FORESIGHT

UW COLLEGE OF ENGINEERING AND APPLIED SCIENCE
Spring 2017, Volume 42, No. 1

PUTTING THE WHEELS IN *in motion*

SEATS AT THE TABLE | CREATING OPPORTUNITIES

COLLEGE OF
ENGINEERING &
APPLIED SCIENCE

UNIVERSITY OF WYOMING

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"I would tell prospective students that they're looking in the right direction when considering UW. **IT'S JUST AN AMAZING UNIVERSITY**, and I'm really happy to be a part of it."

— Virginia Rivas Zambrano,
Petroleum Engineering '18

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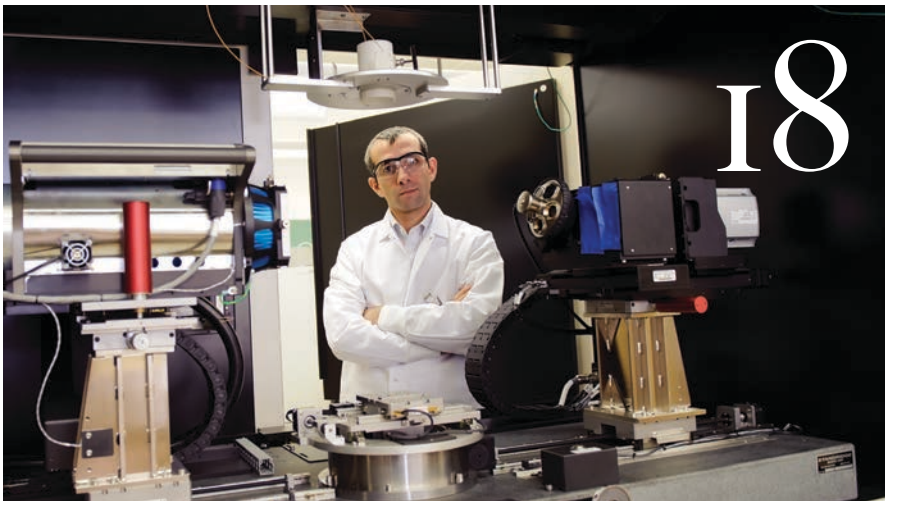

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On the cover: From R to L: Third-grade students Rowyn Taff and Cooper Sinicki test their mint mobile car as part of a classroom exercise during UW's Engineers Week activities in Laramie, Wyo. Abby Sanchez and Tessa Dodd look on.

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Where We've Been and Where We Are Going

It's an exciting time to be part of the College of Engineering and Applied Science at the University of Wyoming.

There have been some interesting recent developments, and there will be challenges in the days ahead.

But consider all the amazing things we have going for us. There is a state-of-the-art facility taking shape before our very eyes, the Engineering Education and Research Building (EERB). We're attracting some of the nation's top minds to come study at our college. We're exploring areas of growth in education, research and development all the time.

This issue of *Foresight Magazine* is dedicated to looking at where we've been, where we are now and where we're going. Our alumni serve as a constant reminder that a degree from UW can lead you to the top of just about any industry. Our current students are in the midst of research projects the likes of which have never been seen at this institution. The future is bright as we find new avenues to explore, with the EERB and High Bay Research Facility serving as a beacon to all who admire innovation and new thinking.

I encourage all of you to take a bird's-eye view of this institution and take stock of our capabilities. Share the good news from our college with anyone who will listen. You'll make an impact—just as our students, faculty and staff are doing.

Sincerely,

Andy Chapman
Editor, *Foresight Magazine*

Stay tuned for the spring issue of ***UWyo Magazine*** with a special section devoted to student excellence!

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Message from Dean Michael Pishko

As we continue the work to advance our college to the upper echelon, steps are being taken to steer us along an established path. You may have heard I've implemented a team to provide vision and help accomplish overall goals for education and outreach for the college.

The formation of the CEAS Dean's Leadership Council represents a significant step in our overall mission. Charter members of the council include Bruce Pivic (president and CEO of Infinity Power & Controls), Amy Allen (director of public services for the City of Rock Springs, Wyo.), Zia Yasrobi (owner/manager of Y2 Consultants), Bryan Hassler (president of United Energy Partners, LLC and managing director of Silverpeak Strategic Partners), Angie Schrader (simulation product manager at Autodesk) and Joe Leimkuhler (vice president of drilling for LLOG Exploration).

The primary function of the council is an advisory role. Along with me, the CEAS Dean's Leadership Council will work with Ben Blalock, the president of the University of Wyoming Foundation, to determine its role in seeking private support. The first item for consideration is development of a strategic plan for the college.

We're just getting started, but in time, these individuals will serve as guides as we meet and surpass our goals as a world-class learning and research institution. I encourage you to get involved and I welcome suggestions and feedback.

Dean
Michael Pishko

THE CEAS DEAN'S LEADERSHIP COUNCIL:

Amy Allen

Bryan Hassler

Joe Leimkuhler

Bruce Pivic

Angie Schrader

Zia Yasrobi

NEWS & NOTES

UW Leads Cloud-Seeding Project in Southwestern Idaho

By UW Institutional Communications

The University of Wyoming, with the use of its King Air research aircraft, headed up a cloud-seeding project funded through the National Science Foundation (NSF) in Idaho.

The research, dubbed SNOWIE (Seeded and Natural Orographic Wintertime Clouds—the Idaho Experiment), began Jan. 7 in concert with Boise-based Idaho Power Co., which provides a good share of its electrical power through hydroelectric dams.

"They (Idaho Power) are interested in putting more snow on the ground in the mountains, which leads to more water in their rivers," says Jeff French, a UW assistant professor in the Department of Atmospheric Science and principal investigator for the SNOWIE Project. "This leads to more power generation capability throughout the year."

Due to water shortages and droughts in some states and in countries around the world, cloud seeding is seen as a potential way to increase water supplies for communities and to irrigate crops. Cloud seeding is typically paid for by water resource managers, power companies (hydropower) and agricultural interests.

"The power company is a partner in this project," French says. "They are paying for cloud seeding and some instrumentation."

Cloud seeding is a process by which silver iodide is released into the clouds, either from the air or via ground-based generators. In the case of the SNOWIE Project, the silver iodide was released by a second aircraft funded through Idaho Power, while the UW King Air gathered measurements to understand the impact of the silver iodide, French says.

"SNOWIE is the most comprehensive study, to date, on cloud seeding in winter," says Nick Anderson, program director in the NSF's Division of Atmospheric and Geospace Sciences, which funded the research. "Scientists are still uncertain about cloud seeding for increasing precipitation, despite ongoing operations around the globe. SNOWIE researchers have an array of advanced instrumentation and modeling to focus on the fine-scale aspects of clouds to determine whether seeding operations are resulting in precipitation enhancement. Improved information about cloud seeding and winter precipitation, in general, is especially important for water resources questions such as those related to hydropower generation and agriculture."

Precipitation in winter orographic storms generally develops when ice crystals form on natural ice nuclei, such as dust particles, and grow. In many storms, the lack of natural ice nuclei active at warmer temperatures results in an inefficient precipitation process. In addition, weak updrafts in these clouds and narrow cloud droplet distributions limit the impacts of any ice processes to multiply.

The project also received assistance from researchers at the University of Colorado, the University of Illinois-Urbana/Champaign and the National Center for Atmospheric Research (NCAR's) Research Applications Laboratory. Those institutions supplied additional instrumentation supported through the NSF proposal. The SNOWIE cloud-seeding campaign took place Jan. 7-March 17 within and near the Payette Basin, located about 50 miles north of Boise.

The UW King Air research aircraft was involved in a cloud-seeding project in southwestern Idaho, which began Jan. 7. (Matt Burkhart Photo)

PetroBowl Squad Wraps Up Competition

A University of Wyoming contingent competed in an annual petroleum engineering competition in February.

UW's team won one round of the PetroBowl, a competition that pits student chapters of the Society of Petroleum Engineers (SPE) against one another in a series of quick-fire rounds, answering technical and non-technical industry-related questions. In the North American regional competition in Denver, Wyoming's team defeated the group from the University of Louisiana-Lafayette in the first round.

The UW contingent included Ian Johnson, Josh Miller, Jillian FitzGerald, Stephen Robert Dalton, Holly Beiko, Thomas Shaffer, Brittany Vigil and Tallis MacDonald. UW graduate Gustave Anderson of Manufacturing-Works served as the faculty adviser for the group.

Along with the Petrobowl, 24 students total attended the SPE Student Symposium the following day. The symposium featured workshops and speeches ranging from technical problems, new technologies, resume building and interview preparation. After the festivities, Anderson set up an alumni event for the students to attend.

"This (alumni event) was potentially more beneficial to students than the symposium," says Shaffer, who serves as the UW SPE chapter president. "Every student who attended had the opportunity to talk to graduates from the University of Wyoming who work in the energy industry."

Graduate Student Wins Competition

UW Petroleum Engineering Ph.D. candidate Mohammad Sabti won first place in an SPE regional paper contest in February in Denver.

Sabti will now compete against winners of other regions in the United States and the world in the upcoming SPE annual meeting which is Oct. 9-11 in San Antonio, Texas.

