MISSOURI S&T MAGAZINE
SPRING 2016 VOL. 90 NO. 1

We are Missouri S&T students, alumni, faculty and staff.

MINERS GIVE BACK

We give back to the community, the university and the world.

We give our time, knowledge, support, spirit and more!

MISSOURI S&T MAGAZINE
MINERS GIVE BACK
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JOIN THE CROWD

S&T students understand the power of philanthropy. So do Miner alumni. You can help the Miner Alumni Association board of directors, the New Alumni Council, STAT and Blue Key give back to our students.

STUDENTS VS ALUMNI

THE CHALLENGE

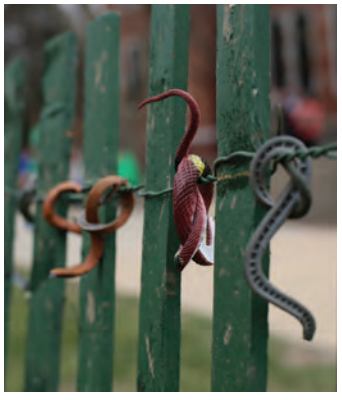
During Philanthropy Month, get 1,500 students to give back.

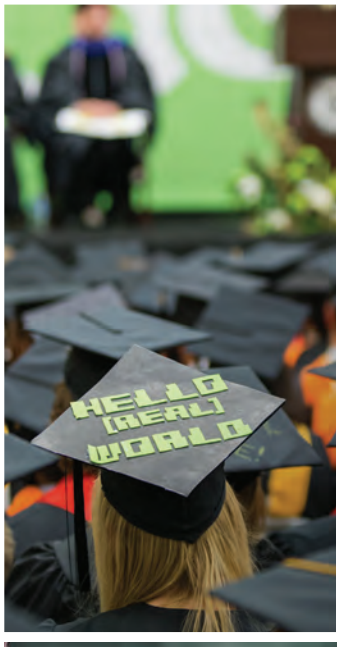
Match that with 1,500 alumni gifts.

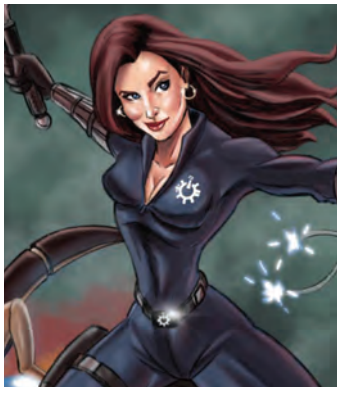
THE CAUSE

Spirit of Change, which funds random acts of kindness and other support for students — things like free umbrellas on a rainy day, free hot chocolate on chilly mornings or feeding expired parking meters.

Join the crowd at crowdfunding.mst.edu/philanthropy2016







AROUND THE PUCK

FEATURES

BEYOND THE PUCK

7,931 Students enrolled on the first day of spring semester classes at Missouri S&T.

2,110 Total Missouri S&T graduates in 2015's four commencement ceremonies.

61 Alumni recruiters attending February's pre-Career Fair breakfast hosted by STAT (Students Today, Alumni Tomorrow).

MISSOURI S&T BY THE NUMBERS

48 Teams of high school students competing in Missouri's FIRST Tech Challenge state robotics championship held at S&T in March.

36 Teams of high school students competing in the Missouri State VEX Robotics Championship held at Missouri S&T in February.

221 Employers recruiting S&T students at the annual Spring Career Fair in February.

8 Miner swimmers selected to compete in the NCAA Division II Championships in Indianapolis.

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

Tell us about your charitable side

Miner alumni are a generous bunch. You share your time and treasure with all types of organizations that serve others in many ways. Many of you give back to your alma mater. We asked what inspires you to give, and here is what you told us.

The Boy Scouts of America is where a majority of my charitable time and money goes. I am a committee member and Life-to-Eagle Coordinator (I assist scouts with the work entailed to earn Eagle Scout) for a troop and a member of the Campmaster Corps (a group that assists troops with off-season camping at council camps). As an adult leader you always end up doing things outside the purview of your title and being a jack of all trades! After starting in Cub Scouts and going all the way to Eagle Scout I cannot think of anything else I would do!

Drew Hayes, ArchE'11
Blue Springs, Mo.

I am president of the board of directors of Sweetwater Mission, a charity that provides food, clothing, financial aid and educational opportunities to those in need in the south Cobb County, Georgia, area (a suburb of Atlanta). Our organization distributed over 1 million pounds of food in 2014. I also lead a church group that provides basic maintenance support to the Sweetwater Mission building.

David J. Beem, Chem'75
Alpharetta, Ga.

When I retired from Eastman Chemical Co. in 2012, the pastor asked me to organize and be president of our parish conference of the Society of St. Vincent de Paul, the international benevolent organization. I used my engineering experience to organize the group, including the required record-keeping. During the past three years I have come to understand poverty in a completely different way. It is a complicated issue that can't be fixed by "just working hard." We are working on many initiatives to bring about systemic change to go beyond short-term financial help and provide permanent improvement in peoples' standards of living. I have continued to be involved with the pro-life ministry, and volunteer for the church maintenance committee and an annual teen ACTS retreat team. My wife, Jan, and I are members of the Equestrian Order of the Holy Sepulchre of Jerusalem, which provides financial support for the historic Christian sites and schools in the Holy Land.

Tom Mittler, CE'75
Longview, Texas

I give to Unity Church, the Missouri S&T Scholarship Fund, and Poplar Grove Vintage Wings and Wheels Museum Scholarship Fund.

The museum has a 12-acre campus. All buildings are pre-World War II and house bicycles, cars, trucks and planes from 1941 or older. Our mission is to preserve these antiquities and foster interest in our youth for aviation and automobiles.

May through October, we have monthly fundraising pancake breakfasts and give free plane rides to kids ages 8–17. We give scholarships toward aviation and automotive degrees or certificates.

Oh, by the way, I live here in the airport community — so I am able to live my volunteering passion.

Bill Moses, ME'59
Poplar Grove, Ill.

An avid cycler, I ride in the annual 160-mile Tour de Cure to raise awareness and funds to support the American Diabetes Association. I have been involved with the North Carolina Tour de Cure since 2010, and in six years I've raised over $17,000 as an individual and over $22,000 as captain of the Oldcastle/Wheels of Stone team. I dedicated my first 80-mile ride to my mother and brother, who both live with diabetes. After being a successful participant and fundraiser, I was invited to serve on the logistics committee and in 2013, Oldcastle honored me as an Outstanding Community Ambassador.

Frank Werner, EMgt'80
Raleigh, N.C.

My wife and I spent five months in a rural Ugandan school where I taught fourth-grade science and my wife taught English. We also helped fund the school session in this very poor area.

In 2014, we spent four months in coastal Ecuador with the non-governmental organization Water Ecuador building water purification plants and testing water quality and water usage in six villages.

We spent six months in 2015 in The Cloud Forest School in Costa Rica. We gave money for school operations and I helped organize a 10k race though the forest trails, as well as general school campus ground work and environmental education classes for grades 1 to 11. My wife taught and assisted in numerous classes and organized the library for student use.

In November, we left for central Mexico to work again with the NGO Water Ecuador on a three-month water quality and water usage project.

The adventures have been and continue to be "an experience."

Terry E. Durham, GGph'70
New Haven, Conn.

TO THE EDITOR

Ladies and Gents,

The Fall/Winter 2015 issue of *Missouri S&T Magazine* has now made a quantum jump in significance, importance and intelligent reporting about issues and topics relating to alumni contributions. Obviously many other topics aside from the great inventors need to be addressed but the inclusion of these several alumni inventors is a great step forward.

My suggestion is that the topical word "innovators" be the word to replace "inventors" since S&T/UMR/MSM alumni have made U.S., even world-class, contributions in other areas of importance, such as marketing, finance, management, military leadership, etc. Also you may want to consider the idea of replacing the R&D acronym in describing the activities that it now includes, but add an "I" for innovation since the latter word is becoming more widely used in industry, especially in the computer, information, agriculture and medical circles.

Perhaps you might consider this suggestion for future feature articles.

Jerry D. Plunkett, CerE'53, MS CerE'54
Dixon, Mo.

TOPPING OUT

On a chilly Monday in February, Missouri S&T placed the final piece of the roof on the new University Commons building on University Drive. This fall, 450 students will move into its apartment-style housing. Watch a time-lapse video of the ceremonial "topping out" at **rol.la/rooftimelapse**.

MISSOURI S&T'S 2016

ALUMNI OF INFLUENCE

Ten Miners will be recognized for their lasting impact on the university, their professions and the wider world when Missouri S&T hosts the 2016 Alumni of Influence Gala on Nov. 5. See the back cover for details. Congratulations to our 2016 honorees:

Joe Ballard, MS EMgt'72, a retired U.S. Army lieutenant general and CEO of the Ravens Group Inc.

Bipin Doshi, MS ChE'63, president and CEO of Schafer Industries.

