01 Dec 2021

The Bridge Newsletter Winter 2021

Missouri University of Science and Technology

Missouri S&T
Winter 2021 | Vol. 47

The Bridge

Civil, Architectural and Environmental Engineering

150 YEARS AT MISSOURI S&T

page 12

Researching new materials and emerging techniques through a national center

page 6

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

The year 2021 is drawing to a close, and many bright spots shine through the shadows of a challenging time. Just one year ago we were largely virtual in our classes, labs were limited in capacity, and COVID-19 case numbers on campus were rising fast. To persevere and advance in the face of continued adversity required a team effort, and the CArEE team of students, staff, alumni and faculty all contributed to growing our legacy. Collectively, our teamwork is focused around our belief that the CArEE department is a destination of choice for talented students and academicians, and this dedicated focus has positioned our civil program as both the highest-ranked graduate engineering program and the highest-ranked undergraduate engineering program in the state of Missouri (*U.S. News*, pg. 4). Our undergraduate environmental and architectural programs are also unique in Missouri and are the most diverse on campus as well. Our team is not resting on these accomplishments. We have and will continue to build on the 150-year, unmatched legacy that got our team to this unique position.

Alumni demonstrated their support of our vision once again by initiating the ongoing Laboratory Equipment Enhancement Program (LEEP). As support for undergraduate teaching labs has waned and our dedication to hands-on, practical education has been a steadfast and a core value of our educational programs, we found ourselves at a crossroads with insufficient support to continue with our educational labs. Miner alumni stepped up, led by academy board member **Brent Massey**'s initiative (pg. 10) to provide the support to advance our abilities and continue our tradition of CArEE alumni being **street-ready engineers**, a term now being used campuswide. We also continued to have great support from our alumni in getting back to campus and giving of time and talent in our students' professional development.

Women of the Academy of Civil Engineers set the bar with the networking and mentoring activity (pg. 20). **John Warmack**, CE'79, served as the summer 2021 commencement speaker, sharing his vision of the future and accomplishment of an impactful career (pg. 5). The Alumni of Influence also was a chance to celebrate the remarkable careers of three alumni, **Mike Hurst**, CE'74, **Ray Betz**, CE'66, and **Wayne Laufer**, CE'67 (pg. 16). The Alumni of Influence list is at 50 total in the history of S&T, and CArEE leads the way with 15 of those members. Our young alumni are also building our reputation and legacy, with **Kandi Spraggs**, CE'08, MS CE'10, **Deidra Foster** CE'20, and **Josi Gass**, EnvE'17, all setting the path with notable professional recognitions (pgs. 11 and 20). For our alumni, do share more of your remarkable accomplishments with us at **care@mst.edu**.

Big accomplishments from faculty help in our mission of educating the next generation of Miner alumni and enhancing our national visibility. Notable kudos go out to **Dr. Chenglin "Bob" Wu** with an NSF CAREER Award (pg. 9), our first professor to receive the award in more than a decade, with novel work in 2D metals and foundational materials research. **Dr. Jenny Liu** also made notable impact, with a new national research center through the USDOT (pg. 6). Our faculty assumed many national and campus-level leadership positions. The support from our stellar staff was also noteworthy — **Jody Seely** and **Joann Stiritz** received CEC annual awards (pg. 10) and Jody also received a 2021 Academy Support Award. We have much to celebrate, and I encourage our alumni and friends to stay in touch with our LinkedIn, Facebook and Instagram posts and campus news (**news.mst.edu**).

The 2021 year was trying, challenging, and draining to the team, yet we did not waiver in our core beliefs and vision. I applaud our entire team and deeply appreciate their exceptional efforts. I find it tremendously humbling and gratifying to see the strength and dedication of our team to our department motto of **Change the World!** Go Miners!

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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 Programs: Cesar Mendoza, Ph.D.

HOMECOMING 2021

STRAUSS HONORED FOR SERVICE

Amy Strauss, CE'90, MS CE'91, pictured in the front row far left, of Springfield, Mo., received a Robert V. Wolf Alumni Service Award during Homecoming. Strauss retired from the city utilities of Springfield as manager of power generation engineering at the John Twitty Energy Center in 2019. She was honored for her overall excellence and for service to her profession and community.

CIVIL ENGINEERING STUDENTS CROWNED ROYALTY

Homecoming Court, pictured from left to right: Hailey Hicks, Alyssa Bax, Olivia Romisch (Queen), Blake Elder (King) and John Rausch.

Missouri S&T crowned the 2021 Homecoming Queen and King during halftime of the Oct. 9 football game between S&T and Truman State University.

Olivia Romisch, a sophomore in civil engineering from Overland Park, Kan., was named Missouri S&T's 2021 Homecoming Queen. **Blake Elder**, a senior in civil engineering from St. Louis, was named Missouri S&T's 2021 Homecoming King. They both received prize baskets and a $250 textbook scholarship to the bookstore.

The Bridge

In this issue

MISSOURI S&T BEST IN STATE FOR VALUE, STARTING SALARIES

A report from the financial technology firm SmartAsset ranks Missouri S&T as the best value among Missouri universities and best in the state when it comes to graduates' average starting salaries.

The average starting salary of $69,200 for Missouri S&T graduates was the highest of all universities in the state, according to the report. In addition to starting salaries, SmartAsset looked at available scholarships, tuition, living costs and the retention rate for each university to determine the "best value" rankings.

In addition to its No. 1 ranking among Missouri universities, S&T was ninth nationally in the study, which measures a university's return on investment.

SmartAsset says when it comes to methodology, salary, tuition, and living costs each received 25% weight, while scholarships and retention rate were given 12.5%.