It marks the second year in a row that a UW participant has won the regional competition. Mahdi Khishvand, a UW doctoral student in petroleum engineering, was the 2016 winner.

CEAS students Ian Johnson, Josh Miller, Jillian FitzGerald and Holly Beiko compete in the 2017 PetroBowl competition. (Thomas Shaffer photo)

NEWS & NOTES

Pejman Tahmasebi, an assistant professor of petroleum engineering at UW, was selected for a prestigious research award by an international organization. Tahmasebi was honored by International Association for Mathematical Geosciences (IAMG) Awards Committee as the recipient of the 2017 Andrei Borisovich Vistelius Research Award. The award is given to a young scientist for promising contributions in research in the application of mathematics or informatics in any field of the earth sciences. Tahmasebi's research interests are in the area of computational geosciences and porous media modeling. This is a broad area that includes geophysics, geology and geomechanics, as well as fluid flow and transport processes, all in close association with computer simulation and computational methods.


Pejman Tahmasebi

Michael Pishko, the dean of the College of Engineering and Applied Science, earned a very prestigious honor from a national academy. The National Academy of Inventors (NAI) Fellows Selection Committee elected Pishko to the rank of NAI Fellow. He was honored specifically for his work and innovations in the areas of diabetes management, drug delivery and pollution remediation. Pishko was invited to attend the Fellows Induction Ceremony on April 6, 2017, at the John F. Kennedy Presidential Library & Museum in Boston.


Michael Pishko

Two faculty members of the College of Engineering and Applied Science were honored recently by a University of Wyoming student organization. Members of the UW Cap and Gown Chapter of Mortar Board recently announced picks for "Top Profs" at the 37th annual Top Prof Night. Associate Dean and Professor of Electrical Engineering Steve Barrett and Professor of Chemical Engineering David Bagley were among the selections for the honor. Bagley was nominated by Holly Ramseier and Meghan Jacobs, while Barrett was nominated by Richard Yang.


David Bagley


Steve Barrett

NOTABLE

Ongoing efforts to strengthen and enhance diversity and inclusion in the College of Engineering and Applied Science (CEAS) were highlighted as part of the University of Wyoming's Martin Luther King Jr. Days of Dialogue. More than 50 people made their way into the Wyoming Union East Ballroom for the "Diversity in STEM" hourlong coffee conversation. Led by CEAS Senior Project Coordinator Teddi Hofmann, the event featured administrators, staff, faculty and students from disciplines in science, technology, engineering and math (STEM). Hofmann unveiled a plan for a CEAS mentorship program to be under way in fall 2017, aimed at women in engineering and led by college alumni, to add to innovation and help advance STEM fields. Beginning in September, the program will engage alumni to serve as mentors to support and provide guidance to female undergraduate and graduate students so that they can navigate the workplace and enhance their skill set to overcome personal and professional challenges. Student organizations including the Society of Women Engineers, National Society of Black Engineers, Multicultural Association of Student Scientists and Women in Math, Science and Engineering also gave presentations to the attendees, and provided information about the leadership initiatives they have taken to better support one another and other individuals in the community.

Teddi Hofmann

The University of Wyoming's Manufacturing-Works was recently awarded a $500,000 grant from the National Institute of Standards and Technology (NIST) that will help support Wyoming businesses.

The grant is part of $12 million in grants NIST recently awarded to Manufacturing Extension Partnership (MEP) centers in 11 states. The agreements have five-year periods of performance that begin April 1, and NIST will provide nearly $60 million in total funding to MEP centers during that time. Manufacturing-Works will receive $500,000 for each of the next five years from NIST. After the third year of the grant, the organization has to be re-evaluated to continue receiving the grant; and then again after five years. David Walrath, a former professor of mechanical engineering at UW, serves as the interim director of MW.


David Walrath (left)

Manufacturing-Works™
Wyoming MEP

students in action

UW Engineering Student Group Designs Adaptive Hunting Trailer

WDH President Corey McGregor receives an adaptive hunting trailer built by a CEAS student team in November 2016. (Steve Barrett photo)

Disabled Wyoming hunters got a big boost, thanks to a project designed and built by a team of University of Wyoming mechanical engineering students.

The contingent, composed of John Ysebaert (Laramie, Wyo.), Vincent Vogt (Powell, Wyo.), Mike Barbero (Arvada, Colo.) and Nathan Benzel (Dayton, Wyo.), designed and built an adaptive tow-behind trailer to assist disabled hunters. Associate Lecturer Kevin Kilty, in the UW College of Engineering and Applied Science (CEAS), was the supervising engineer for the project. Associate Professor Mark Garnich served as the project adviser.

The project will benefit the Wyoming Disabled Hunters (WDH), an organization located in Cody. Founded in 2008, WDH is a non-profit organization made up of Wyoming residents who have a personal connection with physically challenged hunters, and has an organizational goal to provide affordable hunts for hunters who are disabled. The trailer was delivered in November to Corey McGregor, the president of WDH.

The trailer was completed as part of a National Science Foundation Biomedical Engineering and Research to Aid Persons with Disabilities Program grant that links senior design teams with ideas and projects that assist disabled persons.

"I have a lot of good friends who are big hunters but are missing limbs or are physically disabled in some way, so I was looking to help a group like that," Ysebaert says. "When Vince brought up the idea for senior design, I jumped right on board. It is a fantastic feeling that our project got delivered, and it's even better that the group actually uses it and loves it."

The team built a 5-foot by 10-foot flatbed trailer to haul large animals and ATVs, and allow smaller vehicles to pull it through wooded trails. The design accounted for easy assembly by one or two people. The hoist also had to be compatible with different size trailers, and because the WDH will use it in the wilderness, it had to feature off-road capabilities.

The team outlined the reasoning behind the project in its senior design report.

"Our trailer is outfitted with a hydraulically powered hoist arm utilizing a winch for game retrieval," the report states. "Upon shooting an elk, deer or antelope, the trailer is backed up to the animal within the distance of the winch cable and retrieved using the power winch. Once the animal is at the trailer, the arm is used to lift the animal into the air where it can then be field dressed and skinned by a person in a wheelchair from ground level."

Many people were involved in the completing the project, including UW employees Mike Schilt (CEAS Shop) and Tara Evans in the General Counsel office. Scott Keeney, with White's University Motors in Laramie, donated time for technical work on the trailer.

UW Student Organization Helps Build Dormitory in Africa

UW Engineers Without Borders members and Kenyan villagers at the dormitory construction site. (EWB-WYO Photo)

The University of Wyoming chapter of Engineers Without Borders (EWB-WYO) completed its biggest project to date, helping construct a dormitory in an African country in the summer of 2016.

For the past four years, EWB-WYO has partnered with a primary school in Mbita, Kenya, to build a 60-bed dormitory for students. The school serves orphaned and vulnerable children and develops programs to provide a safe living and learning environment for the school's attendees.

Two assessment trips were conducted in 2014 and 2015 to evaluate community needs, perform a technical assessment and gather data for structure design. Under the direction of UW College of Engineering and Applied Science students Adam Block and Brett Prettyman, who served as project managers, a group of students, professionals and faculty progressed from contractor selection to structural completion of the dormitory in a slightly more than two months.

UW Civil and Architectural Engineering Associate Professor David Mukai was the faculty adviser for the project, and Erin Radosevich and Duncan Kline of Malone Belton Abel P.C. were professional advisers. The team utilized a confined masonry technique, a unique construction method used in seismic zones to resist earthquake effects. Block says the team has received very positive feedback about the completion of the design, adding the community leaders have said the dormitory is "the strongest building we have ever seen."

In a press release, EWB-WYO praised its supporters.

"Engineers Without Borders would like to say an enormous 'Thank You' to those of you who helped make the dormitory a reality," the release states. "Your time and donations will have a significant impact on generations of Kenyan and American students to come."

UW Engineering Shares Strong Bonds with Canadian Students

Students who transferred from Canadian institutions have found success at UW. (Doug Cuthbertson photo)

For close to four decades, steady streams of talented students from two Canadian institutions have made the journey to the University of Wyoming to finish their education.

The schools, Southern Alberta Institute of Technology (SAIT) in Calgary and the Northern Alberta Institute of Technology (NAIT) in Edmonton, and UW have had a strong link throughout recent years. Students from SAIT and NAIT have transferred to UW after they earn course credit from a two-year program and attend UW to finish up their bachelor of science in petroleum engineering.

"Hundreds have completed the extra two to three years at UW to go on to successful careers in the oil and gas industry, as leaders and innovators alike," says Doug Cuthbertson, a professor of practice in the Department of Petroleum Engineering.

Cuthbertson himself took the path, going through SAIT and graduating from UW in 1985. He worked in the petroleum industry for years and began teaching at SAIT in 2011, which led him to become a professor of practice at UW in 2016.

In spring 2017, the College of Engineering and Applied Science (CEAS) featured 50 former SAIT students enrolled in petroleum engineering. Twelve students graduated in December 2016.

Efforts are under way to establish agreements between UW, SAIT and NAIT to make the transition smoother for students in more engineering areas. Plans are being formulated between the schools to establish an overarching memorandum of understanding that will facilitate articulation agreements among various academic groups.

