

MISSOURI
S&T
MAGAZINE

SUMMER 2019 VOL. 93 NO. 2

THE BATTLE FOR THE BRAIN

S&T, ARMY TEAM UP TO FIGHT TBI

THE BATTLE FOR THE BRAIN

SUMMER 2019 VOL. 93 NO. 2

ALUMNI **OF** INFLUENCE

NOMINATE A MINER FOR 2021

Missouri S&T is seeking nominations for our 2021 Alumni of Influence, the highest alumni honor the university bestows.

Since the tradition began in 2011, we've honored 38 distinguished graduates for their achievements, service and legacy. Now we're preparing to recognize a new group of honorees during the university's 150th anniversary celebration.

Nominate a Miner online at influence.mst.edu/nominate or forward nominations to **Darlene Ramsay**, MetE'84, executive vice president of the Miner Alumni Association, at ramsayd@mst.edu.

2011 HONOREES

Thomas Akers, Math'73,
MS Math'75

Dick Arnoldy, CE'69,
MS EMgt'73

Keith Bailey, ME'64

Robert Bay, CE'49

***Jerry Bayless**, CE'59, MS CE'62

Jon Bereisa, EE'67, MS EE'70

Jim Bertelsmeyer, ChE'66

Philip Chen, MS ME'65

Delbert Day, CerE'58

Farouk El-Baz,
MS GGph'61, PhD GGph'64

John Fairbanks, EE'71

Gary Forsee, CE'72

Gary Havener, Math'62

Thomas Holmes, MinE'50

***Vernon Jones**, CE'53

Fred Kummer, CE'55

John Mathes, CE'67, MS CE'68

***George Mueller**, EE'39

Zebulun Nash, ChE'72

Mariana Rodriguez, CE'80

Richard Stegemeier, PetE'50

Steve Sullivan, EE'89

Cindy Tang, Econ'85

***John Toomey**, ME'49, MS ME'51

***Ed Tuck**, EE'53

Ted Weise, EE'67

Gary White, CE'85, MS CE'87

Joan Woodard, Math'73

2016 HONOREES

Joe Ballard, MS EMgt'72

Robert Brackbill, MinE'42

Robert Brinkmann, CE'71

Matt Coco, CE'66

Roger Dorf, ME'65

Bipin Doshi, ChE'62, MS ChE'63

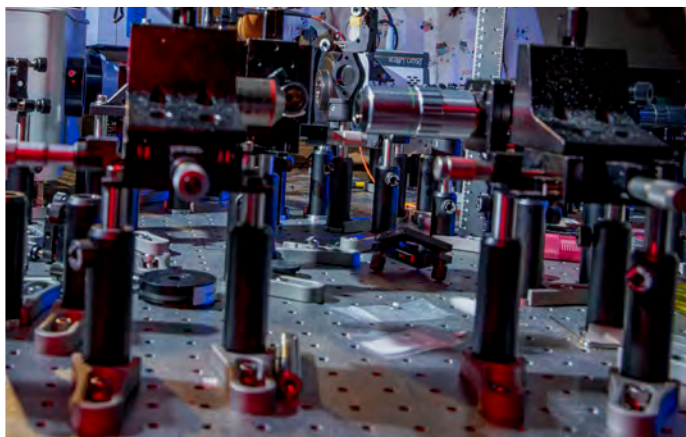
Don Gunther, CE'60

Sandra Magnus,
Phys'86, MS EE'90

***Dick Vitek**, MS Chem'58

Roy Wilkens, EE'66

**deceased*



AROUND THE PUCK

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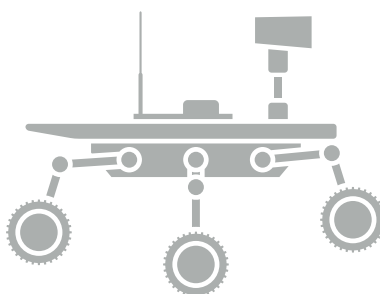
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Missouri S&T's rank among the nation's Top 25 Brainiest Colleges according to Lumosity, a brain training company. S&T ranked ahead of Stanford University in the list.

5

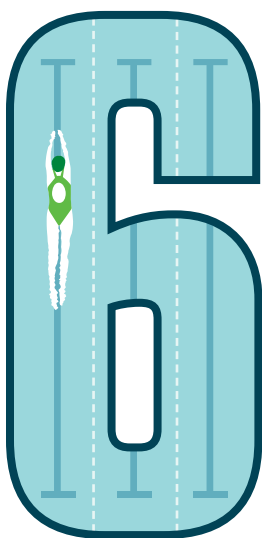
S&T Mars Rover Design Team's finish in the 2019 University Rover Challenge in Hanksville, Utah, with its rover *Valkyrie*. This is the team's third consecutive top-five finish.



15

Number of head men's basketball coaches in the history of the Miners program. See page 38 for a story on No. 15.

MISSOURI S&T BY THE NUMBERS



Miner swimming team's rank in the NCAA Division II Swimming and Diving Championships — S&T's highest national finish in a decade. **Tim Samuelsen** took second-place in the 1,650 freestyle, and the 400-yard freestyle relay team finished fifth.

16,600

Square footage of the newly expanded S&T fitness center, which was dedicated in April and opened its doors in May.

\$652,032

Funds raised for Finish Line Scholarships during S&T's first-ever Giving Day, 24 hours of non-stop philanthropy, on April 24. Finish Line Scholarships help students on the home stretch to graduation.

MISSOURI S&T MAGAZINE

Missouri S&T Magazine is written, edited and designed by the staff of the Missouri S&T Marketing and Communications Department and the Miner Alumni Association.

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Q&A

TOUGHEST CLASS ... EVER

*Some of your classes may have been a breeze, but others kept you up at all hours studying, and some of you struggled just to pass. As part of his research for the S&T 150th anniversary history book, **Larry Gragg**, Curators' Distinguished Teaching Professor emeritus of history and political science, asked you to share memories of your toughest class. Here are a few of your answers.*

"My toughest class was organic chemistry.

I had to take it three times just to scrape by with a passing grade. I could not wrap my mind around it at all. The worst part about it is my professor (when I finally passed it) was absolutely wonderful and did everything she could to help me. And I still barely passed!! The course solidified that I should stick to the biology/life science portion of biological sciences!"

Jen (Qualls) Eisenbath, BSci'10
Kuala Belait, Brunei

"My toughest class?"

Without question it was sophomore physics.

It was taught by Dr. **(Harold) Fuller**, chair of the department."

Russ Wege, PetE'57
Schenectady, N.Y.

"A Bomb."

Chuck Toedtman, ME'65
St. Louis

*Editor's note: Thank you to **Walt Eversman**, Curators' Distinguished Professor emeritus of mechanical and aerospace engineering, for explaining "A Bomb" was an affectionate name for the course Modern Physics, which satisfied the basic science elective and covered, among other topics, atomic physics.*

"My toughest class was EE 251, Principles of Semiconductor Devices.

Calculating movement of electrons and holes across semiconductor boundaries often kept me up late during that semester. If really stuck, we were able to go to the prof's office (**Thomas VanDoren**, EE'62, MS EE'63, PhD EE'69) and view the answer guide. The textbook could be used for the next course in the sequence. I did not continue with semiconductors, but focused on communication courses."

Dave Thatcher, EE'75, MS EE'76
Riverside, Mo.

"I started at UMR in mechanical engineering.

My toughest class was Thermodynamics.

After three tries, I changed to engineering management."

Craig Korkoian, EMgt'75
Estero, Fla.

"That's easy. It was 1964, I think. **The class was differential equations, lovingly referred to as 'Diffy Q.'** We started out with the usual class size of about 30 in old Harris Hall. By the end of the semester, it had been whittled down to 10. There was one A, one B, and eight Cs. I was never so glad to have one of those Cs!"

Hardy J. Pottinger III, EE'66, MS EE'68, PhD EE'73
Mission, Texas

"Unquestionably, it was EE 275, Engineering Electromagnetics.

It took me two tries before success. Very abstract and spatial."

Robert J. Webb, EE'70
Houston

"Servomechanisms, without question.

They scheduled it in the same semester as Differential Equations. Only problem was Servo was consistently about half a month ahead in terms of what Diffy Q was teaching and what they were using."

Keith Bailey, ME'64
Tulsa

TO THE EDITOR

HOLY COW!

Just received the latest *Missouri S&T Magazine* and read it cover to cover. Great job representing the College of Arts, Sciences, and Business (CASB) by students, faculty, staff and the Dean's Leadership Council. April has been a big promotional month for CASB with the 'Thank You' video and now the magazine. Now ... to figure out how to leverage all this press and continue to target other opportunities to help students and CASB.

Big Kudos to **Ted Kelly**, Dr. **Paul Stricker**, **Cori Nelson**, **Steve Frey**, **Carl Schmitz**, **Pam Leitterman**, Dr. **(Stephen) Roberts** and Dr. **(Kate) Drowne** on article input in *Missouri S&T Magazine*.

Michael Haynes, Chem'78
Florissant, Mo.

My mother, **Ellen Woodman Doll**, graduated in 1933 from MSM with a degree in general science with a biology major, and she completed all the coursework from Mizzou to earn teaching credentials. She was one of three coeds that year, and I believe that they all ended up in STEM-type teaching positions. It was during the depression, and she took the only teaching position available. She taught only for a limited time in a rural one-room school in Wishon, which was apparently 11 miles from Rolla. In the 1950s, she decided to go back into teaching now that we children were getting older and extra money for college would be nice. When she went to the Charleston, W. Va., Board of Education to apply for a teaching position, they couldn't believe that she was a walking STEM teacher long before STEM became popular. It turns out she had the credits from her MSM education to be able to teach advanced math, chemistry, physics and biology. She taught algebra for a number of years before getting a master's degree in guidance counseling.

Wick Doll, ChE'65
Spartanburg, S.C.

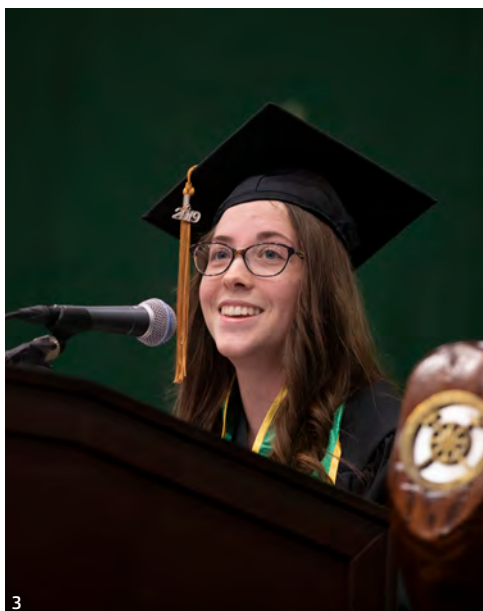
COMMENCEMENT

Bipin N. Doshi, ChE'62, MS ChE'63, retired chairman, president and CEO of Schafer Industries in South Bend, Ind., talked to S&T graduates in May about all the ways Missouri S&T has prepared its graduates for success.

"I firmly believe that today you have more chances to make a mark on the world, get greater satisfaction in doing so and receive bigger rewards than ever before," Doshi told the graduates at S&T's three commencement ceremonies. "No matter what your chosen area of study was, many rewarding careers are waiting for you. Missouri S&T has prepared you for that."

Doshi was awarded the doctor of engineering, honoris causa during the ceremonies.





S&T GRADS RECEIVE GRAINGER POWER ENGINEERING AWARDS

Ten recent graduates each received a \$6,000 Grainger Power Engineering Award from the electrical and computer engineering department at Missouri S&T. The awards are presented as a reward for academic excellence.

The Power Engineering Awards are funded by a \$1.3 million endowment from The Grainger Foundation of Chicago. S&T is recognized by Grainger for its ability to attract top students and educate quality engineers and is one of only six universities in the nation to receive such funding.

Recipients are:

- Kyle Anders, EE'19
- Michaela Dickerson, EE'19
- Matthew Goebel, EE'19
- Gideon Hallman, EE'19
- Nicholas Hausladen, EE'18
- Kevin McPherson, EE'19
- Jordan Nowack, EE'19
- Jared Raffel, EE'19
- Gabe Sheffield, EE'19
- Lane Sprunger, EE'19.

HONORING PROFESSIONAL ACHIEVEMENT

Also during the Saturday afternoon commencement ceremony, three Miner alumni were presented with the Award of Professional Distinction. The award recognizes outstanding S&T graduates for their professional achievements.

Recipients were:

- Kenneth D. Gielow, MetE'70, MS MetE'71, president of Imrie-Gielow Inc.
- Al Kaplan, CE'72, owner of Energy Projects Consulting
- Charles W. Lyon, ChE'84, MS EMgt'91, business director for the Americas and Asia Pacific at INEOS.

STUDENT SPEAKERS

Four graduating students were selected to speak during commencement in May:

1. **Nicole Aldridge**, CSci'19, CpE'19, spoke during the Friday evening ceremony. "It's a bittersweet moment, standing on this stage today, because I really don't know how long it will be before I'm back," said Aldridge. "But I think that's okay, because today, I am only leaving the location, not the people. The friendships that I have made here will never leave my heart."
2. **Levi Noring**, CE'13, ArchE'13, MBA'19, also spoke Friday evening. "My undergraduate studies at S&T, in conjunction with campus involvement and internships, were undeniably a springboard for my career at Black & Veatch," said Noring. "A distance education from S&T allowed me to continue my education through the demands of a career."
3. **Morgan Fender**, ChE'19, spoke during the Saturday morning ceremony. "As we go into our careers, the things that will propel us forward are the moments at S&T that aren't from books or computers; they're the friendships, leadership opportunities, campus organizations, and 2 a.m. doughnut runs," said Fender. "They are the challenges we have faced and overcome."
4. **Moirra Joyce**, EMgt'19, spoke during the Saturday afternoon ceremony. "I want to share the excitement and knowledge that S&T has imparted to me with others, whether co-workers, future students, or friends," said Joyce. "My time at S&T will live on in my memory forever, and I thank you all for giving me the opportunity to learn so much."

TRAVIS GITTEMEIER: THE MAN INSIDE THE MASCOT

He isn't the most talkative person you'll ever meet. But when you spend many of your college days and nights suited up as a mute mascot, chattiness isn't required.

A quiet demeanor and good time management skills have paid dividends for **Travis Gittemeier**, ME'19, during his three years at Missouri S&T, where he spent a lot of time inside the Joe Miner mascot costume.

"I read a book about mascots, and it said that some of the best people who take on mascot roles are introverts," says Gittemeier, a native of Moberly, Mo. And based on his real-life experiences at two schools, Gittemeier can confirm that the book's title — *Yes, It's Hot in Here*, by ESPN's A.J. Mass — is accurate.

Upon arriving on campus in 2016, Gittemeier and mechanical engineering academic advisor **Erica Long**, CE'03, former coach of the Miners cheerleading squad, approached athletic director **Mark Mullin** about handing over the Joe Miner uniform to Gittemeier. A transfer from his hometown Moberly Area Community College in northern Missouri, Gittemeier came with prior experience on his side, having served as MACC's two-legged greyhound mascot, Majic, during the previous two years.

Suiting up as Joe Miner helped boost Gittemeier's confidence. "It's made me more outgoing," he says. But it wasn't always that way. "Even though I'm in a suit, at first it was a challenge to go out in front of people and act crazy."

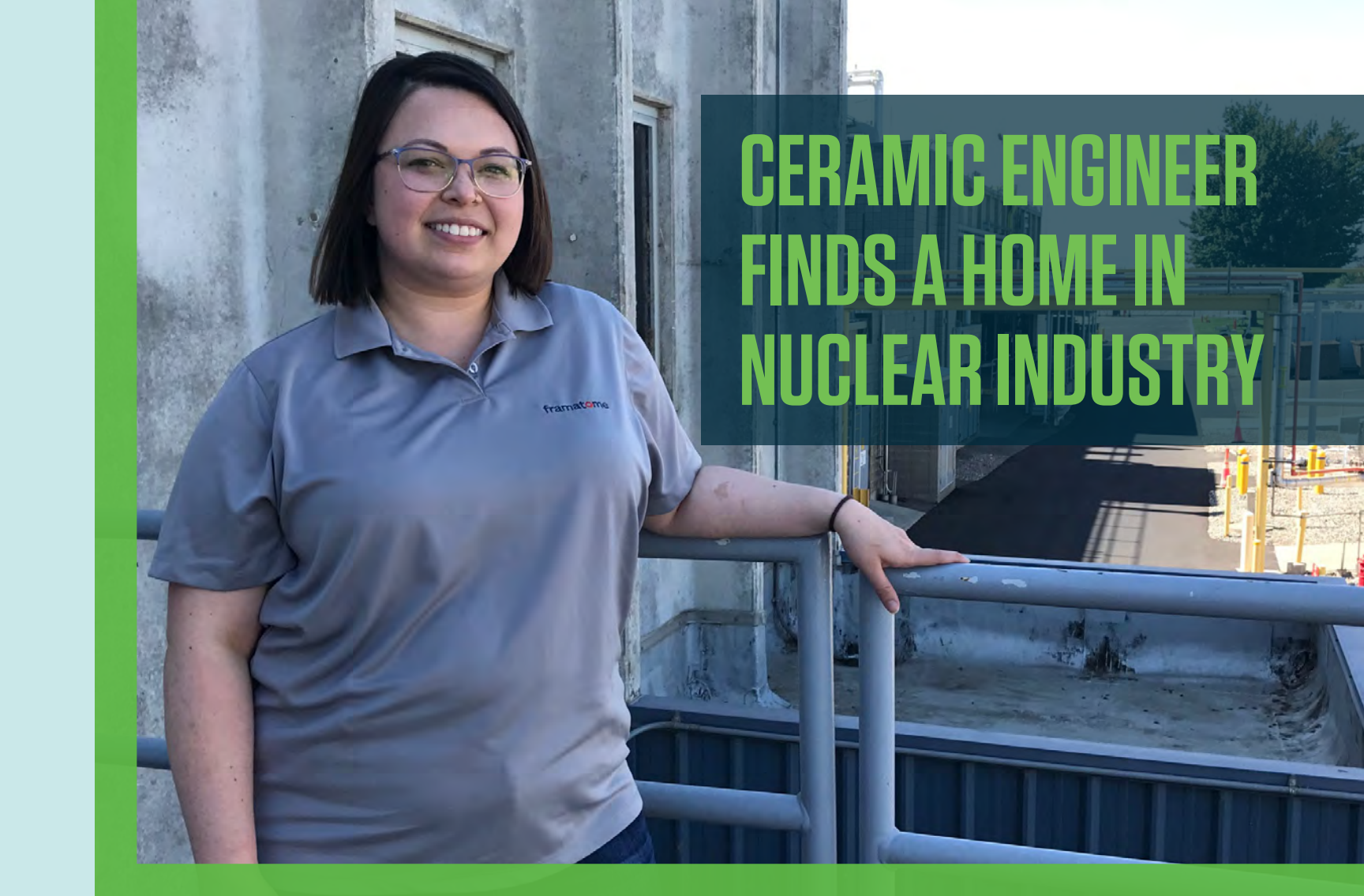
But he managed, and he enjoyed himself in the process — high-fiving fans and leading cheers at sporting events, posing for selfies at student



recruitment and alumni events on campus, and showing up for various university and community occasions. In February, he joined his fellow University of Missouri System campus mascots at the systemwide Legislative Showcase in the State Capitol, where Joe Miner hobnobbed with state lawmakers and their aides.

Along with a greater sense of confidence, Gittemeier's mascot experience helped him better manage his time. "That can be pretty difficult," he says. "There was always something to do, and it was always a lot of fun, but school has to come first."

