FORESIGHT

Fall 2011, Volume 36, No. 3

Chemical engineering research benefits diabetes management... (see story on page 3)

Working for Wyoming and the World

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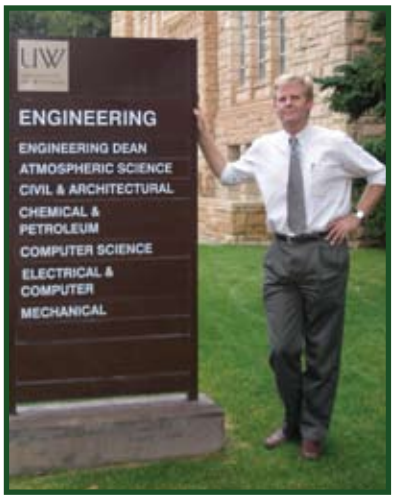
Message From the Dean



The cover story of this issue of Foresight features aspects of the college's endeavors regarding biological engineering, a rapidly growing area of engineering. New colleague, Dr. John Oakey is one of several members of the college's faculty actively engaged in this area of research and education.

This issue features several advertisements from organizations linked to the college in various ways. We are very appreciative for their support of the college and Foresight as we move forward with providing excellent educational and life–long learning opportunities.

The college continues progressing with steps toward renovating and extending the college's building facilities. My editorial is a useful occasion to outline advances and indicate some of the considerations. The steps essentially follow Wyoming's three-level planning process for developing legislative requests for capital outlay appropriations:

Level I – A general study that formally identifies the needs and opportunities the college faces, and outlines constraints such as building site availability. Also considered are growth estimates for enrollment and staffing, and areas where the college has strategic opportunity for further distinction. The costs associated with this level are modest and are being borne by the college and UW.

Level II – An analysis of alternative building configurations to meet the needs and opportunities. Included in this level are schematic designs, cost estimation and preliminary site investigations. This level also typically entails substantially greater costs than does Level I and requires private funding support and funding from the state.

Level III – The final level is the design completion, bidding and construction of the facility. In the process of completing Levels I and II, UW and the college will determine options for funding the building upgrade and expansion.

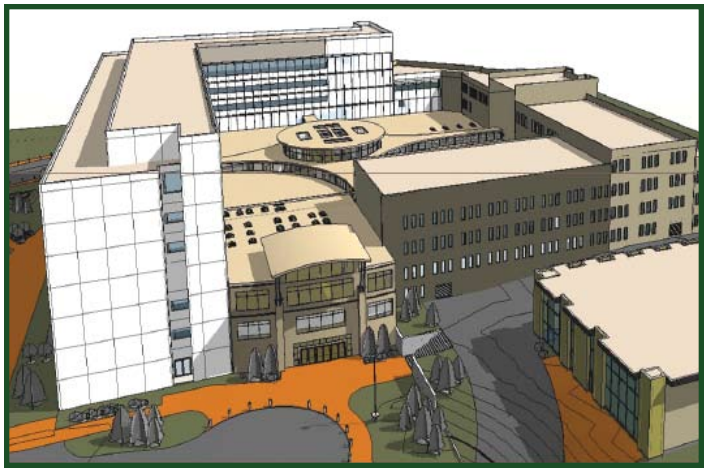
A planning team of faculty, staff, and students are well underway with the Level I study, aiming to complete it by late September. Professor Jay Puckett has also been appointed for a three–year term to serve as associate dean of facility development and will assist the college in leading the charge for this project. Additionally, UW also is laying the groundwork for the ensuing Level II study.

During the past several months the college passed some important milestones:

1. UW's Board of Trustees has approved UW's plan to request $1.25M in state–appropriated funds for use to support the Level II planning effort. This is very heartening news. However, additional funds of similar amount will be needed to fully cover the Level II effort. The college will need to retain special engineering–architectural expertise to identify effective and attractive optimal building arrangements.
2. Subsequent to Trustee approval, UW has submitted the college's Level II funding request as part of its overall budget submission to the state, several branches of which will consider and hopefully approve the request.

3. UW's Board of Trustees and UW Foundation Board members are planning to tour the "Sawtooth" in early September. These tours will acquaint both boards with the current inadequate state of the Sawtooth. More importantly, it will show the difficulty of conducting major construction in the nearly enclosed area the Sawtooth occupies. This point about construction is important, as early tentative assessments of cost and practicality prompt the idea that a new additional building may be needed for meeting the college's anticipated enrollment growth.

In round numbers, we are presently estimating for a college capacity of approximately 2,000 undergraduate students, 450 graduate students (M.S. and Ph.D.), 110 total faculty and 50 staff. Present numbers for the college are 1,320 undergraduate students, 260 graduate students, 81 tenure-track faculty, 14 academic professionals and 43 staff. We have prepared a detailed database of enrollment numbers, graduation rates, faculty staffing and research funding for most engineering programs in the U.S., and for a sub-set of comparator engineering colleges. As a reference point (recent numbers from the American Society of Engineering Education), U.S. engineering undergraduate enrollment grew by 3.9% during 2005—2009, and 5.4% during 2009—2010. Our own estimates take into account optimal relationships between undergraduate enrollment, faculty size, graduate enrollment, staff, and more.



Exterior building artistic rendering by architectural engineering graduate student Kendra Heimbuck.

It is convenient and fun having our own architectural engineering students help explore how the college building could be upgraded. This issue of *Foresight* illustrates two images generated by architectural engineering graduate student, Kendra Heimbuck of Laramie, Wyo. The upgrade may or may not look as she depicts, but the images certainly stimulate the imagination as to possibilities.