Bob Brackbill, MinE'42, an oil industry leader recognized for his contributions to offshore exploration, in particular the discovery of gas reserves in Thailand.

Don Gunther, CE'60, retired vice chairman and director of the Bechtel Group.

Bob Brinkmann, CE'71, founder and CEO of Brinkmann Constructors.

Sandra Magnus, Phys'86, MS EE'90, executive director of the American Institute of Aeronautics and Astronautics and a former NASA astronaut.

Matt Coco, CE'66, retired vice president of Alberici Corp.'s building division.

Dick Vitek, MS Chem'58, founder and retired CEO of Fotodyne Inc.

Roger Dorf, ME'65, retired general manager and vice president of the Broadband Wireless Group for Cisco Systems.

Roy Wilkens, EE'66, retired CEO of WilTel and McLeodUSA, and chairman and co-founder of Adaption Technologies.

RECOVERING OIL WITH CO_2

Traditional methods of oil recovery call for flooding well formations with water, but often as much as two-thirds of the oil is left behind through this process. Carbon dioxide is more efficient for oil recovery because it dissolves into oil and reduces its viscosity, but that approach also has problems.

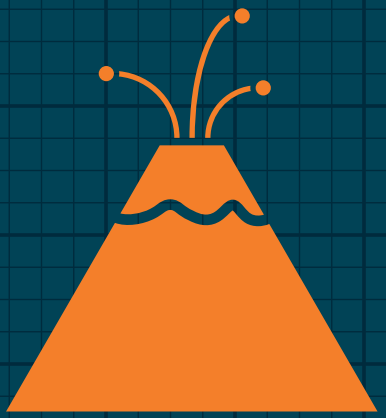
For starters, formations are not uniform. Areas and layers that allow oil to pass through easily are interspersed with areas and layers that are less permeable. Injected CO_2 flows through areas of high permeability but leaves a lot of oil unswept in areas of low permeability, says **Baojun Bai**, the Lester Birbeck Endowed Professor of Geosciences and Geological and Petroleum Engineering. The differences in viscosity between the injected CO_2 and oil can cause the CO_2 to seep through finger-like channels in the formation; the carbon dioxide that's produced reduces the efficiency of the greenhouse gas storage in formations.

Bai hopes to solve these problems by using small particle gels — ranging in size from a nanometer to a few millimeters — that can be stable under reservoir temperatures for more than a year.

"Injecting particle gels into CO_2 flooding formations is a win-win method because particle gels can not only help increase oil recovery, but they also can help keep CO_2 contained in the formation and thus increase greenhouse CO_2 storage efficiency," Bai says. "Storing the carbon dioxide underground is environmentally friendly because it keeps the gas out of the atmosphere."

SAVE THE DATE

Make plans now to attend Homecoming 2016 Oct. 14–15. More details will be published in the Summer issue of *Missouri S&T Magazine*. For hotel information and other accommodations in the area, go to **mineralumni.com/homecoming**.



VOLCANO WARNING

Much like National Weather Service sirens signal impending severe weather, so too may a similar system warn us before earthquakes strike or volcanoes erupt.

Using 1,700 seismographs spread across the lower 48 states, two S&T geophysicists are creating a sort of CT scan of the North American plate, which has been moving southwest at a rate of about an inch a year.

The shift is a continuation of the breaking of the giant supercontinent Pangea 200 million years ago, says **Kelly Liu**, professor of geophysics at Missouri S&T. As the plate moves, it creates earthquakes and volcanic hot spots, huge mountain chains and gigantic ocean basins.

With funding from the National Science Foundation, Liu and geophysics professor **Stephen Gao** are looking for azimuthal anisotropy along the path of a seismic wave. Seismic azimuthal anisotropy measurement is a powerful way to image the earth's internal structural fabric. Their work could lay the foundation for predicting earthquakes and volcanic eruptions.

IN PRINT

Gerald Cohen, professor of foreign languages and an expert in etymology, published *Origin of the Term 'Jazz.'*

Jonathan Finch, a lecturer in philosophy, published *A Crisis of Belief, Ethics and Faith.*

John C. McManus, Curators' Professor of history and political science, published *Hell Before Their Very Eyes: American Soldiers Liberate Concentration Camps in Germany, April 1945.*

IMAGING THE FINAL FRONTIER

A Missouri S&T aerospace engineering professor is developing a microsatellite imager that could be used to check satellites, do small repairs or refuel spacecraft — and keep astronauts from making risky exploratory missions when something goes wrong.

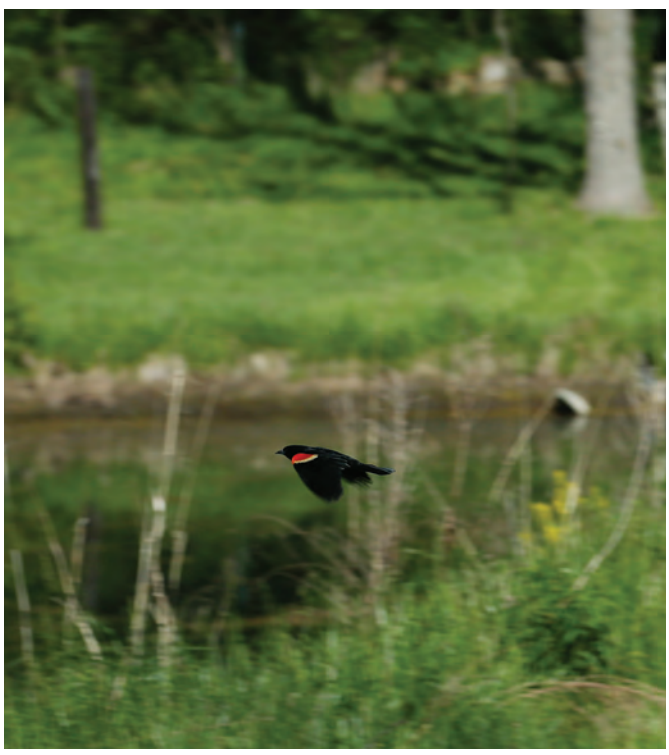
Hank Pernicka, associate professor of mechanical and aerospace engineering, and his students won the final round of an Air Force competition to develop the spacecraft. **Kyle DeMars**, assistant professor of mechanical and aerospace engineering, **Joshua Rovey**, associate professor of mechanical and aerospace engineering, and **Jonathan Kimball**, associate professor of electrical and computer engineering, also are working on the project at Missouri S&T.

Pernicka and his team are working off their winning model and will build the spacecraft next year. Delivery to the Air Force is in the spring of 2017. And if all goes well, from there it's launched to rendezvous with the International Space Station.

The spacecraft is composed of two microsatellites, with one docked to the other during the launch to the space station. After a space station arm flicks the craft away from it, the first test begins. One satellite will push away from the other and use its 12 micro-thrusters to maintain a 10-meter distance between the two. If that's successful, the first satellite then will begin to orbit the second, taking pictures of it with two stereoscopic lenses.

Aerospace engineering graduate students **Yezad Anklesaria**, AE'07, MS AE'09 (left), and **Katelyn Boushon**, AE'15 (center), are pictured in the lab with Hank Pernicka, associate professor of mechanical and aerospace engineering.

A 10-ACRE CLASSROOM



Southwest of Rolla, 10 acres of land once farmed by some of the area's earliest settlers is now being explored by pioneers of a different sort — Missouri S&T students.

Working with the Missouri Department of Conservation and the family of Dr. George Bohigian, a St. Louis ophthalmologist, Missouri S&T is turning the property into a field station that will become a living laboratory and classroom for students in a variety of majors.

"This field station idea goes hand in hand with the S&T concept of taking learning out of the classrooms and out of the labs and into the real world," says **Stephen Roberts**, vice provost and dean for the College of Arts, Sciences, and Business.

Students who took Field Ecology, Cave Biology or Vegetation of the Ozarks courses last summer were among the first to study in and alongside three spring-fed ponds, a wetland fen, a nearby stream, and countless flora and fauna.

"This is a great learning opportunity," says **Dev Niyogi**, an associate professor of biological sciences. "There are some subjects you just can't learn in a lab, and field ecology is one of them."

See more about the field station and experiential learning at ***rol.la/bohigian15***

S&T STARGAZER

For the first time in over two years, S&T students, faculty and staff, and Rolla community members got an up-close look at celestial objects thanks to **Ken Goss**, a senior in computer science and computer engineering. Last August, Goss hosted the S&T Observatory's first Visitors' Night in over two years.

The physics department had been looking for someone to take over Visitors' Nights since **John Schmitt**, associate professor emeritus of physics, retired in 2013. Schmitt taught astronomy and ran the observatory for decades.

Paul Parris, professor of physics, discovered that his neighbor who often stargazed from his front yard using a personal telescope was an S&T student. One night when Parris took his trash bin out to the curb, he approached his neighbor about the observatory.

Goss says he grew up with a "nascent interest" in astronomy. "I'd go out and look for different things at different times of the year." He says his interest has grown in the last two or three years, since he bought a telescope — the same one Parris saw him using. He now considers himself an amateur astronomer.