When he wasn't studying or mascoting, Gittemeier kept active in his fraternity, Sigma Chi, and participated in the Trap and Skeet, Climbing, and Paintball clubs. After graduation in May, Gittemeier joined Midwest Mechanical Contractors in Kansas City, Mo., as a project engineer. Even as an alumnus, he doesn't rule out returning to the sidelines as Joe Miner if an opportunity presents itself. Of course, no one will know if it's really him inside the costume.



CERAMIC ENGINEER FINDS A HOME IN NUCLEAR INDUSTRY

When **Destinee Rea**, CerE'15, began looking at colleges, she knew she wanted to pursue a career in the STEM field. The problem? She had no idea which one.

After considering chemical engineering and later chemistry, Rea landed on ceramic engineering. She knew she wanted to work in manufacturing after an internship in the glaze preparation department at porcelain floor tile manufacturer Dal-Tile.

"In manufacturing, the process of whatever you are manufacturing is essentially the same every day, but there is always a new challenge," she says.

Rea says her professors always stressed that the most important thing students could learn while they were at S&T was how to solve problems.

"This has been so true throughout these first few years of my career," she says.

Rea now works as a process engineer in nuclear fuel manufacturing for nuclear energy company Framatome. The company designs, builds, advances and maintains the world's current fleet of nuclear power plants.

"I certainly never expected to be working in the nuclear industry with my ceramic engineering degree, but uranium dioxide nuclear fuel pellets are ceramic material," she says.

The fuel produced at Framatome accounts for around 5% of the total electricity generated in the United States, according to Rea.

"To me, the most rewarding part of working in manufacturing is that what I do every day contributes to something tangible," she says. "I can just go out on the manufacturing floor and see the fuel pellets that we are making and know that we are contributing to carbon-free electricity."

Rea has also been in the manufacturing side of Framatome's contribution to the Department of Energy's Enhanced Accident Tolerant Fuel program. The company has been developing chromia-enhanced uranium dioxide (UO₂) fuel for the program.

Rea encourages S&T students to remember that their path won't always be linear.

"It's easy to have certain expectations coming in to college as a freshman, but who really has life figured out at 18? Or 19? Or 20?" she says. "Finding a support system

"...the most rewarding part of working in manufacturing is that what I do every day contributes to something tangible."

in the ceramic engineering department was key, really. My professors cared about whether I succeeded or not, and there was always a group of students that I could study with in the McNutt commons area."



TAMAR MAKHARASHVILI:

EXCEEDING EXPECTATIONS

As a child, **Tamar Makharashvili** was curious about computers. She wanted to understand their parts and how they worked. But her interest in technology wasn't encouraged at home or in school in her home country of Georgia.

As a speaker at Missouri S&T's third TEDx event this past spring, Makharashvili, MS EE'15, PhD EE'19, talked about what it was like growing up in Georgia as a young woman interested in science, technology, engineering and math (STEM).

"When you are told that there is a difference in how men and women think and how differently their brains are wired, you just accept it," says Makharashvili. "Girls are convinced they cannot succeed in technical fields."

That discouragement didn't deter her from earning her bachelor's degree in electrical

engineering at Tbilisi State University in Georgia's capital city of Tbilisi. In 2014, her electrical engineering study led her to Missouri and the Electromagnetic Compatibility (EMC) Laboratory at S&T.

"The Electromagnetic Compatibility Lab is famous in my field," says Makharashvili. "I contacted my S&T professors, talked about research and ended up in Rolla after earning my bachelor's."

In the last five years, she's adapted and excelled at S&T. One of her dissertation topics focuses on reducing emissions in vehicles by

evaluating the behavior of electrical components in the design stage to potentially mitigate radiated emission issues for the system.

"My research in the EMC Lab helped me to improve my critical thinking skills, to develop an idea, to investigate and to analyze," says Makharashvili. "Internship programs at Missouri S&T made it possible for me to practice my skills on practical work in industry."

She's accepted an offer in California to work at Google as a design engineer. She will work on printed circuit boards to evaluate their performance, make modifications and improve the product.

She says that S&T gave her the essential tools and skills to build a strong foundation for her engineering career.

"I had a great opportunity to work with and learn from amazing, smart engineers and professors during my studies at school," says Makharashvili. "I am excited and prepared for my next step in my career after graduation."

To watch videos of the TEDxMissouriS&T event, visit tedxmst.com.



Former Student Council President **Madison Moore**, ArchE'19, cuts the ribbon to open the expanded fitness center with the aid of **Joe Miner** and **Kaeden Kessinger**, current Student Council President.

S&T CELEBRATES FITNESS CENTER EXPANSION

Just in time to work off pre-finals stress, Missouri S&T's newly renovated fitness center opened in May. The \$4 million expansion more than doubled the facility's footprint — from 6,400 square feet to 16,600 square feet — which allowed the number of fitness machines to also more than double.

S&T Student Council leaders and the athletics department hosted a dedication and ribbon-cutting on April 25.

Former S&T Student Council president **Madison Moore**, ArchE'19, started working on the project with her council peers when she was a sophomore at S&T.

"This has been one of the best projects that I've gotten to be a part of at S&T," Moore says. "Getting to see this finished project, it really solidifies the value that Student Council is able to add to campus. We get to positively impact our peers."

In spring 2016, S&T students told Student Council leaders that their No. 1 priority on campus was updating the fitness center. A survey showed 60% of students responding considered it the most important project needed on campus at the time.

PHYSICS GRAD RECEIVES NSF GRADUATE RESEARCH FELLOWSHIP

Cameron Lerch, Phys'19, was awarded a place in the National Science Foundation Graduate Research Fellowship Program.

He plans to pursue a Ph.D. in mechanical engineering and materials science (MEMS) at Yale University, where he will work with a professor of mechanical engineering and materials science, applied physics and physics. The MEMS program provides a flexible class schedule, and Lerch is excited to continue pursuing physics-based classes and research.

"The most important aspect of a graduate degree is the professor, or group of professors that advise your research," says Lerch. "I will be able to continue my love for physics while completing other courses relevant to my research."

Lerch studies bulk metallic glasses, which make up a group of materials similar to steels, ceramics and plastics. High yield strength and fracture toughness, in addition to formability, make bulk metallic glasses desirable for a variety of engineering and manufacturing purposes. Common uses for materials include golf club heads and surgical scalpel blades, but they are also used in a variety of consumer electronics.

Each year, the program receives more than 12,000 applications and awards about 2,000 fellowships. The fellowship provides three years of funding for students to conduct research at any accredited U.S. institution. NSF fellows are expected to become experts in their field with the ability to contribute to research, teaching and innovations in science and engineering.



'GLO-KART' HEADS TO NATIONAL COMPETITION

Powered by a six-cell lead-acid battery and stopped with a chemiluminescence reaction using luminol, *Glo-Kart*, one of two S&T entries in a regional 2019 Chem-E-Car competition, took second place and qualified for nationals.

The national competition will take place during the 2019 National American Institute of Chemical Engineers (AIChE) Student Conference in Orlando, Fla., in November. S&T's other entry, dubbed *Terry Cruise*, also drew power from a lead-acid battery, but it used a dye-changing RedOx reaction with bleach and black food coloring. *Terry Cruise* took third in the competition.

The cars competed as part of the AIChE regional competition, which S&T hosted in April.

For Chem-E-Car competitions, students must design and build vehicles that start and stop using only chemical reactions, not mechanical parts.

At the regional competition, all vehicles had to travel a randomly assigned distance between 15 and 30 meters. The random stopping point forced team members to adapt and perform calculations in a short period.

Teams had to calculate the average velocity of their vehicle and decide how much of the chemical solution would be needed to activate the battery power. The car closest to the finish line at the end of the race earned the greatest number of points.

A photograph of Chancellor Mohammad Dehghani, a man in a dark suit, standing on a stage and gesturing with his right hand while addressing an audience. The audience is seated in a large, tiered hall with red carpeting. The background is a large, illuminated wall with a yellow and green geometric pattern. The text "DEHGHANI NAMED CHANCELLOR OF MISSOURI S&T" is overlaid on the image in large, bold, yellow and white letters.

DEHGHANI NAMED CHANCELLOR OF MISSOURI S&T

Chancellor **Mohammad Dehghani** addresses Order of the Golden Shillelagh members during an event in June.

Nationally regarded engineer and academic leader **Mohammad Dehghani** began work as S&T's 22nd leader on Aug. 1. He succeeds **Christopher G. Maples**, who served as interim chancellor since May 2017.

Dehghani previously served as vice provost for research, innovation and entrepreneurship at Stevens Institute of Technology in Hoboken, N.J.

In announcing the appointment, University of Missouri System President **Mun Choi** noted that Dehghani is a mechanical engineer with a track record of building faculty research teams in collaboration with national laboratories and industry. Dehghani's appointment, which followed an extensive national search, was approved by the UM Board of Curators on May 15.

"Missouri S&T plays a vital role in the state, educating some of Missouri's brightest and most innovative students," said **Jon Sundvold**,

chair of the Board of Curators. "As a seasoned leader with experience in formulating multidisciplinary teams and getting results, Dr. Dehghani is the right leader to usher in S&T's next exciting chapter."

A 23-person search committee with representatives from S&T faculty, staff, students and alumni helped to guide the search process. **Francisca Oboh-Ikuenobe**, a professor of geology and biology, and trustee **Tom Voss**, EE'69, co-chaired the committee.

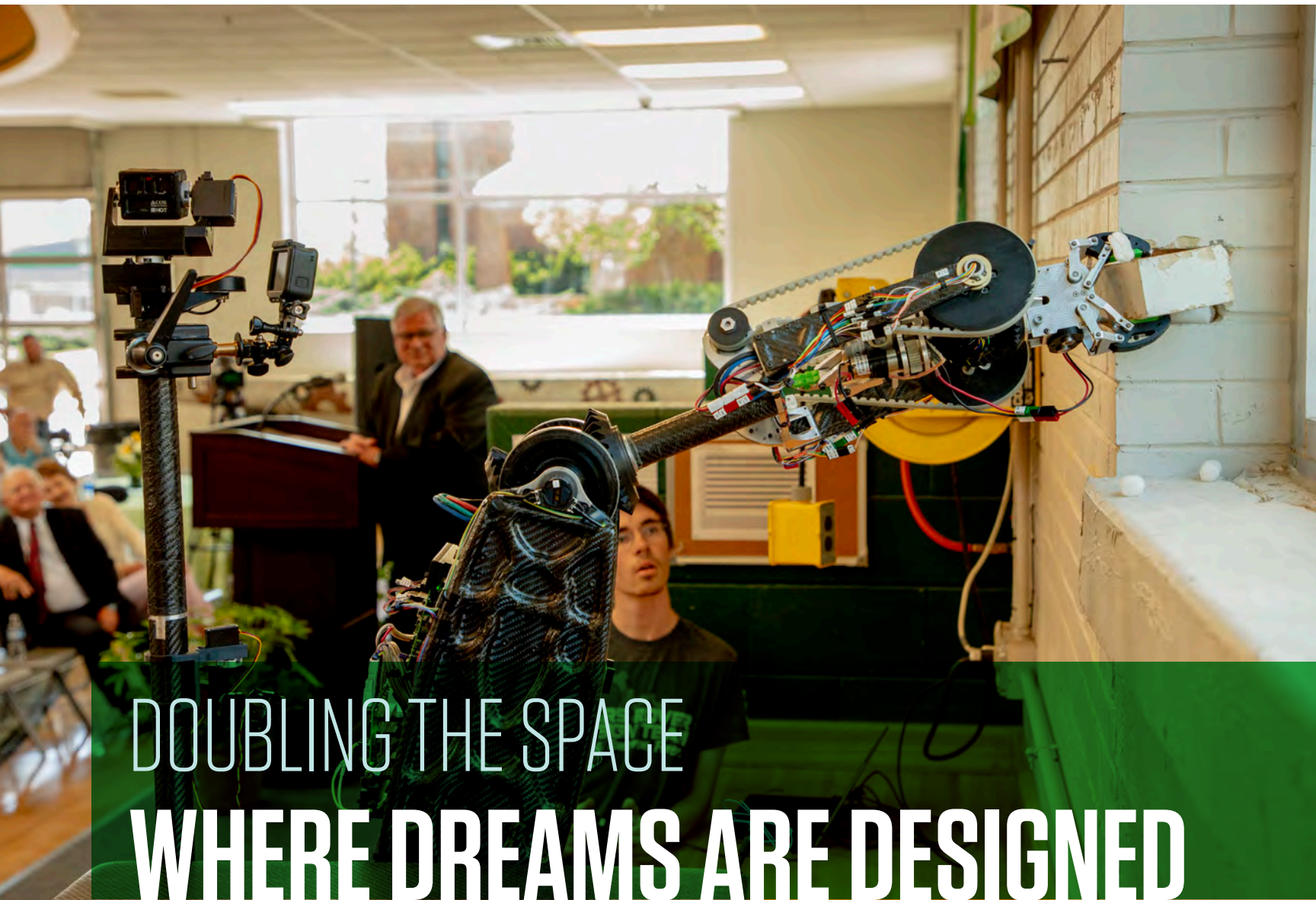
"I am very impressed with Dr. Dehghani's experience and background, both in the academic world and at one of our nation's top

research labs," Voss says. "He brings a wealth of research expertise to this position, as well as a strong passion for educational excellence. I believe that under his leadership, Missouri S&T will continue to thrive as one of the nation's leading STEM-focused research universities."

Dehghani earned bachelor's, master's and doctoral degrees in mechanical engineering from Louisiana State University. He completed a post-doctoral National Science Foundation internship at MIT.

For the past 22 years, Dehghani served in executive positions at nationally prominent universities and national labs. In addition to his role at Stevens, Dehghani was a professor of mechanical engineering and founding director of the Johns Hopkins University Systems Institute.

Prior to joining Hopkins, Dehghani was New Technologies Division leader at the Lawrence Livermore National Laboratory, where he helped develop technologies and expand many areas of engineering. He also spent a dozen years as a tenured faculty member of the mechanical engineering department at Ohio University in Athens.



DOUBLING THE SPACE WHERE DREAMS ARE DESIGNED

A Mars rover with a strong arm broke ground on an 8,000-square-foot expansion of the Kummer Student Design Center at Missouri S&T on April 26. The expansion will double the size of the design center, home of S&T's 20 student design teams.

"We've been working toward this day for a long time, and it's great to finally be here," said **Chris Ramsay**, MetE'83, MS MetE'85, assistant vice provost for student design and experiential learning. "In the eight years since we dedicated the Kummer Student Design Center, we've grown from 10 to 20 student design teams, and the number of students on these teams has tripled to more than 1,200."

The addition will expand the design center to the west of the current building and will include additional manufacturing and fabrication bays, a larger machine shop, upgrades to the welding, waterjet and composites labs, new labs for electronics and synthetic biology, and a remodeled innovation suite.

"S&T students are known for their creativity and resourcefulness, and these skills are magnified by the design team experience," said **Joan Nesbitt**, vice chancellor for university advancement. "There's nothing like applied problem solving to give students an edge in the real world. The hundreds of employers who visit our campus every year in search of talent are proof of that."

The honor of breaking ground — or rather launching demolition — went to a Mars rover designed and built by S&T students. The rover, known as *Valkyrie*, placed fifth among 36 international competitors in the 2019 University Rover Challenge at the Mars Desert Research Station in Hanksville, Utah.

WITH APPRECIATION

Missouri S&T gratefully recognizes the lead donors to the Kummer Student Design Center expansion and thanks them for their support.

- **Richard**, CE'69, MS EMgt'73, and **Nancy Arnoldy**
- **Keith**, ME'64, and **Patricia Bailey**
- The Boeing Co.
- Brinkmann Constructors
- **Michael**, ME'68, MS EMgt'73, and **Joyce Bytnar**
- **Gary**, Math'62, and **Judy Havener**
- **Frederick**, CE'55, and **June Kummer**
- **Roger**, CE'70, MS CE'73, PhD CE'77, and **Karen LaBoube**
- **Chris**, MetE'83, MS MetE'85, and **Darlene**, MetE'84, **Ramsay**
- The Estate of **John Schork**, MetE'47.

James and Joan Woodard: INSPIRING NEW GENERATIONS OF TEACHERS AND SCHOLARS

When **Joan Woodard**, Math'73, was in high school, there wasn't much exposure to engineering. But that changed when she got to Rolla. "I had many friends studying engineering," she says. "I knew that's what I ultimately wanted to do."

After graduation, Woodard joined Sandia National Laboratories. Nearly 40 years later, she retired as executive vice president and deputy director.

Now Woodard and her husband, **James Woodard Jr.**, have established a \$1 million faculty endowment in electrical and computer engineering. The Woodard Associate Professorship for Excellence will support a mid-career faculty member on the path to full professor by providing research funding and other resources.

"The professorship will support excellent faculty members who teach because they love students, do research because it keeps them at the frontier of their fields, and serve because they are leaders."



Photo by Jennifer Coombes

"I started at Sandia as a member of the technical staff," says Woodard, who went on to earn a master of science degree in engineering economic systems from Stanford University and a Ph.D. in mechanical engineering from the University of California-Berkeley. "The work was exciting and cutting edge."

Woodard's first project was in energy research, developing a solar thermal electric power generation system. During the assignment, she met a Ph.D. graduate of MIT, her future husband, James Woodard.

"We were working on a \$110 million federal investment in the 1970s, so there was a lot of pressure," says Woodard. "Using our research, the government built a plant to test advanced concepts in power generation."

Woodard is a member of the S&T Board of Trustees and the Academy of Computer Science. She was recognized among the university's Alumni of Influence in 2011. The Woodards have two sons who are both Miners, **Thomas**, EE'06, and **Mark**, PhD CpE'17.

In addition to consulting work, Woodard continues to mentor newly tenured faculty members through a Department of Defense program funded by the Defense Advanced Research Projects Agency.

"Most of the mentors in the program are retired generals, but a handful of us are from other parts of the national security community," says Woodard, who credits the DOD program with influencing the Woodard Professorship.

"The professorship will support excellent faculty members who teach because they love students, do research because it keeps them at the frontier of their fields, and serve because they are leaders," she says. "And hopefully the endowment will encourage all faculty on that path."



DEEP LEARNING TO ESCAPE

DEEP WATERS

Missouri S&T engineers are using a type of artificial intelligence that mimics how the human brain makes decisions to determine the best evacuation routes during a flood. Photo by Carolina Hidalgo, St. Louis Public Radio

Artificial intelligence (AI) may soon help transportation agencies and first responders determine the best evacuation routes during floods, thanks to the work of Missouri S&T researchers.

Suzanna Long, Hist'84, Phys'84, MS EMgt'04, PhD EMgt'07, and **Steve Corns**, both of Missouri S&T's engineering management and systems engineering department (EMSE), are using a form of AI known as "deep learning" to develop forecasting tools to integrate water level rate of change as part of evacuation route planning in flood-prone areas.

Deep learning is a type of machine learning that imitates the human brain's ability to process information and create patterns for use in decision making. Long and Corns will design their deep learning model to determine the best evacuation routes based on flood data, available roads for evacuation and traffic patterns.

Supported by funding from the Missouri Department of Transportation (MoDOT) and the Mid-America Transportation Center (MATC), a U.S. Department of Transportation initiative based at the University of Nebraska-Lincoln, Long and Corns are also using geospatial data from the U.S. Geological Survey, the National Weather Service and other public data sources to build their forecasting model.

For this research project, Long and Corns will use data from the Meramec and Missouri river basins to train a deep learning neural network to determine how deep and how quickly floodwaters will rise.

"We'll use river rise and current flood plain modeling efforts from partners as part of a deep learning model to develop algorithms to determine when and where traffic needs rerouted," says Long, chair and professor of EMSE. "We'll use the ground truth from the spring 2019 flooding to guide our solutions and as model inputs."

"This will be used to find relationships between the available data to increase the overall accuracy of the deep learning neural network," says Corns, an associate professor of EMSE.

