

THE BRIDGE

Missouri S&T
Spring 2023 | Vol. 50

Civil, Architectural and Environmental Engineering

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



We wrapped the 2022-23 academic year in the CAR EE department with more news to share and celebrate. Our professions are in great demand, our students are achieving remarkable things, and our faculty are leading some amazing work with notable impacts on our world.

Our students are in great demand, and we are working to meet the workforce, as the civil, architectural and environmental engineering programs are obtaining high marks, with more than 180 companies visiting S&T for the career fair this spring. In May 2023 we conferred over 120 degrees, setting the mark high in Missouri and the region for meeting the demands of our profession.

The value of an S&T degree is certainly well recognized, with *U.S. News*, *Princeton Review* and the U.S. World University rankings noting the excellence and values of our programs and research activities (pg. 4). Our student teams and chapters are going great, with Steel Bridge taking first overall and in seven of the eight individual categories in their fifth straight Mid-American championships and a top 15 showing at nationals. Project manager **Krysta Swartz** won the Mid-American Mead Ethics Essay Contest.

Our faculty and student researchers have excelled in their efforts, broadening both research topics and productivity. Collectively CAR EE faculty reached the goal of \$8M in new awards to support research and education at S&T. This doubled from \$2.7M five years ago with an impact on our profession



and planet, such as developing new infrastructure materials and design, while also advancing carbon management. They are building on a legacy that has long been in development, such as emeritus professor **Dr. David Richardson** being a “Hall of Famer” for advancing the Missouri Asphalt profession (pg. 18). Many more accomplishments were highlighted in our recent annual report for 2022. (Website link: issuu.com/clwilsonlibrary/docs/2022_scholarly_productivity/1)

We also offer appreciation to our alumni for supporting our students and programs, and building our reputation and legacy. Alumni **Frank Benavides** is highlighted (pg. 19) for his support of our faculty with the Benavides Scholar award to **Dr. Hongyan Ma**, and we also celebrate **Drs. Jenny Liu and Xiong Zhang** being named James A. Heidman professors (pg. 27).

We also celebrate alumni career excellence as well with 13 new members of the Academy of Civil Engineers (pg. 14), **Bob Brinkmann** as a Chi Epsilon Honor member and 13 new student initiates (pg. 7).

Our Miners are certainly leaders that impact many aspects of our planet and society, be it as lieutenant governor of Maryland like alumna and academy member **Aruna Miller** (pg. 13), S&T student body president **Sammi Young** (pg. 7), steel bridge project manager **Krysta Swartz** (pg. 5), or volleyball captain and researcher **Shelby Ply** (pg. 10).

Without question, our Miners are Changing the World and will continue to do so into the future as we continue to lead the efforts in building a better world.

Stay up-to-date on all happening with CAR EE with our real-time news feed on care.mst.edu or jump on our social media networks (below) to see how our Miners #ChangeTheWorld! Go Miners!

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- instagram.com/sandtcaree
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- twitter.com/SandT_CARe

DEPARTMENT ADMINISTRATION

Department Chair

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

Assistant & Associate Chairs

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

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

Environmental: Mark Fitch, Ph.D.

Graduate Programs: Jianmin Wang, Ph.D., P.E.



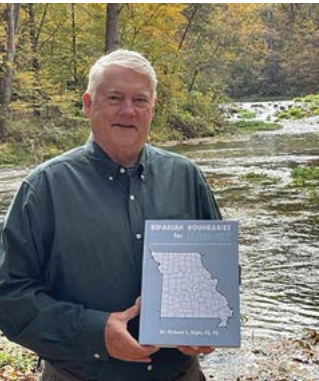
LAUFER RECEIVES HONORARY DEGREE FROM S&T

Wayne Laufer, CE'67, of Sanibel, Florida, retired co-founder and chief executive officer of Bois d'Arc Energy Corp., was awarded the doctor of engineering, honoris causa during S&T's recent commencement ceremonies.

He and his wife, Gayle, established the Wayne Laufer Charitable Foundation, which has awarded 60 undergraduate scholarships, 15 to students who have attended S&T to study engineering or other STEM disciplines. In 2009, the Laufers also established the Wayne and Gayle Laufer Endowed Chair in Energy.

ELGIN PUBLISHES SIXTH BOOK

Dr. Dick Elgin, CE'74, MS CE'76, former faculty member in civil, architectural and environmental engineering, has published his sixth book on surveying titled *Riparian Boundaries for Missouri: A Guide to Inland Nontidal Riparian and Littoral Boundaries*.



"I am particularly proud of this book because it addresses the complex river boundary that, unlike its upland brethren, moves. Much of the *lex aquae* for riparian and littoral boundaries is state-specific and hence this book focuses on Missouri," Elgin says.

The book was partially funded by Missouri's Department of Agriculture, Land Survey Program and the Missouri Society of Professional Surveyors.

Book Details: www.amazon.com/Riparian-Boundaries.../dp/BOBLB35NCH

THE BRIDGE



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Princeton Review rates S&T high for ROI, career placement, internships

Missouri S&T is one of the nation's best public universities when it comes to career placement for its graduates and student internships, according to the Princeton Review's latest "Best Value Colleges" ranking, released April 25.

Missouri S&T is ranked third among the nation's top public universities for best career placement. The ranking is based on student ratings of career services collected by Princeton Review and graduate salary data from PayScale.com.



Photo by Michael Pierce, Missouri S&T

S&T is ranked ninth on Princeton Review's list of best public universities for internships. This rating is based on college student ratings of accessibility of internship placement at their university.

S&T is ranked 24th among public universities for best return on investment, or ROI. For this ranking, the Princeton Review analyzed academic quality and selectivity, affordability, and availability and quality of financial aid packages, as well as salary and career prospects of graduates.

The Princeton Review chose 209 schools for the 2023 list based on data from its surveys of administrators at more than 650 colleges in 2022-23. Topics covered everything from academics, cost and financial aid to graduation rates and student debt. Only about 8% of the nation's four-year colleges and universities were chosen for the listing, says Rob Franek, Princeton Review editor-in-chief.

Students like Claire Croley, pictured left, are highly sought after by employers. In 2023, more than 340 companies signed up to recruit S&T students.

➔**Website:** news.mst.edu/2023/04/princeton-review-rates-st-high-for-roi-career-placement-internships

S&T graduate engineering programs on the rise in *U.S. News & World Report* rankings

Missouri S&T is again one of the nation's top-ranked institutions for pursuing a graduate degree in engineering, and several specific degree programs are on the rise, according to the latest *U.S. News & World Report* rankings.

S&T is ranked 82nd overall in *U.S. News'* Best Engineering Schools ranking, announced, April 25.

Civil engineering is ranked at No. 51 (34th percentile), tied for the highest ranking of all S&T programs with mechanical engineering. In addition, graduate programs in five S&T engineering disciplines climbed in this year's national graduate program rankings:

- Chemical engineering, rose to No. 84 from 87.
- Environmental engineering, rose to No. 47 from 54.
- Mechanical engineering, rose to No. 61 from 69.
- Nuclear engineering, rose to No. 18 from 19.
- Petroleum engineering, rose to No. 14 from 15.

Photo by Michael Pierce, Missouri S&T



Anthony Oha, pictured left, a graduate student in environmental engineering, conducts research with Dr. Joel Burken.

➔**Website:** news.mst.edu/2023/04/missouri-st-graduate-engineering-programs-on-the-rise-in-u-s-news-world-report-rankings-2



S&T Steel Bridge Design team wins fifth consecutive regional competition

The Missouri S&T Steel Bridge Design Team won first place at the American Society of Civil Engineers' (ASCE) Mid-America Student Symposium for the fifth consecutive time. The competition was held at Kansas State University April 13-15.

The Steel Bridge Design Team designs and builds a one-tenth scale model bridge according to a real-world problem set by the American Institute of Steel Construction (AISC). This year teams had to design a bridge that could handle everything from pedestrians to service vehicles in the San Diego National Wildlife Refuge. Teams are judged in categories including construction speed, efficiency and the weight of the bridge.

"It was almost a full sweep," says **Krysta Swartz**, a senior in civil engineering and project manager for the team. "We placed first in aesthetics, stiffness, cost estimation, construction speed, construction economy, and structural efficiency, and placed second in lightness."

The team, advised by **Dr. Nicolas Libre**, associate teaching professor of civil, architectural, and environmental engineering at S&T, hopes to put their bridge engineering and construction skills to the test at the national competition June 2-3 at the University of California-San Diego. And they'll be both defending champions and hosts next year, when the regional 2024 Mid-America Student Symposium takes place at Missouri S&T.

The team wishes to recognize the continuing support of **Dr. Roger LaBoube**, the founding advisor of the steel bridge team. LaBoube is a Curators' Teaching Professor emeritus of civil, architectural, and environmental engineering and director of the Center for Cold-Formed Steel Structures. The team also wishes to thank the CAEE department, the Kummer Student Design Center, official team sponsor Lexicon, and its donors. They are accepting sponsors and judges for the 2024 competition in Rolla, Mo. If you are interested, please contact **Kyle Bryan** (kabng6@mst.edu).