Before coming to S&T, Goss and his wife, Heather, both majored in music education. He earned bachelor's and master's degrees and student-taught music in Missouri's Kirkwood School District. Then the economic recession came, and the job market crashed.

Goss decided to go back to school at S&T to become a computer engineer. "I was afforded the opportunity to retool my skill set," he says.

He never thought he would be running a university observatory.

"Few with my neophyte status have the privilege of handling a telescope this big, so I'm happy to serve the public," he says.

CLEANING UP NUCLEAR WASTE ... WITH GLASS

Stored in steel drums and buried in mountainsides, nuclear waste can remain radioactive for hundreds of thousands of years. Reducing the space needed to store the waste saves time and money and will reduce the overall environmental impact, says **Richard Brow**, Curators' Professor of ceramic engineering.

With funding from the U.S. Office of Nuclear Energy, Brow is working to find a way to make the waste vitrify — or, turn into glass — more efficiently. Using surrogates in place of radioactive isotopes, Brow melts borosilicate glass (similar to the material Pyrex glassware is made from) and surrogates, looking for the sweet spot where a process known as phase separation and crystallization can capture the most waste in the smallest volume of a chemically stable glass. Reducing the volume could help address the nuclear waste storage problem.

Brow uses techniques developed in part by researchers in the Peaslee Steel Manufacturing Research Center at S&T.

"To understand how fast these processes occur, we will quench the melts — probably from 1,450 degrees, Celsius — at different rates to freeze in different microstructures, ranging from phase-separated droplets, known as fast quench, to fully crystallized phases, or slow quench," he says.

It's all to get to the point where the borosilicate glass concentrates the radioactive components into micro-phases within the glass. And when that happens, the benefits will be substantial.

"We could possibly double our waste loading," Brow says.

TOTALLY TUBULAR

No prior experience is necessary for students who compete in the annual inner tube water polo tournament in the Gale Bullman pool. Teamwork, creativity and improvisation are key for players as they have to learn how to navigate the pool and find the back of the net to score.

HITTING THE SWEET SPOT

"PROFESSIONAL GOLFERS MAKE A SIGNIFICANT PORTION OF THEIR YEARLY EARNINGS FROM SOURCES THAT ARE NOT TOURNAMENT PURSES."

While some undergraduate students peer through microscopes or write computer programs for their research projects, senior **Arielle Bodine** made the world of professional golf her laboratory. The applied math and economics double major recently took an eagle-eyed look at the factors that led Phil Mickelson and 46 other top professional golfers to pick up valuable endorsements.

"Professional golfers make a significant portion of their yearly earnings from sources that are not tournament purses," says Bodine. "In fact, many golfers make more money from endorsements and off-course appearances than they do from golfing in tournaments."

Previously published studies used statistics to link specific skills on the course with the amount of money that a golfer makes in tournament earnings. Bodine decided she wanted to discover if there was a connection between the skills displayed during a tournament and the player's ability to earn money off the course.

21

of the 31 golfers with earnings in 2013 earned more off-course money than on-course money

Average off-course earnings among studied golfers 2003–13

$6,335,852

Maximum off-course earnings in the study belonged to Phil Mickelson in 2013

$45,000,000

"My study took five aggregate statistics (scoring, putting, accuracy, short game and power) and attempted to link them with a specific dollar amount that they produce for a professional golfer off the course," says Bodine.

For the past 12 years, *Golf Digest* has published its annual list of the sport's top 50 earners. Bodine used the financial information from those lists and combined it with skill data from ShotLink for analysis using statistical software. Bodine says economics associate professor **Michael Davis**'s Intermediate Macroeconomic Theory class inspired her project.

"It took a lot of personal motivation to complete my project but I learned perseverance and to have pride in the work that I've done," she says. "I also learned to ask for help — a skill that isn't often taught in the classroom."

In the end, Bodine found that golfers with higher accuracy and power were able to earn more off the course when scoring was not considered. She says that scoring was originally the only statistically significant skill, but removed it during a second run of the statistical model because scoring could be thought of as the result of other skills.

"It's groundbreaking in the sense that no one has previously studied that connection," she says. "When I ran the final analysis, I was sitting there and was almost in tears. It felt like it was a long and arduous process to get to that point, but it also was really awesome."

SAVING THE BATS

White-nose syndrome kills bats by the millions. If not stopped, it could disrupt an entire ecosystem. But a group of Missouri S&T students learned that a compound found in citrus fruit can slow the disease.

Caused by a fungus called *Pseudogymnoascus destructans*, white-nose syndrome strikes during bats' winter hibernation when their immune systems are essentially dormant. Often it causes them to wake before spring arrives. If they wake early, many bats starve to death because their main food source, small flying insects like mosquitos, have not yet hatched.

Biological sciences students in Missouri S&T's chapter of iGEM, the International Genetically Engineered Machine Foundation, discovered that ocimene, a compound found in oranges, slows the growth of the fungus, and could help bats hibernate through the entire winter. Once they awaken, their immune systems can begin to combat the disease naturally.

The students, led by **David Westenberg**, associate professor of biological sciences, and **Katie Shannon**, associate teaching professor of biological sciences, won a bronze medal for their project, titled "Defending North American Bats from the Emerging White-nose Epidemic," at the iGEM 2015 Giant Jamboree last fall.

IGNITING INNOVATION

Over the course of their S&T career, graduating seniors **Cori Hatley** and **Eric Fallon** have learned a lot about entrepreneurship and innovation. But that wasn't always the case. Like many of their fellow students, they were interested in these topics when they first arrived on campus, but they didn't know how to find out about what resources were available.

So the pair took an entrepreneurial approach to solving this quandary. They put together a plan and pitched it to investors.

In this case, the plan was to create a resource for first-year students. The investors were the members of Missouri S&T's Innovation Team, which provides university funding for various projects.

In the process, Hatley and Fallon were also applying lessons learned as University Innovation Fellows at Missouri S&T. The UIF program is a National Science Foundation initiative designed to help college students learn more about entrepreneurship and to bring that innovative spirit to their campuses. "It's designed to train us to be change agents," says Hatley, a senior in civil engineering.

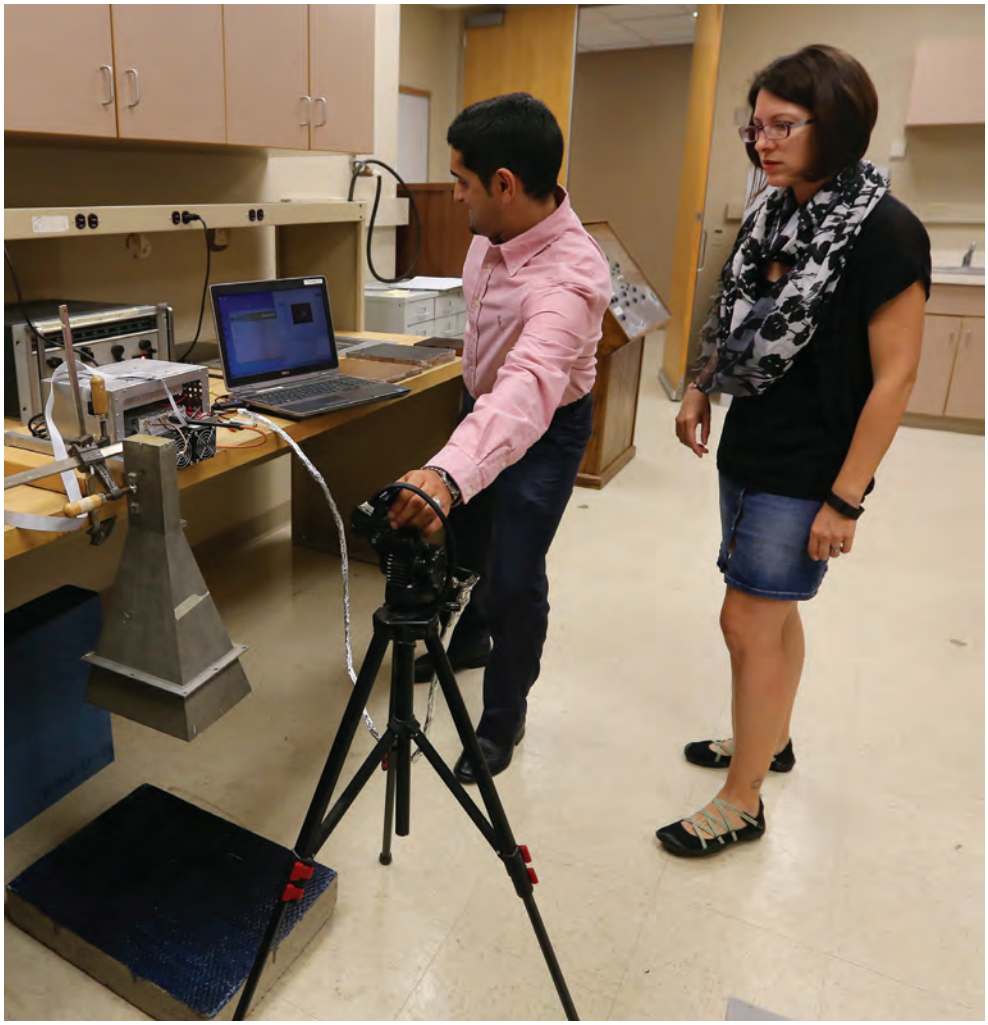
This fall, Hatley and Fallon's program, Ignite Innovation, will introduce incoming freshmen to the entrepreneurship resources available on campus, from design team and undergraduate research opportunities to clubs and coursework focused on innovation. "We're not missing resources," Hatley says. "It's that people are not aware of the resources. So let's start making these connections sooner rather than later so students can harness these resources right away."