"This rate of rise is used to model evacuation or detour planning modules that can be implemented to assure the safety of the community and highway personnel, as well as the safe and secure transport of goods along public roadways," Long adds.

The pair will also create a routing algorithm to guide evacuations based on an assessment of available roads and their conditions. Here, the AI will help determine which roads are accessible during flooding and which can accommodate the evacuation traffic.

"These modules can be linked to existing real-time rainfall gauges and weather forecasts for improved accuracy and usability," Long says. "The transportation safety or disaster planner can use these results to produce planning documents based on geospatial data and information to develop region-specific tools and methods."

Long and Corns received \$124,000 in funding from MoDOT and MATC for the 12-month project, which is in its early stages.

The project combines Corns' expertise in computational intelligence and complex systems with Long's focus on disaster recovery. In 2013, Long and Corns worked with the USGS and the University of Puerto Rico at Mayaguez to develop a model to help city planners return their communities to their pre-event state after a large-scale disaster. That project was inspired by the EF-5 tornado that ripped through the southwest Missouri city of Joplin in 2011.



AT THE FOREFRONT OF ASTROPHYSICS RESEARCH

Using two 4-kilometer-long laser interferometers located in Washington and Louisiana, scientists with the Laser Interferometer Gravitational-wave Observatory (LIGO) detected a weak 1.3 billion-year-old signal from the collision of two black holes. The discovery proved the existence of the gravitational waves Albert Einstein predicted in his general theory of relativity.

This past spring, Missouri S&T became the only Missouri university to join the worldwide LIGO Scientific Collaboration (LSC), a group of about 1,300 scientists from 18 countries and over 100 institutions dedicated to finding Einstein's predicted gravitational waves.

— **Marco Cavaglia**, professor of physics at S&T, co-chairs the LSC's Burst Sources Working Group.

"Space is the frontier of our exploration, and the LSC is at the forefront of astrophysics research," Cavaglia says. "It is one of the largest, most ambitious projects ever funded by the National Science Foundation (NSF)."

Cavaglia, who joined the S&T faculty in January, is an expert in gravitational physics and multimessenger astrophysics, a new research field that began in 2017 with the first observation of a merger between two neutron stars. Multimessenger physicists study data from gravitational waves, electromagnetic waves and high-energy particles like neutrinos and cosmic rays to make astronomical discoveries about the universe.

In April 2019, LIGO and Virgo, its European observatory partner located in Pisa, Italy, registered gravitational waves from what appears to be a crash between two neutron stars — the dense remnants of massive stars that previously exploded. The next day, they detected a different source that scientists believe resulted from the collision of a neutron star and a black hole — an event never before witnessed.

"This search is different from looking for signals like colliding black holes that can be modeled precisely using Einstein's theory of

general relativity," says Cavaglia, who leads a team of over 200 researchers from across the world who look for various gravitational-wave signals. "We're looking for signals of various duration, as well as gravitational waves that originated in stellar explosions or even cosmic strings. While gravitational waves from these sources have not been detected yet, their detection would provide invaluable information about the origin and dynamics of these cosmic events."

With a grant from the National Science Foundation, Cavaglia plans to continue his LSC work in the physics department at S&T. A newly formed astrophysics research group will have a lab that will include a remote-control room for the LIGO detectors. The group will advance the LSC's work with data analysis, detector characterization, and educational and public outreach.

"The hunt for the dark side of the universe is on," says Cavaglia.

GROUNDWATER MAPPING, MANAGED FLOODING MAY HELP STOP SINKING

Parts of California's Central Valley, the state's most productive farm region, sunk as much as 28 feet during the first half of the 20th century, and if modeling is accurate, the ground will sink another 13 feet or more over the next 20 years.

Ryan Smith, an assistant professor of geological engineering at S&T, working with colleagues at Stanford University, developed the model. It could help water managers map precisely where groundwater recharge is most needed to replenish aquifers in the area.

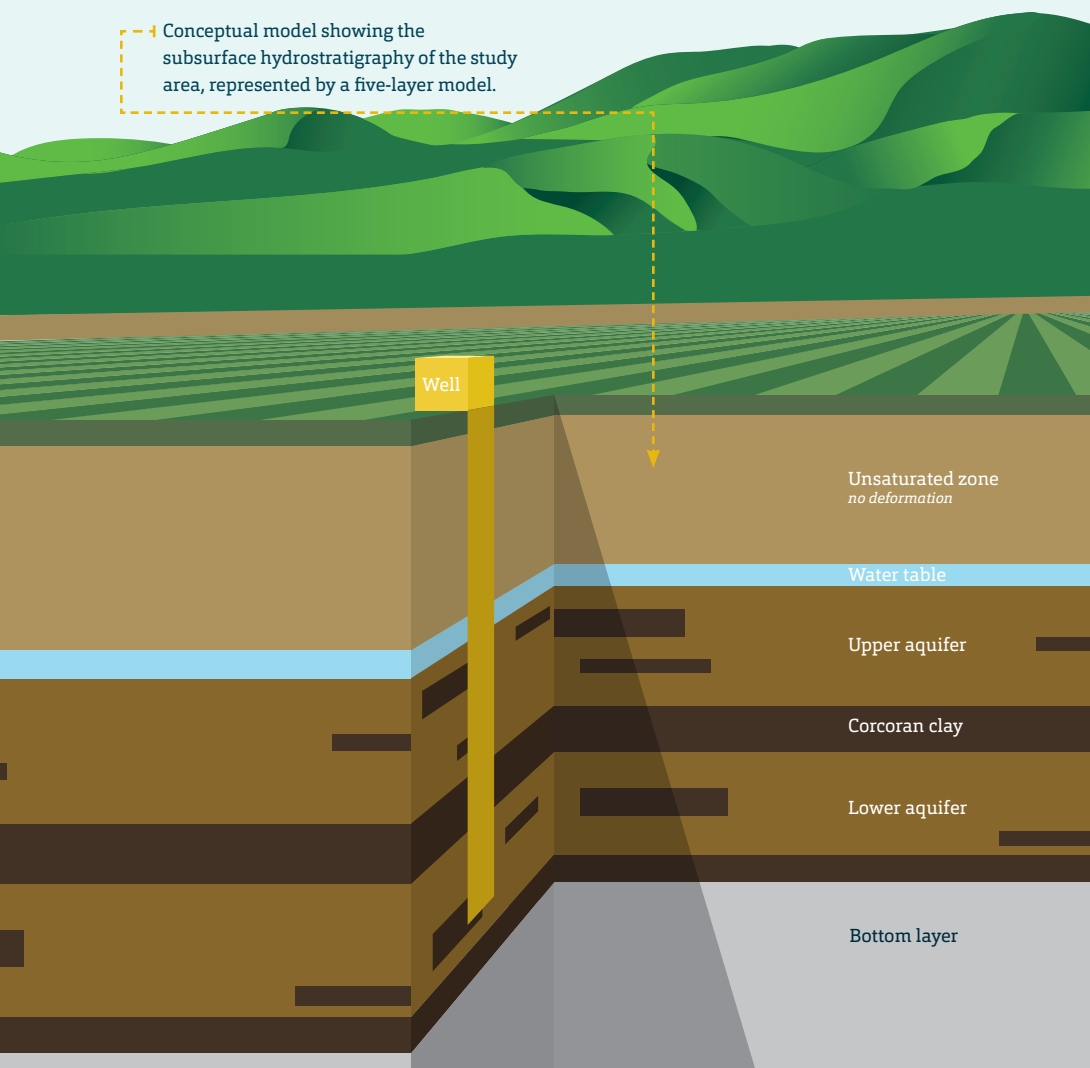
The research, which was published in the journal *Water Resources Research*, suggests managed flooding of the ground above the aquifers.

Smith says the amount of water exiting the Central Valley's aquifers far surpasses the amount of water trickling back in. That overdraft has caused land across much of the region to sink, permanently depleting groundwater storage capacity and damaging infrastructure.

Knowing where water will go underground depends on mapping the intricate channels of sand and gravel that interlace tightly packed clays and silts. In California, that information often comes from drilling contractors' reports to state regulators, which are expensive to acquire and do not cover areas between or beneath the drilled wells. As a result, the most common approach to dealing with subsidence, the downward settling or sinking of the ground's surface, is reactive, Smith says.

"If we are proactively managing, then we can prevent unrecoverable storage loss," says Smith.

Conceptual model showing the subsurface hydrostratigraphy of the study area, represented by a five-layer model.



STEEL BRIDGE TEAM COMPETES AT NATIONALS

Missouri S&T's Steel Bridge Design Team won first place at the regional American Institute of Steel Construction (AISC) Mid-Continent Student Conference in April. The win qualified the team to compete at the national level May 31–June 1 at Southern Illinois University-Carbondale.

In addition to the overall first-place finish during regional competition, S&T's team placed first in both construction economy scoring and construction speed.

Bridges are scored on weight and rigidity, construction speed, and the number of team members building the bridge. Teams are assessed penalties for infractions like dropping bolts, holding two pieces of the bridge at once and stepping over designated lines. Each bridge is also "load tested" to see if it can hold a required amount of weight.

The competition supplements a civil engineering education with a comprehensive student project, from conception and design through fabrication, construction and testing. The resulting steel structure should meet client specifications and optimize performance and economy.

The competition also makes students more aware of real-world engineering issues like spatial constraints, material properties, strength, safety, aesthetics and cost.

At the national competition, construction and aesthetics went well, but during load testing at the national competition, S&T's bridge failed.

WELCOME TO THE LIBRARY

On July 1, **Hsin-liang "Oliver" Chen**, joined S&T as dean of the Curtis Laws Wilson Library.

Chen has worked in library and information science for multiple universities, most recently as associate dean for assessment and librarian of the Joseph P. Healey Library at the University of Massachusetts-Boston.

He also holds a courtesy appointment in the business and information technology department at S&T.



TRUE GRIT

Grit, or strength of character, can predict the academic success of college students more accurately than standardized test scores or demographic indicators, according to current psychological studies.

But one important question about grit has yet to be answered, says **Susan Murray**, chair and professor of psychological science at Missouri S&T.

Is it possible to increase grit?

"Grit is a viable construct for exploration," says Murray. "Grit is egalitarian and encourages

people to work at growing and learning. It reminds us that although we might not be able to achieve something yet, with work, we can."

In one of the first studies in the world to explore methods of increasing grit, Murray's research team set out to discover if first-year STEM (science, technology, engineering and

mathematics) college students could improve their grit score through a targeted intervention.

Murray is the lead investigator of a study titled "Improving First-Year STEM Students' Performance and Retention: Is Grit the Answer?" published by the American Society for Quality's journal *Quality Approaches in Education* with co-authors **Nathan Weidner**, assistant professor of psychological science, and **Stephanie Dukes**, a sophomore in psychology, (pictured above with Murray).

According to a 2016 report from the National Academies of Sciences, Engineering, and Medicine, about half of students seeking a bachelor's degree in a STEM field fail to graduate in four to six years. Many students leave STEM fields altogether, making it difficult for high-tech employers to find qualified workers.

"If we could provide students with a means to increase grit and improve their ability to persevere, we could affect the outcomes of higher education," says Murray. "Retention rates would improve and the return on investment for college education expenses would be greater."

“...having the ability to enhance grit in college students may become an effective method for improving their outcomes.”

To discover if the “grittiness” of first-year college students could be increased through academic intervention, Murray’s research team studied S&T’s three-week summer education program “Hit the Ground Running,” or HGR. The participants were 76 incoming first-year college students enrolling in STEM majors at Missouri S&T for the fall 2018 semester.

Murray and her team measured students’ grit scores — determined by perseverance and consistency of interest — before and after they completed the HGR program. At the end of the program, the students showed a modest overall increase in their grit score driven by an increase in perseverance-of-effort. Their consistency-of-interest showed a small, non-significant change.

“These results highlight the need for more grit studies, especially in higher education,” says Murray. “Because the relationship between grit and various academic outcomes is already established, having the ability to enhance grit in college students may become an effective method for improving their outcomes.”

To follow up on the study, the researchers are re-evaluating the participants after completion of their first academic year to check the relationship among their grit scores, GPA and continuation in their major.

“There’s more work to do,” says Murray. “At Missouri S&T, we’re encouraged by our results and the potential to increase student success through interventions aimed at increasing grit.” ■

Jay Switzer explains the spin coating process used to produce epitaxial films and nanocrystals. His research was published in *Science* in April.



A NEW SPIN ON THIN FILMS

You could say **Jay A. Switzer** is a spin doctor of sorts. The materials scientist and his research team have devised a way to create high-performance inorganic thin films. Also known as epitaxial films, they are used in the manufacture of semiconductors.

“We’ve come up with a super-easy method that has never been done before to make these films from a solution using commercial spin coaters,” says Switzer, the Donald L. Castleman/ Foundation for Chemical Research Professor of Discovery in Chemistry at Missouri S&T. “This is an inexpensive and readily accessible route to single-crystal-like materials that should exhibit superior electronic and optical properties.”

He and his team published their research in *Science* in April.

Switzer’s work uses epitaxial deposits of cesium lead bromide, a semiconductor used in highly efficient photovoltaic solar cells.

Epitaxy is the growth of crystals, or thin films, whose orientation is determined by the crystalline substrate they are layered on. When the atomic structure of these crystals perfectly aligns with their substrate, the result is a film with superior electronic and optical properties that rival the attributes of more expensive single crystals.

Until now, spin coating has been used primarily to make lithographic polymer coatings or to deposit organic semiconductor films on substrates. But the resulting films have been either polycrystalline or without crystalline structure — not epitaxial with the level of perfection needed for today’s state-of-the-art electronics.

“We’ve learned to use spin coating to make highly oriented films and nanocrystals on a variety of inorganic substrates,” says Switzer. “Until now, atomically perfect epitaxial films have been made by several other methods, and some of those are very expensive and require ultra-high vacuum.”

Over two years, the research team showed that epitaxial films of inorganic materials such as lead iodide, zinc oxide, sodium chloride and perovskite crystal structures could be deposited on single crystals or comparable substrates by simply spin-coating their solutions or precursors of the materials.

MinerFest

Miner Homecoming Fall Festival



2019 SCHEDULE

THURSDAY, OCT. 3

Academy of Engineering Management Golf Outing
10 a.m.–3 p.m. | Oak Meadow Country Club

Academy of Mechanical and Aerospace Engineers Board of Directors Meeting
12:30 p.m. | Silver and Gold Room, Havener Center

Geology and Geophysics Advisory Board Meeting
2–3 p.m. | Room 124, McNutt Hall

Academy of Engineering Management Student Meeting
3:30–4:30 p.m. | Engineering Management Building

Academy of Engineering Management Faculty Mixer
4:30–5:30 p.m. | Engineering Management Building

Academy of Mechanical and Aerospace Engineers Induction Dinner and Program
5 p.m. Social, 6:30 p.m. Dinner and Program | St. Pat's Ballroom, Havener Center

Academy of Computer Science Banquet
6 p.m. | Location TBD

Jackling Jocks Welcome Pizza Party
6 p.m. | Comfort Suites, 1650 Old Wire Outer Road, Rolla, Mo.

Geology and Geophysics Annual Awards and Alumni Banquet
6–8:30 p.m. | Carver-Turner Room, Havener Center

Academy of Engineering Management Dinner and New Member Induction
6–9 p.m. | Sybill's St. James, 1100 N. Jefferson St., St. James, Mo.

FRIDAY, OCT. 4

Academy of Mines and Metallurgy Homecoming Meeting
8 a.m.–3:30 p.m. | Missouri-Ozark Room, Havener Center

Academy of Engineering Management Meeting and Lunch
8:30 a.m.–1 p.m. | Room TBA, Havener Center

Academy of Computer Science Meeting
8:45 a.m.–2 p.m. | Room 327, Computer Science Building

Miner Alumni Association Committee Meetings
9 a.m.–4 p.m. | Hasselmann Alumni House

Academy of Mechanical and Aerospace Engineers Annual Business Meeting
9 a.m. | St. Pat's Ballroom, Havener Center

Homecoming Registration
10 a.m.–6 p.m. | Hasselmann Alumni House

Order of the Golden Shillelagh Executive Committee Meeting
10–11 a.m. | Development Conference Room G21, Hasselmann Alumni House

Jackling Jocks Lunch
11 a.m. | Sybill's St. James, 1100 N. Jefferson St., St. James, Mo.

Miner Legends Luncheon
Noon–1:30 p.m. | Kinyon-Koeppel Grand Hall, Hasselmann Alumni House.

Help us honor some of our most distinguished alumni and friends as they receive Miner Alumni Association awards.

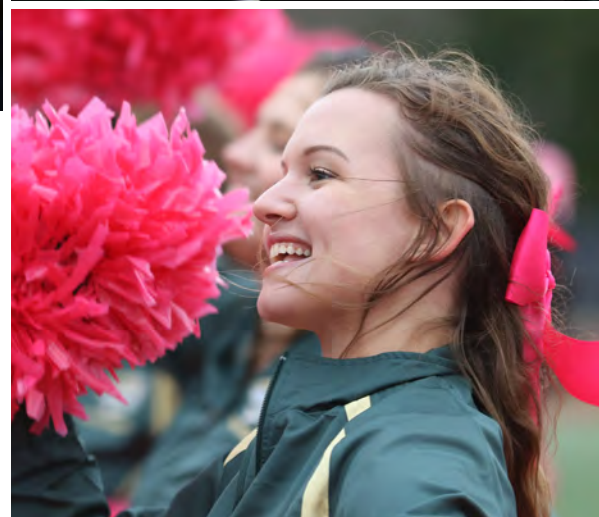
Tickets for event: \$20, complimentary for MAA board members and S&T academy members

Academy of Mechanical and Aerospace Engineers Student Design Team Presentations
1:45 p.m. | Room 140, Toomey Hall

Computer Science Student Research Showcase
2 p.m. | Room 327, Computer Science Building

Department Open Houses
3–4 p.m. | various campus locations

- Arts, languages and philosophy
- Biological sciences
- Chemical and biochemical engineering
- Civil, architectural and environmental engineering
- Economics
- Electrical and computer engineering
- Engineering management and systems engineering
- Experimental Mine
- Materials science and engineering
- Mechanical and aerospace engineering



**Women's Soccer Game: Miners
vs. William Jewell College**
5 p.m. | Missouri S&T Soccer Field

Silver and Gold Gathering
5 p.m. Reception, 6–8 p.m. Heavy Hors D'oeuvres
| Hasselmann Alumni House

*Tickets for event: \$25 for adults, \$10 for children
ages 6–12, free for children age 5 and under.*

**Jackling Jocks Dinner at the
Silver and Gold Gathering**
5 p.m. | Hasselmann Alumni House

**Academy of Miner Athletics Dinner at
the Silver and Gold Gathering**
5–7 p.m. | Hasselmann Alumni House

**Academy of Miner Athletics New
Member Induction Ceremony**
7:15 p.m. | Carver-Turner Room, Havener Center

**Men's Soccer Game: Miners
vs. William Jewell College**
7:30 p.m. | Missouri S&T Soccer Field

SATURDAY, OCT. 5

**Miner Alumni Association Board
of Directors Meeting**
8–11 a.m. | Kinyon-Koeppel Grand Hall,
Hasselmann Alumni House

*The association's annual meeting will be
held during this time.*

**Academy of Miner Athletics Annual
Membership Meeting**
8:30 a.m. | Room G-26F Gale Bullman Building

MinerFest Family Connection
9:30 a.m. | St. Pat's Ballroom, Havener Center
Annual parent meeting.

Homecoming Registration
10:30 a.m.–1 p.m. | Alumni Tent, Gale Bullman
Building parking lot

SUB Homecoming Parade
11 a.m. | *Parade follows State Street to 11th
Street past Hasselmann Alumni House.*

Miner Alumni Association Tailgate Party
11 a.m.–1 p.m. | Alumni Tent, Gale Bullman
Building parking lot

Join us for an authentic tailgate party with
beverages and other tailgate goodies.

