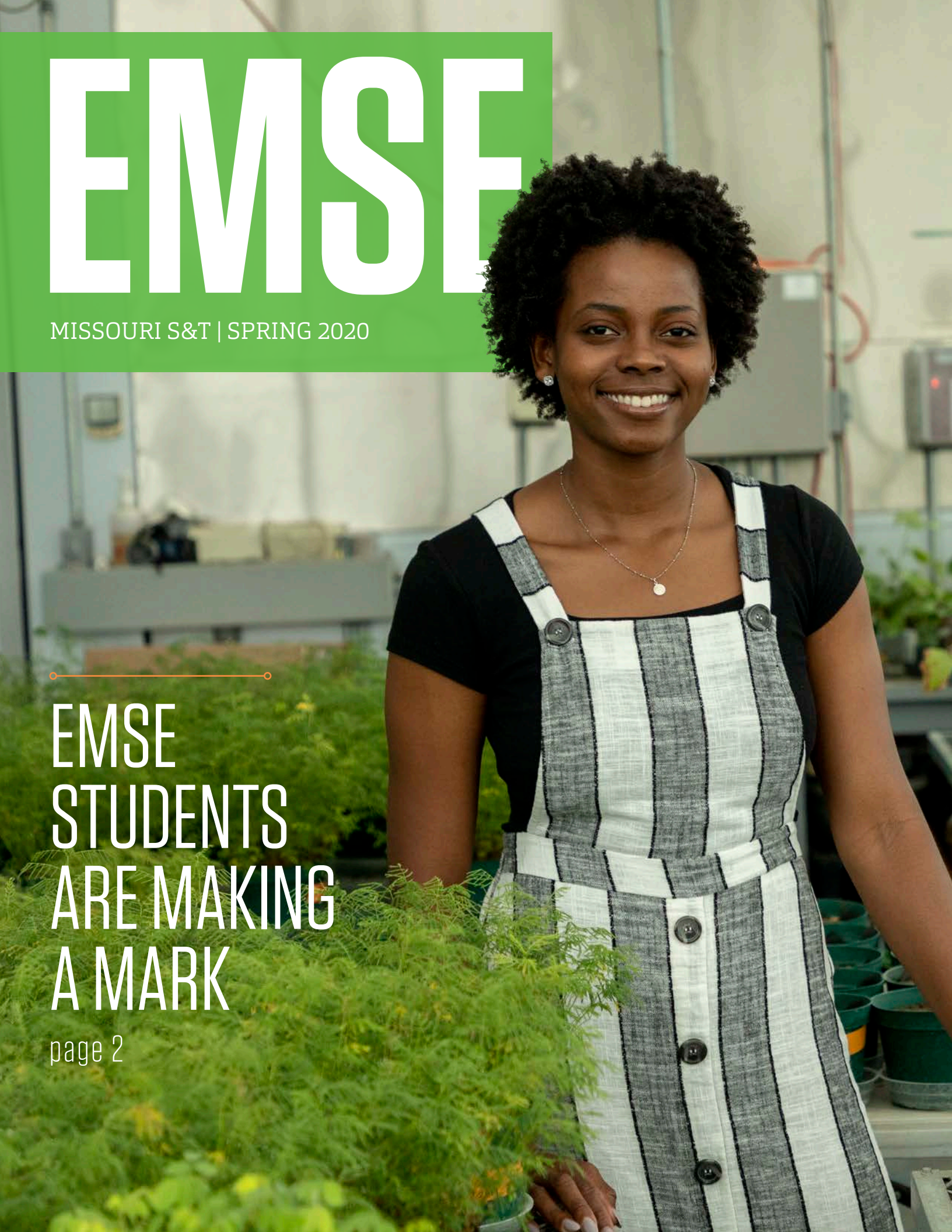


EMSE

MISSOURI S&T | SPRING 2020



EMSE
STUDENTS
ARE MAKING
A MARK

page 2

Preparing engineers for

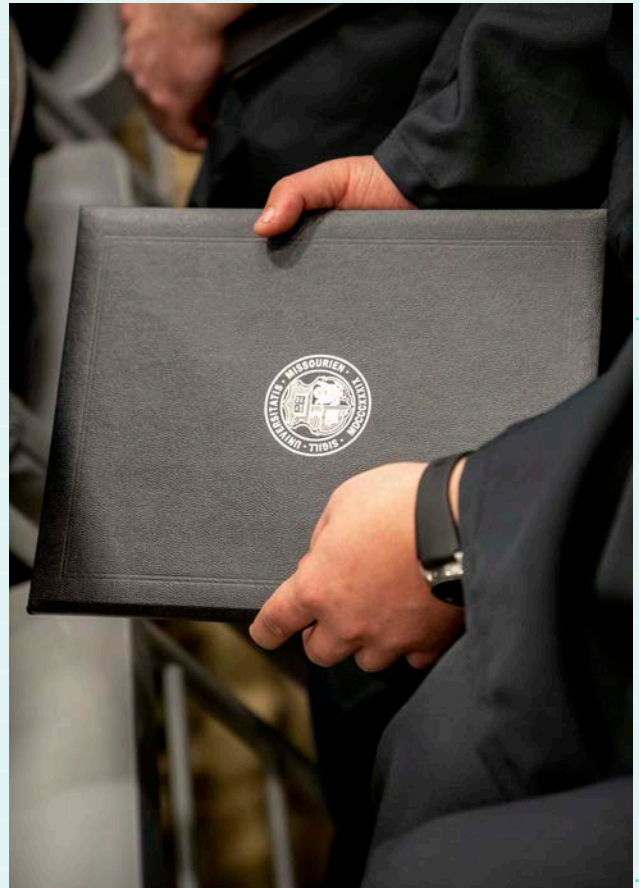
BIG-PICTURE LEADERSHIP

In engineering management and systems engineering, preparing engineers for leadership is what we do. And maintaining a big-picture mindset is how we do it.

For many students, the first step of that leadership journey is scholarship support.

So when you get a call from a Missouri S&T student, we hope you'll take the time to talk. We also hope you'll help us prepare engineers for big-picture leadership by giving back.

GIVE.MST.EDU



DEAR ALUMNI, COLLEAGUES AND FRIENDS

As 2019 draws to a close, I'm forever grateful to lead such an amazing department and to be part of this wonderful university! We welcomed our new chancellor, **Mo Deghani**, in August, and I'm proud to say that Mo holds a research professorship in EMSE. He has an office in the department and uses it; so fun to have him in our midst. The department also celebrated another milestone as our systems engineering graduate program turns 20. Founding director **Cihan Dagli** continues to be a strong right arm for EMSE and is tireless in his approach to systems engineering education and leadership. Our amazing faculty continue to conduct world-class funded research and are amazing educators. You'll find several stories in this issue that showcase some of our talents. We have the best staff and students on campus as well, to my mind. I know you'll enjoy reading more about them.