S&T also received funding last fall to create new courses designed to stimulate innovation. The grant comes from VentureWell, an organization that funds entrepreneurs as well as universities.

ST. PAT'S: S&T GOES GREEN

For a few days in March, the Missouri S&T campus — and the Rolla community — paint the town green for St. Pat's. If you couldn't make it back for the 108th St. Pat's, here are a few scenes from this year's Best Ever celebration.

1. Despite the cloudy day, a large group of students gathered at the Puck for the first day of Follies.
2. During Follies, **Jasmin Hill**, a senior in chemical engineering from Rolla, displayed an impressive green beard.
3. Students drove all the rubber snakes off campus with their shillelaghs during Snake Invasion.
4. This year's parade theme was "St. Pat goes to the movies." Sigma Tau Gamma's entry paid homage to Scooby Doo.
5. New to this year's St. Pat's was Gonzo Gives Back, a morning of community service held before Gonzo and Games. This group of students helped renovate the Kaleidoscope Discovery Center.
6. Miner alumni and friends gathered for breakfast and fellowship at Hasselmann Alumni House before the parade.
7. **Delbert Day**, CerE'58, pictured during the breakfast at Hasselmann Alumni House.
8. Just before dawn on the day of the parade, St. Pat's Committee members and alumni painted Pine Street green.



BAKING BRIDGES

Kristen Donnell, MS EE'03, PhD EE'10, an assistant professor of electrical and computer engineering at Missouri S&T, is using microwave energy to test concrete and rehabilitated aluminum, and in the future her work could lead to safer bridges and aircraft parts.

Donnell studies those materials using an active microwave thermograph (AMT), a tool that highlights flaws that could compromise safety or effectiveness. It works by using microwave energy to heat a defined section of material, which is looked at using infrared thermography imaging. This method of nondestructive testing (NDT) is fairly undeveloped, Donnell says, but is being pioneered at Missouri S&T.

Donnell uses a 1- to 20-gigahertz high-frequency horn antenna to heat the objects, then views them with an infrared sensor that sends data to a computer.

Because the heat burst lasts only a few seconds, Donnell's method reduces the risk of heat damage that can happen when using traditional flash heat lamps, and AMT is able to focus the heat at a predetermined depth instead of heating the whole object.

For example, when using a flash heat lamp to look at a problem in a wall, the whole wall would need to be heated; in contrast, the AMT method focuses heat on only a small section. It's not exactly an X-ray, "but it does allow us to look inside the interior of a structure to show defects or problems," Donnell says.

Using AMT in the lab, Donnell can set the system to focus on the middle of a 4-inch section of concrete. When the images are produced on a computer, they can show if the rebar is compromised (rusted, corroded, broken) or still in good working order. They also show cracks or other defects that could weaken it.

Donnell also can use AMT to look at materials that are wrapped in carbon fiber. The AMT can check the carbon fiber's adhesion for areas that aren't properly bonded. And Donnell can use the method to look at rehabilitated aluminum for weak spots.

CUSTOMIZING ENGLISH COMP

Remember your English composition class? Most likely, you had to choose a random theme, research your idea and write an analytical paper. Today, students in the newly redesigned Writing and Research course write on topics in their own field of study — topics that interest them.

Students investigate journals in their major and career field, learn the research conventions of those journals, discover the hot topics in their majors, and write for those journals — all in hopes of publishing their work.

"Focusing the class as a 'writing in the disciplines' course will make the students appreciate information literacy much more," says **Jossalyn Larson**, assistant teaching professor in English and technical communication. "Because of the investigation skills being developed in the class, students are already beginning to consider non-traditional issues in their respective fields."

"I have had a metallurgical engineering student write a paper about the viability of building metal spaceship parts while in the atmosphere, and an engineering management student examining best practices for leadership in the field," says **Dan Reardon**, assistant professor of English and technical communication and director of composition at Missouri S&T. "The students are teaching us as well, allowing the English faculty to get a glimpse into what topics are really important to students."

IN PRINT

David Wright, associate professor of English and technical communication, edited a book titled *Communication Practices in Engineering, Manufacturing, and Research for Food and Water Safety*. The book includes a chapter by Wright titled "Cowboys and Computers: Communicating National Animal Identification in the Beef Industry."

HELLO [REAL] WORLD

The first program a computer science student writes outputs the message "Hello world" on a display device. It's designed to teach basic syntax for constructing a working program. Now finished with her degree, this computer science graduate, pictured during December 2015 commencement ceremonies, is ready for the "real" world.

COMMENCEMENT STATS

517
Graduates during the morning commencement ceremony for graduate candidates and undergraduates in arts, sciences and business programs.

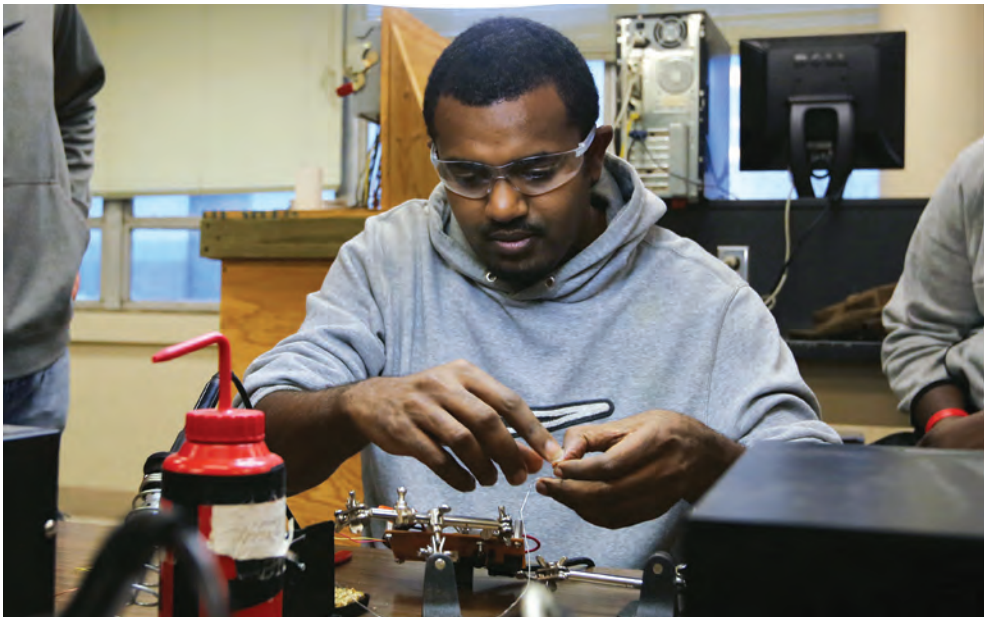
376
Graduates during the afternoon commencement ceremony for undergraduate engineering candidates.

98
Number of cum laude honors.

87
Number of magna cum laude honors.

55
Number of summa cum laude honors.

63
Number of degree programs with graduates.



A LIFE-CHANGING CAB RIDE

One of the biggest moments of **Tamerate Tadesse**'s life came in a cab.

Tadesse, EE'15, a native of Ethiopia, took a job as an airport taxi cab driver after settling in the St. Louis area. His English was not very good, so he practiced by talking to his passengers.

"I like to talk to people, I like to ask questions," he says. "I'd ask them, 'How was your flight?'"

So began a conversation with Peter Desloge, chairman and CEO of Watlow Electric Manufacturing Co., whom Tadesse was driving to his Wildwood, Mo., home.

Desloge noticed Tadesse had rigged up his personal laptop to an old adapter to charge it while he was driving. "It was kind of noisy," Tadesse says.

Intrigued, Desloge asked about Tadesse's hobbies and his plans for the future. Tadesse, who was taking classes to learn English, shared that even as a child, he had always enjoyed fixing things, especially electronics.

"I encouraged him to think about engineering," Desloge says. "I shared with him my experience as an engineer. I told him it is a great field because you will always be challenged and there will always be a demand for engineers."

Before he got out of the car, Desloge handed Tadesse his business card and said, "Just give me a call whenever you can."

The experience inspired Tadesse to continue his education. "Something clicked in my mind," he says. "It was kind of a miracle for me."

