

THE BRIDGE

Missouri S&T
Spring 2020 | Vol. 44

Civil, Architectural and Environmental Engineering



Facemask
Materials
and Testing



Achievements
and Awards

Senior Design
Projects
via Zoom



Proud
Miners



Virtual
Graduations



Changing the World post COVID-19 page 4

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



Spring 2020 is a semester that will be a landmark in many ways and will be a punctuating point in our institutional history, our careers and our lives. The international disruption to education and our society as a whole was certainly unique in our 150 years of civil engineering at Missouri S&T.

We had planned to launch a year of activities and celebration around the 150th anniversary of the founding of MSM/UMR/S&T, as well as the initiation of civil engineering. I'd like to say we are hitting the 'pause' button, but it feels more like hitting a 'reset' button. The future is certainly shrouded with many questions and uncertainty.

Before looking into our cloudy crystal ball, we should share the collective successes of our team. We have numerous highlights to mention about the stories in this edition of *The Bridge*.

The end of 2019 and the beginning of 2020 marked an exceptional burst of new partnerships with alumni, peer institutions, and industry (pgs. 7 and 15), as well as international accolades for our faculty leaders (pgs. 12, 16, 19, 20 and 22) and a celebration of

student and alumni excellence (pgs. 20 and 21). Seeing members of our team recognized internationally at so many levels of teaching, research, service and leadership was tremendously gratifying and reflects the strength and dedication of our team embracing our motto to ***Change the World***.

However, none of us could have predicted the arrival of COVID-19. Campus activities and events such as St. Pat's, Chi Epsilon's initiation, the Academy of Civil Engineers induction ceremony, student competitions and the CAEE department picnic were all canceled. Missouri's governor declared a state of emergency. Students were asked to leave campus, our staff began working remotely, and faculty moved all courses online for more than 600 students. Our departmental and institutional fabric was simply ripped. The initial transition to remote learning was by no means perfect. Our faculty and students take pride in our "hands-on" learning experience that both were missing. Everyone managed to work together and find the best path forward to complete the semester in true Miner fashion — with grit and perseverance.

Along the way, numerous members of our team answered the call for leadership across campus and the nation — notably **Dr. Yang Wang** and his research team answered a barrage of questions about wearing face masks for protection, particularly the safety and effectiveness of various filter materials. His knowledge and scientific findings were featured by *The New York Times*, the TODAY Show and People.com (pg. 4).

So while we will forever look back on the year 2020 as unforgettable, let us also remember our resilience through these unprecedented challenges and how we triumphed to show our true colors as leaders and contributors to our global society. That definitely deserves a big "thumbs up!"

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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.



Pictured L-R: Elizabeth Borgmeyer bites the head off a snake and Ben Dyhouse was selected secretary of the St. Pat's Board.

BEST EVER that was NEVER

Miners were able to “defend” campus from an invasion of snakes this year — but not a coronavirus closure. Due to concerns related to the potential spread of coronavirus (COVID-19), Missouri S&T canceled all university-sponsored events associated with the 2020 St. Pat's Celebration. We will make 2021 the Best Ever!



Employee milestones

Three staff members were honored with their university service awards this spring. Pictured L-R: **John Bullock**, engineering technician I, celebrated 10 years. **Jody Seely**, office support assistant III and **Greg Leckrone**, research lab supervisor, each celebrated five years. We appreciate their years of service to S&T and to our department.

THE BRIDGE



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Environmental engineers study fabrics, materials for face covers



by Andrew Careaga

The day before the federal government issued new recommendations that Americans wear cloth face coverings to help slow the spread of the coronavirus, a researcher at Missouri S&T decided to test a few common household materials – pillowcases, scarves, furnace filters – “out of curiosity.” His early results, which he shared on Twitter on April 2, have attracted the interest of do-it-yourselfers, fellow engineers and scientists, and the general public.

The tweet also attracted the attention of a journalist from *The New York Times*, who reported on the project as part of the newspaper’s coronavirus coverage.

Dr. Yang Wang, assistant professor of environmental engineering at S&T, studies how fine particles like aerosols are transmitted. Recent research suggests that the coronavirus may survive on airborne aerosols for a few hours, although it also can be spread through larger respiratory droplets emitted through a cough or a sneeze.

After seeing posts on Twitter about whether scarves would sufficiently block aerosols, Wang decided to test a variety of household materials – including scarves, bandannas, pillowcases and household air filters – to see how well they might prevent the spread of aerosols.

Wang and his Ph.D. student, **Weixing Hao**, tested the various fabrics and materials using a scanning mobility particle sizer, which measures particle size and concentration. They

then compared the “filtration efficiency” of multiple layers of each material against different aerosol particle sizes, ranging from a few nanometers to over 400 nanometers. Wang then shared their preliminary results on Twitter.

Wang and Hao found that the layers of scarves and bandannas did a poor job of filtering out aerosols. Pillowcase fabric fared somewhat better, depending on thread count. A 600-count pillowcase filters better than a 400-count one, the researchers determined.

But the best aerosol-blocking material of those Wang tested comes from commercially available household air filters. The multilayered air filters work almost as well as n95 medical masks to block aerosols, especially smaller particles, according to Wang’s initial findings.

As more layers of filter materials are stacked, however, a change in air flow through the materials, or “pressure drop,” becomes larger. This pressure drop increase can make it more difficult to breathe. Wang and his team are also looking for a combination of materials that produces the highest filtration efficiency, but the lowest pressure drop.

This off-the-cuff study was more than just a passing curiosity for Wang, however. He is one of several Missouri S&T faculty, students and staff members who have come together to help local physicians and medical staff by providing masks and face shields. The effort began after officials with Phelps Health, a regional medical system based in Rolla, sought help from the university. A handful of students worked across campus to 3-D print masks and face shield brackets for the cause. The students delivered hundreds of face shields to Phelps Health, but are still working on the masks.