Perhaps my favorite phrase of the year is "Gotcha!" I surprised three alumni and founding members of the EMSE Academy with the Sarchet Award at the 2019 spring luncheon with that phrase. Imagine my delight when they used the same phrase



to announce my induction into the EMSE Academy this fall, along with two other fabulous alumni. To all in the EMSE family, we wish happiness and joy in 2020! If you are passing through or by Rolla, please come see us. We will be thrilled to welcome you home and hear about your journey!

Suzie Long

Hist'84, Phys'84, MS
EMgt'04, PhD EMgt'07

Chair, Engineering Management and
Systems Engineering



In this Issue

- 2 EMSE students are making a mark**
Our students are researching answers to future challenges.
- 3 EMSE student receives Gilman International Scholarship**
Scott Grier spent the Fall 2019 semester studying in Hong Kong.
- 4 20 years of systems engineering**
Systems engineering joined our degree offerings in 2000.
- 6 How cyber-savvy are you?**
People may be more likely to fall for a phishing scam than they think.
- 7 Corps of Engineers adopts S&T research**
Mathematical modeling using algorithms will help contingency bases.
- 8 Faculty and staff updates**
Find out what our department has been up to.
- 9 Honoring the ideals of Bernard Sarchet**
Three EMSE alumni were honored for contributions to the field of engineering management.

