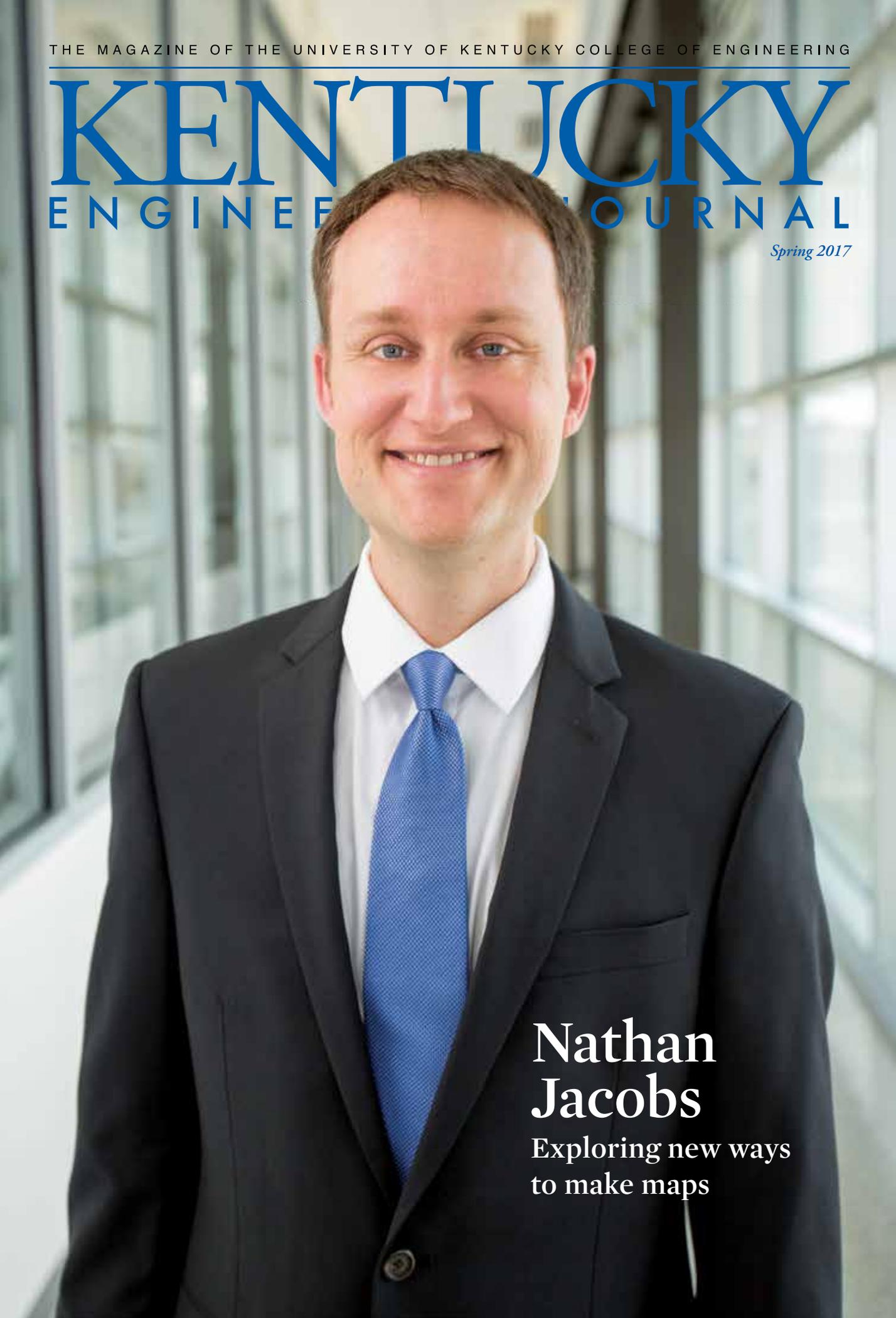


THE MAGAZINE OF THE UNIVERSITY OF KENTUCKY COLLEGE OF ENGINEERING

KENTUCKY

ENGINEERING JOURNAL

Spring 2017

A portrait of Nathan Jacobs, a man with short brown hair and a friendly smile, wearing a dark blue suit jacket, a white dress shirt, and a blue patterned tie. He is standing in front of a large window with a grid pattern, looking directly at the camera.

**Nathan
Jacobs**

Exploring new ways
to make maps



"60 Minutes" reporter Bill Whitaker and Department of Computer Science Chair and Professor W. Brent Seales discuss the Digital Restoration Initiative, in which Seales virtually unwraps manuscripts too damaged to be physically opened. A segment about Seales' research is scheduled to appear in an upcoming episode.

Message from the Dean

Welcome to the spring issue of *Kentucky Engineering Journal*, the flagship publication of the University of Kentucky College of Engineering. In February, this magazine received a third-place award from the Council for the Advancement and Support of Education for best magazine among all schools in the southeast region. That is a significant accomplishment for a university, let alone a college within a university!

As you read, one theme you might notice is student excellence on display *outside* the classroom. A multidisciplinary research team is preparing for the first total solar eclipse to be visible in Kentucky since 1970. Two computer engineering students are putting their knowledge of optimization to use here on campus at WRFL. Another duo took first place honors in JPMorgan Chase & Co.'s Code For Good hackathon in Columbus, Ohio by inventing an app to support Feeding America.

While top-notch classroom training is essential to any substantial engineering program, students deepen their learning when they can apply it through student organizations, competitions, Co-op rotations, internships, research teams and more. We are perpetually striving to create more ways for students to engage in activities that combine their classroom education with real-world challenges and opportunities. It makes a tremendous difference in how well-equipped our graduates are upon leaving UK.

We appreciate hearing from you—what you liked in each issue, what you didn't like. If you have any feedback you would like to share with us, send an email to alumni@engr.uky.edu. Happy reading!

