FORESIGHT

UW COLLEGE OF ENGINEERING AND APPLIED SCIENCE Spring 2016, Volume 41, No. 2

NOT DONE LEARNING

MAKING THE MOST IMPACT • SEEKING ANSWERS ABROAD



You don't get the quality of instructors and the education with that personal interaction anywhere else but UW. You get the same quality of education, but a lot more of the personal experience. Shane Wilson, Civil Engineering '16





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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. **90%** of our graduates have jobs or enroll in graduate programs within six months of receiving their degrees.

GO FOR GOLD

89% of our graduates earn starting salaries greater than **\$50,000** annually.



On the cover: College of Engineering and Applied Science Professor of Practice Bill Bellamy has a unique perspective when it comes to instruction, using real-world knowledge.

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Persons seeking admission to the University of Wyoming shall be considered without regard to race, color, religion, sex, national origin, disability, age, veteran status, sexual orientation, or political belief.

CEAS Students, Faculty Show Selflessness

It's easy to talk about making a difference or making changes on a global level. But the students and staff of the College of Engineering and Applied Science do more than talk about it.

In the following pages, you'll learn more about one student's quest to bring economic diversity to an island nation. One professor knew he had more to give after retiring from industry, so now he teaches. Other instructors serve communities in the state through sustainable building practices and safe roadway construction.

To me, these stories are examples of the character of this college. These people prove you don't have to be rich to make a difference in the lives of the people around you. Whether they donate money, time or knowledge, the CEAS staff, faculty and students make lives better throughout Wyoming with their breakthroughs.

And that's the crux of giving back. The representatives of our college get so much out of their service. They develop and grow as people, gain new perspective, make social connections, use their education to make a real impact and serve as leaders.

As a land-grant institution, UW provides a foundation to this practical approach to helping people. It offers a full spectrum of educational opportunities and endeavors to make the world a better place.

So take an example from the fine folks in this issue, and explore ways to change the world around you in a positive way.

Sincerely,

Andy Chapman Editor, Foresight Magazine



Stay tuned for the May issue of UWyo Magazine with a special section devoted to international endeavors at UW!

Subscribe today! uwyo.edu/uwyo

Message from Dean Michael Pishko



It's been a year since I took the post as Dean of the College of Engineering and Applied Science, and I'm pleased to report that great progress has been made in several areas of importance to the state of Wyoming.

First, we've made strides in the Tier-1 Engineering Initiative and the goals of improving the undergraduate experience, improving K-14 STEM programs and collaborations with public schools and community colleges. We're doing research in support of our land-grant mission, which means research benefitting Wyoming in areas like oil and gas, coal conversion, wind and water. We're working closely with industry stakeholders in the state so we can ensure we meet their needs and drive economic development.

Things are moving quickly in the process of designing and planning for the new Engineering Education and Research Building. That building has new spaces to promote student innovation and entrepreneurship, and collaborative research that benefits the state. At a cost of more than \$100 million, it will be the largest construction project in the university's history. Groundbreaking is expected in late 2016 and construction should be completed in summer 2019.

I look forward to improving in these areas much more in 2016, and can't wait to see what the future holds for our college and all the talented people who make it possible.

If you'd like to be a part of advancing the CEAS in its mission, contact Craig Russow (crussow@uwyo.edu) of the UW Foundation to see how you can contribute financially.



NEWS & NOTES

UW Seeks To Become Cyber Security Hub

To battle one of the most prevalent issues facing the nation today, Wyoming Gov. Matt Mead requested state funding in January 2016 to develop a program at the University of Wyoming to become a center of excellence in cyber defense.

Corporations like Home Depot, Ebay, Sony, Target and even the U.S. government have been compromised through data breaches, due to hackers. Without trained individuals who continually learn and hone dynamic methods, Wyoming's infrastructure, agencies, businesses and citizens are at risk.

According to the Wyoming Cybersecurity Education Initiative, proposed curriculum in the College of Engineering and Applied Science's Department of Computer Science would educate graduates to defend against such attacks and "provide meaningful and sustainable impact to Wyoming's technology sector through cybersecurity and information assurance highereducation programs."

Gov. Mead drafted a letter to the state Legislature in January 2016 in support of an initiative through the Wyoming Department of Enterprise Technology Services (ETS) for UW to obtain certification as a National Center of Academic Excellence (CAE) in information assurance and cyber defense. The certification is administered by the Department of Homeland Security and the National Security Agency. Richard Imbrogno of the ETS outlined the program in a business case proposal.

"Today's cyber threat environment is dangerous and continuously changing," Imbrogno writes. "Without formally trained and appropriately credentialed individuals who continually learn and hone new anti-attack and dynamic methodologies; Wyoming's infrastructure, agencies, businesses and citizens are at risk and are at a major disadvantage."

Department of Computer Science head Jim Caldwell met with the head of the program at the NSA at the Global Tech Summit in Jackson, Wyo., in September. The program will need two faculty members with expertise in cyber-security to get the certification, with a research certification to be established down the road.

The business plan includes a twoyear budget which will be included in the Governor's Office budget. Some of the funds are to support a new faculty member at Laramie County Community College and a person who will help coordinate statewide efforts to market the program to students, and to transfer the LCCC program to other community colleges.



Society of Women Engineers Provides Support, Resources

Typically, when Ann Gibbons walks into one of her engineering courses at the University of Wyoming, she's one of only a few females in the class.

Females account for 18 percent of enrollment in the College of Engineering and Applied Science. That places UW among the national averages, with statistics putting female enrollment at undergraduate and graduate levels between 18 and 24 percent in colleges across the country.

That's where the UW chapter of Society of Women Engineers (SWE) can have an effect. According to the organization, the purpose of SWE is to encourage women to achieve full potential in careers as engineers and leaders, expand the image of the engineering profession as a positive force in improving the quality of life and demonstrate the value of diversity. And statistics do show an increase in females in engineering, improving from 15 percent female enrollment in the CEAS in 2010-11.

"When you walk into a class and there are a few females, it's nice to know that there is a network for them in the college," says Gibbons, the UW chapter president of SWE. "It's about support and helping, and doing the best we can to get them into the workforce."