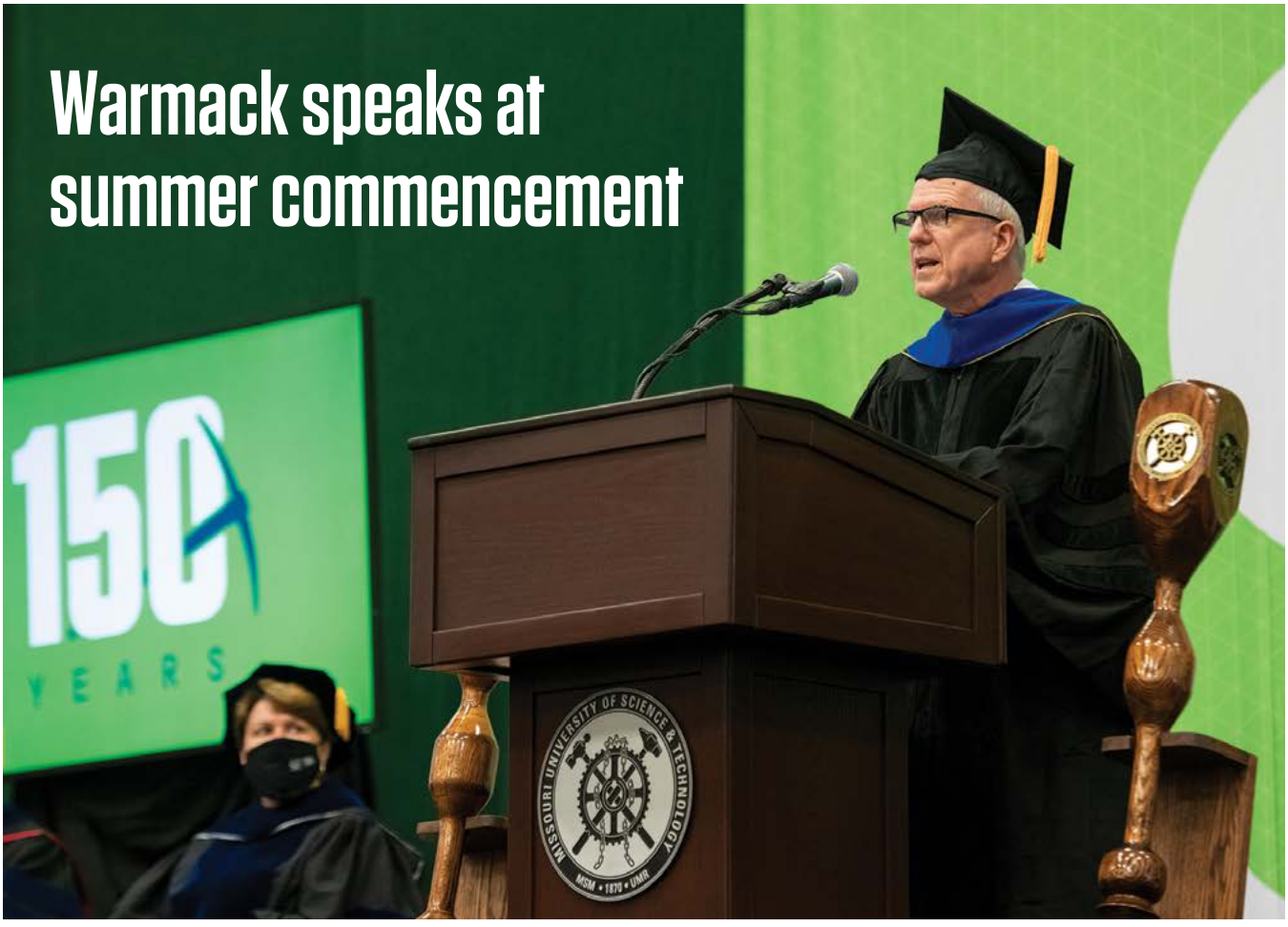
The schools were then ranked by their score, with the No. 1 school receiving a score of 100, and each additional school's index value representing how closely they compare.

Civil Engineering Program listed in *U.S. News* national rankings

Missouri S&T's civil engineering program is No. 21 among the nation's public doctoral-granting universities and is ranked 31st overall in the category, according to the latest *U.S. News & World Report* rankings, which were released in September. Missouri S&T was ranked 88th among public doctoral-granting universities and 179th overall in the category, and S&T's engineering programs were ranked 35th among publics and 63rd overall.

Visit U.S. News' America's Best Colleges website (**www.usnews.com/best-colleges**) for more information about the rankings.

Warmack speaks at summer commencement



John Warmack, CE'79, of Texarkana, Ark., principal at Warmack and Co. LLC, delivered the summer commencement address at Missouri S&T. The special ceremony held in July honored former S&T students who graduated during 2020 or in spring 2021 but were unable to participate in a ceremony because of the COVID-19 pandemic. Candidates for graduation in summer 2021 could also participate.

Warmack arrived on campus from Fort Smith, Arkansas, at age 17 after completing his junior year of high school. He finished his final high school requirements through a correspondence course and graduated from S&T at age 20, after 3 1/2 years of study. After graduation, Warmack joined his family real estate development business, where he worked for 36 years, and became engaged in public service in his home state of Arkansas.

Warmack was a founding member of the Arkansas Executive Forum associated with the Walton College of Business at the University of Arkansas at Fayetteville. His other public service included five years on the Fort Smith, Arkansas, Airport Commission and five years on the Arkansas Workforce Investment Commission.

Warmack's father founded Warmack and Co. LLC in the 1930s. The company manufactured gas heaters in the winter and outdoor lawn furniture in the summer. In 1960, the company transitioned from manufacturing to real estate development with a focus on commercial development. Warmack developed computer-aided design software for the business. He also co-developed the structural engineering module for Graphisoft's ArchiCad and was involved in designing Structural DeskTop, an application program interface for AutoCad.

For the past eight years, Warmack has focused his efforts on developing a national energy policy to close the nuclear fuel cycle through a program for recycling spent nuclear fuel. The science and technology needed to accomplish the policy originated with the Manhattan Project, and Warmack believes it is now ready for full-scale commercial deployment. Warmack has successfully shepherded energy legislation through the Arkansas General Assembly and is working with other states and national laboratories to implement the policy.

To view the commencement video, visit the registrar's website at **registrar.mst.edu/commencement**.

Dr. Jenny Liu, professor of materials and pavement engineering

S&T contributes to infrastructure durability and lifespan through national center

by Nancy Bowles

As America's infrastructure ages and climate change takes a toll on highways, railroads and bridges, Missouri S&T is researching stronger, longer-lasting materials and innovative technologies as a member of the only national university transportation center focused on improving the durability and extending the lifespan of infrastructure.

"S&T has very strong expertise," says **Dr. Jenny Liu**, professor of civil, architectural and environmental engineering at Missouri S&T and the center's primary S&T investigator. "We are doing exciting research by using new materials and emerging techniques such as remote sensing and data analytics."

Liu says the research focuses on critical infrastructure issues like natural hazards, corrosion agents, extreme events, and monitoring and managing infrastructure. Missouri S&T has been working with 10 other universities within the National University Transportation Center (UTC) for Transportation Infrastructure Durability and Life Extension since 2019. Recently, the U.S. Department of Transportation renewed the UTC for an additional year, awarding a total of $10 million over four years. S&T will receive over $2.2 million throughout the grant period.

Liu's research focuses on innovative additives and recycled materials such as waste plastic for asphalt. Additives called phase-change materials – those that change from liquid to solid, for instance – are used to create thermal adaptive pavement and enhance longevity, thereby saving the cost and labor involved in asphalt maintenance.

"More than 94% of roads in the U.S. are paved with asphalt, which is a temperature sensitive material," says Liu. "Different states have to use different types of asphalt depending on their climate conditions – winter in Alaska or summer in Missouri or Texas, for instance. We're working to verify that phase-change materials can work to keep asphalt cool or release heat depending on the need."

Liu's team at S&T is also applying emerging techniques. **Dr. Xiong Zhang**, professor of civil, architectural and environmental engineering, at S&T, is developing a 3D method to detect and characterize cracks in bridges. Zhang uses an unmanned aerial vehicle and structure-from-motion photogrammetry to accurately reconstruct a 3D structure from 2D photographs. The technique would provide a high-accuracy, low-cost and easy-to-operate tool in bridge inspection and maintenance.