GRADUATION DOESN'T MEAN GOODBYE

It's easy to stay in touch with your department. Just say hello when a student representative calls during phonathon, or drop us a note at emgt@mst.edu. Tell us what you're doing with your degree in engineering management or systems engineering so we can feature your accomplishments among our alumni achievement stories.

With your support, there's no limit to what we can achieve!

→ emgt@mst.edu



EMSE STUDENTS ARE MAKING A MARK

Ashley-Ann Davis, a junior dual majoring in civil engineering and engineering management, is studying how hyperspectral images of plants can be used to determine their chemical composition as part of the university's Opportunities for Undergraduate Research Experience program.

As the world grapples with the challenges presented by aging infrastructure and increasing energy demands, successful solutions could come from the next generation of engineers — students who are currently doing research at Missouri S&T.

Ashley-Ann Davis, a junior dual majoring in civil engineering and engineering management, is a promising example. She became interested in infrastructure as a young girl living in Jamaica, where tropical storms often damage bridges and other infrastructure. Davis hopes to take what she learns in her classes and internships back to her home country and work on civil and architectural projects to benefit local communities.

"I decided to attend Missouri S&T because the return on investment is phenomenal here," Davis says. "S&T also has some of the best alumni and is extremely affordable compared to other STEM schools."

Davis doesn't shy away from a challenge. She is an Honors Academy student serving as president of Missouri S&T's student chapter of the National Society of Black Engineers. She has interned with Turner Construction and Clayco, and she is a research collaborator with **Joel Burken**, chair and Curators' Distinguished Professor of civil, architectural and environmental engineering.

Solutions for energy needs are the focus of research being done by **Julia Morgan**, a Ph.D. student in systems engineering. Morgan has developed a model for a peer-to-peer network through which consumers could buy, sell and share energy – similar to sharing networks like AirBnB and Uber. She has presented two research papers on the topic at international conferences for the American Society of Engineering Management (ASEM) and the Institute of Industrial Systems Engineers (IISE).

"More consumers are yearning to use renewable energies, and energy providers are trying to fill that gap between what's already being done and what consumers want," says Morgan.

Work like that of Davis and Morgan has gained national notice. The American Society for Engineering Management (ASEM) this year awarded the engineering management and systems engineering department its Founders Awards for best undergraduate and graduate programs. In addition, EMSE students and recent graduates also earned individual awards. **Samareh Moradpour**, EMgt'18, was recognized with the Best Dissertation Award. **Samuel VanFossan**, a Ph.D. student in systems engineering won the Merl Baker Award for Best Student Paper. Missouri S&T's student case-study team placed second out of 10 teams in competition. Members were senior engineering management students **Lauren Barclay**, **Emma Thompson**, **Aubrey Howell** and **Emily Allen**.

Julia Morgan, a Ph.D. student in systems engineering, is developing solutions for energy needs.



EMSE STUDENT RECEIVES GILMAN INTERNATIONAL SCHOLARSHIP

Scott Grier, a senior in engineering management and civil engineering, spent his Fall 2019 semester in Hong Kong thanks to the Benjamin A. Gilman International Scholarship to study abroad. The scholarship allowed Grier to participate in academic and cultural experiences while studying structural engineering at Hong Kong University of Science and Technology.

"The idea of spending a semester in another country and an environment so different from what I am used to seemed like the ultimate adventure," Grier says. "I was excited to experience the culture and learn more about how people interact in Hong Kong."

The Gilman Scholarship program supports students who have been historically underrepresented in education abroad, including those students in STEM fields. More than 1,300 U.S. institutions have sent more than 28,000 Gilman scholars to nearly 150 countries around the globe.

