and grandfather's footsteps, both of whom were in the oil and gas industry. He earned his bachelor's degree in petroleum engineering from UW, as well as earning an MBA and working toward a master's degree in chemical engineering, both from universities in Oklahoma.

After 30 years' experience in the industry, including Texaco, he founded Le Norman Energy and a number of other successful companies.

"The University of Wyoming has made tremendous strides in advancing its STEM programs," Gov. Matt Mead says. "UW has become known as a world-class university for engineering, energy, technology and science. This generous gift will help to continue producing excellent engineers and scientists that will go on to do great things. I want to thank David and Cory for the opportunity this gift will provide to the university and Wyoming."

The generous gift of Le Norman and his wife is a key part of the ambitious UW Engineering Initiative (EI), which began in 2012. The EI was created to fundamentally transform the CEAS into a nationally recognized institution of academic excellence and world-class research institution.

#### UW Professor Receives DOE Grant to Study Arctic's Mixed-Phase Convective Clouds

A University of Wyoming department head has received a Department of Energy (DOE) grant to study mixed-phase convective clouds in the marine boundary layer in the Arctic.

Bart Geerts, a UW professor and head of the Department of Atmospheric Science, received a \$605,405 DOE grant for his project, titled "Mixed-Phase Convective Clouds in the Polar Marine Boundary Layer." The grant began Aug. 15 and runs through Aug. 14, 2021.

Zach Lebo, a UW assistant professor of atmospheric science, will serve as co-principal investigator on the project. Yonggang Wang, a research assistant professor of atmospheric science at Texas Tech University, also is a member of the research team.

"This grant is part of a larger effort to study mixed-phase convective clouds in the marine boundary layer in the Arctic," Geerts says.





#### **UW's Fisher Innovation Launchpad Names Winners**

Five innovative businesses created by University of Wyoming graduate students were named winners of the Fisher Innovation Launchpad. The five businesses will each receive seed funding from a \$125,000 fund; office space in the Wyoming Technology Business Center (WTBC) for one year; and business counseling.

The Fisher Innovation Launchpad, which began in 2016 as the Fisher Innovation Challenge, is for new, independent businesses – in the seed, startup or early-growth stages – focused on technology and/or innovation. The seed fund was made possible through the financial gift of Donne Fisher, the Launchpad's namesake, and was matched by the UW Office of Research and Economic Development.

The WTBC, a business development program of UW that has business incubators in Laramie, Casper and Sheridan, is administered by the UW Office of Research and Economic Development. The WTBC is a not-forprofit business incubator that provides entrepreneurs with expertise and tools for success.

The five winning businesses are:

• Brass Genes, founded by Marcus Brock, a postdoctoral research associate in botany.

• CS3, founded by Behzad Reza Ahrabi, a staff scientist in mechanical engineering, and Dimitri Mavriplis, a professor in mechanical engineering.

• Deep Winter Games, of which Spencer Ollila, a senior from Laramie majoring in computer science, is one of the collaborators.

• TABI, of which Ph.D. ecology students Mallory Lai, of Denver; and Maya Gans, of Hollywood, Fla., are collaborators.

• VisibleFlow, of which collaborators include Ben Noren, a UW chemical engineering graduate student from Ironwood, Mich., and Leann Bentley, a recent UW graduate in marketing from Laramie.

#### **UW Engineering Duo Honored For Diversity Efforts**

Two individuals associated with the Department of Chemical Engineering were honored at the Diversity, Equity and Inclusion Awards at the University of Wyoming.

Emily Lynch, a senior chemical engineering student, and Saman Aryana, an assistant professor in the department, each won awards.

The awards recognize and reward the efforts of faculty, staff, students and community members to "create and support an environment where diversity, equity and inclusion are valued, both on campus and in the community."

Associate Professor Joe Holles submitted nominations for both Lynch and Aryana.

Lynch won the 2018 Student



Emily Lynch was honored for her efforts to support diversity.

Magnificent Mile Award for Service. In the past year, she helped found the UW chapter of Phi Sigma Rho, a social sorority for women in technical studies and science, technology, engineering and math. She is involved in the UW chapters of American Institute of Chemical Engineers and Society of Women Engineers, and participates in undergraduate research in the department. Holles wrote in his letter to the awards committee that she was an "outstanding example of the combination of academic excellence and natural service leadership that marks her a future leader in her profession."

Aryana was presented the 2018 Faculty Magnificent Mile Award for his efforts to found and advise the UW chapter of the National Society of Black Engineers in 2015. The NSBE created and expanded social and career networks for students of color and minority students at UW.

"It is my pleasure to nominate Saman for the Faculty Magnificent Mile Award," Holles writes. "I give Saman my highest possible recommendation."

## NEWS & NOTE SUTREACH

#### **Outreach Program Exposes Students to Engineering, Computer Science**

Engineering and computer science activities were a highlight of a recent program hosted by the University of Wyoming and the College of Engineering and Applied Science.

The Native American Summer Institute was June 10-16 on the UW campus. It featured 38 Native American students from multiple



states and nearly 10 high schools. They participated in academic workshops, social activities, outdoor excursions and entertainment events. The purpose of the institute is to help young people from Wyoming's Wind River Indian Reservation and other Native American students become acquainted with UW, and encourage preparation for college through academic, career and cultural exploration.

Reinette Tendore, UW's Native American Program adviser, invited students from Wyoming and surrounding states to participate in the unique program.

"These students come from so many different tribes, different environments and different backgrounds, but they have formed a peer support system with the sole purpose of helping each other do better in their lives," says Tendore, who grew up on the Wind River reservation and is dedicated to encouraging more Native students to attend college.

Engineering-related activities for the students included workshops in cybersecurity, programming and technology using microbits; coding and monitoring the environment with raspberry pi (card-sized computers similar to an Intel processor); and a building challenge for a "gravity cruiser" with CEAS K-14 Project Coordinator Teddi Freedman and Coe Student Innovation Center Director Tyler Kerr.

#### State Educators Receive Technology Training Through UW

As Associate Professor Bob Kubichek progressed through his presentation on the first floor of the Engineering Building, eight individuals in the classroom followed along on their computers as he covered the basics of an arduino, a credit-card sized processor.

The students in this particular classroom were educators themselves. In what's become an annual summer program at the University of Wyoming's College of Engineering and Applied Science (CEAS), 80 teachers from Wyoming and the region participated in training in the Engineering Summer Program for Teachers, or ESP4T.

The weeklong professional

development course takes educators through a hands-on discovery program, wherein they learn how to use arduino and raspberry pi as tools for integrating engineering in the classroom. ESP4T is composed of a group of professors, graduate and undergraduate students from UW's Department of Electrical and Computer Engineering, Science and Mathematics Teaching Center and College of Education.

Drew Peregoy, a kindergarten teacher in Shoshoni, Wyo., wants to use the advanced teaching tools.

"Obviously, it will help me teach it more effectively if I have a greater understanding of the concepts," he says.



Kindergarten teacher Drew Peregoy was one of 80 educators from Wyoming to attend ESP4T in 2018.

After a few days in the course, Peregoy formed ideas to implement the technology into his lesson plans in Shoshoni, including a flash card challenge and utilizing the school's weather station for activities.

"I'm very impressed with the university," Peregoy says. "I'm thankful for the opportunity."

## NOTABLE

#### Successful Mentor Program Will Continue

The Female Mentor Program will continue its work in the College of Engineering and Applied Science (CEAS), thanks to a successful debut and positive feedback from those involved.

The program, initiated in 2017 by K-14 Outreach Coordinator Teddi Freedman, formed connections between experienced female engineers and student counterparts. Last year's program featured five mentors from industry, including Robin Hill, Sherrie Merrow, Christie Roberts, Jera Schlotthauer and Amy Sharpe. The mentees were Eloise Fadial, Damiana Murdock, Reenu Paul, Hannah Vehige and Annaliese Fitzsimmons.