Liu is also working with **Dr. XianBiao "X.B." Hu**, assistant professor at Pennsylvania State University and an adjunct faculty member in civil, architectural and environment engineering at Missouri S&T, to anticipate the effects of autonomous vehicles on the nation's infrastructure. Liu says they are using the current infrastructure data to predict the impact and then develop specifications in the operation and maintenance of the transportation infrastructure.

Missouri S&T researchers working in the UTC include Liu, Zhang, and Hu, along with **Dr. Genda Chen**, the Robert W. Abbett Distinguished Professor of Civil, Architectural and Environmental Engineering; and **Dr. Xinhua Liang**, the Linda and Bipin Doshi Associate Professor of Chemical and Biochemical Engineering at Missouri S&T.

Liu is recruiting talented students from across the U.S. to pursue Ph.D. degrees in infrastructure preservation and resilience through a recently awarded GAANN (Graduate Assistance in Areas of National Need) grant from the U.S. Dept. of Education. The grant provides fellowships for up to five graduate students. For more information, contact Liu at **jennyliu@mst.edu**.

Website Link:
news.mst.edu/2021/10/st-contributes-to-infrastructure-durability-and-lifespan-through-national-center

Brinkmann leads Missouri Highways and Transportation Commission

Bob Brinkmann, CE'71, founder and CEO of Brinkmann Constructors, was named the new chair of the Missouri Highways and Transportation Commission. The commission voted this change in leadership at its monthly meeting held in September in Springfield, Mo.

The commission governs the Missouri Department of Transportation, the agency responsible for building, operating and maintaining the state highway system and supporting other transportation modes in Missouri. Missouri's road system spans more than 33,800 miles and includes more than 10,000 bridges and culverts, more than 4,600 miles of rail lines and 1,050 miles of navigable rivers.

Missourians are anxious to see how the state's transportation system will benefit from the recent passage of Senate Bill 262 that will be bring new funding to MoDOT.

Brinkmann was appointed to the commission in 2017 and has more than 50 years of construction industry experience in key executive, project management and engineering roles. He received an Award of Professional Distinction from Missouri S&T in 2001 and is a registered professional engineer in Missouri. He is active in many civic organizations and causes including the Junior Achievement Mississippi Valley, past chairman of the S&T Board of Trustees, member of the Board of Directors for the St. Louis Metropolitan Police Foundation, member of the St. Louis Police Chief's Club, member of the Academy of Civil Engineers, and "Honorary Trooper" of the Missouri State Highway Patrol.

Nickell appointed to Amusement Ride Safety Board

Missouri Gov. Mike Parson appointed **Joseph Nickell**, CE'21, to the Amusement Ride Safety Board.

Nickell works as a Zipline Technician for Universal Zipline Technology where he helps design and construct course layouts that adhere to proper safety protocols.

While attending Missouri S&T, Nickell completed a summer engineering and project management internship with Caron-Mitchell Inc. Engineering and Construction.

FALL CAREER FAIR

The S&T Career Fair returned in September with two days of in-person events, and one day of virtual networking. More than 380 employer booths were on site at the three-day fair.

An interactive floor plan was available in the Career Fair Plus app, to allow attendees to map a route to the companies they were interested in. Students and alumni prepared for the Career Fair by downloading the app at **career.mst.edu** and setting up their account using their university email account. The app also let students connect their LinkedIn profile.

"S&T has worked hard to respond to the rapidly changing job market," says **Dr. Will Zwikelmaier**, director of career opportunities and employer relations at Missouri S&T. "That this year's fair is 15% larger than our largest ever, is a testament to the demand for S&T students and the focus S&T places on supporting them toward their next step."

The in-person fair followed strict protocols to combat the spread of COVID-19. Employers and students were asked not to shake hands. Capacity was limited, with a "one-in, one-out" entry policy.

Wu wins NSF CAREER Award for 2D metals research

by Nancy Bowles

As electronic devices get smaller and faster, computer chips must get thinner to save space and improve performance. **Dr. Chenglin Wu**, an assistant professor of civil, architectural and environmental engineering at Missouri S&T, has won a $500,000 CAREER Award from the National Science Foundation for his work in 2D metals – metals that are three atoms thick – for use in computer chips, sensors and coatings.

"Traditional computer chips are made by stacking silicon dies, but you cannot infinitely thin the silicon or the matrix materials, so there's a need for replacement materials," says Wu. "2D materials are the ideal candidate."

Wu is working with two different types of materials – titanium carbide (Ti2C) and molybdenum disulfide (MoS2), each three atoms thick. He says the materials can be stacked like sheets of paper to serve multiple functions, but adhesion and fragility can be challenging. Wu says those challenges limit commercial applications of the technology.

"The 2D materials begin to break down when they undergo a chemical reaction, and they lose their 'stickiness,'" he says. "The real issue is the materials are always under strain, either bent or stretched. With this CAREER Award, I will develop unique tools to study the mechanism that causes the breakdown and find ways to prevent it."

Wu says commercial interest in 2D materials is growing, and the market for the materials is projected to be $6 billion by 2035. He adds that the semiconductor and coating industries are already moving into 2D materials as the cost comes down.

Another industry that could benefit from 2D applications is health care, Wu says. He and other researchers at Missouri S&T are using 2D materials in sensors to detect COVID-19 in people's breath.

"We recently ran a hospital experiment with Phelps Health, and our test was spot-on with the hospital's standard test," he says. "The beauty of it is that our test takes about 30 milliseconds to detect COVID, where the standard test takes 15 minutes. Our test can also differentiate between COVID and the flu."

Wu says S&T researchers are developing a Bluetooth cell phone application that works with a 2D sensor in a mask to detect viruses, sending data from the mask directly to your phone and alerting the testing center. They are also working with collaborators at other universities across the country to develop wearable sensing devices, including a patch that can monitor diabetes using 2D sensor technology.

"So that's the future we're working on here," Wu says.

Website Link:
news.mst.edu/2021/07/missouri-st-researcher-wins-nsf-career-award-for-2d-metals-research

RAISING FUNDS FOR NEW LAB EQUIPMENT

Facing shortages in funding for teaching laboratory equipment and expenses, our values in experiential learning and hands-on education have been challenged. In an effort to have a direct impact on the education of our students and add to the level of excellence of CArEE department educational facilities, the Academy of Civil Engineers officers and board of directors recently challenged its members and other alumni to raise funds for much-needed equipment in the core undergraduate teaching labs, with initial focus on the geotechnical, environmental and construction materials laboratories.

Many thanks to board member **Brent Massey**, CE'95, and principal with CEI Engineering Associates Inc., who is leading the challenge, appropriately named the Laboratory Equipment Enhancement Program, or "LEEP." Massey developed the core challenge to the academy members, and the board pledged $10K out of their reserves to kick off the campaign. The funds raised go toward upgrading and replacing equipment like concrete air meters, materials drying ovens, water quality testing equipment, educational rheometers and balances, and much more.

The goal was to secure $100K and Massey is happy to report that they have almost reached the goal. "We have just eclipsed $90K towards our $100K goal for the LEEP campaign, and the response from so many academy members has been tremendous! These lab upgrades will have a direct impact on students and recruitment for years to come," said Massey. "We only need a few more contributions to help us reach the goal before year end – we're close! Will YOU help make a difference?"