GOLF TOURNEY BRINGS IN \$8K

On a beautiful October day, EMSE students joined faculty, staff and academy members for our annual golf tournament at Oak Meadow Country Club. The brainchild of founding EMSE Academy member **Greg Slack**, EMgt'70, the tournament raised \$8,000 for EMSE.

One academy member matched the funds raised from sponsorships, and 60% of our academy members sponsored holes.

The Academy of Mechanical and Aerospace Engineers won by two strokes, but it was still a lovely day.



OUR ONLINE PROGRAM IS TOP NOTCH

Students interested in pursuing an online master's degree from Missouri S&T have 15 nationally ranked programs to choose from. The programs were ranked as part of *U.S. News & World Report's* 2019 Best Online Programs rankings.

Missouri S&T's online graduate engineering programs, including our engineering management and systems engineering programs, ranked 22nd in the nation overall and 17th among public universities.

U.S. News assessed data from nearly 1,500 online degree programs. Rankings are determined by factors like student engagement, faculty credentials and training, peer reputation, and student services and technology. Each ranking category weighs the factors differently, and all except for online bachelor's degree programs also weigh admissions selectivity.

Engineering management was S&T's first online degree program, established back in 1998. Today S&T offers online graduate degree programs in 18 disciplines. More information about Missouri S&T's online degree programs is available online at dce.mst.edu.

20

YEARS OF SYSTEMS ENGINEERING

Systems engineers have to be problem definers as well as problem solvers. They develop functional systems to make life easier for customers in fields as diverse as transportation, power generation, financial planning and investment, and more. Systems engineers are an integral part of systems from development all the way through production, implementation, training, operation and disposal. Pretty cool, right?

Since 2000, when its systems engineering graduate program was established under the leadership of founding director **Cihan Dagli**, Missouri S&T has prepared more than 500 systems engineering graduates. It is the only university in the world to have four recipients of the International Council on Systems Engineering (INCOSE) Stevens Doctoral Award.

S&T's systems engineering program is also one of five in the world that meet INCOSE standards. That means that a systems engineering graduate from S&T has the opportunity to bypass the INCOSE Certification Program knowledge exam on the path to becoming an Associate Systems Engineering Professional (ASEP) or Certified Systems Engineering Professional (CSEP).

As we celebrate 20 years of systems engineering at Missouri S&T, we can be proud of our graduates' accomplishments both on campus and in the world. You can learn more about the history and future of S&T's vibrant systems engineering program by watching the video at emse.mst.edu.



DEEP LEARNING TO ESCAPE DEEP WATER

Missouri S&T researchers are using deep learning to design smarter ways to evacuate during floods, such as this 2008 event that flooded neighborhoods along the Meramec River in eastern Missouri. Photo by Jocelyn Augustino/FEMA

Artificial intelligence (AI) may soon help transportation agencies and first responders determine the best evacuation routes during floods, thanks to the work of EMSE's **Steve Corns** and **Suzanna Long**, Hist'84, Phys'84, MS EMgt'04, PhD EMgt'07. The researchers 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. Corns and Long are using deep learning to find the best evacuation routes based on flood data, available roads for evacuation and traffic patterns.

With funding from the Missouri Department of Transportation (MoDOT) and the Mid-America Transportation Center (MATC), Corns and Long 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.

Data from the Meramec and Missouri river basins will train their deep learning neural network to determine how deep and how quickly floodwaters will rise.

"We 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, EMSE chair and professor. "We 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.