With a driving passion for designing bridges, team leader Krysta Swartz's background and experiences will take her far in the field of structural engineering. She also won the Daniel Mead essay contest for the Mid American Region.

➔ **Website:** steelbridge.mst.edu

Myers named director of Missouri Center for Transportation Innovation

Dr. John J. Myers, a professor of civil, architectural and environmental engineering at Missouri S&T, was named director of the statewide Missouri Center for Transportation Innovation (MCTI).

"I am excited to serve as the next director of MCTI, and I look forward to expanding the collaborative

"Other state departments of transportation, such as in Texas and Iowa, have developed similar statewide centers that work very closely with their partners," Myers says. "So it was logical for MCTI to be formed to not only bring together the talents of the faculty from all four campuses to create more collaborative teams, which will allow for more MoDOT funding to stay

rubber from recycled tires into asphalt pavement as a method to improve the sustainability of asphalt pavement and use materials that normally would be disposed of in landfills.

Myers says the work MCTI is doing today may take some time to be fully implemented statewide, but that goes with the territory for infrastructure projects.

"The first step is often a demonstration project after laboratory study," Myers says. "We will evaluate a new technology in one area and then prove it is successful. We live in the 'Show-Me' state, and it is important to test and show people how our projects may work on a reduced scale before implementing them more broadly."

As of December 2022, MCTI has taken part in 54 projects and received over \$11 million in funding from MoDOT and other research sponsors. The group's initial goal for the first three years was \$3 million total, which they quickly exceeded. Myers says this funding has been put to good use to benefit Missouri's infrastructure.

"One of the things that most excites me is being able to implement new technologies and innovations into practice," he says. "We can find methods to benefit the life of existing structures and develop new systems that can last even longer with reduced maintenance. This can save the taxpayers money that can then be used for other important programs."

→ **Website:** news.mst.edu/2023/03/st-professor-named-director-of-missouri-center-for-transportation-innovation



MCTI leaders met with Secretary of Transportation, Pete Buttigieg, third from left, in announcing new transportation research funding in Missouri.

opportunities and building upon the successes seen during the first three years of operations under Dr. Bill Buttler's leadership," Myers says.

MCTI began three years ago as a research center that works in partnership with the Missouri Department of Transportation (MoDOT), and Myers has served as deputy director since its launch. A significant amount of MoDOT's research funding goes to this group.

Myers says it makes sense to bring the talents from the four University of Missouri System campuses in the transportation and infrastructure areas together, as each campus has experts who are willing to collaborate on projects. All four universities are involved with MCTI.

in the state, but also to leverage those resources to go after larger national-level research opportunities."

"Our goal is to bring together the ideas and resources from a larger group of researchers who have an interest in Missouri infrastructure," he says.

MCTI examines methods to potentially improve Missouri's roads and bridges. For example, one current project focuses on guardrail barriers for roadways that are made from fiber-reinforced polymers instead of steel to develop new systems that will extend the service life of bridge barriers and guardrails.

Another recent project implemented the use of recycled plastics or crumb



Chi Epsilon initiation includes Brinkmann as honor member

Bob Brinkmann, CE'71, founder and CEO of Brinkmann Constructors, was recently initiated as the 137th honor member of S&T's Chi Epsilon chapter.

Chi Epsilon, the national honor society for civil engineers, selects individuals who have attained a degree of eminence in the civil engineering profession, exhibited experience and ability worthy of emulation by young civil engineers, and possess a minimum of 10 years' experience in the civil engineering profession as registered professional engineers. The S&T student chapter initiated 13 new current students during the ceremony along with Brinkmann.



He inspires employees by example to embrace their right brains — the bold, creative lobe — to develop powerful insights and outstanding solutions with extraordinary value.

For many years, Brinkmann and his wife, Kim, hosted a gala in their home to raise money for S&T student design teams. Brinkmann was also among the first donors to the Kummer Student Design Center, and he also completed a two-year term as president of the S&T Board of Trustees. He was appointed by Governor Parsons to Chair the Missouri Highways and Transportation Commission, and he serves on the boards of Junior Achievement of Mississippi Valley, the Regional Business Council, and the St. Louis Police Foundation.

Brinkmann is chairman of the board of Brinkmann Constructors. Throughout the industry, he is known as an exceptional creative thinker and problem solver. He focuses on building construction innovators through a culture of entrepreneurship, ongoing education, and high expectations.

Borrok named dean of college



Dr. David Borrok, GGph'95, accepted the position of vice provost and dean of his alma mater's College of

Engineering and Computing effective Feb. 1. Since August 2022, Borrok has served in this role in an interim capacity.

→ **Full Story:** news.mst.edu/2023/01/missouri-st-alumnus-named-vice-provost-dean-of-the-college-of-engineering-and-computing

Young elected student body president

Civil engineering student **Sammi Young** was elected 2023-24 Missouri S&T Student Body President.



Young is passionate about people. She cares about fellow students and wants them to have the best experience

they can at S&T. She has been involved with the Spelunkers Club, moving through the ranks from secretary to president. Her biggest strengths are developing organizations and being willing to listen to critiques and ideas.

Green Schools students learn about sustainability initiatives at S&T

During National Engineers Week 2023, a Missouri S&T alumna shared her old stomping grounds with a group of seventh- and eighth-grade students participating in the Missouri Green Schools Quest who wanted to expand their knowledge related to sustainable engineering principles.

Anne Faeth-Boyd, GGph'02, MS EnvE'04, brought 23 students to S&T as part of a sustainability class taught by Bill Henske from the Maplewood Richmond Heights School District in Maplewood, Missouri. The school also participates in the Missouri Green Schools program.



Anne Faeth-Boyd, pictured far right, organized the field trip and S&T alumni Brett, EnvE'12, and Emily, GeoE'14, Forthaus, helped in coordinating.

This class elected to work with indoor plants to improve indoor air quality and aesthetics, while also discussing and researching other benefits of the plants. Faeth-Boyd serves as the Green Mentor for the students' quest.



Area youth bring talent to the Future City State Championship

Students from across Missouri challenged each other and their view of a future city with an exciting day of competition in Butler-Carlton Hall. Using the Engineering Design Process (EDP) and project management skills, students showcased their solutions to a citywide sustainability issue. This year's challenge asked students to build a 100% electrically powered city with energy generated from sources that keep citizens and the environment healthy and safe. Kaleidoscope Discovery Center organized the event, and it was sponsored by the S&T Kummer Center for STEM Education, the CArEE department and Missouri Society of Professional Surveyors.



Local students tour ACML

Students from the Kaleidoscope Discovery Center in Rolla eagerly listened to **Dr. Mohamed ElGawady**, the Alard and Sheri Kaplan Faculty Scholar and Professor of Civil Engineering, talk about concrete research and careers in the design and construction world on a visit to the Advanced Construction Materials Lab during spring break.



A new way to study architectural engineering

What is the first thing that pops into your mind when you hear the words virtual reality? Is it video games or simulators? Or maybe Meta’s social media platform? For some Missouri S&T students, the answer is architectural engineering.

In **Dr. Stuart Baur’s** new virtual reality laboratory, prospective students touring the S&T campus can get a taste of the types of research and studying they can conduct at the university by using virtual reality goggles to view the campus’ Solar Village homes. Baur’s programs allow viewers to virtually move around in the buildings, view structural information about them and pass straight through walls to see all the components that go into building “smart” homes.

The Solar Village in virtual reality was modeled and programmed by students **Andrew Kinder** and **Meliorin Azimzadeh**, ArchE’22. Both are working to build virtual models to create a new way for S&T students to study architecture and construction engineering.

“With my students’ help, current and prospective students can study buildings thousands of miles away

that could be fundamental to their education or research,” says Baur, an associate professor of civil, architectural and environmental engineering at Missouri S&T. “Virtual reality could lead to many educational breakthroughs in our field, and I am excited for our architectural engineering students to pilot this program.”

Now, thanks to Kinder and Azimzadeh’s models, tours of the university’s 2013 and 2017 solar houses, along with Fallingwater designed by 20th-century architect Frank Lloyd Wright, can be viewed virtually. The group is also developing more locations to tour.

“We are working to develop partnerships with other departments on campus as well,” says Baur. “History students could view far-off locations or buildings in the height of their glory before being destroyed, like Notre Dame in France. The possibilities truly are endless when it comes to advancing students’ educational experience.”

Stephen Simmons, ArchE, CE’21, MS CE’23, is using the virtual reality setup in a different way. He researches light use in outdoor settings, such as

streetlights. Simmons has research participants view an outdoor location on campus at night through the VR goggles, and then shows them different levels and colors of light to gauge feelings of visibility and safety.