Sincerely,



Larry E. Holloway
Interim Dean



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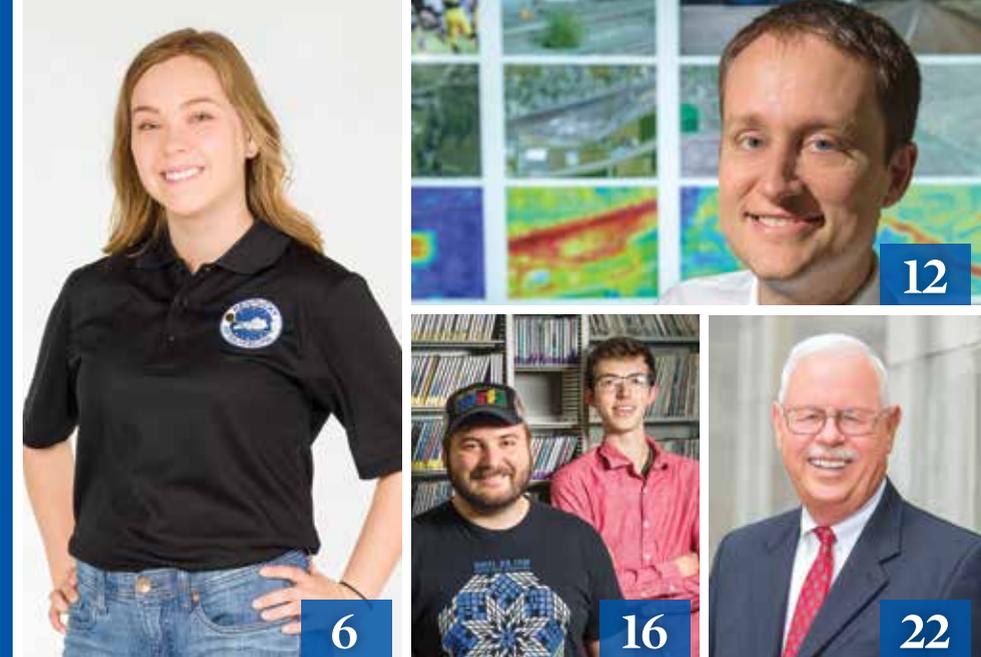
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FRONT COVER

From maps of scenic-ness to maps of faces, Nathan Jacobs is using satellite and ground imagery to create better ways of visualizing data.

 College of
Engineering



Contents

- 6 Eclipse Day**
A total solar eclipse will cross western Kentucky on August 21 and a team of UK engineering students will be there.
- 12 Maps 2.0**
New tools have enabled computing cartographers like Nathan Jacobs to produce maps you never knew you needed.
- 16 The Spirit of Radio**
Mitch Mullins and Grant Sparks are bringing new school optimization to an old school radio station.
- 22 Know Thyself**
Alumnus W. Terry Strange is back on campus and teaching a leadership class.
- 26 Life and Legacy**
The Aubrey Donald May Scholarship Fund is a story about delight, appreciation and giving back.
- 28 In the Spotlight**
- 30 Hall of Distinction**
- 32 News & Recognition**
- 36 Class Notes**
- 38 Now You Know**
Class composite photos

ECLIPSE DAY

This summer, a total solar eclipse will blanket western Kentucky in complete darkness for two minutes and forty seconds. A multidisciplinary student research team two years in the making will be there.

On August 21, 2017 a total solar eclipse—an astronomical event where the moon completely blots out the sun’s light, will occur along a narrow line originating in Salem, Ore., and exiting through Charleston, S.C. It will be the first total solar eclipse to cross the Pacific and Atlantic coasts in 99 years and the first to be visible in the southeastern United States since 1970. For eclipse enthusiasts—and there are many—a long wait is about to come to an end.

Count University of Kentucky biosystems engineering major Mollye Malone among those hoping to see midnight blackness in the early afternoon. This eclipse has been on her calendar since she was eight years old.

“I remember thinking, “This is so far away. I’m never going to see an eclipse.”

Not only will Mollye witness the eclipse, but she and roughly 30 other UK students are part of a research team that will launch two high-altitude latex balloons equipped to take pictures and record video of this rare event. NASA Space Grant, a program of the NASA Office of Education that develops the U.S. aerospace STEM workforce and aerospace research, is conducting a nationwide cooperative eclipse event

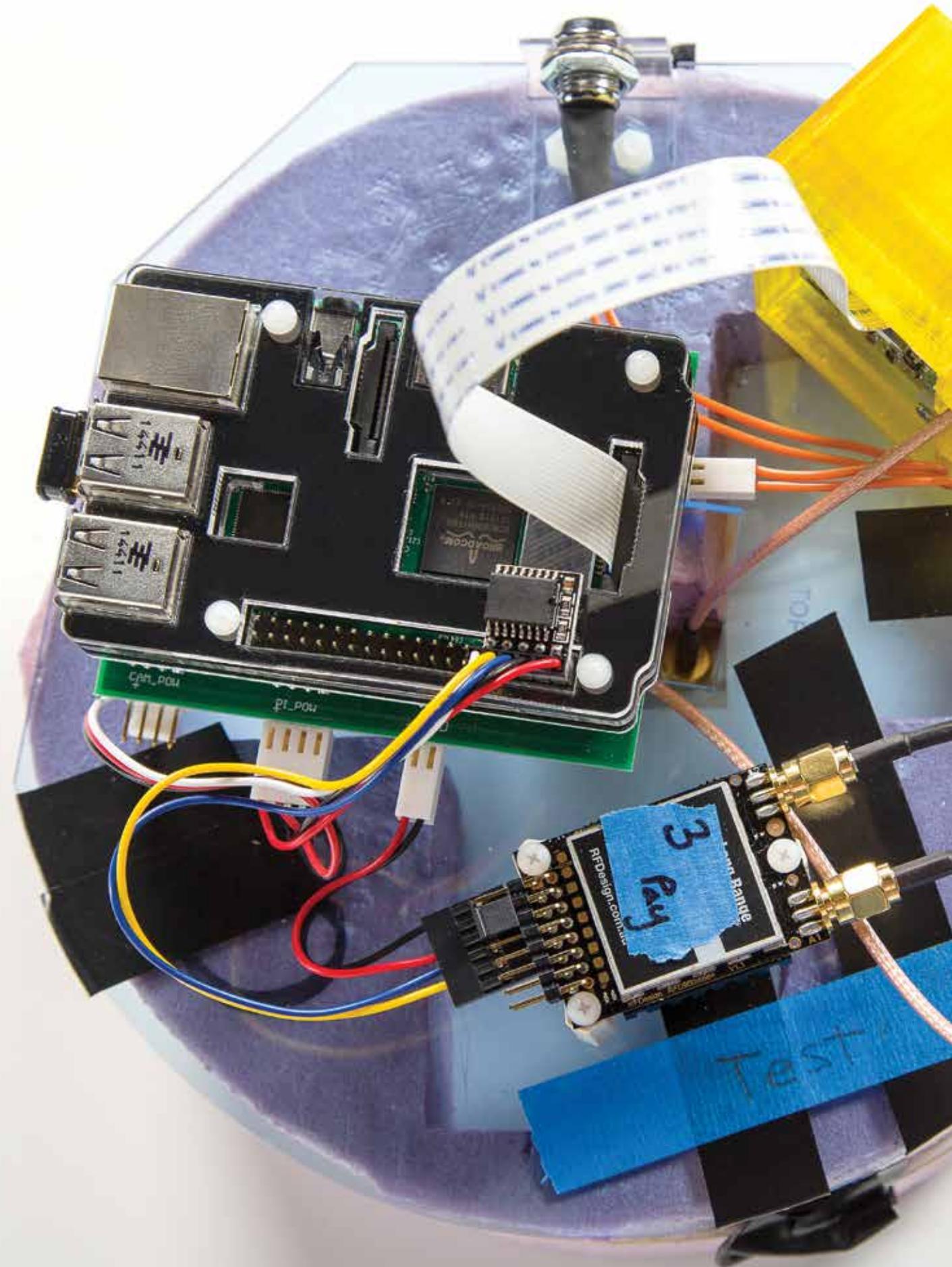
with over 50 teams live-streaming video from the edge of space.