*Tickets for event: \$5 for those who preregister
online or call by Sept. 29, 2019. Tickets purchased
at the door: \$10 for adults, \$5 for children ages 6
to 12, free for children age 5 and under, free for
the first 150 registered S&T students with valid ID.*

*Commuters Commodities donations: During
the tailgate, help us support Commuter's
Commodities by bringing non-perishable food
items, cleaning supplies or hygiene products.
Everything collected will go to the food and
supply pantry sponsored by Student Diversity.*

**Missouri S&T Athletic Hall of
Fame Room open to visitors**
11:30 a.m.–12:30 p.m. | Room G-25,
Gale Bullman Building

ACADEMY EVENTS

Academy of Computer Science

Banquet
Thursday, Oct. 3 | 6 p.m.
Location TBD.

Meeting
Friday, Oct. 4 | 8:45 a.m.–2 p.m.
Room 327, Computer Science Building

Academy of Engineering Management

Golf Outing
Thursday, Oct. 3 | 10 a.m.–3 p.m.
Oak Meadow Country Club

Student Meeting
Thursday, Oct. 3 | 3:30–4:30 p.m.
Engineering Management Building

Faculty Mixer
Thursday, Oct. 3 | 4:30–5:30 p.m.
Engineering Management Building

Dinner and New Member Induction
Thursday, Oct. 3 | 6–9 p.m.
Sybill's St. James, 1100 N. Jefferson St.,
St. James, Mo.

Business Meeting and Lunch
Friday, Oct. 4 | 8:30 a.m.–1 p.m.
Room TBD, Havener Center

Academy of Mechanical and Aerospace Engineers

Board of Directors Meeting
Thursday, Oct. 3 | 12:30 p.m.
Silver and Gold Room,
Havener Center

Induction Dinner and Program
Thursday, Oct. 3 | 5 p.m. Social, 6:30 p.m.
Dinner and Program
St. Pat's Ballroom, Havener Center

Annual Business Meeting
Friday, Oct. 4 | 9 a.m.
St. Pat's Ballroom, Havener Center

Student Design Team Presentations
Friday, Oct. 4 | 1:45 p.m.
Room 140, Toomey Hall

Academy of Miner Athletics

Dinner at the Silver and Gold Gathering
Friday, Oct. 4 | 5–7 p.m.
Hasselmann Alumni House

New Member Induction Ceremony
Friday, Oct. 4 | 7:15 p.m.
Carver-Turner Room, Havener Center

Annual Membership Meeting
Saturday, Oct. 5 | 8:30 a.m.
Room G-26F, Gale Bullman Building

Academy of Mines and Metallurgy

Homecoming Meeting
Friday, Oct. 4 | 8 a.m.–3:30 p.m.
Missouri-Ozark Room, Havener Center

Football Game: Miners vs. Quincy University
1 p.m. | Allgood-Bailey Stadium

Tickets for event: \$8 for adults, \$5 for students (K-college) and seniors age 65+, free for children age 5 and under or S&T students with a valid ID.

Volleyball Game: Miners vs. Lewis University
3 p.m. | Gibson Arena, Gale Bullman Building

Miner Alumni Social
6–8 p.m. | Public House Brewing Co.,
600 N. Rolla St., Rolla, Mo.

Wrap up your homecoming weekend with a pint and some down time with fellow alumni. We'll serve complimentary Alex's Pizza. Come and go as you please.

Jackling Jocks Annual Banquet and Business Meeting
6–9 p.m. | Carver-Turner Room, Havener Center

SUNDAY, OCT. 6

Chancellor's Advisory Committee on African-American Recruitment and Retention Meeting
10 a.m.–1 p.m. | Hasselmann Alumni House

Women's Soccer Game: Miners vs. Rockhurst University
Noon | Missouri S&T Soccer Field

Men's Soccer Game: Miners vs. Rockhurst University
2 p.m. | Missouri S&T Soccer Field

CASB Dean's Leadership Council Meeting
2–9 p.m. | University Advancement Conference Room, Hasselmann Alumni House

MONDAY, OCT. 7

CASB Dean's Leadership Council Meeting
8 a.m.–2 p.m. | Room 204
Curtis Laws Wilson Library

SPECIAL CELEBRATIONS

Jackling Jocks 22nd Annual Reunion
Oct. 3–6
For more information contact **Delbert Day** at 573-364-5569, day@mst.edu or **Newton Wells** at 979-690-3650, nwells1@suddenlink.net.

MINERFEST REGISTRATION

Register online at mineralumni.com/homecoming
or call 800-JOMINER (800-566-4637).

Alumni should pick up their registration packets at the Homecoming Welcome Table:

- 10 a.m.–6 p.m. Friday, Oct. 4, Hasselmann Alumni House
- 10:30 a.m.–1 p.m. Saturday, Oct. 5, Alumni Tent, Gale Bullman Building parking lot



2019 HOMECOMING AWARD RECIPIENTS

Alumni Achievement

1. **Steven Jung**, CerE'05, MS CerE'07, PhD MSE'10, chief technology officer for Mo-Sci Corp. and president of ETS Wound Care
2. **Janet Kavandi**, MS Chem'82, director of the NASA John H. Glenn Research Center

Alumni Merit

3. **Gerald (Gerry) Stevenson**, ChE'59, MS ChE'63, senior vice president of worldwide marketing and sales for Jacobs Engineering Group (retired)
4. **Paul Lang**, MS MinE'83, president and chief operating officer for Arch Coal Inc.

Robert V. Wolf Alumni Service

5. **Dixie Finley**, Psyc'68, school counselor for Rolla Public Schools (retired)

Distinguished Young Alumni

6. **Nicole Galloway**, Econ'04, Math'04, Missouri state auditor
7. **Stephanie Vogt**, EE'03, MS EMgt'05, chief operating officer of Inside Rx, a subsidiary of Express Scripts

Frank H. Mackaman Alumni Volunteer Service

8. **William (Bill) Hallett**, MetE'55, senior business analyst for Truck Engine Marketing in the Engine Division of Caterpillar Inc. (retired)

Honorary Life Member Award

9. **Christopher Maples**, former interim chancellor of Missouri S&T

Class of '42 Excellence in Teaching

10. **Steve Liu**, assistant professor of finance in business and information technology at Missouri S&T.

ACADEMY INDUCTIONS

In April, 38 alumni and friends were inducted into Missouri S&T academies. Academy membership recognizes careers of distinction and invites members to share their wisdom, influence and resources with faculty and students. Some academies hold induction ceremonies in the spring, others in the fall.

ACADEMY OF ELECTRICAL AND COMPUTER ENGINEERING

Geoffrey A. Akers, EE'96
F. Scott Aschinger, EE'88
Sharon Beermann-Curtin, EE'87
Nancy A. Pendleton, EE'88
Martin O. Penning, EE'80
Christopher A. Philipp, EE'82, MS EMgt'89
David R. Saunders, EE'83
H. Ward Silver, EE'78

ACADEMY OF MINES AND METALLURGY

C. John Brannon, Phys'85, CerE'85, Psyc'86, MS CerE'86, PhD CerE'89
Donald Dwyer, MinE'02
Kevin Edwards, NucE'89
Michael Gross, MetE'88, MS MetE'94
Andrew Knudsen, NucE'86
Molly Laegeler, PetE'00
Charles "Hank" Rawlins, MetE'91, MS MetE'92, PhD MetE'08

ACADEMY OF CHEMICAL ENGINEERS

Farhad Adib, ChE'84, MS ChE'85, PhD ChE'91
Edward C. Bonney, ChE'79
Ralph E. Grant, ChE'93
Marvin R. Havens, ChE'71, MS ChE'73, PhD ChE'76
John Hegger, ChE'86
Daniel J. Klingenberg, ChE'85
David Neuwirth, ChE'71
Ed Palmer, ChE'68
Gerald R. Thiessen, ChE'68, MS EMgt'74

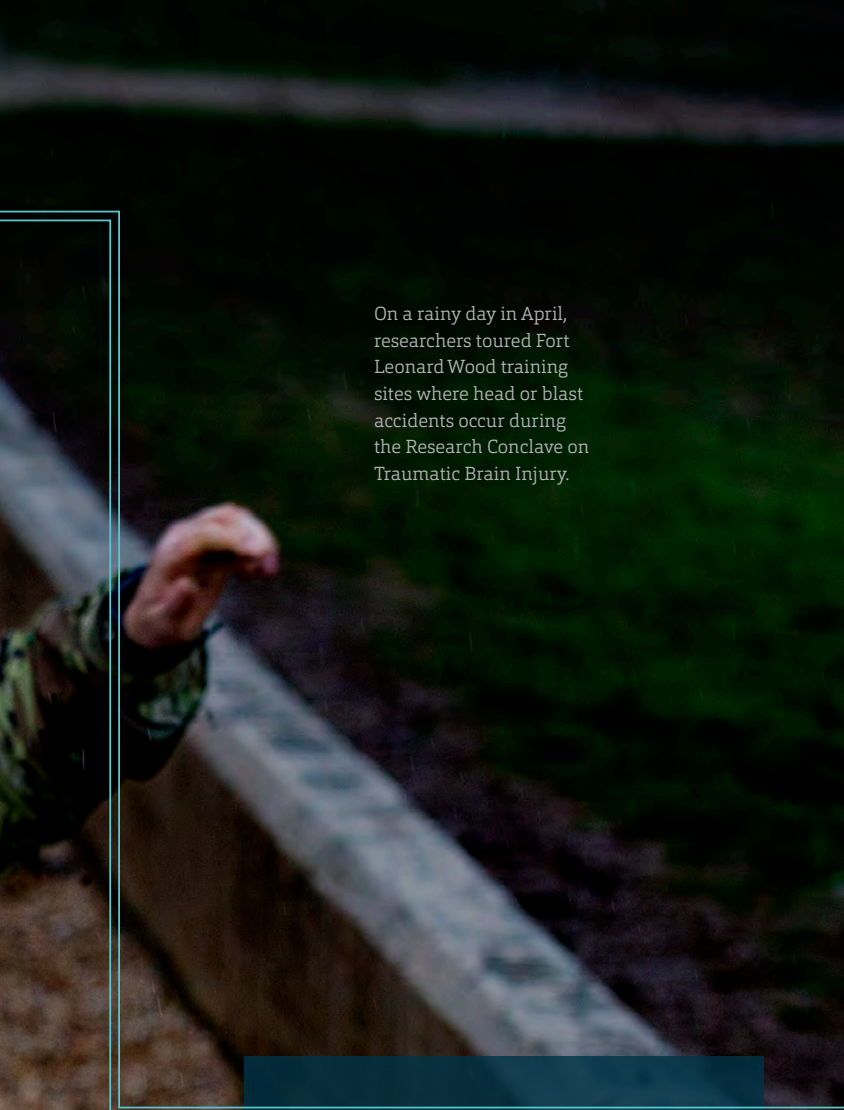
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Thomas M. Feger, CE'69
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Brent Massey, CE'95
Scott Preston, CE'97, MS EMgt'02
Kevin Sutterer, CE'82, MS CE'84
Mike Woessner, CE'76
John J. Myers, associate dean of academic affairs for the S&T College of Engineering and Computing and professor of civil, architectural and environmental engineering (honorary)

A photograph of a soldier in full combat gear, including a helmet, goggles, and a tactical vest, looking off to the side. Other soldiers in similar gear are visible in the background, slightly out of focus. The scene appears to be outdoors in a field or training area.

THE BATTLE FOR THE BRAIN

By Andrew Careaga, acareaga@mst.edu



On a rainy day in April, researchers toured Fort Leonard Wood training sites where head or blast accidents occur during the Research Conclave on Traumatic Brain Injury.

The facts on traumatic brain injury

- One of every 60 people in the U.S. lives with a TBI-related disability
- Every day, 137 people die in the United States because of a TBI-related injury
- At least 5.3 million Americans live with a TBI-related disability
- The number of people who sustain TBIs and do not seek treatment is unknown

Source: Brain Injury Association of America

Soldiers in combat encounter life-threatening perils at every turn. But even if they survive a dangerous situation like a roadside bomb detonation, that experience could result in long-term, life-threatening damage. And the cause may never be known.

Hundreds of thousands of U.S. soldiers suffer from traumatic brain injury (TBI), according to a 2018 report from the Center for a New American Security, a Washington, D.C., think tank. Left undiagnosed or untreated, TBI can result in later complications, including dementia, according to a 2018 study published in the American Medical Association's journal *JAMA Neurology*.

But soldiers don't experience brain trauma only on the battlefield. The Army estimates that 85% of all TBIs occur during training, says **Barry S. White**, executive director of the Acute Effects of Neurotrauma Consortium (AENC). Army recruits at Fort Leonard Wood, about 30 miles southwest of Rolla, endure high levels of blast overpressure — the pressure waves that come from explosions — while firing heavy weapons, White says.

"One poor sergeant said he could barely drive home at night" after a full day of leading hand-grenade training at Fort Leonard Wood, White says. "He was practically begging for us to do something."

Now, thanks in large part to Missouri S&T researchers, the consortium is taking action.

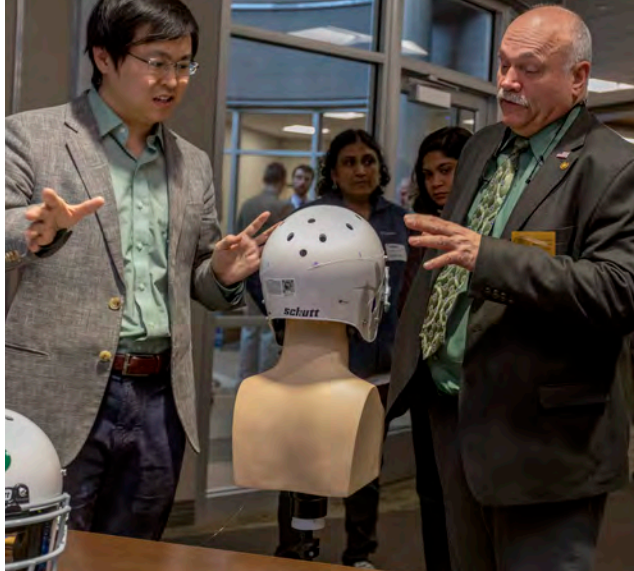
Leaving 'the Model T era'

Despite recent advances in brain science — from brain-mapping techniques to a greater understanding of Alzheimer's — little progress has been made to understand or treat TBI. "The field test to determine if a soldier may have a brain injury consists of, 'How many fingers am I holding up?' and asking, 'Who's the president?'" says White.

"Diagnosis is still in the Model T era, and so is treatment," says Dr. **Donald L. James**, chair of the AENC board of directors and senior vice president of research and government affairs at Phelps Health, a regional health system based in Rolla.

Missouri S&T, Phelps Health, Fort Leonard Wood, the Leonard Wood Institute (LWI, the Army base's research arm) and three other universities recently joined together to advance TBI diagnosis and treatment. Phelps Health and LWI formed the AENC as a mechanism to support TBI research. They worked with U.S. Sen. Roy Blunt, who helped secure \$10 million in federal funding for the effort. Missouri S&T joined the consortium in 2018. The University of Missouri campuses in Columbia and Kansas City, along with Washington University in St. Louis, are also AENC members.

The consortium is focused on prevention, detection or treatment of "acute" (short-term) TBI only. For the military, the earlier TBI can be detected, the better — not only for the sake of soldiers' health, but also for economic reasons. It costs the Army about \$77,000 to train a single soldier, White says, adding that the Army estimates 600 to 800 recruits at Fort Leonard Wood experience TBI each year, even though only 200 to 250 are reported.



Top Left: During the TBI conclave, soldiers demonstrated various ways head injuries can occur during training.

Top Right: Jie Huang (left), associate professor of electrical and computer engineering at S&T, demonstrated his "smart helmet" to participants, including State Rep. Don Mayhew, CE'92 (right). Sensors imbedded inside the helmet can detect when a TBI occurs.

Bottom: Casey Burton, Chem'13, PhD Chem'17, tells conclave attendees about his research using biomarkers in urine to diagnose TBI — research he started at S&T and now continues at Phelps Health in Rolla.

"If we can mitigate brain cell death, that will be the first big step."

Seizing 'serendipitous moments'

The partnership between S&T and Phelps Health made sense, James says. Both organizations are based in Rolla, and both entered into an agreement in 2015 to more closely work together on relevant research. One outcome of that agreement is the Ozark Biomedical Initiative, which provides seed money from both entities to support collaborative projects. The S&T-Phelps Health connection has also led to what White calls "serendipitous moments."

One of those resulted from a practical research need a few years ago.

Casey Burton, Chem'13, PhD Chem'17, and his advisor **Yinfa Ma**, Curators' Distinguished Teaching Professor emeritus of chemistry, were devising a system to detect the presence of breast cancer through urine testing. They found that urine containing a certain biomarker — what Burton calls a "molecular fingerprint" — indicated the presence of breast cancer more accurately and safely than a mammogram. The process is also less costly, and results are available in minutes.

But Ma and Burton needed urine samples for their research. Ma contacted James, who was intrigued by the project. He told Ma about a University of Utah study of student-athletes with concussions in which blood samples drawn from the students found two biomarkers that indicated concussions. James encouraged Burton and Ma to expand their project to see if similar biomarkers might also indicate brain trauma.

Ma has since retired from S&T, but the work continues under Burton. Now director of medical research at Phelps Health and an adjunct professor of chemistry at S&T, he is one of seven S&T-affiliated researchers to obtain LWI funding to conduct further research into TBI (see story on page 28).

Burton's work could result in a portable kit the military could use to detect TBI during training or on the battlefield. Other Missouri S&T projects could result in similar tools for the Army's use, including a sensor-embedded helmet that could detect TBI and another helmet that could better protect soldiers or recruits from head injuries.

In all, the S&T researchers have received more than \$5.1 million in federal funding for their TBI research, and more is expected.

Beyond military applications, the research could lead to improvements on how TBI is detected and treated among civilians. Because TBI is linked to long-term problems like dementia, Alzheimer's disease and post-traumatic stress disorder, early diagnosis or treatments could prevent future chronic problems.

"If we can mitigate brain cell death, that will be the first big step," James says. "Then we can look at other applications." □





From left, S&T faculty researchers **Catherine Johnson**, **Paul Nam** and **Honglan Shi** and chemistry post-doctoral fellow **Anna Pfaff** discuss their TBI research in a campus lab.

SEEKING TBI THERAPIES

By Delia Croessmann, croessmannd@mst.edu

Complications from TBI can be life altering. They include post-traumatic seizures and hydrocephalus, as well as serious cognitive and psychological impairments, and the search for treatments to mitigate these neurodegenerative processes is on.

Paul Nam, S&T associate professor of chemistry, leads a \$412,000 multi-disciplinary project, also funded through the Leonard Wood Institute, to investigate the use of antioxidants to treat TBIs.

Nam believes antioxidants could prevent or reduce the oxidative stress that occurs in the brain following exposure to a blast. And that oxidative stress is the culprit of the degenerative symptoms.

"Currently there are no FDA-approved drugs to treat TBI, but the research of antioxidants for brain health and recovery is an ongoing area of study," says Nam. "We have a collaborative team of experts at S&T who can apply their knowledge to every stage of this study to test the antioxidants we've targeted and determine their efficacy."

Co-principal investigators are **Nuran Ercal**, professor of chemistry and the Richard K. Vitek/Foundation for Chemical Research Endowed Chair in Biochemistry, who has extensive research experience studying the effects of antioxidants in living systems; **Honglan Shi**, PhD Chem'10, research professor of chemistry, who specializes in bioanalysis, environmental analysis and sophisticated instrumentation applications; and **Catherine Johnson**, assistant professor of mining and explosives engineering, who is already characterizing blast models in her work with the Acute Effects of Neurotrauma Consortium (AENC), Phelps Health and the U.S. Department of Veterans Affairs.