Simmons says he first gained an interest in lighting when, while camping in a field, his father pointed out the brighter section of sky that was light pollution from a nearby city. “My survey of participants is looking at how lighting demands impact new building construction and its environment,” says Simmons. “And light color impacts more than many realize. In the evenings, for example, the redder the light the better for our bodies and the environment, but visibility is slightly lower than bluer light. These considerations need to be considered when constructing new locations – even the light’s shielding can change perceptions.”

→ **Website:** news.mst.edu/2023/02/st-students-study-architecture-through-virtual-reality

Missouri S&T volleyball star 'jumps' at research opportunity

Several phrases can be used to describe Missouri S&T environmental engineering senior **Shelby Ply**, including: aspiring environmental engineer, accelerated master's degree student, decorated collegiate athlete, proud alumna of Rolla High School and equestrian aficionado.

Now, she can add one more phrase to her repertoire: successful student researcher.

Although this descriptor may still feel new to Ply, people may be surprised to learn this when they hear her share her knowledge in her field and see the passion in her eyes for environmental engineering.

"Two years ago, my department chair, **Dr. Joel Burken**, asked if I would be interested in assisting with some research, and I jumped at the opportunity," Ply says. "As a member of S&T's volleyball team, I haven't had as much time as I would like to be involved with other activities, but this project was perfect. I was able to set my own schedule and gain some hands-on experience in the process."

Ply assisted an environmental engineering graduate student, **Anthony Oha**, with his thesis project, which Burken oversaw.



Shelby Ply, center, works with Anthony Oha and Dr. Joel Burken on remediating 1,4-dioxane from groundwater.

In April, she presented this research during Undergraduate Research Day at the Capitol in Jefferson City, Missouri.

"This project was focused on remediating 1,4-dioxane from groundwater," she says. "For part of the project, we were out in the field and testing tree cores from contaminated sites. However, I spent a great amount of time in the greenhouse as well."

S&T's rooftop Baker Greenhouse at Butler-Carlton Civil Engineering Hall provides a "living lab" for students in environmental engineering as well as other disciplines. While in the Baker Greenhouse, Ply tended to hundreds of tree saplings that were eventually tested as part of the research project. The trees were exposed to the emerging pollutant 1,4-dioxane as part of a United States Department of Defense project with the University of Iowa.

"One purpose of the research was to develop new ways to extract and test liquid from these trees," she says. "Another variable we tested was to add dioxane-degrading microbes to the roots of the trees to determine how this would potentially mitigate the impact of dioxane we introduced."



Ply is a star on S&T's volleyball court, where she serves as a team captain and has won multiple athletic honors.

Ply says the research confirmed that gas chromatography mass spectrometry (GC-MS) can work in concert with solid-phase microextraction (SPME) sampling to analyze dioxane in plant tissues, and this method could be used to evaluate bioremediation approaches.

This approach of plant sampling for environmental analysis, which is termed “phytoforensics,” was initially developed at S&T but had never been applied to 1,4-dioxane before Oha developed the method along with Ply on Burken’s team.

Future research at S&T will be able to build on the research team’s findings related to the mitigation of dioxane. The team is already applying the new method for samples from contaminated sites and will analyze samples this year from former military facilities as part of the DOD project.

Burken, who is a Curators’ Distinguished Professor and chair of civil, architectural and environmental engineering at the university, says he has been impressed with the research team’s work. He hopes prospective students will take notice of the opportunities that are available at Missouri S&T.

“I love thinking of the unique opportunities for our students,” he says. “Shelby is from Rolla, and she was able to attend S&T and work with Tony, who is a Nigerian immigrant and an amazing researcher.”

“She has earned multiple honors as a collegiate volleyball player, and now she will present her research at the state capitol,” he says. “She has been on a remarkable journey, and yet she can still stop by her family’s farm and ride her horse on the weekend.”



Ply says she is grateful she was able to assist with Oha’s research project, and she knows the skills she developed will be beneficial in her career.

For now, Ply says she is keeping her options open for after she leaves S&T. She will finish her undergraduate degree this spring, and then she plans to finish her

master’s degree within the next year as part of the S&T Grad Track pathways program for accelerated BS+MS completion.

“I am open to anything,” she says. “The great thing about my education at Missouri S&T is I feel like I could launch an amazing career in a variety of positions related to environmental or civil engineering.”

Ply says her career may eventually take her to St. Louis, Kansas City or perhaps another city, but she is currently enjoying being closer to her family in Rolla, including her quarter horse, Carmella.



➔Video: youtu.be/INTfqkaS-ug



Research in the S&T greenhouse



Showcasing work at the Missouri State Capitol in Jefferson City to Missouri State Representative Tara Peters



With quarter horse, Carmella

Progress in 3D concrete printing

A research team at Missouri S&T is currently working to make the 3D printing of concrete faster, stronger and more resilient for the U.S. Army Corps of Engineers.

“Through our research, we hope to develop new fiber-reinforced concrete composites that can be 3D printed,” says **Dr. Kamal Khayat**, S&T’s vice chancellor for research and innovation. “This type of printing can allow for faster construction of protective battlefield structures including temporary bridges, military barracks, guardhouses, bunkers and blast-resistant shields, which can reduce risks to soldiers in volatile areas.”

Right now, S&T researchers are working on two projects funded by grants related to this endeavor. One is for \$320,000 through the U.S. Army Corps of Engineers. This grant began in April 2022 and will last for two years. The other, which was for \$360,000, was awarded to S&T through Florida International University, but this is part of a larger project that is also through the Corps of Engineers. This grant was awarded during the fall of 2022 and will be ongoing until August 2025.

“There are distinct differences between the aims and scope of work of these grants, but they have the same general goals in mind in advancing the state-of-the-art additive construction of concrete structures,” says Khayat. “For both, we are aiming to print fiber-reinforced concrete



Khayat, center, is a pioneer in 3D printing of ultra-high-performance concrete.

into intricate shapes with no form work and with little or no reinforcing steel that is typically required to resist tensile stresses in reinforced concrete structures.”

The project that began in April 2022 will examine three different strength classes of concrete and develop quality control test methods for 3D printing.

The second project examines ultra-high-performance concrete and how it can be used for 3D printing with three different construction methods: layer-by-layer, sprayed

(continued on page 20)

Career Development

Students from all engineering disciplines at Missouri S&T attended a career development opportunity and learned from experts working in the engineering field as part of the university’s National Engineers Week 2023 activities.



Wendy Bailey

Wendy Bailey, ArchE’07, MS CE’08, and **Stacy Wagner**, both engineers at Burns & McDonnell, delivered a talk titled “Owning your engineering career in the early years.”

“Both Wendy and Stacey have already had incredible careers as engineers, and this was a valuable presentation for our students to attend,” says **Dr. Joel Burken**, Curators’ Distinguished Professor and chair of S&T’s civil, architectural and environmental engineering department.



Stacy Wagner

Students learned about projects Bailey and Wagner completed. They discussed their college experiences and provided advice for aspiring engineers about their work-life balance. Students also learned about Burns & McDonnell, its locations, possible internship opportunities and whatever else the speakers anticipated students wanted to know.

Bailey was a member of S&T’s cross country and track teams, as well as the Student Athlete Advisory Council, Blue Key Honor Society and the Chi Epsilon International Civil Engineering Honor Society. She was inducted into S&T’s Academy of Miner Athletics and received the 2020 Outstanding Young Alumni Award from the Academy of Civil Engineers.

She has worked for the past 15 years at Burns & McDonnell in Kansas City and is currently an associate structural engineer and the structural department manager in the company’s Aviation and Federal Group.

Wagner earned a bachelor’s degree in civil engineering from Marshall University. She was also a college athlete, having played on the women’s golf team. After interning with J.E. Dunn in 2006-07, she joined Burns & McDonnell as a civil engineer in 2008 and is currently the civil department manager and an associate civil engineer in the company’s Aviation and Federal Group.

Maryland lieutenant governor inducted into Academy of Civil Engineers

Aruna Miller, CE'89, has been a "first" several times in her life.

Most recently, on Jan. 18, 2023, Miller was sworn in as lieutenant governor of Maryland — and as the first South Asian female to be elected to this role in the United States. On April 13, she returned to her alma mater and was inducted as the first South Asian female member of S&T's Academy of Civil Engineers.

As a lifelong public servant, she has been a trailblazer on multiple other instances — both in her work as a transportation engineer and as an elected official for the state of Maryland — but she says that was never specifically the goal.

"It's not lost upon me, being the first," she says. "It's a very profound moment. But I've got to tell you — being the first

great opportunities comes a great desire to pay it forward. And immediately upon graduating from S&T, I dedicated my life to public service because that was my way of paying it forward." She offers three pieces of advice for anyone else who may be a "first" in the future.

"What I say about being the first is that you need to be grateful for everyone who worked to break ground for you so that you could be in this moment," she says. "You have to be willing to step out of your own comfort zone and take risks. When you do get to be the first, make sure you create opportunities for others and tear down barriers so they can be their authentic selves."