“As a biosystems major, I knew I wasn’t going to be doing aeronautical projects,” Mollye admits. “So this became a passion project. To see it up close is beyond anything I could ever hope for.”

Mollye’s anticipation is understandable. The next total solar eclipse near Kentucky will be April 8, 2024, well after graduation. After that...2045, when team members will be pushing 50. This may not be a once in a lifetime experience, but it’s close. Fortunately, the eight team leaders—Mollye, Colton Pugh, Matt Graham, Patrick Heelan, Ginny Smith, Tristan Hagerman, Christen Setters and Stannard Phelps—have immersed themselves in preparations for Eclipse Day.

“Last summer, we spent a week at the Borealis Lab at Montana State University in Bozeman, Mont.,” explains Ginny. “It was a week of intensive building and testing our systems, but by the time we came back, everything we built worked.”

The UK team is using what team leaders refer to as the “Montana System.” A live video camera will



MOLLYE MALONE

Biosystems engineering
Public relations team leader

COLTON PUGH

Biosystems engineering
Ground station team co-leader

MATT GRAHAM

Medical lab science
Payloads team co-leader
Ground station team co-leader

PATRICK HEELAN

Mechanical engineering
Payloads team co-leader
Launch team leader

GINNY SMITH

Mechanical engineering
Mission control leader

TRISTAN HAGERMAN

Mechanical engineering
Chase and recovery team leader

CHRISTEN SETTERS

Mechanical engineering graduate student
National coordinator

STANNARD PHELPS

Mechanical engineering
Payloads team co-leader



stream the eclipse from 100,000 feet. A still camera will capture high-quality photos; and all “Montana System” balloons have a “cut down” termination system. Christen says one call from the Federal Aviation Association (FAA) could trigger a call to “cut down” the balloon.

“Every team is flying a specific tracking payload connected to the iridium satellite network. The

FAA can watch every single balloon at the same time on one graph. If they see a problem, they will call Mollye and tell us to cut down. Once she sends the command to terminate, the payloads will drop and the balloon will soar and pop.”

A congested sky isn’t the only potential snag; in fact, receiving permission to release the balloons at all would be a win. A late summer thunderstorm would

pose an obvious problem, but an overcast day could prove just as detrimental. Per FAA regulations, if there is more than 50 percent cloud cover, the team cannot fly. Further, too much wind could jeopardize the launches and whereas most balloon launches occur before 9:00 a.m., the team won’t send theirs until noon CST...when the winds tend to be higher. But if they can just get the green light...

“As long as we get the go ahead we will try to be prepared for whatever wind conditions we have,” shrugs Colton.

To maximize their chances for success, the team will launch from near Hopkinsville, Ky., the point of greatest totality—essentially the prime place to glimpse the eclipse in all its fullness. Fortunately, Suzanne Weaver Smith, Donald and Gertrude Lester

Professor of Mechanical Engineering, director of NASA Kentucky and faculty coordinator for the project, had the foresight to book 20 hotel rooms more than two years ago. Christen, who is coordinating with visiting schools from other states, says some teams are staying as far away as Bowling Green—66 miles from Hopkinsville.

On the morning of August 21, the team's first objective will be to find the ideal location for the first launch. While they can begin making computer generated predictions of the balloon's flight path based on weather up to seven days before the eclipse, patterns change from day to day.

"You can get a good prediction about 12 hours before the launch," says Matt. "So we won't know where to set up until that morning"

"It will definitely be a scramble," Mollie adds.

The eclipse should arrive in Hopkinsville at 1:22 p.m. CDT. Because cell towers will be overloaded, the team will use a Wi-Fi connection and Google Chat to communicate. At noon, all eyes will turn to Ginny, the team's "mission control" leader.

"I will go down the line and ask everyone if they are go or no go," she explains. "We have a 10 minute window in which to launch, so we have to have everything down to a system. If the times line up, I will start the countdown."

The totality of the eclipse will last two minutes and forty seconds. It should become dark as midnight in the middle of the afternoon.

"We have a specific picture in mind that we want to get," says Ginny. "A balloon directly in front of the eclipse. We have also been working on video stabilization in order to reduce the spinning that sometimes happens. But the camera should face the eclipse and on the live stream we will be able to see what an eclipse looks like at 100,000 feet."

In addition to the live video and still camera

payloads, Matt and Patrick are exploring payloads with GoPro™ cameras, weather sensors and even a Girl Scout payload to help local Girl Scout troop members earn their space badges.

"On one of our previous launches, we sent zebrafish embryos at the request of a professor in the biology department," Colton smiles. "That's not happening this time."

If the balloons reach 100,000 feet, they could travel anywhere from 20-100 miles, depending on the weather. So how will the team locate them? Tristan, who is in charge of chase and recovery, indicates prediction modeling will make the job easier.

"During our practice launch, I was in charge of tracking the balloon with our high-altitude tracker system. It is accurate, so we should have no problem finding them."

If successful, the team will possess photos, videos and other data that will be processed and saved for research projects leading up to the 2024 eclipse. What's more, Smith conjectures that this anomalous day in August will have a transformative effect on each student's career path.

"Most of these students are freshmen and sophomores, so they will have tremendous technical and teamwork experience to contribute to other College of Engineering research laboratories after the 2017 Eclipse is over. Further, the technical knowledge and multidisciplinary teamwork experience they are gaining will be invaluable as they decide on career directions, identify applicable materials in future classes and interview for internship and job opportunities." [KEJ](#)

Mollie Malone co-created the infographic on the next page.

ECLIPSE BALLOONING PROJECT

IRIDIUM SATELLITES, IN COMBINATION WITH GPS SATELLITES, COMMUNICATE THE LOCATION OF EACH BALLOON.

THE PROJECT CONSISTS OF 57 HIGH ALTITUDE BALLOONING TEAMS OF STUDENTS AT UNIVERSITIES AND HIGH SCHOOLS FROM AROUND THE COUNTRY.