This year's program has nearly tripled in membership, and plans for future years include even more growth with regards to mentors and planned activities.

The mentor group includes those involved in civil, environmental, computer and structural engineering, and computer science.

#### Explore Engineering Outreach Team

The CEAS has announced the students who will serve as Explore Engineering Outreach members for the 2018-19 academic year. The students participating in the program include Sara Bashir (Cairo, Egypt); Holly Beiko, (Calgary, Canada); Annaliese Fitzsimmons (Greybull, Wyo.); Moriah Miller (Powell, Wyo.); Aisha Mohammed (Kwara State, Nigeria); Chris Rumple (Harrisburg, Pa.); Connor Desmond (Cheyenne, Wyo.); and Mike Tran (Hanoi, Vietnam).

The individuals each receive a scholarship of \$1,000 and are required to put in 30 hours of outreach per semester and 60 hours over the course of the academic year, visiting classrooms throughout the state and hosting student groups on campus. • Civil and Architectural Engineering Ph.D. candidate Majid Karami was awarded a \$10,000 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Grant-in-Aid award. Each year, only 10 to 25 applicants from all over the world receive the prestigious award. Karami, who is originally from Iran, says he believes this is the first time the grant has been awarded to a UW student.

• Beginning in fall 2018, the CEAS introduced a minor option focused on international engineering. The 18-credit hour program is open to all engineering students, and the program includes a study-abroad experience and coursework intended to help students gain understanding of perspectives and viewpoints from around the world.

• CEAS alumnus Bruce Pivic (electrical engineering '84) and his wife, Carla, donated a statue depicting UW's Kenny Sailors in Laramie's Washington Park. Sailors, who is credited with inventing the modern jump shot, led UW to the 1943 NCAA men's basketball championship. His statue was sculpted by Green River's Rudy Gunter.

• Petroleum Engineering Ph.D. candidate Vahideh Mirchi won first place in the international student paper contest competition at the annual Society of Petroleum Engineers Annual Technical Conference and Exhibition on Sept. 24-26 in Dallas. Mirchi beat out competitors from 14 world regions.



CEAS student Vahideh Mirchi (left) (Photo courtesy SPE)

• A paper in the Proceedings of the National Academy of Sciences describes how an artificial intelligence technique called deep learning can automatically identify, count, and describe animals in their natural habitats. The paper was written by computer science Assistant Professor Jeff Clune, his Ph.D. student Mohammad Sadegh Norouzzadeh, his former Ph.D. student Anh Nguyen (now at Auburn University), Margaret Kosmala (Harvard University), Ali Swanson (University of Oxford), and Meredith Palmer and Craig Packer (both from the University of Minnesota).

• The Wyoming Engineering Society Student of the Year nominees from the CEAS included graduating seniors Nathan Brown (mechanical engineering); Brittany Endsley (chemical engineering); Dean McClure (petroleum engineering); Krista Riester (civil engineering); Will Schutz (energy systems engineering); Alexandra Switzer (architectural engineering); Trevor Trouchon (computer engineering) and Jeffrey Wen in electrical engineering.

# students in action



Alex Howell uses a gas spectrometer to separate compounds. (Courtesy photo)

Alex Howell needed to make a decision on her area of study for college, and she had some specific interests in mind.

One of her main goals was finding something that would allow her to make a difference on a large scale. When she came across the energy systems engineering (ESE) program in the College of Engineering and Applied Science (CEAS) at the University of Wyoming, she was intrigued because the curriculum involved issues with impacts on the global stage, including energy research and consumption.

"I chose ESE because it seemed like a logical area of study that would become very relevant in the coming years, due to the energy dilemma faced by the entire globe," she says. "Students are exposed to many topic areas including the technical, social and economic

#### ESE Graduate Prepared for Future of Industry

considerations that are all key to real energy solutions. Additionally, I was interested in the science behind harvesting energy resources like solar, wind and geothermal."

A standout student from Morrill, Neb., she had many educational opportunities elsewhere. She chose UW to follow the legacy of her parents and some family members, all of whom attended the university.

"I got several scholarships that made my education much more affordable than other institutions," she says. "The reputation of the engineering college and the unique ESE program helped me make my final decision."

After earning her bachelor's degree in ESE and environment and natural resources in 2017, she currently is pursuing a master's degree in mechanical engineering. Her background as an undergraduate helped her transition to her master's program.

"I think the most beneficial part of the ESE program was the diverse class work requirement," she says. "I was taking mechanical engineering classes, but also was enrolled in classes like geological climate change, natural resource economics, international environmental law and management.

"This program produces welldiversified students who are aware of the complexities incorporated in global issues. Students also emerge from the program well prepared to engage with colleagues from a wide range of backgrounds, and this gives the students many career options to pursue once leaving higher education."

Howell's master's research involves thermochemical pretreatments and subsequent combustion of solid fuels, such as coal and biomass. She strives to optimize the performance of biomass integration into technological applications, particularly energy generation. She is also interested in utilizing technology to develop innovative solutions to improve the human environment and enhance existing systems.

The CEAS has begun to implement new methods and curriculum requirements for the ESE degree program, which will enhance student experiences. Howell attributes much of her success and knowledge base to the ESE program.

"I would let (prospective students) know that they are in an exciting and rapidly growing field," she says. "I would tell them that they have already chosen a great field that will teach them to be innovative and creative problem solvers with the technical background to implement solutions in a wide variety of fields.

"I did not begin this program thinking that I would be studying combustion coming out, but I love the research I get the opportunity to perform, and I think other ESE graduates can attest to the wide variety of career prospects available to us."

#### Chemical Engineering Student Makes College History

Brandon Wilde has always embraced a challenge, and his tenacity led him to accomplish something historic for the College of Engineering and Applied Science (CEAS).

Wilde, who studied chemical engineering at the University of Wyoming, became the inaugural graduate in May from the Engineering Honors Program. The program was established in fall 2017, and combines the same opportunities already offered by the University Honors Program with additional coursework in Engineering Honors curriculum.

"I transitioned from a UW Honors program minor to an Engineering Honors major in my last year, just as this new system was being introduced," he says. "This was a great supplement to my experience and education at UW."

Wilde came to UW via Worland, Wyo., thanks in part to a substantial academic scholarship. He had his eye on an engineering degree and knew about UW's reputation for strong programs. He chose chemical engineering as his path and put in

the time to be a successful student.

His work in the Engineering Honors Program also was a boon to his education, as it provided the opportunity to delve deeper into his areas of interest and receive additional resources to participate in independent

INGINE VERS Brandon Wilde (left) and Professor David Bagley (Courtesy photo)

significant contribution to society," Wilde says.

those professors who held very high expectations for their students.

"Even if it made maintaining a good GPA or even passing the class seem difficult, the benefit was worth it."

#### Mechanical Engineering Trio Conducts Research Through Fellowship

Three individuals from the Department of Mechanical Engineering at the University of Wyoming made the most of an opportunity from the U.S. Air Force to further research into combustion measurement.

Erica Belmont, an assistant professor in mechanical engineering, and two students took part in the U.S. Air Force Summer Faculty Fellowship Program (SFFP) from June through August at Wright Patterson Air Force Base near Dayton, Ohio. The program, administered by the Air Force Office of Scientific Research, funded Belmont and UW mechanical engineering graduate student Matthew Brown for the summer. They were joined by Matthew's brother, graduate student Marcus Brown, who received a different source of Air Force funding to participate.

"Spending a summer conducting research at the Air Force Research Laboratory was a wonderful opportunity for me, as I was able to work with internationally renowned researchers and observe several interesting experiments," Marcus Brown says. "Over the summer I learned many different experimental techniques, including particle imaging velocimetry (PIV) and planar laser-induced fluorescence (PLIF), which can both help characterize flames."