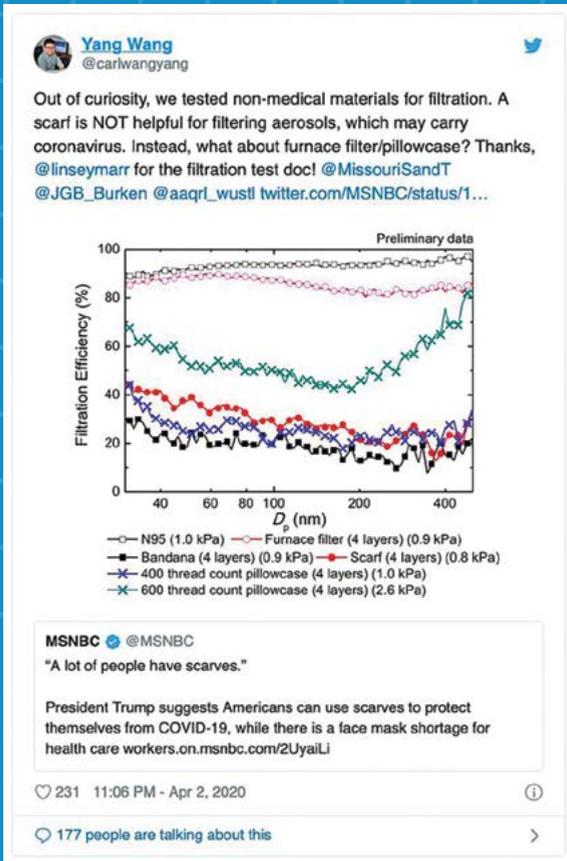
To adequately protect health care workers, these reusable masks require some type of filter to block airborne particles that may spread the coronavirus or other diseases. That’s where Wang comes in.

Dr. Joel Burken, a fellow environmental engineer and chair of Missouri S&T’s civil, architectural and environmental engineering department, invited Wang to join the effort.

“We knew we had to come up with some sort of non-medical filters to use with these masks,” Burken says, “so I asked Yang to be a part of this campuswide project, and he’s been a strong team member.”



Different mask materials like bandannas being tested in the environmental lab.



Dr. Wang's April 2 tweet that fueled national discussion.

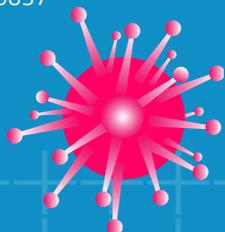
Wang and Hao are continuing to test different materials for the masks. While a furnace filter may be much more efficient at filtering out aerosols than, say, a bandanna, it's possible that the components of such a filter could pose risks.

Different furnace filters are made of different materials, such as cotton, fiberglass or polyester. One further protective measure would be to wrap that filtration material with another type of material, such as a fabric.

Dr. Wang's findings became part of the national debate on a variety of readily available efficient filter materials and his work was featured by *The New York Times*, the TODAY Show and People.com.

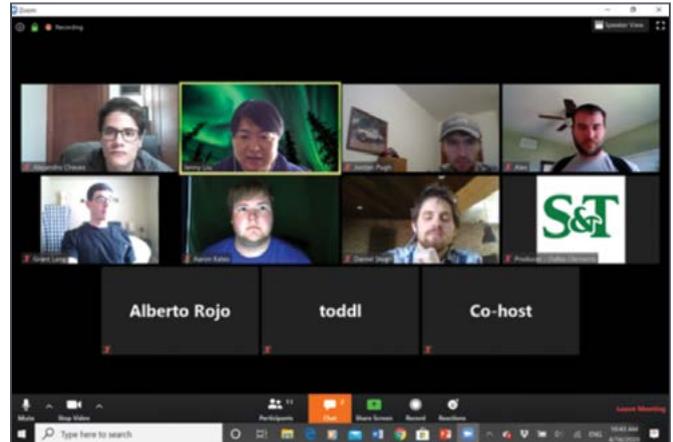
FEATURED WEBSITE ARTICLES:

- www.nytimes.com/article/coronavirus-home-made-mask-material-DIY-face-mask-ppe.html
- www.today.com/style/what-kind-filter-should-you-put-face-mask-t179037
- people.com/lifestyle/cloth-face-mask-filters/

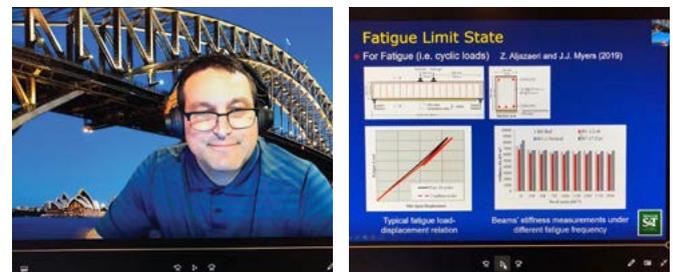


Rising to the challenge

In what seemed like the blink of an eye, our team moved all courses online for more than 600 CAR EE students during the COVID-19 pandemic. Faculty and staff worked from home using new delivery methods and trying their best to continue to deliver the quality education that S&T is known for across the state, nation and world.



Dr. Jenny Liu's class shown on Zoom.



Dr. John Myers using Zoom's many features.



Dr. Mark Fitch works comfortably from home at his dining table.



Dr. Lesley Sneed preparing to record one of her lectures.

Envisioning a digital city:

Missouri S&T research could lead to “smart” infrastructure

by Nancy Bowles

Dr. Genda Chen wants to make the city of the future more intelligent — able to build and repair its roads, bridges, electrical grids, power plants and other infrastructure through a network of robotics, sensors and data analytics that diagnose and identify the community’s needs. Researchers at the Center for Intelligent Infrastructure (CII) at Missouri S&T are looking to create new infrastructure capabilities on a grand scale to lower construction and maintenance costs and improve worker safety.

predict damage to roads, rail lines and power grids in the event of a tornado or earthquake, possibly leading to improved construction techniques.

Chen says using robots and sensors would improve worker safety and cut costs. Rather than requiring a human to scale a bridge to inspect for needed repair, a robot could do it. Robots could also be used in construction to help prevent injuries to people, Chen says. He says construction and maintenance involving robotics is currently used on a small scale, but nothing of the magnitude that the CII researchers envision.

The work is particularly important as the world’s infrastructure ages. Chen says the advanced technology developed at the center enables faster and less expensive inspection to meet more frequent inspection requirements for aging infrastructure. He says the technology also allows for more accurate, safer assessments for infrastructure with limited remaining life or severe deterioration.

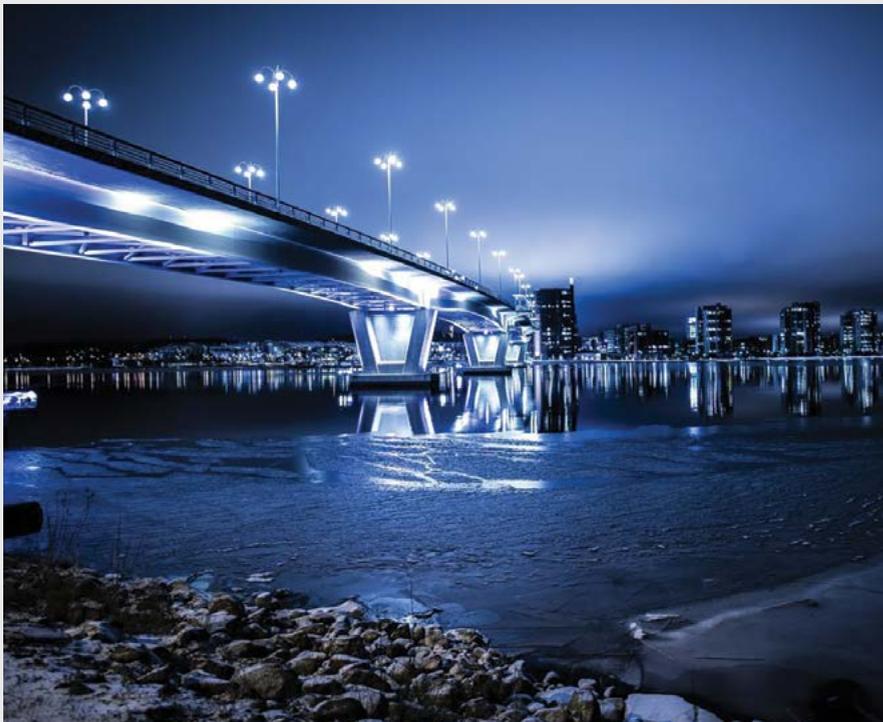
“There is no better time than now,” says Chen.