Katie Hopfensperger has spent three years as a member, and now serves as the vice president of SWE at UW.

"It's all about empowering women in the field because we're



underrepresented," she says. "There's a support system for us in industry to give us confidence."

The organization is a valuable resource for engineering females at UW who might feel out of place. The SWE chapter in Laramie hosts resume and interviewing workshops, industry panels and other outreach events. Attendance and membership have varied over the last few years, but Gibbons points to the first meeting of the 2015-16 academic year, when 60 people attended. "It's been a struggle and we've had

"It's been a struggle and we've had some ups and downs," Gibbons says. "This is the year we're trying to gain a foothold, so we're trying really hard to get the members to come together so we can build up."

Both Gibbons and Hopfensperger became SWE members at the urging of older students who were involved. It's that kind of engagement that will ensure the organization remain effective at UW. SWE members were involved in Engineers Week Girls Day in February, along with outreach events like working with Big Brothers, Big Sisters in Laramie.

"Hopefully the connections make members realize they'll have a network that can help them throughout their college career," Gibbons says.

NEWS & NOTES

STEM Discussion Kicks Off MLK Days of Dialogue

The kick-off event for Martin Luther King Jr. Days of Dialogue (MLKDOD) was deemed a success, after nearly 80 people joined the discussion Feb. 1 about challenges faced by underrepresented groups in the fields of science, technology, engineering and mathematics at the University of Wyoming.

Hosted in the Wyoming Union, the event, "A Troublesome Hypothesis: The Myth of Diversity in STEM," was part of UW's 15th annual MLKDOD. Dean Michael Pishko, from the College of Engineering and Applied Science, provided opening remarks, followed by breakout discussion sessions

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OF WYOMING

among students, staff and faculty centered on "untold stories of unheard voices," the theme of this year's MLKDOD.

"I'm pleased this event is occurring and that our college is involved," Pishko says. "We're looking forward to this conversation and ongoing conversations to help us out in our efforts. Achieving diversity is a must. There's no way the United States can remain competitive and continue its preeminence in science and technology without diversity. We have to engage our entire population. Diversity is something that greatly improves the workplace, improves creativity and changes the dynamics on how people interact."

Christina Mendoza, a master's student in statistics, was one of many who shared their stories within the breakout discussion sessions.

"I enjoyed it because I believe it brought the issue of diversity to light for the people who attended," she says. "Being someone who is not white and being a first-generation college student, it is hard and you feel like you're on your own. If you don't feel like you belong somewhere, how are you supposed to stay there, learn and grow?"

The shared stories, documented by event facilitators, will be used to help develop an action plan and clear set of objectives to effect change at an institutional level. Through this annual week of programming, UW celebrates the continuing impact of Dr. Martin Luther King Jr.'s life and ideals. The MLKDOD tradition is intended to expand institutional awareness about issues of diversity, to build a sense of community and to celebrate diversity.

Student CEAS Group **Recognized For** Excellence

It was a banner year for the Wyoming student chapter of the American Society of Civil Engineers in 2015.

Working under the tutelage of faculty adviser Ryan Kobbe, the ASCE Student Chapter within the University of Wyoming's College of Engineering and Applied Science took home multiple awards. The group received the following awards in 2015 from the national office:

- Letter of Recognition for Community Service (for exemplary community service),
- Certificate of Commendation (outstanding chapter of ASCE, given to just 5 percent of all

The University of Wyoming Center

for Global Studies awarded the 2016

David and Jade Walsh Graduate

Fellowship, and Nielson Awards

to students from the College of

Graduate Fellowship in Global

of Civil and Architectural Engineering. The 2016 Nielson

Engineering and Applied Science.

The 2016 David and Jade Walsh

Studies recipient is Guy Litt, from Lancaster, Ohio. Litt is a hydrology

Ph.D. candidate in the Department

and Hydrochemical Runoff

UW MLK Days of Dialogue logo



Engineering Students Receive Global Studies Fellowship and Scholarship

Nearly 80 people joined in to discuss diversity issues in STEM fields Feb. 1 at UW



student chapters), • Student Leadership Award (in recognition of graduating senior Iake Sumearll's achievement and service to ASCE). • Outstanding Faculty Adviser Award (given to Kobbe for outstanding work and dedication to the UW student chapter). UW's student chapter of ASCE has

Graduate Excellence Fellowship recipient is Emily Beagle of Sheridan, Wyo. Beagle is a mechanical engineering Ph.D. candidate. Litt will receive a \$10,000 fellowship to support his dissertation project focused on internationally oriented topics related to energy security and international security, international environment, natural resources or natural development. Litt's project, titled "Hydrometric Characterization and Modeling Across Multiple Land Covers in Panama," evaluates how Panama Canal operations, which depend entirely on secure freshwater supplies to its reservoirs, are sensitive to land

established a tradition of excellence, adding this year's Certificate of Commendation to the awards it received in 2012 and 2014.

"These awards are primarily a testament to the hard work and dedication of the student leaders, and I like to see them recognized," said Kobbe, who serves as an associate academic professional lecturer.

management decisions.

Beagle's Nielson Award from The Center for Global Studies-School of Energy Resources will support a \$10,000 graduate fellowship for coursework, research and career goals focused on developing human resources and the know-how required to solve critical energy and natural resource challenges faced by society. Beagle's Ph.D. dissertation project, titled "A Comparative Analysis between the EU and the United States of the Feasibility of Co-Firing Woody Biomass in Existing Coal Fired Power Plants from a Technical, Economic and Policy Perspective," examines various ways to use biomass for energy applications.

students in action

UW Contingent Selected For Prestigious Engineering Competition



By Andy Chapman

The hard work of a group of engineering students was rewarded recently, as it was announced that a University of Wyoming team was selected to participate in a national rover design and demonstration competition. For the first time in the event's history, a UW team was invited to participate in the 2016 RASC-AL Exploration Robo-Ops Competition, sponsored by NASA and the National Institute of Aerospace. The 2016 event will be hosted May 24-26 at NASA's Johnson Space Center in Houston, Texas.

