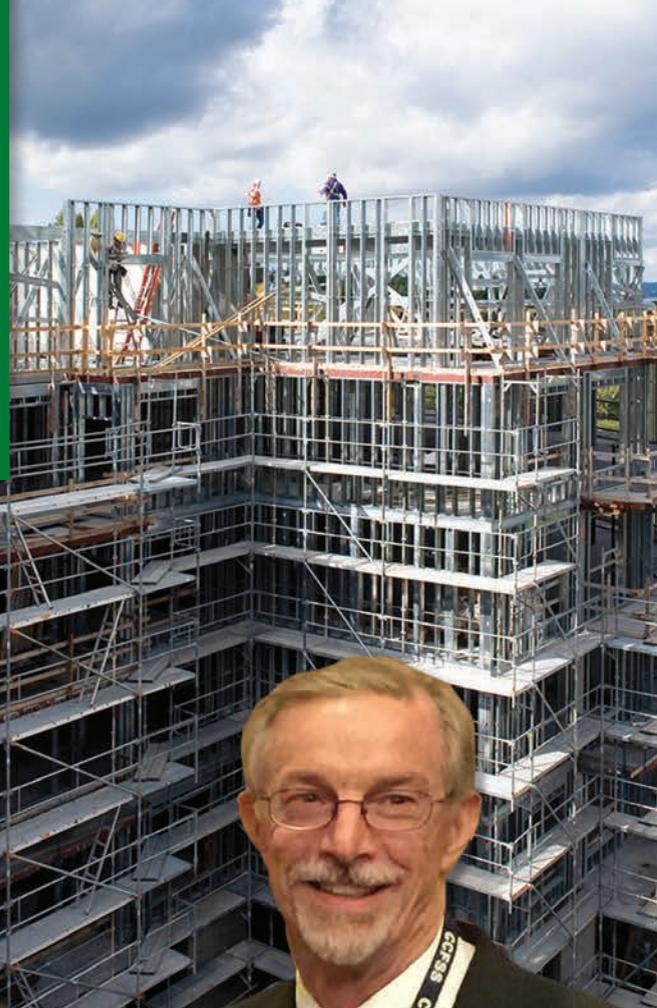


THE BRIDGE

Missouri S&T
Winter 2016 | Vol. 37

Civil, Architectural and Environmental Engineering



World's only
cold-formed steel
conference

page 16

Dr. Wei-Wen Yu, founding director, and
Dr. Roger LaBoube, current director,
of the Wei-Wen Yu Center for Cold-Formed
Steel Structures



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FROM THE CHAIR: Joel G. Burken, Ph.D., P.E., BCEE, F.AEESP



I am pleased to go into the 2017 semester as chair of the CArE Engineering Department. In the year ahead we plan to continue to build upon the strengths of our academic and research programs, to continue our reputation in producing excellent “street-ready” engineers and to enhance our reputation as a premier technological research university. We look forward to celebrating the strong legacy of our department.

In 2017, we will continue to move forward with the department’s strategic plan — Vision 2020 — and gain ground on the following three goals with the help of our faculty, students and alumni.



1. Advancing our educational and research facilities with the Advanced Construction and Materials Laboratory (ACML).
2. Establishing a Professor of the Practice position to promote the preparation of our students to enter the engineering profession.
3. Supporting our students who seek advanced education and are working as graduate teaching assistants in our educational programs.

In particular, we will continue to expand the footprint of Butler-Carlton Hall and move forward with the ACML project to broaden our capabilities. The addition of new faculty expertise and investment in instrumentation will be housed in the new facility built to be a comprehensive addition to our infrastructure research.

Speaking of new faculty, we are thrilled to welcome **Dr. William “Bill” Gillis**, **Dr. Chengling “Bob” Wu**, and **Dr. Xiong Zhang**, to our group. (see page 8)



Chi Epsilon “Pie Your Professor” was a hit. Visit our Facebook page for video and more photos.

Their experience and knowledge will enhance our expertise and build upon our legacy. We are anxious to bring in a few more team members this spring.

Sadly, over the holidays, we said goodbye to a beloved pillar of our department — **Dr. Joseph Senne**. Dr. Senne passed away at the age of 97 (see page 23). His career at UMR/S&T spanned over 40 years, including serving as chair for 20 years. He left an indelible imprint on our department and campus as a pioneer in many ways, including establishing the Academy of Civil Engineers and being the inspiration, designer and driver of the Stonehenge project that stands as a monument to his brilliance as an engineer and visionary.

I’d also like to acknowledge the contributions of our team in Rolla. In particular, I want to call attention to three long-standing team members, **Marsha Grayer**, **Darlene Turner**, and associate professor **Jerry Bayless**. Marsha and Darlene have completed 35 and 30 years of service, respectively, on campus — most of which have greatly enhanced our department function and culture. I want to extend my sincere appreciation for their efforts and impact. And what more can I say about Jerry Bayless, a.k.a. “Mr. UMR?” Jerry announced he will retire in 2017. Stay tuned as we plan to celebrate over Homecoming honoring his unparalleled contributions. Feel free to contact me by email at burken@mst.edu for details about Jerry’s celebration or anything covered in this *Bridge*.

THE BRIDGE



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OUTSTANDING PAPER

Congratulations to **Dr. John Myers** and doctoral student **Zena Al-Jazaeri** for receiving the outstanding paper award at the International Conference on Sustainable Construction Materials and Technologies in Las Vegas. The paper was titled "Strengthening of Reinforced Concrete One-Way Slabs for Flexure Using Composite Materials: Evaluation of Different Composite Materials."

Even better, the work is expected to move from the lab to the real world when the innovative composite material is used to rehab a load-posted bridge in Howell County, Mo.

ALUMNI AWARD

Congratulations to **Tom Feger**, CE'69, who was awarded the Frank H. Mackaman Volunteer Service Award at this year's Legends Alumni Awards event from the Miner Alumni Association.

DEPARTMENT ADMINISTRATION

Department Chair

Joel Burken, Ph.D., P.E., BCEE, F.AEESP

Assistant Chairs

Civil: Eric Showalter, Ph.D., P.E.

Architectural: Stuart Baur, Ph.D., A.I.A.

Environmental: Mark Fitch, Ph.D.

Graduate Program: Cesar Mendoza, Ph.D.



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ALUMNI **OF** INFLUENCE

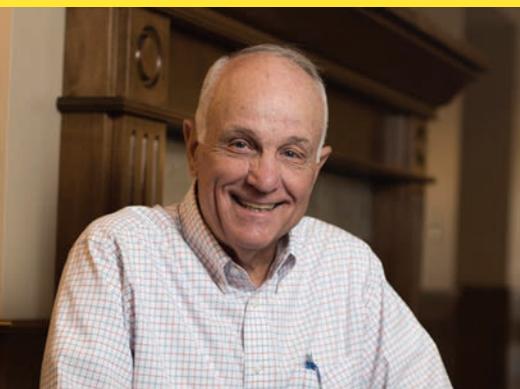
Three civil engineering graduates were recognized as Missouri S&T 2016 Alumni of Influence — the university's highest honor. These Miners were celebrated for their visionary contributions to our university and the wider world. Read their full profiles online at influence.mst.edu.

photos by Sam O'Keefe



Bob Brinkmann, CE'71 BUILDER AND BIG THINKER

While Brinkmann Constructors is known today for the client service that brings 80 percent of customers back, founder **Bob Brinkmann** says the best part of the business will always be building stuff. "The fun is being in your boots putting the footings in," says Brinkmann, who has two other passions that have shaped the company — mentoring and giving back.