Miller says her experiences at S&T helped prepare her for her time as a transportation engineer and as an elected official.



Aruna Miller

In terms of her best memory and takeaway from S&T, though, she credits meeting her husband, David, EE'89.

She says she can remember countless hours the couple spent studying on the third floor of S&T's library and date nights spent at Alex's Pizza Palace. They have now been married for 33 years.

As for if Miller plans to be the "first" in any other ways moving forward, she doesn't dismiss the notion, but rather says she intends to keep paying it forward however she can.

"I hope the future holds for me what the past held for me," she says. "That is continuing to serve the public. I hope I continue to do that until I exit the material world."

→ **Video:** youtu.be/Qopq7-Ubhdw



was never the assignment." For Miller, the assignment has been more about giving back and using her knowledge and experiences to be an effective public servant.

"I came to the United States when I was seven years old as an immigrant, and I have been afforded so many opportunities," she says. "And with

"I received a great education here at Missouri S&T," she says.

"It gave me a great foundation — a launching pad to be able to do the things that I wanted to do."

"It taught me to be a problem solver. Many of the things, whether it's engineering or in the space of elected office, it is about problem solving," she says.

While a student at S&T in the late 1980s, Miller had several experiences and memories that she now cherishes. She fondly remembers celebrating St. Pat's, making friends, being mentored by her professors, and interviewing celebrities, such as Jay Leno and Cheap Trick, for the student newspaper.

Academy of Civil Engineers inducts 13 new members

Thirteen professionals with ties to Missouri S&T were inducted into the S&T Academy of Civil Engineers during an induction ceremony held in April. The academy recognizes outstanding alumni for their professional achievement and success. It also provides support and experience to help the civil, architectural and environmental engineering department at S&T to reach its collective mission and values.

New members are:

Jerry Beckmann



Jerry Beckmann of St. Louis, deputy director of St. Louis Lambert International Airport, earned a bachelor's degree from Missouri S&T in 1987. In January 1988, he began work for Professional Services Industries in Memphis. In September of that year, he returned to his hometown to work for St. Louis Lambert International Airport, where he worked for 12 years

before leaving to work as a consultant with St. Louis as his principal client for nine years. He returned to work at the airport in 2009 and has overseen all planning, engineering and environmental activities there since 2013. Beckmann played a major role in the recovery and rebuild of the airport after the 2011 tornado, which did approximately \$30 million in damage to the facilities. Beckmann is engaged in St. Louis' master planning efforts and looks forward to participating in the construction of new terminal facilities at the airport.

Tom Birkemeier



Tom Birkemeier of St. Louis, president of Keeley Construction, earned a bachelor's degree in civil engineering from Missouri S&T in 1980. He has been with Keeley Construction since 2014, and also currently owns Seven Group Properties LLC. He has over 40 years of experience in commercial, institutional and healthcare-related construction, serving as senior vice president of McCarthy Construction and then president of L. Keeley Construction. Birkemeier is also active in the American Society of Civil Engineers and Associated General Contractors (ACG) and through service leadership, participating in many of the Keeley company philanthropic and service activities. He is also active with Urban Reach, A Seat at the Table and Pedal the Cause and supports the World Pediatric Project. Birkemeier's honors include L. Keeley Person of the Year; leader of the second-place team in Falling Springs Primary Expansion; winner MSD Dellridge; 2020 second-place Construction Safety Excellence Award; CLO Learning Elite Award.

Daniel F. Conway



Daniel F. Conway of St. Louis, president and owner of Conway Contracting Inc. earned a bachelor's degree in civil engineering from Missouri S&T in 1985. He wrestled for S&T and was a member of Kappa Sigma fraternity, serving as kitchen steward, vice president and president. He also served as vice president of the Interfraternity Council and was a member of Theta Tau. Conway has spent his entire career in the design build construction industry, working for three St. Louis companies before opening his own firm, Conway Contracting, in 2002. The firm conceptually designed and built houses for Kappa Sigma, Lambda Chi Alpha, Theta Xi and Sigma Pi fraternities at S&T. His conceptual design of Kappa Sigma won a national fraternity award. Conway is a board member of the St. Louis Rotary Club, the Missouri Athletic Club, the Kappa Sigma Alumni Association, St. Louis Engineers Club and AGCMO, and is a builder of and contributor to the Gene Slay Girls and Boys Club and the Sew Hope Community Center.

CHANGING THE
WORLD

Carrie Falkenrath



Carrie Falkenrath of Webster Groves, Missouri, principal transportation engineer and planner for T2 Traffic and Transportation, earned a bachelor's degree from Missouri S&T in 1997 and a master's degree from the University of Washington in 2000, both in civil engineering. Her career began with Sverdrup in St. Louis and continued at

DKS Associates, JACOBS, URS Corp. and CBB until 2016, when she founded transportation engineering firm: T2 Traffic and Transportation. A licensed professional engineer in nine states, Falkenrath is a certified Professional Traffic Operations Engineer, Professional Transportation Planner and Road Safety Professional. Falkenrath is a Fellow of the Institute of Transportation Engineers (ITE) and has held several leadership roles in the organization. She is a charter member of the St. Louis Chapter of the Women's Transportation Seminar, the American Public Works Association, the American Planning Association and ITS Heartland. She has been an adjunct professor at both Saint Louis University and Southern Illinois University Edwardsville, and she serves on the city of Webster Groves traffic advisory committee. Falkenrath's honors include the ITE Midwestern District Transportation Professional of the Year, ITE Missouri Valley Section Transportation Professional of the Year, and ITE Missouri Valley Section Young Professional of the Year.

Lloyd Flowers



Lloyd Flowers of Phoenix, Arizona, project director for McCarthy Building Companies, earned a bachelor's degree in civil engineering from Missouri S&T in 1988. He began his career as an engineer at the Illinois Department of Transportation, then joined McCarthy Building Companies as project engineer in 1991. Flowers became McCarthy's first Black

superintendent in 1998 and its first Black project manager in 2001. During his 32-year career, Flowers has led 26 projects with a construction value of over \$1.3 billion with experience that spans the education, healthcare, transportation, manufacturing and municipal sectors. His experience includes the \$15 million air traffic control tower at Scott Airforce Base, the \$55 million expansion to the Federal Reserve Bank, the \$90 million South Campus addition for BJC HealthCare, the \$1.2 billion William Beaumont Army Medical Center replacement project in El Paso, Texas; and currently a \$50 million applied research facility for the University of Arizona in Tucson. He has earned several internal awards for skillful project leadership and received the Modern Day Technology Black Engineer of the Year award and the Associated Minority Contractors of Arizona 2022 President Advocated of the Year.

Michael O. Geisel



Michael O. Geisel of Chesterfield, Missouri, Chesterfield city administrator, earned a bachelor's degree in civil engineering from Missouri S&T in 1982 and holds an MBA from the University of Missouri-St. Louis. A licensed professional engineer, he was recognized among the Top 10 Public Works Leaders in North America and has earned credentials as a

Leadership Fellow. He is a two-time recipient of the Missouri Outstanding Engineer in Government and Engineer of the Year awards and has received the Spirit of Chesterfield Award from the Greater Chesterfield Regional Chamber. Following the flood of 1993, Geisel oversaw construction of a new public works facility, a new city hall, parks maintenance facility, acquisition and development of the Chesterfield Valley Athletic Complex, construction of the city's aquatic facility, an amphitheater, and the implementation of an areawide wetland mitigation permit and wetland preserve. He has also been involved in the administration of the Chesterfield Valley TIF District and is executive director of the Chesterfield Valley Transportation Development District, a member of the North Outer Forty Transportation Development District board and serves as president of the Monarch-Chesterfield Levee District.

Kevin D. Hicks



Kevin D. Hicks of Omaha, Nebraska, SVP and principal for TranSystems Corp., earned a bachelor's degree in civil engineering from Missouri S&T in 1993 after graduating from high school in Ash Grove, Missouri. He spent the first 25 years of his career with Union Pacific Railroad, where he progressed through their management training program and many

other positions, finally serving as AVP and chief engineer – design, which took him to locations around the country, including Idaho, Oregon, California, Arkansas and Nebraska. Hicks moved to the consulting engineering field in 2018 when he joined TranSystems to lead their freight market sector. He leads business development and project execution nationally for clients in the railroad, ports and maritime, energy, and warehousing businesses. Hicks has been an active member of several industry and professional organizations, including the American Railway Engineering and Maintenance Association, serving on its board of directors; the Railway Tie Association, serving on its board of directors; the National Railway Construction and Maintenance Association, currently serving on the board of directors and as chairman of the policy and legislative committee; Missouri S&T Corporate Development Council;

(continued on the next page)

Inspire University Transportation Center at S&T; and the Missouri S&T Steel Bridge Team. His honors include the W.W. Hay Award from AREMA in both 2014 and 2015, the RTA Branding Hammer Award in 2021, and an ACEC Honor Award in 2015.