It was Belmont's third time researching at Wright Patterson Air Force Base and the second time she's been funded by the SFFP to conduct summer research. It was the first instance in which Belmont was able to involve UW graduate students in the project. Belmont's research areas at UW include combustion, solid fuels (coal, biomass), alternative fuels and renewable energy.

"Working in the lab with some of the best researchers in the country was incredibly useful," Matthew Brown adds. "Their expertise and willingness to lend a hand allowed us to develop experimental techniques quickly, thus allowing us to collect vast amounts of important data."

The objectives of the SFFP include enhancement of research interests and capabilities of faculty in the U.S. academic community, and to elevate awareness in the U.S. academic community of Air Force research needs.



research and explore offcampus experiences. "It took a lot of work

and more all-nighters than I can count, but I feel like it was worth it, since I now have a valuable degree, with which I can make a "I particularly appreciate

# faculty in action

#### **UW Materials Science Researcher Meets with Lawmakers**

Dilpuneet Aidhy has seen the statistics. The United States is in danger of falling behind in areas of science and technology and could soon be surpassed by other countries. He wants to ensure that doesn't happen.

Aidhy, an assistant professor in mechanical engineering at the University of Wyoming, is a materials science researcher. He studies materials at the nano and atomic level to examine how they behave under different circumstances. In his work at UW,



he examines new alloys for structural applications and fuel cells to enhance capacity through improved oxygen conductivity at material interfaces.

In summer 2018, he made a trip to the nation's capital to meet with lawmakers and provide his perspective as to why research funding for science research and education is so critical to the future of the United States.

As part of a trip organized by the

Materials Research Society, faculty members from a variety of institutions visited Washington, D.C. Aidhy and the members of his travel group met with the respective representatives from their home states. The trip included a visit with Wyoming's congressional delegation, including Rep. Liz Cheney and Sens. Mike Enzi and John Barrasso.

"We informed them about the impact of funding in materials science," Aidhy says. "We are potentially looking at an innovation deficit in the next decade. Other countries are heavily investing in education in science, technology, engineering and math (STEM), and encouraging their young citizens to study those fields. From 2012 data, nearly 44 percent of undergraduate degrees awarded in China were in science and engineering fields, compared to just 17 percent in the U.S. Investments like these position other countries to be on the frontier of solving next-generation problems."

Materials science is a field that includes physics, chemistry, biomedical science and mechanical engineering. Aidhy says "materials are the backbone of a developed economy," which includes precision equipment for national defense and medical treatment materials available to the general public. Traditionally, agencies such as the National Science Foundation, Department of Energy, Department of Defense and NASA fund research in areas critical to STEM. Any potential reduction to the budgets of these agencies represent a threat to continued innovation, Aidhy says.

"Potential cuts to funding is alarming, but the bigger worry is if you're not going to invest in the technology such as the upcoming quantum computing, we may end up purchasing this technology from other countries because we wouldn't have developed it here," he adds. "That's not good for the national security. Part of the reason why the U.S. is currently a superpower is because of the technologies that we create here."

The trip also served as a way to thank lawmakers for their support for researching funding in recent years. Aidhy says is a crucial time for funding in research and education, because despite a slight budgetary increase in 2018, the nation could be in a precarious position if the funding is not sustained at its current levels.

"We thanked them because they understood why funding science and technology is important," Aidhy says. "In a way, our intent was to thank them for this year's improved funding, despite some forecasts of future cuts, and also to keep them informed on the innovation deficit issue the country may face in the next five years."

Aidhy also spoke to the Wyoming delegation about topics including rare-earth mineral mining in the state and bolstering Wyoming's workforce entrepreneurship and talent retention.

#### Associate Dean's Book Relates Fondness for Education and Dogs

Since he became an educator, Steve Barrett has strived to provide the best learning tools to as many young people as possible. The fact that one of the most useful items was named after his favorite dog breed was just a bonus.

Barrett, a University of Wyoming professor of electrical and computer engineering and associate dean for academic programs at College of Engineering and Applied Science (CEAS), has written 12 textbooks for use in microcontroller and embedded systems courses. He was introduced to one microcontroller, the BeagleBone Black, while it was in its planning stages. The open source hardware Linux PC, just the size of a mint tin, soon became available for educational labs, and Barrett wanted to be involved. The deal got sweeter for Barrett, whose



Associate Dean Steve Barrett (right) holds a BeagleBone microcontroller. (BeagleBoard.org photo)

adult daughter owned two beagle dogs, as the unit was nicknamed "Boris" after the BeagleBoard.org beagle mascot.

He and BeagleBoard.org co-founder Jason Kridner wrote a textbook in 2015, "Bad to the Bone: Crafting Electronic Systems with BeagleBone Black." It now is in its second edition and covers topics such as getting started with the basics of using BeagleBone Black in a classroom and exercises centered on motivational and fun robotic projects.

The goal of the book is to reduce barriers for faculty and students in order to use the embedded Linux processor. By partnering with Morgan & Claypool Publishers, it allowed students across the globe to have free electronic access to the work. Barrett, along with Kridner and Mark Yoder, taught the first American Society of Engineering Education BeagleBone Hands-On workshop in 2013. Participants built circuits and coded with BeagleBone in an effort to increase confidence in teaching methods.

Barrett serves as an administrator, teacher and researcher. Despite his busy schedule, he always makes time to serve as a mentor to students and faculty.

#### **GenCyber Program Educates Wyoming Youth**

A group of youngsters from the state will be well prepared for the future of technology, thanks to outreach efforts by the University of Wyoming.

Mike Borowczak, the UW Department of Computer Science director of cybersecurity education and research, administered the state's first-ever GenCyber camp with UW School of Teacher Education Associate Professor Andrea Burrows. Teachers and middle- and high-school students attended the free weeklong educational camps this summer to learn about computer science. The events were hosted in Riverton (July 2-6) and Laramie from July 16-20.

"Over the course of two weeks, we ended up reaching about 80 students and about a dozen teachers," Borowczak says. "These participants received handson instruction from university faculty, as well as a number of computer science and mechanical engineering students. Each week concluded with an open house where friends and family were invited to see what the participants were able to develop, based on their new knowledge in cybersecurity, computer science and programming."



The National Security Agency (NSA) and National Science Foundation (NSF) jointly awarded UW a \$100,000 grant to fund the camp in order to increase interest in cybersecurity careers nationwide; help students understand safe online behavior; and improve teaching methods for cybersecurity content in K-12 curricula. Attendees learned with hands-on activities in areas including password cracking, robotics, medical devices and data mining.

Participants were able to take home a College of Engineering and Applied Science 3D-printed badge containing a programmable micro:bit, moto:bit and NeoPixel LED ring. Borowczak says UW will apply for another GenCyber grant for 2019 and hopes to partner with teachers from around the state to implement a slightly different model that enables a broader reach.

"The program was amazing," Borowczak says. "We learned quite a bit about what our participants are capable of, which is quite a bit. Our participant and parent feedback has been extremely positive, and we've made some lasting connections in at least two Wyoming communities."



### THE BUSINESS OF ENGINEERING

The CEAS has instilled an entrepreneurial mindset in students and faculty

The research was the easy part for Carl Frick and his team.

Frick, the department head of mechanical engineering at the University of Wyoming, was awarded a grant from the National Science Foundation (NSF) I-Corps Program in the spring of 2018. It was related to the liquidcrystalline elastomer (LCE) research he's done to make football helmets more effective.

This grant, however, wasn't meant to further the scientificdiscovery process. The purpose of the I-Corps Program is to teach engineers and scientists how to think like entrepreneurs.