Nam expects the study to take a year to complete.



UNDERSTANDING THE INVISIBLE INJURY:

Students advance traumatic brain injury research

By Sarah Potter, sarah.potter@mst.edu

“Research is creating new knowledge.”—Neil Armstrong

Research keeps professors on the vanguard of knowledge in their fields and allows students to gain a deeper understanding of their area of study.

For students and recent graduates researching traumatic brain injury (TBI) at Missouri S&T, the work is both a passion and a duty.

Explosives and brain injuries

Barbara Rutter, MS MinE’15, PhD ExpE’19, saw firsthand how blast-induced TBIs occur during her deployment to Afghanistan in 2012 with the U.S. Marine Corps Reserves.

“It got a lot more personal with me since some of the guys I deployed with are showing symptoms,” says Rutter. “This work is all very near and dear to my heart.”

Rutter, from New Llano, La., developed her own equation for calculating impulse — the amount of pressure over time — applied to the brain during a blast. In conjunction with **Catherine Johnson**, S&T assistant professor of mining and explosives engineering, and researchers at the University of Missouri-Columbia, Rutter created a pressure-versus-impulse graph and defined the regions of mild, moderate or severe TBI in people.

“And from what I’ve found, the threshold is really, really low for brain injury. That surprised and scared me,” says Rutter.

Because TBIs are invisible injuries, she also looks for other physical injuries that may indicate brain injury.

“You can’t physically see a TBI, but other injuries could indicate the presence of one,” says Rutter. “If you have lung damage or ear drum rupture, those are physical indications that you may also have a TBI.”

She hopes military personnel will use her research for faster diagnoses and treatment of TBI on the battlefield.

“I’m making it very easy for the medics to make the quick assessment,” says Rutter. “They will get faster treatment to lessen and even reverse the effects of the brain injury itself.”

Rutter’s ultimate dream is to work on explosives with the ATF — the Bureau of Alcohol, Tobacco, Firearms and Explosives. For now, she plans to stay on at S&T as a postdoctoral scholar to continue her TBI research. Rutter will be looking at the relationship between the occurrence of TBIs to surrounding structural damage in a blast.





"The threshold is really, really low for brain injury. That surprised and scared me."

S&T graduate **Barbara Rutter**, a former Marine, developed an equation that calculates the pressure the brain experiences during blast and used it to build a scale of TBI severity.



Chase Sigler is helping Honglan Shi identify the combination of biomarkers in urine that indicate a TBI.

A non-invasive diagnosis

Chase Sigler is just beginning his TBI research as a first-semester graduate student in chemistry. Along with a team of researchers led by S&T chemistry research professor **Honglan Shi**, PhD Chem'10, he is examining different biological markers, called biomarkers, in urine to determine if their combinations could indicate a TBI.

Sigler says the goal of his research is to find a non-invasive method of detecting TBI biomarkers and studying the progression of TBIs.

In partnership with the Leonard Wood Institute and Phelps Health, S&T researchers will collect urine samples from military personnel going through blast training. Sigler will analyze 20 different biomarkers that he hopes will help him quantify the different stages of TBI.

"For example, one of our compounds is glucose, and if you have a high amount of glucose in urine, that could mean you have a TBI, but it probably means that you just ate a hamburger," says Sigler. "But if we get a whole panel of biomarkers, you will get to see the trends and point us in the direction of TBI."


Sigler hopes to develop the method to separate the biomarkers in urine and quantify them. He will compare the military patient samples with control samples, and potentially, discover a pattern to biomarkers in people with TBIs.

Sigler, from Bakersfield, Mo., earned undergraduate degrees in chemistry and human molecular biology at College of the Ozarks. The mix of bioanalytical chemistry at S&T fits his interests, he says.

"I came to Rolla because I know S&T does a lot of this cross-disciplinary research," says Sigler. "I'm interested in that because I'm a chemist, but I'm also a biologist so studying the human body is the best of both worlds for me."

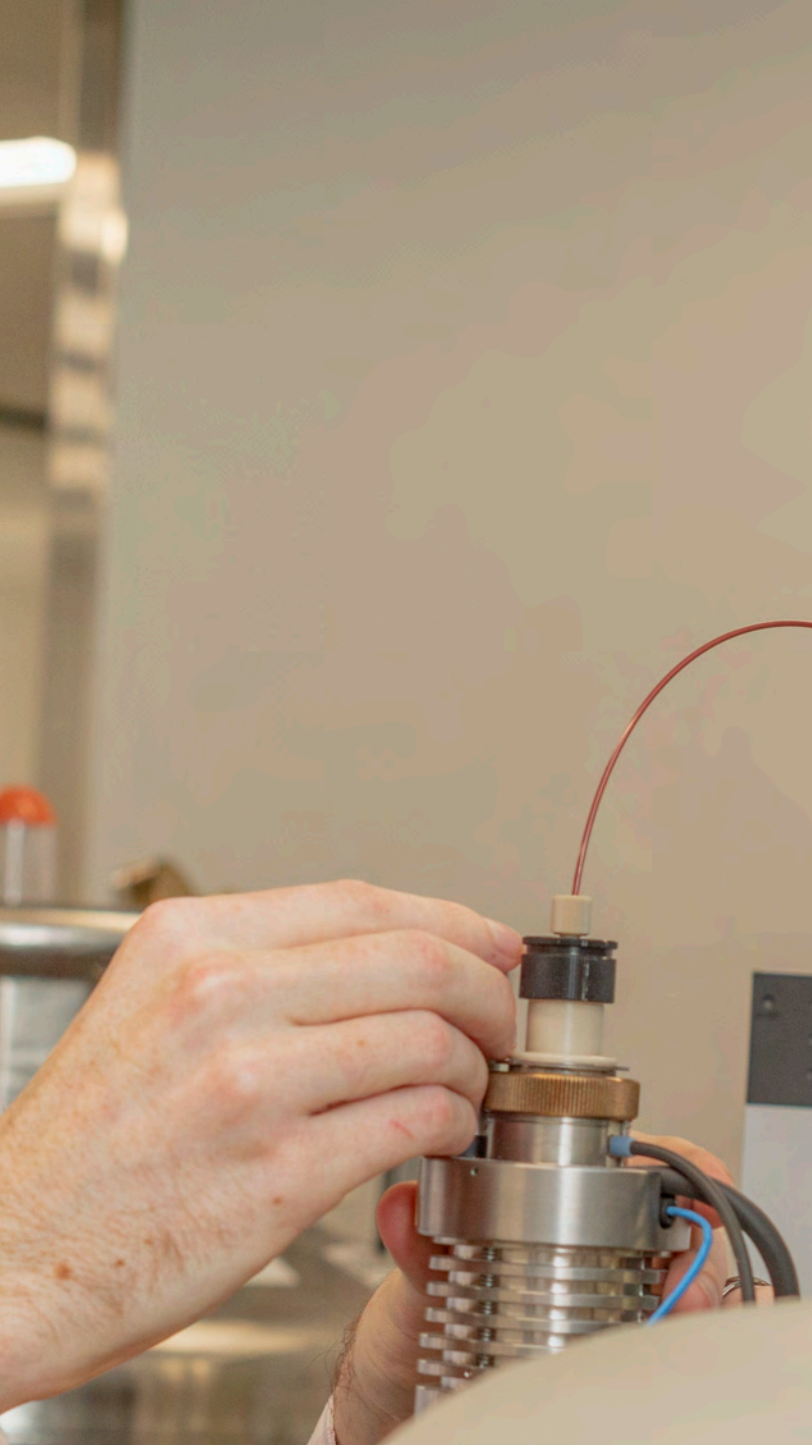
He also appreciates the chance to help people.

"Being able to serve my country through this — it really makes me feel wonderful," says Sigler. "I'm getting to contribute to not only the military, but also to human health in general — in making people better." □

A photograph of a man with a beard and short brown hair, wearing a light-colored checkered shirt, working in a laboratory. He is looking down at a piece of equipment. The background is a blurred laboratory setting with shelves and equipment.

ANALYZING SMALL MOLECULES FOR BIG RESULTS

By Delia Croessmann, croessmannnd@mst.edu



At only 28 years old, **Casey Burton**, Chem'13, PhD Chem'17, director of medical research at Phelps Health in Rolla and an adjunct professor of chemistry at Missouri S&T, is poised to become a prodigious bioanalytical researcher.

His scientific quests have already led to the publication of over 20 scientific journal papers, mostly focused on the development of small molecule screening methods used to diagnose pathologies, particularly through the use of urinary metabolites.

When Burton first came to Missouri S&T as an undergraduate, he had already conducted scientific research. As a high school sophomore at School of the Osage in Lake Ozark, Mo., he validated the hypothesis that perfect pitch could be taught through a gamification experiment that suggested school children could accurately identify the 12 chromatic pitches after training. His research was later published in the *Undergraduate Journal of Psychology at Berkeley* in 2013.

At S&T, Burton's scientific potential was recognized by **Yinfa Ma**, Curators' Distinguished Teaching Professor emeritus of chemistry, who was Burton's academic advisor and mentor throughout his undergraduate and graduate studies.

"Casey Burton continues to display a remarkable scientific aptitude and passion for bioanalysis that has led to significant advances in targeted urinary metabolomics for use in molecular epidemiology," Ma says. "Among many examples are the academic challenges he pursued creating composite urine biomarker panels, then translating that work into the development of new instrumentation and technologies."

Burton and Ma worked together for a decade — from Burton's undergraduate years through completion of his Ph.D. — to discover and develop urinary biomarkers for noninvasive early detection of cancer, the subject of Burton's dissertation and 14 of his published papers. Burton's research has also contributed to breakthroughs in the bioanalysis and application of a group of metabolites called pteridines in cancer detection and diagnosis.



Moving into TBI diagnostics

With this background, Burton is well-positioned to expand his bioanalytical expertise into the search for similar urinary biomarkers that may help detect traumatic brain injuries (TBIs).

Today he leads a \$1.24 million research project, "Assessing Traumatic Brain Injury Noninvasively with Urinary Metabolites," which aims to develop a simple blood or urine test to assess whether a TBI has occurred. He hopes that this new approach will result in a new medical device that can be deployed in the field.

This project is one of seven supported by the Acute Effects of Neurotrauma Consortium (AENC) and funded by the U.S. Army Research Laboratory through the Leonard Wood Institute near Waynesville, Mo. Collaboration with the Fort Leonard Wood Army training post is critical because up to 85% of military TBIs result from training activities.

According to Burton, current approaches to detect TBIs are inadequate. Many involve cognitive assessments or advanced neuroimaging techniques that can be either subjective or impractical for use in the field.

"Early detection and diagnosis of TBIs are essential to identify patients at risk of developing ongoing symptoms," says Burton.

Burton's research involves identifying 20 molecular biomarkers (five proteins and 15 metabolites) to create a "TBI fingerprint."

"These metabolic indicators are sensitive to subtle changes in the biological and physical indicators of TBI and can be measured more easily than conventional protein biomarkers," he says. "With our unique approach, we aim to determine the feasibility of using these small metabolites in urine to noninvasively detect a TBI."

Top Left: Casey Burton discusses his search for urinary metabolites that can indicate TBI with S&T research chemist Wenyan Liu.

Top Right: Burton earned undergraduate and graduate degrees from S&T, and now serves as an adjunct professor while working as director of medical research for Phelps Health in Rolla.

Bottom: Burton sits in on a briefing at the Delbert Day Cancer Institute in Rolla with staff who handle research patient intake and support.

"Our study proposes to identify an innovative combination of 20 molecular biomarkers ... that will allow us to create a 'TBI fingerprint.'"

Teaming up for a three-phase validation

The project has three phases: one to develop the core technology to screen these biomarkers in blood; one to compare their levels in TBI patients and healthy individuals; and one to study their changes after intensive training at the Fort Leonard Wood breacher course, where soldiers learn how to break barriers with explosive devices.

The project draws on the expertise of co-investigators **Honglan Shi**, PhD Chem'10, a research professor of chemistry at S&T; **Paul Nam**, associate professor of chemistry at S&T; and Dr. **Donald James**, AENC chair and senior vice president for research and government affairs at Phelps Health. Shi and Nam will develop the method and oversee the work of graduate and undergraduate students, while James will help design the experiments and coordinate with Fort Leonard Wood.

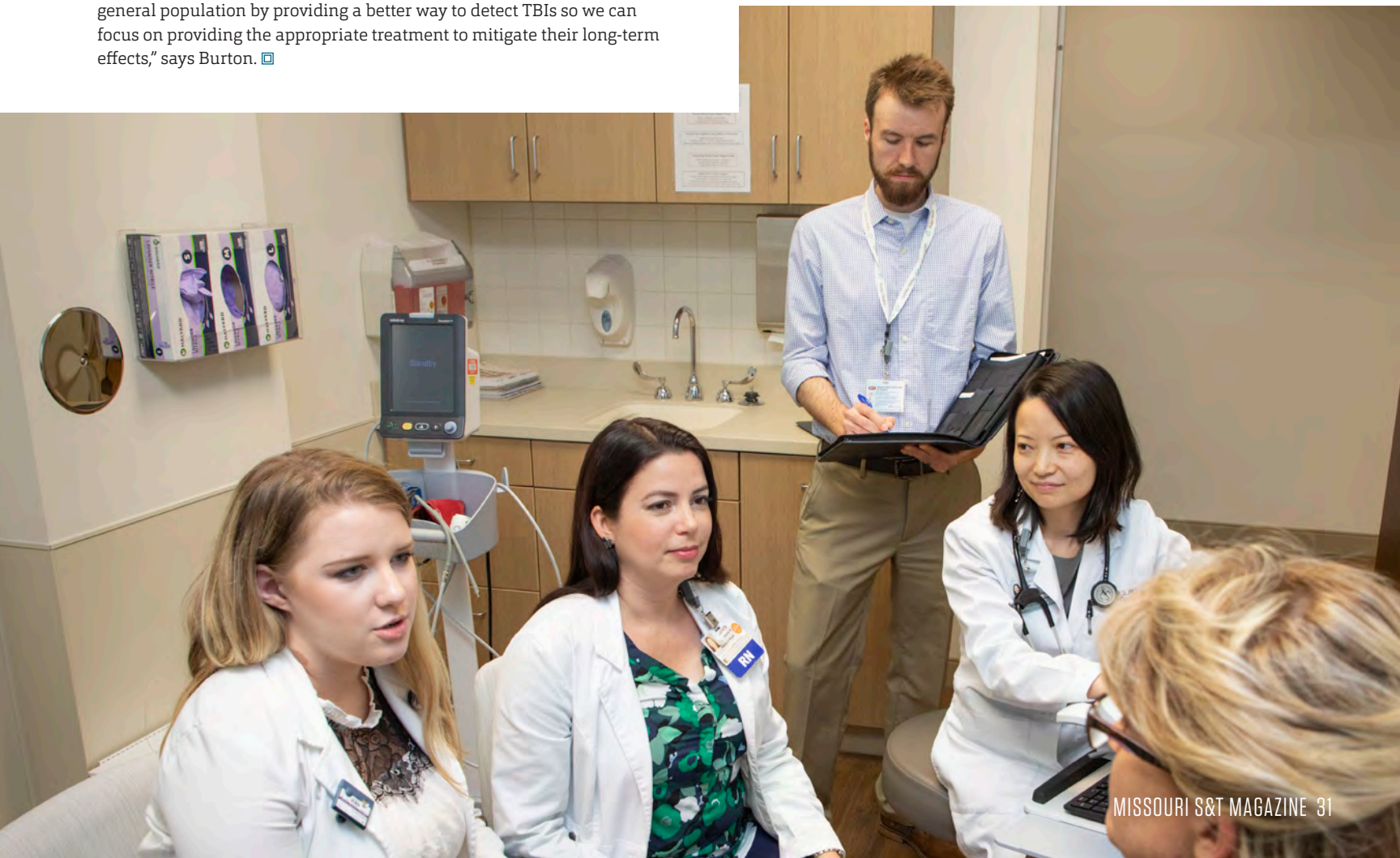
In the first phase, the researchers will develop a method to analyze and identify 20 TBI biomarkers in serum and urine.

The second phase explores the feasibility of using the biomarkers with two groups: 60 TBI patients recruited from the General Leonard Wood Army Community Hospital and a control group of 60 recruited from the 43rd Adjutant General Battalion at Fort Leonard Wood, where basic combat training takes place.

In phase three, the researchers will evaluate the two groups as they go through the breacher course, where they are repeatedly exposed to low-level blasts. Burton and his team will monitor short- and long-term changes in the participants' biomarker profiles in relation to individual and cumulative blast forces.

Burton expects the research to take about two years to complete.

"With this project, we're in a great position to help the military and the general population by providing a better way to detect TBIs so we can focus on providing the appropriate treatment to mitigate their long-term effects," says Burton. □



TO PREVENT AND PROTECT

By Peter Ehrhard, ehrharp@mst.edu

Researcher **Jie Huang** is holding a prototype of his "smart helmet." Equipped with sensors, the helmet can identify when a TBI has occurred, so treatment can be quickly administered.



TRAUMATIC BRAIN INJURIES (TBIs) ARE AN UNFORTUNATE BUT ALL TOO COMMON OCCURRENCE DURING MILITARY TRAINING AND DEPLOYMENT. BECAUSE MILD TBIs OFTEN PRESENT NO OBVIOUS SIGNS OF HEAD TRAUMA OR FACIAL LACERATIONS, THEY ARE THE MOST DIFFICULT TO DIAGNOSE AT THE TIME OF THE INJURY, AND PATIENTS OFTEN PERCEIVE THE IMPACT AS MILD OR HARMLESS. BRAIN INJURY IS CUMULATIVE, SO TREATING A PATIENT WITHIN THE “GOLDEN HOUR” — THE FIRST 60 MINUTES AFTER INJURY — IS CRUCIAL FOR IMPROVED LONG-TERM RECOVERY.

Jie Huang, an assistant professor of electrical and computer engineering, is working to improve detection of TBIs by developing technology to autonomously collect and process data on trauma-inducing actions — in a reliable and “smart” manner for prompt identification. By embedding military helmets with sensors and other data-transmission technology, Huang hopes to help quickly and accurately diagnose and administer aid to mild TBI victims.

“Our aim is to develop a fundamental understanding of acute TBIs through large-scale data acquisition of blast lab impact events from pressure-sensor-equipped helmets processed through machine learning,” says Huang. “Military-related TBIs come primarily from repeated exposures to explosive blasts during planned training activities. Blast TBIs account for approximately 60% of all military-related TBIs, and of those, 80% are categorized as mild.”

With \$2.25 million in funding from the Leonard Wood Institute, Huang and his research team are developing a smart-helmet prototype using a standard football helmet. The prototype will be equipped with fiber optic micro interferometer sensors.

The sensors will be activated by blunt-force impacts that range from 3 to 15, or mild to severe head injury, on the Glasgow Coma Scale (GCS). The GCS gives medical personnel a practical way to describe the level of consciousness in patients with acute brain injury by scoring verbal response, motor response and eye movement.

Once activated, the sensors send data wirelessly in real-time via the “smart” helmets, integrating machine learning based on a decision-making framework that can detect the severity of the impact level.

Once the helmet is developed, Huang will correlate laboratory testing data with field data to improve the overall configuration of the helmets.

“Our research project will use advanced optical fiber sensors, embedded in smart helmets, to instantly warn soldiers of the severity of a concussive event in the field so that treatment can be sought immediately,” says Huang. “Such a framework, with the ability to yield highly accurate predictions, will mitigate a soldier’s suffering and save time for medical personnel.”