"This effort fits in nicely with the goals of UW and the CEAS to increase enrollment in the college over the next few years while pursuing our Tier-1 ambitions," Cuthbertson says.

At this time, the programs involved are petroleum, chemical, mechanical, civil and architectural engineering. The parties are in the process of developing relationships to iron out the necessary agreements and course credit details among all schools.

faculty in action

Solar-Panel Expert from UW Shares Building Design Strategies

Jon Gardzelewski believes solar panels should become a bigger part of the design of buildings and housing in the future.

Gardzelewski, an architect and associate lecturer at the University of Wyoming in the Building Energy Research Group (UW-BERG), says that solar panels typically aren't included in building design, which becomes a barrier to integrating them into the ultimate product. BERG uses faculty expertise and advanced students to improve Wyoming buildings in terms of design and energy performance. This service is aligned with UW's mission as a land-grant institution, emphasizing research, public service, and practical education.

An interview with Gardzelewski was published by *ArchDaily*. The article, "5 Techniques to Incorporate Solar Panels into Your Architecture Beautifully (Not as an Ugly Afterthought)," was released Feb. 8.

There are factors that make solar-panel integration a tough sell for architects and homeowners. Gardzelewski says market trends show people will pay a premium for solar-powered homes, but one appraiser told Gardzelewski the appraisal likely would be the same regardless. The initial cost of installing solar panels can be high, despite the actual price of the panels decreasing. One reason is that builders aren't quite sold on the concept.

"Once solar integrates into the home-building industry, the price of labor will go down because the contractor is going to manage that pretty tightly," Gardzelewski says.

Another factor is a fear that solar energy will hurt fossil-fuel economies and take away jobs. Gardzelewski believes that established blue-collar jobs of the industry could become green-collar jobs.

There are five strategies for integrating solar panels into building design using BERG's philosophy.

Legibility: Revealing the building systems to see how they work, similar to an industrial look with the "guts" of the building exposed.

Material Planes: Structures like Gerrit Rietveld's Schroder House and Ludwig Mies van der Rohe's Barcelona Pavilion highlight design focused on planar composition. The Barcelona Pavilion features planar composition to show off the richness of materials such as glass, marble, onyx, and travertine. With this strategy, the material aspect of a solar panel is celebrated and highlighted.

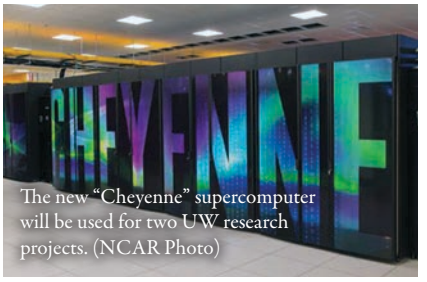
Form Follows: From the principle "form follows function," this design features a building that adapts its shape to the path of the sun. This strategy works well when a design provides optimal orientation for a large number of solar panels.

Shading: Solar panels can provide shade for the building itself or adjacent outdoor space, which is a good method for an existing roof.

Disguise: Solar panels are hidden through either compositional strategy or design innovation. This strategy is best used in conjunction with "form follows," as architecture designed around the panel is suited to disguise it.

Jon Gardzelewski believes solar panels may play more of a role in building design very soon.

UW Researchers to Use New Cheyenne Supercomputer



The new "Cheyenne" supercomputer will be used for two UW research projects. (NCAR Photo)

By UW Institutional Communications

The National Center for Atmospheric Research (NCAR) launched operations of one of the world's most powerful and energy-efficient supercomputers, providing the nation with a major new tool to advance understanding of the atmospheric and related earth system sciences.

Two of the six initial projects that will run on the supercomputer, nicknamed "Cheyenne," will be led by University of Wyoming researchers.

Dimitri Mavriplis, a UW professor in the Department of Mechanical Engineering, will head the wind energy research project. UW researchers will use Cheyenne to simulate wind conditions on different scales, from across the continent down to the tiny space near a wind turbine blade, as well as the vibrations within an individual turbine itself. Additionally, an NCAR-led project will create high-resolution, 3D simulations of vertical and horizontal drafts to provide more information about winds over complex terrain. This type of research is critical as utilities seek to make wind farms as efficient as possible.

Projecting electricity output at a wind farm is extraordinarily challenging, as it involves predicting variable gusts and complex wind eddies at the height of turbines, which are hundreds of feet above the sensors used for weather forecasting.

A smoke and global climate study, led by Xiaohong Liu, a UW professor of atmospheric science and the Wyoming Excellence Chair in Climate Science, will look into emissions from wildfires and how they affect stratocumulus clouds over the southeastern Atlantic Ocean. This research is needed for a better understanding of the global climate system, as stratocumulus clouds, which cover 23 percent of Earth's surface, play a key role in reflecting sunlight back into space. The work will help reveal the extent to which particles emitted during biomass burning influence cloud processes in ways that affect global temperatures.

Since the supercomputer came online during October 2012, allocations have been made to 71 UW research projects, 36 of which are still active. More than 2,200 scientists from more than 300 universities and federal labs have used its resources.

UW Researcher Part of Widely Hailed Energy Report

Gang Tan helped develop a low-cost and eco-friendly film to cool surfaces. (Gang Tan Photo)

The landscape of energy technology could soon be vastly improved thanks to the work of a University of Wyoming researcher.

UW Associate Professor of Civil and Architectural Engineering Gang Tan was part of a research team that developed a cost-effective and eco-friendly method of cooling without energy and water consumption, even under direct sunlight. Although the project was led by the University of Colorado, Tan was the co-author of the paper, "Scalable-manufactured randomized glass-polymer hybrid metamaterial for daytime radiative cooling," published in the journal *Science*. This work was immediately reported by publications such as *The Economist*, *Forbes*, *Scientific American* and *Energy & Environment News*.

The method involves using the installation of a transparent polymer film featuring miniature glass particles. Coated with silver, the material reflects incoming solar energy back into space while simultaneously allowing the structure underneath to shed heat in the form of infrared thermal radiation. The material has been shown to cool surfaces by as much as 18-27 degrees Fahrenheit.

Facilities like power plants and data centers generate enormous amounts of heat from energy. Radiative cooling draws on Earth's natural method of cooling itself, taking heat from surfaces and pushing it into space as infrared radiation. Because the material is relatively inexpensive and can be mass produced, applications include passively cooling buildings and electronics like solar cells, which work more efficiently at lower temperatures.

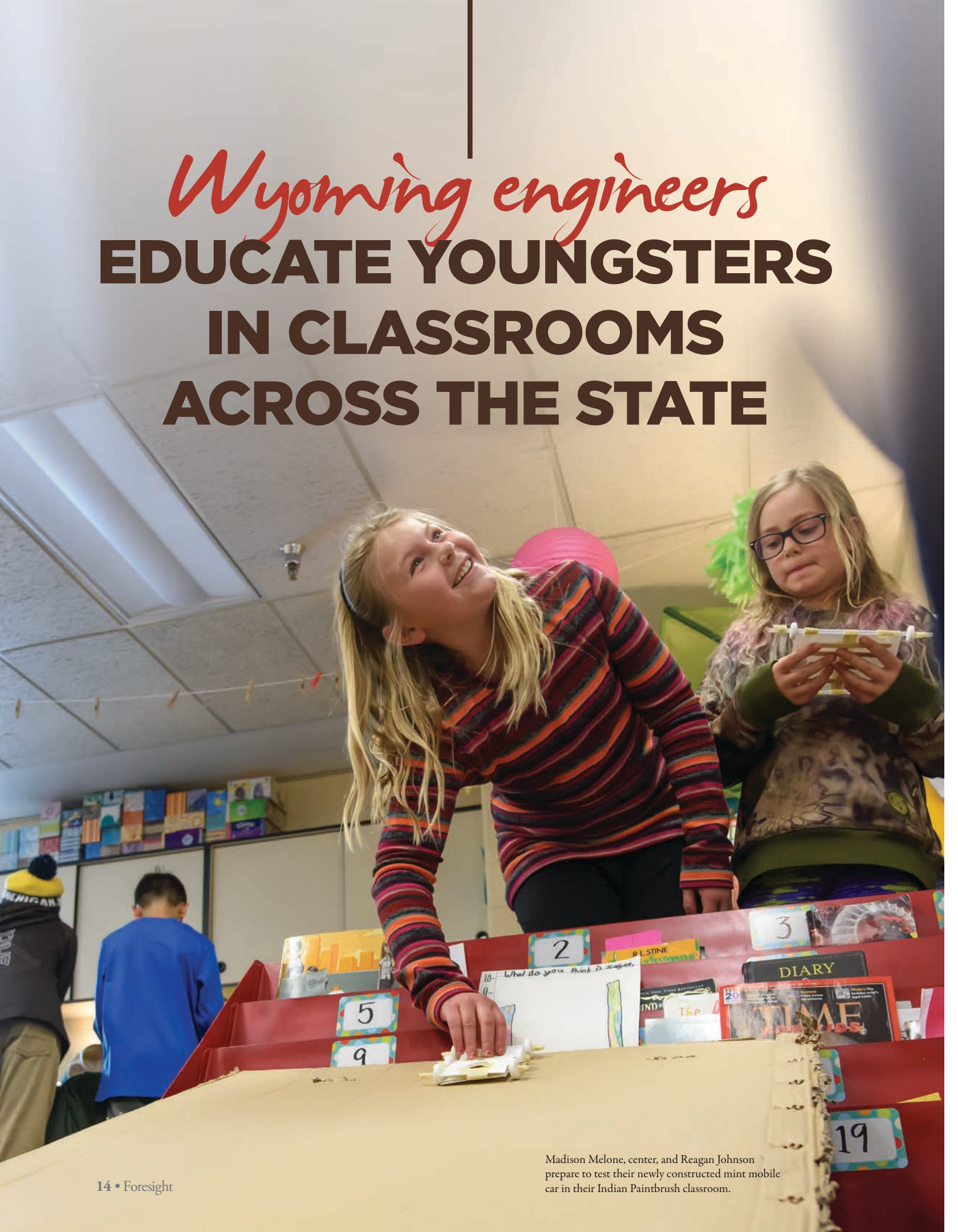
"I was very excited and proud to develop a breakthrough and transformative technology for real-world applications," Tan says.