Matt Coco, CE'66 TRUE AND TIRELESS BELIEVER

"I've built everything from rocket plants to a hockey rink," says **Matt Coco**, a former alumni association president and S&T trustee who retired from Alberici in 2006 as vice president of the building division. "I enjoy the construction process, especially industrial construction because you have to make sure something works."



Don Gunther, CE'60 GLOBAL GROUND BREAKER

When Bechtel formed its first executive committee, **Don Gunther** was a founding member. Before long, he was in charge of the company's international division, where he led a reorganization. "We had a map of the world in our conference room," Gunther says. "We asked ourselves 'Where's the money to build things?' Then we set up engineering offices in the 20 top markets."

Sunderland Foundation gives \$100k to help build new S&T lab

by Mary Helen Stoltz

The Sunderland Foundation, the charitable arm of Ash Grove Cement Co., recently donated \$100,000 to Missouri S&T to support construction of the planned Advanced Construction and Materials Laboratory (ACML).

The laboratory will provide 12,600 square feet of research space for developing and testing new construction materials and methods. These innovations will offer faster, longer-lasting, more cost-effective and greener solutions to building and infrastructure challenges.

“The Advanced Construction and Materials Lab will help us realize our long-term vision of developing safer, more durable and longer-lasting civil infrastructure,” says **Dr. Kamal H. Khayat**, lab director and the Vernon and Maralee Jones Professor of Civil Engineering at S&T.

The ACML will also be vital to interdisciplinary collaboration and will support Missouri S&T’s Advanced Materials for Sustainable Infrastructure signature area. More than 35 pieces of testing equipment currently scattered across campus and at the Hy Point Industrial Park will be consolidated into the new research space.

The Advanced Materials for Sustainable Infrastructure signature area focuses on the rehabilitation of urban

mass-transportation centers, including highways, bridges, tunnels, rail, airports, and port and water navigation channels, as well as utility infrastructure. It encompasses four S&T research centers and six academic departments.

“Infrastructure is the foundation that connects the nation’s businesses, communities and people, driving our economy and improving our quality of life,” says Khayat. “S&T has existing strengths in this area and with further emphasis, we can become a best-in-class leader.”

“We are fortunate to be a part of S&T’s vision to build long-lasting civil infrastructure by developing new products with cutting-edge technology,” says Kent Sunderland, president of the Sunderland Foundation. “The research and teaching that will take place in the Advanced Construction and Materials Laboratory is vital to the nation’s economy.”

Based in Overland Park, Kansas, Ash Grove Cement is the largest U.S.-owned cement company.

Donors to the ACML project can double their support through dollar-for-dollar matching funds provided by a \$3 million gift from the estate of the late **James A. Heidman**, CE’65.

KHAYAT RANKED AS ‘MOST CITED’ IN CIVIL ENGINEERING

by Velvet Hasner

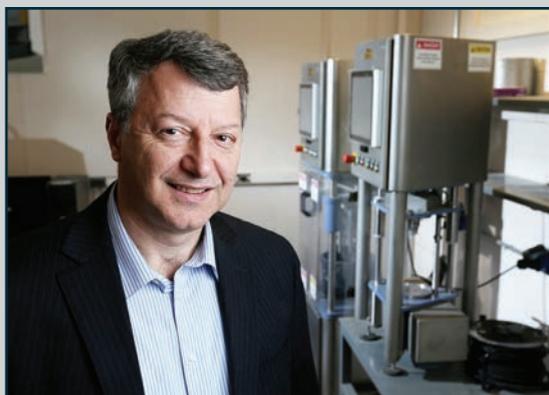


photo by Sam O’Keefe

Dr. Kamal Khayat, the Vernon and Maralee Jones Professor of Civil Engineering, is among the world’s most cited researchers in the civil engineering discipline, according to the 2016 Academic Ranking of World Universities. Khayat is the only Missouri S&T professor to be included in the “most cited” ranking. He also is the only professor from the four-campus University of Missouri System to make the list.

Khayat also serves as director of the Center for Infrastructure Engineering Studies and the Center for Transportation Infrastructure and Safety. He joined Missouri S&T in 2011 as the Jones Professor.

Bartels travels west on ‘Grand Challenge’ topic with EPA

by Joe McCune



photo by Sam O’Keefe

There are few places that have better summers than the United States’ Pacific Northwest. Mild temperatures, clear days, low humidity — and no rain.

Missouri S&T student **Katherine Bartels**, a senior in environmental engineering from Independence, Mo., experienced this year’s Pacific Northwest summer through an Environmental Protection Agency (EPA) Greater Research Opportunities (GRO) Fellowship. Bartels worked out of Newport, Oregon, studying salt marshes’ ability to remove nitrogen from the ecosystem.

The official title of her work was “Ecosystem Services of Pacific NW Salt Marshes: Nitrogen Removal.” Salt marshes,

Bartels says, are wetlands that have the natural ability to capture and use nutrients, such as nitrogen, before they enter oceans, reducing the potential for the water to become eutrophic. Eutrophic means the water is rich in nitrates, phosphates and organic nutrients that promote a proliferation of plant life, especially algae.

“Nutrient pollution is a major problem and is best exemplified by the ‘Dead Zone’ that occurs in the Gulf of Mexico caused by the agricultural runoff from the Midwest,”

Bartels says. “The salt marsh I studied is in Tillamook Bay, Oregon. In the study, the goal was to characterize the hydrology and soil composition of the bay to see if the conditions were suitable for denitrification, which removes nitrogen from the system.”

Her work with the EPA was built off of studies she performed at Missouri S&T. On campus, Bartels studies the volume and quality of storm water saved by the green roof on top of S&T’s Emerson Electric Co. Hall with **Dr. Joel Burken**, Curators’ Distinguished Professor and chair of civil, architectural and environmental engineering, and **Dr. Eric Showalter**, associate teaching professor of construction engineering.

Although the green roof absorbs a lot of storm water, the water that is washed out has higher concentrations of nitrogen and phosphate than a typical roof.

“Seeing Katie work on this topic was exciting as ‘Managing the Nitrogen Cycle’ is one of the 14 grand challenges put forth by the National Academy of Engineering,” Burken says. “With Katie already doing research on urban nitrogen cycles at S&T and now doing watershed research in the same area, she is pretty unique in her knowledge and experience in an area of global interest. Finding solutions to these challenges will take policy based on integrated scientific and technological approaches.”

Bartels says she picked this research because it gives her a chance to study a type of hydrology that she otherwise probably would never have learned about.

“Being from the Midwest, oceanography is not often emphasized, and we mostly are only taught about the hydrology of rivers,” she says. “Since marshes provide a natural technique to mitigate nutrient pollution, I was really interested if it could be applied to the research that I conduct at Missouri S&T, which involves urban hydrology, green roofs and nutrient pollution.”

Bartels’ fellowship provided \$30,000 for up to two years and a summer internship at an EPA facility where worked alongside EPA’s engineers and scientists. Her internship ended in August.

The 34 students who received the fellowships pursued degrees in environmental science and other related fields, including engineering, environmental health and the physical sciences. Since its inception in 1981, the GRO Fellowship program has awarded more than \$13 million in funding to nearly 400 students. Bartels is the sixth Missouri S&T student to earn this fellowship.