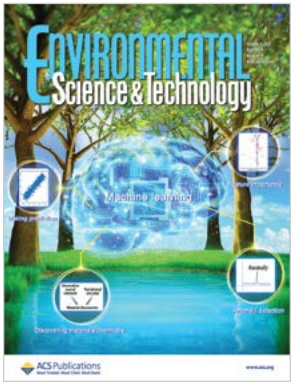
The current funding includes gifts of more than $25K each from **Al Kaplan**, CE'72, and **Duane Montana**, CE'75, to help reach our first-year goal of $100K.

If you would like to donate, you can go online to **give.mst.edu**. There you can select the circle under "Designations" (select one). A drop-down menu appears and then you scroll down to Initiatives and select "Civil Academy-LEEP Lab Equipment" (714590).

Or you can mail a check to:
Academy of Civil Engineers, Attn: Robyn Collier
211 Butler-Carlton Hall, 1401 N. Pine St.
Rolla, MO 65409-0030

S&T Researchers author feature article on machine learning

Dr. Joel Burken, Curators' Distinguished Professor and chair, and **Dr. Majid Bagheri**, a 2021 Ph.D. graduate at S&T, recently collaborated on a paper with a large team of engineers and scientists from eleven institutions. The paper was highlighted as a feature and cover article in the October issue of the *Journal of Environmental Science and Technology*, the leading research journal in the environmental field. The journal aims to be transformational and direction-setting, publishing rigorous and robust papers for a multidisciplinary and diverse audience of scientists, policy makers, and the broad environmental community.



The article is a feature in the current issue and explores the potential of machine learning (ML) to revolutionize data analysis and modeling in the environmental science and engineering (ESE) field and covers the essential knowledge needed for such applications. The lead author on the article is Dr. Huichun (Judy) Zhang, Frank H. Neff Professor at Case Western University. "The goal of this article was to introduce machine learning ideas and tools to environmental scientists and engineers, and address 'best practices' for machine learning," says Zhang.

CEC Dean's Awards

Three members of our team received dean's honors from the College of Engineering and Computing (CEC) for their outstanding performance. The winners were:
- **Dr. Chenglin Wu**, Dean's Scholar Award, pictured left
- **Jody Seely**, Student Service Award, right
- **Joann Stiritz**, Team Impact Award, center.

Gass named to 20 In Their 20s list

Arkansas Business announced that Garver Transportation Project Engineer **Josi Gass**, EnvE'17, has been honored as one of the publication's 20 In Their 20s. In being named to this year's class, Gass joins a number of her peers from across the state who are considered to be rising stars in their respective industries. In that respect, Gass couldn't be in better – or more appropriate – company.

Even before arriving at Garver in 2019, Gass had already been making waves. As Arkansas Business noted, while attending Missouri S&T, Gass had joined Engineers Without Borders (EWB) and worked with a team to design and build water systems that provided clean, reliable water for communities in Guatemala, Bolivia, and Honduras.

In doing so, she found a means of channeling her lifelong passion for water into truly meaningful work – something which has made her a natural fit as a project engineer for Garver's Hydrology & Hydraulics Team and a Certified Floodplain Manager. This work has allowed her to play an integral role in shaping the relationship that communities have with water, including bridge replacement projects and drainage studies to minimize flooding in Arkansas communities.

"Josi has demonstrated an outstanding commitment to the engineering industry and her community, and the impacts of her influential work have been, and will continue to be, felt across the region," said Garver Director of Transportation Jerry Holder, P.E.

Still, as her past volunteer work suggests, her dedication to her community has rippled well beyond Garver's office in North Little Rock.

In recent years, Gass has become an advocate for STEM education, particularly for young women, organizing conferences for students across Arkansas to introduce them to STEM careers to leading hands-on activities at the STEM Girls Rock Conference. What's more, her passion for service has found outlets ranging from Plastic Free Little Rock to helping build a greenhouse that teaches troubled adolescents about growing their own food.

Reprinted from garverusa.com/news

Koen to retire in December

Dr. Mary Ann Koen, adjunct professor of engineering mechanics: statics, will retire after the Fall 2021 semester. She began her journey at S&T in August 1975 and continued on to earn her master's and Ph.D. degrees in engineering management with an emphasis in civil engineering.

She began her teaching career with basic engineering in 1991 and also taught courses for engineering management, both on campus and thru the university outreach project at the U.S. Army-Fort Leonard Wood Engineer School. She has been with the Department of Civil, Architectural and Environmental Engineering since 2010.

Her teaching evaluations have consistently emphasized her organizational and presentation skills, as well as her dedication to the welfare of students, resulting in several university Outstanding Teaching Awards.

Wang highlighted in NBC article on face masks

Dr. Yang Wang, assistant professor of environmental engineering, was highlighted in an NBC article on why surgical masks work better than cloth ones. According to Dr. Wang, people were significantly more protected by wearing a higher caliber of disposable mask.

The hope is people continue to remain vigilant — especially when traveling and gathering in large groups — in protecting themselves and others against COVID-19 regardless of their vaccination status.

Story: nbcsandiego.com/news/business/money-report/still-using-cloth-masks-its-time-to-switch-to-surgical-heres-why

Oerther named UM System Presidential Engagement Fellow

Dr. Daniel Oerther, professor of environmental health engineering, is serving as a University of Missouri System Presidential Engagement Fellows during the 2021-22 academic year. He will serve as an ambassador in the region and speak to local organizations and communities about his areas of expertise.

Oerther is an expert in community healthcare systems and engineering, access to safe drinking water, and effective hygiene in developing communities around the world. He is available to discuss various topics related to health engineering, nutrition security in Missouri, and water, sanitation and hygiene needs related to the United Nations' Sustainable Development Goals.

To request a Presidential Engagement Fellow speaker at an event, visit **umurl.us/pef-speaking-request**.

150th CELEBRATION

The Academy of Civil Engineers induction banquet and awards ceremony was the cornerstone of the department's 150th anniversary celebration. Students, alumni, faculty and friends participated in Homecoming events. The department also hosted the 2021 Stueck Distinguished Lecture, an Open House featuring lab demonstrations and tours of the new Advanced Construction and Materials Lab (ACML).

150
YEARS AT MISSOURI S&T

CIVIL, ARCHITECTURAL AND ENVIRONMENTAL ENGINEERING

ACADEMY OF CIVIL ENGINEERS

The Academy of Civil Engineers celebrated its 2020 and 2021 classes of new members and appreciated the chance to gather in person. The business meeting, held at the Havener Center, focused on the quality of educational programs, celebrated student success, highlighted departmental rankings and outlined needs to continue excelling as the premier engineering programs in Missouri.

STUECK DISTINGUISHED LECTURE

Nobel scholar shares climate change solutions

Dr. Don Wuebbles, professor emeritus of atmospheric science at the University of Illinois, calls climate change "the biggest challenge of our time." Wuebbles, who shared the 2007 Nobel Peace Prize for his role in the Intergovernmental Panel on Climate Change (IPCC), discussed extreme weather events related to climate change and possible ways to slow and mitigate the challenge during the 2021 Stueck Lecture at Missouri S&T.