The project was funded with $3 million from the Department of Energy's Advanced Research Projects Agency-Energy (DOE ARPA-E) in 2015, awarded to Professors Ronggui Yang and Xiaobo Yin of CU-Boulder and Tan. Other members of the research team include Yao Zhai, Yaoguang Ma, Sabrina N. David, Dongliang Zhao (a UW Ph.D. who graduated in 2014) and Runnan Lou.

PUTTING THE WHEELS IN *motion*

Third-grade students Tessa Dodd, left, and Abby Sanchez measure the distance covered by their mint mobile vehicle. The duo built the craft as part of UW's Engineers Week activity at Indian Paintbrush Elementary School in Laramie, Wyo., in March.

Wyoming engineers EDUCATE YOUNGSTERS IN CLASSROOMS ACROSS THE STATE



Madison Melone, center, and Reagan Johnson prepare to test their newly constructed mint mobile car in their Indian Paintbrush classroom.

By Andy Chapman

Squeals of excitement filtered down the hall as students tromp in from recess on a snowy, overcast day. They've been looking forward to this visit.

As 30 third-graders look onward anxiously, Derrick Thompson asks the group a question: "Who knows what engineering is?"

This is Erica Jensen's classroom at Indian Paintbrush Elementary in Laramie, Wyo. The outreach event is part of National Engineers Week, which was Feb. 19–25. The University of Wyoming College of Engineering and Applied Science (CEAS) has partnered with several organizations to create a free program that brings professional- and college-level engineers into third-grade classrooms around Wyoming to lead a one-hour hands-on activity. The activity is designed to inspire innovative thinking among young students to encourage participation in science, technology, engineering and mathematics (STEM).

Thompson, a civil engineer from Laramie-based Trihydro Corp., explains the process behind creating and building, the hallmarks of engineering. He outlines the steps needed, like brainstorming, design, planning, building, testing and improvement. Thompson is a UW alumnus and earned a bachelor's and master's degree in civil engineering. He works on projects related to water resources and abandoned mine reclamation, but this was his first experience with outreach work for Trihydro.

"It's good getting them involved at a young age, to start thinking about the process," he says. "Hopefully it helps them as they progress through school and want to follow the technical engineering career path."

He leads a workshop to build a "mint mobile," a tiny car constructed from popsicle sticks, mint Lifesavers, straws and tape. Thompson bends down to eye level with two youngsters to discuss the project. Words like design, speed and weight echo throughout the room.

"What are you guys thinking for this car?" he asks.

"It's good getting them involved at a young age, to start thinking about the process."

At center, Derrick Thompson, an engineer from Trihydro Corporation, discusses the design process with third-grade students Max Graef (left), Jacob Waggoner and Katie Moran.

Perhaps they don't know it consciously, but they're putting engineering *in action.*

The suggestions come immediately: Headlights for the car. Six wheels. One industrious group built a sail using popsicle sticks and the plastic bag in which the building materials were packaged. It takes some serious willpower from the students to not eat the Lifesaver wheels. Some sneak a quick lick, followed by a giggle.

"Let's lay everything out first," says 8-year-old Brenna Perriton to her classroom partner. "We should talk about it and then build it."

The third-graders think big, drawing extravagant designs and luxury features, but Jensen offers a practical reminder to the group. This is about making a car that will actually move, not just look cool.

The first team to test its model is the duo of Abby Sanchez and Tessa Dodd. They line up the craft along the top edge of a cardboard ramp and release. When it comes to rest after rolling across the carpet, they've achieved a mark of 45 inches. They tell Thompson their car can go farther if they add pennies for weight.

"It's like when you go sledding," Tessa says. "The more people on the sled, the further you'll go."

Over the course of the hour, the children make progress in testing runs by switching up the design, the wheels and the weight. Perhaps they don't know it consciously, but they're putting engineering in action.

Jensen points to programs like this as a way to educate the students from another perspective.

"We do something else called Junior Achievement, in which volunteers from the Laramie community come into classrooms with a program to teach.

"We live in such a great community where we can pull people in from all walks of life, and for the kids, they know these are real jobs people have in our town and these are things I could be when I grow up," she says.

"When they come to me in third grade, they say when I grow up, I want to be a something that isn't real. When we are able to provide opportunities like this, people who can come in and show them what they do and how they are successful in the community, it's really helpful for my students. It's motivating. My job every day is to show them what the premise is of what we're learning. This is authentic, problem-based learning. This is what STEM is all about, real ingenuity at work."

Abby Sanchez, right, and classmate Tessa Dodd ask Derrick Thompson for advice on improving their mint mobile vehicle near the test track.

Cooper Sinicki lines up his mint mobile to maximize his distance as his classmates look on.

CREATING OPPORTUNITIES

ENGINEERING BENEFACTORS ELEVATE COLLEGE OF ENGINEERING AT UW

DONALD ADAMS

STACY KNULL

CARYL AND ROY CLINE

By Andy Chapman

Perhaps they never set out to make such a huge impact on the College of Engineering and Applied Science, but that's exactly what they did.

The CEAS at the University of Wyoming features several notable individuals, each of whom has contributed to the college in his or her own way, and left a unique impression.

ROY AND CARYL CLINE

Roy and Caryl Cline have been involved with UW for years, freely giving their time to causes important to the university. Both grew up in the Greybull, Wyo., area and Roy attended college in Laramie.

Caryl is a key member of the Art Museum National Advisory Board. Roy, who was inducted into the CEAS Hall of Fame after earning a civil engineering degree in 1960, received the UW Distinguished Alumni Award. Both received the UW Cornerstone Award and donated to the Marian H. Rochelle Gateway Center.

Roy had a career in engineering and construction after serving in the Vietnam War for the Air Force. In his career, he worked for two major international companies, Morrison Knudsen and Peter Kiewit, and retired as an executive vice president in 2002. His experiences involved major power and industrial facilities across the country and parts of the world.

They have demonstrated unbelievable generosity to Wyoming's only four-year university. In addition to long-term support for the UW Art Museum and UW athletics, the couple has provided major support for the CEAS Cline Chair professorship and the Engineering Education and Research Building (EERB).

"Our love for Wyoming and the university, which provided me with a solid engineering foundation, gives us both a wonderful feeling to give time and financial support back to the university," Roy says.