We hope you take advantage of the many exciting events coming to campus this fall.

Rob Ettema, Dean

CONTENTS

ON THE COVER: Professor John Oakey inspects a microfluidic device while Hao Zhang, a postdoctoral researcher from Changsha, China and Paige Fischer, a junior in chemical engineering from Arvada, Colo., look on. See story on page 3.

Microscale Research Advances Diabetes Management

Courtesy of John Oakey

Microfluidics, a field that studies and exploits fluids flowing within channels smaller than a human hair, is in the process of becoming big business. In tiny channels, fluids are easily and precisely controlled, an ability that can be utilized in a large and growing number of disciplines from environmental sensing to the on-demand production of hazardous chemicals.

In the Department of Chemical and Petroleum Engineering, Professor John Oakey's laboratory is developing biomedical applications for these tiny devices. His lab's interests reside in a research area commonly referred to as "lab-on-a-chip," where the goal is to miniaturize conventional instruments to the microscale where they can be linked together into complex, multistep processes. The end goal is biomedical instrumentation that is smaller, more sensitive, lower cost and requires less sample than existing equipment.

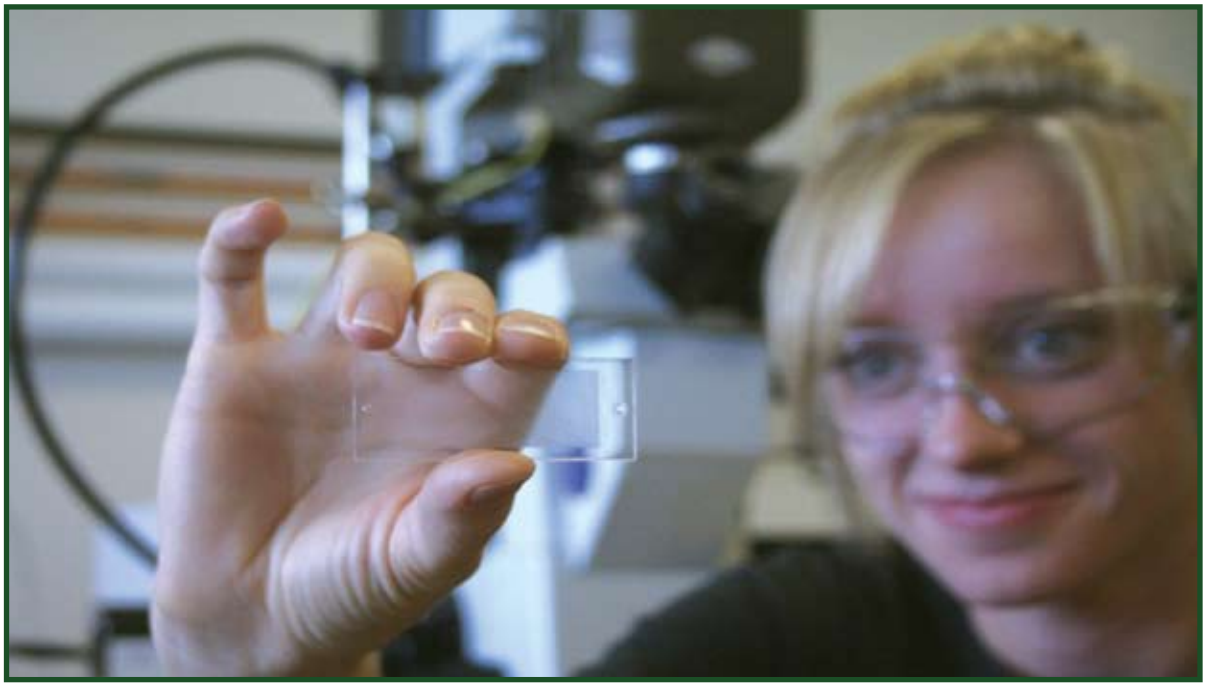
"We are starting to see the first wave of diagnostic devices be successfully deployed and they'll continue to appear everywhere from our doctor's office to resource-limited settings, such as disaster zones and areas that are globally underserved by health care," says Oakey. "We have to build our own instruments and obviously, with so many pieces to the puzzle, this field is interdisciplinary and quite collaborative."

Microfluidics research draws upon fundamentals in Engineering, Physics and Chemistry and requires as much instrument development as experimental design. Oakey's lab works cooperatively with groups at several universities and hospitals, including the Colorado School of Mines and University of Colorado, Boulder.

"The goal of the project is to create an "artificial pancreas" or, more accurately, restore natural function to the pancreas so that patients don't need to measure their glucose levels or self-administer insulin." says Professor John Oakey.

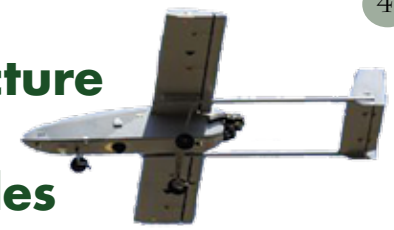
Oakey's lab is utilized for both diagnostic and therapeutic applications for microfluidics. "We build networks of channels through which living cells can flow and study how they behave and how we can engineer new capabilities around that behavior," Oakey explains. "We are very interested in how cells respond to different materials and and how we can quickly screen these interactions. Microfluidics helps us screen these interactions much more quickly, which enables us to develop and test new approaches to engineer tissue or regenerate lost function in organs."