Working with Chen on the research project are Missouri S&T faculty members including **Dr. Jenny Liu**, professor of civil engineering; **Dr. Suzanna Long**, professor and chair of engineering management and systems engineering; and **Dr. Zhaozheng Yin**, associate professor of computer science; as well as University of Missouri-Columbia professors **Dr. William G. Buttlar**, the Glen Barton Chair of Flexible Pavement Technology; and **Dr. Glenn Washer**, professor of civil engineering.

CII is funded through a strategic investment from the University of Missouri (UM) system as part of a multi-campus research initiative. Missouri S&T will collaborate closely with researchers from the other universities in the UM System. Chen says he would like to see a few universities outside of the UM System get involved with CII to bring additional strengths to the team.

“This is an ambitious project, and there are lots of challenges,” says Chen, the Robert W. Abbett Distinguished Professor of Civil Engineering at Missouri S&T and CII’s director. “We are investigating a new frontier.”

Chen says S&T’s INSPIRE University Transportation Center is already developing robotics technology that focuses on inspection and maintenance of bridges. That technology could serve as a baseline for new technology coming out of CII, Chen says. He envisions a future where a digital stream of data from sensors could be used to run scenarios and help public officials determine policy and plan for potential infrastructure problems before they happen. For instance, the data could be used to





Missouri construction and academic leaders to collaborate through new consortium



MISSOURI CONSORTIUM for
CONSTRUCTION
INNOVATION

by Nancy Bowles

Missouri construction companies and Missouri S&T will combine their expertise to spur innovation in the construction industry. The Missouri Consortium for Construction Innovation (MoCCI) was established Jan. 30, 2020, with a celebration at the headquarters of a charter member, Brinkmann Constructors in Chesterfield, Missouri.

Missouri benefits from having top nationally known, recognized and ranked construction companies in its urban areas and strong academic support for the construction industry from Missouri S&T, according to consortium leaders.

“Brinkmann Constructors is thrilled to be a part of such a unique partnership helping shape the future of the construction industry,” says **Brian Satterthwaite**, president of Brinkmann and a Missouri S&T alumnus who earned a bachelor’s degree in civil engineering in 1989. “We are proud to have many Missouri S&T alumni in our ranks, and they are honored to be able to share their insight beyond measure. By connecting experienced professionals with the next generation of construction engineers, MoCCI is enhancing not only the skills of current students and their development, but preparing them to be the future leaders of our industry.”

MoCCI is composed of various construction-associated members such as contractors, owners, subcontractors, vendors and service providers. Brinkmann is one of the initial MoCCI members, along with McCarthy Building Companies, Arco Construction, Clayco, BJC HealthCare and the Greensfelder law firm. All have operations in St. Louis. Consortium leaders expect other companies to join in the near future.

Three core areas make up the focus of MoCCI: education, research and professional development. Consortium

(continued on the next page)



Pictured L-R: Bob Sieckhaus, CE'63, Steve Sieckhaus, CE'87, MS EMgt'94 and COO of Clayco, discuss MoCCI activities with MoCCI founder and director, Dr. Islam El-adaway.



S&T REPRESENTATIVES WITH MEMBERS OF MOCCI

Pictured L-R: Dr. Richard Wlezien, dean of S&T's College of Engineering and Computing; Bob Brinkmann, CE'71, founder and CEO of Brinkmann Constructors; Dr. Islam El-adaway, S&T professor and founding director of MoCCI; Brian Satterthwaite, president of Brinkmann Constructors; Steve Sieckhaus, COO of Clayco; Dr. Joel Burken, chair of S&T's civil, architectural and environmental engineering department; and John Komlos, vice president of ARCO Construction Company.

New consortium continued...

leaders say integrating these three areas in a corporate-academic partnership will benefit the member companies and their employees so that they stay at the cutting edge of the construction industry. The relationship will also provide S&T students with increased opportunities for broader education programs and direct employment, internships and cooperative educational opportunities with MoCCI members, leaders say.

"One of the first things we learned at S&T is what our students need to succeed in the construction industry," says **Dr. Islam El-adaway**, the Hurst/McCarthy Professor at Missouri S&T and founding director of MoCCI. "We began by closing gaps in the curriculum."

As a result, S&T is, for the first time, offering a minor in construction engineering and management in the civil, architectural and environmental engineering department. The program's six courses provide the academic foundation that graduates will need to be successful in the construction

"Our goal is to meet the needs of the construction industry, and the member companies have a say in what those needs are and how they are met."

— **Dr. Islam El-adaway**
Hurst/McCarthy Professor and
MoCCI Founding Director



industry from day one rather than picking up needed skills during their first months of employment after graduation.

The second core area for MoCCI, research, aims to develop practical, applicable solutions to challenges in

the construction industry. Two research projects are underway so far. Each involves developing a model for best practices and decision making — one in collaborative planning and one in modularization.

In the core area of professional development, experts from Missouri and across the nation will present workshops for member companies focusing on challenges and areas of interest for those companies.

"MoCCI is a service-based organization," El-adaway says. "Our goal is to meet the needs of the construction industry, and the member companies have a say in what those needs are and how they are met."

He adds that combining the strengths of vigorous academics and the work of large construction companies will benefit state and local economies and help build the work force.

"This is an opportunity that needs to be grasped," El-adaway says.

Gordon Research Conference covers topics in advanced materials

Dr. Kamal H. Khayat, the Vernon and Maralee Jones Professor of Civil Engineering and director of the Center for Infrastructure Engineering Studies (CIES), co-chaired the 2020 Gordon Research Conference (GRC) on Advanced Materials for Sustainable Infrastructure (AMSI) Development held recently in Ventura, California. Gordon Research Conferences are prestigious international scientific conferences organized with topics covering frontier research with presentations in the biological, chemical, physical, and engineering sciences and their interfaces.