If engineers can better understand customer needs, they can accelerate their technological innovations from the laboratory and turn them into usable products. As part of this grant, Frick's group interviewed 100 potential customers over seven weeks. Mitch Anderson, a UW Ph.D. candidate, was the entrepreneurial lead for the project, while Frick was the technical lead.

"The experience overall was very tough," Anderson says. "It was an extremely fast-paced program and at one point, I was on a plane every day for a week and in six different cities. The instructors were very critical and pushed extremely hard in an effort to teach us as much as possible, as fast as possible."

Anderson's experience as the entrepreneurial lead was unique, as he served as the face of the company. He met with groups, gave presentations and provided progress reports to the I-Corps personnel. He gained valuable perspective as an engineer wading through the world of business.

"Often, it is the engineer or scientist that has some amazing idea that will revolutionize the world," he says. "They have all the passion, commitment, and vision—but too often lack the understanding for what it takes to make a successful product or company. I-Corps teaches us how to think beyond this to what the customer actually wants and needs. Too often these ideas are passed on to the business world and the engineer loses almost all input. The point of I-Corps is giving those engineers the skills and a new way of thinking, so that they can take their ideas to fruition."

The College of Engineering and Applied Science has always encouraged the entrepreneurial spirit in its students and faculty, providing resources and guidance to those who want to combine engineering pursuits with business ideas. The efforts have been more pronounced under the direction of Dean Michael Pishko, who has been a proponent of expansion of business and engineering ventures since he took over in 2015.

"Students benefit from having an entrepreneurial mindset," he says. "No matter what discipline you're in or what career you do, having an entrepreneurial mindset really benefits you. The university has an obligation to the state to be a driver for economic development and diversification."

Frick's team spent significant time performing active customer discovery work, interviewing potential customers and potential partners. The work yielded a clear decision based on the viability assessment of the overall business model, firsthand evidence for or against product-market fit and a narrative of a compelling technology demonstration for potential partners.

"During customer discovery, we traveled to 15 cities over seven weeks," Frick says. "We met with neurosurgeons to learn about concussions, team equipment managers to learn what they look for when selecting helmets, plastics manufacturers to learn about mass producing our product, and of course, football and military helmet manufacturers."

The project has ties to Frick's startup company, Impressio, which developed materials for football helmets to redefine energy dissipation to prevent concussions and chronic traumatic encephalopathy (CTE). Frick gained momentum for the project after winning a football-safety startup competition in February 2018. Impressio won for its submission in the category of "Advancements in Protective Equipment" after it developed energy-absorbing materials that can be put in helmet padding to reduce the impact from hits. Impressio has raised more than \$500,000 in non-equity funding so far, primarily from the NFL.

"We are actively leveraging the customer discovery from I-Corps for Impressio," Frick says. "For example, it is a huge advantage to be able to talk with helmet companies about their biggest challenges, as it gives us a great perspective for Impressio. Also, with the help of the I-Corps instructors and the leadership at the Wyoming Technology Business Center (WTBC), we created a startup specific formal business plan for Impressio."

#### CEAS-RELATED ENTREPRENEURIAL VENTURES

The companies and businesses spawned with help from the CEAS and UW over the years are too numerous to list. While this breakdown doesn't contain every successful venture, here are some notable businesses and programs with ties to the college, the university and the Wyoming Technology Business Center.

#### Alpenglow

Founded in 2013, Alpenglow Instruments designs and fabricates commercial airborne and ground-based Lidar systems, a remote sensing technology capable of producing high-rate, high-resolution data. This technology can be used to study atmospheric phenomena, air quality monitoring and surveying. This is a spinoff from UW's Department of Atmospheric Science.

Alpenglow Chief Executive Officer Perry Wechsler was a senior research scientist and chief engineer of the King Air research aircraft. University of Colorado Atmospheric Science professor and UW Adjunct Professor Zhien Wang is the chief science officer, and UW Atmospheric Science senior mechanical engineer Nicholas Mahon is the chief financial officer.

#### **Resono Pressure Systems**

Resono Pressure Systems was founded by Pourya Nikoueeyan, a doctoral student in mechanical engineering. It offers innovative measurement techniques and instrumentation systems in fluid dynamics and aerodynamics. Others involved include Michael Hind, a loads and control engineer at Siemens Wind Power who received his master's degree from UW; John Strike, a tunnel test engineer at the Florida Center for Advanced Aero-Propulsion who received his master's degree from UW; Stephan Whitmore, a professor of mechanical and aerospace engineering at Utah State University; and Jonathan Naughton, a UW professor of mechanical engineering.

#### հարորարարարարող

#### EnWyo

EnWyo is a UW startup company formed to develop technologies to add value to Wyoming's coal resources by reviving dormant coal-bed methane wells in the Powder River Basin. The company works to optimize and sustain long-term production of secondary biogenic coal bed natural gas (gas generated by microbial systems living within coal seams). Michael Urynowicz is EnWyo's co-founder and a UW professor of environmental engineering.

EnWyo researches how treatment agents can be used to enhance the availability of coal as a food source for the microorganisms to generate natural gas. It also offers research into soluble biomass derivatives from plants that could be injected into coal seams to transform biomass into natural gas.

Urynowicz estimates that thousands of unproductive coal-bed methane wells could be rejuvenated to produce natural gas using EnWyo's technology. These technologies could be applied to depleted coal seams located throughout the Powder River Basin, with the added economic benefit of existing coal-bed methane-related infrastructure.

#### LogiLube

Laramie-based LogiLube focuses on big data predictive analytics and machine learning in the field of intelligent machine health, and its markets include wind energy and oil and gas compression and transmission. Founder Bill Gillette has employed engineering graduates as employees since the beginning, and of eight current Laramie employees, seven have roots in the CEAS.

#### **Bright Agrotech**

Bright Agrotech was a Laramie-based technology company developed in 2011 by UW graduate Nate Storey. The company's technology helps reduce waste and can improve food quality and health for people around the world. It was acquired by Plenty, a Silicon Valley company, in 2017. Bright Agrotech and Plenty have employed many CEAS graduates as mechanical and design engineers for their vertical-farming applications.

#### McGinley Associates-Electrical and Computer Engineering collaboration

Dr. Joseph McGinley of McGinley Ortopedics in Casper, Wyo., has worked on a project with UW Department of Electrical and Computer Engineering Professor John McInroy, Professor Suresh Muknahallipatna and graduate student Brad Riotto to develop an augmented reality system for medical use.

McGinley, a diagnostic radiologist, and the CEAS team worked on a conceptual project for remote rendering of care and visualization of anatomy from cross-sectional imaging scans. Soon it was evident that the technology had applications for real-time ultrasound image guidance for medical procedures. The technology provides improved use of procedure-room time, enhanced patient safety and significant improvement in physician ergonomics.

McGinley says he is pursuing a licensing agreement with UW to use the technology, and it has shown excellent potential for commercialization. The applications in a clinical setting are immediate, and as soon as it's ready, McGinley plans to use it for medical procedures in his practice.

#### **Firehole Composites**

Founded by mechanical engineering graduate Jerad Stack, Firehole Composites was founded 25 years ago, and was purchased in 2013 by Autodesk Inc., which focuses on 3-D design, engineering and entertainment software.

The multimillion-dollar sale to the San Francisco-based Fortune 350 company represents one of the most successful outcomes of a UW-based business.

#### **IDES**

Mike Kmetz founded IDES in 1986, and it is credited with being the first spin-off business to emerge from UW. Kmetz was a doctoral student in mechanical engineering at UW and worked on a research project for IBM. As a result, Kmetz created the IDES Prospector Plastic Materials Database, an online search engine that catalogs plastic materials properties. Today, the database is used by more than 319,000 industry users worldwide. Kmetz sold IDES in 2012 to UL, a world leader in advancing workplace safety.