The team consists of UW engineering students including Robert Ressler, Burlington, Vt.; James Lamb, Mountain View, Wyo.; Cale McCormick, Lewellen, Neb.; Brian Moore, Littleton, Colo.; Matthew Love, Laramie, Wyo.; Kent Scarince, Lander, Wyo.; Richard Yang, Laramie, Wyo.; Sean O'Leary,

St. Charles, Mo.; Reda Al Momen, Dammam, Saudi Arabia; Arron Harms, Evergreen, Colo.; Ross Petrutiu, Boise, Idaho: Gowthaman Prabhu, Tamil Nadu, India; Mohammed Busaleh, Al-Hasa, Saudi Arabia; and Nasser Alawami, AlQatif City, Saudi Arabia.

Faculty involved in the project include Ruben Gamboa, professor of computer science and project faculty adviser; Kevin Kilty, associate lecturer of mechanical engineering; and David Whitman, professor of electrical and computer engineering.

Team organizers also pointed to the work of the team that embarked on the project in 2014, which includes Carter Schultz, Joshua Bailey, Thomas Bilodeau and Kyle Cox, all of whom studied mechanical engineering.

"The seniors involved in this project last year did quite a good job on chassis selection and proposal generation," Kilty

says. "They deserve some credit for this as well."

The UW rover beat out two incumbent teams with an innovative chassis and suspension design that mimics the mechanics of movement of a saltwater shrimp. The sevenwheeled rover will be the first submission with an odd number of wheels in event history. Event judges took notice of the unique nature of the rover's power architecture.

In an event billed as "obstacle course meets scavenger hunt," students are tasked to form a multi-disciplinary squad to build a planetary rover prototype that can perform competitive tasks in field tests. Qualifying teams receive a \$10,000 award to facilitate full participation, including expenses for rover development, materials, testing equipment, hardware and software.

International Student Finds A Comfort Zone At UW



By Andy Chapman Kaidi Sun feels right at home in Laramie, Wyo.

She's grown comfortable with the small-town atmosphere, the mountain setting and the easy pace of the town. It's hard to believe that just a few years ago, she was studying and living in one of the world's most populated cities.

Sun currently is in her second year of a Ph.D. program in chemical engineering at the University of Wyoming. She finished her bachelor's and master's degree in chemical engineering at China University of Mining and Technology in Beijing.

Current population estimates put Beijing's population at around 20 million people. But something about UW intrigued her, and after contacting Maohong Fan, a professor of chemical and petroleum engineering, she arrived in Laramie in

August 2014.

she says.

Now in a town of roughly 31,000, she has found a place to excel. Under Fan's direction, Sun studies the plausibility of using natural gas as an alternative to petroleum.

fuel and is widely distributed around the world. According to industry projections, current reserves of natural gas are significantly more expansive than those of petroleum. Natural gas seems to be the most promising alternative to replace oil and produce both liquid fuels and other

Pedal To Power Thanks To CEAS Student Design Team



By Andy Chapman

If everything goes to plan, folks soon may be able to get some exercise and charge up electronics at the same time.

The University of Wyoming College of Engineering and Applied Science student team of Alex Howell (Morrill, Neb.), Daylon Roitsch (Colorado Springs, Colo.) and Taylor Wollert (Lingle, Wyo.) have designed a device that converts the mechanical energy from a stationary

According to the group's project proposal, "The purpose of this bicycle powered charging system is to power a single, removable 12-volt storage battery pack with capabilities to distribute charge to various devices at once." The system will consist of a bicycle provided by the user, a specified trainer designed in order to reduce frictional resistance to the power output, a chain system to connect the bicycle to the charging system, a generator, a storage system and a computer display to inform the user of the status of their workout and the

storage system.

the devices.

"I'm very curious about new things. I thought to look outside and see what was going on in another part of the world,"

Natural gas is a very abundant fossil

value-added chemicals.

Methane molecules are very stable, so catalysts are necessary to produce reactions and create energy. They need to be readily available and inexpensive for use in industry.

"UW is a good place to come and study, and Dr. Fan's group is very good," she says. "Each professor is very helpful and likely to answer my questions. That's why I chose the University of Wyoming for graduate school."

So far, she and the other members of Fan's group have made breakthroughs, but many challenges remain. Fan credits hard work as a reason the group will be successful.

"They have made significant progress in their research projects, and I am proud of Kaidi and all the other members of this research group," Fan says. "Without their keen and highly appreciated intellect, what we have achieved to date in this group would not have been possible."

bicycle to electrical energy used to power everyday electronic devices.

The group found several challenges during the project, including the initial idea to use a mobile bicycle to power

"Looking further into this method, it was realized that a charger attached to a moving bicycle would have to be small and lightweight to avoid hindering the rider," the design team wrote, adding this had already been addressed by a commercial charger.

After it was determined a stationary bicycle was the best option, the group found a charger could be any size necessary to produce the voltage desired without significantly increasing the pedaling load for the user.

The design team then determined the most effective way to harness the mechanical energy from the bike by the trainer. Use of the wheel was avoided as that would complicate the installation for the user and the tire would have to be removed from the wheel in order to implement the use of a belt.

faculty in action

With DOE Grant, UW to Study Retrieval of **Rare Earth Elements from Coal Ash**



By UW Institutional Communications

University of Wyoming researchers have received a \$600,000 grant from the U.S. Department of Energy (DOE) to develop a way to recover rare earth elements from the ash of Wyoming's Powder River Basin coal.

Led by Maohong Fan, a UW School of Energy Resources (SER) professor in the College of Engineering and Applied Science's Chemical and Petroleum Engineering departments, UW's project will receive funding from DOE's National Energy Technology Laboratory to support the recovery

of rare earth elements from coal and coal byproducts.

"The overall objective of the new DOE project is to create a pollutionfree and cost-effective technology for recovering high-value rare earth elements from coal and coal ash," Fan says. "We want to make coal a very valuable resource for engineering a variety of much more treasured carbon, hydrogen, metal-based and other products."