Wuebbles presented "Our Changing Climate: The Science and the Pathway to Sustainability" on Oct. 8 at Leach Theatre in S&T's Castleman Hall.

"I feel confident that we can slow climate change and reduce its magnitude, but it will take a worldwide effort" says Wuebbles. "The clock is ticking. Meaningful solutions rest on technological, education, social and cultural actions."

Wuebbles is an expert in atmospheric physics and chemistry and has authored more than 500 scientific publications related to Earth's air quality, climate and the stratospheric ozone layer. His metrics for ozone depletion and global warming potentials are commonly used around the world in establishing national and international policy. He was a coordinating lead author on several international climate assessments led by IPCC that resulted in the Nobel Prize.

NEW ADMINISTRATIVE ROLES

Dr. Costas Tsatsoulis, Missouri S&T's vice chancellor of research and dean of graduate studies since September 2018, became vice provost of graduate education at Missouri S&T effective Sept. 1. **Dr. Kamal Khayat**, (pictured left) the Vernon and Maralee Jones Professor of Civil Engineering at Missouri S&T, was named interim vice chancellor of research, also effective Sept. 1.

"I am very grateful to Costas for his diligence in leading both areas of graduate studies and research," says **Dr. Mo Dehghani**, S&T chancellor. "Success in both of these areas is critical to our efforts to grow graduate education and elevate research. Costas is the right person to lead our graduate studies initiatives."

Tsatsoulis will report to **Dr. Colin Potts**, Missouri S&T provost. "I look forward to working with Costas as he brings renewed focus to our graduate studies programs and services," Potts says. "He brings a wealth of experience to the assignment and a needed perspective and student focus."

Khayat, as interim vice chancellor of research, will report to Dehghani.

"I appreciate Kamal's willingness to step into this interim role," Dehghani says. "He brings a strong track record and reputation as one of our most renowned researchers, and I know that under his leadership we will continue to grow research and scholarship in our areas of excellence while also pursuing new opportunities."

Prior to joining S&T in 2018, Tsatsoulis served as dean of the College of Engineering at the University of North Texas in Denton for a decade. He holds a Ph.D. in electrical engineering from Purdue University, as well as master's and bachelor's degrees in electrical engineering and a bachelor's degree in German, all from Purdue.

Khayat joined S&T as the Jones Professor in 2011. He served as director of the Center for Infrastructure Engineering Studies (CIES) and RECAST university transportation center. Before joining S&T, he was director of the Center for Excellence on Concrete Infrastructure Engineering and head of the Integrated Research Laboratory on Materials Valorization and Innovative and Durable Structures at the Université de Sherbrooke in Canada. He holds a Ph.D. in civil engineering from the University of California, Berkeley, where he also earned a bachelor's degree in civil engineering, a master of engineering degree in construction engineering and management, and a master of science degree in structural engineering.

Fayek receives graduate research fellowship

Sara Fayek, a Ph.D. student in civil engineering, received the Waheed Uddin Diversity Graduate Research Fellowship. Fayek was selected based on her outstanding qualifications to work with researchers at the National Center for Transportation Infrastructure Durability & Life-Extension (TriDurLE) on projects relevant to the USDOT's strategic priorities. Her in-state tuition will be paid for one year and she will be granted a research assistantship with a TriDurLE researcher at Missouri S&T. Sara is pictured, above left, with her advisor, **Dr. Xiong Zhang**.

ElGawady named interim director of Center for Infrastructure Engineering Studies (CIES)

Dr. Mohamed ElGawady, Benavides Faculty Scholar and professor of civil, architectural and environmental engineering, has been named interim director of the Center for Infrastructure Engineering Studies. He succeeds **Dr. Kamal Khayat**, Vernon and Maralee Jones Professor of Civil Engineering. Khayat became interim vice chancellor of research on Sept. 1.

ElGawady joined the Missouri S&T faculty as the inaugural Benevides Faculty Scholar in 2012. Prior to coming to S&T, he taught at Washington State University and was a visiting associate professor at the Tokyo Institute of Technology in Japan. ElGawady holds a bachelor's degree in civil engineering and a master's degree in structural engineering from Cairo University in Egypt. He earned a Ph.D. in structural engineering from the Swiss Federal Institute of Technology in Lausanne, Switzerland.

American Society of Civil Engineers 2022 president speaks at Missouri S&T

Dr. Dennis D. Truax, the incoming 2022 president of the American Society of Civil Engineers (ASCE), presented a talk titled "Engineering Our Future" on Wednesday, Oct. 20. He discussed how ASCE envisions building a better infrastructure system using new methods and advanced materials to support a sustainable, inclusive and equitable society.

Truax is professor emeritus of the Richard A. Rula School of Civil and Environmental Engineering at Mississippi State University. During his 41-year career, he served as school director, department head and professor. He held the James T. White endowed chair at Mississippi State for 15 years and was director or co-director of the Mississippi Transportation Research Institute for 13 years.

Truax is a licensed professional engineer and holds national certifications as an environmental engineer from the American Academy of Environmental Engineering and Scientists and as a water resource engineer with American Academy of Water Resources Engineers. As a consulting engineer, he has worked on environmental and water resource management systems throughout the world, including the design of over 550 water and wastewater treatment systems.

Truax was elected as an ASCE fellow in 1999 and fellow of the National Society of Professional Engineers in 2016. He is a chapter honor member of the Mississippi State University Chapter of Chi Epsilon. Truax received the 2020 Edmund Friedman Professional Recognition Award and the 2018 NCEES Distinguished Service Award. Recently, he was the 2020 ASCE Region 5 Wall of Fame Inductee and in 2021 was inducted into the Academy of Distinguished Alumni of the Charles E. Via Jr. Department of Civil and Environmental Engineering at Virginia Tech.

Truax, pictured front right, was joined by fellow ASCE leaders: Chapter advisors Dr. Joel Burken and Dr. Kevin McLain; St. Louis Chapter president John Weiland, CE'97, MS CE'04; and Region 7 governor Shawnna Erter, GE'00, MS GeoE'13; along with ASCE student officers for Fall 2021.

A WORD OF THANKS:
The department and the ASCE student chapter at Missouri S&T hosted the presentation and the ASCE St. Louis Section sponsored the student dinner and reception, as well as production of the webinar.

Infrastructure journal names ElGawady editor-in-chief

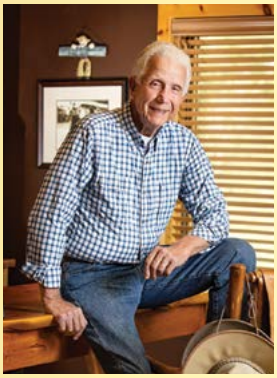
Dr. Mohamed ElGawady, professor of civil, architectural and environmental engineering and Benavides Faculty Scholar, was appointed the next editor-in-chief for the *Journal of Innovative Infrastructure Solutions on Sustainable Structures and Construction Management*.