With funding from Wyoming Idea Network for Biomedical Research, graduate student Kaspars Krutkramelis and Postdoctoral Researcher Hao Zhang are studying the effect of encapsulating insulin-producing cells in biomaterials with the hope of developing a strategy to restore insulin independence in Type I diabetes patients. The group is also interested in engineering materials to repair defects in structural tissues, such as cartilage, bone and tendon, as well as developing diagnostic and prognostic tests for cancer based upon the capture of rare cells that circulate in the bloodstream.



Amy Reece, a junior in chemical engineering from Gillette, Wyo., holds a microfluidic device, used in her research on rare cell capture. The chip contains thousands of parallel channels to process whole blood, selectively capturing rare cells that provide crucial information about the progression of diseases such as cancer, photo courtesy of John Oakey.

H.T. Person Homecoming Lecture Presents Overview of Unmanned Aerial Vehicles



Developing Cooperative, Autonomous, and Heterogeneous Unmanned Aerial Vehicles

In this lecture, Dr. Daniel J. Pack will present an overview of unmanned systems research and training activities at the U.S. Air Force Academy. He will describe a number of current research projects at the Academy Center for Unmanned Aircraft Systems Research that are sponsored by government organizations and industry partners to develop heterogeneous, cooperative unmanned systems technologies. Cooperative control, sensing, and communication challenges for multiple unmanned aircraft are also described. Finally, he will show the results of a research project on a heterogeneous, mobile sensor network, consisting of unmanned aircraft, mobile ground robots, and a set of stationary ground sensors, cooperating to perform the intelligence, surveillance, and reconnaissance (ISR) mission. For these missions, onboard radio frequency (RF) signal detectors as well as infrared (IR) and optical cameras as sensors were used. The project results illustrate the different roles played by the heterogeneous mobile sensor platforms as they cooperatively search, detect, verify, and locate ground targets using different target signatures, while demonstrating the scalability and effectiveness of the cooperative unmanned systems technologies.

Daniel J. Pack, professor of Electrical and Computer Engineering and Director of the Academy Center for Unmanned Aircraft Systems Research at the U.S. Air Force Academy in Colorado, received B.S. in electrical engineering, M.S.degree in engineering sciences, and Ph.D. degree in electrical engineering from Arizona State University, Harvard University, and Purdue University, respectively. He also spent a year as a visiting scholar at the Massachusetts Institute of Technology-Lincoln Laboratory. He has co-authored six textbooks on embedded systems (including 68HC12 Microcontroller: Theory and Applications and Embedded Systems: Design and Applications with the 68HC12 and HCS12) and published over 100 book chapters, technical journal/transactions, and conference papers on unmanned systems, cooperative control, robotics, pattern recognition, and engineering education.

In addition, Daniel is the recipient of a number of teaching and research awards including Carnegie U.S. Professor of the Year Award, Frank J. Seiler Research Excellence Award, Tau Beta Pi Outstanding Professor Award, Academy Educator Award, and Magoon Award. He is a member of Eta Kappa Nu (electrical engineering honorary), Tau Beta Pi (the engineering honorary), IEEE (senior member), and the American Society of Engineering Education. He is a registered professional engineer in Colorado. His research interests include unmanned aerial vehicles, intelligent control, automatic target recognition, and robotics.

SAVE THE DATE for These Exciting Events

September 21
3 p.m.
Distinguished Lecture Sponsored by the H.T. Person Fund
Raghu Ramakrishnan, Yahoo!
College of Ag Auditorium

October 14
8-10 a.m.
Breakfast on the Lawn
Prexy's Pasture

12 p.m.
H.T. Person Lecture—Dr. Daniel J. Pack
Director, Academy Center for UAS Research
U.S. Air Force Academy
Classroom Building Room 310

October 15
10 a.m.
Homecoming Parade
Featuring: Student Projects, 2011 Hall of Fame, 2011 Distinguished Engineer, & Energy Float

October 15
6 p.m.
Alumni Awards Banquet
Honoring Hall of Fame & Distinguished Engineer
Hilton Garden Inn/UW Conference Center
RSVP by October 7 to engevents@uwyo.edu

October 31
5:30 p.m.
Society of Petroleum Engineers Alumni Reception
Hyatt Regency Convention Center, Denver, CO

December 1
8 a.m. - 5 p.m.
Senior Design Symposium

December 2
7:30 p.m.
Commencement, A&S Auditorium

Event questions? Call us at (307) 766-4248
or contact us by e-mail to engevents@uwyo.edu.

Yahoo! Researcher to Lecture at UW

Yahoo! Chief Scientist for Search and Cloud Platforms Raghu Ramakrishnan will present a lecture about his research on **September 21, at 3 p.m. in the College of Agriculture Auditorium.** Raghu Ramakrishnan is a Yahoo! Fellow, heading the Web Information Management research group. **The lecture is free and open to the public.**

His work in database systems, with a focus on data mining, query optimization, and web-scale data management, has influenced query optimization in commercial database systems and the design of window functions in SQL:1999. His paper on the Birch clustering algorithm received the SIGMOD 10-Year Test-of-Time award, and he has written the widely-used text "Database Management Systems" (with Johannes Gehrke). His current research interests are in cloud computing, content optimization, and the development of a "web of concepts" that indexes all information on the web in semantically rich terms. Ramakrishnan has received several awards, including the ACM SIGKDD Innovations Award, the ACM SIGMOD Contributions Award, a Distinguished Alumnus Award from IIT Madras, a Packard Foundation Fellowship in Science and Engineering, and an NSF Presidential Young Investigator Award. He is a Fellow of the ACM and IEEE.