Jon Jacobsmeyer



Jon Jacobsmeyer of St. Louis, senior vice president of operations for McCarthy Building Companies, earned a bachelor's degree in civil engineering from Missouri S&T in 1988. He began his professional career in project management roles at J.S. Alberici Construction Co. and Oscar J. Boldt Construction Co., then joined McCarthy Building Companies as senior

project manager in 2002. Jacobsmeyer has participated in over \$8 billion in completed construction projects across the U.S., including the \$1 billion National Bio and Agro-Defense Facility Animal Disease Laboratory in Manhattan, Kansas; the \$1.7 billion replacement campus for the National Geospatial-Intelligence Agency's St. Louis facilities; the \$1 billion Veterans Affairs Medical Center Replacement Hospital in New Orleans; and the \$113 million Cornell University Physical Sciences Building in Ithaca, New York, which features some of the most noise-free, shielded, vibration-proof facilities in the world. Jacobsmeyer is an active leader of McCarthy's internal "mega projects" team, which focuses on sharing best practices and lessons learned on large projects across the nation. And he regularly partners with the company's National Learning and Development team to share his experience during management and leadership development programs. A member of McCarthy's Central Region Leadership Team, Jacobsmeyer helps guide the region's strategy and project operations and oversees the in-house scheduling and MEP departments.

Academy Goals

- Provide organized assistance to the department.
- Constantly improve educational experience of the students.
- Provide advisory guidance to faculty and students.
- Advance department objectives through financial support.
- Achieve national prominence as a top educational institution.

Jennifer Kuchinski



Jennifer Kuchinski of Columbia, Illinois, vice president of WSP's Aviation National Business Line, earned bachelor's and master's degrees in civil engineering from Missouri S&T in 1995 and 2002, respectively. A licensed professional engineer in 10 states, she has worked for WSP for 22 years in numerous leadership roles. Under her leadership, WSP has

continued to serve a trusted partner for the nation's largest airports. She received a service award in 2017 for exemplary leadership in mentoring young professionals within WSP and in the overall engineering community. Her STEM focus has been to mentor others, volunteering to promote the industry and encourage young people to pursue careers in engineering. Kuchinski is a member of the American Association of Airport Executives, Airport Council International – North America, National Society of Professional Engineers, Missouri Airport Managers Association, Greater St. Louis Business Aviation Association and the Engineers Club of St. Louis.

Aruna K. Miller



Aruna K. Miller of Germantown, Maryland, lieutenant governor of Maryland and former Maryland state delegate, earned a bachelor's degree in civil engineering from Missouri S&T in 1989. Miller was born in India and came to the United States at age 7 and grew up in Ballwin, Missouri. Upon graduation, she worked as a traffic engineer for the Los

Angeles County public works in California. After marrying her college sweetheart, David Miller, a 1989 S&T electrical engineering graduate, they moved to Maryland where she worked for 25 years for Montgomery County Departments of Transportation and Permitting Services, retiring from Montgomery County government in 2015. Miller is a former two-term member of the Maryland House of Delegates, serving from 2010 to 2019. She served on the House Ways and Means Committee and in her second term, the House Appropriations Committee. In 2018, Miller ran for the U.S. Congress in Maryland's 6th District and finished second in a field of eight candidates. On Nov. 8, 2022, Wes Moore and Miller were elected by a landslide as governor and lieutenant governor of Maryland, earning the most votes of any gubernatorial candidates in Maryland's history. Moore is Maryland's first black governor and Miller is the first Asian American, first immigrant, first woman of color, and first engineer to become lieutenant governor of Maryland. Miller previously served as a board member for the Montgomery County Public Schools Educational Foundation, Round House Theatre, The Universities at Shady Grove, Montgomery Parks Foundation, Madison House Autism Foundation.

Chris Nisbet (Honorary Member)



Honorary member **Chris Nisbet** of Des Peres, Missouri, project director for McCarthy Building Companies, earned a bachelor's degree in engineering management with a civil focus from Missouri S&T in 1984. He started his career with McCarthy as a project engineer, then joined Druco Development as a project manager in 1993, returning

to McCarthy as a superintendent in 1996. As project director with McCarthy, he holds the overall responsibility for preconstruction and construction services on his projects. His experience includes the \$100 million Edward Jones Training Center, \$90 million Cross County Metrolink Extension, 45,000 cy of concrete at Bissell Point Final Clarifiers and Ranken Jordan Pediatric Bridge Hospital addition. Nisbet led the setup and takedown of the Go! Marathon for 13 years and has completed five marathons. He is a trustee for the Construction Training and Advancement Foundation and has been active in the Associated General Contractors. He worked with S&T to advance the Hurst-McCarthy Professorship in 2018-19 and helped facilitate the advancement of the Missouri Consortium for Construction Innovation at S&T. Nisbet is also a member of the Missouri S&T Academy of Miner Athletics.

Paul W. Ridlen



Paul W. Ridlen of Denver, president of U.S. operations for Knight Piésold, earned bachelor's and master's degrees in civil engineering from Missouri S&T in 1989 and 1991, respectively. At Knight Piésold, he is responsible for operations in the U.S., Mexico and Brazil. He is also a member of the board of directors of the Knight Piésold Group, a global mining

and hydropower specialty firm founded in South Africa in 1921 and now based in London. Ridlen has worked for large engineering companies such as Woodward-Clyde/URS Corp., Stone & Webster and Tetra Tech, as well as the medium-sized firm S.H. Smith & Co. A recognized expert in the design and operation of tailings dams, Ridlen consults on several projects around the world and is the current U.S. representative for tailings dams to the International Commission on Large Dams and is active in several other professional organizations. He has authored several technical publications and is a lead author on the Unified Guidelines for Tailings Dam Safety being developed by the U.S. Society of Dams for the Federal Emergency Management Agency. Ridlen has been an invited lecturer for several short courses and conferences in the U.S. and Brazil. He has supported several charitable organizations throughout his career, including St. Jude Children's Hospital, Water.org, Engineers Without Borders and Christian Veterinary Mission.

Darcy Schumacher



Darcy Schumacher of Overland Park, Kansas, principal and shareholder with Wallace Design Collective, earned a bachelor's degree from Missouri S&T in 2002 and a master's degree from the University of Kansas in 2009, both in civil engineering. She joined the Kansas City office of Wallace Design Collective in 2003. She is passionate about the AEC

community and is dedicated to her company's mission to "Make Lives Better." Schumacher was the first S&T graduate to be named both an associate and a principal at Wallace. Over her career, Schumacher has worked on four buildings designed by Pritzker Prize-winning architects, often including the innovative use of metals and framing systems. A licensed professional engineer in 29 states, she has served either as the engineer-of-record or project manager on at least one project in 48 states, including serving as project manager for S&T's Hasselmann Alumni House. Schumacher was named one of Engineering News-Record's National Top 20 Under 40 in 2017 and has received the Commercial Real Estate Women KC's Excellence Award and an AIAC's Pillars Leadership Certificate. She is active in many organizations, including Commercial Real Estate Women KC, the National Council of Structural Engineers Association's structural engineers equity and engagement committee and Women in Design-KC. Schumacher mentors others, participates in women's leadership initiatives and promotes positive change within the AEC industry, regularly presenting nationally about equity and engagement within the structural engineering profession.

Academy Awards

The awards below were presented during the academy's spring induction ceremony:

- **Joseph H. Senne Jr. Faculty Scholarly Achievement Award:** Dr. Mohamed ElGawady.
- **Joseph H. Senne Jr. Faculty Teaching and Service Achievement Award:** Dr. Mark W. Fitch.
- **CArEE Exemplary Young Alumni Award:** Mel Peterein, P.E., CE'12 and Ryan Reiss, P.E., CE'06.
- **Neil Stueck Outstanding Senior Award:** Rosalia Meusch, Gideon Plank, Krysta Swartz and Natalie Wohlgemuth.
- **CArEE Outstanding Support Staff Award:** Jeff Heniff.

Richardson inducted into Missouri Asphalt Pavement Association Hall of Fame



Dr. David Richardson, pictured right, receiving his Missouri Asphalt Pavement Association (MAPA) Hall of Fame Award.

When **Dr. David Richardson**, CE'71, MS CE'73, PhD CE'84, began his bachelor's degree studies in civil engineering at Missouri S&T in the late 1960s, he says he never could have dreamed how exactly his career would progress — and how many high-profile awards and accolades he would earn along the way.

Now, Richardson, who also earned his master's and Ph.D. degrees in civil engineering from S&T, has one more award he can add to his mantle, as he was recently inducted into the Missouri Asphalt Pavement Association (MAPA) Hall of Fame.

"I started teaching at Missouri S&T in 1984, and I have been involved with MAPA ever since it was founded in 1990," he says. "We've had a great working relationship over the years, and I appreciate them presenting me with this honor."

MAPA is an industry association that represents asphalt contractors across the state and promotes quality asphalt materials, quality work and accountability for the industry.