Innovative Infrastructure Solutions is a peer-reviewed international journal. It aims to present innovative studies serving the general disciplines of geotechnical engineering and sustainable civil infrastructures, in addition to non-geotechnical fields. It also supports sustainable development strategies of countries concerned with developing their existing and new infrastructures in terms of mitigating and adapting to climate change.

Alumni of Influence honored

Three civil engineering alumni were among 11 honored as Missouri S&T 2021 Alumni of Influence during a special event held in November. These alumni are celebrated for their lasting contributions to our university and the wider world.

Ray Betz, CE'66
Engineer, entrepreneur, real estate developer



Ray Betz, CE'66, describes himself as someone who believes in the American dream. And he credits his parents with laying the foundation for his success.

"They taught me to work hard and always do the right thing," he says.

"My uncles got me jobs in factories," says Betz, who also spent a summer with a slide rule calculating water flow volumes for the Metropolitan St. Louis Sewer District. "I was raised by wonderful German-American parents with eighth-grade educations who wanted more for their children."

For Betz, that meant coming to Rolla.

Betz made time to serve in leadership roles for Theta Xi fraternity, compete on the ROTC Pershing Rifle Drill Team and participate in intramural sports. By his junior year, he knew he wanted to enrich his civil engineering background with a business degree. He chose Purdue University's master's program in industrial administration, graduated with 13 job offers and went to work for Deloitte's management consultancy.

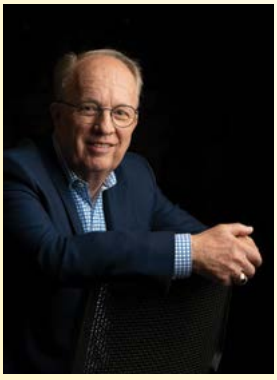
"It wasn't the job with the highest salary, but it offered the broadest exposure to business," says Betz, who took leave to complete his Army service as a lieutenant at Fort Belvoir and in Vietnam. Upon returning to Deloitte, he relocated to Houston "because of the tremendous growth potential."

Five years later, Betz gathered a small group of investors, bought a few tracts of land and went into business for himself in 1976. He has been developing commercial real estate ever since, riding booms, weathering downturns and making the most of both.

The Betz Companies grew, built a headquarters, and expanded into industrial, retail, medical, storage, hotel, and residential real estate in Houston, Austin and San Antonio. Nearly half a century after his first acquisition, Betz is still making deals and giving back to the philanthropic causes he supports with his wife, Susan. A Missouri S&T trustee emeritus, member of the Academy of Civil Engineers, and donor to many university initiatives, he also encourages out-of-state students through the Raymond and Susan Betz Endowed Scholarship.

"I value what the university has meant to me and the foundation my education provided," says Betz. "The discipline and problem-solving approaches you learn in engineering courses will serve you well in any career. Add an entrepreneurial mindset and the doors are wide open."

Mike Hurst, CE'74
Civil engineer, builder, solution seeker



Mike Hurst, CE'74, credits a lifetime of mentors with going the extra mile for him. One of the earliest was Sister Marcella Ewers, his science teacher at St. Vincent High School, who told him point blank that he could do a lot better than ranking in the bottom quartile of his class.

"By the time I graduated, I was eighth in my class," says Hurst, who grew up on a farm where corn, soy beans and livestock supported the family. "My two older brothers went into agriculture but my mother wanted me to be an engineer."

Hurst had just begun his freshman year at Rolla when adulthood arrived.

"I found out that Barbara and I were going to be parents," says Hurst, who went to his advisor, **Dr. LeRoy Thompson**, CE'56, MS CE'65, and told him he would have to quit school

to support his family. "Dr. Thompson said I needed to stay in school. He helped us find a place to live. He and his wife had us over for dinner many times. His daughter babysat for us. He was a great friend."

As a student, husband and father, Hurst still found time to be active in campus organizations, honor societies and Sigma Phi Epsilon fraternity. He also started planning for life after graduation.

"I had a number of interviews and my two finalists were McCarthy and Procter & Gamble," he says. "I talked with Barb about how McCarthy was smaller and riskier while P&G was huge and stable. About 10 years later, P&G eliminated its construction management department — so much for my risk analysis."

Hurst's first McCarthy project was a student center for Southeast Missouri State University. When he showed up on the job, the construction superintendent asked, "What are you supposed to do?" Hurst remembers his answer: "I've never been an engineer before. I have no idea."

Over the next two decades, Hurst managed many construction projects and spent 14 years working for McCarthy's Southwest division, eventually as executive vice president of operations. In 1994, he met his biggest challenge — constructing a $350 million chip fabrication plant for a contentious client with a 12-month schedule.

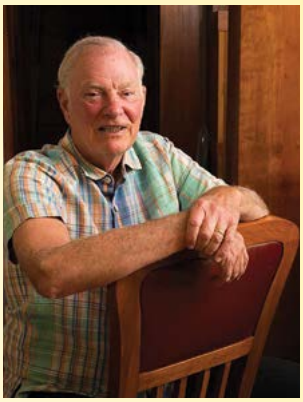
"It was the kind of project where stress levels were so high that people broke down and cried," says Hurst. "At one point, I was pretty sure we'd be fired. When Mike McCarthy said it was time for me to become company president in 1995, I asked what convinced him. He said it was that project."

Hurst served as president and COO of McCarthy until his retirement in 2007. He helped to lead many changes over 33 years with the company, including the transition from a family-owned to employee-owned company and the implementation of safety improvements that have been adopted industrywide.

The Hursts established the Hurst-McCarthy Professorship in Construction Management in 2008 in partnership with McCarthy.

"More than 40 percent of S&T's civil engineering graduates work in construction, so it made sense to create an endowment supporting excellence in the field," says Hurst, who serves on the S&T Board of Trustees. "Civil engineers are builders and solution-seekers. They get things done."

Wayne Laufer, CE'67
Engineer, oilman, energy advocate



When **Wayne Laufer**, CE'67, explains how he got into the oil business, the story begins in metallurgical engineering, detours to electrical engineering and ends up in civil engineering.

"After one semester in metallurgical and three in electrical, I switched to civil because it wasn't as narrow," he says. "You have hydrology, steel design, concrete design, soil mechanics — lots of variety and real-world applications."

Laufer knew his major would provide a good foundation for whatever he did. But the story took another twist as he was about to graduate.

"I interviewed with three construction companies but didn't get a job offer," he says. "A fraternity brother recommended I look at oil companies. I interviewed with Shell, Gulf (now Chevron) and Humble (now ExxonMobil) and got offers from all three. They were looking for warm bodies with decent grades and a willingness to be trained."

Laufer chose Shell Oil Co. and moved to New Orleans as a production engineer.

"It couldn't have been a better experience," he says. "I had a lot of responsibility from the start." After three months in a Shell training program with about 200 other new hires, he spent a year as a field foreman "learning what makes an oil field tick because you don't learn that sitting in an office."

After 10 years with Shell, Laufer co-founded a petroleum engineering consulting firm with a former Shell colleague on the faculty at Texas A&M University.

Laufer sold his interest in 1980 and worked for small oil companies before co-founding Bois d'Arc Energy in 1983.