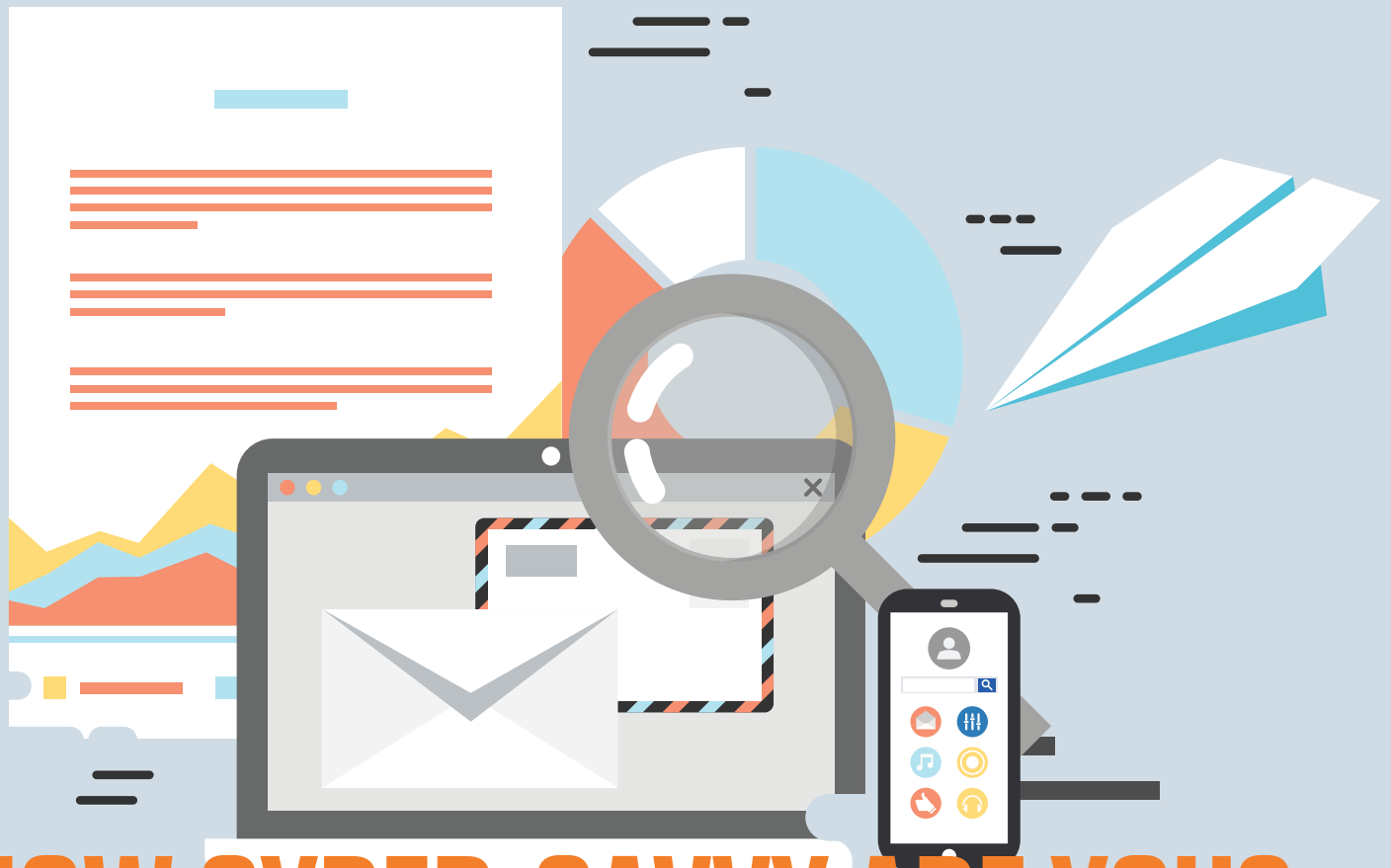
"This rate of rise is used to model evacuation or detour planning modules that can be implemented to assure the safety of

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. 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," Corns 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."

The project combines Corns' expertise in computational intelligence and complex systems with Long's focus on disaster recovery.



HOW CYBER-SAVVY ARE YOU?

Can you tell the difference between a phishing email and a message from a legitimate source?

Although most of us would say yes, people may not be as cyber-savvy as they think they are.

Casey Canfield, an assistant professor in EMSE, says employers may benefit from teaching employees how to spot those phishing emails by regularly sending them fake phishing emails.