#### **Industrial Affiliates**

The Department of Computer Science's Industrial Affiliates Program was developed to link industrial and business partners with potential employees and faculty members. Forming these constructive relationships between industry and the department drastically reduces recruitment costs, while also developing a channel of communication between affiliate partners. Partners include Microsoft, American Express and the Wyoming Business Council.



Chemical Engineering Associate Professor Katie Li, left, and College of Business Assistant Professor Matthew Fox examine materials in an Engineering Building lab. As part a college-wide effort to increase research and cooperation among faculty of all disciplines, Li is part of a new Engineering-Initiative research center in the college, the Multiscale Biomaterials Research Center.

#### EI-FUNDED CENTERS PROPEL UW ENGINEERING TO NEXT LEVEL

Since the Engineering Initiative (EI) was created in 2012, it has elevated the College of Engineering and Applied Science (CEAS) to new heights in education, research and service. The goals of improving Wyoming and the economic well-being of its residents have stayed at the forefront. The initiative has created three chairs, nine excellence funds, two scholarship funds and one faculty fellowship to contribute to these efforts.

Seven years later, the CEAS continues to break through and undertake transformational research. A core component of the EI, the development of research centers in the college has progressed rapidly in recent years. Since the inception of the EI, eight centers have been established to advance research crucial to Wyoming. Some of the initiatives from the past included research involving oil and gas recovery, clean coal, high-performance computing, produced water and combustion.

Research for Wyoming



Here is a look at the newest EI-funded centers, which were approved in summer 2018.

#### Multiscale Biomaterials Research Center

The newest interdisciplinary research center turns its focus on biomaterials miniaturization for fundamental and applied cell biology.

The faculty investigators include Chemical Engineering Associate Professors John Oakey and Katie Li, Mechanical Engineering Department Head Carl Frick, along with Molecular Biology Associate Professors Jay Gatlin and Daniel Levy.

The center will be a collection point for biomedical engineering-related research at UW, thanks to the core group of investigators. The group's strength lies in its diverse research interest area and a history of conducting successful and widely respected research.

As a team, the researchers will collaborate and focus upon manipulation of biomaterials at uncommonly small-length scales. This niche capability offers unique opportunities. The team hopes to develop new technological platforms, commercialize them and provide broad user communities with access to resources to enhance their own research.

According to the center's mission documentation, the path to sustainability for this center will revolve around two related areas:

#### **Biomaterial Microfabrication**

This track focuses on unified fundamental advances in biomaterial miniaturization and cell encapsulation, thanks to research collaboration from the departments of Chemical and Mechanical Engineering and Molecular Biology.

These tools will be leveraged as unique platforms for tissue microfabrication and the 3-D printing of complex tissues.

#### Microsystems for Model Systems

The second track will focus on developing collaborative expertise in microfabrication, microfluidics and imaging. This will be done in an effort to gain a designation as a National Institutes of Health Resource Center. This would allow the outcomes to be shared with a wider base of nationally funded researchers as results are shared and disseminated.

#### Artificially Intelligent Manufacturing Center

The economy of today needs advanced materials and manufacturing. Consumer devices, such as televisions, cell phones and computers, are everywhere because of inexpensive mass production, which has led to unprecedented growth in industrial applications. The drawback of this rapid growth is the design process itself, as conceptualizing new materials is a slow process and requires significant investments in capital and labor.

The focus of the new CEAS center of excellence, Artificially Intelligent Manufacturing, is the synergy of three key areas at UW: artificial intelligence (AI), computational modeling, and experimental materials synthesis.

The faculty investigators include Computer Science Assistant Professor Lars Kotthoff, Chemical Engineering Associate Professor Patrick Johnson, and Mechanical Engineering Assistant Professor Dilpuneet Aidhy and Associate Professor Ray Fertig.

Thanks to advances in artificial intelligence, the process for design can be sped up. Machinelearning techniques can replace expensive and time-consuming laboratory processes and computational simulations to quickly and reliably predict how to create materials with desired properties and how materials will behave in specific circumstances.

This research group will apply these techniques to materials engineering and manufacturing in order to reduce cost and improve performance. The center merges expertise from the college in materials development, chemical engineering, mechanical engineering and computer science for the development of powerful methods to design and model the behavior of advanced materials and manufacture advanced devices.

The group's research capabilities already have yielded the ability to create carbon-based electronic devices from thin polymeric films as a new material and method of manufacturing. The center's artificial intelligence can dynamically control a laser in real time to create conductive paths on non-conductive sheets of carbon. This center will model the failure of composite materials under stress using machine learning to determine safe deployment conditions.

The development of this center during the early stages of AI-integrated materials discovery efforts will establish UW as a leader in this growing field. UW will join the fledgling efforts in this space, which already have already been undertaken at institutions such as the University of California, Northwestern University and Cornell University.



Top: The Artificially Intelligent Manufacturing Center will utilize its advanced laser technology to create nano-scale circuits in thin sheets of material, which can enable next-generation technology devices such as cell phones and tablets.

Bottom: This chart depicts the limits of forces that can be applied to composite materials before they break, a crucial component of engineering and manufacturing. Machine-learning techniques can be applied to determine flexible failure envelopes and predict them based on very little data for new materials.



Center: Marcus Cantu (left) and Casey Key (right) of Pinedale, Wyo., work on their blockchain application under the tutelage of mentor Matt Garnett of ConsenSys.

Bottom left: Members of the North Texas Blockchain Alliance Michael Lewellen (center) and Cody Marx Bailey (right) receive feedback from Danielle Peterson (left), who served as a subject matter expert for the WyoHackathon.















## WYOHACKATHON 2018: BREAKIN' THROUGH

A participant in the WyoHackathon 2018 takes a quick nap on a cot set up in the UW War Memorial Fieldhouse.

UNIQUE EVENT HIGHLIGHTS UW'S COMMITMENT TO TECHNOLOGY he idea was ambitious, but that's never deterred Caitlin Long before. A 1990 graduate of the University of Wyoming, Long has strong affection for the state, its residents and its university. She wanted to show her appreciation in a real, tangible way. But how do you say 'thank you' to an entire state?

Then she had a wild idea. Why not invite 400 of the world's top technologists for a unique event on the high plains to raise money for UW?

The WyoHackathon 2018 was born. It took place Sept. 7-9 at the UW War Memorial Fieldhouse.

ConsenSys founder Joe Lubin (left) and UW alumna Caitlyn Long discuss the future of cryptocurrency and blockchain during the WyoHackathon 2018.

#### Early stages

It was March 2018 in Cheyenne, Wyo. The Wyoming State Legislature had just wrapped up, and it passed some of the most unique legislation in the entire nation. In March, Gov. Matt Mead signed five blockchain-related bills into law as the state has assumed a leadership role in the sector. Officials say shortly after, about 200 new companies registered in Wyoming with names indicating involvement in blockchain.

Long was very excited. The new laws dealt directly with her area of expertise, as the chairman and president of a blockchain company, Symbiont. She's been a blockchain and bitcoin evangelist since 2012 and served on Morgan Stanley's internal blockchain working group.

She just had to do something to show appreciation to the state and its citizens, so she called up Department of Computer Science Head Jim Caldwell.

#### The idea

It became evident the most effective way to involve UW and the state was to host a hackathon. It had never been done before on campus, but as a member of the Wyoming Blockchain Coalition, Long knew she could enlist her organization's know-how to help coordinate the event.

"The WyoHackathon is a volunteer 'passion project' for me, as is my work with the state's legislative efforts," Long says. "I'm just a volunteer who loves my native state and UW, and saw an opportunity to connect the state to this nascent industry, creating benefits for both."