Rare earth elements are a series of chemical elements found in Earth's crust. Due to their unique chemical properties, they have become essential components of

many technologies spanning a range of applications including electronics, computer and communication systems, transportation, health care and national defense. The demand and cost of rare earth elements have grown significantly over recent years, stimulating an emphasis on economically feasible approaches for their recovery. The potential to recover rare earth elements from coal is significant for Wyoming, the nation's No. 1 coal producer.

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"UW is a leading institution in the U.S. in converting coal to highly marketable and near-zero-carbonfootprint materials due to the state's strong support and the efforts of our faculty and students," SER Director Mark Northam says.

UW's project aims to design, develop and test a three-step, benchscale extraction process that will use carbon dioxide and ferric chloride under supercritical conditions to recover rare earth elements from Powder River Basin post-combustion coal ash.

"This research is a great example of research envisioned in Wyoming's Tier-1 Engineering Initiative," says Michael Pishko, dean of the College of Engineering and Applied Science. "Our researchers are among the world's leaders in developing new technologies that will benefit Wyoming's economy and provide solutions to some of the world's biggest challenges."

Engineering Faculty Honored by Campus Student Group



By Andy Chapman

Six faculty members of the College of Engineering and Applied Science were honored Nov. 4 by a student group at the University of Wyoming.

The CEAS faculty members were honored as "Top Professors" by UW's Cap & Gown Chapter of Mortar Board. The organization is a national honor society that recognizes college seniors for excellence in the areas of scholarship, leadership and service. Mortar Board

seeks to provide opportunities for continued leadership development, promote service to colleges and universities, and encourage lifelong contributions to the global community. All members of the senior honor society selected professors who made a positive impact on their lives at UW. These professors go beyond normal classroom expectations to help their students succeed, both in college and later in their careers.

UW Professor Listed Among Most Highly Cited Researchers



By UW Institutional

Xiaohong Liu has made a name for

Liu, a UW professor in the

himself among the world's most highly

Department of Atmospheric Science

and the Wyoming Excellence Chair

in Climate Science, was listed in the

prestigious 2015 Thomas Reuters'

Communications

cited researchers.

Highly Cited Researchers for the second-straight year. Highly Cited Researchers represents some of the world's most influential scientific minds from 21 scientific fields. Approximately 3,000 researchers earned this distinction by writing the greatest number of reports officially designated by Essential Science Indicators as "Highly Cited Papers"—ranking among the top 1 percent most cited for their subject field and year of publication (2003-2013). Only articles and reviews in science and social sciences journals indexed in the Web of Science were considered. "Being included in the Thomas Reuters 2015 list of Highly Cited Researchers is not only an honor for myself, but for my group and my co-workers, and it demonstrates the significant impact of our work in the scientific community," Liu says. Liu has received numerous awards and honors, including Pacific Northwest National Laboratory's

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The award recipients from the college included: **Tony Denzer**, department head and associate professor of civil and architectural engineering (honored by Paul Drake); Jerry Hamann, professor of electrical and computer engineering (honored by Matthew Gern and Karolyn Hopfensperger); Eva Ferre-Pikal, associate professor of electrical and computer engineering (honored by Ann Gibbons); Saman Aryana, assistant professor of chemical and petroleum engineering (honored by James Segrave); **Cam Wright**, professor of electrical and computer engineering (honored by Rebecca Steinkraus); and Jeff Clune, assistant professor of computer science (honored by Richard Yang).

Exceptional Contribution Program Award and Outstanding Performance Award; the World Meteorological Society's Young Scientist Award and its Mariolopoulos-Kanaginis Award (honorable mention) for papers in atmospheric environmental research; the Alexander von Humboldt Research Fellow at Fraunhofer Institute for Atmospheric Environmental Research, Garmisch-Partenkirchen, Germany; and was elected into the "100 Talent Program" of the Chinese Academy of Sciences.

Liu also leads a research project where he uses the National Center for Atmospheric Research (NCAR)-Wyoming Supercomputing Center (NWSC) in Cheyenne, Wyo. His project goal is to better understand the role of black carbon emitted by wildfires and mineral dust lofted into the atmosphere from arid regions on decadal climate variation. This will ultimately lead to better climate prediction capabilities.

Chris Rumple, a graduate student in mechanical engineering, will work on a project to establish hydroelectric dams in rural Indonesian villages.

Seeting ANSWERS ABROAD

like many young people, Chris Rumple wants to change the world for the better. And he's willing to travel across it to ensure he'll leave a legacy of innovation and creativity.

A Ph.D. candidate in the Mechanical Engineering Department at the University of Wyoming, he has decided to put his knowledge to work, even if it means delaying his college education for a while. As part of a Fulbright Program grant, Rumple arrived in Indonesia in January 2016 to help villages develop sustainable power sources. Because Indonesia's government hopes to develop new sources of energy

production, Rumple will travel to rural settings in Java and Sulawesi. He will help install and improve micro-hydropower dams over small streams, which power local industry like coffee production. The objective of this project is to facilitate development by way of economic empowerment.

And all it took was learning the Bahasa Indonesia language, planning to be abroad for a full year and

traveling 9,290 miles – the distance from Laramie, Wyo., to Jakarta, the nation's capital.

Originally from Harrisburg, Pa., he graduated from Pennsylvania State University with undergraduate and master's degrees in aerospace engineering, with an emphasis in wind energy. He wanted to become a pilot as a young man, but those plans were derailed when he was diagnosed with Type-1 diabetes. He shifted his

focus, and discovered an interest in the motion of fluids in both wind and water energy. But after earning his master's degree, he wasn't sure where he wanted to do this.

"You could work for a big company on some wind-energy project and the result of that would help people, but I wouldn't see and feel it," Rumple says. "I wanted a little bit more than that. I looked into industry, but I didn't like the

atmosphere. I wanted to make memories, not just make money." And that's what brought him to UW. Jonathan Naughton, professor of mechanical engineering and director of the Wind Energy Research Center, invited him to visit in January 2015, and Rumple came to campus in June 2015.

"What attracted me to UW is it

is very similar to Penn State, and Jonathan Naughton had a great





reputation with the professors with whom I had worked," Rumple says. "I said, 'What can I do for you?' He flipped it around and said, 'No, what can I do for you?' He looks for students who are both self-starters and can also work within a team setting. I liked that philosophy."