“With the help of this funding, undergraduates are able to explore their passion in environmental science and cultivate their research skills,” said Thomas A. Burke, EPA science advisor and deputy assistant administrator of EPA’s Office of Research and Development. “These fellows are the next generation of scientists, who will help lead the way in protecting the environment and public health.”



“ Seeing Katie work on this topic was exciting as ‘Managing the Nitrogen Cycle’ is one of the 14 grand challenges put forth by the National Academy of Engineering. ”

— **Dr. Joel Burken**

Curators’ Distinguished Professor and Chair
Civil, Architectural and Environmental Engineering



photos submitted by Katherine Bartels

Three new faces

We are pleased to introduce to you the three newest faculty members of the department. Visit care.mst.edu to learn more about them and their research interests.



Dr. William Gillis

Assistant Teaching Professor, Architectural Engineering
Missouri S&T



Dr. Chenglin Wu

Assistant Professor, Structural Engineering
University of Texas at Austin



Dr. Xiong Zhang

Associate Professor, Geotechnical Engineering
Texas A&M University

Sneed improves ACI building codes

Dr. Lesley Sneed, associate professor and Stirrat Faculty Scholar in civil, architectural and environmental engineering, has been recognized by the American Concrete Institute for moving building codes forward. Sneed served as principle investigator of a project titled "Interface Shear Transfer of Lightweight Aggregate Concretes with Different Lightweight Aggregates." The findings from this research proposed revisions to the next edition of the ACI 318 code and PCI Design Handbook for shear-friction design provisions of a smooth interface condition.

Frey receives AGC of Missouri Award



Missouri's building contractors honored **James E. Frey** (pictured left), retired senior vice president, Alberici Group Inc., with the AGC of Missouri Skill, Responsibility, Integrity Award. The award was presented at a meeting held in September.

The Associated General Contractors (AGC) of Missouri is the largest organization representing the united voice of the construction industry throughout the state of Missouri.

"This is a very special recognition for Jim, who served the AGC of Missouri in a top leadership role for more than a decade," said Len Toenjes, CAE, president. "This coveted award is not bestowed annually, but rather is reserved for special recognition of service above and beyond on behalf of our organization. We congratulate Jim on his service and thank him for his many contributions to the betterment of Missouri's construction industry."

Frey, CE'74, served as chairman of the AGC of St. Louis in 2002 and as a member of the board from 2006 to 2008. From 2001 to 2010 he chaired the Competitiveness Nucleus Group that worked to improve competitiveness in the construction industry and led to the adoption of more consistent contract language in basic trade contracts, thereby increasing productivity. From 2006 to 2010, he served as co-chair of PRIDE of St. Louis Inc. (Productivity and Responsibility Increase Development and Employment, now known as the St. Louis Construction Cooperative), the nation's first voluntary construction labor-management organization.



MAKING STRONGER CONCRETE

by Joe McCune

Portland cement has been around for more than 250 years as the binding material for concrete, mortar and stucco, but a Missouri S&T researcher is studying ways to make concrete without the traditional material.

Dr. Mohamed ElGawady, associate professor and Benavides Faculty Scholar in civil, architectural and environmental engineering at S&T, is testing mixtures of concrete made with fly ash that can be more durable, strong and resilient than concrete using ordinary Portland cement (OPC).

Using zero cement (ZC) concrete is expected to improve the durability and performance of Missouri Department of Transportation (MoDOT) concrete bridges and extend their useful service life beyond the typical 75 years, ElGawady says. Using zero cement concrete will also improve the sustainability of MoDOT structures. The mixtures that will be developed as part of the study will allow MoDOT to use ZC concrete to address shrinkage cracking and freeze/thaw damage that is currently experienced with conventional concrete mixtures.

“The superior durability of zero cement fly ash means also less potential maintenance and repair,” ElGawady says.

The goal is to develop zero cement concrete mixtures that can be used by MoDOT contractors for bridge deck and girders using locally available material. The feasibility of using ZC concrete for partial depth deck and prestressed girder repair works will be explored, too. The test will make up to 3,000 samples that have different sources of fly ash, different alkaline activator properties and concentrations, curing temperature variances, different curing times and water content.

Conventional concrete mixes use OPC or OPC and fly ash as the main binding material and involves slow process of hydration of the OPC/fly ash, ElGawady says.

Additionally, conventional concrete requires curing and reaches its compressive strength typically at 28 days. ZC concrete combines an alumina-silica rich material such as fly ash, calcined clay, mine tailings or blast furnace slag with alkali activator such as sodium hydroxide, sodium silicate, potassium hydroxide or potassium silicate. ZC concrete involves substantially quick chemical process where the alkaline liquid polymerizes the fly ash, creating a new three-dimensional strong inorganic polymeric chain, ElGawady says.

So ZC concrete reaches its compressive strength in less than 24 hours versus 28 to 56 days in the case of conventional or high-volume fly ash concrete. ZC concrete experiences very high resistance to freeze/thaw, corrosion, elevated temperatures, fire, salt and acid or alkaline environments. ZC also shows very low permeability and high tensile strength.

Hence, ZC is more durable than conventional concrete, ElGawady says. And research showed that making ZC is cheaper or equal to the price of conventional concrete while ZC concrete has much higher durability and performance.

More research will investigate the production of ZC concrete with locally sourced materials to determine the best practice to produce ZC concrete with the desired workability without jeopardizing strength. The effects of ZC concrete on the bond between the concrete and rebar will be investigated, as well. Finally, because ZC concrete maybe used for retrofitting purposes, ElGawady will try to determine the cohesion and friction between existing OPC concrete and ZC concrete.

AN OLYMPIAN AMONG US

Civil engineering student **Shawn Wallace** competes in Rio

by Mary Helen Stoltz



photo by Sam O'Keefe

For as long as he can remember, Shawn Wallace loved the water, and swimming is his favorite pastime. This past summer, that pastime took him to the 2016 Summer Olympics in Rio de Janeiro.

Wallace began swimming competitively at age 8 as part of a neighborhood summer league in his Houston, Texas, hometown. He joined Houston-based Alief Aquatic Club when he was 10. He still swims with Alief on breaks from school.

"I always liked swimming," says Wallace, a senior in civil engineering at Missouri S&T. "My mom always told me that if I wanted to compete, I should just go for it. Obviously I kept it up."

Wallace has lived in Houston since he was 6, but he was born in the island nation of Palau, a series of over 500 islands in the Micronesian region of the western Pacific Ocean.

Wallace joined the national team in Palau in 2011. He holds three Palauan long-course records: the 50-meter and 100-meter freestyle and the 50-meter butterfly. He also holds a short-course record in the 200-meter freestyle.

"Around 2010, I was a spectator at the Micronesian Games, and a very good coach I know introduced me to the team," Wallace says. "He told the coaches he thought I could do great things for Palau." Wallace showed Palau's coaches what he was capable of, and the team invited him to compete in the World Championships the following year. His first international competition was in Shanghai.

"Since then I've been to five world championship meets," Wallace says. Between competitions and training trips, swimming has taken him to Guam, Japan, Spain, Turkey, Qatar, New Zealand, the Federated States of Micronesia, Papua New Guinea, Russia, Fiji and, of course, Brazil.

Wallace swam the 50-meter freestyle in the 2016 Summer Olympics in Rio and set a personal best time — and a national record for Palau. His time of 26.78 seconds, even though it is a record in his home country, was not fast enough to qualify for the Olympics. Instead, he entered under a Universality place.