Ramakrishnan is on the Board of Directors of ACM SIGKDD, and is a past Chair of ACM SIGMOD and member of the Board of Trustees of the VLDB Endowment. He was Professor of Computer Sciences at the University of Wisconsin-Madison, and was founder and CTO of QUIQ, a company that pioneered crowd-sourcing, specifically question-answering communities, powering Ask Jeeves' AnswerPoint as well as customer-support for companies such as Compaq.

UW Homecoming Events

October 13
UW Cowgirls vs. TCU volleyball
7:00 p.m., UniWyo Sports Complex

October 14
Alumni Appreciation Breakfast on the Lawn, 8-10 a.m., Prexy's Pasture

H.T. Person Homecoming Lecture 12 p.m., Classroom Building Room 310

Former President of the Soviet Union, Mikhail Gorbachev, 3:30 p.m., Arena Auditorium
This event is open to the public.

Homecoming Sing and A Night of Madness, 7:30 p.m., Arena Auditorium (Doors open at 7:00 p.m.)

October 15
Cowboy Walk and Pep Rally, 9:15 a.m., West parking lot, Hilton Garden Inn & UW Conference Center

UW Homecoming Parade, 10:00 a.m., parade starts at Ninth and Ivinson

UW Cowboys vs. UNLV Rebels football game, 12:00 p.m., Jonah Field at War Memorial Stadium

UW Cowgirls vs. New Mexico volleyball match, 7:00 p.m., UniWyo Sports Complex

Puckett Appointed Associate Dean of Facility Development

The dean recently announced the appointment of Professor Jay Puckett as the college's Associate Dean for Facility Development.

In addition to his duties as the Vincent O. Smith Professorship in Engineering in the Department of Civil and Architectural Engineering, Puckett is a registered (structural) professional engineer in Wyoming. He obtained his B.S. in civil engineering from the University of Missouri in 1978, and continued his education at Colorado State University where he obtained his M.S. in 1980 and his Ph.D. in 1983.

Professor Puckett is known nationally for his scholarship and teaching in structural engineering, specifically as applied to highway bridges. His textbook, Design of Highway Bridges - An LRFD Approach, is widely accepted as one of the most authoritative in the field. He serves the bridge engineering community nationally as an advisor, committee member and consultant to the American Association of State Highway and Transportation Officials (AASHTO). Puckett has also served on several committees of the National Academies of Science and Engineering and as a research contractor to the Cooperative Highway Research Program. He was instrumental in starting the ASCE Journal of Bridge Engineering and served on the original team of editors. In 2000 he was inducted into the Academy of Distinguished Alumni at the University of Missouri at Columbia.

Puckett's appointment is for a 3-year term, starting June 1, 2011. The position's main charges are to work closely with the dean, department heads, and collaborative partners in providing the leadership and analytical underpinning needed to complete the comprehensive upgrade and expansion project upon which the college is now embarked. The project, as presently conceived involves 1) replacement of the so-called "Sawtooth" which is in the center area of the Engineering Building; and, 2) develop a laboratory research building (or buildings). Puckett will also be instrumental in assembling metrics to support the college facility planning effort.

Artistic rendering by architectural engineering graduate student Kendra Heimbuck, looking south from a virtual atrium area replacing the "sawtooth" section of the building.

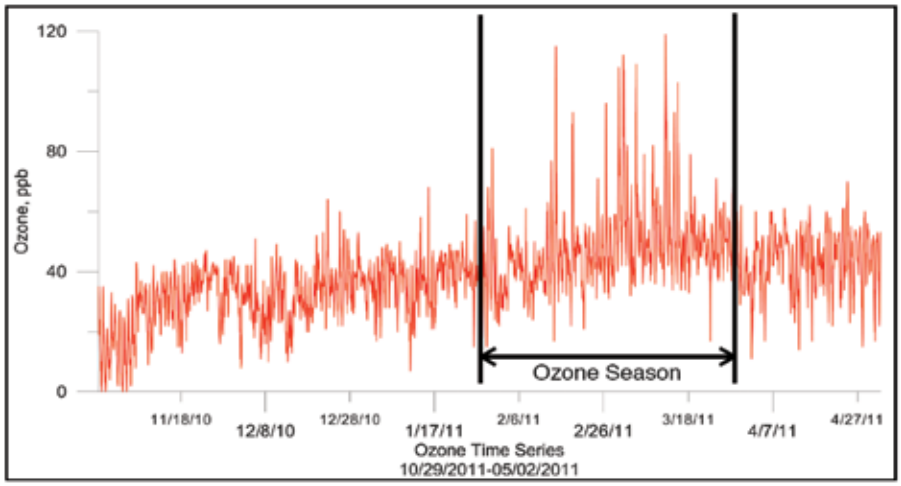
Above is a view of a drill rig in the Upper Green River Basin. Figure below shows ambient ozone concentrations measured at the UW mobile laboratory at Boulder Wyoming November 2010 to April 2011; photo courtesy of Jeff Soltis.

Atmospheric Scientists Conduct Ozone Measurements in Sublette County

Courtesy of Atmospheric Science

Last winter Dr. Robert Field and his colleagues Jeff Soltis and Professor Derek Montague from the Department of Atmospheric Science carried out the first year–long phase of a two year project to understand how elevated levels of volatile organic compounds (VOC) affect the formation of wintertime ozone, a pollutant controlled through the Clean Air Act, in Sublette County, Wyoming. For the first time, a thorough assessment of the atmospheric concentrations of VOC associated with oil and gas development emissions were made in the area. The more than two thousand hourly measurements show that natural gas development is indeed the main contributor to the VOC composition of the air.