Now, some five years later, Tadesse still keeps Desloge's business card in his wallet for good luck.

"I was pleased to find out that he took my advice," Desloge says. "It reminds me that we all have a chance to have a positive impact on others every day of our lives — even in a brief encounter in a taxi."

PARTNERS FOR PROGRESS

Missouri S&T and Phelps County Regional Medical Center in Rolla are exchanging ideas and collaborating on research, education and technology transfer thanks to a memorandum of understanding (MOU) leaders from both groups signed last summer.

The MOU established an executive board and a research and education council made up of representatives from S&T and PCRMC. The partnership led to the creation of the Ozark Biomedical Initiative, which held its first research symposium in February.

This past fall, Missouri S&T signed a similar agreement with Honeywell Federal Manufacturing & Technologies. The agreement will let the two work more closely on research and development of new technology for national security.

In addition to research collaboration, the agreement allows for greater interaction between S&T faculty and students and Honeywell personnel, including the exchange of faculty, students and researchers.

RUNNING HIS OWN RACE

When 400-meter hurdler **Chayce Boyce** steps up to the starting line during a track meet, he's not thinking about the spectators in the stands or even the runners he is competing against. He's focused only on running his own race.

"Just run your race; don't focus on anyone else." That mental mantra has gotten him through countless races. But Boyce says it's not all a mental game — it's a game of repetition.

"Repetition cuts down on errors," says Boyce, a junior in engineering management from De Soto, Mo. "Depending on the hurdles, you can lose a race by one misstep, so I practice a lot to develop my technique."

Boyce began running hurdles because his high school coach thought he might be good at it.

"My coach just kind of threw me in it because I was built for hurdles," he says. "I was reluctant, but I discovered I was good at it and slowly I liked it more. I loved it even more when I won my first hurdling race."

"JUST RUN YOUR RACE; DON'T FOCUS ON ANYONE ELSE."

And even though it's hard work to improve and compete, Boyce says running track and hurdling offers him more than just physical fitness.

"Running around and being around the team gives me an outlet outside of the day-in and day-out rigors of schoolwork," he says. "It's relaxing and helps me to stay on top of things because it forces me to budget my time."

Though running is an individual sport, Boyce loves being on the team and working on teams in general.

"Not one person on a team is the same," he says. "It's interesting to hear other views and learn about my teammates' past to find a way to adapt and work with them best."

As much as he enjoys teamwork, Boyce is still focused on running his own race.

"After graduation, I want to do something that gratifies me and that I feel is important," he says. "I'm going to work wherever my degree takes me and I'm only focusing on reaching my own goals. I have to focus on me and what I want out of life."

MANISH SHARMA: WORKING TO ENJOY THE RIDE

During high school, **Manish Sharma** often studied by candlelight. Power outages lasting six to eight hours a day were a fixture of hometown life in Khurja, India. For most of his peers, studying in America was a distant dream. But Sharma never gave up on his goal.

After earning a bachelor's degree in electrical engineering and a master's degree in nuclear engineering from universities in India, Sharma set his sights on Missouri S&T to complete his Ph.D. in nuclear engineering.

"I never gave up because I knew tomorrow would be better," he says. "I turned my plans into actions and went out of my comfort zone to make things happen."

Sharma is working with **Ayodeji Alajo**, assistant professor of mining and nuclear engineering, and **Hyoung K. Lee**, associate professor of mining and nuclear engineering, on research related to proactive radiation detection at airports, borders and nuclear facilities.

"At a certain threshold, nuclear radiation like X-rays and gamma rays may negatively impact the health of living tissue, but current radiation-detection devices used by employees at nuclear facilities only detect doses that have already been absorbed in the employee's body," Sharma says. "My work will attempt to develop technology that is more proactive in detecting doses of radiation and will help the personnel to avoid radiation-prone areas, eventually resulting in less radiation exposure."

Since he began work on his Ph.D. at Missouri S&T in 2011, Sharma has stepped even further out of his comfort zone. He was a lead counselor at S&T's Jackling Introduction to Engineering summer camp, danced on the winning team at Celebration of Nations and learned to play the guitar.

"I follow a style of doing things where I choose one thing to do at a time and give 100 percent to that without focusing on the outcome," Sharma says. "I put forth my best and focus on enjoying the ride. Dedication and determination to my work has made my experience great."

> "I NEVER GAVE UP BECAUSE I KNEW TOMORROW WOULD BE BETTER."

After graduation, Sharma's goal is to change the world by shaping the minds of students as a professor.

"So much of a country's future development is primarily dependent on the youth," he says. "As a professor, I want to bridge the gap between young, passionate youth and experienced researchers."

We are Missouri S&T students, alumni, faculty and staff.

MINERS GIVE BACK

We give back to the community, the university and the world.

We give our time, knowledge, support, spirit and more!

BY ANDREW CAREAGA, ACAREAGA@MST.EDU

Just as a stone tossed into a lake can create ripples that turn into waves, so too can a single, well-placed gift make an impact greater than its initial intent.

Consider the impact of a single donation from the V.H. McNutt Foundation. More than 30 years ago, the foundation, set up to manage the estate of mining entrepreneur **Vachel H. McNutt**, MinE 1910, MS MinE 1912, provided funds to support construction of V.H. McNutt Hall. The building project would bring Missouri S&T's mineral science and engineering programs under one roof.

The dream of McNutt Hall became a reality in the mid-1980s. **Gary Havener**, Math'62, attended the dedication ceremony. Inspired by the magnificence of the new building, he was also saddened that its namesake was not alive to see what his gift helped create. So Havener decided that he would make his gift while he was still around to see the impact. Some 20 years later, his donation for a student center on campus led to construction of the Havener Center, which today is a focal point for student and community activity.

Less than a decade later, the ripple gained momentum when **James E. Bertelsmeyer**, ChE'66, decided to donate funds toward construction of the new chemical and biochemical engineering building that bears his name. During the dedication ceremony for Bertelsmeyer Hall in October 2014, Bertelsmeyer identified Havener as "my inspiration to make this contribution now rather than fund it in my will."

Perhaps some graduate who heard Bertelsmeyer's words during that ceremony will be the next to support a major campus project.

But Miners don't need to name a building to have a big impact. Alumni across the globe are making a difference through their gifts of time, financial support or expertise. No matter the size of the gift or type of cause, Miners express their generosity in many ways.

They give to their communities and service clubs. They give to religious and charitable organizations. They give to offer hope to others.

Read on to learn about the impact of Miners who give, and the many ways their generosity has a ripple effect on the world around them.

Miner Challenge

Breaking the spring break stereotype

BY PETER EHRHARD, EHRHARDP@MST.EDU

Miners give back in many ways. Many of our students give back by participating in Miner Challenge, a week-long alternative spring break program. Miner Challenge gives students a chance to help individuals and communities affected by issues like poverty, a lack of access to education, homelessness and natural disasters. For 73 Missouri S&T students, their 2016 spring break took them to small, underprivileged areas in states like Kentucky and Louisiana instead of the typical South Padre Island or Fort Lauderdale party scenes.

> "...these students return from the trip looking at the world in a different way."

Some students didn't wait for spring break to make an impact. During winter break, a team traveled to Santa Julia, Nicaragua, through Panorama Service Expeditions. The team worked to provide access to clean drinking water for the community.

"Our participants were impacted by the idea of privilege in immediate ways, such as the Nicaraguans' work ethic and outlook on life," says **Miranda Cory**, a junior in engineering management from Atchison, Kan., and the Miner Challenge peer involvement advisor. "In America if you ask a high school student what they want to be in the future, they'll list an occupation, but in Nicaragua, the student will say something along the lines of 'I want a job to support my family.' The education and opportunities that we receive are much different and more widespread than what is offered there."

Miner Challenge participants become immersed in situations they might not otherwise encounter. By seeing how various people struggle in daily life and making a positive impact on those lives, Missouri S&T students learn valuable teamwork, leadership and communication skills.

"The trips are often a transformational learning experience for the students," says **Jessica Haywood**, student service coordinator in the department of student life and Miner Challenge manager. "A lot of times the trips are the first time students see real poverty or homelessness. It is not just a 'Hey, let's go volunteer for a short while' type of involvement; these students return from the trip looking at the world in a different way."

During the recent spring break, student volunteers traveled to five different locations in teams of 11 to 16, along with a Missouri S&T staff member acting as trip advisor.

A team in Montgomery, Ala., helped construct houses for struggling families and volunteered at an after-school program. In Colorado Springs, Colo., a team worked with the Care and Share Food Bank to provide meals for those in need. The team in Hammond, La., partnered with the Ginger Ford Fuller Center to improve local housing. In Harden County, Tenn., a team helped socialize rescue dogs and cleaned hiking trails at Horse Creek Wildlife Sanctuary and Animal Refuge. And in Harlan, Ky., a team built and distributed dog houses made from scrap to local homeowners.

Miner Challenge roadmap

2015: Worked with Habitat for Humanity to build homes for those displaced by Hurricane Katrina in Hattiesburg, Miss.