The idea, however, wouldn't work without buy-in from UW officials. She didn't have to persuade them too long. The College of Engineering and Applied Science immediately offered its full cooperation.

"We are excited to host this groundbreaking event at the University of Wyoming," UW President Laurie Nichols said in June 2018. "This emerging technology has great promise to boost the state's economy, and our faculty and students are immersed in the exploration of its potential. The hackathon will shine a bright light on these efforts and those of people from across the country."

Shortly after the university agreed to host, the event had a name with a tie-in to UW's strategic plan theme: "WyoHackathon 2018: Breakin' Through."

"We're bringing some of the top people in blockchain to UW, and our goal is to 'Break Through' with new businesses and new ideas using blockchain," Long says. "WyoHackathon is a platform to bring these great minds together."

#### OK, how do we pull this off?

Organizers hoped for 400 participants, which included hackers and technologists, as well as business people of all disciplines and skill levels. The event was slated to begin on a Friday night and run through Sunday afternoon.

The sponsors and industry folks agreed early on to support the event. Among the notable early supporters was Joe Lubin, founder of ConsenSys and co-founder of Ethereum; Patrick Byrne, founder and CEO of Overstock.com; and Erik Voorhees, founder and CEO of ShapeShift. The sponsorship total exceeded \$100,000.

But how do you get hundreds of people to sign up? Rich Kopcho was hired as the event producer in June.

"Wyoming is progressive beyond its perceived reputation," Kopcho says. "Its history as a first mover is welldocumented. Therefore, it's no surprise it took the lead with cryptocurrency, Distributed Ledger Technology, blockchain and decentralization—all progressive technologies offering a promising future world of trustworthy checks and balances."

#### Logistics

The event needed to accommodate nearly 500 people including participants, volunteers and sponsors. The War Memorial Fieldhouse, home to UW track and field, offered the space requirements necessary.

The venue had to be staffed the entire time, and the coders

Cody Marx Bailey (left) discusses his blockchain application with Danielle Peterson.



#### WHAT IS A HACKATHON?

An event, typically lasting several days, in which a large number of people meet to engage in collaborative computer programming.

The event aligned with the efforts of both UW and the state of Wyoming to incorporate and use new technology to add value to the state's economy and educational system. Early sponsors to jump on board included ConsenSys, Microsoft and ShapeShift.

"The College of Engineering and Applied Science is proud to support this event as it emphasizes some of the core themes of our recently released strategic plan," CEAS Dean Michael Pishko says. "The hackathon, and other events like it, will bolster our college's culture of entrepreneurship, help us guide Wyoming's economic development and foster innovative growth."

#### WHAT IS BLOCKCHAIN?

Blockchain is a breakthrough of database technology for storing information, including cryptocurrency, and the concept already has made its way into UW classrooms. The Department of Computer Science has featured it in curriculum, as Professor of Practice Mike Borowczak taught a course wherein students built an Ethereum-based voting platform during the spring 2018 semester. The College of Business and the College of Law also are teaching the subject to enrolled students. The UW Foundation now accepts cryptocurrency donations, and UW is one of the first universities to do so.













CEAS student Kevin Achieng (center) works with his team to develop a WyoToken application during the WyoHackathon 2018.



#### **EVENT HIGHLIGHTS:**

- Overstock.com Chief Executive Officer Patrick Byrne discussed the possibility of opening a new office for blockchain software developers in Wyoming.
- DECENT, a Swiss blockchain company, awarded prizes worth \$1,500 each to two teams of high school students from Shoshoni and Laramie. DECENT's blockchain engineers also pledged to continue mentoring the students remotely from their offices in Switzerland and Slovakia.
- ActiveAether Chief Executive Office Robert MacInnis announced the blockchain startup is moving most of its operations from New York City to Jackson, Wyo.
- ActiveAether announced a donation of compute capacity worth \$20,000 to UW's Department of Computer Science.
- Sponsors donated more than \$100,000 to UW to pay for the event.
- Wyoming gubernatorial candidates judged the "Best for Wyoming" category and pitched to the developers why they should set up their businesses in Wyoming.

worked throughout the night, occasionally napping on cots, to develop software that was ultimately judged Sunday afternoon by blockchain entrepreneurs.

Personnel from UW worked together to offer food, cots, WiFi access, tables, chairs and other accommodations. Dozens of volunteers from the community pitched in to help with registration and operations during the three-day event.

#### The student experience

At least 20 UW students participated in the event. That number includes three CEAS students who developed a blockchain application over the three-day span.

Civil engineering Ph.D. student Kevin Achieng and two computer science students, Finley McIlwaine and Cale DePaolo, huddled around a table in the Fieldhouse. Over the course of the event, the team developed a WyoToken, an application built on the bitcoin-cash algorithm that allows users to carry out transactions using the blockchain platform of their choice.

"The event provided a platform for students to get handson information and experience on state-of-art blockchain tools, which are used to develop blockchain in the real world," Achieng says.

#### 'The event smashed our expectations'

Admittedly, the goal of 400 participants in the event seemed unlikely. In late July, organizers had registered fewer than 25 people. Efforts by the vast volunteer network and targeted marketing helped push registration numbers up, and by the time Sept. 7 rolled around, 462 registrations were tallied. Of the 20 sponsor challenges, the teams completed 18 of them. The event featured 11 speakers, 17 mentors and 28 judges.

"Our fervent hope is new businesses are formed and incubated in Wyoming from the WyoHackathon," Kopcho says. "We're sure everyone will gain a deeper appreciation for the power and efficacy of blockchain technology."

Long says many participants asked if UW was planning to host the event again, and with the positive momentum, it's a real possibility. The Wyoming Technology Business Center awarded prizes of rent-free office space to WyoHackathon participants in Laramie, Casper, Gillette and Sheridan.

"The event smashed our expectations," Long says. "We anticipated about 10 teams would compete, but we had 27. The quality of the submissions was terrific, including one from a senior Google engineer, and I believe more than a handful of these projects will turn into real businesses."

The Wyoming Blockchain Coalition was a driving force behind the WyoHackathon 2018. The group's advisers are listed below.

#### **Ben Blalock,** President, University of Wyoming Foundation

Mike Borowczak, Director, Cybersecurity Education Research Center and Lab, University of Wyoming
Randy Bruns, CEO, Cheyenne LEADS
Patrick M. Byrne, CEO, Overstock.com
James Caldwell, Head, Department of Computer
Science, University of Wyoming
David Chicoine, College of Business, University of
Wyoming
Greg Dyekman, Senior Partner, Dray, Dyekman, Reed
& Healey P.C.
Gale Geringer, Consultant, Gale Geringer LLC
Hon. Jim Geringer, Director, ESRI and former
Wyoming governor
Rob Jennings, President, RWJ Consulting, LLC

**Erin Johnson,** Owner, Erin Johnson Consulting **Jonathan Johnson,** President, Medici Ventures Toni Marie Kopack, Manager, DAPCPA Pope & Jackson, Inc.

**Kristin Lee** 

**Caitlin Long,** Chairman & President, Symbiont, past UW Foundation Board

Richard McGinity, DBA, President Emeritus/Professor of Management, University of Wyoming David R. Miller, Business Development Executive, EY Cameron Nazminia, Former Policy Advisor to Wyoming Governor Matt Mead

Marian Orr, Mayor, City of Cheyenne

**Michael Pishko,** Dean, College of Engineering and Applied Science, University of Wyoming

**Jeff Pope,** Attorney at Law, Holland and Hart **David A. Pope,** CPA CGMA, CEO and Founder, DAPCPA Pope & Jackson, Inc.