Ozone formation in winter was, until recently, an unrecognized phenomenon in the air quality community. Its discovery in Sublette County therefore drew significant attention to the region. The winter of 2011 created 'perfect storm' conditions for ozone production, with cold temperatures and deep snow cover across the Upper Green River basin. The photo above shows snow cover in mid February. The figure (rigth) shows ozone levels measured at the UW mobile lab, situated near the town of Boulder, south of Pinedale. Ozone levels peaked during February and March, the time period now known as "winter ozone season".



Researchers at UW and regulators at the Wyoming Department of Environmental Quality measured ozone levels at numerous monitoring stations in the basin in 2011, and postulate that stagnant air masses, enriched with ozone through the sunlight driven reactions of VOC with oxides of nitrogen, drift from south to north across the basin in late afternoon. For the first time, high ozone levels were recorded in the town of Pinedale. An initial analysis of the data shows that ozone concentrations in the basin matched those of the previous worst season, in 2008. At the UW site the National Ambient Air Quality Standard for ozone of 75 ppbv was exceeded on 11 different days. Given these high ozone levels, the UW VOC measurements are especially valuable for on-going scientific assessments attempting to model ozone formation.

2011 Hall of Fame

HANK B. SWARTOUT

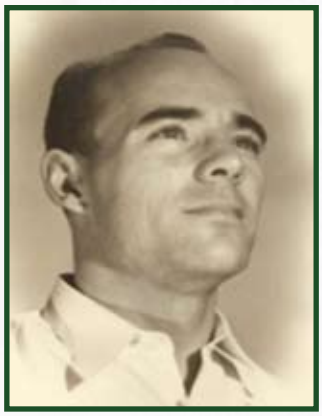
Hank was born in 1951 and raised in Melfort, Saskatchewan. After graduating high school from St. Peter's College in Muenster, Saskatchewan, Hank moved to Calgary in 1971 and completed the petroleum program at Calgary's Southern Alberta Institute of Technology. He then attended the University of Wyoming and graduated with honors in petroleum engineering.

In 1978, Hank returned to Calgary and joined Nabors Drilling to build rigs for use in Alberta and Alaska. He then moved to Edmonton in 1981, to manage the rig design and construction business of Dreco Energy Services Ltd., delivering drilling rigs to clients for use in 48 Southern states, Canada, Alaska, and overseas.

In 1985, Hank went into business for himself in Calgary and purchased an interest in Cypress Drilling which only had three drilling rigs and 20 employees. In 1987, Cypress acquired the drilling assets of Precision Drilling Ltd. As the executive chairman and founder of Precision Drilling (1987) Ltd., he was able to direct and lead Precision Drilling into becoming the third largest oilfield service company in the world with over 15,000 employees and working in 34 countries. Hank retired from Precision Drilling in August of 2007, and continues to be active in small private oil and gas companies. He continues to be a leader and mentor in the oil and gas industry.

Hank resides in Calgary, Alberta Canada with his wife, Carol and together they have four children and five grandchildren.

LYLE BJORN



Lyle Bjorn (1916–1983) came from a pioneering family which homesteaded in Wyoming. That adventurous spirit carried into his love for flying. As a teenager, Lyle designed and built a glider which he tested from ski jumps.

Lyle worked in aircraft design and became a test engineer before working on missiles and rockets. After working in missile development, he tested Navaho and Hound Dog missiles before being assigned to the Saturn/Apollo Project. His career spanned the space program from its infancy to manned lunar landings.

As manager of testing and operations on Stage II of the Saturn V Rocket, Lyle led a team of 400 engineers and technicians. His overall responsibility was to prepare SII for launch. This included completion of test procedures and the prelaunch checklist which his team wrote. Over 1,000 parameters were measured and analyzed when engineering calculations were made by slide rule. The reliability of the five 80,000 RPM turbo pumps was critical to the rocket's thrust. Lyle was in the Launch Control Center and gave the OK that SII was ready.

Even though Lyle made significant contributions to the U.S. Space program, perhaps his greatest legacy was his ability to uplift and enrich the lives of those who knew him. That quality is still felt today.

2011 Distinguished Engineer

TED C. GERTSCH

Ted was selected as the recipient of the 2011 Distinguished Engineer. He graduated in 1951 from Loveland, Colo., high school and attended UW beginning fall 1959. He graduated with honors in 1962 with a B.S. in civil engineering with an architectural option. He is a registered Professional Engineer and Architect.

"It is with gratitude, humility, and pride that I accept the College of Engineering and Applid Science Distinguished Engineer/Scientist Award," says Gertsch. "Thanks for the educational experience, I am grateful for this honor."

During his time between high school graduation and attending UW, he worked construction and served in the U.S. Army. He also studied one year in the school of Architecture at Colorado University. After graduation from UW, he served four years with the UW Physical Plant and four years as a full time instructor in the Department of Civil and Architectural Engineering. He served as an adjunct professor in the department from 1995-1998.

Ted cofounded Gertsch/Baker and Associates in Laramie, Wyo., in 1973 and has been actively involved in the company for 36 years. Along with consulting, he was involved with the Laramie City Council for six years, serving as mayor for two years during that same time. He was active with the Wyoming Senate for one year, Kiwanis, Chamber of Commerce, Boy Scouts of America, and served as a board member for a local bank for fifteen years.

Currently Ted is a member of the City of Cheyenne Housing and Community Development Committee and the Parent Advisory Committee for Laramie County School District #1 of Cheyenne. Ted lives in Cheyenne with his long–time friend Sharon and they are proud grandparents of four.