Richardson says he has been a Missouri S&T Miner in one form or another for most of his life.

After earning his Ph.D., he entered the classroom and research laboratories as a faculty member at the university, where he stayed until retiring in 2015. However, even in retirement, Richardson has still been active at the university, working with students and faculty and being involved in professional conferences and technical activities.

Throughout his career, Richardson has directed countless asphalt and concrete conferences and workshops — likely more than anyone else in the state.

He has also worked with several thousands of students when counting his classes at Missouri S&T, as well as other short courses and training sessions he has facilitated.

He is a member of the university's Academy of Civil Engineers and a Fellow of the American Concrete Institute (ACI). He has also served in leadership roles for the ACI both as president of the state chapter and as a chair on national technical committees.

Richardson was honored with the Missouri S&T Alumni Merit Award in 2017, and he was presented with the James M. Robbins Excellence in Teaching Award from the Chi Epsilon national civil engineering honor society in 2018 — one of 20 teaching awards he received during his career.

His research interests have included asphalt pavement design, asphalt pavement preservation and management, pavement drainage, concrete durability, alternative sustainable materials for asphalt, concrete and masonry, concrete aggregate gradation optimization, and soil sub-grade properties. He also owned an engineering consulting firm for over 20 years.

"The longer you work in this field, the more the numbers keep growing, and the more you can see the influence you have made on future engineers and the field in general," he says. "I am grateful to be inducted into the MAPA Hall of Fame, and it has been a pleasure for me to have such a meaningful career at Missouri S&T."

➔ **Website:** news.mst.edu/2023/04/st-professor-emeritus-inducted-into-missouri-asphalt-pavement-association-hall-of-fame

Benavides's legacy continues over 50 years after his graduation

It may have been 53 years since **Francisco "Frank" Benavides**, CE'70, graduated, but his name is still regularly heard around campus and the department.

The reason for this is because Benavides funds the Francisco M. Benavides Faculty Excellence Award for the department, which honors high-achieving professors.

"I loved my time as a student at Missouri S&T, and it helped prepare me for a successful career in my field," Benavides says. "I feel honored to give back to my alma mater and to recognize faculty members who are truly working to change the world."

Benavides has supported faculty members with this award since 2013. Every year, he donates \$5,000 toward this cause, and he recently renewed this commitment for another five years.

Dr. Mohammed ElGawady, professor of civil, architectural and environmental engineering and the Kaplan Faculty

Scholar, was the first recipient of the Benavides Faculty Excellence Award, and his research has focused on sustainable and resilient infrastructure. One example of this is his work with 3D printing concrete that is both strong and environmentally friendly.

Dr. Hongyan Ma, associate professor of civil, architectural and environmental engineering, is the current awardee and has the title of Benavides Faculty Scholar. One of his current projects, which received \$2 million in funding from the U.S. Department of Energy, focuses on removing critical minerals from silicate waste materials with a carbon-negative mineralization process. The method he is developing will include carbon capture and storage elements.

"The research going on at Missouri S&T is truly remarkable," Benavides says. "I appreciate that I can contribute to faculty members' efforts and still be connected to the wonderful people in Rolla, Missouri, over 50 years after finishing my undergraduate degree."



Frank Benavides, CE'70, received the Award of Professional Distinction in 2015.

Benavides, of St. Louis, founded PENTA Engineering Corp. and continues to work as the principal consultant of the PEC Consulting Group subsidiary. He is a member of the Society for Mining, Metallurgy and Exploration.



Pictured left to right: Boatwright, Myers, Brinkmann, Allmeroth and ElGawady

ANNIVERSARY CELEBRATION

In February the Missouri Center for Transportation Innovation (MCTI) recently celebrated its three-year anniversary with a presentation to the Missouri Highway and Transportation Commission in Jefferson City, Mo. Among those present at the meeting were **W. Dustin Boatwright**, CE'08, MS CE'10, commission member, **John J. Myers**, MCTI director and S&T professor, **Robert G. Brinkmann**, CE'71, commission chair, **Becky Allmeroth**, CE'96, MoDOT safety engineer and **Mohamed ElGawady**, S&T professor and CIES interim director.

3D concrete printing

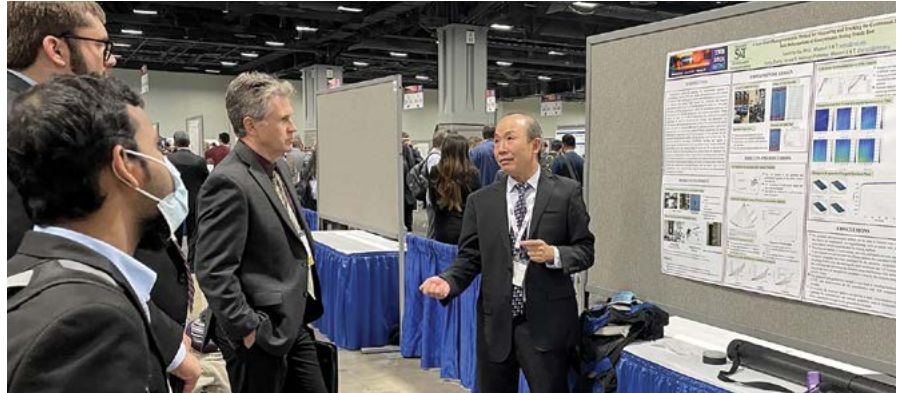
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concrete and stay-in-place formwork systems.

“Using ultra-high-performance concrete with 3D printing is a new concept, and we are leading the charge on this work at Missouri S&T,” says Khayat. “There are many technical challenges that we will need to solve, but there are also many opportunities that lie ahead once we master this construction process.”

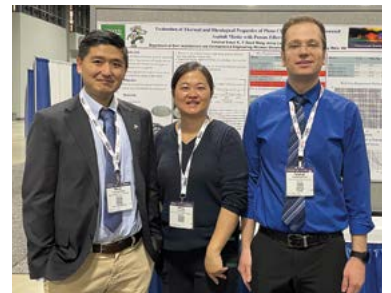
“This is something that could be done quickly and can overcome weight and logistics obstacles associated with using concrete for rapid construction or the repair of needed battlefield infrastructure,” he says. “3D-printed concrete can also be crucial for humanitarian assistance and disaster relief applications. People will be able to use materials that are locally available, such as natural pozzolans, dune or crushed sand, and natural fibers to make a cost-effective fiber-reinforced concrete for 3D printing.”

Teams present at TRB meeting



Drs. Jenny Liu and Xiong Zhang, and their research teams gave multiple presentations in both podium and poster forms on transportation infrastructure related topics at the Transportation Research Board (TRB) annual meeting held in January, in Washington, D.C.

Presentations included: “Comprehensive Evaluation of Important Aspects of Triaxial Testing Using a Photogrammetry-Based Method,” “Evaluation of Thermal and Rheological Properties of Phase Change Material Incorporated Asphalt Mastic with Porous Fillers” and “A low-Cost Photogrammetric Method for Measuring and Tracking the Continuous 3D Full-Field Deformations of Geosynthetics During Tensile Tests.”



Wang, Liu and Kerahroudi

In addition, Liu organized the ASCE bituminous materials committee meeting in conjunction with the TRB meeting. **Dr. David Wang**, a postdoctoral researcher in civil engineering, gave a research presentation on Innovative Integration of PCM in asphalt and **Farshad Kerahroudi**, a Ph.D. candidate in civil engineering, gave a poster presentation.

2023 MO-CCI Industry Night

A group of MO-CCI construction companies took time out of their busy schedules to make professional connections with our students on campus and to provide useful career information. Learn more at mo-cci.mst.edu.

Note: MO-CCI’s fall meeting will be hosted at Missouri S&T.



Khayat named vice chancellor for research and innovation

Dr. Kamal Khayat, the Vernon and Maralee Jones Professor of Civil Engineering at Missouri S&T, became vice chancellor for research and innovation on Feb. 1.

Khayat served as interim vice chancellor for research and innovation since Sept. 1, 2021. He joined S&T as the Jones Professor in 2011.

“Dr. Khayat is an exceptional leader, a renowned researcher and a true possibility thinker who brings a visionary and collaborative mindset to this role,” says **Dr. Mo Dehghani**, Missouri S&T chancellor. “As interim vice chancellor, he has focused on fostering an environment in which researchers from multiple disciplines can come together to address some of our world’s most critical research issues. I am confident that under his leadership we will continue to grow our research and scholarship in areas of excellence while also pursuing new opportunities.”

“It is a privilege and an honor to join the leadership team and work in partnership with the research community at Missouri S&T on knowledge discoveries and innovative solutions to solve the world’s most pressing societal, environmental and economic issues,” Khayat says. “Missouri S&T is at an inflection point of growth, and with the transformational gift from June and Fred Kummer, we are well positioned to become a global leader in research, innovation and entrepreneurship for years to come.”