That team concept was not lost on Rumple. An avid rugby player, Rumple also coaches for the UW club team. His tenacity on the pitch Rumple studies language at the Center for Southeast CSEAS ENDOL Center for Southeast Asian Studie Asian Studies Indonesia with instructor Melisa Fransiska. (Photo courtesy of Chris Rumple)

DLLA

FULBRIGHT PROGRAM

The Fulbright Program is the flagship international educational exchange program sponsored by the U.S. government and is designed to increase mutual understanding between the people of the United States and the people of other countries.

also helped him earn his Fulbright grant. He had submitted proposals to the group twice in prior years, only to be rejected. The third time, however, was the charm as he was named a Fulbright Scholar in 2015.

"The overall goal of my Fulbright is to develop relationships between UW and the Agriculture Institute of Bogor (IPB) in Indonesia," he says, adding he hopes one day to bring students from Indonesia to UW and vice versa. Additionally, he'll serve as a liaison for UW's chapter of Engineers Without Borders.

Rumple will mentor a team of students from IPB on methods of design, project management and team dynamics. He'll work with them to help communicate with the village. The entire process takes about six months, during which the team will introduce the concept to the villagers and build the dam. Turbine designs in these contexts can be inefficient, so Rumple will be on hand to innovate prior designs that can be produced in an economically efficient manner while publishing these innovations.

"We live in a global world," Naughton says. "When the Paris climate summit talks about Indonesian islands being threatened by rising waters, it can seem pretty remote to someone living in Wyoming. By spending time in Indonesia, Chris will develop a knowledge of that part of the world that is hard to come by unless you live there.

"While there, Chris will work on the development of renewable energy projects. Although the challenges can be quite different in different parts of the world, the efforts to diversify energy sources are not so different than what we are trying to do here in the U.S. Chris will spend part of his time looking for areas where collaborations between groups here at UW and IBP may be beneficial to both groups."

Rumple believes successful

application of this project could serve energy systems in the U.S. in the quest for innovation.

"Getting it to work over there will help push us over here to try new ideas," Rumple says. "The strength of the Fulbright program is not in its ability to award grants. Its strength comes from your ability to reach for higher. It opens the door to young, hopeful minds who are trying to make a difference."

In Rumple's world, every day is an opportunity to make a difference. It's rare to see him without a smile on his face, walking briskly to class or to do research.

"Chris is incredibly enthusiastic about his work," Naughton says. "When he has a project to do, he runs at it with all his energy. As a result, he is very effective at getting things done."

That's evident with his research on turbulence at the UW Wind Energy Research Center. He helped produce a device called an active grid, finishing the final design in less than six months. This grid will be used



"When operational, the active grid will give us unique capability in our wind tunnel," Naughton says. "The active grid will allow us to add turbulence to the wind tunnel flow so that we can mimic systems under conditions that are similar to those found in the real world. For instance, we will look at wakes like those behind wind turbines in the presence of turbulence like that in the wind. Similarly, we can test airfoils in flows with different types of turbulence to see how they respond."

For now, the active grid will be built while Rumple is overseas. It will be waiting for him when he returns from Indonesia, and he'll no doubt be a little more experienced and worldly.

"The challenge of it is going to give a really good experience to become a world-class collaborator," he says. "I'm of the opinion that I'm not important—it's what I do that's important."



to tailor turbulence so that realistic experiments can be carried out in a

ENGINEERS Without Borders

Rumple will serve as the UW liaison for EWB, and his work in Indonesia aligns with the philosophy of the chapter's goals.

- UW is one of more than 300 student chapters of EWB-USA.
- Membership is open to all UW students, not just those in the College of Engineering and Applied Science.
- The chapter's mission is to "help disadvantaged communities improve their quality of life through implementation of environmentally and economically sustainable engineering projects, while developing internationally responsible engineering students."
- · Participating students pay dues and fees totaling about \$25 per year; other costs are covered by fundraising activities.
- Rumple has worked with UW's Zach Witters, a senior in chemical engineering and a member of the EWB chapter at UW. They are pursuing funding opportunities for Witters to go to IPB for the summer and fall to conduct research to make biodiesel from the oil from the jatropha seed.



NOT DONE LEARNING

A professor of practice shares his knowledge but also gains an education.





By Andy Chapman

Despite retiring from industry in 2014, Bill Bellamy knew he still wanted to contribute to the profession.

So instead of spending his days relaxing at home with family, fishing or golf, he decided to stay in the game. Bellamy now serves as a professor of practice in the College of Engineering and Applied Science, the first to be appointed to such a post in the college. He joined UW's faculty ranks in 2013.

Before that, he was the senior vice president at CH2M Hill, finishing his 30th year in 2014 when he retired. CH2M is an environmental and engineering consulting service, which allowed Bellamy to work on every

continent except for Antarctica. In his younger years, he served in the Army, worked at Texaco, lived in Saudi Arabia and worked for Aramco. Suffice it to say, he knows the ins and outs of municipal and industrial global environmental systems.

But the typical retiree route didn't feel quite right. He knew he had more to share with those willing to learn it. That's what brought him to UW. Bellamy's area of expertise is municipal and industrial water systems. A majority of his professional work dealt with community use of water, sustainability and systems design. He's part of a Tier-1 group with CEAS professor Jon Brant, a Center of Excellence in Produced Water Management. That group analyzes the feasibility of industrial water treatment and mineral extraction of produced water/resource recovery like iodine, uranium, lithium and the water itself.

With all that knowledge, it felt right to share with the next generation of engineers, so he tried his hand at teaching.

"For me, it keeps me active and learning new subjects," Bellamy says. "I've always believed in lifelong learning."

He jokes he's an "average" teacher, but he's able to pass on knowledge developed from theory and apply it to how things work in the real world.

"My problems are a lot more application-oriented," he says.

"Instead of teaching a course about theory, I give my students a problem, split them into teams and it's up to them to figure it out."

In classes like the first semester Introduction to Engineering, he tasks his students with finding solutions to issues like drought in California.