Canfield worked with Carnegie Mellon University colleagues to measure how well people's confidence in their ability to detect phishing matched with reality.

Participants viewed a series of emails and answered questions to determine if they could identify the two types, then asked how confident they were with their answers and how negative the consequences would be if they missed a phishing email.

When people were 90-99% confident they correctly identified the email, they only identified phishing emails correctly about 56% of the time.

Canfield compared their answers with the activity on their home computers using data from the Security Behavior Observatory at Carnegie Mellon – a long-term study that monitors every action on a volunteer's computer.

"Surprisingly, we saw that people with better metacognition tended to be better at protecting themselves," says Canfield. "They had fewer malicious files on their computers."

She says that artificially increasing the number of phishing emails people receive could potentially improve their ability to distinguish scams from legitimate messages.

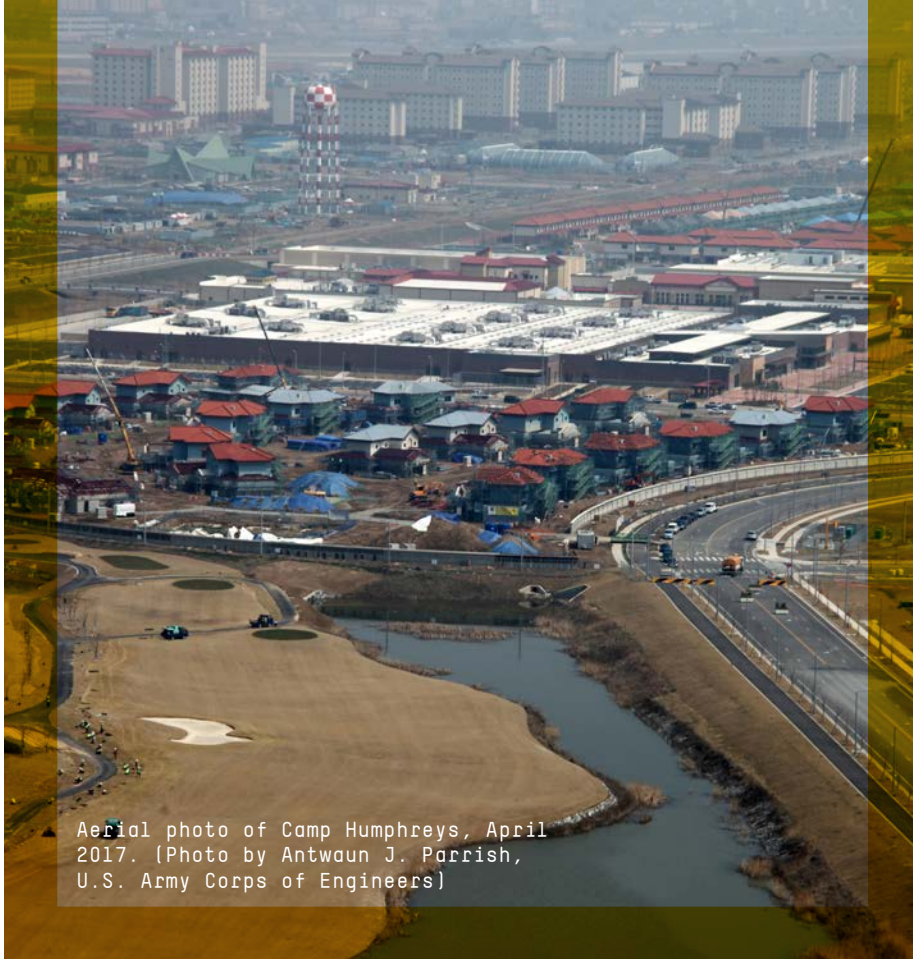
"One challenge with phishing emails is that you don't necessarily get feedback on whether or not you made the right decision," says Canfield. "Without that feedback, it's really hard for people to learn whether they're good at detecting phishing emails."