DONALD F. ADAMS

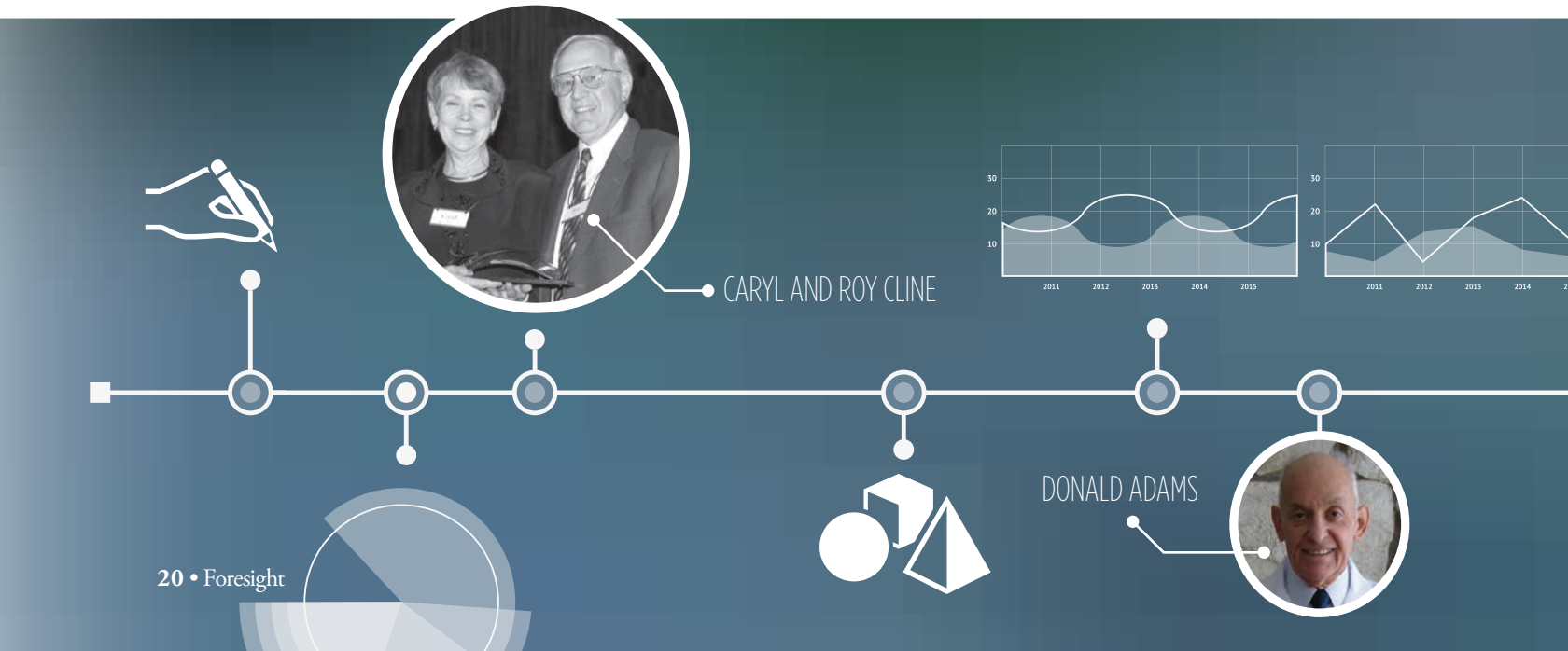
Donald Adams is the founder and president of Wyoming Test Fixtures Inc., a company specializing in the design and fabrication of mechanical test fixtures for the composite materials community since 1988.

Adams' notable contribution to UW includes serving as an emeritus professor of mechanical engineering at UW, where he founded and for 27 years was director of the Composite Materials Research Group (CMRG). He headed up the interdisciplinary composite materials research group at UW for many years, involving a broad range of government and industry programs.

Prior to joining the faculty at UW in 1972, he held positions including Northrop Aircraft Corp. (Hawthorne, Calif.), the Aeronutronic Division of Ford Motor Co. in (Newport Beach, Calif.), and the Rand Corp. in Santa Monica, Calif. Adams received a bachelor's degree in mechanical engineering from the University of Illinois (1957), a master's in mechanical engineering from the University of Southern California (1960) and a Ph.D. in theoretical and applied mechanics from the University of Illinois in 1963.

He has been involved in composite materials analysis, testing and design for more than 50 years. Adams has served on several national committees and review boards. He has regularly presented seminars and short courses in the United States and abroad and has been published in journals.

"I was a professor of mechanical



engineering for 27 years, and had a very active and successful career in Laramie," Adams says. "I started my Wyoming Test Fixtures Inc. business while there, as a university-approved spin-off from my university research. I owe the university for allowing me to develop my career there."

STACY KNULL

Stacy Knull grew up in Alberta, Canada, but ever since he began considering his academic career, Wyoming was always at the top of his list.

He earned his UW bachelor's degree in petroleum engineering in 1995 after attending Northern Alberta Institute of Technology for two years prior. A self-described "local farm boy," he joined the rodeo team and hockey team while attending UW. He even met his wife, Shelby, in Laramie.

"A lot of engineers in Canada are from Wyoming," he says. "Guys I worked with said it was a great college. I applied for 10 colleges, but I looked for a school that fit me better. My biggest class in high school was 25, and in college it might've been 100. UW was more my style. I loved the culture because it was close to my heart."

Knull keeps UW close to his heart, as his company hires CEAS graduates whenever it has the opportunity. He serves as the chief executive officer, president and director at Saguaro Resources Ltd.

Knull has decades of experience in the energy industry, focused primarily on unconventional resource play growth from a grassroots conceptual stage through to full-scale asset development. Saguaro provides specialized experience in field optimization, technology implementation and full-cycle development in a variety of oil and natural gas resource plays.

He's worked in various places in Canada, moving up the corporate ladder rapidly. He served as vice president and chief operating officer at Sinopec Daylight Energy Ltd. For nearly 20 years, he advanced in the Encana Corp., being named vice president of Clearwater Business Unit & Canadian Conventional Exploration and Joint Ventures and the Fort Nelson Business Unit. He is a professional engineer with membership in the Association of Professional Engineers, Geologists, and Geophysicists of Alberta.

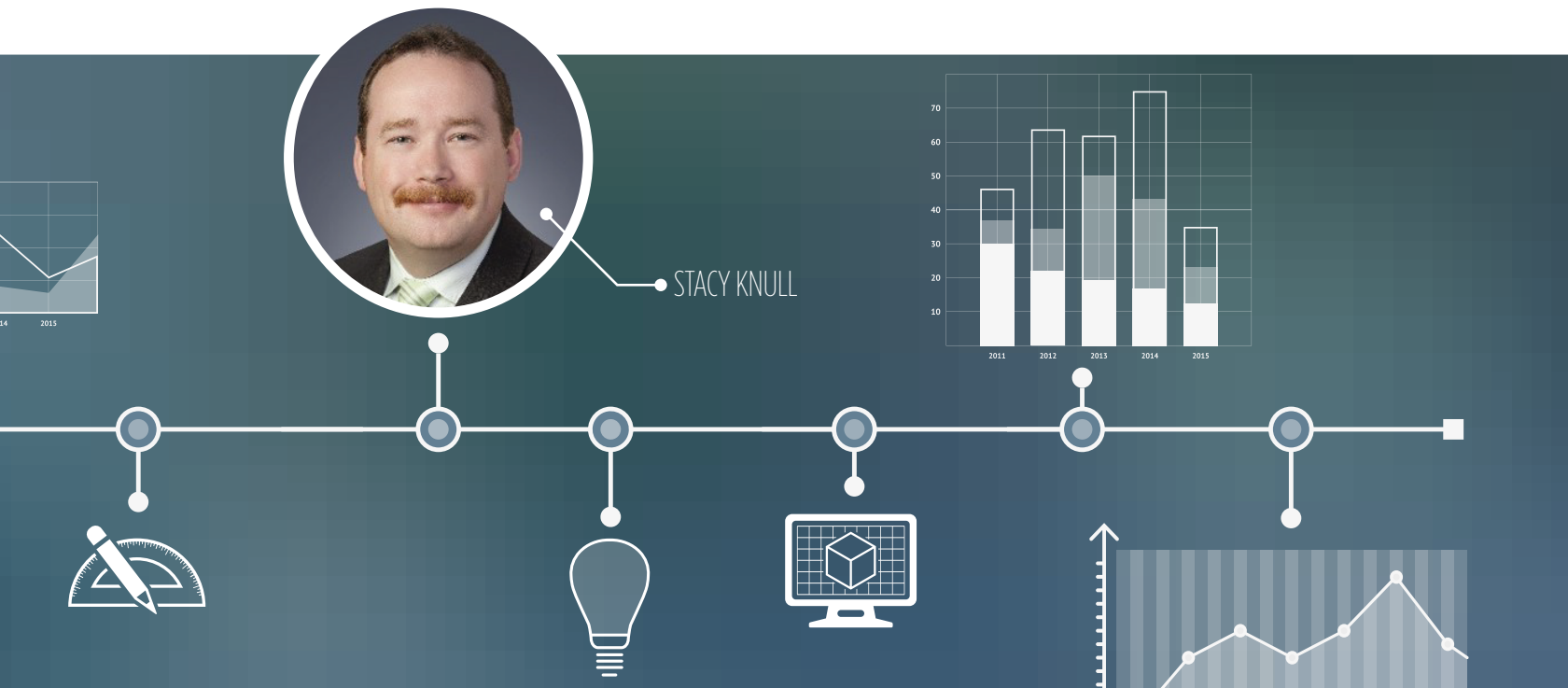
He encourages Canadian pupils to consider UW for finishing out their degrees.

"We believe in growing the university population and the pipeline," he says. "Oil and gas is cyclical and you're going to get the ability to work through booms and busts with applicable knowledge. Wyoming is a great place to go because you can really be a part of something bigger."

Knull joins notable Canadian UW alumni, including Mike Graham and Randy Eresman, who have made a tangible impact in oil and gas in a burgeoning field. He credits his UW education for part of his success and hopes others will follow in his footsteps. Of Saguaro's 18 staff, seven have UW educations.

"You had great professors that you had access to," he says. "What I loved about UW is you're gaining lots of knowledge, including common sense and big-picture stuff, along with the academic work.

"It's been great for us. I have always believed in the university's education, and it gives you the ability to think through problems and have the background to understand it."



SEATS AT THE TABLE

Endowed Chairs in Engineering Advance UW's Profile

Fred Ogden has been called a "rainmaker," an interesting moniker given his profession.

His work in hydrology has been hailed worldwide, for breakthroughs in the field that have improved upon research taking place since the 1900s.

He's been able to do that via an endowed chair in the College of Engineering and Applied Science at the University of Wyoming.