"They came up with solution sets, even as freshmen, to solve the problem," Bellamy says. "It gave them an idea of how to work in teams, present solutions, writing and research in a real-world environment. These are the things that are important in engineering. I'm not asking them to do anything they won't do professionally." He believes UW is on the

forefront of promoting innovation in the college's programs such as the VISTA initiative in Civil Engineering, adding Wyoming is close to, if not leading the way in the area.

"Students would spend two years in a course of study but never see 'engineering," he says. "They didn't understand how all the theories applied. These courses take what you're learning along the way and start applying it."

That sort of instruction helps complement what the academic faculty provide.

"Professors of practice like Bill help bring in industry expertise in everyday activities at the college," Dean Michael Pishko of the College of Engineering and Applied Science says. "They want to give back to the university. They give back through teaching courses that have heavy industry relevance versus just theory. They help bring in industry knowledge in what actually happens in the real world." The notion of passing on applicable, real-world knowledge has spurred Bellamy to compile

short instructional videos to replace traditional lectures, and use class time for movement and handson application. He, along with Department Head of Chemical Engineering Dennis Coon, will cover subjects like economics, problem solving and other core needs to students.

"Most people think they know about problem solving, but my guess is very few people truly understand how they make a decision," Bellamy says. "Our approach is using analytical techniques based on rational modeling."

Coming from outside academia has allowed him to teach in a different manner, which could benefit students in the long term.

"The university benefits from being able to teach in those applied areas," Bellamy says. "Having practiced it for 30 years, I've got a good feel for what goes into it."

the Most mpac

Civil and Archi Lecturer Jon Gardze efficient and able to withsta elements of Wyoming weather. Here Gardzelewski is inside a home construction in Laramie

Civil Engineering Professor Khaled Ksaibati, right, and civil engineering student Kristen Debler conducting gradation testing on aggregate from a gravel road in Teton County for a study.

housing and roadways.

They are headed up by CEAS faculty with a passion for improving lives in the state of Wyoming.



Two groups in the University of Wyoming's College of Engineering and Applied Science have made it a mission to improve two key areas:

By Micaela Myers, **UWyo Magazine Editor**

Zero-Energy Housing

Folks looking for a break on energy costs have several options at their disposal, but a smart move would be to enlist the assistance of BERG— UW's Building Energy Research Group and Jon Gardzelewski.

According to the Solar Energy Industries Association, the U.S. solar industry grew 34 percent in 2014. But Gardzelewski, an assistant lecturer in the Department of Civil and Architectural Engineering, believes solar panels often are just an afterthought in the design of efficient homes.

"We've seen so many examples of solar or net-zero houses where someone has taken a house that wasn't really designed to fit the site or the climate, and then they throw on solar panels and call it a 'green' house," says Gardzelewski, who heads up the group. "Being architects and having a really serious appreciation for aesthetics, we are out to prove that if you're considering solar panels and making your home a showcase, zero-energy house, the home should celebrate that."

Energy savings are no small factor in determining sites of buildings and overall costs.

"We'd been approached by people around the state to look at ways they could save energy in their buildings," he says. "That was a serious motivation for forming this group—we could tackle big projects, be organized and have access to more resources."

The group also wants to produce a catalog of Net-Zero Energy Homes for Wyoming.

"The goal is to create home designs that can meet just about every need that we think people in Wyoming will have," he says. "Our goal is to give the designs away, and then people can

modify them to fit their lot and meet their needs.

"We developed a few models and started presenting them to builders, real estate people, solar people—everyone in the industry to get feedback. The designs are continually being revised to really try to get a perfect set of home plans for people in Wyoming that are going to be zero-energy, that are going to be affordable and that are architecturally competitive."

Gardzelewski says Colorado homes with "green" features have added value, and this will come to fruition when homes are designed with these aspects in mind. Gardzelewski and his colleagues want to help Wyoming residents and builders with projects on a regular basis and hope to strengthen outreach going forward.

"Oftentimes through class or independent projects, we'll set up a student with someone who has approached us," he says. "They'll work with the person and give them lots of design options. We teach our students how to use computer modeling and building information modeling, so people can get a really good visualization and understanding of a design."

Soon, Wyoming could be part of the efficient home and building market.

"For people who have building needs, we are really excited to talk to them," Gardzelewski says. "We'll never compete with local professionals, but we recognize we can help with a lot of this detailed simulation work that local professionals just aren't yet doing. We're hoping to make stronger connections with the design teams in the state too."

Getting There Safely

Residents of Wyoming know the state's geography necessitates driving long distances. But nowadays, you're likely to encounter more safe and

efficient roadways, bridges and work zones, thanks to the Wyoming Technology Transfer Center, which is sponsored by the Federal Highway Administration in cooperation with UW, the Wyoming Department of Transportation (WYDOT), and Wyoming cities and counties.

The center, which has existed for more than 20 years, is housed within UW's College of Engineering and Applied Science and Khaled Ksaibati is the group's director. He believes that partnerships are key to the center's success.

"The main objective of the center is to do technology transfer for the transportation community in the state."

"The main objective of the center is to do technology transfer for the transportation community in the state," says Ksaibati, who is a professor of civil and architectural engineering. "We do lots of trainings around the state, and attendees include people from consulting agencies, contractors, WYDOT personnel, as well as road and bridge departments from cities, towns and counties. We want to make sure that our partners in the state are aware of the latest technology and that we help them through the implementation of that technology."

Gregg Fredrick, WYDOT chief engineer for engineering and planning, says research, studies and training continue to be effectively implemented in many of the local transportation agencies across the state.

"This synergy, fostered by Professor Ksaibati, has a positive effect on the safety of the local roadways," Fredrick says. "It provides local agencies access to highway technology and engineering knowledge that

assists in the maintenance of their transportation infrastructure and enhances the local agencies' expertise."

Several Wyoming counties have used the center to learn about dust control on county dirt roads, sign reflectivity compliance, speed limits, certifications and asset management for paved roads. But improving safety is one of the Wyoming Technology Transfer Center's main goals.