"One challenge with phishing emails is that you don't necessarily get feedback on whether or not you made the right decision."



CASEY CANFIELD

Assistant professor in engineering management and systems engineering



Aerial photo of Camp Humphreys, April 2017. (Photo by Antwaun J. Parrish, U.S. Army Corps of Engineers)

CORPS OF ENGINEERS ADOPTS S&T RESEARCH

A mathematical-based modeling system using evolutionary algorithms for developing versatile forward-operating contingency bases for the military developed by EMSE professor Steven Corns has been adopted by the U.S. Army Corps of Engineers, Lt. Gen. Todd Simonite recently announced.

Forward-operating bases are temporary military contingency bases that support tactical operations on foreign soil. They are often plagued by operational and logistical inefficiency, excessive resource demands, and increased costs.

Corns' model, which used a mathematical representation, provided a higher level of accuracy and efficiency than previous methods.



SCHOLARSHIP SENDS STUDENT TO ESTONIA

Sam Araujo, a senior in engineering management, spent last summer studying Russian in Narva, Estonia, thanks to a scholarship from Project GO (Global Officer).

The scholarship provided Araujo with full tuition, lodging, travel, textbooks and program-related costs during the eight-week advanced Russian language course at Narva College of the University of Tartu.

In May, Araujo also received the 2019 American Council of Teachers of Russian annual Post-Secondary Russian Scholar Laureate Award, a national foreign language award.

BUFFA-VOGT HONORED BY ALUMNI ASSOCIATION

Stephanie Buffa-Vogt, EE'03, MS EMgt'05, received the Distinguished Young Alumni Award from the Miner Alumni Association during Homecoming 2019. Vogt is chief operating officer of Inside Rx, a subsidiary of Express Scripts.

The Distinguished Young Alumni Award is granted to S&T graduates of 40 years of age or younger based on a high level of early achievement in one's profession, demonstrated leadership ability and a substantial commitment to the service of others.



FACULTY AND STAFF UPDATES

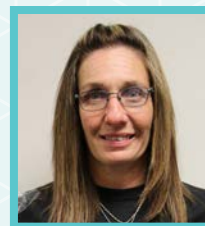


Our own student support specialist **Michelle Emerson** was featured in the campus Staff Spotlight in August. Emerson joined S&T after a 22-year career in the U.S. Navy. She runs the day-to-day operations of the Engineer Captains Career Course program, a cooperative program with Fort Leonard Wood that

lets soldiers earn a master of science degree in engineering management, geological engineering, civil engineering or environmental engineering.

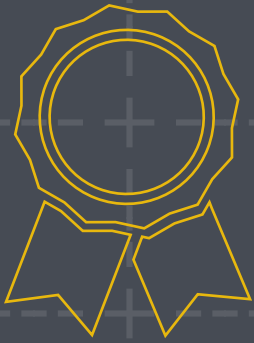
- » EMSE professor **David Enke's** research on neural networks was highlighted in *IISE Magazine*.
- » EMSE professor **Chian Dagli** spoke at a University of Missouri System Research Symposium on healthcare at the University of Missouri-Kansas City. The symposium was held in conjunction with the UM Board of Curators meeting.
- » EMSE associate professor **Steven Corns** spoke at a UM System Research Symposium on disaster resilience at the University of Missouri-Columbia. The symposium was held in conjunction with the UM Board of Curators meeting.
- » **Sheryl Hodges**, was promoted to associate teaching professor.

EMSE's annual Chili Cook-off, held on Halloween, raised \$445 for local charity GRACE (Greater Rolla Area Charitable Enterprise).



Above: Chili Cook-off winners: **Jeanette Goban**, (left) EMSE office support assistant III (traditional category) and **Mike Swope**, (right) (non-traditional category).

Left: Costume winner: **Neil Outar**, chief diversity officer.