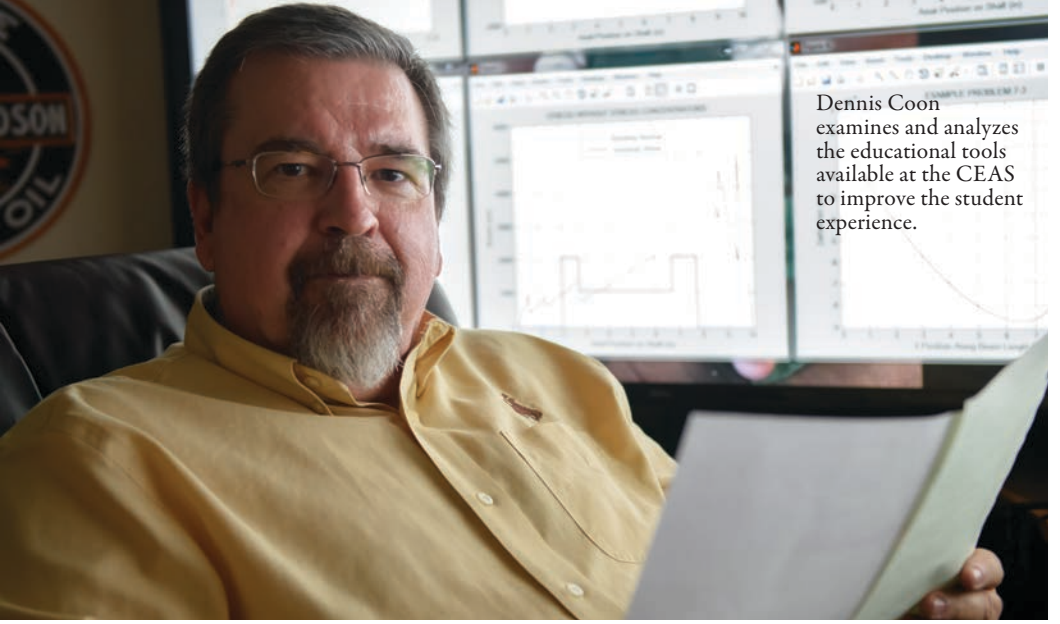
Ogden is the Cline Distinguished Chair of Engineering, Environment and Natural Resources for the Department of Civil and Architectural Engineering and Haub School of Environment and Natural Resources. He has served in the role since 2006. He also is a professor and the director of the Center for Computational Hydrology and Hydrosciences.

The Roy and Caryl Cline Distinguished Chair of Environment and Natural Resources was created by a generous donation to the university, matched by the state. Roy Cline is an alumnus of the college. The Clines noticed there was an opportunity to engage more engineering in the Haub School. Ogden applied and was the first person to occupy the unique position that shares ties with UW engineering and the Haub School.

Ogden's work as an endowed chair highlights the importance of these posts

Fred Ogden and his research team have developed a widely used supercomputer-based model for flood forecasting.

Mohammad Piri is the newest CEAS chair, taking over the Botts Chair in spring 2017. The chair was established by UW alumnus Tom Botts, who endowed the seat to advance oil and gas research at UW.



Dennis Coon examines and analyzes the educational tools available at the CEAS to improve the student experience.

in higher education. Endowed chairs help allow world-class research and education to be conducted at universities. It's the reason Ogden chose UW after being a civil engineering faculty member at the University of Connecticut for 11 years. He saw an opportunity to collaborate with two areas, engineering and natural resources.

"Endowed chairs have the freedom to lead large proposal activities that can bring in significant amounts of resources to the university," Ogden says. "That's the biggest and most valuable thing we do."

Ogden leads a project funded by the National Science Foundation to look at the effect of land use management decisions on water supply availability in the Panama Canal watershed. That project is funded via $3.2 million over three years.

"Through donors, the Smithsonian Tropical Research Institute purchased 1,700 acres of land that we can manipulate and perform experiments," Ogden says. "There are pastures with cattle, forests, planted trees and cut trees. It's interesting to see how rapidly things change in those environments."

Perhaps the most notable research for Wyoming residents is Ogden's group work with the National Weather Service. They have developed a supercomputer-based model for flood forecasting. He will co-teach a summer innovators program at the National Water Center in Tuscaloosa, Ala.

"The forecasting system in the U.S. evolved using conceptual hydrology models, which are not physics based. Think of them like Rube Goldberg contraptions. They only forecasted at the points where there were established stream gauges," Ogden says.

"A few years ago, the Weather Service obtained funding from Congress to modernize their flood forecasting system to enable predictions everywhere, not just at stream gauges. They need the kinds of models we develop and the ability to use real topography data."

His group adds a fair amount of resources through equipment, including helping bring funding from the National Science Foundation to give UW its first supercomputer, Mount Moran.

The supercomputer model that the group has developed helps predict snowmelt and runoff forecasts to accurately give lead times of snowmelt and runoff. That can help agricultural interests and towns near flood plains.

"The communities have the ability to understand when a flood is coming," Ogden says. "We often know weeks in advance when snowmelt flooding could happen."

Ogden points to his ability to have a lighter teaching load as a faculty member so he can focus on his research—and building UW's national and international reputation.

"The reduced teaching load gives endowed chairs the opportunity to attend conferences or meetings that may result in opportunities for the university and our students," he says. "It is good to have endowed chairs in the college. Some people look at us as 'rainmakers,' where we are well known enough to be invited to participate in unique opportunities."

DENNIS COON, HT PERSON CHAIR

Dennis Coon's journey to UW was a bit unconventional, to say the least.

He came to the college in 1988 from a national laboratory and had never taught in a classroom. He was hired as a mechanical engineering instructor with a background in ceramic science and engineering.

He now is the HT Person Chair and Professor, named to the post in 2016. In addition to a regular teaching load of five courses, his chair post examines how to improve education in the college.

"The two previous HT Person chairs, Charles Dolan and David Whitman, had ideas of what was important," Coon says.

Dolan and Whitman implemented curriculum that emphasized new engineering design for freshmen and seniors and active learning and also established the HT Person Distinguished Speaker, a notable speaker who visits with CEAS students every Homecoming and gives a lecture.

As one of his first tasks in the position, Coon has begun tracking metrics of students and faculty in order to study exactly which methods are effective for students and which markers can predict success.

"We have some very high-end engineering analysis tools, but we've never really taken the time to apply those to the educational process," he says. "I want to know how the best students move through here to accumulate those lessons and apply it

to other students. I think if we identify some policy and infrastructure issues, we can help students graduate. That was one of HT Person's missions. He knew engineering was tough. But he sat people down and said 'How do we get you through this?'"

Coon's project examines the process by which a typical student completes his or her degree, using 12 "prototype" pupils as baselines. He and other administrators look at things including cost and how quickly students accumulate requirements, all of which can determine how a student proceeds through the college.

"We never really teach an instructor how to teach," Coon says. "We teach graduate students how to research. They're very intelligent people, but oftentimes if they go on to become a faculty member, they need help for the transition."

He asks faculty members to recruit practitioners in residence. Course instructors recruit accomplished alumni, and they meet and visit with students and explain how they applied their education.

Coon never forgot the advice given to him by a former CEAS dean when he was starting out.

"Never forget the purpose of this place is to educate the sons and daughters of Wyoming," Coon says. "If these kids come with the skill and motivation, our job is to make them engineers, not to limit their choices."

MOHAMMAD PIRI, BOTTS CHAIR

Mohammad Piri is the newest CEAS chair, taking over the Botts Chair position in spring 2017.

The chair was established by UW alumnus Tom Botts, who endowed the seat to advance oil and gas research at UW. Botts also serves as the co-chair of the Governor's Task Force for the Tier-1 Engineering Initiative. The position is classified as a research chair, occupied by a faculty member for a certain amount of time. The money that is endowed generates interest to be used at the discretion of the chair to advance research.

"What is more important than the money is the message it carries," says Piri, who is an associate professor of petroleum engineering. "That's much more important to me. This is an indication that state leaders appreciate and acknowledge what we're doing as a research institution and want to highlight it. It shows that it is appreciated when you work hard to put the University of Wyoming on the map in your research area."

This is an especially meaningful position for Piri, who was among the first faculty hired after the petroleum engineering program was reinstated at UW in 2003 after being shuttered in 1996. Piri says Botts' financial contribution to the chair is also evidence of the commitment of the state leaders to the department.

"He is a truly visionary leader and a dear friend whom I respect enormously. He's spent his entire career in the oil and gas industry and therefore has a wealth of experience and knowledge to share," Piri says. "What it means to me, personally, is how deeply the leaders in the state care about the research we perform. They strongly support UW and they know what is important to its faculty and students. By establishing the chair, Tom is saying that he believes in cutting-edge research and the faculty who are leading it, and the idea that we can provide high-quality education to students here—in other words, 'This is the way forward.'"

Piri wants to establish UW as a center of world-class research.

"I want to make it so Wyoming isn't just a place to go fishing or hunting," he says. "This is a way to say you can be better than everyone in a given area here. This could be a model for people to follow."

WHAT IS AN **ENDOWED CHAIR?**

An **endowed** professorship (or **endowed chair**) is a position permanently paid for with the revenue from an **endowment** fund specifically set up for that purpose. Typically, the position is designated to be in a certain department. The donor might be allowed to name the position.