THE BALLOONS WILL ASCEND TO 100,000 FEET ABOVE THE EARTH AND WILL BURST SHORTLY AFTER THE CONCLUSION OF THE ECLIPSE

ON BOARD THE BALLOONS ARE A 5.8GHZ MODEM FOR TRANSMITTING VIDEO AND A 900MHZ MODEM FOR TRANSMITTING IMAGES, BOTH OF WHICH ARE RUN BY RASPBERRY PI 2 COMPUTERS

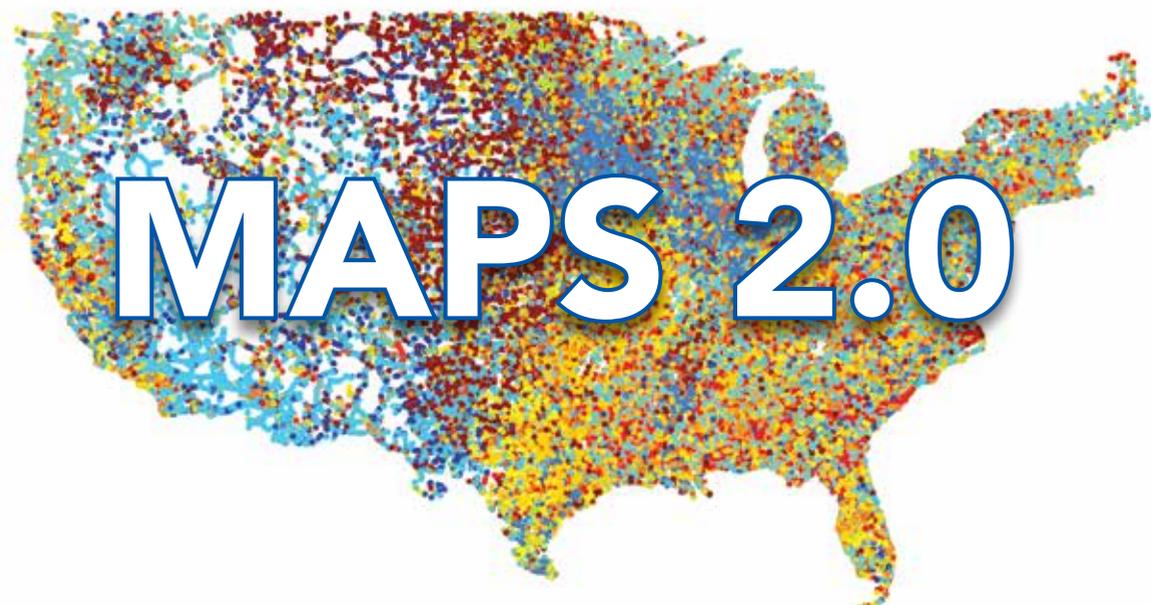
VIA THE IRIIDIUM SATELLITE DATA THE FEDERAL AVIATION ADMINISTRATION (FAA) WILL BE ABLE TO TRACK ALL PROJECT BALLOONS SIMULTANEOUSLY

THE RASPBERRY PI 2 COMPUTERS PAIR WITH THE GROUND STATION COMPUTER AND TRANSMIT VIDEO AND IMAGES FROM THE BALLOON TO GROUND STATION THROUGH RADIO WAVES

THE VIDEO AND IMAGES TRANSMITTED TO THE GROUND STATION COMPUTERS ARE DIRECTLY STREAMED ONLINE WHERE THE FOOTAGE CAN BE ACCESSED BY ANY DEVICE, MAKING THE SOLAR ECLIPSE VISIBLE FROM THE EDGE OF SPACE TO ANYBODY WITH INTERNET ACCESS

WATCH THE 2017 SOLAR ECLIPSE FROM THE EDGE OF SPACE LIVE AT STREAMECLIPSE.LIVE

BE SURE TO WATCH THE ECLIPSE LIVE FROM THE EDGE OF SPACE AT STREAMECLIPSE.LIVE! SPECIAL THANKS TO THE NASA SCIENCE MISSION DIRECTORATE, NASA SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM, AND THE TEAMS PARTICIPATING IN THE PROJECT.



New tools have enabled computing cartographers like Nathan Jacobs to produce maps you never knew you needed.

Maps. We usually think of them as geographic tools that accurately identify where places are located. Lately, however, researchers are discovering new ways to take maps to the next level. For instance, computer science associate professor Nathan Jacobs was part of a team that developed a map according to personal taste. Residents in the United Kingdom had been given a set of pictures and asked to assign a number to each picture based on how scenic they thought it was. Jacobs' team then translated the results into a map of the United Kingdom entirely based on aesthetic taste. An isolated patch of blue (scenic) surrounded by gray (non-scenic) may reveal a hidden treasure worthy of an afternoon hike.

According to Jacobs, who is interested in making maps no one has ever made before, advances in technology and social network data are leading to new kinds of maps with better quality.

"You can make maps of all sorts of things. People have taken social network data and mapped where it was snowing at that moment. It was possible because people were posting geotagged pictures of snow. One group asked volunteers look at Google Street View photos and give each one a score according to whether they thought that place looked safe or not. Then they built a map that

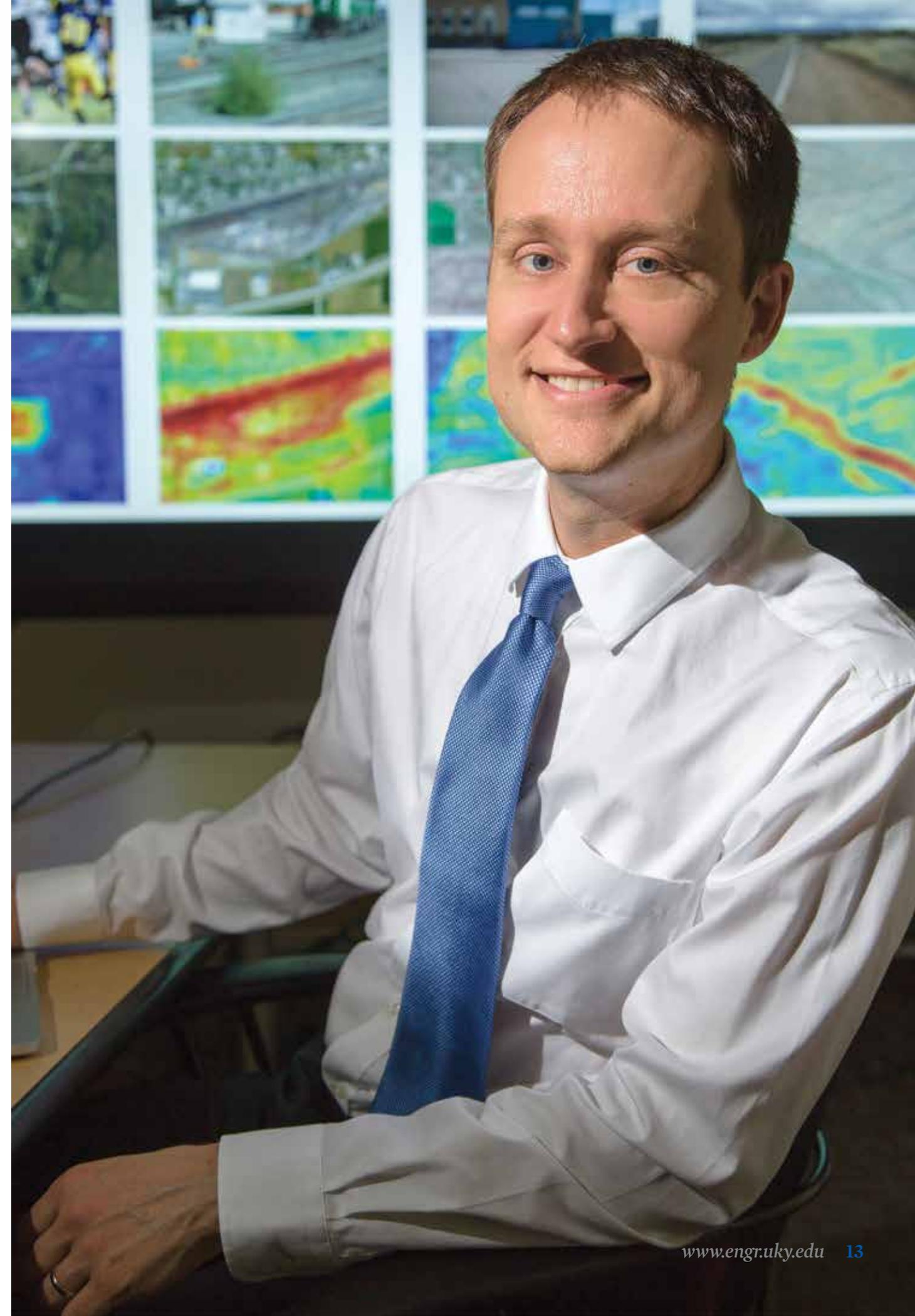
illustrated the perceived safety of each location."