Shawn Wallace competed in the 50-meter freestyle during the 2016 Summer Olympics for the country of Palau.



Typically, a country can enter two qualified athletes for each event. However, countries that have no swimmers who reach the qualifying standards can still enter two swimmers, one of each gender, under the Universality clause. Wallace was chosen based on his results at national and international meets.

Palau's national team — which sent only two swimmers to the Rio games — is relatively small, especially compared to the U.S. team.

"We're a very small country," Wallace says of Palau. "The population of the entire country is only around 21,000 people. Swimming isn't as predominant a sport as in some other countries."

When classes are in session at Missouri S&T, Wallace, who is a member of Triangle fraternity, swims and competes with the Rolla Fins Swim Club, a local competitive group. He is training with hopes of returning to Olympic waters in 2020.

Wallace hopes his fellow Fins swimmers — and any other athlete — follow their dreams.

"If you believe you can do it, you have to be disciplined."

— Shawn Wallace
Senior, Civil Engineering

"If you believe you can do it, you have to be disciplined," Wallace says. "You're going to have to make some tough decisions in your life that you may not like at the time — like training instead of hanging out with your friends. But it is all worth it. When you look back, you'll thank yourself for doing it."

Libre's video channel reaches students, over 130 countries



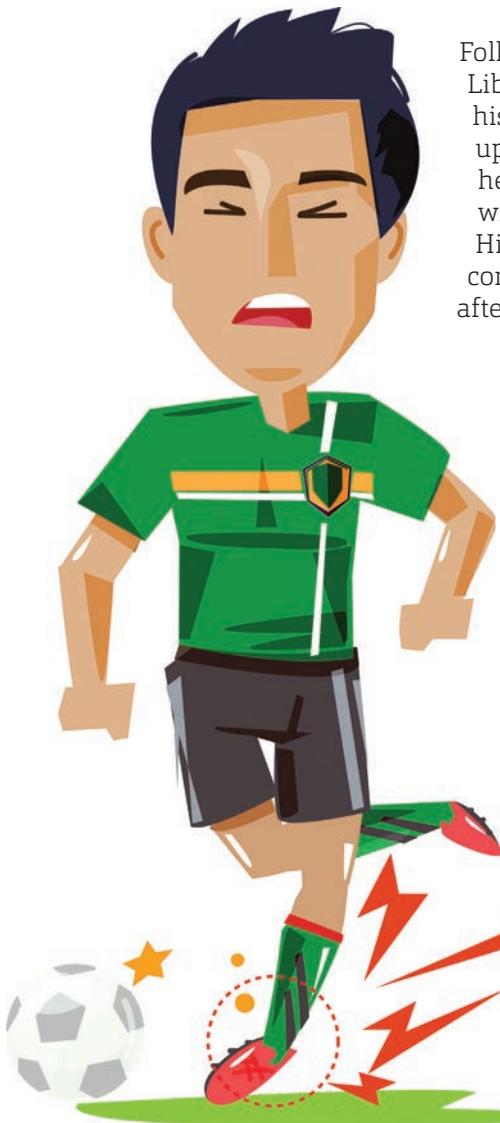
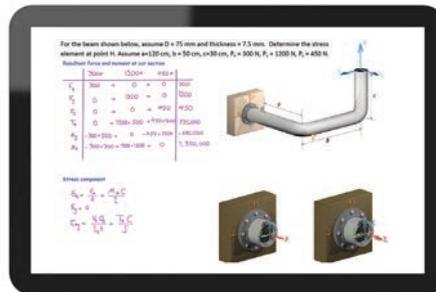
Dr. Nick Libre, assistant teaching professor in civil, architectural and environmental engineering, created an innovative way of teaching his Mechanics of Materials class.

Following a soccer injury that limited Libre's mobility, he decided to record his civil engineering lectures and upload the videos to YouTube so he could still reach his students without being in the classroom. His students encouraged him to continue to produce them even after he returned to class.



130+
COUNTRIES

26,500+
CHANNEL VISITORS

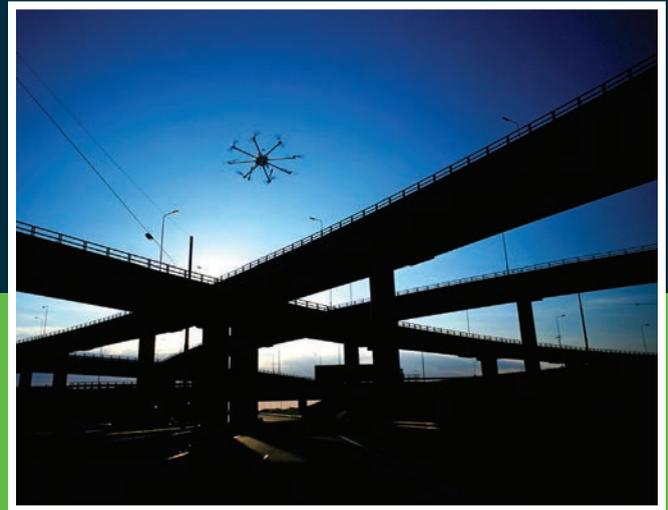


Learn more by watching the video created by educational technology staff on our YouTube Channel: [missourisandtcare](https://www.youtube.com/channel/UCmissourisandtcare) or link directly to the video at: youtube.com/watch?v=A7jo5EDc-5k

Robotic bridge inspection, preservation is focus of upcoming research

by Andrew Careaga

Your commute to work may be smoother in the future, thanks to new federally funded research at Missouri S&T.



S&T will receive a \$1.4 million 2016 University Transportation Centers (UTC) tier 1 grant to develop robotic tools to inspect and maintain bridges and portions of highway from the air or from the side of the structure. The U.S. Department of Transportation's Office of the Assistant Secretary for Research and Technology announced the award in December.

"We plan to develop a robotic arm for both flying and climbing unmanned vehicles to inspect and maintain bridges and other transportation infrastructure," says **Dr. Genda Chen**, the Robert W. Abnett Distinguished Chair in Civil Engineering at Missouri S&T and director of the new UTC. "Once this technology is developed and in use, we will never need to close traffic for bridge or highway inspection and preservation."

Instead, robotic unmanned aerial vehicles (UAVs) or robots capable of crawling up along the sides of bridges will inspect or fix bridges from beneath the flow of traffic, Chen says. The robotic arms could also apply sealant or paint to bridge sections, while engineers guide the work remotely and monitor on a screen and visually verify the results as needed. Chen envisions equipping the robots with sensors and microwave cameras capable of detecting potential problems inside bridge beams and decks before they become problematic.

"With the arrival of the robotic era, we expect bridge inspection to be reinvented and transformed into a more consistent, reliable and rapid process," Chen says.

Missouri S&T will lead a consortium of 10 colleges and universities in the effort. The grant is one of 35 five-year grants awarded under the UTC program, which was reauthorized under the Fixing America's Surface Transportation Act (FAST Act). The federal funding is renewable annually up to five years (totaling \$7.5 million) and must be matched by non-federal sources.

The S&T-led UTC is called Inspecting and Preserving Infrastructure through Robotic Exploration, or INSPIRE. In addition to the research, a portion of the grant will be used to "train and expand the transportation work force," Chen says.