The 2020 GRC was the first in North America in nearly 20 years to focus on AMSI. The conference brought together approximately 150 leading experts from 22 countries, representing industry, government and academia. They discussed

cutting edge technologies to improve the sustainability of cement-based/ advanced materials for infrastructure development.

Attendees of different scientific backgrounds, such as civil engineering, materials science, computation and data science, debated their ideas and non-published findings to provide implications for advancing resource and energy efficiency, life cycle, adaptability, and resilience of civil infrastructures. The GRC themes aligned with the Advanced Materials for Sustainable Infrastructure (AMSI) strategic area at Missouri S&T.

Dr. Aditya Kumar, assistant professor of materials science and engineering, and **Dr. Dimitri Feys**, associate professor of civil, architectural and environmental engineering, gave presentations at the conference.



Dr. Kamal Khayat, pictured right, GRC co-chair and Dr. Doug Hooton, co-chair from University of Toronto, deliver GRC Awards.

During the conference, **Dr. Nima Farzadnia**, a post-doctoral fellow of the CIES, co-chaired the Gordon Research Seminar (GRS) on “Concrete Solutions towards Carbon-Neutral Construction by 2050.”

The 2020 GRS gathered more than 40 Ph.D. students, post-docs and early career professionals from different fields of cement and concrete science and technology to discuss the drastic shifts and solutions toward carbon-neutral construction.

Dr. Hongyan Ma, assistant professor of civil, architectural and environmental engineering, served as a discussion leader at the GRS. **Kavaya Vallurupalli**, a Ph.D. student in civil engineering, won one of two best poster awards.



2020 participants at the Gordon Research Seminar (GRS)

To learn more about the **2020 Gordon Research Conference**, visit the website at: grc.org/advanced-materials-for-sustainable-infrastructure-development-conference/2020/ or to learn about the **Gordon Research Seminar**, visit grc.org/advanced-materials-for-sustainable-infrastructure-development-grs-conference/2020/.

Showalter honored as AGC Outstanding Educator

by Nancy Bowles

The Associated General Contractors of America (AGC) awarded its 2020 Outstanding Educator Award to **Dr. Eric Showalter**, a professor of civil engineering at Missouri S&T, at the AGC Annual Convention in Las Vegas. Each year, AGC recognizes an educator who makes a significant mark in the field of construction education.

“Receiving the AGC Outstanding Educator Award is a highlight of my career,” says Showalter. “To be nominated was an honor. I appreciate the support of my colleagues, friends, students and AGC.”

The honor includes a \$5,000 cash award for Showalter and two \$2,500 scholarships for the coming academic year for students of Showalter’s choosing. He has named two undergraduates in civil engineering to receive the scholarships: **Devin Schrieber** of Waterloo, Illinois, and **Raymond Boos** of Cape Girardeau, Missouri.

“Dr. Showalter has established a high standard of quality for the education of future civil engineers at Missouri S&T,”

said **Dr. Richard Wlezien**, vice provost and dean of the College of Engineering and Computing. “We are proud of his work and congratulate him on this well-deserved recognition.”

Showalter has been on the faculty at Missouri S&T for 20 years. He is assistant chair of civil engineering and director of undergraduate advising in the civil, architectural and environmental engineering department. He also advises the student chapter of AGC on campus, the Concrete Canoe team and a team with Engineers Without Borders.

In spring 2010, Showalter worked in Tallinn, Estonia, through the Fulbright Scholar program, teaching green construction classes and advising master’s degree students at Tallinn University of Technology. Showalter is a Dean’s Education Scholar in S&T’s College of Engineering and Computing. Prior to his academic career, Showalter worked in the construction industry for five years.



“Receiving the AGC Outstanding Educator Award is a highlight of my career.”

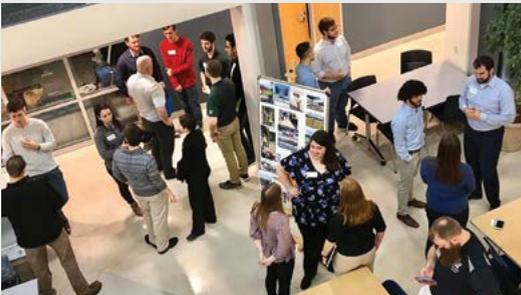
— **Dr. Eric Showalter**
Teaching Professor



Podcast with the president

Leonard Toenjes, president of AGC-Missouri, visited campus and gave our chapter members — **Devin Schrieber**, S&T-AGC chapter president and **Amr Elsayegh**, fundraising chair — the opportunity to join in and share updates on student chapter activities at Missouri S&T during the podcast: “I podcast AGCMO.”

RECORD NUMBER of recruiters at S&T's Career Fair



NIGHT TO NETWORK

Missouri S&T students seeking full-time employment after graduation or co-op or internship for the semester had an opportunity to meet with hundreds of employers at the 2020 Spring Career Fair held on Tuesday, Feb. 18, in the Gale Bullman Building. More than 250 companies attended the event with many coming early to our networking reception and staying the next day for on-campus interviews.

A total of 1,721 different employers were recruited from Missouri S&T this spring, which is a 24 percent increase from last spring. And 6,393 jobs have already been posted online by the career opportunities and employer relations (COER) department at S&T, which is a 35 percent increase from last year.

The average starting salary for undergraduates with S&T degrees is over \$63,000. The average starting salary for graduate students is over \$79,000.

MINERS CONNECT

Top: Missouri S&T 2020 Career Fair by COER, Photo by Tom Wagner/S&T.

Left: CArEE students gather with potential employers in the Kummer Atrium inside Butler-Carlton Hall.

Middle: Steve Ford, CE'79, and VP at Garney Construction with Ben Dyhouse.

Right: Recruiters and a group of current students visit about their bright futures.

S&T researchers organize IACIP workshop and present at TRB's annual meeting



Dr. Jenny Liu, professor of materials and pavement engineering (pictured above left), chaired the 10th International Association of Chinese Infrastructure Professionals (IACIP) workshop held on Jan. 12 in conjunction with the 99th Transportation Research Board (TRB) annual meeting in Washington D.C.

Dr. Genda Chen, the Robert W. Abnett Distinguished Professor of Civil Engineering (pictured above right), gave the keynote presentation at the workshop titled "Empowering and Rejuvenating the Civil Engineering Profession with Informatics, Automation and Actuation."

Dr. XianBiao "X.B" Hu (pictured below left) and **Dr. Hongyan Ma**, both assistant professors in the department, served as session chairs and poster reviewers for the IACIP workshop. S&T students Hanli Wu, Jun Liu, Sara Fayek and Xingxing Zou received poster awards during the IACIP Student Poster Competition.