While novel in scope, maps based on social network data alone are limited because images are not available for every location. Filling in the gaps usually leads to low-resolution maps. As a result, Jacobs has begun experimenting with combining ground imagery with satellite imagery.

"Utilizing social network data works well in major tourist areas where people are taking lots of photos, but it doesn't help in areas that are more non-descript. So you need to be able to match against other images. That is why satellite imagery is so important; it gives us another way to collect imagery."

For instance, the team's map of scenic places in the United Kingdom used both ground-level and satellite imagery, which enabled them to produce a more robust map than using ground imagery alone. With that level of detail, it might one day be possible to receive driving directions tagged to a scenic route. Encouraged by his preliminary results, Jacobs has begun applying the same techniques to a variety of areas.

"If you have a map with that kind of resolution, you can do all kinds of useful things with it."



When Jacobs arrived at the University of Kentucky in 2010, most of his research involved outdoor webcams. His work on a global webcam archive catalogued more than 16,000 live webcams in the U.S., Europe and parts of Asia and explored how such a repository of images could monitor global trend changes. While a move to satellite imagery might seem like a departure from his earlier research, Jacobs says the overall theme is the same.

“With a webcam, you have a camera fixed in one spot and can trace what a particular scene looks like over time. We did some interesting research with that approach, but it was limited because the cameras are sparsely distributed. We can get farther with social network, Google Street View and now satellite data. So it’s been a natural progression in that we’re trying to expand the set of the different types of images we can work with; however, all of them have the connection that we think about where and when those pictures were taken.”

A map of scenic-ness may illustrate a new way of looking at a particular place, but we can still readily understand it as a map; but what about a map that isn’t about places? That is what Jacobs is investigating with a project he thinks of as Google Maps™ for people.

“We took a large data set of images with geotags and then ran a face detector on all of them. Then we built a map where you can zoom in to places all over the world and see what the average person looks like in that exact place. You see a composite picture of the representative face for any age or gender. If you want to see what the average five-year old boy in Japan looks like, you can. I’ve become a dabbler in the world of faces. Another possibility would be that elementary school kids interact with it in social studies classes. They could see what the average kid their age in South Sudan looks like. Actually seeing people from a place you’ve never visited can get rid of a lot of misconceptions.”

A map that elucidates our shared humanity and promotes understanding? One could certainly say we’ve come a long way from sea monsters lurking on the edges of sailing maps! [KEJ](#)



The yellow bounding box shows the image crop that maximizes scenic-ness. The predicted scenic-ness scores for both the entire image and the cropped region are shown in the inset.

THE SPIRIT OF RADIO

Mitch Mullins and Grant Sparks are bringing new school optimization to an old school radio station. Just don't ask them to automate the music.

On March 7, 1988, WRFL (“Radio Free Lexington”) began broadcasting on 88.1 FM from the University of Kentucky campus. Since that day, the station has put a live human being in the DJ’s chair 24 hours a day, seven days a week, 365 days a year. No computers manning the overnight shift. No algorithm-curated playlists. If it’s 2:30 a.m. and you want to hear Neutral Milk Hotel, contact the lord of the board for that time slot *and they’ll play it*; likewise, if you can name half the bands on an hour’s playlist, then you *really* know your music. As an “educational” radio station, WRFL’s license frees it to expose the public to bands excluded from top 40 radio.

And sometimes you randomly get dogs barking over the air. Aware of the sound emanating from the “ON AIR” room, computer engineering senior Grant Sparks shakes his head and laughs.

“You hear a lot of oddball stuff here and that’s some of the charm of it.”

WRFL oozes charm. Temporarily housed in the basement of the White Hall classroom building due to the renovation of the Student Center, the 100+ staff and volunteers who bear the spirit of WRFL have not let relocation erase their mojo. Unsolicited artists have generously donated graffiti to suit every taste. The DJ’s room is low-lit, crowded with stacks of vinyl and compact discs and perfectly suited to

receiving one’s euphonious muse. Posters old and new festoon the windowless walls.

“The Red Hot Chili Peppers played in the student center ballroom in 1988,” says Mitch Mullins, a double major in computer engineering and computer science. “We’ve got the poster around here somewhere.”

Two of 18 student directors on staff, Mitch oversees the website (WRFL.fm) while Grant handles the ins and outs of production. About a year ago, the two decided to apply their computer engineering skills in ways that would optimize repetitive tasks within the DJ booth.

“The website hadn’t been updated since 2011,” recalls Mitch. “We really needed to improve the functionality for the DJs.”

Music licensing requirements compel radio stations to report what they’re playing. That means DJs must manually enter the artist, track and album for every single song they air—tens of thousands of entries each year. Using the old website, it took DJs about 45 seconds to complete the form for each song. Mitch and Grant started thinking about how to streamline the process. In their new system, DJs enter an album’s assigned number and instantly the form is pre-filled with the album title and artist. They merely type in the track title. Grant says the average time



Mitch Mullins (left) and Grant Sparks (right) host TEKtalks Thursdays from 6-8 p.m. on WRFL.



has gone from 45 seconds to 10.

“We’re not only shaving time, but hundreds of thousands of keystrokes per year.”

Mitch and Grant didn’t just innovate; they developed a whole new self-sustaining system. Now, the music director can make judgments about which albums are getting stale and swap them out. It has also transformed reporting for national charts.

“Until recently, we paid a student to read through pages and pages of playlist data to tally all of the plays for the week. Now, since every album has a unique ID number, whenever someone enters a play, a counter adds a number to it. The charting process is fully automated,” explains Mitch.

While feedback has been positive, Grant and Mitch understand their gifts must operate within longstanding boundaries. According to Mitch, automation is a dirty word at WRFL.