Missouri S&T faculty who will work with Chen on the project are **Dr. Zhaozheng Yin**, assistant professor of computer science; **Dr. Ruwen Qin**, associate professor of engineering management and systems engineering; **Dr. Suzanna Long**, professor and interim chair of engineering management and systems engineering; **Dr. Reza Zoughi**, the Schlumberger Distinguished Professor of Electrical Engineering; **Dr. John Myers**, professor of civil engineering; **Dr. Leslie Sneed**, associate professor of civil engineering; **Dr. Mohamed Elgawady**, associate professor of civil engineering; and **Dr. Hongyan MA**, assistant professor of civil engineering.

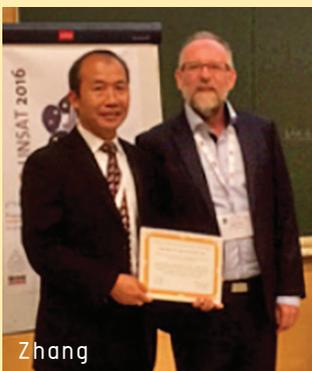
Missouri S&T's partners in the project are City College of New York, Georgia Institute of Technology, University of Colorado at Boulder, University of Nevada-Reno, University of Nevada-Las Vegas and four Missouri institutions: Lincoln University, East Central College, St. Louis Community College and Ozarks Technical Community College.

Missouri S&T is a partner in the Mid-America Transportation Center, which is a regional UTC that also received grant funding from the U.S. Department of Transportation. This consortium is led by the University of Nebraska-Lincoln.

Zhang receives international award for innovation

Dr. Xiong Zhang, associate professor of geotechnical engineering at Missouri S&T, was invited to attend the third European Conference on unsaturated soils in Paris, France in September at Ecole des Ponts ParisTech, where he received the International Award for Innovation in Unsaturated Soil Mechanics from the Technical Committee on Unsaturated Soils (TC106) of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). ISSMGE is the pre-eminent professional body representing the interests and activities of engineers, academics and contractors all over the world that actively participate in geotechnical engineering.

Zhang was recognized for his “outstanding innovation, scholarship and leadership in the development of a photogrammetry-based method to measure total and local volume changes of unsaturated soils during triaxial testing.”



Schonberg pursues NASA research, lectures on engineering education



Last summer, **Dr. William Schonberg** was a visiting scholar at the NASA Jet Propulsion Laboratory (JPL) in California, where he worked on developing new design equations for earth-orbiting spacecraft. When integrated into current design protocols, the equations Schonberg developed will allow NASA to develop spacecraft that are safer and more resilient against damage from the high-speed impacts of space debris.

Schonberg will present his work this year at various technical conferences and symposia sponsored by NASA and the European Space Agency. In addition to working at JPL, Schonberg is working with NASA's Engineering and Safety Center on improving the damage-resistant design of the pressurized tanks that hold the fuel used by spacecraft to get to and stay in earth orbit.

Schonberg also continues to pursue his study of the interactions between globalization, engineering and art. Last March, he was invited to present a Tedx talk under the theme of “FutureVision.” Schonberg's presentation, “Technological Literacy in a Global Society,” discussed the need

for everyone to be technically literate, especially our leaders and decision makers. In addition to sharing his ideas on how we as engineering educators can enhance the technical literacy of the general population, Schonberg also discussed how faculty can do a better job of instilling a sense of societal awareness and obligation into engineering students and graduates. You can watch his presentation at: youtube.com/watch?v=ws9KpyQ31mU.

In October, he presented a talk on the interaction of art and engineering entitled, “Technology as Art and Art as Technology – Educating Audiences through Artistic Endeavor.” This presentation was co-authored with Luce Myers, assistant teaching professor in arts, languages and philosophy at Missouri S&T. The presentation followed up on the premise of Schonberg's March Tedx talk on technical literacy in our global society by providing specific examples for how art museums can participate in this process through displays, outreach programs, and other activities. The presentation can be viewed at: facebook.com/NatGalCayman/videos/640075166163353/.

Holmes named ASCE Fellow

Dr. Robert Holmes, adjunct professor of civil, architectural and environmental engineering, has been elected a Fellow of the American Society of Civil Engineers. ASCE Fellows are decided by their professional accomplishments and election. Less than 3.5 percent of ASCE members are named Fellow.

Missouri Concrete Conference

The annual Missouri Concrete Conference, directed by faculty member **Dave Richardson** ('71, '73, '84), was held on the S&T campus on May 3-4, 2016. Eighteen presentations were given, including ones by departmental alumni **Rick Holesinger** ('85, '11) and **Lou Jearls** ('74). Attendance totaled 154.

SUPERPAVE and Certification Courses

During the 2015-16 season, five different types of certification courses were held at Missouri S&T: two Superpave QC/QA full certification short courses (5-day), four Superpave QC/QA re-certification short courses (2-day), one Binder Test course (1-day), three Aggregate Consensus Tests courses (1-day), and two TSR courses (1-day), for a total of 12 courses and 163 engineers, inspectors, and contractors were certified. The courses were directed and taught by faculty member **Dave Richardson** ('71, '73, '84). Other instructors included **Steve Jackson** ('07) and **Mike Lusher** ('96, '04). Over 3,000 individuals have gone through the training and certification at Missouri S&T since 1998.

Mays receives ASCE Ven Te Chow Award

Dr. Larry Mays' accomplishments in water resources engineering over the past four decades continue to bring him prestigious honors. Mays was recently awarded the American Society of Civil Engineers (ASCE) Ven Te Chow Award for "exceptional achievement and

significant contributions in research, education and practice" in the field of hydrologic engineering.



Mays

The award recognizes Mays' research on watersheds, water infrastructure and hydrological systems, encompassing every aspect of their design, management and operations.

His popular and authoritative water engineering textbooks and technical handbooks were also noted by the ASCE for their influence

on water resources engineers throughout the world. One of these textbooks is *Applied Hydrology* co-authored with Ven Te Chow and David Maidment, published in 1988.

Mays was presented the ASCE award at the World Environmental and Water Resources Congress in Florida in May. During the award ceremony he delivered the key note lecture "Ancient Stormwater Management."

The award added to a collection that more recently includes the Prince Sultan bin Abdulaziz International Surface Water Prize from Saudi Arabia, the ASCE Julian Hinds Award, and the Warren Hall Medal from the Universities Council on Water Resources.

Mays earned his bachelor and master of science degrees in civil engineering from Missouri S&T in 1970 and 1971, respectively. In 2016, he was inducted into the S&T Academy of Civil Engineers. Mays has been a professor at the Ira A. Fulton Schools of Engineering, Arizona State University for more than 27 years, and before that a professor for 13 years at the University of Texas at Austin.

Mays is also considered one of the foremost experts on ancient water systems, and one of his highly regarded books details how ancient water technologies can still be applied to managing water resources in a sustainable fashion.



Left to right: Chi-Ling Pan, MS CE'87, PhD CE'92, Robert Glauz, CE'82 and Dr. Wei-Wen Yu.



World's only conference ON COLD-FORMED STEEL

Dedicated to furthering the field of cold-formed steel, the Wei-Wen Yu Center for Cold-Formed Steel Structures — housed within civil, architectural and environmental engineering — hosts continuing education events such as its international specialty conference, which in 2014 was named after the center's founding director **Dr. Wei-Wen Yu**.

The Wei-Wen Yu International Specialty Conference on Cold-Formed Steel Structures is the only conference in the world that is focused solely on cold-formed steel structures. Leading researchers, manufacturers, engineers, educators and students who are engaged in research, design, manufacturing and the use of cold-formed steel gather at this conference to present and discuss their recent research discoveries.