In addition, Liu, **Dr. Xiong Zhang**, (pictured above center), Hu and their students gave more than 10 podium and poster presentations on a variety of transportation topics at the TRB annual meeting.



A photograph of Nancy Matteoni, a woman with blonde hair, wearing a white hard hat, a high-visibility yellow safety vest over a patterned shirt, and blue jeans. She is standing in a large, dimly lit underground tunnel. The tunnel has concrete walls and a set of stairs leading down the center. A large yellow pipe runs along the ceiling. The lighting is focused on the center of the tunnel, creating a sense of depth.

Nancy Matteoni: underground engineer

by Peter Ehrhard

Photo by David Torrence

If you have traveled through St. Louis in the past few years, chances are you have driven on or over a construction project that **Nancy Matteoni** has built.

As a principal engineer and project manager for Parsons, she coordinates large-scale projects in the greater St. Louis area.

Matteoni, CE'90, worked on the U.S. Highway 40/Interstate 64 expansion that was years in the making, and she was a part of the team that added a pedestrian bridge connecting the MetroLink East Riverfront Station to the Eads Bridge — a combined railroad and roadway that spans the Mississippi River.

“The Eads Bridge construction project was fun because I had the opportunity to become an expert in the history of this 145-year-old bridge,” says Matteoni. “I love history, so learning about the role it had played, its creation and expansion, and its one-time status as an engineering marvel was great.”

Currently, Matteoni is leading a Parsons project for the Metropolitan St. Louis Sewer District known as the Deer Creek Tunnel Project. The 4-mile-long tunnel lies approximately 175 feet

underground and will run from Shrewsbury, Mo., to Clayton, Mo. A portion runs underneath the parking lot of the Saint Louis Galleria shopping mall.

“Before 2017, all I had worked on in my career were bridges,” says Matteoni. “Now suddenly I am working in an opposite direction, under the ground.”

The tunnel, which will have a 19-foot-diameter interior, will collect and temporarily store water during heavy rains, alleviating potential flooding in the cities. The collected water will then be filtered to treatment plants and put back into the flow system. The tunnel will also help control sewage flows to a waste water treatment plant, eliminating an expensive proposed treatment plant expansion.

“I love being on the construction side of things during any project,” says Matteoni. “It is different than the design end of the business that I am usually on. Here I can see issues as they arise and make changes to the project on the go — it makes a project much more agile.”

“It is different than the design end of the business that I am usually on. Here I can see issues as they arise and make changes to the project on the go — it makes a project much more agile.”

— **Nancy Matteoni**
Principal Engineer
and Project Manager
Parsons, St. Louis

Geotech group attends conference in St. Louis



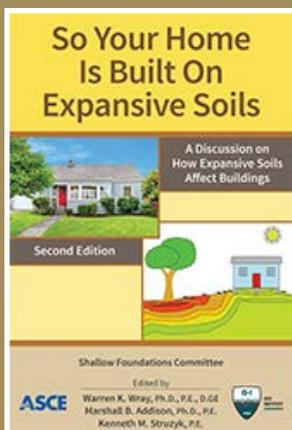
The Geotechnical Engineering Research Group at Missouri S&T attended the Structural and GeoConfluence 2019 in St. Louis.

Beshoy Riad, a Ph.D. student in civil engineering, was one of two graduate students awarded the ASCE 2019 GeoConfluence Research Scholarship. The ASCE GeoConfluence Scholarship Program recognizes and supports outstanding students who are specialized in geotechnical or geoenvironmental engineering at Midwestern universities within the ASCE St. Louis Section.

The main objective of Beshoy's research is to develop a landslide warning system for rainfall induced landslides for natural slopes. He is working as a graduate research assistant under the guidance of **Dr. Xiong Zhang**.



Beshoy Riad, is pictured center with Dr. Warren K. Wray (left) and his advisor, Dr. Xiong Zhang (right).



Wray publishes book on expansive soils affecting buildings

Dr. Warren K. (Kent) Wray, provost emeritus, co-edited the second edition of *So Your Home Is Built On Expansive Soils: A Discussion on How Expansive Soils Affect Buildings*. The book was published earlier this year by the American Society of Civil Engineers. The book addresses problems associated with expansive soils, a common issue in several areas of the United States. Wray edited the original edition, which was published in 1995.

NEW TRANSPORTATION CENTER TO ADDRESS AGING INFRASTRUCTURE IN MISSOURI

by Nancy Bowles



Aging infrastructure in Missouri — such as crumbling roads and bridges — affects Missourians every day and can impede the state’s economic growth. A new transportation research center announced in December in Jefferson City will combine the research of Missouri S&T and the other University of Missouri (UM) System campuses with industry and government leaders to develop new strategies to address the state’s infrastructure issues.

The Missouri Center for Transportation Innovation (MCTI) will be led by the University of Missouri-Columbia (MU) for its first three years. **Dr. Bill Buttlar**, the Glen Barton Chair in Flexible Pavement Systems at the MU College of Engineering, will serve as the center’s director, joined by **Dr. John Myers**, Missouri S&T professor of civil engineering, as the deputy director.

“The MCTI is an exciting opportunity to help Missouri address infrastructure challenges now and into the future,” says Myers. “The MCTI will also provide an opportunity for our students to gain real-world experience as they prepare for civil engineering careers.”

The MCTI will share research from all four UM System campuses with the Missouri Department of Transportation (MoDOT), which is providing base funding for the project through the state’s planning and research dollars. The MCTI hopes to attract federal funding as well.

“Combining the strengths of the UM System universities with MoDOT through the MCTI is a clear expression of our mission to foster research that benefits the people of Missouri, the nation, and the world,” says UM System **President Mun Choi**. “Building effective connections between our universities and the state will accelerate research breakthroughs and support economic development and improve transportation safety.”

The MCTI was announced at the Missouri Department of Transportation (MoDOT) Central Laboratory in Jefferson City. Choi joined with MoDOT officials in delivering remarks. Buttlar and Myers also shared their vision for the center during the ceremony.

Myers and Buttlar will work with MCTI operations cabinet members **Dr. John Kevern**, professor of civil and mechanical engineering at the University of Missouri-Kansas City, and **Dr. Jill Bernard**, assistant teaching professor in the College of Business Administration and assistant director of program development for the Center for Transportation Studies at the University of Missouri-St. Louis.

At S&T, a new lab is scheduled to open this summer and will further expand the UM System’s infrastructure capabilities. The Clayco Advanced Construction and Materials Laboratory (ACML) will combine Missouri S&T’s infrastructure testing and analysis expertise — specialties of the university’s High-bay Structures Laboratory — with the development of new materials and construction methods in the adjoining ACML.