When the oil industry went into a tailspin in the 1980s, Laufer took advantage of the downturn to begin aggressive acquisition.

(continued on page 20)

Burken speaks at ACEC

Burken, above center, with a group of Miner alumni

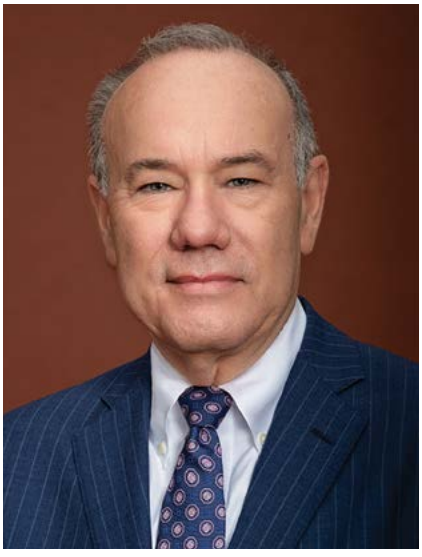
Dr. Joel Burken, Curators' Distinguished Professor and chair of civil, architectural and environmental engineering, spoke at this year's American Council of Engineering Companies (ACEC) state meeting. He discussed the future of engineering education in Missouri. With roots dating back more than 100 years, ACEC is a federation of 52 state and regional councils representing more than 600,000 engineers, architects, land surveyors and other specialists.

Toebben receives ACI Missouri Scholarship

Paige Toebben, a civil engineering student studying modified Portland cement and Portland clinker, was awarded the Dr. David Richardson Graduate Scholarship by the Missouri Chapter of the American Concrete Institute (ACI) for 2021-22.

Toebben is beginning her master's degree and received $5,000 in recognition of her academic excellence and exemplary character.

ACI president speaks to the tale of two high-profile projects



An internationally recognized expert in structural engineering and National Academy of Engineering member, Dr. Randall Poston spoke to students in civil, architectural and environmental engineering about the repair of concrete structures that present many unique construction challenges compared to newer construction challenges.

He talked about the fact that there are often variations in the as-constructed details compared to those shown in design and construction drawings. Moreover, for buildings that have been in service for some time, the aging and deterioration of components can make construction more difficult especially if the building must remain in service during the repairs.

In describing some of the challenges, the presentation focused on the evaluation and repair of two high-profile concrete buildings — the Courthouse Square mid-rise building complex in Salem, Ore., and the Austonian high-rise residential tower in Austin, Texas. His presentation discussed the nature of design and construction defects that were uncovered during investigation, the types of concrete deterioration that had been experienced during service, and the types of repair and strengthening schemes that were utilized to bring the buildings into compliance with building codes.

Poston, the founding senior principal of the consulting engineering firm Pivot Engineers in Austin, Texas, is currently the president of ACI, and is a Neil Armstrong Distinguished Visiting Fellow at Purdue University College of Engineering. He received his bachelor's, master's and doctoral degrees in civil engineering from the University of Texas at Austin in 1978, 1980 and 1984, respectively and was elected to the National Academy of Engineering in 2017.

From 2006 to 2014, Poston chaired the American Concrete Institute (ACI) Committee 318, which was responsible for the first comprehensive reorganization of building code for structural concrete in 45 years. For his work leading the effort, ENR named him a Top 25 Newsmaker in 2015, and ACI recognized Poston with the 2014 ACI Henry L. Kennedy Award and the 2015 Delmar Bloem Distinguished Service Award.

A reception followed the presentation, was sponsored by the Missouri chapter of ACI.

Liu appointed associate editor and committee member

Dr. Jenny Liu, professor of materials and pavement engineering, was invited to serve as associate editor of ASCE *Journal of Cold Regions Engineering*, which is the world's leading peer-reviewed scientific journal in the area of cold regions engineering published by the American Society of Civil Engineers (ASCE).

Established in 1987, topics of this journal include ice engineering, ice force, construction on permafrost and seasonal frost, cold weather construction, environmental quality and engineering in cold regions, snow and ice control, cold regions materials, and surveying and planning in cold regions.

Liu has been serving as associate editor for two other ASCE journals — *Journal of Materials in Civil Engineering* and *Journal of Transportation Engineering Part B: Pavements* — for more than 10 years.

Liu was also appointed a member of Transportation Research Board's (TRB) Standing Committee on Pavement Preservation — AKT20 from 2021-24.

TRB is one of seven program units of the National Academies of Sciences, Engineering, and Medicine, which provides independent, objective analysis and advice to the nation and conducts other activities to solve complex problems and inform public policy decisions. Liu is a member of TRB AKM80 Committee on Mineral Aggregates. She has served on other TRB committees including AFK30, AFK50, and AFH50.

Myers shares expertise with concrete, transportation organizations

Dr. John Myers, professor of civil, architectural and environmental engineering, is gaining national attention for his work. He was recently appointed as a founding member of the American Concrete Institute's (ACI) Concrete Innovation Council. The council was formed to strengthen the ACI Foundation's approach to innovation in the concrete industry and better support ACI's growing focus on innovation. In addition, Myers was appointed secretary for ACI's Fiber Reinforced Polymer Reinforcement (FRP) Committee, ACI 440.

Myers was also named a founding member of a new Transportation Research Board (TRB). This group focuses on innovative applications of technology and materials in the design, rehabilitation and construction of bridges and ancillary transportation structures. TRB is one of seven program units of the National Academies of Sciences, Engineering, and Medicine.

In October, Myers delivered a keynote presentation at the fifth International Conference on Transportation Infrastructure and Materials (TIM 2021). More than 1,000 people attended the online session.

Paper selected as Editor's Choice

Dr. Yi Bao, PhD CE'17, recently had one of his papers selected as an Editor's Choice Article by the journal Sensor.

The article titled "Measuring Three-Dimensional Temperature Distributions in Steel-Concrete Composite Slabs Subjected to Fire Using Distributed Fiber Optic Sensors" gives detailed information about temperature distribution that can be important to understanding structural behavior in fire. Under **Dr. Genda Chen**'s direction, the study develops a method to imaging three-dimensional temperature distributions in steel-concrete composite slabs using distributed fiber optic sensors.

Editor's Choice articles are selected based on their noteworthiness, high interest to readers and are considered among the best in current research.

Article link: mdpi.com/1424-8220/20/19/5518

ASCE Region 7 Awards

Civil, architectural, and environmental engineering was well represented at the American Society of Civil Engineers (ASCE) section/regional awards.

Here are the awardees from the event held in St. Louis:

2021 ST. LOUIS SECTION SCHOLARSHIP

- **Brenan Pool**, a senior in architectural and civil engineering

2021 STRUCTURAL ENGINEERING INSTITUTE (SEI) SCHOLARSHIP

- **Deidra Foster**, master's student in civil engineering

2021 YOUNG ENGINEER AWARD

- **Kandi Spraggs**, CE'08, MS CE'10, Bridge Engineer for TranSystems

2021 PROFESSIONAL RECOGNITION AWARD

- **Randy Perkinson**, CE'82, Burns & McDonnell

Academy Networking Event

Pictured left to right: Amy Strauss, Marsia Geldert-Murphey, Paula Wuebbels Hart, Claudia Hoeft, Darcey Schumacher, Becky Baltz and Jenna McGregor Jarvis.