The hope is that a high level of pay and prestige will allow UW to better retain top faculty already on campus, while helping to recruit top-flight faculty with national reputations.

The presence of just one or two endowed professorships in a department can raise the excellence of the entire group. That, in turn, can create greater opportunities for students in terms of grant money, research, publications, and future prospects for graduate school or the job market.

alumni in action

UW Engineering Graduate Helps Launch Innovative Spacecraft

A University of Wyoming alumnus played an integral role in launching a spacecraft to explore an asteroid in our solar system.

Ben Bryan worked for several years as a project manager, designer and engineer with various engineering firms. One day, his phone rang and the person on the other end posed an interesting question.

"Lockheed Martin called me and asked if I wanted to build spaceships for a living," Bryan says. "The rest is history, and I'm honored to be making history."

Originally from Alaska, Bryan graduated in 2003 from UW with a degree in structural engineering. In 2010, Lockheed Martin offered him a position, and now he serves as a systems integration engineer for the aerospace company.

He's involved with an exciting project, the OSIRIS-REx spacecraft. It launched into space Sept. 8, 2016, and will travel to "Bennu," a carbonaceous asteroid whose rocky material may record the earliest history of our solar system.

Lockheed Martin has hopes that Bennu may contain the molecular precursors to the origin of life and the Earth's oceans. Bennu also is a potentially hazardous asteroid, as it has a relatively high probability of impacting the Earth late in the 22nd century. The OSIRIS-REx will determine Bennu's physical and chemical properties, which will be critical to know in the event of an impact-mitigation mission. Asteroids also may contain natural resources such as water, organics and precious metals. In the future, these asteroids may one day fuel the exploration of the solar system by robotic and manned spacecraft.

Bryan's role on OSIRIS-REx was the Assembly Test and Launch Operations (ATLO) lead. It was an important role, as he led two spacecraft teams to build and test the spacecraft from the beginning of the project.

"In ATLO, I dressed up in a bunny suit (cleanroom suit) every day and put together an actual spaceship, which is not a bad way to earn a living," he says. "I worked on it every day for two-and-a-half years in a Class-7 cleanroom, working directly on the spacecraft with my team. We tested it in every environment it would see on its mission and successfully launched it Sept. 8."

Top: Ben Bryan's team assembles the OSIRIS-REx spacecraft. Bottom: Bryan, in the blue hood, poses with team members.

Bryan believes this mission will open the door for many new discoveries and innovations.

"We have invented new technologies for this mission that will affect future innovations and development," he says. "Perhaps there is an element that has yet to be discovered. It is space exploration, and that is always beneficial to the human race."

Local Physician Credits CEAS and Family For Success

Taking the easy path through her education wasn't ever an option for Kim Westbrook.

After spending four years earning an engineering degree from the University of Wyoming, she had an eye on a new challenge: earning a medical degree. That decision translated to five more years of school and an additional four years of residency.

"My transition to medical school was one of the most difficult things I have experienced," she says.

Westbrook graduated from the College of Engineering and Applied Science with a chemical engineering degree with a biomedical emphasis, along with a minor in Spanish in December 2005. She attended medical school at the University of Washington through the UW medical program partnership, WWAMI. She graduated in 2010 and moved on to a residency in obstetrics and gynecology at Creighton University in Omaha, Neb., in July 2014. After moving back to her hometown of Laramie, she began working at Laramie Physicians for Women and Children in August 2014.

"The work ethic I developed during my engineering degree was invaluable for my medical training," she says.

She is the only CEAS student ever to be named as the college's Outstanding Freshman, Sophomore and Junior. As a senior, she was named the Wyoming Engineering Society Student Engineer of the Year.

She has three brothers who also earned engineering degrees from UW. Westbrook's father, Wyoming State Sen. Philip Nicholas, was a huge proponent of UW. The senior Nicholas earned his law degree from UW.

"My family is truly the 'poster family' for the College of Engineering at UW," Westbrook says. "We have demonstrated that an engineering degree will allow an individual to pursue any profession. I take the most pride in the successes of my entire family rather than my individual successes."

Kim Westbrook

Westbrook's career serves as a great example of what an engineering degree can do for a motivated individual. She also credits the overall CEAS environment for helping her.

"Obtaining a degree from UW was a very unique experience," she says. "The classroom sizes are small, which allows the students to have more individualized education. This allowed for a working relationship with the professors that cannot be achieved at many other schools."

Checking In With: Capt. Marcus Catchpole, U.S. Air Force

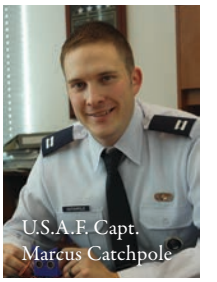
U.S. Air Force Capt. Marcus Catchpole is building a great career, thanks to a University of Wyoming education.

Originally from Wheatland, Wyo., he now is stationed in Colorado Springs, Colo., and is active duty in the military. He earned a degree in electrical engineering from UW in 2011. His wife, Jenny, a Cheyenne native, is a CEAS graduate, earning a degree in computer engineering in 2010.

He is a flight commander in a recruiting squadron that covers 450,000 square miles from northern Wyoming to Texas and is directly responsible for 12 noncommissioned officers under his command. His job includes overseeing operations and medical processing for a squadron of 80 recruiters. His squadron enlisted and medically processed more than 1,000 people into the Air Force in the past year.

After getting his degree and commissioning as a second lieutenant, he went to Hill Air Force Base in Utah. He used his education to support the F-4 Phantom, A-10 Warthog, and F-16 Falcon airframes.

"The University of Wyoming and the Air Force ROTC program prepared me for a competitive career," he says. "As someone who is now interviewing officer applicants with bachelor's degrees, I know how valuable an engineering degree from UW is to potential employers. In my time in the Air Force, I've worked with other engineers who have graduated from the University of California-Berkeley to the Massachusetts Institute of Technology, and I am every bit as capable and productive as my peers."


U.S.A.F. Capt. Marcus Catchpole

He now capitalizes on his engineering degree in a managerial environment, utilizing a method of "data-driven" decision making. The rigorous math education from UW's engineering program makes him adept at gathering, understanding, and leveraging data.

Catchpole was competitively selected by the Air Force to pursue a master's degree on a full-time basis, with pay, and teach computer science at the Air Force Academy. He will begin the degree program in 2017 and start teaching, after a three-year tour, in 2022.

alumni in 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.

Mr. William Anderson
BSEE ’62 – Walcott, Wyo.

Mr. Alfred Barkman
BSME ’61 – Lingle, Wyo.

Mr. Michael Brill
BSEE ’70, MS ’71 – Palm Springs, Calif.

Mr. George Bush
BSEE ’67, MS ’68 – Buckley, Wash.

Mr. Thomas Clark
BSEE ’50 – Baton Rouge, La.

Mr. John Cotton
BSME ’65 – Maple Valley, Wash.

Mr. Walter Dowd Jr.
BSCE ’49 – Las Vegas, Nev.

Mr. Joseph Dzuback
BSME ’48 – Westfield, N.J.

Mr. John Ellerby
BS ’60 – Fort Collins, Colo.

Mr. Gerome Fedrizzi
BSME ’73 – Rock Springs, Wyo.

Mr. Ray Huenefeld
BSME ’51 – Riverton, Wyo.

Mr. Everett Killam
MS ’65, Ph.D. ’73 – Bozeman, Mont.

Mr. James Kladianos
BSCE ’50 – Rawlins, Wyo.

Mr. Johnny Kuncheff
BSME ’49 – Sheridan, Wyo.

Mr. Max Lawton
BSCE ’73 – Lakewood, Colo.

Mr. Duane Manfull
BSCE ’50, MS ’51 – Windsor, Colo.

Mr. Alan Mass
BSEE ’70 – Cheyenne, Wyo.

Mr. Gary Neemann
BSME ’69 – Pisgah Forest, N.C.

Mr. Michael Sowders
BSCE ’85 – Hixson, Tenn.

Mr. Steven Stewart
BS ’68 – Denver, N.C.

Mr. Robert Stickley
BSEE ’63 – Napa, Calif.

Mr. Donald Streett
BS ’58 – Idaho Falls, Idaho

Mr. John Villar
BSPE ’86 – Marquette, Mich.

I/we would like to make my/our gift to the College of Engineering and Applied Science:

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Thank you for your continued support!

WYOALUMNI

The Online Home for All UW Friends, Alumni, and Supporters

The mission of WyoAlumni is to be the online home for everyone associated with the University of Wyoming – including friends, alumni, and supporters. WyoAlumni strives to be the primary online destination for people to connect with the UW and its people.