The conference takes place every two years. The first conference was held on the S&T campus in August 1971. A total of 31 papers were presented during that first conference. In 2016, the 23rd conference was held in Baltimore, Md. **Dr. Roger LaBoube** and **Christina Stratman**, the center's staff, planned and organized the conference. It was a great success with a total

of 113 participants registered, 61 papers presented and 18 countries represented.

Student awards were also presented for the Wei-Wen Yu Outstanding Student Paper Award to Morgan Rendall from the University of Sydney and two Wei-Wen Yu Student Scholar Awards were given to Hannah Blum from the University of Sydney and Andre Martins from the University of Lisbon.

When asked what they liked most about the conference, participants gave the following comments:

- Quality of information and variety of papers
- Opportunity to meet/network with top students and researchers from around the world
- Relevant research to steel deck
- International audience giving the full picture of what is new in the world of cold-formed steel
- Well organized and executed
- High scientific quality of the contributions and topics presented



Pictured left: Dr. Wei-Wen Yu presents Hannah Blum with a Student Scholar Award.

“ After attending the 2014 Wei-Wen Yu International Specialty Conference in St. Louis, it was my honor to attend again in Baltimore in 2016. I was impressed with the number of participants. Researchers and producers from 18 different countries and from top universities around the world came to present their work. In my opinion, it was a top-notch event to make connections in the area of cold-formed steel. I am grateful for Dr. Roger LaBoube in helping me secure travel funds through the conference budget to attend. ”



— **Ahmed A. Gheni**
Ph.D. Candidate, Civil Engineering
S&T conference attendee



First conference held on the S&T campus in 1971.

Khayat to receive national award for concrete innovation

Dr. Kamal Khayat will be honored with the ACI Foundation’s Jean-Claude Roumain Innovation in Concrete Award in March 2017. The award will be presented March 26 during the ACI Spring 2017 Concrete Convention and Exposition in Detroit.

He received the award for “over 25 years of research, teaching, innovation and leadership contributing to the advancement of self-consolidating concrete; and for the relentless pursuit of knowledge transfer by organizing numerous conferences covering the science, performance, design and testing standards of self-consolidating concrete.”

The ACI Foundation is a not-for-profit organization established by the American Concrete Institute to promote progress, innovation and collaboration by supporting research and scholarships.

Oerther receives Fulbright Award

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Dr. Daniel Oerther, professor of civil, architectural and environmental engineering, has been selected as a Fulbright Specialist Roster Candidate from 2016-21. The Fulbright Specialist Program is a recent innovation that promotes links between U.S. scholars and professionals and their counterparts at host institutions overseas through short-term exchanges of two to six weeks in duration with up to three exchanges to different countries occurring in a five-year window.

Mid-American Environmental Engineering Conference

A group of more than 60 graduate students, faculty, visiting scholars and engineering professionals attended the 2016 Annual Mid-American Environmental Engineering Conference in October at the Southern Illinois University Edwardsville School of Engineering.

Ken Campbell, a Ph.D. student in civil engineering (pictured second from left), won the award for best presentation. His advisor is **Dr. Jianmin Wang**.



TEACHING AWARDS 2015-16

Forty-one Missouri S&T faculty members received the Outstanding Teaching Award for 2015-16. The award is given each year to faculty members by the Outstanding Teaching Award Committee, which bases its selections on student evaluations.

Among the awardees were two CArEE instructors:

Dr. Mary Ann Koen, assistant adjunct professor of civil, architectural and environmental engineering and **Dr. Glenn Morrison**, professor of civil, architectural and environmental engineering receiving their awards from **Dr. Robert Marley**, provost, at a ceremony held in December.



BIG BEAM TEAM finishes fifth in nation

The Missouri S&T Big Beam Team finished fifth overall in the nation in the 2016 Big Beam Contest, an annual collegiate competition sponsored by Precast/Prestressed Concrete Institute (PCI).

Teams in the competition design an 18-foot-long, pre-stressed and pre-cast concrete beam, which is then tested and evaluated for predicted structural behavior, including member strength, cracking load, section ductility and cost. Student teams fabricate the beams with the help of PCI producer members. The Missouri S&T team worked with Coreslab Structures Inc. of Marshall, Mo.

Missouri S&T members of the Big Beam Team were **Hayder Alghazali**, **Eli Hernandez** and **Saipavan Rallabhandhi**. **Dr. John J. Myers**, professor of civil, architectural and environmental engineering and associate dean for academic affairs in the College of Engineering and Computing at S&T, serves as the team's advisor.



ASCE *Journal of Bridge Engineering* names ElGawady associate editor

In June, the *ASCE Journal of Bridge Engineering* announced that **Dr. Mohamed ElGawady**, associate professor and Benavides Faculty Scholar in civil, architectural and environmental engineering at Missouri S&T, was named an associate editor. The *ASCE Journal* publishes papers in regards to all aspects of the art and science of bridge engineering and about research that advances the practice and profession of bridge engineering. It includes papers on projects, materials, design, fabrication, construction, inspection, evaluation, safety, performance, management, retrofitting, rehabilitation, repair and demolition.

With a diverse background in structural engineering, ElGawady has specific teaching and research interests in the areas of damage-free bridge columns, accelerated bridge construction, hybrid construction, fiber-reinforced polymers (FRP) for new construction, the use of sustainable materials in seismic-prone regions, application of FRP in strengthening and repair of masonry/reinforced concrete structures, and seismic behavior of masonry structures.

Through his teaching and research, ElGawady has mentored and promoted the development of civil engineers. His knowledge and research on structural design, construction and materials has contributed to new sustainable methods and materials that can preserve large infrastructure under extreme events such as earthquake or vehicle impact.

National intelligence leader speaks at Missouri S&T



Stephanie O'Sullivan, principal deputy director of national intelligence and a 1982 civil engineering graduate of Missouri S&T, spoke about her journey from working as a civil engineer to leading the U.S. in national intelligence.

O'Sullivan was sworn in as the principal deputy director of national intelligence in 2011. She currently serves in a role similar to a chief operating officer, focusing on the operations of the Office of the Director of National Intelligence. She manages intelligence community coordination and information sharing, including briefings for the president and White House staff.

Earlier in her career, O'Sullivan held various management positions in the CIA's Directorate of Science and Technology, where her responsibilities included systems acquisition and research and development in fields ranging from power sources to biotechnology. She joined the CIA in 1995 after working for the Office of Naval Intelligence.

The presentation was hosted by the civil, architectural and environmental engineering department and the Society of Women Engineers.



O'Sullivan, pictured center, with members of the Society of Women Engineers (SWE).

ElGawady selected to serve on TMS Committee

Dr. Mohamed ElGawady, associate professor and Benavides Faculty Scholar in civil, architectural and environmental engineering, was selected to serve on The Masonry Society's (TMS) 2016-22 cycle of TMS Committee 402/602, Building Code Requirements and Specifications for Masonry Structures. This is the official U.S. committee that develops standards for masonry construction and design. TMS has approximately 650 members worldwide who help support the Society in its mission to advance the knowledge of masonry.

Building Code Requirements for Masonry Structures (TMS 402) covers the design and construction



of masonry structures. It entails numerous subjects, including contract documents; quality assurance; materials; analysis and design; strength and serviceability, loads;

reinforcement; seismic design requirements; glass unit masonry; and veneers. Empirical design, strength design, and allowable stress design are also covered.