In this role, Khayat is responsible for overseeing Missouri S&T’s Division of Research. The division works with research centers, consortia, academic departments and laboratories, and individual faculty and students to provide guidance and assistance in

obtaining research grants and attaining their research goals. The division is also responsible for moving research discoveries into marketable products, services, intellectual property and spin-off companies.

An expert in civil infrastructure and materials, Khayat has led several research centers and initiatives at S&T. He served as director of the Center for Infrastructure Engineering Studies, the Center for Research on Concrete Applications for Sustainable Transportation and the Center for Transportation Infrastructure and Safety. The latter two centers were Tier 1 and National University Transportation Centers funded through the U.S. Department of Transportation.

Khayat also was instrumental in establishing the Clayco Advanced Construction and Materials Laboratory, a high-bay facility where S&T faculty and students conduct research related to transportation and building infrastructure. The Clayco ACML opened in the fall of 2020.

As interim vice chancellor for research and innovation, Khayat established the office of innovation, entrepreneurship and commercialization to expand the university’s outreach to area businesses and entrepreneurs and help move university research into the marketplace. He also recruited and hired S&T’s first associate vice chancellor for innovation, entrepreneurship and commercialization.

Khayat also has led the searches for directors of four new research centers established through the Kummer Institute. Two of those center directors have been hired. Khayat also launched the Ignition Grant Initiative to provide seed funding to faculty for promising



Dr. Kamal Khayat, vice chancellor for research and innovation at Missouri S&T.

research proposals; provided seed funding for arts, humanities, social sciences and behavioral sciences; and established the Research Proposal Review and Mentoring Panel to help review research proposals and mentor early career faculty members.

Before joining Missouri S&T, Khayat was director of the Center for Excellence on Concrete Infrastructure Engineering and head of the Integrated Research Laboratory on Materials Recycling and Innovative and Sustainable Structures at the Université de Sherbrooke in Canada. He also held a National Science and Engineering Research Council (NSERC) Chair on High-Performance Flowable Concrete with Adapted Rheology, a research consortium with 17 industrial partners. 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.

Abbett distinguished lecture focuses on smart cities

In April, Dr. Andrew Smyth presented the Abbett Lecture titled, “Smart Cities Frontier – From Sensor Monitoring of the Physical Infrastructure Layer to An Integrated Digital Layer.”

Smyth is the Robert A.W. and Christine S. Carleton Professor of Civil Engineering and Engineering Mechanics at Columbia University in New York and the director of the National Science Foundation Engineering Research Center for Smart Streetscapes. His presentation

traced the research path from infrastructure monitoring to vehicle fleet monitoring to broader use of urban sensor data in enhancing performance of infrastructure systems, culminating in a new initiative – the NSF Engineering Research Center for Smart Streetscapes.

The Abbett Distinguished Lecture Series is hosted by the Center for Intelligent Infrastructure, Center for Infrastructure Engineering Studies and the CAR EE department.



Andrew Smyth, pictured right, with Dr. Genda Chen

Hurst-McCarthy Lecture discusses construction industry challenges



In March, Dr. Makarand (Mark) Hastak gave the 2023 Hurst-McCarthy Lecture, titled “Construction Industry Challenges and the Need for Innovation.”

He discussed historical construction projects that were successfully built but failed to achieve one or more key performance indicators. Students listened as Hastak talked about the continuous innovation and implementation of best practices and strong project management teams to maintain targeted costs, schedules, quality, safety and sustainability with delivering projects of any size and complexity.

Hastak is Professor and Dernian Family Head of Construction Engineering and Management at Purdue University.

International KCI Lecture



Dr. John J. Myers, professor and deputy director of the Missouri Center for Transportation Innovation, was invited

to deliver the 2022 Korean Concrete Institute (KCI) Lecture as part of the International Seminar for Bridge and Structural Engineering at the Korean Concrete Institute Fall Convention in Jeju, Republic of Korea.

His speech, titled “Repair Technologies: Advances in Rehabilitation and Strengthening of Reinforced Concrete using Fiber Reinforced Cementitious Matrix (FRCM),” was the fifth of six invited speeches. His presentation involved recent advances in the latest repair and strengthening technologies from his research group.

Civil engineering historian speaks on ‘great projects’ for Stueck Lecture



Missouri S&T hosted Raymond “Paul” Giroux as the speaker for its 2023 Stueck Lecture. Giroux’s lecture focused on lessons that could be learned from “great projects” for North American infrastructure engineering and construction.

The lecture was held April 14, in Butler-Carlton Civil Engineering Hall and was free and open to the public.

Some of the projects Giroux discussed were the Brooklyn Bridge, the Hoover Dam, the Eads Bridge, the Golden Gate Bridge and the Panama Canal. Giroux is a veteran of the construction industry, and he is also an award-winning civil engineering historian and a 2022 inductee to the National Academy of Construction.

During the lecture, he shared his perspective on these historic and monumental projects, as well as the lessons that can be learned from them.

Giroux made contributions to several large-scale projects throughout his decades of work at Kiewit Corp., such as the Fort McHenry Tunnel in Baltimore, Maryland; the San Francisco-Oakland Bay Bridge East Span; and multiple projects on the Central Artery/Tunnel Project “Big Dig” in Boston, Massachusetts, such as the Leonard P. Zakim Bunker Hill Memorial Bridge.

He currently serves as a visiting professor of engineering practice at Purdue University and has served on multiple

professional boards and organizations, such as the Transportation Research Board and national committees for the American Society of Civil Engineers (ASCE).

Giroux was presented with the ASCE’s Civil Engineering History and Heritage Award in 2013 and the G. Brooks Earnest Technical Lecture Award in 2016. He was also elected as a Distinguished Member of the society in 2016. In 2017, the ASCE Construction Institute presented him with the organization’s Roebling Award. A 1979 alumnus of Iowa State University’s construction engineering program, he was inducted into his alma mater’s Construction Engineering Hall of Fame in 2018.

This presentation is part of the Neil and Maurita Stueck Distinguished Lecture Series for Civil, Architectural and Environmental Engineering at Missouri S&T. Funding for the series was established by Maurita Stueck to honor her late husband, a 1943 civil engineering graduate of S&T, and also provide students with outside perspectives.

The lecture was also part of the 2023 celebration and meetings of the Academy of Civil Engineers. The academy was founded in 1972 to acknowledge outstanding Miner alumni.

IACIP selects Liu as president



Dr. Jenny Liu, James A. Heidman Professor, was elected president of the International Association of Chinese Infrastructure Professionals.

IACIP is a U.S.-registered non-profit professional organization with members who work or study in the fields of civil infrastructure and systems (CIS) and related areas who are interested in CIS development and related issues. IACIP aims to facilitate the advancement of knowledge and technology in the areas of CIS through education, technology transfer and research at an international level. Learn more at www.iacip.net.

Zhang presents at Geo-Congress

Dr. Xiong Zhang, James A. Heidman Professor, attended the American Society of Civil Engineers Geo-Congress 2023 held March 26-29 in Los Angeles.

Zhang, along with Dr. Laureano Hoyos, professor of civil engineering at the University of Texas at Arlington, and Dr. Sanchez Marcelo, professor of civil and environmental engineering at Texas A&M University, taught a short course titled "Simple methods to rapidly characterize and model unsaturated soil behavior."



Strain Localization, and Shear Band Characterization During Triaxial Testing Using a Photogrammetry-Based Method."

Zhang chaired a technical session on "Soil Properties" with Dr. Cassandra Rutherford, assistant professor of civil, construction and environmental engineering at Iowa State University. He also gave two poster presentations, titled "Efficient and Accurate Coded Target Decoding for 3D Reconstruction of Soil Specimen in Triaxial Test" and "Measurement of Volumetric Deformation,

Oerther named executive director of American Academy of Environmental Engineers and Scientists



Dr. Daniel Oerther, a professor of environmental health engineering at Missouri S&T, was recently named executive director of the American Academy of

Environmental Engineers and Scientists (AAEES).

Oerther recently served as the organization's interim executive director, and he will now begin a three-year term in an official capacity. A member of the academy since 2005, he has earned several awards and served in multiple leadership positions.

"Through board certification, the academy identifies the best of the best in environmental engineering and science, and through our partnership with ABET Inc., we share responsibility for ensuring the quality of future professionals," Oerther says.

"My role at the academy means that my students at Missouri S&T learn leadership and excellence in environmental engineering and science today and the over-the-horizon approaches for 2050 and beyond."

Oerther's AAEES honors include the 2020 Honor Award for Environmental Sustainability, the 2018 Stanley E. Kappe Award, the 2016 Superior Achievement Award, the 2014 Excellence in Environmental

Engineering Education Award and the 2009 Honor Award for University Research. He was also the first person to be recognized by the AAEES both as a Board-Certified Environmental Engineer and a Board-Certified Environmental Scientist.

Oerther has been a member of the S&T faculty since 2010. He holds master's and Ph.D. degrees in environmental engineering from the University of Illinois, Urbana-Champaign. He also holds bachelor's degrees in both environmental engineering and biology from Northwestern University.