“We’ve considered not having a live DJ during the overnight hours, but no one here really wants that to happen. So where we can’t automate, we optimize. If the bike won’t drive itself, how can we add training wheels by way of making forms easier to complete or improving other processes within the station?”

The only engineering majors at WRFL, Mitch and Grant were quickly tagged “the IT guys”; however, the moniker serendipitously led to an invitation for the two of them to

host a weekly show. TEKtalks, which airs Thursdays from 6-8 p.m., is a mixture of music and commentary on current events related to science and technology. Their shows have explored 3D printing, autonomous vehicles, video games and even sonic fire extinguishers. Occasionally, they invite College of Engineering faculty to join them as guests. On January 12, they celebrated two years on the air. It is unclear what the future of the show will be after graduation.

For that matter, what is the future of radio? Can college

radio stations compete with the conglomerates that are eating up smaller stations? Mitch thinks so.

“Radio today is heavily commercialized. The real radio spirit exists in your college and community radio stations. That’s what the future of radio will be: die-hard stations seeking to keep radio not top 40, which is the grit of music.”

Grant agrees, but relays a different concern, one that takes into account growing interest in services like Spotify, Apple Music, Amazon Unlimited and others.

“Why should I turn on the radio when I can just pay \$10 and listen to all the music I want?” he asks. “We’re not just up against the commercial stations but the new thing that will *slay* commercial stations—the ability to curate exactly what you want to hear.”

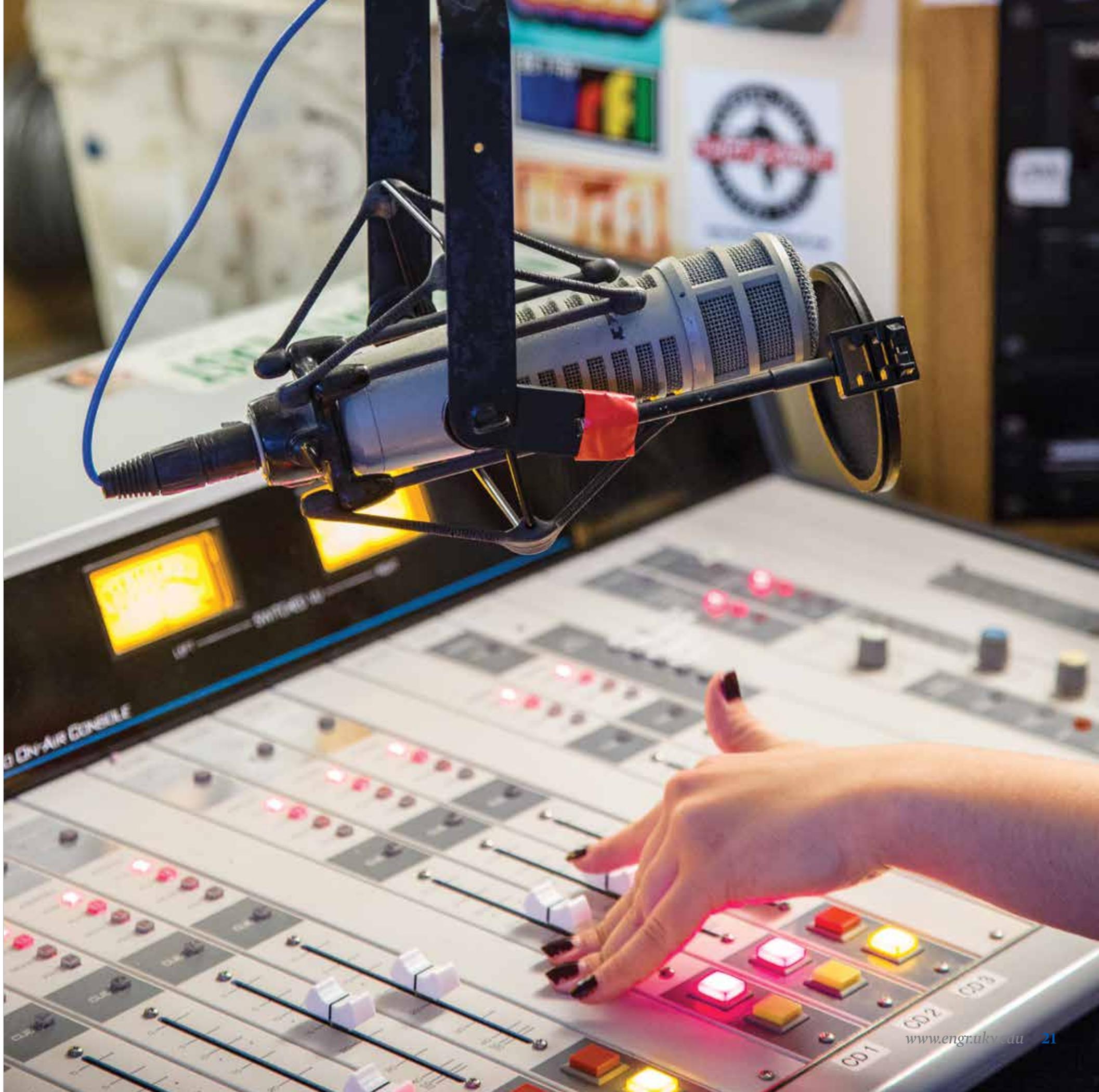
“We’re not only shaving time, but hundreds of thousands of keystrokes per year.”

—Grant Sparks

So is radio an antiquated means for listening to music?

“WRFL can compete,” Mitch says assuredly. “We’re highly interactive. We offer a stream over the Internet. We have an app called RadioFX, which is similar to the iHeart Radio app, but with an exclusive focus on college radio stations. It lets the listeners interact with the DJs via a chat feature, make requests, save our broadcast schedule, set alerts for upcoming shows, follow our social media streams and more. And because we’re not mainstream radio, our DJs will likely play something you’ve never heard before. That human touch will make all the difference.”

Until it doesn’t—and let’s all hope that never happens—be assured that someone, around the clock, is piloting the airwaves just for you. [KEJ](#)



KNOW THYSELF

Alumnus W. Terry Strange's leadership class teaches University of Kentucky engineering students how to deal with the most important person they will ever manage—theirself.

Shortly after W. Terry Strange (BSChE '73, MSChE '74) retired in 2013, he informed Doug Kalika, chair of the Department of Chemical and Materials Engineering, that he would like to be more involved with the department. If Kalika saw a need, and Strange was a good fit, he would be happy to help. When a Hall of Distinction inductee who spent nearly 40 years at Dow Corning wants to devote time to your department, you dream up ideas quickly. Kalika, who knew Strange had taught leadership classes to plant employees, pitched the idea of a similar class for chemical and materials engineering students. Strange accepted and launched CME 395-015: Seminar in Engineering Leadership Concepts during the spring 2015 semester. The application-only class is only open to second-semester juniors pursuing a bachelor's degree in chemical or materials engineering and is capped at 24 students.

Recently, we talked with Strange about the class, how he brings his experience into the classroom and the value of working outside the United States.