"WYDOT has contracted with the center to assist counties in evaluating the safety of the county roadways, to develop a strategy to correct the safety deficiencies at high-risk locations, and to assure that the project proposals meet the federal and state requirements for federal funding," Fredrick says. "Cost-effective improvements are selected and funded, and these often consist of installing curve warning signs, guardrail, pavement markings, roadside delineation and others."

One study the center has underway with the Wyoming Transportation Safety Coalition and WYDOT involves looking at trucks crashes in recent years on some of the state's main highways, including I-80, I-25, I-90, WY-59, US-30 and US-26.

"We are also looking at the citations that the Wyoming Highway Patrol issues on those highly traveled roadways," Ksaibati says. "We are trying to correlate citations to crashes. The objective would be to help the Wyoming Highway Patrol in identifying hot spots on our highway system where additional enforcement might help in reducing crashes. It's very well known that safety is impacted by the three E's: engineering, enforcement and education."

Another example of the center's work to improve safety involves speed limit standards. Several years ago, there were no standards for setting speed limits on local roads. Additionally, the center recently studied the state's paved country

roads and helped develop a management system in cooperation with Wyoming counties, the Wyoming County Commissioners Association, WYDOT and the Federal Highway Administration. "We have about 2,400 miles of county roads," Ksaibati says. "Some were built well over 40 years ago, and we never really allocated the proper resources to maintain them and upgrade them to the appropriate level. Such a management system will be extremely beneficial in establishing funding needs for local paved roads so that they can service the driving public as well as industrial or energy traffic."

🖌 🖌 The designs are continually being revised to really try to get a perfect set of home plans for people in Wyoming that are going to be zeroenergy, that are going to be affordable and that are architecturally competitive.

"

- Jon Gardzelewski, CEAS lecturer

Roads such as this are made safer and more efficient through the efforts of the Wyoming Technology Transfer Center.

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alumnin action

Log On, Give Back To Laramie Using UW Graduate's Site

By Andy Chapman

Volunteering in the local community has become easier, thanks to the work of a University of Wyoming graduate.

Brad Kovach developed www. ServiceSpark.org as a way for residents of Albany County to log on and see what efforts are being undertaken by community organizers and find opportunities to volunteer.

Kovach came to Laramie in 2011 to pursue a degree at the College of Engineering and Applied Science. He also began volunteering at the United Way of Albany County at that time. Originally from Afton, Wyo., he came to UW after receiving an associate's degree in 2010 in computer information systems at Western Wyoming Community College in Rock Springs, Wyo.

In 2014, he earned his bachelor's degree in computer science and began working for Underwriters Laboratories (UL) in Laramie as a web developer. In his off time, he also serves as the information technology lead for the United Way. He provides IT setup and support, and also heads up the United Way of Albany County's open-source projects, including Civique and ServiceSpark.

None of this great work would've been possible without his UW education.

"My degree at UW got me hired and working at UL here in Laramie



almost immediately," he says.

His latest project, ServiceSpark, was introduced in 2014 as a tool to energize community service in Albany County. The website allows community organizers to find and post volunteer opportunities, and community volunteers to track their time spent in community service.

"We built the site over the course of our senior year, and it was very well received at Undergraduate Research Day, where we presented our projects," Kovach says. "I continue to work on ServiceSpark, which has evolved tremendously. We use it to coordinate the free VITA tax program and have tracked over

900 volunteer hours in service of our community."

That sense of community is largely what drives Kovach in his work and volunteer efforts.

"Being a lifelong Wyoming resident, I have always felt a large sense of community no matter where I am in the state," he says.

"My time at UW bolstered that relationship. Wyoming is unique in that you can run into someone you know, no matter where you go. UW has magnified that phenomenon by helping me meet great minds on campus. It's a really neat surprise when I run into a UW friends when I'm all the way across the state."

Developing Software, Personal Growth Important to UW Alumnus



By Andy Chapman

Just months after beginning his postcollege career, Colter Reed found himself without much direction in his life.

Despite graduating with honors from the College of Engineering and Applied Science at the University of Wyoming in 2000, Reed had no job offers or internships lined up after graduation. As a last resort, he moved to Colorado Springs and secured a post working for MCI WorldCom. Just five months later, the company laid off about 250 developers as

group of developers. His professional journey took him back to the place he had grown up, and for two years, he worked in Rock Springs, Wyo., as a web administrator. In 2006, a friend persuaded him to take another job-as a software engineer with Apple.

"I couldn't say yes fast enough," Reed says. "We're creating products we want to use. We get excited about it. I'm always

Pioneering CEAS Graduate Makes Waves In Canadian Oilfield

in," he says.

By Andy Chapman When times are tough, Hank Swartout

finds solutions. The price of oil has ebbed and flowed over the years, but the companies that get through the rough patches find ways to make it work. Swartout, a University of Wyoming graduate in petroleum engineering in 1977, devised a plan to get the most out of his company in an economic downturn.

In the late 1980s and early 1990s, the demand for Canadian drilling was drying up. But Swartout led Precision Drilling on an acquisition charge, buying up assets when others were retreating. According to MNP's Oilfield Service News, "Under the leadership of the soon-to-become legendary Hank Swartout, Precision went on an acquisition and consolidation binge not likely every to be duplicated."

Under the direction of Swartout, Precision acquired nine drilling companies from 1987-2005, becoming the largest drilling contractor in Canada's history in the process. It also invested in several oilfield services, or OFS companies, which provided a vast and diversified portfolio and enabled it to consolidate businesses to stay financially solvent. Swartout's aggressive moves were the avenue by which Precision reduced costs and also became a bank of sorts, assuming debts of the companies it acquired and subsequently paying off lenders.

"What the OFS market needs today is another Hank Swartout," Oilfield Service News says, going on to state "that mold is surely broken" and "the Canadian oilpatch can only ever create and support one guy like Humble Hank."

it descended into bankruptcy.

"There were developers with 20 years of experience who were taking significant pay cuts just to find another position, so for someone who was nine months out of college, it was not a good position to be

After the job disappeared, he looked for ways to stay relevant in the industry. He began volunteering on an open-source project for an instant messaging app. After the founder approached him about taking it over, he was leading an international

amazed that our product gets into people's hands and they absolutely love it."