**Craig Russow,** Major Gift Officer, University of Wyoming Foundation

**Rich Slater,** Attorney at Law, Richard Slater Law Practice

Mark Smith, CEO and Co-Founder, Symbiont Isaac Sutphin, Partner, Holland and Hart

## alumnin action

#### Drilling Expert Encourages Students to Explore Field

In 1984, Joe Leimkuhler was working as a "mud engineer" on a rig drilling in the Snowy Range Mountains near Laramie when his life took an unexpected turn.

Jack Evers, the former head of petroleum engineering at the University of Wyoming, brought students to the up to the rig site for a tour. Leimkuhler gave the students an overview of the layout and operation of the drilling fluid, or "mud system." After the tour concluded, Evers was impressed, and asked Leimkuhler if he had a degree. Leimkuhler replied, "Yes, in forestry and geology."

Evers continued: "That'll do. You're actually an engineer, and I would like to talk to you about graduate school at UW. Can you make it into town to the fourth floor of the Engineering Building tomorrow afternoon?"

Originally from Haddonfield, N.J., Leimkuhler earned his undergraduate degrees from the University of Montana. After graduating, he worked on rigs around Wyoming. When Evers asked him to be a petroleum engineering graduate student at UW, he had no prerequisites, which meant taking undergraduate engineering and math classes through the mail. As the rig moved throughout the state, he'd receive parcels addressed to him in each town. He would then complete the work and send it back to UW. He did that for 18 months, then attended UW for two more years, finishing up in 1987 with a master's degree.



"When you left this place, you knew how to run a rig," he says of UW's curriculum strength at the time.

"I had internships with students from bigger schools like Stanford, USC and Texas, and they all asked me how I knew how about the more practical side of drilling engineering. Well, it was obvious they did not have Jack Evers teach them drilling."

He left the high plains of Laramie in 1987 after Shell Oil Co. hired him, so he and his wife, Stephanie, packed up their kids, drove to New Orleans to work the Deepwater Gulf of Mexico. They've been there ever since.

Leimkuhler worked for Shell for 25 years in various roles related to offshore drilling, ending up as the offshore well delivery manager for North and South America. In 2012, he was approached by LLOG Exploration, a small private oil company in Covington, La. The company needed help growing its drilling department and further expansion into deepwater operations. For the last six years, he has been LLOG's vice president of drilling as it grew into the nation's largest private oil company and fourth-largest offshore producer.

Despite the up-and-down nature of the industry, Leimkuhler urges

prospective students to study petroleum engineering. As a member of the department's advisory board, he believes the department's emphasis needs to be on undergraduate education and research, in order to prepare students for immediate contributions. He offered a one-hour presentation to engineering students on deepwater offshore drilling in November.

"We've got faculty who are energizing the students," Leimkuhler says. "We're on our way. We just need to stay on the path. The industry is at a fascinating point right now. The world is consuming hydrocarbons at its greatest rate ever, and the U.S. is the largest producer in the world. I'd call that a turnaround, compared to what it was a few years ago."

Leimkuhler believes in the value of internships for gaining real-world experience, which also benefits employers who can add recent graduates with little to no learning curve. He says students need to be open to all opportunities and be aggressive about pursuing them. The opportunities are there, even if they are a bit more of a challenge to find coming out of a downturn.

"That's what students who come into this need to realize about oil and gas," Leimkuhler says. "One month, there might be nothing going on. The next month, you might have trouble picking between job offers because they're so numerous.

"It's not online dating—employers won't just find you. It's incredibly dynamic, and there are tremendous opportunities, but you have to go look for it."

#### Architectural Engineering Alumna Honored for Service

Kendra Heimbuck, a graduate of the University of Wyoming's College of Engineering and Applied Science, received a community service award for her efforts in a Wyoming town.

Heimbuck, who earned bachelor's and master's degrees in architectural engineering from UW in 2011, was awarded the "Rising Star" distinction at the Jackson Hole Chamber of Commerce's 53rd annual awards celebration Oct. 19. Heimbuck is the executive director of Habitat for Humanity in Jackson, Wyo.

The annual event recognizes community members and businesses who made an impact in the town. The "Rising Star" award honors the individual under the age of 40 who is "blazing the streets of Jackson with their innovation and service—both professionally and personally."

In her award letter, a chamber

#### CEAS Graduate Reaches New Heights in Career

#### By Micaela Myers

Where in the world is Logan Christensen? Today, he could be in any number of major U.S. cities, walking across the roofs of skyscrapers or dangling down the sides. As a project manager for CBRE in the downtown Denver office, Christensen works on the building envelope team.

A 2011 architectural engineering graduate of the University of Wyoming, he is a licensed professional engineer and a registered roof observer who is also rope trained to conduct rope drops or swing stage assessments on the sides of buildings. Christensen's job is to assess buildings for clients interested in buying or leasing them.

"There's always something different," the Cheyenne native says of his job. "I love to travel. It's fascinating, because the buildings are so different depending review committee member wrote, "Kendra is the strongest, level-headed, positive leader I have ever met. She leads by example and continues to be an inspiration to her entire staff. She is wise and composed beyond her years. Habitat for Humanity went through a period of change and staff turnover all while starting the biggest project Habitat has ever taken on. Kendra is an incredible asset to the community."

Heimbuck is originally from Green River, Wyo.

"Studying engineering at UW provided many opportunities that serve me well in my professional career today," she says.

"The rigor of UW's engineering programs helped me to develop a strong work ethic and develop strengths in problem solving, process management and collaborative work. The faculty, and particularly my



instructors and adviser during my master's degree, were tremendously supportive of my education, my future beyond UW and my introspective and self-guided working style.

"I graduated from the College of Engineering with two reputable degrees, which continue to open doors for me professionally, and the confidence and intellect to pursue my vocational dreams and to continue to grow in my field of work."



on the geographic location and age of construction. This job allows me to see the country from coast to coast, which is a pretty great bonus."

He also appreciates his talented team of co-workers: "They make work fun every day."

During his time at UW, Christensen was a member of Pi Kappa Alpha and enjoyed the university's smaller class sizes and personal attention, as well as the quality of professors.

"Our teachers are proud of what they do," he says. "They want to further the body of knowledge for students.

"It's nice to have a college that I feel

prepared me with knowledge and a work ethic for my career. I recommend UW to everybody. When I travel, I'm like a walking Wyoming billboard. I have a Wyoming suitcase and wear a Wyoming polo or ball cap."

Christensen wants other engineering students to know there are many career opportunities in a variety of fields.

"I'm not in a traditional engineering profession," he says. "You don't have to stay in a box. There are opportunities to expand your knowledge and find things you like. Be flexible within your career, and don't be afraid to try something new." alumnin. memoriam

Since our last issue, we regret to announce the passing of the following alumni. Our greatest sympathy is extended to the families of these valued friends.

William Banish BSME '54 – Centennial, Colo.

**Floyd Bishop** BSCE '42 – Cheyenne, Wyo.

**John Boysen** BSCH '76, MS '78 – Laramie, Wyo.

**Milton Coulter** BSCE '64 – Bisbee, Ariz.

**James Forbis** BSME '69 – Boulder, Colo.

**Frank Graves** BS '74 – Loveland, Colo.

**Steven Greenhalgh** BSME '61 – Cedar City, Utah **Roger Hergert** BSME '69 – Colorado Springs, Colo.

Alan Jessup BSCE '61 – Sun City West, Ariz.

**Charles Lien** BS '50 – Rapid City, S.D.

**Gordon Myers** BS '61 – Roseville, Calif.

**Dirk Neverve** BSEE '86 – Douglas, Wyo.

Linne Olson BSCE '48 – Rawlins, Wyo.