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- Find your dream job with multiple career resources
- Access the UW Libraries databases

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- Share photos
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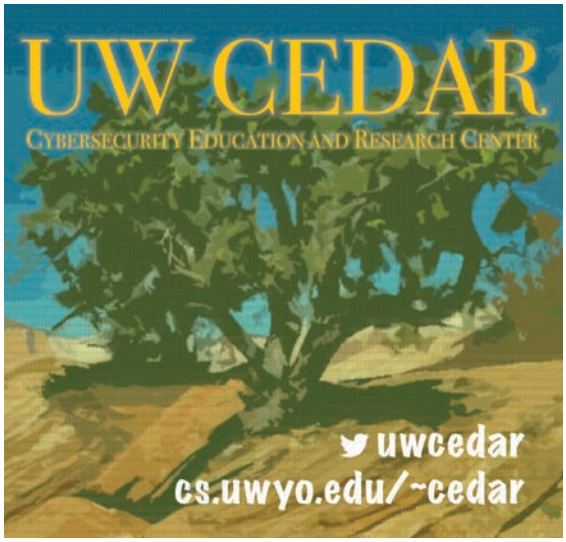


COMPUTER SCIENCE DEPARTMENT AIMS FOR **NATIONAL CYBERSECURITY DESIGNATION**

If an individual or business comes under attack from cyber criminals, the next steps can often be vague and confusing. Within the next two years, the University of Wyoming will help train professionals to fend off the bad guys and help businesses get back on track.

The Department of Computer Science in the College of Engineering and Applied Science has begun implementation of coursework in cybersecurity, a new area within its curriculum. Department head Jim Caldwell hired Mike Borowczak as a professor of practice to help lead the efforts.

If all goes to plan, within two to three years UW will be designated as a National Security Agency-Department of Homeland Security Center of Academic Excellence in Cyber Defense Education. Wyoming Gov. Matt Mead requested state funding to establish the center in 2016 to no avail, so CEAS Dean Michael Pishko decided to institute the program in 2017 using Tier-1 Engineering Initiative funding.

Shortly after, Caldwell hired Borowczak, and he purchased lab equipment for the establishment of the UW Cybersecurity Education and Research Center (CEDAR), which will be brought online in summer 2017 in time for the fall semester.

Borowczak, originally from Cincinnati, has been in Laramie for a few years, and has spent the last six years in industry. He has a Ph.D. in computer science and engineering with an emphasis in hardware security from the University of Cincinnati and previously worked for Intel as a hardware security architect.

"The main focus of the center is education, so that's why I was interested in the position," he says. "My background includes embedding research within K-16 educational context. I have a passion for teaching and education, and this position was to establish the University of Wyoming as a nationally recognized educational center in the realm of cyber defense."

Currently, Borowczak is determining what areas are important for the NSA designation, which includes capturing what is currently taught and modifying classes to meet standards. The NSA requires at least three graduates from the concentration before they'll award UW with the designation, which will appear on student transcripts. The earliest UW will receive the designation is 2018 or 2019.

"The first step is figuring out what we already teach and what do we not have for NSA standards, and then we'll add a course or two that will address those topics," Caldwell says. "The NSA folks are anxious for us to get the designation. We're one of seven states that doesn't have it currently, and they're looking to increase the number of graduates who have the expertise in cyber security."

The state of Wyoming has an organization, called CRISP (Cyber Response and Infrastructure Support Program), which was established in 2015. The CRISP Incident Response Team (CIRT) provides rapid, collaborative and focused cyber-incident response assistance to partner entities with critical infrastructure and resources in Wyoming. The UW CEDAR Center will work directly with CRISP.

"We'll serve as an outreach hub for government and industry through the center at UW," Caldwell adds. "We'll be a clearinghouse for information about current cyber security threats and news about cyber security."

Borowczak already has met with local Laramie companies, including Medicine Bow Technologies, with the hopes that local companies can be a resource for current UW students, and he will also present at the Wyoming Cybersecurity Symposium on April 20.

WHAT IS CYBERSECURITY?

Cybersecurity is the body of technologies, processes and practices designed to protect networks, computers, programs and data from attack, damage or unauthorized access. In a computing context, security includes both cybersecurity and physical security.

In the coming weeks, CEDAR can be found online at uwyo.edu/cedar.

UW CALENDAR OF EVENTS

APRIL

April 7: An Evening With Garrison Keillor

April 10: Staff Recognition Day

April 14: Cowgirl Tennis vs. New Mexico

April 15: Cowgirl Tennis vs. Air Force

April 16: Easter Sunday

April 17–19: Cowgirl Golf at Mountain West Championship

April 21–23: Cowboy Golf at Mountain West Championship

April 22: COMBAT Color Run

April 28: Cowboy and Cowgirl Track host 7220 Invite

MAY

May 5: Last day of spring 2017 classes

May 8–12: Finals week

May 10–13: Cowboy and Cowgirl Track at Mountain West Championship

May 13: Spring commencement

May 15: UW summer hours begin

May 22: Summer courses begin

May 25–27: Cowboy and Cowgirl Track at NCAA West Preliminary Round

May 29: Memorial Day holiday

JUNE/JULY

June 7–10: Cowboy and Cowgirl Track at NCAA Championship

July 4: Independence Day holiday

July 28: Picnic in the Pasture for potential students

AUGUST

Aug. 30: First day of fall classes

SEPTEMBER

Sept. 4: Labor Day holiday

WyoCal

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

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

Fine arts: **uwyo.edu/finearts**

NEW FACILITIES

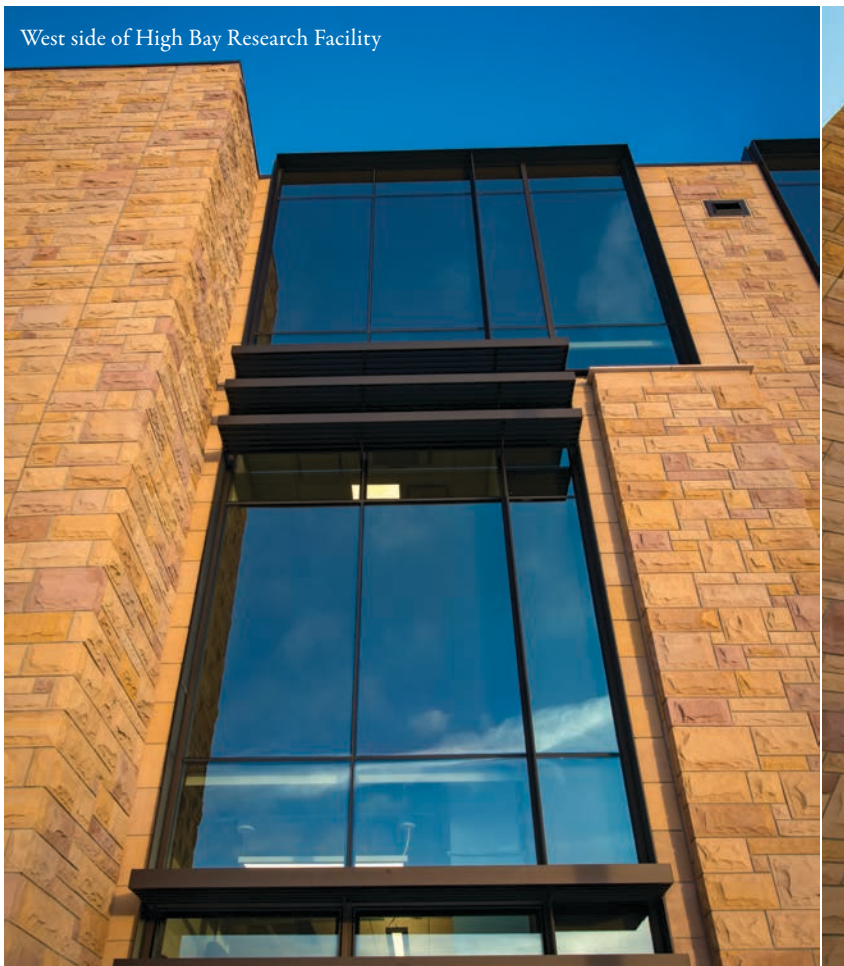
ENGINEERING EDUCATION AND RESEARCH BUILDING

Time lapse images of the EERB (GE Johnson photos)

This will be a state-of-the-art engineering facility that fosters innovation and collaboration among students and faculty. The approximately 100,000-square-foot facility is the most ambitious construction project in the university's history at $105 million. The facility is part of UW's Tier-1 Engineering Initiative.

Construction began in October 2016 and tangible progress is evident. The facility will be complete in 2019.

HIGH BAY RESEARCH FACILITY



West side of High Bay Research Facility

The facility was completed in January 2017. It contains about 90,000 square feet of high-bay and traditional laboratory space, and affiliated office and meeting areas. The research spaces will be for research into unconventional oil and gas reservoirs, part of UW's Tier-1 Engineering Initiative, and will house the Center of Innovation for Flow in Porous Media, Improved Oil Recovery Laboratory and Geomechanical/Petrology Laboratory.

A Structures Research Laboratory also is part of the new building. A grand opening ceremony, open to the public, will be hosted in August 2017.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5.041m²
P2
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UNIVERSITY OF WYOMING
College of Engineering and Applied Science
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Laramie, WY 82071-2000

"OBTAINING A DEGREE FROM UW WAS A VERY UNIQUE EXPERIENCE."

The classroom sizes are small, which allows the students to have more individualized education. It allows for very strong relationships and friendships to develop among classmates. My long-term friendships have been one of the most valuable aspects of my education."

-Kim Westbrook
Chemical Engineering '05