Dr. John Myers shared his vision for the MCTI at the opening ceremony. Also pictured (L-R) are UM System President Mun Choi and Dr. Bill Buttlar, engineering professor at the University of Missouri-Columbia and the MCTI director.

Photos by Mark Boyd, University of Missouri-Columbia

Sneed appointed to ACI code committee



Dr. Lesley Sneed, associate professor of civil engineering, has been appointed to serve on American Concrete Institute (ACI) Committee 318-25, Structural Concrete

Building Code. This committee develops and maintains building code requirements for structural concrete.

ACI 318 Building Code Requirements for Structural Concrete presents the codes that are necessary to ensure public safety. It is adopted, either directly or as a main reference, in the national code of more than 30 countries. ACI 318 is a must-have standard for all professionals engaged in concrete design, construction, and inspection. Sneed's six-year term became effective Aug. 19, 2019.



Oerther selected Kappe lecturer

Dr. Daniel Oerther, professor of environmental health engineering, has been selected as the 2020 Kappe Distinguished Lecturer by the American Academy of Environmental Engineers and Scientists.

Inaugurated in 1989, the Kappe series includes presentations on approximately a dozen college campuses during the autumn academic term. During the autumn 2020 academic term, Oerther will offer two different lectures. The first will present his work with nurses using community based participatory research to eliminate childhood stunting in Guatemala, and the second will present his work with the World Bank using science diplomacy to promote climate resilience and food security in the Caribbean.

Schonberg named Fulbright Specialist

The U.S. Department of State's Bureau of Educational and Cultural Affairs and World Learning named **Dr. William Schonberg** of Missouri S&T to the roster of Fulbright Specialists. Schonberg is a professor of civil, architectural and environmental engineering at S&T.

"I look forward to helping other countries develop engineering programs and learning about their cultures and traditions," Schonberg says. "The opportunity to work collaboratively with other countries is personally rewarding, but just as importantly, it allows me to bring back information to share with my students."

Schonberg's three-year tenure as a Fulbright Specialist runs through Oct. 11, 2022.

Fulbright specialists are recognized experts in their fields who are matched with projects designed by host institutions in more than 150 countries around the world. When the host institutions identify a national need and apply to the Fulbright Commission and U.S. Embassy in their country, they can name a specialist to work on their project. If no one specific is requested, the specialists themselves can express interest in the projects. All Fulbright Specialist projects must be a minimum of 14 days and a maximum of 42 days.



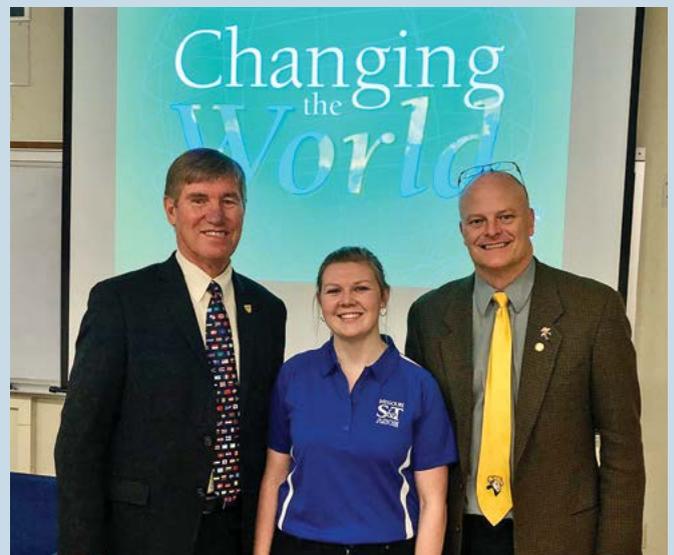
This is not Schonberg's first involvement with Fulbright. In 2018, he was named a Fulbright Distinguished Chair in Advanced Science and Technology. He worked for several months under that appointment, with scientists at the Defence Science and Technology group, a government agency in Australia, researching the effects of physical attacks on land vehicles.



Incoming ASCE 2021 president visits S&T

In February, the 2021 president of the American Society of Civil Engineers (ASCE) — Dr. Jean-Louis Briaud — gave a presentation discussing society’s current and future infrastructure challenges.

In his lecture, titled “Engineering the Future,” Briaud discussed the challenges humanity faces in investing and maintaining infrastructure to maintain the quality of life in the U.S. and globally as the world population is projected to surpass nine billion by 2050. To face the challenges of shrinking resources, he says engineers must broaden their knowledge beyond science and technology to understand the integration of societies. Engineers face challenges to create safe, sustainable and efficient infrastructure to preserve the planet’s limited resources for future generations.



Pictured L-R Dr. Jean-Louis Briaud, ASCE President 2021, Lizzy Sanders, ASCE student chapter President, and Dr. Joel Burken, CArEE department chair and ASCE advisor.



RULES FOR A SUCCESSFUL CAREER

10. Relentless pursuit of excellence as a way of life
9. Be curious
8. Work hard but balance your interests
7. Make lots of friends, public relations
6. Look for solutions and not who is to blame
5. Be firm in your decisions but fair and polite
4. Treat others as you wish to be treated
3. Communication is best way to solve problems
2. Surround yourself with smart people
1. Go after your dreams with vision and perseverance



Witushynsky honored with ASCE Region 7 Outstanding Younger Member Award

Nichole Witushynsky, ArchE'08, MS CE'11, pictured above left, was awarded the ASCE Region 7 Outstanding Younger Member Award. This award goes to an engineer that has exhibited professional achievement and has made a significant impact to the field of civil engineering through professional activities, ASCE involvement, research and innovative engineering solutions. The award is intended for individuals who are ages 35 years or less and a member of ASCE in Region 7, which consists of members from Kansas, Colorado, Wyoming, South Dakota, Nebraska, Iowa, St. Louis and Kansas City areas of Missouri. She was presented the award by another S&T alumnus, **Shawna Erter**, GeoE'00, ME Gtech'13, pictured above right.

Witushynsky has an interesting civil engineering background having spent her career in the structural world first with buildings, then aviation, and now an extended period of time in bridge design. With a bachelor's degree in architectural engineering, a master's degree in civil engineering, and a focus in structures, Witushynsky has recently led multiple bridge design efforts of significant magnitude including a finite element analysis (FEA) of an existing multi-cell cast-in-place box girder bridge. In another project, she led the FEA of a proposed single-span, large, complex, curved steel tub girder. This bridge is wider than it is long and her research was used to validate work done by the University of Kansas and also to answer design questions not addressed by an independent program.

Hudwalker talks to ASCE student chapter

The American Society of Civil Engineers (ASCE) student chapter at S&T hosted **Tim Hudwalker**, CE'88, Academy of Civil Engineers member and vice president of BSI Constructors, in March. Hudwalker discussed the planning and construction of Washington University's fitness, recreation and athletic facility in St. Louis built by BSI. Historic renovations and a major addition to the existing athletic facilities were included. Hudwalker reviewed the contract, bidding strategy, logistics planning and construction for the project.