Call for Nominations

Hall of Fame
Wyoming Eminent Engineer
Outstanding Alumnus Engineer

If you know of an outstanding engineer you wish to nominate for the College of Engineering and Applied Science Hall of Fame contact us via e-mail at engevents@uwyo.edu or (307) 766-6433. Eminent Engineer award nominations are also being sought and may be directed to Steven Barrett at SteveB@uwyo.edu or visit the Tau Beta Pi Web site at www.eng.uwyo.edu/societies/tbp and click on Eminent Engineer Nominations. Deadline is January 31, 2012.

Natural Gas Vehicles—Driving the Frontier

By Amy Zmolik, External Relations Advisor
Encana Natural Gas Inc.

Natural gas vehicles (NGVs) are making major strides in Wyoming. NGV supporters across the state have witnessed some major accomplishments this year. One of the most significant occurred in March with the passing of House Bill 235 calling for the conversion of 20 state government vehicles from gasoline to natural gas. Achievements as these are made possible by avid supporters such as the Wyoming Natural Gas Vehicle and Infrastructure Coalition (WYNGVIC), a group comprised of 11 natural gas producers and 16 other entities including State of Wyoming departments. Leading the efforts of this coalition is Encana Oil & Gas (USA) Inc., a major natural gas producer in Wyoming that has been integral in efforts to increase the numbers of vehicles and fueling stations across the state.

Currently, three public natural gas fueling stations are established in Wyoming along the I-70 corridor in Cheyenne, Evanston and Rock Springs. Through the resilient efforts of the WYNGVIC and Encana, Wyoming will soon see the addition of three public natural gas fueling stations north of I-80 – the first of which is currently being constructed by Encana in Riverton and will open this fall. This will be followed by a Sublette County School District station in Pinedale and a Questar station in Marbleton.

The addition of these stations means the addition of NGVs. This enhanced infrastructure provides necessary fueling for fleets hoping to convert. With substantial operations in Wyoming, Encana has a fleet of over 200 trucks in the state and is beginning to convert vehicles to operate using bi-fuel engines – capable of running on natural gas or gasoline. These trucks carry additional natural gas fuel on board that extends the range of these vehicles another 300+ miles, and driving these trucks using natural gas means better air quality for Wyoming.

Cleaner emissions is just one benefit offered by NGVs. Natural gas offers up to a 29% reduction in greenhouse gas emissions over gasoline. It is also more affordable with a 20%-40% reduction in fuel costs. With these advantages and the fact that the U.S has over a 100 year supply that can help displace foreign oil, it is easy to see why the Cowboy State is tipping its hat to NGVs.

Photo of Red River Natural Gas Station courtesy of Encana.


When it comes to lowering emissions, we've not just talking the talk or walking the walk.
We've driving the drive.
4X4
We are converting 30 percent of our vehicles in the southern Rockies so that they can run on natural gas. We're doing this, quite frankly, because it's good for the environment and it's good for business. We are Encana.
encana.
natural gas
Learn more about natural gas and Encana at www.encana.com

Master Technician, Brent Glover, prepares the Wyoming Cloud Radar (WCR) for a test flight on the UW King Air.

Scientists Conduct Cloud Research in St. Croix, U.S. Virgin Islands

Courtesy of Jeff French

Scientists and faculty from the Department of Atmospheric Science (UW-DAS) participated in "The Ice in Clouds Experiment-Tropical Field Campaign" (ICE-T) this past July in St. Croix, US Virgin Islands. Research Scientist Dave Leon and Professors Zhien Wang and Jeff Snider were principal investigators in the campaign aimed at investigating the onset and initial growth of ice in convective clouds within the maritime tropical environment. Even in the tropics, ice processes are critical to precipitation development in convective clouds. Tropical clouds in turn are important to the global water cycle.

As part of ICE-T, Drs. Leon, Wang and Snider in collaboration with scientists from several universities across the United States, used the National Science Foundation/ National Center for Atmospheric Research C130 research aircraft to obtain measurements within growing cumulus clouds to measure ice concentrations and to determine mechanisms responsible for the initial formation of ice and the factors responsible for controlling how much ice is produced. Key instruments on the C130 included the Wyoming Cloud Radar (WCR) and Wyoming Cloud Lidars (WCL) which allow investigators to "look into the cloud" away from the aircraft to gain a better understanding of the processes occurring in these clouds. Both the WCR and WCL(s) are part of the University of Wyoming King Air National Facility and are operated regularly on the UW King Air as well as other NSF aircraft to investigate atmospheric processes in clouds. In addition to the scientific investigative personnel from UW-DAS, scientists Jeff French, Larry Oolman, and Sam Haimov participated in ICE-T to support the deployment of these critical instruments. ICE-T was the fourth deployment for these instruments and the third outside of the continental United States in past 10 months.

Chemical Engineers Collaborate with Argonne National Laboratory

Courtesy of Joseph Holles

Joseph Holles, associate professor of Chemical and Petroleum Engineering, has entered into collaboration with Jeffrey Miller, senior chemist, Chemical Sciences and Engineering Division of Argonne National Laboratory to investigate the structure/property relationship of palladium/ gold nanoparticle catalysts. The catalysts will have the palladium preferentially located on the surface in order to produce a desired change in the electronic properties of the catalyst compared to pure palladium catalysts. Miller will synthesize the catalysts and perform X-Ray Absorption Spectroscopy on the catalysts at Argonne National Laboratory to determine the structure of the palladium surface atoms. Holles will perform hydrogen chemisorption and ethylene hydrogenation reactivity experiments on the catalysts at UW to determine the catalyst structure effects on binding energy and reactivity.