LOOKING AHEAD

Fatih Dogan, a professor of ceramic engineering, is expanding the idea of head protection by developing liquid body armor for use in helmets. His computational research combines materials processing and various mechanical test methods to look at energy absorption and energy redirection.

In addition to TBIs, Dogan’s work also relates to the equally worrying behind-armor blunt trauma (BABT). BABTs are the non-penetrating injuries caused by the distortion and warping of body armor designed to protect the body from explosive impacts. Bending of the surface of body armor could come from the impact of a bullet or other projectile.

“By studying the nanostructured composite fluids, we hope to better understand impact weakening and blast-wave mitigation,” says Dogan. “Multilayered viscoelastic materials — like polyurethane and rubber — could serve as ballistic and blast protection in relation to TBIs and BABT.”

While the initial focus of this TBI research is for military use, the work could one day be applied throughout the world of safety and prevention. Children could have better helmets when learning to ride a bicycle, football players could enjoy their pastime with a better sense of security and construction workers may be better equipped to prevent workplace accidents from becoming disasters.

Below: Ceramic engineering professor **Fatih Dogan** and his undergraduate research assistant, **Brendan Carriel**, assemble layers and mix moldable materials as part of their TBI research.





BUILDING MODELS OF PROTECTION

While some faculty are busy with TBI detection and protection, others have turned their focus on modeling injuries to better understand them and determine the best methods for healing.

Donald Wunsch, the Mary K. Finley Distinguished Professor of Electrical and Computer Engineering at S&T and director of the Applied Computational Intelligence Laboratory, is heading a team of researchers to analyze data from a TBI repository built by the National Institutes of Health and the Department of Defense.

The team, which includes **Gayla Olbricht**, associate professor of mathematics and statistics at S&T, and **Tayo Obafemi-Ajayi**, assistant teaching professor in the S&T Cooperative Engineering Program based at Missouri State University, will study data using neural networks that can "learn" on their own combined with statistics to allow for personalized medicine — medicine that is tailored for each individual patient and focuses on unique genetic profiles.

To better treat TBI sufferers, S&T researchers are also building better computer models to show the extent of injuries and help medical

professionals determine the extent of damage to the brain. **Hyoung K. Lee**, associate professor of nuclear engineering at S&T, is developing a real-time computed tomography scan (CT scan) that would help to better design and test TBI prevention gear.

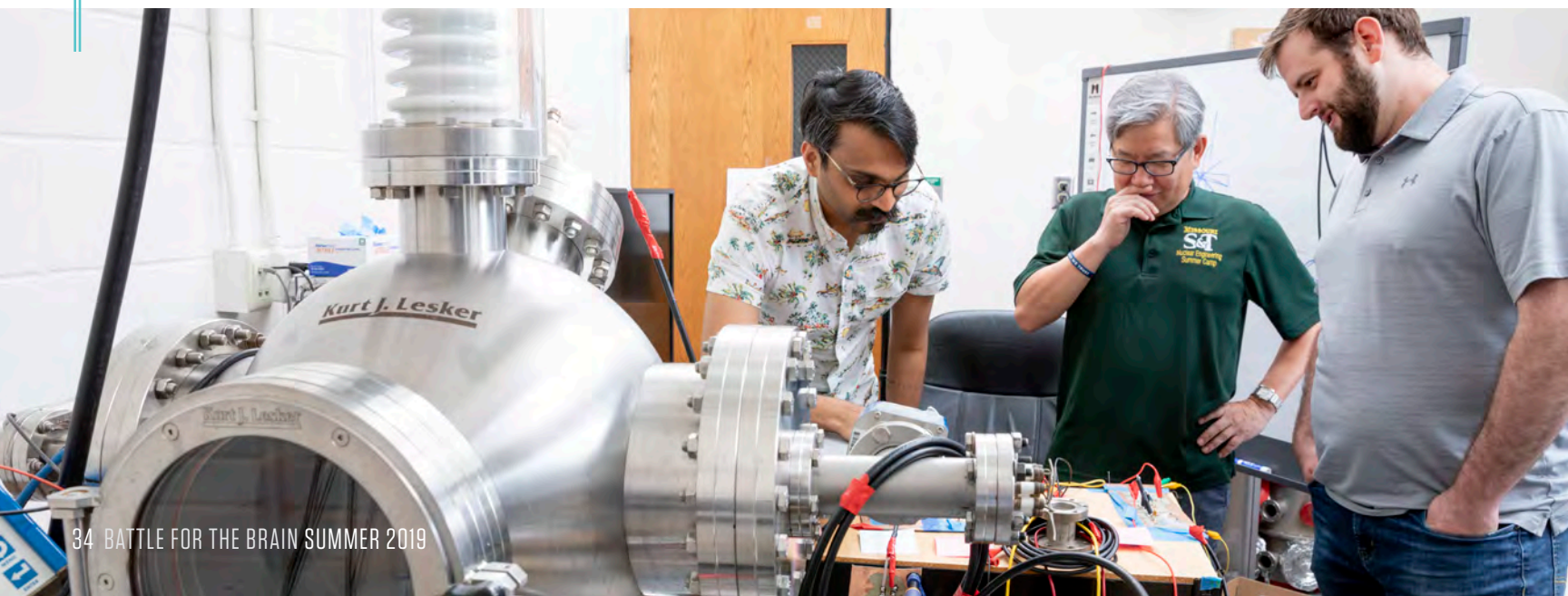
Instead of taking several images of a patient from different angles, Lee's CT system would sweep X-ray beams around a patient. These individual ray sources need to be compact and fast in order to fit a large-enough number of projections for a successful head-and-neck CT, Lee says.

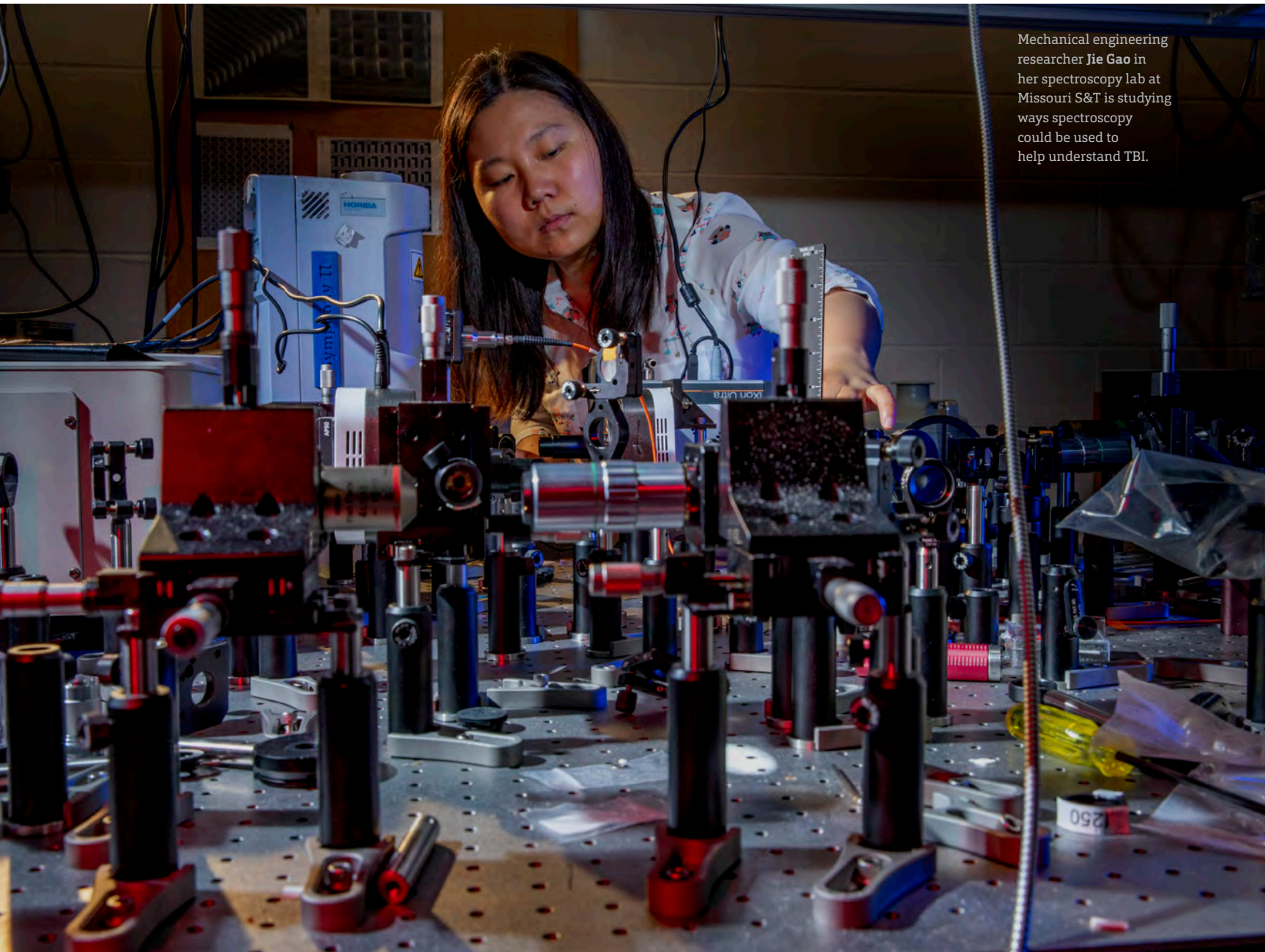
"The overall goal is to design a compact and fast X-ray tube that will be used for development of a stationary CT system," says Lee. "Our approach is that a tungsten flat emitter, a drum-shaped anode, and an electron beam focusing and steering system will allow the size of an X-ray source to be reduced while still generating the required high-intensity X-ray beam."

Lee and his team believe that the development of such a compact and fast X-ray will lead to the creation of a real-time CT scan — driving the field of imaging forward while allowing injuries like TBIs to be quickly diagnosed so treatment can begin.

Top: Donald Wunsch leads a team of researchers in the Applied Computational Intelligence Laboratory to study TBI data using neural networks and statistics to one day allow for medicine that is tailored to each individual patient.

Bottom: Nuclear engineering researcher **Hyoung K. Lee** (center) is developing a new CT scanning device that can create a real-time image and help physicians diagnose injuries like TBIs quickly.





Mechanical engineering researcher **Jie Gao** in her spectroscopy lab at Missouri S&T is studying ways spectroscopy could be used to help understand TBI.

COMBINING IMAGING AND BIOMARKERS

Jie Gao, associate professor of mechanical and aerospace engineering, hopes to develop spectroscopic imaging techniques that will allow researchers to understand the fundamental biochemical alterations and their underlying mechanisms in TBI processes, as well as the effects of N-acetylcysteine amide (NACA) treatment on the injuries.

Gao's research team includes **Xiaodong Yang**, associate professor of mechanical and aerospace engineering, and **Nuran Ercal**, the Richard K. Vitek/Foundation for Chemical Research Endowed Chair in Biochemistry.

Yang studies spectroscopy and imaging techniques, and Ercal studies animals and oxidative stress-related disorders.

Also combining chemistry with animal studies, **Paul Nam**, associate professor of chemistry, received a grant to develop antioxidant therapies and identify oxidative biomarkers to diagnose and treat both acute and chronic TBI.

Oxidative damage caused by free radicals, membrane lipid peroxidation in particular, are some of the most reliably validated secondary injuries from TBI, says Nam. Discovering antioxidants that inhibit this type of damage — and its neurotoxic consequences — could be used in therapeutic drugs to prevent and treat TBI, he says.

Nam's research focuses on open-field blast settings that will generate shock waves simulating the ones that occur during battle. Similar to Gao's work, Nam's will examine the effects of NACA as a treatment and then conduct biomarker analysis and measure those markers. □

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With over 50 sections across the country, the Miner Alumni Association offers an abundance of opportunities for you to expand your professional and social circle. From sporting events to St. Pat's festivities, Miners like you get together year-round to connect and play. Don't miss out on the fun. Check out the events calendar at mineralumni.com/events.



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CLASS NOTES

SHARE A CLASS NOTE

Let your classmates know what you've been doing. Send us information about your professional and personal accomplishments — career changes or promotions, weddings, births and other news — and we will publish it in an upcoming issue. Email your update and a high-resolution photo (if available) to alumni@mst.edu.

Deadline:

Spring issue — Nov. 15

PUBLICATION POLICY

We publish information submitted by alumni, news submitted by employers of alumni, and selected news stories that mention alumni and their affiliation with Missouri S&T. We are happy to announce weddings, births, promotions and other special occasions after they have occurred. We will print addresses if specifically requested to do so by the alumnus/alumna submitting the note and will mention a spouse's name if it is specifically included in the submission. We reserve the right to edit alumni notes and will use submitted print-quality photos as space permits. Due to the production time required for each issue, submissions may take up to six months to appear. Your patience is appreciated.

1967

Gary Sievert, ME: "I'm enjoying my 11th year of retirement. My car hobby keeps me busy."

1969

Fred B. Parks, ME, was appointed CEO of Nuvector Corp., a neurostimulation medical device company. He has served on the company's board of directors since March 2016 and will retain his position as a director.

John C. Preston, ME, was one of 200 Illinois veterans honored at the Illinois Bicentennial "Honor 200" event on Dec. 3, 2018, at Navy Pier in Chicago. The Illinois Department of Veterans Affairs and the Illinois Bicentennial Committee joined together to honor the work of 200 veterans who have served honorably and who have dedicated their time and energy to inspire and assist other military service members and their communities.

Joseph Stahl, Math, MS CSci'72: "A new book I co-authored titled *Faces of the Union Soldiers at Antietam* was published in July by History Press. It tells the stories of 36 soldiers at Antietam including images of each soldier, most of which have never been published before. They are part of my collection of Antietam soldier images I use as a certified National Park Guide for Antietam and Harpers Ferry Battlefield parks when I give tours."

1971

Jeu Foon, EE, performs on guitar and taiko drums, sings in a professional choir, writes short stories about his youth in Arkansas and was named contributing editor of the *Alhambra Source* online news.

1973

Montie Gauss, CSci, MS EMgt'74: "I married Caryn Brinkmeyer, an education graduate of Missouri State University, in 1973 and began working for Alcoa, Davenport

Works in Riverdale, Iowa, in 1975. I retired after 30 years of working in computer analysis, industrial engineering and production management in 2005. Caryn and I have two sons and a daughter, who have blessed us with nine grandchildren. Caryn retired in 2006 from teaching preschool. Since retirement, we have focused on traveling and enjoying our family. Since graduation, we have enjoyed being involved in an informal alumni group of Rolla graduates who lived in House C of the MRHA, that meets annually or more frequently. We still live in the Quad City area of Iowa. Contact us at gaussmc@aol.com to catch up."

1974

Lindell "Bob" Hurst, MetE, MS MetE'77, MS EMgt'84, MS EMch'87: "I was co-editor of the Materials of Construction section for the Ninth Edition of *Perry's Chemical Engineering Handbook*. It was a great honor to

be asked to work on this prestigious publication."

1975

Delores J. "Dee" Hinkle, PetE, chair of the board and council president for Girl Scouts of San Jacinto Council, was named to *Houston Woman Magazine's* list of "Houston's 50 Most Influential Women of 2018." Hinkle retired as director of corporate reserves for Marathon Oil after 35 years in the oil and gas industry.

1976

Gary Terschluse, MS CE, was featured in the Dec. 15–16 weekend issue of the *Washington Missourian* for earning what the paper calls a "rare distinction in the field," earning three professional licenses. Terschluse is a licensed architect, a licensed professional engineer and a licensed structural engineer.

1977

David Diestelkamp, CE, was named operations manager for ABNA Services. He previously



BRANCH PROMOTED TO COLONEL

Kevin Branch, MS ME'06, MS EMgt'09, was promoted to colonel in the U.S. Army. Branch enlisted in ROTC at the University of Arkansas-Pine Bluff, where he majored in physics. He was commissioned as an Army field artillery officer in 1998. In 2007, he transferred to the Army Engineer Branch, where he serves as director of public works and regional engineer for the 99th Division.

Branch earned a master of defense studies degree from the Royal Military College of Canada and a master of national security strategy degree from the National Defense University. He studied at the National War College and Army Command and General Staff College. He earned the Bronze Star, Afghanistan Campaign Medal, Iraq Campaign Medal and the German Armed Forces Proficiency Gold Badge.

Photo courtesy of UIS Athletics



HISTORY GRAD RETURNS TO S&T TO COACH BASKETBALL

Bill Walker, Hist'87, former head men's basketball coach at the University of Illinois Springfield (UIS), joined the S&T athletics program as head men's basketball coach on April 1. He is the 15th head coach in the history of the Miner program. He succeeds **Jim Glash**, who retired after 10 seasons as head coach.

"I always loved my time at the university and no matter where I've been, I have followed the program closely and have been rooting for it from afar," Walker says. "It is a great honor to come back and occupy the seat that **Billy Key** and **Dale Martin** held so honorably during my time there as a student-athlete."

Walker began his coaching career as a graduate assistant at the University of Alabama-Birmingham, then became a full-time assistant at the University of Missouri-St. Louis, the University of Central Missouri, the University of Minnesota and Texas A&M University. He spent two seasons as a professional scout for the New Orleans Hornets, then spent a year at Drake University as an assistant coach before moving to UIS.

spent 38 years at Jacobs Engineering.

1978



Paul J. Nauert, EE, received the Outstanding Professional Engineer in Education Award from the Missouri Society of Professional Engineers in February 2019. Nauert teaches electrical engineering as an adjunct professor at Washington University in St. Louis and as a lecturer for Missouri S&T. He also teaches technical training courses for engineers and technicians at Ameren, where he retired after a 35-plus-year career.

1983

Paul T. Demzik, MinE, was elected chief commercial officer for Arch Coal Inc. He previously served as head of thermal coal trading at Anglo American and president of Peabody COALTRADE.



Matt Mabrey, MinE: "I was promoted to vice president of operations over the power generation and transmission groups for Hoosier Energy Rural Electric Cooperative Inc. Before joining

Hoosier in 2001, I worked for U.S. Gypsum Co., then a local aggregate company in southern Indiana. I earned a master's degree in engineering management from the University of Alabama in Huntsville, earned project management professional certification and became a certified cost engineering professional and certified lean six sigma black belt. The degree I earned at S&T created a solid foundation for me to work in a variety of disciplines. I've been married for 32 years, have four children and four grandchildren."

Helene Hardy Pierce, EMgt, received the 72nd annual J.A. Piper Award at the National Roofing Contractors Association Convention. The J.A. Piper Award is the roofing industry's most prestigious award.

1984

Raymond E. Williams, ME, an attorney with law offices in West Plains and Eminence, Mo., is the 2018-19 president of The Missouri Bar Association. He is a graduate of the University of Missouri School of Law.

Chris Yarnell, CE, manager of ESS Engineering Co. of Jefferson City, Mo., was inducted into the Helias High School Hall of Fame. Inductees must have graduated at least 20 years prior to induction, demonstrate loyalty and service to Helias, distinguish themselves in a chosen field, and exhibit high moral standards.



Jayant Ramakrishnan, MS ME'83, PhD ME'88, visited the Terra-Cotta Museum in the town of Xian while on a personal trip to China. "I thought it was a great place to wear the S&T Academy of Mechanical and Aerospace Engineers shirt."

1985

Timothy J. Aydt, ME, was appointed vice president of business development for MPLX GP LLC. He is located in Findlay, Ohio.

1986

Patricia Morreale, MS CSci, executive director of Kean University School of Computer Science, was elected a fellow of the American Association for the Advancement of Science. She was honored for exceptional leadership and service to advance diversity in computing, and for substantial research in multimedia systems and networks.

1988

Jeffrey S. Balmer, PetE, MS EnvE'93, PhD PetE'98, was named senior vice president and chief operating officer for Callon Petroleum Co.