Libre shares online teaching techniques with ASCE leaders



Dr. Nicolas Libre, assistant teaching professor of structural engineering at Missouri S&T, was invited to be a panelist in the first of a series of seminars and panel discussions sponsored by the American Society of Civil Engineers (ASCE) in April. Libre talked about the use of educational technology in effective online teaching — important information as classes moved online due to

COVID-19 and social distancing. The goal, he said, was to share some practical teaching techniques that could be adopted by engineering educators and to inspire innovative teaching in a virtual environment.

Zhang delivers keynote at GEO-Omaha conference

Dr. Xiong Zhang, associate professor, delivered a keynote speech at GEO-Omaha 2020, the 37th Annual Geotechnical Conference in Omaha, Neb., in February. Zhang's presentation was titled "Use of Wicking Fabric to Dehydrate Road Embankment under Unsaturated Conditions."



Dr. Islam El-adaway,
Thomas Fitch Rowland Prize
recipient for 2020



El-adaway's work honored by American Society of Civil Engineers

The American Society of Civil Engineers (ASCE) recognized **Dr. Islam El-adaway**, the Hurst/McCarthy Professor at Missouri S&T, and his team with the 2020 Thomas Fitch Rowland Prize for significant contributions to construction engineering.

El-adaway won the prize for the paper "First Attempt Toward a Holistic Understanding of the Interdependent Rippled Impacts Associated with Out-of-Sequence Work in Construction Projects: System Dynamics Modeling Approach." The paper was published in the September 2018 issue of *Journal of Construction Engineering and Management*.

"According to our research, there are 25 parameters that can cause out-of-sequence work, resulting in productivity losses, cost and schedule overruns, and quality decline, either directly or indirectly," says El-adaway. "This paper models many of the interrelated parameters for the first time, and our end goal is to model all 25."

One such parameter could be a change order, El-adaway says. Or perhaps construction has been completed, but the quality is subpar and the builders need to bring on

a different work crew or use different materials, he says. The model developed by El-adaway and his team enables users to examine projects both retrospectively and prospectively. For instance, they can review a completed project and determine what went wrong and when. Or they could use the model to predict what could happen if one or more parameters on a current or future project goes out of sequence.

El-adaway collaborated on the paper with lead author Dr. Ibrahim Abotaleb, an assistant professor of construction engineering at the American University in Cairo. Abotaleb is El-adaway's former student and performed post-doctoral research at Missouri S&T. El-adaway received the award on March 8, 2020, during the Construction Research Congress in Tempe, Ariz. The prize recognizes papers in which the authors describe accomplished works of construction or make valuable contributions to construction management and construction engineering.

El-adaway's research group earlier received the 2017 ASCE award for best peer-reviewed paper from the *Journal of Management in Engineering*.

Oerther recognized for lifetime achievement

Dr. Daniel Oerther, professor of environmental health engineering, has received the Albert Nelson Marquis Lifetime Achievement Award from Marquis Who's Who.



Oerther joined Missouri S&T's faculty in 2010 as the John A. and Susan Mathes Endowed Chair of Civil Engineering. In addition to his primary roles,

Oerther served as director of the environmental research center, faculty senator, secretary of the graduate faculty and chair of the Committee on Effective Teaching.

Throughout his career, Oerther has led efforts using engineering to bridge cultures. He is a three-time recipient of the Fulbright Scholar award from the United States Department of State conducting research and teaching in India, Brazil, and the United Kingdom. In addition, he is a two-time recipient of University of Missouri System awards, including the President's Award for Cross-cultural Engagement as well as the C. Brice Ratchford Memorial Fellowship for advancing the land-grant mission through extension, international education, and agricultural economics programs.

Oerther is a fellow of the Society of Environmental Engineers, the Society of Operations Engineers, the Chartered Institute for Environmental Health, and the Royal Society for Public Health. He is also a lifetime honorary fellow of the American Academy of Nursing, and the Academy of Nursing Education of the National League for Nursing.

CAREE Department celebrates Class of 2020 online



The coronavirus altered this year's festivities, but the civil, architectural and environmental engineering students, staff and faculty team showed their Miner spirit and persevered. The department awarded more than 100 engineering degrees on Saturday, May 16.

Katie Bartels, EnvE'17, who earned a master's degree, served as a speaker during the university's virtual commencement ceremony on May 16.

"We are confident these newly minted Miner alumni will contribute to a legacy of excellence that dates back to the first graduation from the Missouri School of Mines, when two of the three graduates were civil engineers," says **Dr. Joel Burken**, chair of civil, architectural and environmental engineering.

More than 65 students, staff and faculty in the department joined online via Zoom May 15 to celebrate what would have been a traditional senior luncheon and awards ceremony. During the ceremony, **Cole Distler**, **Ashley Fillback**, **Abby Menkhuis**, **Rahel Pommerenke**, **Jonathan Galvez** and **Marina Mueller** received Senior Achievement Awards. Pommerenke and **Scott Grier** received Stueck Outstanding Senior Awards.

Watch the 2020 graduation celebration video: youtu.be/7Ejj3LhC30g



Katie Bartels



Scott Grier



Rahel Pommerenke

The Masonry Society honors Jemison



Sarah Jemison

Sarah Jemison, ArchE'18, CE'18, MS CE'18, was awarded the 2019 Outstanding Master's Thesis Award from The Masonry Society (TMS) for her work "Compressive Behavior of Masonry Columns Confined with Steel Reinforced Grout (SRG) Composite" under the direction of **Dr. Lesley Sneed**.

While at S&T, Jemison was a Greenberg Scholar, a mechanics of material lab assistant, and she was also involved with the Steel Bridge Design Team and Chi Epsilon. Since graduation, she has been working at KPFF Consulting Engineers in St. Louis as a structural engineer.

Ph.D. student awarded International Concrete Repair Institute Scholarship

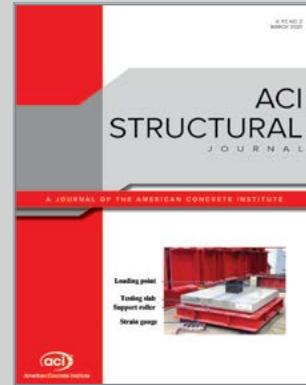


Zou and his advisor, associate professor Dr. Lesley Sneed

Xingxing Zou, pictured right, a Ph.D. student in civil engineering, was awarded the Great Plains Chapter of the International Concrete Repair Institute Scholarship in the amount of \$1,500 for the 2019-20 school year.