2016
2015
2014
2012-2013
2010-2011
2008-2009

For a complete list of Miner Challenge locations go to **magazine.mst.edu**.

2015: Volunteered at a local women's cooperative to teach sound financial practices and assisted with crop and fertilizer production in Santa Julia, Nicaragua.

2015: Built homes with Habitat for Humanity and worked at a local food bank in Pittsburgh, Pa.

A history of service

Miner Challenge began in 2008, with a small team of students traveling to Boone, N.C., to work with two organizations during spring break. Western Youth Network, a group dedicated to bettering the lives of children and youths in the local North Carolina communities through education and role models, and Habitat for Humanity, an organization devoted to building "simple, decent and affordable" housing for those in need, were the first two partners with Miner Challenge.

No such thing as a free lunch

The team's trips are all paid for entirely by participant fundraising. Miner Challenge members sell cookie dough in the fall and chocolate-covered strawberries in the spring and hold letter-writing campaigns and crowdfunding to raise the necessary funds to travel.

Each student in the organization develops leadership skills while working on various jobs throughout the months leading up to the trips.

> "Today's students need to see that they can have an immediate impact on a community."

In 2014, a team traveled outside the country for the first time in the program's history. A team went to Jinotega, Nicaragua, to help improve young students' English, mathematics, science and vocational skills.

"Today's students need to see that they can have an immediate impact on a community," says **John Gallagher**, director of student life. "These trips can 'flip a switch' and really change their perspectives. I went on the Detroit trip last year, and it was amazing to see these students stepping up and learning to lead others."

The team members also help the local Rolla community. Miner Challenge participants have volunteered at the Russell House, a home for victims of domestic violence, and the Rolla Animal Shelter and even baked cookies for the local fire department.

"One of the best parts of my job is seeing how the trip teams really come together and how the trip leaders grow to take on more and more responsibility," says Cory. "This was my third year traveling and volunteering as part of Miner Challenge, which has let me see that no matter how small of an impact you have on the community, each little bit stacks up and helps people." ◻

Interested in helping support the students?

Visit the Miner Challenge website at **minerchallenge.mst.edu** or email **stulife@mst.edu.**

Miner Challenge by the numbers

1,300 Pounds of cookie dough made for the fall fundraiser

23 Majors represented by Miner Challenge participants

2,862 Miles the Nicaragua team would travel if they drove to Santa Julia instead of flying

24 Freshmen participating in 2016 Miner Challenge

500% Increase in number of trips offered as compared to 2008

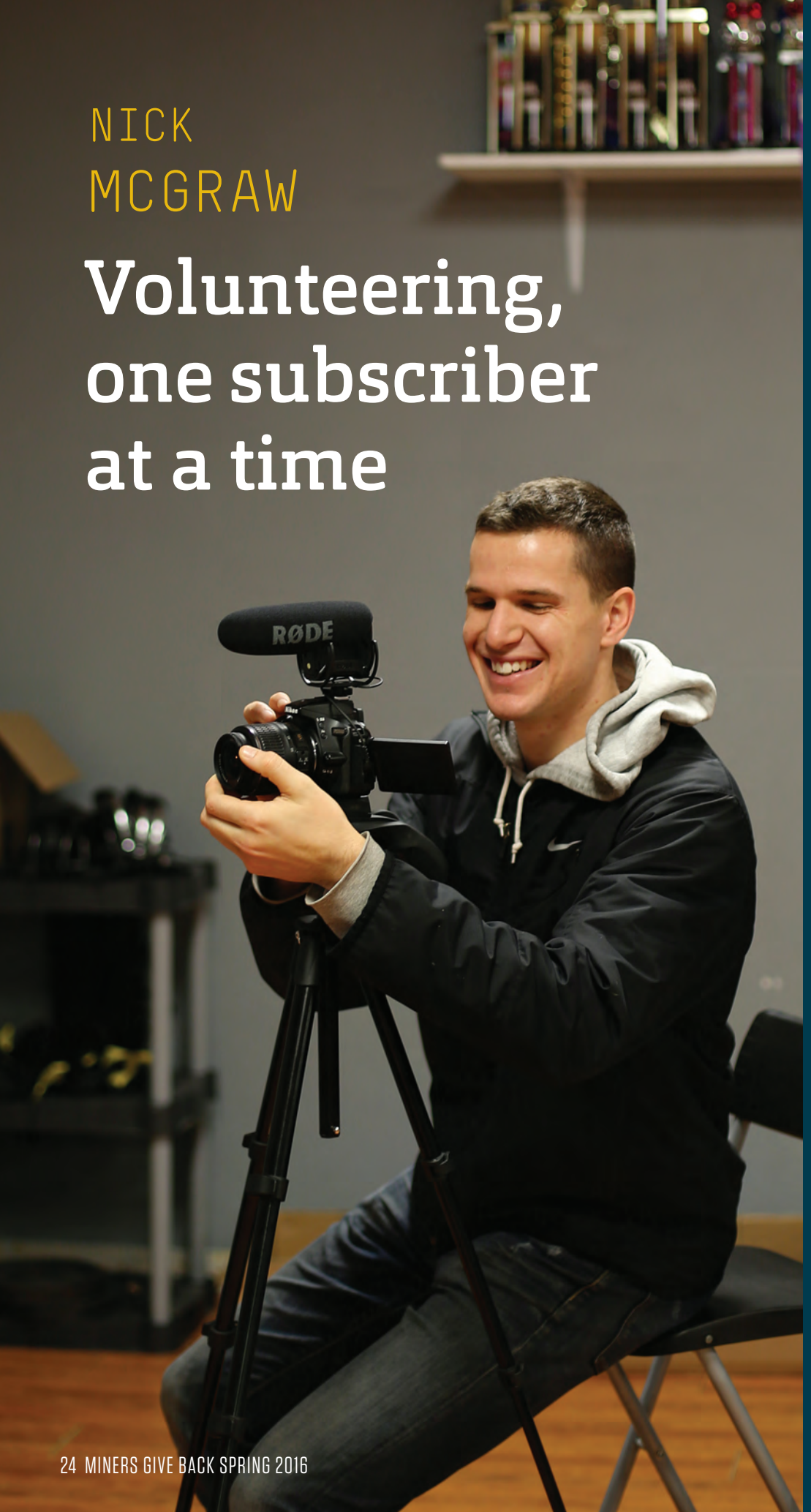
51 First-time Miner Challenge participants in 2016

$400 Cost to rent one van for a team's domestic travel

88 Students who applied to join 2016 Miner Challenge

NICK
MCGRAW

Volunteering, one subscriber at a time



BY ARIELLE BODINE, NEWS@MST.EDU

When **Nick McGraw**, EMgt'15, launched his YouTube channel, Nick's Perspective, he pledged to do one hour of community service for each subscriber to his channel.

Over the next six months, McGraw completed hundreds of service hours — all while producing more videos, many of which focus on volunteerism.

"I make a video every day about something that's important to me," he says. "The goal of every video I make is to allow anyone to feel like they were actually there and hopefully inspire them to try out an event on their own."

> “The goal is to inspire and recruit others to make videos about their volunteer efforts.”

Top: Nick McGraw carries a box of clothes and toys to a family’s car outside of The Dance Studio in Rolla after the family picked out community-donated items for holiday gifts. Bottom: Following an interview with Kathy Heflin and Mary Beth Myers about their work as volunteers, McGraw joins them in front of the camera for the conclusion of his video.

McGraw, who had spent over 400 hours doing service prior to his YouTube commitment, decided to intertwine his volunteer activities with his love of video production.

“Originally, I saw my service and my YouTube channel as two separate endeavors,” he says. “I decided to merge them because the more relevant helping others and spreading positivity is to the viewers, the more likely someone is to do it.”

McGraw has given back to his community through countless service events, from working with Habitat for Humanity to cleaning city parks. But his favorite service activities are the ones where he gets to interact with strangers.

“Being able to tell a stranger that whatever they’re going through will be okay can make a huge difference,” he says. “Helping others and spreading positivity is addicting.”

Since there may come a time when McGraw can’t keep up with the number of subscribers, he says he has a bigger plan.

“I will never stop my volunteering efforts, but there is no limit to the possible subscribers the channel could gain,” he says. “Given my lack of immortality, the goal is to inspire and recruit others to make videos about their volunteer efforts.”

Check out Nick’s YouTube channel at **rol.la/NicksPerspective**.

ERIC POTTS
Urban cowboy

BY MARIDEL ALLINDER, ALLINDERM@MST.EDU

Photo by Eric Kayne

> "The livestock show and rodeo is a whole bunch of things, but at the end of the day, it's about education."

Eric Potts, CE'73, calls himself an urban cowboy. The Texas transplant and retired Army colonel has lived all over the world. But it wasn't until he landed in the Lone Star State that he learned to tell an Angus from a Charolais.

He owes it all to the Houston Livestock Show and Rodeo.