Craig Borgmeyer, CE: "After 28 years in consulting, I have switched to the transportation industry. In August 2018, I started my new job as director of environmental engineering for the Kansas City Southern Railway Co."

1990

Jason Carter, MetE: "The company I founded in 2010, Aegis Strategies, had a great year. During 2018, we rebranded as UNCOMN LLC, were a third-time recipient of the INC 5000 'Fastest Growing Companies in America,' hired our 100th employee, were recognized as a 'Top Workplace' for the second year and ranked No. 1 in Employee Communications by the *St. Louis Post-Dispatch*. We were recognized by CIOReview as one of the nation's '20 Most Promising AWS Solution Providers — 2018' and we became CMMI Dec-III certified."

1991

Mark Stielow, ME, a project manager for GM, was featured in a *HOT ROD* magazine Q&A in November 2018. In the article, Stielow mentions his background as Formula SAE team captain in 1990 and 1991.

1993

Tim Hellebusch, CE, resident engineer for the Missouri Department of Transportation Highway 47 bridge over the Missouri River near Washington, Mo., was featured in a *Washington Missourian* article about his partnership and friendship with **Kevin Kriete**, MS CE'04, an engineer with HDR Inc., the bridge design firm. Hellebusch and Kriete both graduated from St. Francis Borgia Regional High School 30 years ago.

1994

John Schroeder, CE, professor of atmospheric science in the geosciences department at Texas Tech University, was named senior director of the National Wind Institute.

1995



Sean Peters, GeoE, and Col. **Scott Preston**, CE'97, MS EMgt'02, are both attending the U.S. Marine Corps War

College in Quantico, Va. The photo shows them on Omaha Beach in Normandy, France, as part of the college's staff ride during their study of World War II.

Andre D. Taylor, ChE, professor of chemical and biomolecular engineering at New York University, found an innovative and promising way to improve solar cells and make their use in many applications more likely. Taylor earned a master's degree from Georgia Tech and a Ph.D. from the University of Michigan. Before joining NYU, he was the first chaired African American professor in Yale University's School of Engineering and Applied Science. Taylor earned a National GEM Consortium Fellowship that funded both his master's degree and his Ph.D.

1998

Mark Tschopp, MetE, MS MetE'99, regional lead for the U.S. Army Research, Development and Engineering Command Research Laboratory's regional campus in the central region and a materials researcher, was named a fellow in the American Society for Metals (ASM). The fellowship honors members for achievement and distinguished contributions to materials for industry, academia and government. "It's funny to think back to how this whole journey into materials started," Tschopp said in a U.S. Army Research Laboratory story. "Prof. **Ronald Kohser** at Missouri S&T,



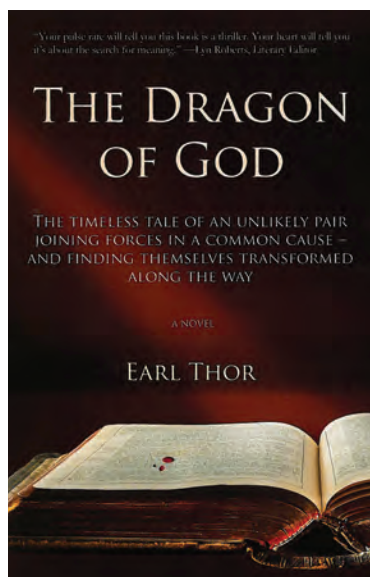
NINH SHARES PEACE CORPS STORIES

A blog post written by **Kayla Ninh**, EE'16, was featured in *THE BRIDGE*, the magazine of the Institute of Electrical and Electronics Engineers-Eta Kappa Nu (IEEE-HKN). Ninh shares her experiences with the Peace Corps, a U.S. government volunteer program that provides social and economic development abroad while promoting mutual understanding. She was stationed in Lesotho, Africa, a landlocked country surrounded by South Africa.

In the post, Ninh speculates that promoting STEAM (science, technology, engineering, arts and mathematics) education could help bring a country out of poverty.

Ninh also discusses the challenges students in Lesotho face, including hours-long walks to school, a lack of resources and daunting weather conditions. Educators must face the perception that STEAM subjects are difficult and that there is a lack of proper supplies for the classes, she says.

"IEEE-HKN was founded on a commitment to service, a value that I tried to instill in others during my time with the university's Gamma Theta chapter and a value that I still remind myself of every day," says Ninh, who was president of the IEEE-HKN student chapter at S&T. "My experience of service with IEEE-HKN and STEAM disciplines at Missouri S&T drove me to turn words of problems into actions of solutions."



CHAPIN WRITES NEW THRILLER

Roger Chapin, Math'64, MS Math'66, wrote a novel titled *The Dragon of God*, a religious thriller that follows a religion professor who investigates the deaths of people who — through prior near-death experiences — believe that Christian fundamentalist beliefs are based on a misinterpretation of the Bible.

Chapin, writing under the pen name Earl Thor, says that he got the idea for the novel from his enjoyment of the debate format.

"What theme could be more significant than the question of life after death — the question that Plato said was the most important question of existence?" says Chapin. "I spent five years studying the Bible, books about the Bible and books about the craft of writing — all new territory for a math major who had a career in software development."



FUTURE MINERS

1. **Courtney Buck**, Econ'03, and his wife, Kayla Ann, had a girl, Cora Genevieve, on July 24, 2017. She joins sister Cameron Ann, 5, and brother Charles Tristan, 3.

2. **Edward Coco**, NDD'90, and his wife, Colleen, had a girl, Kira Kathleen, on Jan. 4, 2019. Her grandfather is **Matt Coco**, CE'66.
3. **Benjamin Irwin**, ME'08, and his wife, Megan, had a boy, Gabriel Russell, on Feb. 23, 2019.
4. **Tyler Johnson**, Hist'09, BSci'09, and his wife, Rachel, had a girl, Charlotte, on June 14, 2018.
5. **Dan Lester**, Bus'05, and his wife, Burnea, had a boy, Layland Daniel Frank, on April 17, 2018. He joins brother Daniel "Dane" Frank.
6. **Erik Lorince**, AE'10, and his wife, **Kierstyn (Harvey)**, CE'09, had a girl, Sofie Kathleen, on Oct. 5, 2018. She joins sister Emma, 4.

now retired, pulled me and my parents aside on a visit to campus to tell me about materials. I've been hooked ever since."

1999

Jeffrey Zimmerman, MS EMgt, was named director of facilities management for Pine-Richland. He previously served as regional facilities director for CBRE Group Inc. and regional facilities manager for Dick's Sporting Goods.

2001

Roger Smith, CerE, MS CerE'02, was appointed technical manager for Plibrico. He is responsible for development of refractory formulas and providing technical guidance to the company's partners and customers.

2002

Chris Vaeth, CE, vice president of McCown Gordon Construction in Kansas City, was named to the *Engineering News-Record* list of 40 Top Young Professionals in the Midwest Under 40.

2004

Kevin Kriete, MS CE, an engineer with HDR Inc., the firm that designed the Highway 47 bridge over the Missouri River near Washington, Mo., was featured in a *Washington Missourian* article about his partnership and friendship with **Tim Hellebusch**, CE'93, resident engineer for the Missouri Department of

Transportation's bridge project. Hellebusch and Kriete both graduated from St. Francis Borgia Regional High School 30 years ago.

James Parks, CE, was named senior design manager for Castle Contracting. He previously served as senior project manager at Glasper Professional Services, assistant project manager at CDG Engineers, and project engineer at Crafton, Tull and Associates.

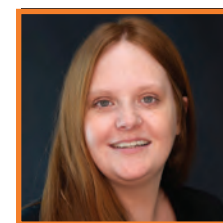
2005

Grant Mabie, Bus, was elected mayor of Crestwood, Mo., in November 2018.

2010

Logan Strother, Hist, assistant professor of political science at Purdue University, published a piece on race and the second amendment in *The Washington Post*.

2011



Alexandra Harmon, EnvE, an environmental scientist, joined Hanson Professional Services Inc.'s Corpus Christi office as part of the environmental group.

Brian T. Molloy, EMgt: "I am an online graduate student in geological engineering (at S&T). I am also an active-duty captain

assigned to the Army Corps of Engineers in Pittsburgh. During the last three years, I have been fortunate to be entrusted with leading several high-profile projects, including a \$500 million nuclear waste remediation project, a pilot project to convert corps locks to remote operation, and as the lead strategic planner for the power grid restoration of Puerto Rico, among many others."

2015

Leslie Cerny, CE, ArchE, was named vice president at Gateway Land Services, an engineering and land surveying company.

Kayla Stephens, CE, was hired to head the Union, Mo., public works department. She is only the second public works director in Union history. Previously, she was

a project engineer for Byrne and Jones Construction.

2016

James Trusler, Hist, who teaches social studies and coaches at Rolla Junior High School, received

the Outstanding Beginning Teacher Award at the Missouri Association of Colleges for Teachers of Education (MACTE) conference in March. Trusler is a graduate of S&T's teacher education and certification program.

2018

Emily Echele, CE, ArchE, joined S.M. Wilson and Co. as a project engineer. She worked for S.M. Wilson on an apartment complex project as an intern during summer 2018. ▣



Patent attorney **Mike Thomas**, EE'90, and his wife, **Marybeth (Volk) Thomas**, EE'92, spent a week in January on a ski trip to Steamboat Springs, Colo., with sons **Adam**, a senior in electrical engineering at S&T, and **Anthony**, a sophomore in electrical engineering, and nearly 200 other S&T students as part of a travel opportunity available to students and their families.

S&T GRAD HELPS CAPTURE FIRST-EVER IMAGE OF BLACK HOLE

This past spring, an S&T graduate was among the group of scientists who captured the first image of a supermassive black hole at the center of Messier 87, or M87. M87 is a galaxy within the Virgo galaxy cluster, 55 million light years from earth. **Frederick K. Baganoff**, Phys'85, a research scientist at the Massachusetts Institute of Technology's Kavli Institute for Astrophysics and Space Research, collaborated on the international Event Horizon Telescope project to produce the first direct images of a black hole. Baganoff and over 200 scientists worldwide announced this breakthrough on April 10 in a series of papers published in a special issue of *Astrophysical Journal Letters*.

A NEW FACE OF CIVIL ENGINEERING

The American Society of Civil Engineers named **Andrea DuMont**, GeoE'11, one of 10 New Faces of Civil Engineering for 2019 in the Professional category. The program recognizes young civil engineers for their achievements and contributions to the society.

DuMont, a professional engineer who earned a master of science degree from Texas A&M, works as a water resources engineer for Jacobs Engineering.

When she isn't busy at her day job, DuMont authors "The Watermark" on andromedadumont.com, a blog focused on sharing a behind-the-scenes look at civil engineering. The blog, her Instagram feed and her YouTube channel, youtube.com/andidumont are aimed at young women who are interested in engineering.

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MINERS REMEMBERED

Missouri S&T Magazine will announce deaths when information is submitted by an immediate family member or published in a newspaper obituary. Notification of deaths that have occurred more than two years before the date of publication will not be published unless a special request is made by a family member. Yearbook photos, if available, will be included for alumni when families submit obituary information. Due to the production time required for each issue, submissions may take up to six months to appear. Your patience is appreciated.

magazine. He was president and founder of Raymondo J. Chico Inc. and of American Gold Mineral Corp. He served as president of Amada Mineral Corp. and owned Northern Iron Ore Mines Ltd. (Jan. 30, 2019)

Lee R. Courson, Chem
(Jan. 11, 2019)



1941

Leonard J. Stohldrier,
ME (Aug. 27, 2018)

1944

Beryl H. Haught,
NDD (Aug. 8, 2018)

1945

Ralph E. Kolde, NDD
(Oct. 22, 2018)

1946

Jean E. Janssen, NDD
(April 17, 2018)

Jose Machado, MinE
(April 2, 2017)

1948

Vernon R. Lawson,
EE (Nov. 12, 2018)

Richard A. Walker,
ME (Jan. 4, 2018)

1949

Charles R. Boutin,
EE (Sept. 5, 2017)

Albert F. Seelig, ME
(June 1, 2017)

Charles P. Springstube,
ME (Nov. 25, 2018)

Judson M. Willis,
ME (Feb. 18, 2019)

1950

Earl A. Bage, ME
(Oct. 8, 2018)

William F. Bucha,
CE (Aug. 25, 2017)

Willis S. Cady, MetE
(Dec. 1, 2018)

Jack K. Coffelt, CE
(Dec. 15, 2018)

Robert E. Collins,
CerE (Jan. 2, 2019)

**Robert Carlyle
Edmunds**, NDD
(Jan. 16, 2019)

Clarence E. Graves Jr.,
GGph (Oct. 27, 2017)

Jack A. Liebsch, CE
(Dec. 1, 2018)

Arthur L. Schmidt,
ChE (Feb. 18, 2019)

Arthur A. Smith,
ME (Jan. 19, 2019)

Davis T. Steele, ME
(April 4, 2017)

William L. Utnage,
ChE (Feb. 3, 2019)



Victor E. Van Matre,
MinE, was a former
assistant bridge engineer
for the California
Bridge Department.
(July 29, 2018)

1951

James G. Roberts,
EE (July 22, 2018)

1952

Kenneth L. DeLap,
CE (Nov. 23, 2018)

Nicholas J. Gioseffi,
MetE (March 25, 2018)

1953



Jack L. Eason, CE,
was a member of Pi

Kappa Alpha, Blue Key
and Chi Epsilon and
worked on the *Rollamo*.
He served in the U.S.
Navy during the Korean
Conflict and then
joined his father in the
structural engineering
business. (Jan. 3, 2019)

Joe A. Henry, MetE
(Oct. 21, 2018)

Robert D. Jenkins,
CE (Nov. 25, 2018)

James F. Roberts,
CE (Nov. 28, 2018)

1955

Carl Gene Penzel,
CE (Nov. 20, 2018)

Edward N. Sickafus,
Phys, MS Phys'56
(Nov. 15, 2018)

1956

Gerald W. Hoffstetter,
ChE (Feb. 4, 2019)

1957

Clifford C. Tanquary,
CE (Nov. 1, 2018)

1958

Philip E. Gerwert,
ChE (Jan. 1, 2019)

Jack B. Haydon, CE
(Feb. 13, 2019)



Richard H. Okenfuss,
ChE, MS ChE'60, was a
member of Phi Kappa
Theta and worked
on the *Rollamo*. He
and his wife, Julie,
were members of the
Order of the Golden
Shillelagh. Mr. Okenfuss
joined Procter &
Gamble in 1960 and
worked there for 35
years. After retirement,
he traveled the world.
(Jan. 22, 2019)

R. Thomas Smith,
CerE (Jan. 13, 2019)

Donald B. Stormont,
ChE (Jan. 14, 2018)

1959

Carl R. Carver, PetE
(Oct. 20, 2018)

Raymundo J. Chico,
MS GGph, was
featured in the 1994
Entrepreneurs issue
of the *UMR Alumnus*

Ronald B. Husemann,
ChE, was a member
of Beta Sigma Psi and
the St. Pat's Board and
participated in Army
ROTC. Mr. Husemann
was St. Pat in 1958.
After graduation, he
served in the U.S. Army
and was stationed in
Alaska. He worked for
Goodrich Chemical.
He retired as a
manager of production
performance and
development for
Crown Zellerbach.
(Dec. 12, 2018)

Robert F. Pare, NDD
(Jan. 14, 2019)

William O. Statler Jr.,
ME (Nov. 26, 2018)

1960

Eldon R. Dille, ChE
(Nov. 18, 2018)

1961

Robert L. Craig, CE
(Jan. 25, 2019)

John L. Hodges,
ME (Jan. 2, 2019)

Bill J. Pfefferkorn,
CE (Feb. 2, 2019)

1962

Aylmer P. Cheng,
CE (Oct. 25, 2018)



Charles K. “Charlie” McCaw, ME, was a member of Sigma Nu, M-Club, the American Society of Mechanical Engineers and Jacking Jocks, participated in Army ROTC and played football for the Miners. Mr. McCaw entered the Army in 1961, where he served as combat engineering commander before his discharge as a first lieutenant in 1989. He began his engineering career with Cities Service, worked for several companies through mergers and acquisitions, and spent the last 12 years of his career as vice president of pipeline for Williams Pipeline. He retired in 1996. (Dec. 31, 2018)

Ned M. Hutchins,
MinE (Feb. 17, 2019)

1964



John P. Banks, CerE,
was a member of

Continued on page 45



REMEMBERING FORMER CHANCELLOR JOHN F. “JACK” CARNEY III

Dr. **John F. “Jack” Carney III**, former chancellor of Missouri S&T, died Wednesday, April 24, at his home in Cambridge, Massachusetts. He was 77.

Dr. Carney’s appointment as chancellor at Missouri S&T began on Sept. 1, 2005. He retired on Aug. 31, 2011.

He led the decision to rename the campus in 2008 to Missouri University of Science and Technology to better position the campus as a nationally recognized technological research university. He also presided over S&T’s \$127.8 million Advancing Excellence fundraising campaign.

S&T initiated or completed several major projects during Carney’s tenure — all benefiting from private funds during a time of declining state support. They include the construction and renovation of Toomey Hall; the completion of the first building of Innovation Park; construction of the Miner Dome Indoor Practice Facility for athletics; construction of a new fitness center and varsity weight and cardiovascular training rooms; and construction of the Kummer Student Design Center. He also secured private funding and bond financing for James E. Bertelsmeyer Hall, which was completed in 2014.

A native of Massachusetts and a civil engineer by profession, Dr. Carney held a bachelor of science degree in civil engineering from Merrimack College in North Andover,



Mass., and master of science and Ph.D. degrees in civil engineering from Northwestern University in Evanston, Ill.

Before joining S&T, he served as provost and vice president for academic affairs at Worcester Polytechnic Institute in Worcester, Mass., and served in faculty and administrative positions at the University of Connecticut, Auburn University and Vanderbilt University.

Dr. Carney was most recognized in the research community for his work in the area of impact mechanics. He held 10 patents. One of his projects was included in the publication *Technology Transfer Works: 100 Innovations from Academic Research to Real-World Application*. Today, devices he designed and developed, known as crash cushions, line highways in the United States and other countries.

In 2018, Dr. Carney was named Honorary St. Patrick and served as parade marshal for the 110th St. Pat’s celebration. He was a strong supporter of St. Pat’s in Rolla, and the St. Pat’s Celebration Committee presented him with the St. Pat’s Order of the Emerald at his retirement. In 2012, Dr. Carney was presented the Chancellor Medal in recognition of his contributions to the well-being, growth and development of the university.

Donations in his honor may be made to the Multiple Myeloma Research Foundation at tribute.themmrf.org/jfc3.



1. **Chester Hugh Baker**, CE'55, died Jan. 27, 2019. He was 104. Mr. Baker worked at the U.S. Geological Survey in Rolla for more than 30 years, retiring in 1981. He is the namesake of the Chester and Evelyn Baker Greenhouse, located on the roof of the Butler-Carlton Civil Engineering Building. A registered professional engineer, Mr. Baker was a member of the American Society of Professional Engineers, the Missouri Society of Professional Engineers, Chi Epsilon Honor Society and the Potosi Masonic Lodge 131.
2. **Donald G. Brackhahn**, Hon'93, former executive director of the Miner Alumni Association, died April 1, 2019. He was 81. Mr. Brackhahn joined the S&T staff in 1985 and retired in 2002. He and his wife, Nancy, have been longtime supporters of S&T, the alumni association and Miner athletics. Mr. Brackhahn taught social sciences and served as athletic director for the Kansas City (Missouri) Public School System for six years. In 1966, he became an alumni director at his alma mater, the University of Missouri-Kansas City, and in 1970, he was appointed director of development and alumni relations at UMKC. Mr. Brackhahn held bachelor of arts and master of arts degrees in history from UMKC. He was the first president of the UMKC Alumni Association, and in 1989 he received a presidential citation for his service to the university and his development efforts. In 1993, the Miner Alumni Association awarded him honorary life membership, and in 1995, he was dubbed an Honorary Knight of St. Patrick. In 2000, Mr. Brackhahn was named one of UMKC's Top 100 Innovators and Benefactors. Upon his retirement from S&T in 2002, the Chancellor's Advisory Committee on African American Recruitment and Retention commended him for his work to build ethnic diversity among alumni constituents.
3. Dr. **Nord Gale**, founding chair and professor emeritus of the biological sciences department, died Feb. 1, 2019. He was 80. Dr. Gale served Missouri S&T for 32 years, retiring in 2000. During his time at S&T, he received 18 Outstanding Teaching Awards and the Governor's Award for Excellence in Education and was named Curators' Distinguished Teaching Professor. One of Dr. Gale's final accomplishments before retirement was writing the proposal that was ultimately successful in establishing a graduate biology program. Missouri S&T's Gale Hufham Scholarship for students in biological sciences is named after Dr. Gale and the late Dr. **Jim Hufham**, the first faculty member Dr. Gale hired.