Zou's doctoral research focuses on the subject of strengthening and repairing concrete structures using advanced composite materials. He is also exploring the use of a novel nondestructive testing technique, called active microwave thermography (AMT), to detect the initiation and propagation of composite debonding.

Work highlighted on the cover of premiere concrete journal



Research and work led by **Dr. John Myers**, professor of structural engineering and deputy director of the Missouri Center for Transportation Innovation, was highlighted on the cover of the March 2020 issue of the *ACI Structural Journal*.

In the article, "Effectiveness of Using Carbon Fiber Grid Systems in Reinforced Two-Way Concrete Slab System," Myers and his former Ph.D. students — **Zena Aljazeera** and **Hayder Alghazali** — write about their work on a state-of-the-art process of using carbon fiber grids as an internal reinforcement with self-consolidating concrete in two-way slab systems.

"The *ACI Structural Journal* is considered the premiere journal in the U.S. to publish structural concrete research. Our research team was excited to see a Missouri S&T project highlighted on the cover," Myers notes.

To view the cover and read about Myer's research, visit concrete.org/publications/acistructuraljournal.aspx.



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Khayat receives Robert E. Philleo Award from ACI Foundation



Dr. Kamal Khayat holds a photo of Dr. Randall Poston giving a thumbs-up and showing a note that reads, "Congratulations, Kamal!" The actual award ceremony was postponed due to COVID-19.

The Concrete Research Council of the American Concrete Institute (ACI) Foundation recognized **Dr. Kamal Khayat**, the Vernon & Maralee Jones Professor of Civil Engineering and director of the Center for Infrastructure Engineering Studies, with the 2020 Robert E. Philleo Award. The award acknowledges Khayat's body of research, teaching, innovation and leadership related to high-performance concrete, and specifically his pursuit of knowledge transfer regarding the science, performance, design and testing standards of self-consolidating concrete (SCC).

"Kamal has been a true pioneer in the field of concrete rheology as it relates to SCC," says Dr. Randall W. Poston, immediate past president of ACI. "One would be hard-pressed not to find the effects of his prolific career on the utilization, design, quality

control and testing of one of the most common forms of concrete in use in the world today."

The Robert E. Philleo Award is given in recognition of individuals or organizations for outstanding research in the concrete materials field, or for outstanding contributions to the advancement of concrete technology. Philleo was an ACI past president and honorary member. He also chaired the Concrete Materials Research Council, now known as the Concrete Research Council.

Dr. John Myers, an ACI Fellow and deputy director of the Missouri Center for Transportation Innovation, notes the award is considered to be among the highest research honors ACI bestows for career contributions to materials research.

"Dr. Khayat's research contributions continue to advance the next generation of concrete materials from the laboratory to the field," Myers says. "He is the first at Missouri S&T to receive this award, and he has significantly elevated S&T's stature in our field not only across the United States, but around the world."

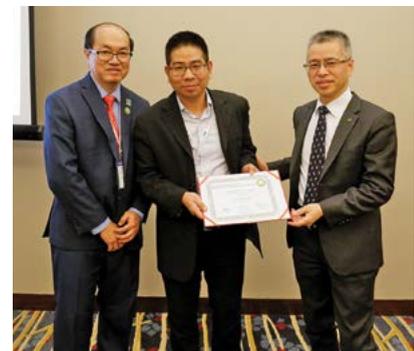
Khayat joined the Missouri S&T faculty in August 2011. He was previously a professor of civil engineering at the Université de Sherbrooke in Quebec, Canada, and served as the director of the Center of Excellence on Concrete Infrastructure Engineering and head of the Integrated Research Laboratory in Valorization of Innovating and Durable Materials and Structures.

Over the span of his career, Khayat has authored or co-authored more than 450 publications. He has collaborated with scholars from several countries, including Canada, China, France, Iceland, Japan, the United Kingdom and the U.S.



EWB Talent Show

High-energy songs, dancing and comedy were among the lineup at a benefit performance held in January to support Missouri S&T's Engineers Without Borders (EWB). Faculty members, including **Dr. Mark Fitch**, attempted to play, "Are you smarter than a 5th grader?" Many friends across campus revealed their hidden talents.



Hu appointed associate editor

Dr. Xianbiao Hu, assistant professor of transportation engineering at Missouri S&T, received the 2019 Outstanding Reviewer Award at the editorial board meeting of the *International Journal of Transportation Science & Technology* on Jan. 14, 2020. He was also appointed associate editor of the journal during the meeting. The journal recently received an impact factor of 3.87. **Website:** journals.elsevier.com/international-journal-of-transportation-science-and-technology.



Missouri S&T to launch Global Engineering Program in fall 2020

Future engineers who aspire to work globally can prepare for their careers through Missouri S&T's new Global Engineering Program. Engineering students will enroll in the program starting in the fall 2020 semester.

S&T's Global Engineering Program (GEP) will allow students to earn two degrees simultaneously in five years as they increase their intercultural competence and proficiency in another language. Upon completion of the program, GEP graduates will hold a bachelor of science (B.S.) degree in an engineering discipline and a bachelor of arts (B.A.) degree in multidisciplinary studies with an emphasis in language and culture.

"A degree from Missouri S&T is widely recognized to be highly valuable; in fact, it is one of the highest value programs in the nation," says **Dr. Richard Wlezien**, vice provost and dean of Missouri S&T's College of Engineering and Computing. "Giving our engineering students the opportunity to earn dual degrees provides them an even greater edge — they will be transformed into citizens of the world with the unique ability to work on global teams.

"As we build this program, we're looking to marry student interests and skills to internships abroad," Wlezien says.

According to a 2019 report by the American Council on the Teaching of Foreign Languages, nine out of 10 employers rely on employees with language skills other than English, and 56% of employers say their demand for employees with foreign language skills will increase in the next five years. The report urges educators to recognize foreign language

as a complementary skill for careers in science, technology, engineering and mathematics (STEM) to produce the globally competent workforce employers seek.

S&T's GEP program begins in the fall with French and Spanish language options. Future plans include adding options for German and Russian.

In the first three years, students will lay the groundwork for their degrees in engineering and multidisciplinary studies. Study abroad options are available during the fourth year, when students will study language in the fall semester and complete an engineering internship in the spring. During the fifth year, students will complete their degree requirements at Missouri S&T.

"When our engineering graduates understand the importance of history, philosophy, social sciences and liberal arts, while increasing their language abilities, they will make critical contributions to critical global challenges that now often come with their careers," says **Dr. Mohammad Dehghani**, Missouri S&T chancellor. "S&T is taking the first step to prepare them with our new Global Engineering Program."

Students can find out more about the program online, as well as provide input at globalengineering.mst.edu or contact **Dr. Lesley Sneed**, associate professor of civil, architectural and environmental engineering at globalengineering@mst.edu.



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