The counterpart to the TMS 402 code is the Specification for Masonry Structures (TMS 602). This part serves a different purpose — namely to control materials and construction. It entails minimum construction requirements for masonry in structures. These may be supplemented by specific project requirements. Quality assurance is the main focus, such as the placing, bonding and anchoring of masonry, and the placement of grout and reinforcement.



Dr. Joel Burken was part of the Leadership Team that hosted the 2016 statewide NSF Experimental Program to Stimulate Competitive Research (EPSCoR) Missouri Transect Annual Meeting, held on the Missouri S&T campus in September. Over 100 scientists, engineers, educators and students from nine Missouri research institutes and the St. Louis Science Center were on campus to understand how climate variability impacts plants and communities in Missouri.

The project's overall mission is to model and predict:

- short- and long-term trends in temperature and precipitation at the regional and local levels
- the effects of these trends on the productivity of Missouri's native flora and agricultural crops
- how different stakeholder communities are likely to respond to these changes.



DICK ELGIN: SURVEYOR OF THE YEAR

The Missouri Society of Professional Surveyors (MSPS), at its recent annual convention, named **Dr. Richard “Dick” Elgin**, CE’74, MS CE’76, its “Surveyor of the Year.” Elgin is the department’s long-time adjunct professor, teaching the required and elective courses in surveying. He was recognized for his many years of service to the profession

and MSPS, as well as being a “practitioner, surveying educator, author and researcher.” Elgin is the author of the book, *The U.S. Public Land Survey System for Missouri* (among others). He is a past president of the Academy of Civil Engineers.

Elgin’s book reflects on Vietnam experiences



Elgin

Far from his usual books on surveying, Dick Elgin’s latest work, *Shoulda Played the Flute*, is a memoir of his time in Army aviation, including a year flying helicopter combat missions in Vietnam.

Elgin, CE’74, MS CE’76, an adjunct professor of civil engineering at Missouri S&T, washed out on his first try at S&T, so he volunteered for the Army’s rotary wing flight school. After graduating from flight school, he was sent to Vietnam in 1969 and assigned to the Americal Division in Chu Lai. Within the Americal, he flew the Hughes OH-6A for the

196th LIGHT INFANTRY BRIGADE on a wide variety of missions.

Through humorous, serious and sad vignettes in the book, Elgin describes the missions he flew.

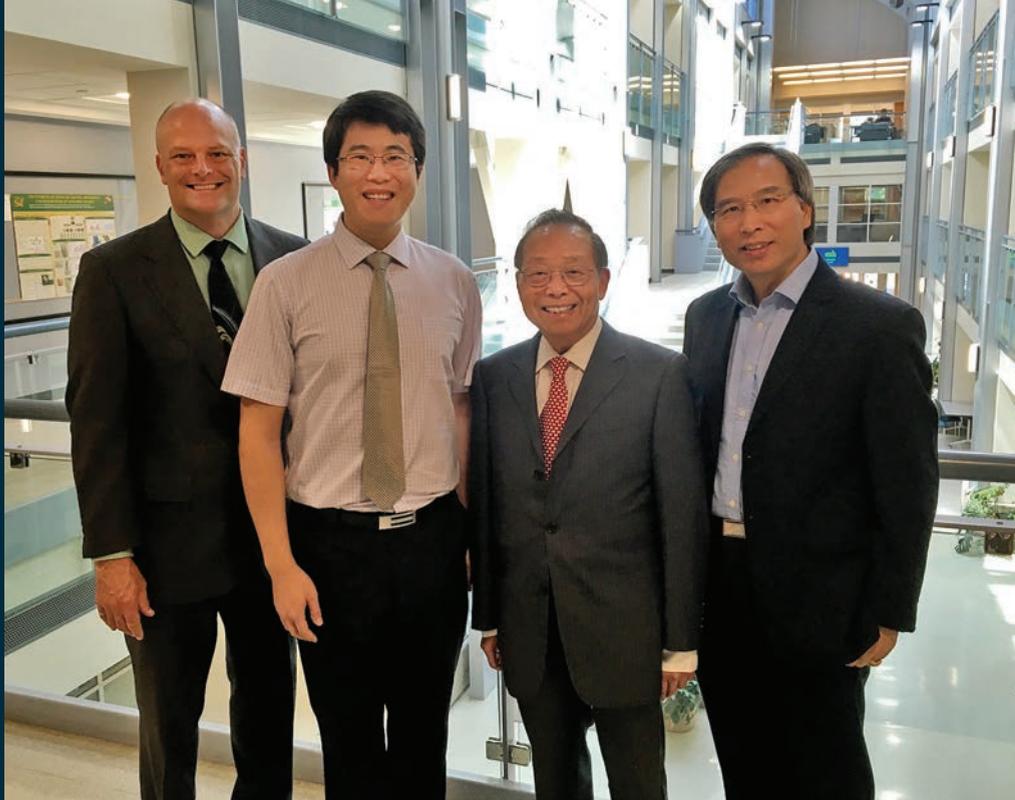
Long before Vietnam, Elgin played the flute in his high school band. During basic training in Fort Polk, La., the post band director made him an offer: He could fulfill his Army obligation — guaranteed — playing the flute in the Fort Polk Army Band. Elgin declined.

There were missions in Vietnam when he remembered the offer, thinking he “shoulda played the flute.”

Franklin Y. Cheng

TEACHING SCHOLARS PROGRAM

Pictured from left to right: Dr. Joel Burken, department chair, Yi Bao, Dr. Franklin Cheng and Dr. Genda Chen, Bao's advisor.



Placing Ph.D. graduates in academic positions is one of the most effective means to enhancing the stature of this department and university.

This past August, **Yi Bao**, a Ph.D. candidate in civil engineering, became the first Franklin Y. Cheng Teaching Scholar at Missouri S&T.

The Franklin Y. Cheng Teaching Scholars Program is a new academic and professional development opportunity that allows doctoral candidates within the department to teach a course in their area of expertise, preparing them to pursue academic positions. This teaching scholars program will have a rippling effect, increasing the training of aspiring scholars and the academic reputation of our department, while fulfilling a Vision 2020 strategic goal.

“Curators’ Distinguished Professor Emeritus **Dr. Franklin Cheng** has definitely surpassed his exceptional teaching history and is now leaving a scholarly legacy by helping fund this new program,” says **Dr. Joel Burken**, department chair.

“We need to cultivate our graduate students to be recognized as academic leaders in the U.S. and abroad,” says Cheng. “With Dr. Burken’s enthusiasm, the support of loyal alumni, assistance from **Dr. Genda Chen** to develop guidelines and the continued effort of CAR EE faculty to train students, I am confident this program will continue to grow and expand. My commitment to the new teaching scholars program stands strong and firm.”

In the teaching arena, graduate students are often not given the opportunity to develop their teaching effectiveness and independent lecture experience beyond serving as a teaching assistant or providing an occasional lecture. Through facilitating this new teaching program and extending funding, Ph.D. candidates in the program can complete scholarly publications and strengthen their scholarly accomplishments. This experience will assist in the placement of doctoral graduates in academic positions — preparing them for careers that train future-generation engineers and scientists around the world.