**Raymond Pavlovich** BSCE '59, MS '65 – Katy, Texas **Robert Sandison** BSME '63 – Casper, Wyo.

**Glen Shelton** BSME '60 – Fishers, Ind.

**Erwin Stetson** BSCE '83 – Jackson, Wyo.

Archibald Tehan BSPE '53 – Longview, Texas

**Richard Waggener** BS '52 – Laramie, Wyo.

**Scott Woodcox** BSPE '85 – Herriman, Utah



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- **ONLINE:** www.uwyo.edu/giveonline
- CALL: (307) 766-6300 or (888) 831-7795
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INSTITUTE OF INNOVATION AND ENTREPRENEURSHIP



There now is a valuable resource available on the University of Wyoming campus for students interested in creating a business with their engineering or computer science background.

UW took a step forward in its quest to become a more engaged, systematic driver of statewide economic growth and diversification with the creation of the Institute of Innovation and Entrepreneurship (IIE). It will serve as the front door for economic development and diversification support at UW, aligned with the economic interests of Wyoming to drive new venture creation and growth. The new center was established thanks in part to the efforts of College of Engineering and Applied Science Dean Michael Pishko.

Jack Mason, who most recently was director of entrepreneurial studies at the Palumbo Donahue School of Business Administration at Duquesne University, will serve as the chief operating officer for the IIE. Joining him in the IIE will be Patrick Kreiser (Rile Chair of Entrepreneurship) and Matthew Fox from the College of Business, along with Peter Scott, the CEAS entrepreneur-in-residence.

The mission of the IIE is to integrate the diverse economic development support functions of UW and serve as the champion, principal point of contact, and support resource across the state for those engaged in entrepreneurship activities. It connects resources at UW to enable and promote engagement with key private, state and federal organizations.

The IIE draws on the strengths of UW and includes the following new and emerging elements.

• Center for Business and Economic Analysis: Driven by the Department of Economics, this center will provide professional economic insight, undertake economic impact assessments, conduct specialized analyses, and study and disseminate population demographic and workforce conditions to support statewide economic development.

 

 Image: Additional a additional addi • **Business Creation Factory:** The Business Creation Factory will assess innovations and their potential, systematically provide support and mentoring to entrepreneurs, provide experiential learning for students, and move new ventures through a staged process to make them ready for earlystage private investment.

• Center for Design Thinking: A partnership between the Department of Visual and Literary Arts and the College of Engineering and Applied Science, the Center for Design Thinking is located in the new Engineering Education and Research Building. It provides a place for students, staff, faculty and stakeholders from across the state to apply design thinking principles to innovative and entrepreneurial projects and to explore creative outcomes that benefit and are attractive to consumers.

• Student Innovation Center: The new Engineering Education and Research Building will house a Student Innovation Center featuring a makerspace, student project space and an advanced machine shop with master machinists. The new facility complements existing campus makerspaces.

• Health Bioscience Innovation Hub: Led by the School of Pharmacy, this hub will help develop nextgeneration health and wellness solutions. It will serve as the point of coordination for resources necessary to develop intellectual property from idea to fundamental research to commercial launch.

• **Proposed elements:** A proposed Center for Disruptive Technologies would bring technical expertise from the university together with business innovation abilities and high-tech industry commercialization partners to conduct predictive gap analysis/opportunity assessment for applying disruptive technologies to exploit opportunities to drive economic growth and diversification. Another proposed element, the Incentive Fund for Entrepreneurship, would be available for strategic use to advance the purpose of IIE. Allied Elements would help UW work with private-sector partners and investors, including the UW Foundation, to assess the need for seed and early-stage equity capital.

In conjunction with the launch of the IIE, an assortment of diverse and exciting curricular options are being created for all UW students. These options include a cross-campus entrepreneurship minor open to all UW students, as well as potential undergraduate and graduate entrepreneurship degree programs. These programs focus on both in-class and out-of-class activities to provide a variety of meaningful experiences for UW students. A culture of entrepreneurship will be promoted across campus and students will engage in experiential learning though integrated coursework, competitions, class projects, internships, and more, leveraging opportunities with startup companies, existing businesses, corporate partners, and campus and state entities.

#### JANUARY

Jan. 1: New Year's Day

Jan. 4-5: Cowboy Wrestling hosts Cowboy Shootout Duals

Jan. 5: Cowgirl Basketball hosts UNLV Jan. 12: Cowboy Basketball hosts Utah State Jan. 21: Martin Luther King, Jr. Day Jan. 28: First day of spring semester

#### **FEBRUARY**

Feb. 6: Cowgirl Basketball hosts Air Force
Feb. 9: Cowboy Basketball hosts Colorado State
Feb. 18: President's Day
Feb. 20-23: Cowgirl Swimming and Diving

at Mountain West Championships Feb. 27-March 2:

Cowboy Swimming and Diving at Western Athletic Conference Championships

#### MARCH

March 9-10: Cowboy Wrestling at Big 12 Championships

March 11-13: Cowgirl Basketball at Mountain West Championships

**March 13-16:** Cowboy Basketball at Mountain West Championships

March 18-22: Spring Break

### **UW CALENDAR** OF EVENTS

#### **APRIL**

April 1-5: Advising week

**April 15-17:** Cowgirl Golf at Mountain West Championships

**April 26-28:** Cowboy Golf at Mountain West Championships

#### MAY

May 10: Last day of spring semester classes May 18: Spring commencement May 27: Memorial Day



For the latest events and information, visit **uwyo.edu/calendar** 

UW Cowboys and Cowgirls: **gowyo.com** 

Fine arts: uwyo.edu/finearts

Concrete from a truck is poured into wall forms for the Engineering Education and

### UW LAUNCHES CONSTRUCTION MANAGEMENT DEGREE PROGRAM

The University of Wyoming's College of Engineering and Applied Science (CEAS) will offer a new degree program to meet the demands of industry in the state and region.

The UW Board of Trustee voted in November 2018 to approve the new bachelor's degree in construction management, which will be coordinated by Department of Civil and Architectural Engineering Professor of Practice Matt Newman.

"This degree program will produce students with the critical skills needed to become our next generation of leaders in the construction industry," Newman says. "These project management skills, however, are not isolated to construction. We will be working in parallel with many of our existing programs, better preparing Wyoming students to excel in their respective fields."

The newly established program will help meet the needs of Wyoming and the region by producing qualified construction managers, currently in high demand thanks to a booming construction industry. Construction managers work in concert with architects and engineers by taking on critical project management roles required to successfully complete increasingly complex construction projects. Graduates of the program will be knowledgeable in management of both the vertical construction of buildings and structures, as well as horizontal construction, which includes the fields of highway construction, civil infrastructure and mining.

Employment data for construction management positions indicate a regional growth rate of 169 percent from 2013-18 and a national growth rate of 11 percent from 2016-26, which equates to about 45,000 new jobs. The national average salary for a construction manager is \$91,370.



UW will offer a bachelor's degree track in construction management for students who successfully complete 120 credit hours. While the CEAS will administer the program, it's not an engineering degree. It includes business and communication courses as part of the curriculum.

The core competencies will be project management, including scheduling and budgeting, along with computing, which involves building information modeling, virtual design and construction.

Thanks in part to UW's close connections with industry, the program has been developed over the last three years. Newman expects 150-200 students to be enrolled in the program at full rollout, which will necessitate the development of 14 new courses, five additional faculty positions and one administrative assistant position.

In 2018, freshmen can declare as construction management majors, and the search for one new faculty member will begin. In fall 2019, sophomore-level classes will be offered. In 2020-21, students will progress to juniors and in May 2022, the inaugural graduating class for the major will be celebrated.



in 2017. (Anthony Denzer photo)





College of Engineering and Applied Science Dept. 3295 1000 E. University Avenue Laramie, WY 82071-2000



I am very impressed with the faculty's willingness to allocate time towards helping students. Unlike many large universities, the faculty is truly dedicated to providing a quality education for the students.

JEFFREY Electrical Engineering '18

#### VISIT UWYO.EDU/CEAS FOR MORE INFORMATION