International collaboration in the Department of Chemical and Petroleum Engineering

Courtesy of Carol Robinson & Norman Morrow

The Petrophysics and Surface Chemistry (PSC) Group in the Chemical and Petroleum Engineering Department has collaborative research on enhanced oil recovery reaching around the globe. The group, run by Wold Chair of Energy Norman Morrow, is working on several key areas of oil recovery research including improved waterflooding and recovery by spontaneous imbibition.

Research on spontaneous imbibition, a key mechanism for oil recovery from fractured reservoirs, includes collaborations with researchers at the University of Loughborough (UK), and the University of Manitoba (Canada); experimental work includes MRI imaging of oil and water within the pore spaces of rocks at the ConocoPhillips Research Center, Bartlesville, and radioactive tracer imaging at the University of Bergen (Norway).

Research on improved waterflooding, by far the most widely applied method of increasing oil recovery, includes low salinity waterflooding, Coal Bed Methane waterflooding, capillary number and microscopic displacement efficiency, and sequential waterflooding. Low salinity waterflooding was pioneered at UW in the 1990s. Field applications of low salinity waterflooding are now being implemented world-wide. Research into the mechanisms responsible for improved oil recovery due to low salinity waterfloods and optimization of injection brine compositions is still ongoing. Sequential waterflooding is an unexpected outcome of repeated use of individual cores in the study of low salinity waterflooding. Even without change in salinity, each core flood could significantly alter the outcome of subsequent tests with systematic reduction in residual oil from one flood to the next. Two patents on field application of this new method of improved oil recovery were filed by the PSC group. Single well field testing of this method is under consideration by a major oil company. Continued research includes collaboration with the department of Applied Math at the Australian National University on micro-x-ray computer tomography and nano-scale detail of changes in surface deposition of crude oil components that accompany waterflooding.

At the molecular level, the interfacial tensions and other properties of oil/water, gas water, and gas/oil interfaces that determine oil recovery are being investigated by molecular simulation in collaboration with researchers at the University of Kyoto (Japan).

NSF Grant Assists Civil Engineers in Research of Water Treatment Systems

Courtesy of Jonathan Brant

Dr. Jonathan Brant, Dr. Thom Edgar and Ryan Kobbe are working on an NSF grant funded project to study the implications that nanotechnology, and the associated manufactured nanomaterials, may have for the safety of drinking water. Jonathan, Thom and Ryan, from the Department of Civil and Architectural Engineering, will have different focus areas regarding the research. Jonathan will serve as the Principal Investigator and be responsible for coordinating all research efforts while studying nanomaterial removal in different treatment processes, Thom will primarily be working on the nanoparticle infiltration into the subsurface aspect of this project, while Ryan will be organizing and executing the outreach activities to high schools in Wyoming. Graduate student Erik Pfeiffer is also collaborating on this project, while he pursues his masters in environmental engineering at UW. The three-year project, budgeted at $326,480, is titled Quantifying Nanomaterial Dose in Drinking Water and Assessing the Environmental Risks Posed by Residual Waste Streams Rich in Manufactured Nanomaterials and is being funded by the National Science Foundation.

The main emphasis of the project is to study the removal of manufactured nanomaterials by conventional and advanced drinking water treatment processes. Through this study, researchers will quantify what the dose (i.e., the concentration of nanomaterials that someone would injest when consuming drinking water) of different manufactured nanomaterials are likely to be following conventional and advanced treatment of drinking water. During this project they will also study the release of manufactured nanomaterials from the residual waste streams that are produced during water treatment. For example, the nanomaterials that are removed during clarification end up in the sludge that is eventually disposed of in an evaporation pond. They will assess the extent to which these nanomaterials may escape from the evaporation pond through the composite clay liner and ultimately into the groundwater system. In this respect, they are determining whether water treatment plants serve as sinks or sources of manufactured nanomaterials. The proposed research will advance discovery and understanding while promoting teaching, training and learning through our work with educational outreach programs.

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Alumni Highlights

Henry Bauer Selected Fellow of CSAB

Courtesy of UW News

Henry Bauer, University of Wyoming professor emeritus of computer science, has been selected as a fellow of Computing Sciences Accreditation Board (CSAB) Inc., the profession's leading accreditation program. He was honored for his outstanding contributions to the computing profession and to computing education.

CSAB is part of the Accreditation Board of Engineering and Technology (ABET) Inc., the recognized accreditor for college and university programs in applied science, computing, engineering and technology. ABET accredits more than 3,100 programs at more than 600 colleges and universities worldwide.

During his 33 years at the university, Bauer served as chairman of the Department of Computer Science (1978-86, 1993-97) and associate dean in the College of Arts and Sciences (1997-2006). He was among the first program evaluators to serve CSAB in 1985 and became a commissioner for CSAB's Computing Science Accreditation Commission (CSAC).

A specialist in compiling for parallel machines, Bauer joined the UW faculty in 1973 after receiving his Ph.D. in computer science at Stanford University.

Donald Blackketter Appointed Chancellor of Montana Tech

The Board of Regents approved hiring Donald Blackketter to become the next chancellor of Montana Tech of The University of Montana during its May meeting at Flathead Valley Community College in Kalispell.

Blackketter served as dean of the College of Engineering at the University of Idaho in Moscow and began his new duties at Montana Tech in Butte on June 27. Blackketter earned bachelor's, master's and doctoral degrees in mechanical engineering from UW. After earning his doctorate, he joined the University of Idaho (UI) in 1989 as a mechanical engineering assistant professor and moved through the ranks to become a full professor in 1997. He was assistant director for the National Institute for Advanced Transportation Technology from 1998 to 2005, including one year as acting director. In 2005 he was elected chair of UI's Department of Mechanical Engineering, and he accepted appointment as dean of the College of Engineering in December 2008.