“ I am extremely honored and appreciative for being appointed the first Franklin Y. Cheng Teaching Scholar. This unique teaching experience helps me prepare to teach courses. It is invaluable and will have a profound effect on my academic career. I am excited to report that I have received a couple of interview invitations for tenure-track assistant professorships. ”

— **Yi Bao**
Ph.D. Candidate
Civil Engineering

Former chair and avid astronomer memorialized

Dr. Joseph H. Senne Jr., MS CE'51, professor emeritus and former chair of civil engineering at Missouri S&T, died Dec. 20, 2016. Dr. Senne joined the S&T faculty as an instructor in civil engineering in 1948 and was named assistant professor in 1951. He spent eight years at Iowa State University, earned his Ph.D. there, then returned to Missouri S&T as professor of civil engineering in 1963. He served as chair of civil engineering from 1965 to 1985. Joe led the department during the transition from a strong undergraduate program to a department with both research and graduate programs without changing the strength of the undergraduate program. While chair, and with Joe's leadership, the department's Academy of Civil Engineers was founded. The academy has been copied many times at S&T and at other universities.

In addition to civil engineering, Joe was an avid astronomer. He helped design and made the astronomical calculations for the Missouri S&T Stonehenge partial replica which was dedicated on the summer solstice in 1984. The project won an award from the National Society of Professional Engineers as one of the top 10 engineering achievements of 1984. "The stones had to be placed precisely to be aligned for observing equinoctial summer and winter solstice sunrises and sunsets, by which ancient Britons kept track of the seasons with the original Stonehenge," he said in 1985.

In the early days of the "space race," and in collaboration with the Independent Tracking Coordination Program, Joe predicted the time of



Dr. Joseph H. Senne Jr.

satellite crossings over Missouri and made them available to news media. He avidly tracked Skylab from its launch in 1973 to its reentry to Earth in 1979.

A member of the International Occultation and Timing Association, for many years Joe made calculations which predicted lunar grazing occultations. He also observed occultations — when a star passes behind the moon, grazing its edge. These observations provided data on the moon and star positions. Joe published predictions of these occultations to astronomers worldwide so they could make these measurements.

Realizing a lifelong goal, in 1985 Joe coauthored the *Celestial Observation Handbook and Ephemeris*. The ephemeris, sold to surveyors, was published annually from 1985 until 2008. About 100,000 ephemerides were sold worldwide by the Sokkia Corp. During this period Joe wrote the

code for and codeveloped a module which surveyors could use in the HP 41 calculator. The module contained an internal ephemeris, the first of its kind, which revolutionized the way surveyors determined precise direction from celestial observations.

Joe served in World War II as a Navy Seabee. While crossing the Pacific in a liberty ship, Joe built a sextant from scavenged parts found on the ship. He also built a telescope, hand grinding the lenses crafted from the glass used in portholes. (No one who knew Joe would be surprised that he built these instruments.) Joe was on Okinawa when the "Instrument of Surrender" was signed in Tokyo Bay on Sept. 2, 1945.

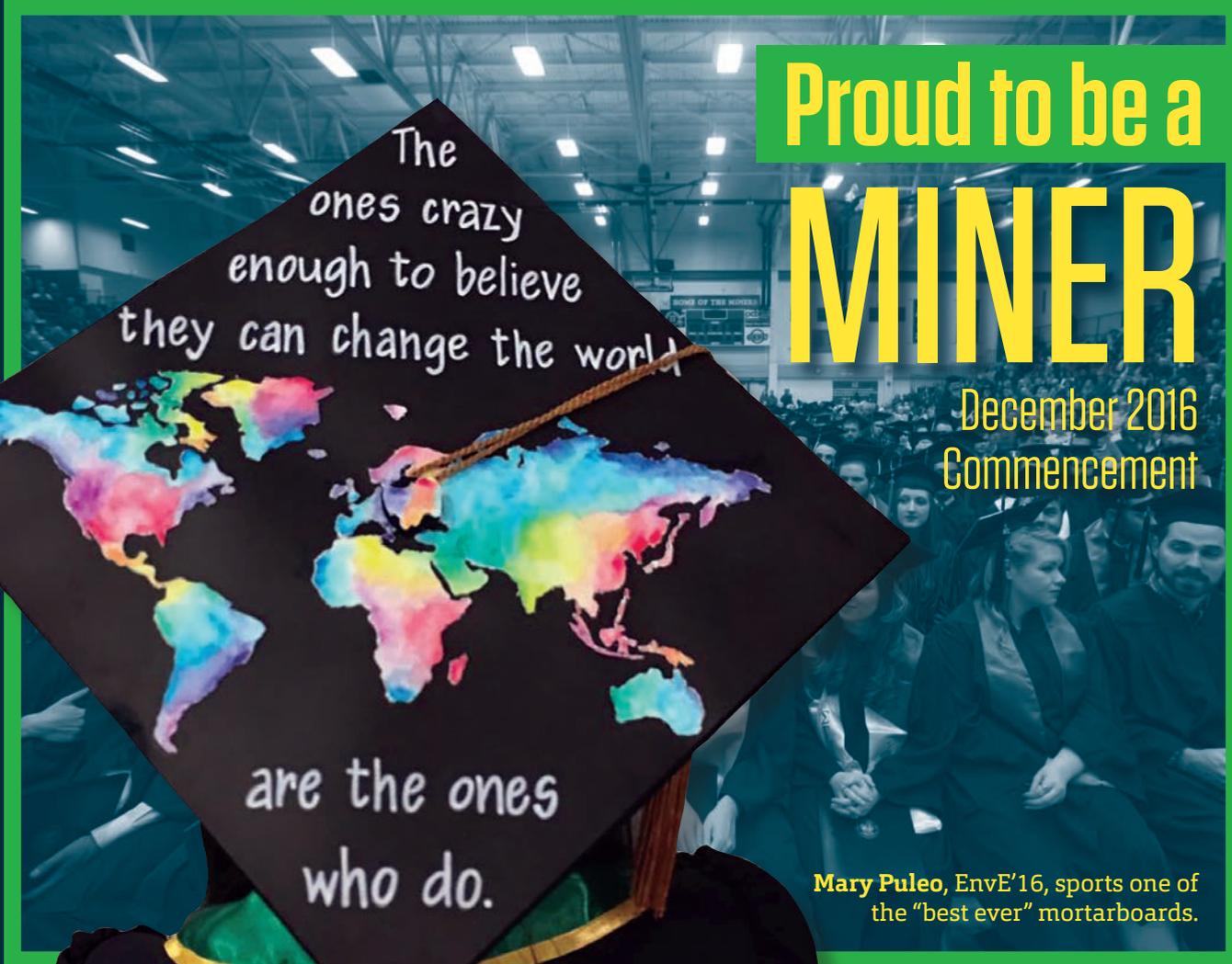
He was a fellow and life member of the American Society of Civil Engineers (ASCE), the American Society for Engineering Education, the Missouri Society of Professional Engineers, and was the chair of the ASCE Advanced Technology Committee and the ASCE Space Shuttle Task Committee.

A member of the Society of Sigma Xi, Chi Epsilon, Tau Beta Pi, Phi Kappa Phi and Outstanding Educators of America, Joe held a bachelor of science degree from Washington University in St. Louis and a Ph.D. from Iowa State University, both in civil engineering.

If you would like to make a memorial contribution to the Joseph Senne Academy of CE Faculty Achievement Award, you may contact Sue Wallace, senior development officer, by phone at 573-466-3202 or by email at wallacesue@mst.edu, or go online at bit.ly/2im86nE.

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**Proud to be a
MINER**

December 2016
Commencement

The
ones crazy
enough to believe
they can change the world

are the ones
who do.

Mary Puleo, EnvE'16, sports one of
the "best ever" mortarboards.