After retiring in 2000 from a distinguished military career, Potts became deputy director of aviation for the City of Houston. He credits his boss with involving him in Houston's biggest annual event — a 20-day extravaganza featuring the world's largest livestock show, a rodeo competition, star-studded concerts and more.

"He thought I'd be good at it, so I gave it a shot," says Potts. "I've learned more about cattle than I ever imagined."

For the past decade, Potts has served on the show's steer auction committee. This marks his second year to chair the 200-person committee.

"Last year the steer auction raised $5.6 million," says Potts. "Our grand champion junior market steer sold for $300,000. Proceeds support scholarships, so we touch a lot of young people's lives."

Founded in 1932, the Houston Livestock Show and Rodeo has committed more than $400 million to scholarships and educational programs. More than 2,200 students currently attend 80 Texas colleges and universities on show scholarships.

"The livestock show and rodeo is a whole bunch of things, but at the end of the day, it's about education," says Potts, who also champions Missouri S&T as a member of the Academy of Civil Engineers and Academy of Miner Athletics. He and his wife, **Inge**, are generous supporters of the civil engineering program, alumni association and Miner athletics.

Today, as account director for Freese and Nichols, Potts spends a great deal of time in client meetings. But for three weeks every March, in keeping with the company's tradition of community support, the Houston Livestock Show and Rodeo takes over this executive's life — and a big cowboy hat becomes mandatory attire.

"After 27 years of moving every two or three years in the Army, I landed in Texas," says the St. Louis native. "It's the longest I've been in one place. I would call this home."

CAILEY BAKER

Catching Miners

BY MARY HELEN STOLTZ, MHSTOLTZ@MST.EDU

Miner softball catcher **Cailey Baker** loves the excitement of playing behind the plate.

"It's an adrenaline rush seeing a girl coming straight at you and knowing you have to tag her out or she'll score," Baker says.

She also loves the challenge of reading a batter, evaluating her strengths and weaknesses, and calling for just the right pitch.

She says her job as a student development officer works much the same way.

"Just like picking a pitch as the batter approaches the plate, when I call an alumnus for the first time, I have to decide the right thing to say while the phone rings," Baker explains. "Sometimes I just ask them how their day is going. Other times I thank them for a recent gift. My goal is to connect with alumni on a personal level."

Building that connection, particularly with donors, is the reason the Student Development Officer Program was founded.

"The Student DO Program is mainly about donor satisfaction," says **Rob Ruchotzke**, an annual giving officer in university advancement. "We want to ensure that our alumni, family and friends are appreciated and that their voices are heard. Our student DOs do that and more through their outreach."

Baker says she loves getting to know Miner alumni.

"Our alumni always say they want to hear what students have to say, and they love to share their stories," she says. "It's really rewarding."

Although she does occasionally reach unhappy people who think she's just another telemarketer, Baker says she takes it all in stride. She apologizes for the inconvenience and thanks them for their time. Often, she turns the conversation around.

"Once they realize I'm genuinely interested in getting to know them, not just asking for money, it changes," she says. "Those are the moments I live for."

Cailey Baker recruits students to work with the Miner Phonathon during an event in the Hasselmann Alumni House.

SEAN
CHENG

Booming biotechnology

BY PETER EHRHARD, EHRHARDP@MST.EDU

Photo by Genevieve Shiffrar

> "That's the reason why I wanted to set up the scholarship, to encourage and inspire students to think wildly and create new things."

To support students in biotechnology and give back to the mentor who had helped guide his academic career, **Xiaoliang "Sean" Cheng**, PhD Chem'10, recently founded a scholarship for chemistry or biology students who partner with faculty on research conducted in the Center for Single Nanoparticle, Single Cell and Single Molecule Monitoring at S&T.

Cheng says he wanted to help support students who conduct research at the center, which was established by **Yinfa Ma**, Curators' Teaching Professor of chemistry and associate dean of research for the College of Arts, Sciences, and Business. Ma was Cheng's research advisor at S&T.

"Since switching from being a student to a technology company founder, I have learned that technology begins with the innovative ideas that come from learning," says Cheng. "That's the reason why I wanted to set up the scholarship, to encourage and inspire students to think wildly and create new things."

A self-described serial entrepreneur, Cheng started thinking of ideas for new companies before he had even graduated from Missouri S&T. So far, he has helped found CZ Technologies, Neo-Leaf Technology, Clingnenomix and Wuhan Quality Life Technology, and partnered at a private angel investor venture that provides capital to early- and growth-stage life science companies.

"Having previous experience in building and developing companies really helps when looking to found a new one," says Cheng, who also serves as an adjunct professor of chemistry at Missouri S&T. "Unique ideas always seem to spark starting a company, and I have been lucky to always find the right team to help grow an idea into a reality."

Cheng's latest venture is QL Tech, a microbial bioreactor engineering and discovery technologies company he co-founded in 2013. He serves as CEO of the company. Its headquarters are in Wuhan, China, but it has a division in the Silicon Valley, where Cheng and his wife, **Lin Zhu**, MS IST'09, live.

APRIL:

A month of thanks at S&T

BY ARIELLE BODINE, NEWS@MST.EDU

During Philanthropy Month 2015, T-shirts and tags bearing the message "Made possible thanks to our generous donors" could be spotted across campus.

Philanthropy Month at Missouri S&T celebrates giving, progress and the philanthropic spirit.

During the month of April, students, faculty and staff take the time to thank donors and volunteers for their generosity. But it's more than that. Philanthropy Month is designed to raise awareness about the power of giving at S&T.

"We want current students to understand that philanthropy is rooted in helping other people," says **Katie Jackson**, assistant director of the Miner Alumni Association and an organizer of Philanthropy Month. "So, activities during the month also focus on reaching out to students as well as those in need."

All month, Students Today, Alumni Tomorrow (STAT) is partnering with Blue Key Honor Society to raise money for Spirit of Change. Spirit of Change provides funds for student support and random acts of kindness around campus. In the past, Spirit of Change has awarded a $500 book scholarship, and students involved in the effort have handed out free umbrellas on rainy days and added change to expired parking meters on campus.

Organizers will staff a movable booth during April for students, faculty and staff to make donations to the program. Donations of over $5 will be matched dollar for dollar by the university. Look inside the front cover of this issue to see how you can help.

Green tags bearing the message "We Give Because We're Miners" will be placed on equipment, buildings and offices that were funded in some part by charitable gifts. University personnel will hand out T-shirts with that same message to students and then perform random acts of kindness by passing out gift cards to students spotted wearing the shirt.

STAT will also host a month-long scavenger hunt as part of Philanthropy Month. Members will release philanthropy-related clues each week for students to search for on campus.

Through Philanthropy Month events, organizers and participants alike see firsthand the giving spirit that unites Miners.

Academies in action:
answering the call to lead and serve

> "Academy members are a passionate force for positive change. Their work goes well beyond financial support."

They are trusted advisors and true believers, stakeholders and sounding boards, investors and advocates — and most of all proud Miners. Who are these champions? They're members of Missouri S&T's eight academies, and they're using their superpowers to make a difference.

"Academy members are a passionate force for positive change," says **Joan Nesbitt**, vice chancellor for university advancement. "Their work goes well beyond financial support. As industry leaders, they advance the university's strategic plan by serving as an invaluable sounding board for academic departments and their faculty and students."

Whether they are advising department chairs, visiting classes as guest speakers, fundraising for priority projects, cheering for student-athletes or endowing scholarships, academy members personify Miner pride in action — and the power of partnership.

Bertelsmeyer Hall, dedicated Oct. 17, 2014.

"They are hardworking champions who wear many hats," says **Lea-Ann Morton**, assistant vice chancellor for university advancement. "They bring expertise and vision to the departments they serve. I've never seen anything quite like academies at other universities. They are more than honorary or donor groups. Academy members are engaged at a very personal level."

Here's an overview of Missouri S&T's eight academies and how they are answering the call to lead and serve.

Academy of Chemical Engineers

FOUNDED: 1996

A 68,500-square-foot testament to the dedication of this academy stands at 11th and State streets: James E. Bertelsmeyer Hall. Academy members were instrumental to raising the roof on this $22.3 million facility with contributions totaling $7.5 million. They also champion research and experiential learning through their support of graduate teaching assistantships and the Chem-E-Car team. You'll find academy members mentoring students, hiring graduates and advising the department on everything from accreditation to technology transfer.

Academy of Civil Engineers

FOUNDED: 1972

The members of Missouri S&T's oldest academy have been building bright futures for more than 40 years. From high-bay and hydraulics labs to advanced construction materials testing, academy members have kept the department at the leading edge of experiential learning, research and technology transfer. Academy members were instrumental supporters of the $22 million, 143-square-foot addition to Butler-Carlton Civil Engineering Hall in 2003. They were also visionary contributors to the 23,000-square-foot Student Design and Experiential Learning Center dedicated in 2011.