Academy of Civil Engineers female members and recent civil engineering alumni shared their professional experiences and successes in the working world. They took time out of their busy schedules to travel to Rolla and talk about their careers — how they got started, where their paths have led and their leadership roles along the way. Sharing their knowledge about their varied professions is an extremely valuable experience for our students.

Alumni of Influence (continued from page 17)

"We bought leases from people who wouldn't have sold them to us before 1983," he says. "Many people were fearful about the future of the industry but we didn't know any better, so we kept acquiring drilling areas for next to nothing."

Over the next two decades, Laufer steered Bois d'Arc into continued growth — and took the company public in 2005.

The company sold in 2008 and Laufer retired, although he continues to invest in entrepreneurial ventures and oversees the Wayne Laufer Charitable Foundation with his wife, Gayle. The Laufers support many philanthropic causes and in 2009 established the Wayne and Gayle Laufer Endowed Chair in Energy at Missouri S&T. A member of the Academy of Civil Engineers, Laufer remembers his Rolla years for their academic rigor — and the one week in March when no one cracked a book.

"I have good memories of Rolla, my Sigma Pi fraternity brothers and St. Pat's," he says. "We spent hundreds of hours making cudgels and stuffing crepe paper into chicken wire holes to make floats. The rest of the year there was a lot of peer pressure to study. We didn't slack off. If I applied today, I'm not sure I'd be admitted."

EQUINOX FEST

Thirty-seven years ago, Stonehenge appeared on the Missouri S&T campus. The 160 tons of granite acts as a natural clock and calendar, and marks the fall equinox in mid-September.

During the festival, **Dr. Dick Elgin**, former professor of civil engineering, talked about the science behind Stonehenge and its history and significance. Students learned about changes in visual perspective of the moon and stars, participated in hands-on activities, and visited with space- and solar-related student organizations and design teams.

S&T Stonehenge is a half-size replica of the monument located in England, but unlike that 3,000-year-old version, we know precisely how S&T's Stonehenge came to exist.

Dr. Joseph Senne, professor emeritus of civil, architectural, and environmental engineering, and **Dr. David Summers**, Curators' Distinguished Professor emeritus of mining engineering, unveiled their handiwork of a partial reconstruction of the English original in 1984.

Cut from 160 tons of granite using S&T's waterjet technology, the monument was named one of National Society of Professional Engineers' 10 Outstanding Engineering Achievements for 1984. S&T Stonehenge was dedicated during the Summer Solstice, June 20, 1984.

Pictured above: Students participated in hands-on activities; Middle: T-shirt design for the event; Bottom: Dr. Dick Elgin and Dr. Joseph Senne working on building S&T's replica of Stonehenge

Yan elected to NAAHDRI leadership team

Dr. Grace Yan, associate professor of structural engineering, was elected to the leadership team of the North American Alliance of Hazards and Disasters Research Institutes (NAAHDRI).

NAAHDRI is dedicated to bringing together leaders of hazards and disaster research centers and institutes throughout North America, as well as partner individuals and organizations to advance research, education, advocacy and action. NAAHDRI has 82 member institutions (70 in the U.S. in 30 states).

In July, Yan was selected as one of seven members of the NAAHDRI Board of Directors. During her service, she would like to advance the following actions and priorities:

1. Convergence research to enhance national community resilience by promoting collaboration among engineering, climatology, geoscience, urban planning, social science, psychology, economics, finance, government and community.

2. International collaboration to address global warming and climate change faced by the entire earth. This exposure will improve Missouri S&T's national and international reputation on hazard mitigation and community resilience in both education and research.

To learn more about Dr. Yan and NAAHDRI, visit the website: **naahdri.org/leadership/board-of-directors**.

STAT CHANGER

Brynnleigh Weaver, a sophomore studying civil engineering at Missouri S&T, is designing and building play kits for budding scientists and mathematicians. Her work, called "STEM for ALL," recently earned her a Girl Scout Gold Award.

The original goal behind her project was to get more girls interested in STEM. Weaver created STEM kits now on display at the Sump Memorial Library in Papillion, Nebraska. She purposely included kits that did not have a correct answer or one way of doing them because she wanted the children to be able to learn and grow with them.

"I didn't want them to feel like it was a confining/restraining thing that you had to be doing," said Weaver, who wants the children to be creative while learning.

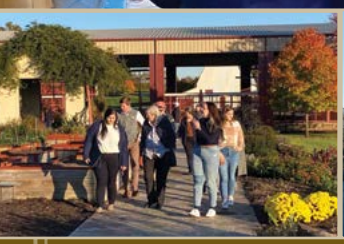
Weaver has also donated books related to STEM and used grid paper to design building plans to be used with blocks. She is thinking about the next generation and making a difference in children's lives!

Watch the news story: 3newsnow.com/rebound/positively-the-heartland/positively-the-heartland-papillion-woman-creates-stem-for-all

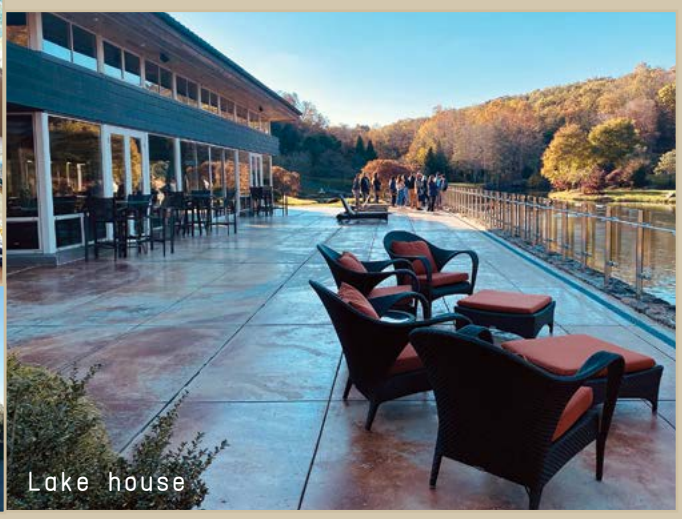
Home Tour

Main house

Missouri S&T's Architectural Design Class, along with members of the S&T Solar House Design Team, were invited to tour Rex and Jeanne Sinquefield's home, lake house and geodesic dome near Folk, Missouri. It is one thing to talk about sustainability, it is another to live it!



Geodesic Dome



Lake house

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Civil, Architectural and Environmental Engineering
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ALUMNI OF INFLUENCE

CIVIL ENGINEERING 2021 HONOREES LISTED ON PG. 16

Civil Engineering Alumni of Influence who attended this year's ceremony and are celebrated as our most distinguished graduates:

John Mathes, CE'67, MS CE'68, **Wayne Laufer**, CE'67, **Matt Coco**, CE'66, **Ray Betz**, CE'66, **Mike Hurst**, CE'74