ThetaChi fraternity. He retired from PPG Industries as director of quality and value focus. He also served the company as plant manager, director of manufacturing services for automotive glass and chief quality control engineer. (Oct. 28, 2017)

David M. Griffith, CE (Dec. 9, 2018)

Charles R. Harrison, ME (Dec. 16, 2018)



John W. Lamont, EE, was a member of GDI, Eta Kappa Nu and IEEE as a student. He earned his Ph.D. at the University of Missouri-Columbia in 1970 and taught on the engineering faculty of the University of Missouri, the University of Texas and the University of Southern California, and retired as professor emeritus from Iowa State University in 2007. He also managed research at the Electric Power Research Institute in Palo Alto, Calif. Dr. Lamont was a licensed professional engineer in Missouri, Texas and California, and he was a member of IEEE and Sigma Xi. (Nov. 27, 2018)



Charles M. Leslie, EE, was a member of Tau Kappa Epsilon fraternity and retired as an engineering manager from Kraft Foods Inc. (Oct. 14, 2017)

Dale E. Sukow, CE, MS CE'66 (Feb. 4, 2019)

1965

Bruce R. Morhaus, Math (Nov. 10, 2018)

Michael J. Slapak, EE (Feb. 1, 2019)

1966

Richard W. Merritt, MetE (Nov. 19, 2018)

1967

Thomas L. Joslin, EE (Dec. 1, 2018)

1968

George D. Leaming, CE (Oct. 26, 2018)

Joseph J. Long, CE (Nov. 4, 2018)

John B. Mitchell, ME, was a member of Tau Kappa Epsilon. He earned a law degree from American University in Washington, D.C., and traveled extensively. He retired as associate general counsel for New Holland North America Inc. (May 27, 2018)

Donald G. Ozburn, ME (Nov. 13, 2018)

1969

James Averweg, EE (Feb. 12, 2019)

Patricia J. Blair, Chem, MS Chem'70 (Nov. 18, 2018)

Donald P. Bloechle, CerE (Nov. 17, 2018)

1970

Carl G. Duffner, ME (Dec. 16, 2018)

Kenneth E. Moss, CE (Jan. 3, 2019)

David E. Neely, EMgt (Feb. 13, 2019)

1971

Jack B. Enger, MS EMgt, was a retired lieutenant colonel in the U.S. Air Force. (Sept. 9, 2017)

Thomas D. Wichlinski, ChE (Nov. 14, 2018)

1972

Richard T. Booth, CSci (Nov. 22, 2018)

Alan D. Bowlsby, EMgt (Oct. 28, 2018)

D. Dudley Harrelson, ChE (Nov. 2, 2018)

Douglas A. Hopkins, CE (Nov. 13, 2018)

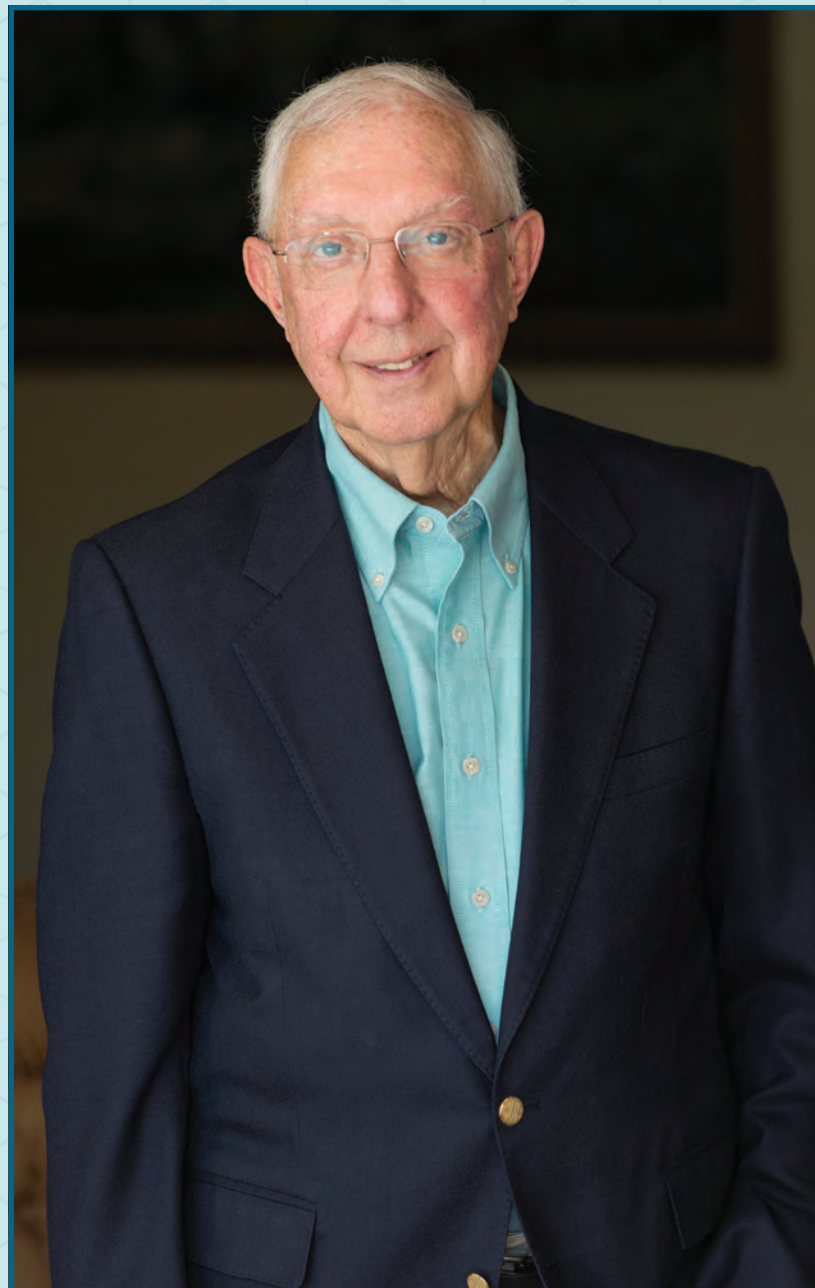
Warren N. Keith, CE (Dec. 6, 2018)

Gregory G. Lalish, GGph (Dec. 1, 2018)

1973

Michael A. Pekarik, ChE (Nov. 11, 2018)

Thomas J. DePauw, CSci (Jan. 28, 2019)



Richard K. Vitek, MS Chem'58, died May 21, 2019. He was 84. Mr Vitek began his career as a research chemist for the Atomic Energy Commission producing uranium from ore. Then as a scientist with Allied Chemical Co., he developed solid oxidizers for rockets and missiles for the U.S. space program's Advanced Research Projects Agency. He worked as national sales and marketing director for Aldrich Chemical Co. before founding three startups in the 1970s, including FOTODYNE, a pioneer in molecular imaging and the first company to manufacture lab instruments for DNA research. Working with the U.S. Coast Guard, Mr. Vitek developed UV imaging instruments that analyze oil spills to identify the tankers responsible. He then developed a method of testing arsenic levels in wine that led the Environmental Protection Agency to impose stricter limits on pesticide use in U.S. vineyards. Mr. Vitek retired as chair and CEO of FOTODYNE in 2002. At Missouri S&T, his legacy includes an endowed chair in biochemistry and a graduate fellowship in analytical chemistry. He was also a past president of the Board of Trustees and trustee emeritus, and co-founder of the S&T Foundation for Chemical Research. In 2016, he was honored as one of S&T's Alumni of Influence.



1. Dr. **Barry Flachsbart**, professor emeritus of business and information technology, died May 25, 2019. He was 81. Dr. Flachsbart served on the S&T faculty for over 50 years, starting as an adjunct member and eventually becoming a full professor. His S&T career included a term as chair of information science and technology. Prior to joining S&T, Dr. Flachsbart was an aeronautical engineer at the McDonnell Douglas Co., and worked for Union Pacific in its emerging technology division. He earned his Ph.D. from Stanford University. Flachsbart is credited with helping to incorporate the city of Chesterfield, Mo., in the 1980s. He was also one of the city's longest-serving city council members and helped establish the city's police department. He served as temporary mayor of Chesterfield from 2010 to 2011.
2. **Catherine George**, wife of the late **Lawrence C. George**, Hon'89, an assistant to the Chancellor for Affirmative Action and Equal Opportunity, died Dec. 29, 2018. She was 81. For 60 years, Mrs. George was an active member of the Rolla community. She chaired Christ Episcopal Church's Open Door program that provided food to the needy, served on the board of directors for Big Brothers/Big Sisters, volunteered at the Russell House women's shelter and was a founding member of the Rolla chapter of the NAACP. She earned the "Yes I Can" award for her contributions to the NAACP and was "Mother" of the former Epsilon Psi Chapter of Alpha Phi Alpha Fraternity at Missouri S&T.
3. Dr. **Sotirios G. Grigoropoulos**, professor emeritus of civil and environmental engineering, former director of the Environmental Research Center and former director of the professional training program in water supply and pollution control, died Jan. 27, 2019. Dr. Grigoropoulos joined the S&T faculty in 1960 and served until 1982. He earned a chemical engineering degree from the National Technical University of Athens in 1955, and a master of science degree in chemical engineering in 1958 and a doctor of science degree in environmental and sanitary engineering in 1960, both from Washington University. Dr. Grigoropoulos' research focused water pollution control and water purification.

Gerald T. Weir, Chem
(Feb. 10, 2019)

1974

Charles L. Raab, CE
(Nov. 14, 2018)

1975

V. William Kolze,
EE, MS EMgt'76
(Dec. 12, 2018)

1977

William R. Christians,
MinE (Jan. 2, 2019)

1980

Steven C. Keaveny, ME,
EMgt'83 (Jan. 5, 2019)

1982

Patrick John Corkery,
MS CSci (Jan. 8, 2019)

Scott Denis Herzog,
ME (Jan. 30, 2019)

1983

Harold K. Chernoff,
NucE (Nov. 17, 2018)

1985

Steven W. Anthony,
PetE (Jan. 30, 2019)

Jeffrey W. Koch, EE,
was a member of IEEE,
Student Union Board,
Tau Beta Pi, Kappa
Mu Epsilon, Eta Kappa
Nu, the Association
for Computing
Machinery, Sigma Pi
Sigma and Phi Kappa
Phi. He was deputy
assistant secretary for
administration and
management at the
U.S. Department of
Labor, where he held

various appointed
positions. He worked
at the White House
Office of Management
and Budget and
received a letter of
commendation from
Pres. George W. Bush.
Before moving to
Washington, D.C., he
was an engineer at
RF Monolithics Inc.
and E-Systems in the
Dallas-Fort Worth
area. (Nov. 3, 2018)

1986

Greg C. Raimondo,
EMgt (June 14, 2018)

1989

Jeffrey Alan Furman,
CSci (Nov. 15, 2018)

1997

Mark Edward Burton,
GGph, MS GGph'05
(Oct. 27, 2018)

1999

Gina M. Stephens, CSci,
was a member of the
Racquetball Club and
worked for Thomas
Reuters. (Oct. 7, 2018)

2002

Venkata Amaravadi,
MS ME (Feb. 19, 2019)

Jessica Steinmetz,
NDD (Nov. 17, 2018)

2014

Patrick Moore, IST
(Feb. 2, 2019)

2019

Patrick Beasley, MinE
(April 28)

FRIENDS

Peggy Bay, wife of Robert D. Bay, CE'49 (Jan. 9, 2019)

Amanda K. Bridegroom, wife of John Bridegroom, EE'99 (Dec. 24, 2018)

Helen Bruening, wife of the late Richard Bruening, ME'34 (Oct. 23, 2018)

Vincent Carpenter, retired S&T staff member (Feb. 4, 2019)

Betty Cleveland, former S&T staff member in electrical engineering and University Police and wife of the late Harold Cleveland (Feb. 13, 2019)

Helen Coolidge, wife of the late Donald Coolidge, ME'43 (Nov. 18, 2018)

Norman J. Deleo (Aug. 11, 2017)

Marcia Dever, wife of the late John P. Dever, EE'57 (Sept. 21, 2017)

James B. Devlin, junior in mechanical engineering at Missouri S&T (Dec. 27, 2018)

James L. Gaddy (Jan. 29, 2019)

Dolores Houk, wife of the late Clarence Houk, GGph'50 (March 14, 2017)

Clarellen W. Howerton, wife of the late Joseph W. Howerton, MetE'38 (Sept. 13, 2018)

Mary E. Koch (July 12, 2018)

Robert L. Krantz (Aug. 2, 2018)

Dwight Lowry Lyle, retired from printing services at S&T after 30 years of service (Jan. 20, 2019)

Geraldine "Gerre" McKay, worked as an administrative secretary at Missouri S&T for 16 years (Dec. 11, 2018)

Catherine "Sue" Meschke (Dec. 13, 2018)

Robert E. Myers Jr. (Feb. 8, 2019)

Shannon Nash (Dec. 14, 2018)

Bill Ransdall, former president of Ransdall Recycling and former Missouri state representative (Nov. 12, 2018)

Shirley J. Snelson (Aug. 29, 2018)

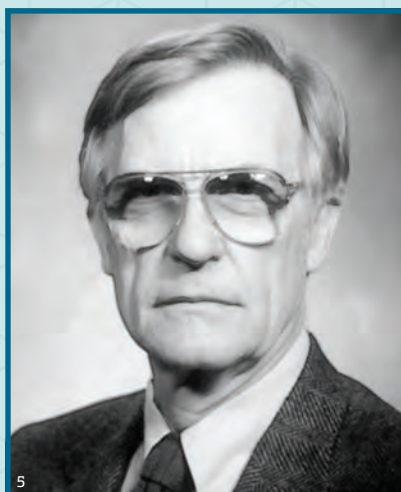
Janice I. Spurgeon, former administrative assistant in electrical engineering at Missouri S&T (Jan. 18, 2019)

Patricia Swartz, former administrative secretary at Missouri S&T and wife of the late Glenn I. Swartz, MetE'60 (Dec. 31, 2018)

Anne Ellen Tebeau, a former S&T student (Jan. 5, 2019)

Raymond Len Walderich, a longtime employee of the U.S. Geological Survey in Rolla (Dec. 12, 2018) ■

4. Dr. **Lyle Rhea**, professor emeritus of mechanical engineering and former Miner baseball coach, died Nov. 17, 2018. He was 86. Dr. Rhea joined the S&T faculty in 1964 teaching heat transfer and mechanical engineering courses. He also coached the university's baseball team for several seasons in the 1970s. Dr. Rhea earned his Ph.D. in mechanical engineering from Kansas State University. After teaching for a dozen years at S&T, he became team leader for the Bradley Firing Port Weapon at Picatinny Arsenal, also serving as an expert witness testifying at congressional committee meetings in Washington, D.C. He later returned to teaching at Arkansas State University, where he retired in 1983. In 1996, Dr. Rhea moved back to the Rolla area and served as chair of the Phelps County Republican Committee and appeared before higher education committees in both the Missouri House and Senate.
5. Dr. **Earl Frederick Richards Jr.**, MS EE'61, PhD EE'71, professor emeritus of electrical engineering, died Dec. 27, 2018. He was 95. After serving in the U.S. Army during World War II, Dr. Richards earned a bachelor of science degree in electrical engineering from Wayne State University in 1951. He then moved to Rolla and spent over 50 years with the university, first as a student and then as a faculty member. He was a member of the Small Motor Manufacturers Hall of Fame and advisor to Theta Xi and Eta Kappa Nu at S&T.
6. Dr. **Hirotsugu K. "Koge" Yasuda**, former professor of chemical engineering at Missouri S&T and director of the Institute for Thin Film Processing, died Oct. 29, 2018. He was 88. Dr. Yasuda moved to the University of Missouri-Columbia as chair of chemical engineering in 1988. He was an expert in plasma polymerization and the ways it could be used. Among other accomplishments, he helped Saturn adhere paint to its cars' bumpers, developed the process to prevent seawater corrosion for the military and created a coating that allowed contact lenses to be worn day and night for up to a month. He retired from MU in 2003 and cofounded Bio Interface Engineering in 2011. The company produces artificial skin for burn victims.





REMEMBERING A BELOVED SON, BROTHER AND FRIEND

Wayne and Kay Beasley with their son, Matthew, and Megan McIver at the Experimental Mine where their late son, Patrick, studied mining and explosives engineering.

Kay Beasley remembers her son, **Patrick Beasley**, MinE'19, as someone who delighted in bringing home rocks. "As a kid, he would pick them up and my pockets would be full," she says. "He still has rocks lining the window ledge in his room. Not long ago, he brought home the Missouri state mineral."

"Galena," adds Patrick's father, **Wayne Beasley**, CSci'85. "He was so excited to find it."

The Beasleys' 23-year-old son died on April 28 in his sleep. On May 17, his father and brother, **Matthew Beasley**, MinE'15, accepted his diploma on his behalf. Patrick earned a bachelor of science degree in mining engineering with minors in explosives engineering and geology.

With the support of family, friends and the community, the Beasleys have established the Patrick Beasley Memorial Scholarship Endowment to support students majoring in mining engineering, explosives engineering or geology. Also contributing are members of the S&T Greek community. Patrick and Matthew are Kappa Sigma members, and their father is a member of Sigma Nu.

"We wanted to create something lasting in honor of Patrick," says Wayne, a retired Air Force officer

who is now a pilot for American Airlines. "Patrick was an outdoor enthusiast — he loved hiking, skiing, hunting and just being outdoors. This led to his strong interest in the environmental side of mining engineering."

Patrick was to have begun work with Kiewit Mining Group's San Miguel Lignite Mine in Christine, Texas. He recently received the Watchman Award presented by the Old Timers Club, a national honor established in 1938 by coal mining executives. More than 40 S&T students have been recipients.

Miner pride runs deep in the Beasley family. Patrick's uncles, **Bruce Berwick**, EMgt'87, and **Carl Berwick**, MinE'97, are Miners, as well his late great-great-uncle, **John Berwick Jr.**, MetE'39, and Wayne and Kay's godson, **Joe Haas**, MinE'07.

For Wayne and Kay, Patrick described himself best in a paper he wrote in 2014 for his freshman engineering class: "I believe that I exemplify the stereotypical engineering student. I would rather solve a math problem or play with rocks than write a short paper such as this one."



Patrick Beasley

"That's who Patrick was and that's the kind of student we're hoping to assist with this scholarship," Wayne says.

For more information on the Patrick Beasley Scholarship Endowment, contact **John Held** at heldjohn@mst.edu or 573-341-6533.



SURVEYING FOR SOCIETY

Student members of Engineers Without Borders center a surveying tripod over a nail while training with surveying gear at Schuman Park in preparation for summer EWB travels.



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