Along with his wife and two children, Reed lives in Silicon Valley in Cupertino, Calif.

"I knew all these places by name because I had seen the press releases. To drive around and see where the products I use are made, there's a bit of an 'awe' factor," he says. "But I've never felt in any way that I was disadvantaged for having come from Wyoming. It's a badge of honor. I went through school and graduated without any student debt. I have co-workers with six figures of student debt because they went to a 'prestigious' university."

Reed helped create prestige for the college. Because UW didn't offer a computer engineering degree at the time, the transcripts for his degree in electrical engineering with a computer engineering option and computer science were used as blueprints to create the new program.

"Obtaining my petroleum engineering degree from the University of Wyoming has had a great impact on my professional career,"



Swartout says. "It provided me with a solid foundation of knowledge, communication and problem-solving skills. It also helped me gain a greater world view that empowered me to stay competitive in the oil and gas industry with strategic decision making and risk taking. I gained greater confidence from my education to pursue my career and take the risks that I did, which in turn helped me become a strong leader in the industry and proud of my accomplishments."

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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.

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Connecting With Wyoming's Youth



By Andy Chapman

While appealing to young people about science, technology, engineering and mathematics is no easy task, Teddi Hofmann is always up for the challenge.

She serves as the K-14 outreach coordinator for the College of Engineering and Applied Science. The position was created in 2015, but candidates needed certain qualifications to even be considered.

"We needed someone dynamic and energetic to help us connect with students at all levels, whether we're talking about grade-, middle- or high-school students," CEAS Dean Michael Pishko says. "That means developing connections with teachers, with parents and with the students themselves. That's Teddi's role, and she does a fantastic job of bringing in those groups into the engineering fold and helping us communicate the value of pursuing an engineering degree."

Upon graduating from college in upstate New York, Hofmann, a Bay Area native, had the opportunity to work at a ranch camp in Dubois, Wyo., and from there, moved to Jackson, Wyo. She lived there for four years, teaching at the Teton Science School (TSS) and working for other nonprofit organizations before enrolling in the TSS-UW graduate program, where she completed a master's degree in science education.

"For me, engaging in community and interacting with different people is what I love and what I thrive on," she says.

Her passion for working with young people and commitment to education inspired her to apply for the CEAS position while finishing up her degree in Laramie.

"I felt it was a perfect fit, because I would be able to engage with a broad audience-kindergarten through college-aged students, as well as teachers, faculty and staff," Hofmann says. "I thought it would be a great challenge to see what programs I could support while identifying other areas of need."

Pishko stresses the K-14 outreach is "not a one-step process," pointing to elementary school activities as the foundation, continuing through high school with programs like the annual Engineering Summer Program (ESP) at UW.

"The impact of bringing in high school juniors and having them spend a week here in the summer for ESP would not be as great as if you continually engaged them from grade school through high school," he says. "It builds up a momentum for them to consider a career in engineering.

"If you look at Wyoming and the percentage of high school seniors that go into engineering, it's less than the national average. However, if you look at the Wyoming economy, it's fueled by engineering and industries like oil, gas, mining, minerals, information technology and data centers. Those rely on engineers. Our revenue comes from these industries, so it's important we create a workforce who wants to live and work in Wyoming. Our mission at the college should be to produce these students and help the pipeline. We want to see many more Wyoming students go into engineering."

That's where Hofmann hopes her efforts are paying off. The strengths of the college have allowed her to take off in her new role as K-14 outreach coordinator.

"I receive amazing support from my supervisors, Steve Barrett and Dean Pishko, as well as from Sarah Ramsey-Walters from the School of Energy Resources and the amazing WYSTEM group on campus. I've come on board with a lot of existing programs and have been immediately brought into the loop and given responsibilities," Hofmann says. "The staff and faculty here at UW trust my abilities and are very encouraging. If I have a new idea, I'm often able to run with it."

Barrett has seen her expand the reach of the CEAS.

"She brings a wealth of related education and experience to the position," he says. "She hit the ground running and has developed and coordinated a number of outreach events for the college."

The programs in place are geared toward getting students as young as kindergarten to engage in activities that will help them see their potential.

"Engineering is very hands-on, and at the very core, requires kids to use their problem-solving skills," she says. "I think kids often times just need to be provided with the opportunity to realize their potential as an engineer so that they can start saying 'Yes' to things versus 'I'm not good at that.' It's about opening that door, so if there is an interest, they can pursue it."

UW CALENDAR OF EVENTS

MARCH

March 5: MathCounts State Competition

March 5–6: Cowboy Wrestling at Big 12 Championships

March 7–11: Cowgirl Basketball at Mountain West Championships

March 9–12: Cowboy Basketball at Mountain West Championships

March 11: Midsemester

March 14–18: Spring Break

March 17–19: Cowboy Wrestling at NCAA Championships

March 28–April 1: Advising week for Fall 2016

March 31: Application deadline for Engineering Summer Program

APRIL

April 1: Last day to withdraw from individual semester classes

April 18–20: Cowgirl Golf at Mountain West Championships

April 22: Last day for all-school withdrawal

April 22–24: Cowboy Golf at Mountain West Championships

April 27–May 1: Cowgirl Tennis at Mountain West Championships



For the latest events and information, visit uwyo.edu/calendar. UW Cowboys and Cowgirls: gowyo.com Fine arts: uwyo.edu/finearts

MAY

May 6: Last day of classes

May 9-13: Finals Week

May 11–14: Wyoming Track and Field at Mountain West Championships

May 14: Spring Commencement

May 14: Residence halls close

May 23: Summer Session 2016 begins

May 26–28: Wyoming Track and Field at NCAA West Preliminary

JUNE

June 9–12: Wyoming Track and Field at NCAA Championships

June 19–25: Engineering Summer Program

JULY

July 4: Fourth of July holiday

AUGUST

Aug. 23–25: Faculty Reporting begins

Aug. 29: First day of classes

SEPTEMBER

Sept. 5: Labor Day holiday



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The level of rigor that the professors expect of you is very high, but they are always fair. The amount you know is always reflected in your grade. But you have to earn it.

> - Bryce Fiore, Architectural Engineering '16

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