EMSE GRADS EARN DISSERTATION PRIZES

Tejaswi Materla, MS EMgt'14, PhD EMgt'18, received the Dell'Anna Doctoral Dissertation Prize from the International Academy for Quality (IAQ). Her dissertation is titled "Analyzing Factors Affecting Patient Satisfaction Using the Kano Model."

Associate professor **Elizabeth Cudney**, PhD EMgt'06, was her research advisor.

Materla was an assistant adjunct professor in EMSE. She joined Penn State Abington as a tenure-track assistant professor of management this past fall.

Samareh Moradpour, PhD EMgt'18, received the Best Dissertation Award from the American Society for Engineering Management. Her Ph.D. advisor is EMSE chair and professor **Suzanna Long**, Hist'84, Phys'84, EMgt'04, PhD EMgt'07.

Moradpour received the award during ASEM's Annual International Conference, held in October in Philadelphia.



From left: Greg Slack, Dan DeRiemer, Jim Faletti and Suzanna Long.

HONORING THE IDEALS OF BERNARD SARCHET

The engineering management and systems engineering department might not exist without the efforts of department founder **Bernard Sarchet**, who was also one of the founders of the American Society for Engineering Management (ASME).

In remembrance of him, EMSE's Sarchet Award is given to those who make significant contributions to the field of engineering management. This year's recipients are **Jim Faletti**, EMgt'71, MS EMgt'79; **Dan DeRiemer**, EMgt'72; and **Greg Slack**, EMgt'70. The three men are founding members of the Academy of Engineering Management.

EMSE chair and professor **Suzanna Long** surprised them with the award. She had asked them, as a ruse, to help present it to someone else. "Gotcha!"

Faletti, who served on the Missouri S&T Engineering Management Advisory Board and is now on the S&T Board of Trustees, is the retired president and CEO of Strategic Insights Ltd.

DeRiemer has served as chair of the academy's membership committee. He and his wife sponsor the Dan and Laura DeRiemer Scholarship of Possibilities for eligible S&T undergraduate engineering management students.

Slack is founder of the golf challenge between EMSE and the mechanical and aerospace engineering department. Profits from the challenge directly benefit Missouri S&T students in both departments.

"For 50-plus years, these three have given their time, talent and energy to benefit the department and the campus," Long says. "They embody the ideals of Bernie Sarchet."

WELCOME TO THE ACADEMY

Help us welcome the three newest members of the Academy of Engineering Management. This year's inductees included one very surprised department chair. The banquet was held at Sybill's St. James in October. This year's inductees are:

- » **Curt D. Hertel**, ME'70, MS EMgt'71, of Marco Island, Fla. Hertel is co-Founder of Power Supply Industries in Fenton, Mo.
- » **Suzanna Long**, Hist'84, Phys'84, MS EMgt'04, PhD EMgt'07, is EMSE chair and professor at Missouri S&T. "Gotcha" back!
- » **Michael L. Potter**, EMgt'69, of Lake Saint Louis, Mo. Potter is a partner and former vice president of Traube Industrial Systems.



Engineering Management and
 Systems Engineering
 223 Engineering Management Building
 600 W. 14th Street
 Rolla, MO 65409

NONPROFIT ORG.
 U.S. POSTAGE
 PAID
 PERMIT NO. 170
 ROLLA MO 65401

150 YEARS:

Let's celebrate the Missouri S&T story

From our founding in 1870 as a pioneering technical school to our 21st century standing as a national technological university, the Missouri S&T story spans a century and a half of remarkable change.

GET SET TO CELEBRATE 150 YEARS OF MINER PRIDE!

A year of special events kicks off with MinerFest 150 in October 2020 and concludes with the Alumni of Influence celebration in November 2021. In between, mark your calendar in green for our biggest best ever festival — or “Bestival” — over St. Pat’s Weekend in March 2021.

Watch for the publication launch in October 2020 of a commemorative book by Curators’ Distinguished Teaching Professor emeritus Larry Gragg. His history of the university spans 150 years of Miner milestones, memories and mischief.

Visit 150.mst.edu for more information.