Upper: The purple glow emanating from the roof of Butler-Carlton Civil Engineering Hall comes from specially designed red and blue LED lights that promote and optimize plant growth in the Baker Greenhouse. Academy of Civil Engineers members helped fund the building's renovation in 2003. Lower: Emotive bioinformatics company founder and CEO Tan Le gave the keynote address during the Golden Jubilee, which the Academy of Computer Science helped organize.

> "I've never seen anything quite like academies at other universities. They are more than honorary or donor groups."

Academy of Computer Science

FOUNDED: 2003

Making history at the frontier of a technological revolution takes vision. Although the academy didn't exist 50 years ago when the computer science department was founded, members stepped forward in October 2015 to make the department's Golden Jubilee a landmark event. Academy members are also advisors and industry partners committed to advancing computing and other technologies through interdisciplinary research hubs such as Missouri S&T's Smart Living signature area.

Academy of Electrical and Computer Engineering

FOUNDED: 1980

Academy members have provided wisdom and leadership for more than three decades. In 2013, they embraced Missouri S&T's "20/20 Challenge" by leveraging state matching funds with private contributions to endow needs-based scholarships. The academy established two new scholarships, adding to a legacy that already includes a number of endowed scholarships and a lab equipment fund. Members also advise the department on curriculum and experiential learning opportunities, now a university requirement for all undergraduates.

Academy of Engineering Management

FOUNDED: 2005

Following a 2009 brainstorming session on how to make a bigger difference, this academy established a formal mentoring program. Today, approximately 20 academy members are partnered with students seeking professional perspective. Academy members also have established scholarship endowments, including a needs-based scholarship funded in response

Upper: The Academy of Mechanical and Aerospace Engineers helps fund student design projects, like the racecars built by the S&T Formula Car Team. Lower: Miner athletes now have a comfortable, well-equipped classroom for team meetings, thanks to support from the Academy of Miner Athletics.

to S&T's "20/20 Challenge." They continue to serve as guest lecturers, assist the department with accreditation — and raise awareness of the business side of engineering.

Academy of Mechanical and Aerospace Engineers

FOUNDED: 1995

Strengthening experiential learning has been a priority for this academy since its inception. Toomey Hall's exceptional labs are a testament to that. Academy members were instrumental to the construction of the Fluid Dynamics, Gas Turbine, and Dynamics and Control labs. This year, construction on a Kinematics, Kinetics and Power of Mechanical Systems lab began with funding from Nucor-Yamato Steel Co. The academy also supports scholarships, graduate teaching awards – and innovation. Every year, student design teams are invited to present proposals in a competition for funding.

Academy of Miner Athletics

FOUNDED: 2011

Whether they are cheering for student-athletes in competition or the classroom, there is no more dedicated group of supporters. These former Miner athletes serve as advisors to the athletic director and mentors to student-athletes. Their generosity impacts every area of the department, from scholarships to equipment. Academy members also have helped to fund many enhancements in the Gale Bullman Building, including renovations to the room used for team meetings, film reviews and study halls.

Academy of Mines and Metallurgy

FOUNDED: 1995

From explosives camps and geologic field studies to irradiation research, academy members are making a difference. They serve as advisors to three departments: materials science and engineering, mining and nuclear engineering, and geosciences and geological and petroleum engineering. They encourage future Miners by supporting summer programs for high school students. They award scholarships to students selected by their peers. They fund faculty awards recognizing early-career and senior scholars. And more than a few have ventured into the Haunted Mine to support this popular Halloween fundraiser benefitting student organizations. □

DeWayne Phelps (center), senior lab mechanic in mining and nuclear engineering, supervises students as they set up an explosive device at the Experimental Mine during the explosives summer camp.

A network of connection

Getting involved with S&T after graduation is more than serving on a committee. In fact, it can be just about anything you make it. From attending sporting events and talking with potential students to serving on the Miner Alumni Association Board of Directors, staying connected after graduation isn't difficult. Here are some of the ways you can get involved and stay involved.

COME TOGETHER

With over 50 sections across the country, you have an abundance of opportunities to expand your professional and social circle in 2016. 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.**

LET YOUR VOICE BE HEARD

Your opinion matters to the Miner Alumni Association, which represents nearly 60,000 alumni. If you have comments, questions or ideas, please share them with your elected representatives listed below.

PRESIDENT
Richard W. Eimer Jr. '71

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To contact your representatives, go to **mineralumni.com.**

Photo by stevejonesphoto.com

NEW ALUMNI WE ARE YOU!

New alumni just out of school are focused on starting careers and getting established in a new community. And sometimes that community is a long way from home and campus. But just because you aren't in Rolla doesn't mean you have to lose touch.

The Miner Alumni Association created the New Alumni Council to represent the needs of recent Missouri S&T graduates.

"I remember when I first moved to Memphis," says **Danny Ryan**, ME'12, director of education for Pi Kappa Alpha Fraternity and member of the New Alumni Council. "Not only did I not know anyone but I also had no clue where to go or what to do. Things just weren't the same as they were in Rolla. Connecting with other new alumni helped me adapt to life in my new city and allowed me to make some great new friends who totally understood the transition from my quirky life in Rolla."

Ryan says that because of the heavy career focus, many recent graduates don't seek out alumni activities until they are more established in their careers — sometimes 20 or 30 years out.

"New alumni don't really have a lot of time or money so we feel as though we don't have a reason to 'give back' or re-engage with S&T, especially since we are just starting our careers," Ryan says. "New alumni still need a way to stay engaged, though, and the New Alumni Council works to make sure that can happen."

Ryan says it's easy to get involved.

"Connect with other alumni in your area," he says. "It doesn't have to be a big, formal event. It can be three or four people watching a sporting event or going out to eat — anything you like to do. If you don't know anyone in your area, reach out to the alumni office, or engage with us via social media. We can help you connect with other alumni in your area.

"Other alumni want to connect with you, trust me," Ryan says. "There are plenty of great things going on with Miners all over and we want to know."

Connect with the Miner Alumni Association on Facebook (facebook.com/MinerAlumni) or Twitter (@MinerAlumni).

John and Marie Eash at the Bauer Bar in Hasselmann Alumni House. The Eashes supported the alumni house by naming one of the barstools in the Bauer Bar.

COMING FULL CIRCLE: JOHN AND MARIE EASH

It isn't surprising that what attracted **John Eash**, AE'79, MS EMgt'90, to Missouri S&T as a student is exactly what brought him back 40 years later as an employee.

Because Eash has always believed in the power of partnerships.

That belief attracted him to S&T's co-op program as a high school senior. It drove his involvement as president of the Miner Alumni Association and Boeing's chief executive focal. And, ultimately, it brought him back to campus last August as the university's first executive director of corporate relations.

"My father, who was an engineer at McDonnell Douglas, learned about the co-op program at Rolla," says Eash. "We talked about what a great opportunity it would be — valuable work experience and a good salary while I was earning my degree."

The aspiring aerospace engineer decided to become a Miner. For five semesters, he gained experience working for McDonnell Douglas (now Boeing) through the co-op program. He joined the company full time after graduation and went on to a distinguished 36-year corporate career in flight test engineering, manufacturing, supply chain management and quality control.

But service was as important as success to Eash — and giving back to S&T was a priority. He joined the alumni association board and became Boeing's chief executive focal for S&T, a position focused on employee recruitment, research and development, and continuing education. Under his leadership, new initiatives blossomed: a student mentoring program, campus speaker network, Boeing Day at S&T and two milestones in 2014 — a master research agreement and Boeing office at Innovation Park.

Eash has now come full circle from co-op student to corporate liaison to campus leader. "The opportunity to lead a new corporate relations office has been the biggest — and most unexpected — milestone of my relationship with S&T," he says.

Meanwhile, Eash and his wife, **Marie**, are settling into life in Rolla and doing what they've always done: give back. They recently established a planned gift that will create endowments in support of three priorities near and dear to their hearts: the alumni association, mechanical and aerospace engineering department, and Miners by Design, the donor group that supports S&T's 14 student design teams.

"Missouri S&T has been a huge part of our lives for many years," says Eash. "We hope to inspire future generations of Miners to feel the pride that comes with giving back."

PHOTO FINISH: MILLENNIUM ARCH

Designed by sculptor Edwina Sandys and cut from Missouri red granite using waterjet technology developed at Missouri S&T, the 15-foot-tall *Millennium Arch* on the Castleman Hall lawn stands as a perfect example of the intersection of science and art.

MISSOURI S&T

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MINERS GIVE BACK

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Forging their futures in Rolla. Forever changing the world.

MISSOURI S&T'S 2016

ALUMNI OF INFLUENCE

Join us for a celebration of innovation, exploration, leadership and impact as we honor 10 Miners for their lasting contributions to our university and the wider world. Meet them on page 5.

The 2016 Alumni of Influence Gala
Saturday, Nov. 5, 2016
Missouri S&T
Rolla, Missouri

SAVE THE DATE. WATCH FOR DETAILS.
For more information, contact **Sarah Jones** at **jonessarah@mst.edu**, or visit **influence.mst.edu**.