KEJ: In your own words, what is the purpose of the class?

TS: Essentially, this class is about preparing young UK students for situations they're going to run into the rest of their lives. At their age, they don't have a lot of world experience. They haven't been away from home much and they have little work experience. So they have never really had to deal with people. When they graduate, they're hopefully going to work for a company or do academic research. When they do, they will work with people who see the world differently than they do. My wife and I will go see a movie and even though we sit next to each other and see the same movie, when we start talking, it will be almost as if we saw two different movies. And that's the way life is. You're always around people who don't see things the way you see them. So how do you work with people like that? How do you communicate? How do you adapt

yourself to meet the situation so you can bring others with you? That's what we do in this class.

KEJ: That sounds fascinating. How do you get that conversation started?

TS: First of all, I want them to understand who they are. We use the Myers-Briggs Type Indicator (MBTI) for that. It gives them a much better appreciation for who they are and why they have the preferences they have. Then they have to realize there are 16 different types within the MBTI and that their classmates and lab partners have different personality types than they do.

Because students often work in groups, you usually have a mix of types trying to work together. So someone who has a personality type that takes charge and knows how to get things done might get matched with two people who are





thinkers. They don't communicate well and they don't do what they're asked to do because they enjoy thinking about the process more than doing it. Most of the time that can be very frustrating, but what I teach in this class helps the take-charge types learn that the thinkers aren't evil. They aren't doing it to make others angry. They aren't lazy. They just see the world differently. A lot of the homework for the class is sharing how they use this stuff in their lives.

KEJ: What pushback do you get from students?

TS: Probably when I talk about the difference between personality and behavior. You're not going to change your personality but you *can* change your behavior. Anything that comes out of your mouth or anything you do with your body is a behavior. You choose to do it. If you react in anger, you choose to do that. Who you are down deep is your personality and it *drives* a lot of your behavior if you let it. But it doesn't have to. Often, that's a revelation to the students.

I was major manager within a chemical company for 25 years, even though my personality type isn't usually one that is identified as a "born leader." But I worked on my behavior so I could do what needed to be done.

KEJ: What stories from your experience do you tell to illustrate what you teach?

TS: I moved to Wales in Great Britain in 1995 to take charge of the largest expansion Dow Corning had ever done. We went out and hired the best engineers you could find, but they were only interested in the technical aspects of their job. So when we needed someone to lead a team or a project, none of them wanted to do it. None of them *could* do it. They had zero leadership skills. So I started a leadership class there. I picked 40 of the top people across the site and said, "This is not an option. For the next year you *will* show up on certain days for leadership training." My HR manager and I created the materials as we went.

Toward the end of that year, I told them the class was no longer mandatory, but they could attend for another year if they wanted to. Out of the 40, only one person dropped out. Plus, I had a list of more than 40 people who wanted to be a part of it. So I started a second group. After that year, I

had another list. The whole demeanor of the site changed. Now, people were able to get together and make decisions. They felt empowered to do what they should have always been able to do. They actually didn't need me anymore.

KEJ: You lived in Wales for nine years and China for two and a half years. How did living and working abroad shape you?

TS: I had been successful in my career already, but I didn't have the rounding out and understanding of people that I did after going to Europe and Asia. People are people no matter where you are in the world; but we also need to remember that people in different parts of the world have principles built into their societies and that can help us understand *why* they do what they do. I wouldn't have done that as much had I stayed in the U.S. I tell my class that any time they get the opportunity to study or work abroad, it would be well worth their effort to take it.

KEJ: What is one of your favorite class topics?

TS: I start off the discussion on empowerment by saying, "I am one of the most empowered people you will ever meet. Why?" They will say because I was a high-level manager. I say that has nothing to do with it. What do you need to be empowered? Knowing what to do, knowing how to do it, being motivated to do it and having the authority to do it. If you see something that needs to be done and no one has told you to do it, where do you get the authority to do it? You don't; you just do it. That makes you so empowered if you're smart about it. It almost always turns out to the advantage of the company. After a few minutes of talking about empowerment this way, the light bulbs tend to go on.

KEJ: Bottom line, what do you hope your students take from your class?

TS: That if you learn to recognize your limitations and the things you can do to overcome those, the sky is the limit. **KEJ**

LIFE AND LEGACY

The Aubrey Donald May Scholarship Fund is a story about delight, appreciation and investment in the next generation of civil engineers.

When faced with a thorny problem that demanded space for equations and sketches, Aubrey May's (BSCE '58, MSCE '60) preferred outlet wasn't a doodle pad or a spiral notebook—especially since inspiration sometimes struck at the dinner table. “Napkins,” says his wife, Karen, with a smile. “He would whip out his pen and show me how he was going to fix a wall that was caving in. Some jobs used up a lot of napkins!” For Aubrey, the challenges, details and creativity that civil engineering required brought him *enjoyment* which was imprinted on those napkins.

Eventually, Aubrey's drawings became buildings, roads and bridges. He joined the consulting civil engineering firm of Fuller, Mossbarger, and Scott in 1971 and became vice president in 1973. In just under 30 years, Fuller, Mossbarger, Scott and May grew from a dozen people to 250 employees. He retired in 2000. He was inducted into the college's Hall of Distinction in 2004. In 2015, he passed away having experienced a successful career and a full life as a husband, father, grandfather and friend.