Blackketter has been an active researcher for more than 20 years, focusing on solid mechanics and receiving more than $3.7 million in funding from a variety of sources. He has performed research and published in areas that include composite materials, biomechanics, numerical methods and hybrid vehicles.

In Memoriam

Sadly since our last issue, we have lost the following alumni. Our sympathy goes out to the families of our valued alumni and friends.

William H. Osterberg	Lincoln, NE	B.S. civil engineering 1957
Douglas J. Stobart	Hagerman, ID	B.S. electrical engineering 1974
Joseph O. Church	Englewood, CO	B.S. electrical engineering 1966
John R. Anderson	Miami, FL	B.S. electrical engineering 1947
Arnold G. Sisson	Rockwall, TX	B.S. electrical engineering 1963
Clay L. Sivertsen	Oceanside, CA	B.S. mechanical engineering 1952
Milton F. Vollmer	Windsor, CO	B.S. electrical engineering 1935
Ryan E. Bright	Federal Way, WA	B.S. electrical engineering 1989

Faculty and Staff Highlights

Reviewing for the PE Exam

Cameron Wright, Associate Professor in the Electrical and Computer Engineering Department, wrote an article outlining various preparation and study tips for passing the Professional Engineer (P.E.) exam. The article also lists sources for various types of study manuals and other study aids; it appears in the August 2011 issue of IEEE Today's Engineer and can be found at the URL: http://todaysengineer.org/2011/Aug/PE-Review.asp.

Russian Version of New Textbook Now Available

Vladimir Alvarado, assistant professor in the Department of Chemical and Petroleum Engineering, in cooperation with Dr. Eduardo Manrique, has released the Russian version of their book titled Enhanced Oil Recovery: Field Planning and Development Strategies.

John & Sally Steadman Endowment Awarded to Mechanical Engineer

Assistant Professor Yuan Zheng from the Department of Mechanical Engineering is the recipient of the 2011 grant from the John and Sally Steadman Endowment for Undergraduate Teaching Improvement.

Zheng is associated with the new Energy Systems Engineering Program. He plans to use the funding to purchase three small scale solar collectors and a pyranometer for in-class demonstrations and course projects in the Solar and Geothermal Engineering course. The hands-on experience with small-scale solar collectors will significantly help students to understand how the conversion of solar energy varies with time, incidence angle, environmental conditions and collector design.

The first course project will involve measurements and predictions of electrical energy generation from the PV panel; the second course project will involve design, construction, and heat transfer analyses of a non-concentrating solar collector using evacuated tubes; the third course project will involve design, construction, and operation of a concentrating parabolic solar BBQ cooker. All three projects will involve measurement of incident solar radiation under various conditions.

Ryan Kobbe Joins Civil and Architectural Engineering

Ryan Kobbe joined the faculty in the Department of Civil and Architectural Engineering beginning this fall. As an academic professional/assistant lecturer, he will instruct a civil engineering materials course and co-advise graduate students. Ryan was previously an assistant lecturer in the college Center for Student Services where he was responsible for employment services, academic advising,

Ryan grew up in Farson, Wyo. He received a B.S. in architectural engineering from UW in 2003 and M.S. in civil engineering from Washington State University in 2005. Prior to joining the college in 2008, he worked for Structural Solutions in Casper, Wyoming and then for Idaho National Laboratory in Idaho Falls, Idaho.

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Liqiang Wang Receives National Science Foundation Career Award

The National Science Foundation has selected Liqiang "Eric" Wang for an Early Career Faculty Development award. Eric is currently an assistant professor in the college. The award of $450,495 will assist Eric as he conducts research on scalable error detection for parallel software systems on high-performance computing platforms.

High-performance computing introduces many new challenges to parallel program design, where a computation may involve hundreds of thousands of processes with multiple-level parallelism. It is very difficult to debug such large-scale parallel programs. Scalable and light-weight correctness tools are critical to combat this challenge.

This research seeks to design innovative algorithms and develop a scalable toolkit to efficiently and effectively analyze parallel programs and detect potential errors on the emerging heterogeneous and extreme scale computing platforms. Specifically, the objectives of the research are to: (1) develop instrumentation tools and optimized monitoring systems to support building tools for error detection, (2) design various optimization strategies and techniques to improve scalability and reduce overhead, (3) integrate static and dynamic program analyses to improve reporting accuracy and code coverage, (4) design more accurate and efficient detection techniques on large-scale parallel systems, and (5) investigate domain-specific techniques for error detection and optimization.

This research will greatly help the development of extreme scale parallel programs for scientific computing and discover hard-to-find errors in early stage. It will significantly reduce

UW Photo

the burden of tedious debugging activities, so researchers can focus on scientific problems. The toolkit is targeted for general computing platforms, from local clusters to extreme scale supercomputers. In the education thrust, the research results will facilitate the development of new courses and enhance existing ones. High-school, undergraduate, and graduate students will have opportunities to get involved in the research.

Liqiang (Eric) Wang has been an assistant professor in the Department of Computer Science at UW since 2006. He received a Ph.D. in Computer Science from Stony Brook University in 2006. His research interest is the design and analysis of high-performance computing systems. For analysis, he is mainly working on concurrency-related error detection. He is currently working on data-intensive parallel computing on multicore CPU, GPU, and Cloud Computing platforms. His research has been supported by NSF, ONR, NASA, and the University of Wyoming.