To learn more about Missouri S&T's environmental engineering programs, visit care.mst.edu.



Chen recognized

Dr. Genda Chen, CII director, received the 2022 Editorial Excellence Award by the *Journal of Civil Structural Health Monitoring (JCSHM)*, which publishes five issues a year to advance the understanding and the application of health monitoring methods for the condition assessment and management of civil infrastructure systems.

Chen was also upgraded to the Fellow of the Society of Photo-Optical Instrumentation Engineers or International Society of Optics and Photonics (SPIE) in March of 2023. SPIE Fellows are members of distinction with significant scientific and technical contributions in the multidisciplinary fields of optics,

photonics, and imaging. About 10% of the overall membership or a total of more than 1,700 SPIE members have become Fellows since the Society's inception in 1955.

Chen was recognized for his research contributions and professional leadership in the field of smart structures, particularly for the engineering applications of grating- and scattering-based fiber optic sensing technologies.

To date, Dr. Chen has published journal papers in the broad area of adaptive data analysis and system identification (18 total), neural network and deep learning (11 total), and sensors and sensing systems (64 total).

Professors named fellows of the Taylor Geospatial Institute



Burken



Chen

Two professors from Missouri S&T were recently announced as part of the inaugural class of fellows for the Taylor Geospatial Institute (TGI). **Dr. Joel Burken**, Curators' Distinguished Professor and chair of civil, architectural and environmental engineering at S&T, will serve as a fellow, as will **Dr. Genda Chen**, the Robert W. Abbett Distinguished Professor of Civil Engineering.

Through this program, TGI institutions will be supported in recruiting and retaining high-achieving researchers in geospatial science fields, developing scientific leaders, and strengthening collaboration among the TGI members to accelerate the St. Louis region's development as a world-renowned global geospatial center.

Fellows will receive support from TGI in several ways, such as discretionary funding, assistance from a TGI postdoctoral scholar, access to data analytics and computing resources, and guidance with grant proposal development.

The TGI consortium includes Missouri S&T, Saint Louis University, the Donald Danforth Plant Science Center, Harris-Stowe State University, University of Illinois Urbana-Champaign, University of Missouri-Columbia, University of Missouri-St. Louis and Washington University in St. Louis. Collectively, these institutions encompass more than 5,000 faculty and 100,000 students.

CII collaborates with European communities

Dr. Ian Smith, founding director of the new Georg Nemetschek Institute (GNI) AI for the Built World at TU Munich, Germany, invited S&T Center for Intelligent Infrastructure director **Dr. Genda Chen** to serve as a member of the TUM GNI International Scientific Committee for a three-year term, which began in March 2023.

The GNI is similar to the CII in many ways with synergistic activities in AI applications for data-driven, knowledge-based decision making throughout a life cycle of buildings and civil infrastructure systems. It will help lead international competitions and establish short-term visiting and postdoctoral fellowships.

FACULTY KUDOS



Dr. Daniel Oerther has been named a Diplomate Laureate of the American Academy of Sanitarians. Formed in 1966, the academy elevates the standards, improves

the practice, advances the proficiency, and promotes the highest levels of ethical conduct among the nation's thousands of professional sanitarians who work in every field of environmental health. He also is the first individual to be recognized by all three American Academies associated with the practice of environmental health – Sanitarians, Nursing, and Environmental Engineering.



Dr. Sanjay Tewari, associate teaching professor of environmental water and resources engineering in our Missouri S&T/ Missouri State University (MSU)

Cooperative Civil Engineering Program, and a team of researchers landed a notable U.S. Environmental Protection Agency (EPA) P2 grant. Tewari and his engineering students will help Missouri manufacturing companies reduce, eliminate and prevent pollution at its source before it is created and save energy.



Dr. Grace Yan and a team of researchers were recently awarded a \$200,000 development grant as part of the Geospatial Institute Seed Grant Program to Stimulate

Collaborative Research. Her team's project is titled "Developing a Smart Geospatial Tool for Extracting Building Information at a Community Level to Enable Digital-Twins for Disaster Resilience."

New Kummer ignition grants

Diagnosing a disease from your wearable. Making electrical infrastructure more resilient. Predicting catastrophic events. These innovations and more could result from the latest round of Kummer Ignition Grants for Research and Innovation at Missouri S&T.

Ranging from \$25,000 to \$50,000 per project, these grants support researchers' efforts to develop compelling proposals for multi-million-dollar grants from federal agencies, foundations and corporations.

When added to the first 12 Ignition Grants and second round of five grants funded in Fiscal Year 2022, the Kummer Institute tallies 29 projects funded by nearly \$900,000.

"Even if a small percentage is funded, we will see an excellent return on investment," says **Dr. Kamal Khayat**, vice chancellor for research and innovation at Missouri S&T. "From the fall 2021 cycle of Ignition Grants, 13 external proposals totaling \$25 million were submitted and we expect a similar level for future cohorts."

Two proposals from our department funded by the Ignition Grants are: "Cost-Effective and Ecological 3D Printing of Reinforced Concrete Structures through Vibration Dynamics and Granular Physics" led by **Dr. Dimitri Feys** and "Planning an ERC and Other Significant Projects on Gigaton-Scale Carbon-Negative Engineering" led by **Dr. Hongyan Ma**.

Annis joins Missouri LTAP team



Dr. Nicole Annis, ArchE'08, MS CE'10, PhD CE'15, recently returned to the Missouri S&T campus as a member of the CAR EE department. She joined Missouri's Local Technical Assistance Program (LTAP) staff on Feb. 1, 2023, as assistant director under **Dr. Heath Pickerill**, assistant teaching professor and LTAP director. She worked with LTAP for seven years as a graduate student in the department (2008-15). Upon graduation, she was an associate professor and program assessment coordinator at Lawrence Technical University in Southfield, Michigan, for three years.

Annis worked five years as a consulting design engineer and project manager. As a design engineer, she helped to determine project tasks, weekly assignments, and specific deadlines and represented the engineering team during client/owner reviews. As a project manager, she managed a government-funded research project that included a large multidiscipline team of designers and subcontractors. As part of the LTAP team, one of her priorities is the final implementation of a new learning management system (LMS) with an integrated website. She has years of firsthand experience and insight into the training and services LTAP provides as well as a diverse background in curriculum development, program administration, and various other areas related to her role. In addition, Annis now teaches as a lecturer for the department and recently taught the HVAC course.

Two S&T infrastructure researchers named Heidman professors

Drs. Jenny Liu and Xiong Zhang have been named James A. Heidman Professors of Civil, Architectural and Environmental Engineering at Missouri S&T.

“It is an honor to be appointed to this role and serve in a named professorship at one of the top engineering schools in the country,” says Liu. “I am very grateful to university leadership for valuing and supporting faculty excellence, and I look forward to the opportunities this professorship will allow me to pursue.”

Liu joined Missouri S&T in 2017 as an associate professor of civil, architectural and environmental engineering and was promoted to professor in 2018.

Her infrastructure research focuses on innovative additives and recycled materials such as waste plastic for asphalt. She earned her Ph.D. in civil engineering from Texas A&M University.

Zhang says he values being appointed to this professorship, which is named after an alumnus of the university.

“At Missouri S&T, we help students develop the skills necessary to make positive contributions to the world and help shape the future,” he says. “James A. Heidman made a significant difference throughout his life, and I appreciate that I can inspire the next generation of students with this professorship and honor his legacy.”

Zhang joined Missouri S&T in 2016 as an associate professor of civil, architectural and environmental engineering and was promoted to professor in 2020.

His research interests include unsaturated soil mechanics,



Pictured left to right: Drs. Jenny Liu and Xiong Zhang

“At Missouri S&T, we help students develop the skills necessary to make positive contributions to the world and help shape the future.”

constitutive modeling of geomaterials, remote sensing for geo-engineering applications, geothermal and ground source heat pump systems, soil stabilization and ground improvement, and frozen ground engineering. He holds a Ph.D. in civil engineering with an emphasis in geotechnical engineering from Texas A&M University.

Liu and Zhang have collaborated on research, along with 10 other universities within the National University Transportation Center (UTC) for Transportation Infrastructure Durability and Life Extension.

A gift from the estate of James A. Heidman funds these professorships. Heidman earned his bachelor’s and master’s degrees in civil engineering from Missouri S&T in 1965 and 1966, respectively.

Heidman was a retired lieutenant colonel in the Army and former staff engineer with the U.S. Environmental Protection Agency. He lived in Mountain Home, Arkansas, prior to his death in 2014. His bequest was also instrumental in funding S&T’s Clayco Advanced Construction and Materials Laboratory.

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Because of faithful supporters like you, Civil, Architectural and Environmental Engineering continues to be recognized nationally, as one of the top civil engineering programs in the country.

Our department is leading the way at Missouri S&T in many aspects, and our collective support helps continue that long-standing tradition.

Let's do our part to continue to drive that upward trajectory.

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