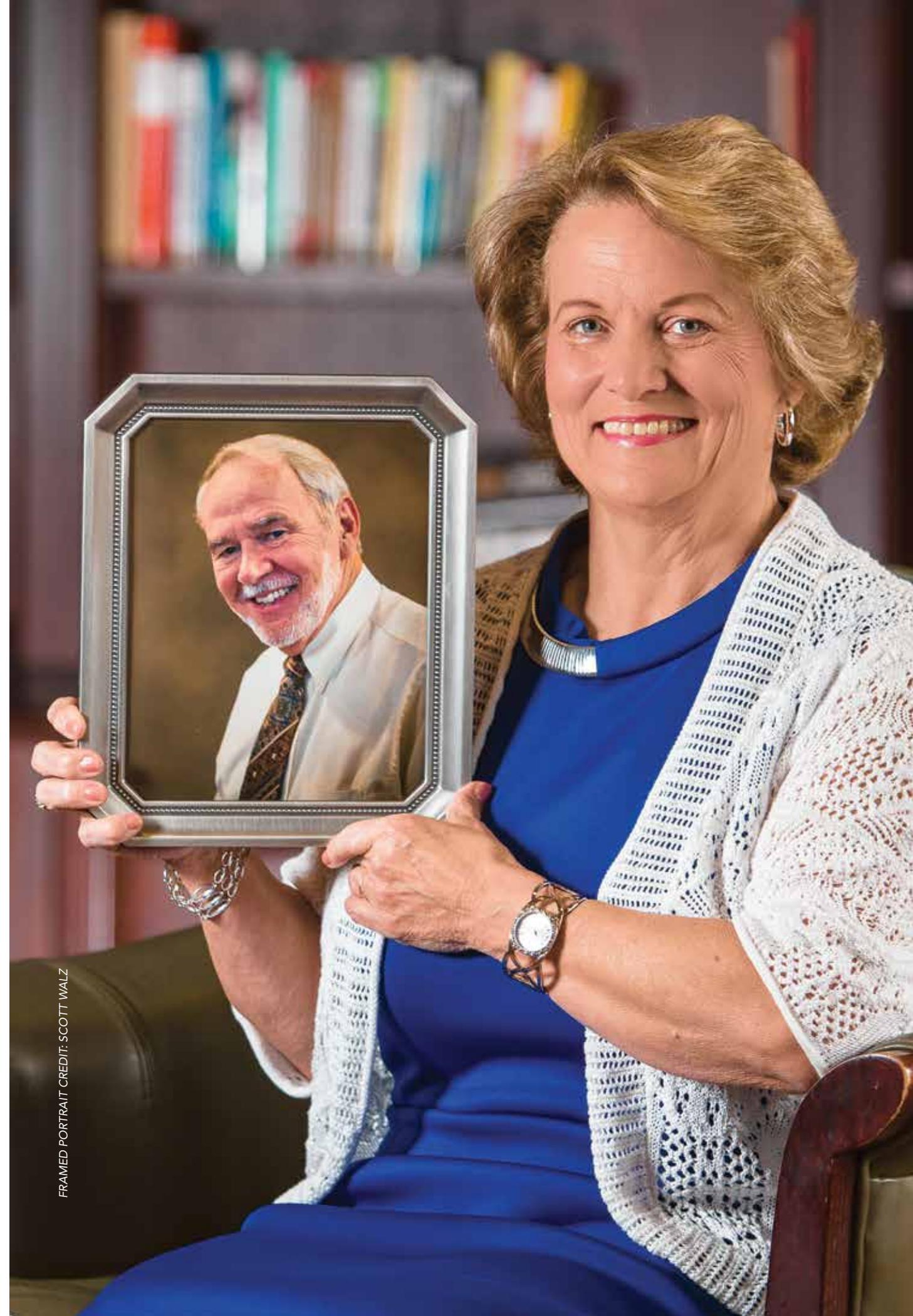
It might not have been so. The odds were not in his favor growing up in Pike County, Ky., where career opportunities were very limited. Fortunately, he received a scholarship from the Kentucky Transportation Cabinet, which was his ticket to the University of Kentucky College of Engineering.

Aubrey's career consisted of service and leadership to professional engineering organizations: KSPE, KSCE and KCEC to mention a few. He received many honors and awards from these groups and from the UK College of Engineering. Aubrey was proud to serve two terms on the Board of Licensure for Professional Engineers and Land Surveyors. He took great pleasure mentoring young engineers.

Following his wishes, Karen has established the Aubrey Donald May Scholarship Fund. The endowment will generate scholarships for civil engineering students who have unmet financial needs and express an interest in the college's University Scholars program, which allows participants to earn their bachelor's and master's degrees in five years. Students must be Kentucky residents and preference will be given to attendees from eastern Kentucky counties. The first scholarships will be awarded for the fall semester.

“This is his legacy,” says Karen. “Aubrey credited UK for giving him the tools to do what he loved and give him a good life. He wanted to pass that opportunity on to others.”

Perhaps future Aubrey May scholars will be given a package of napkins as a symbolic reminder of their benefactor. As his life shows, they come in handy when one is brimming with inspiration, remembrance and gratitude. [KEJ](#)



FRAMED PORTRAIT CREDIT: SCOTT WALZ



Matthew Ebert:
Junior,
Mechanical Engineering

As an aviation electronics technician in the United States Marine Corps, Florence, Ky., native Matthew Ebert experienced two separate deployments to Iraq and the Persian Gulf. He kept the University of Kentucky in his thoughts; in Qatar, he comforted himself that University of Kentucky was only 7,252 miles away. After facing the challenge of serving his country, Matthew says he was ready for a new goal to achieve. That's why he chose to become a mechanical engineering major in the UK College of Engineering. In January, Matthew, now a junior, was featured in a video telling his story and explaining why earning an engineering degree from UK is so special to him. (Google "UK Matthew Ebert" to see it.) The video was second in a five-part series highlighting student veterans at the UK and Matthew was honored by UK Athletics during a men's basketball game at Rupp Arena.



Janet Lumpp:
Professor, Department of
Electrical and Computer
Engineering, Director of the
First-Year Engineering Program

Janet Lumpp, professor of electrical and computer engineering and director of the First-Year Engineering program at the University of Kentucky College of Engineering, has been selected to receive one of three Outstanding Materials Engineer (OMSE) Awards from the School of Materials Engineering at Purdue University. The award recognizes Lumpp's work in the areas of thin film growth and surface modification methods for microelectronics, as well as her efforts in outreach and education through her activity with the Kentucky Space Grant program. Lumpp will visit Purdue later this semester to receive her award from the institution where she earned bachelor's and master's degrees in material engineering. Lumpp joined the college in 1993. UK's brand new First-Year Engineering program launched this past fall.



Dusan Sekulic:
Secat J. G. Morris Aluminum
Professor of Mechanical
Engineering

An estimated \$1.2 million international research project funded by NASA, the European Space Agency and the Roscosmos State Corporation for Space Activities in Russia—a rare feat in itself—is being led by University of Kentucky College of Engineering's Dusan P. Sekulic. The project, "Brazing Aluminum Alloys in Space," will study how molten metal behaves in space and could enable manufacturing/assembly and/or repairs of the International Space Station or other spacecraft, and facilitate construction in space and/or on extraterrestrial objects (like on Mars), as well as other applications. The targeted technological applications involve mitigating the consequences of possible collisions with micro-meteorites and space debris. The project was selected as one of 16 flight proposals for research to be conducted aboard the International Space Station as part of NASA's MaterialsLab program.

In-state Tuition Anywhere?



- Are you a member of the University of Kentucky Alumni Association?
- Do you have a child who wants to study engineering at UK?
- Do you live out of state and worry about out of state tuition?

Good news! The Legacy Tuition Program may be for you!

If you are an alumnus of the University of Kentucky and a member of the UK Alumni Association, your child may qualify for UK's in-state tuition rates no matter where you live. The Legacy Tuition Program is just one component of the Legacy Initiative, which inspires legacy children to make UK their college choice. Don't let out of state tuition costs discourage your child from pursuing an engineering education at UK. Join the Legacy Initiative today!

Call Tony Jackson, director of recruitment, at (859) 218-5170 for more information.

HALL OF DISTINCTION

Initiated in 1992, the Hall of Distinction recognizes and honors those alumni who have demonstrated distinguished professional accomplishments, outstanding character and commitment to community service. This recognition serves to encourage exemplary achievements by current students and others. It is a symbol of the respect and admiration held by the University of Kentucky College of Engineering for these esteemed individuals.

CLASS OF 2017

INDUCTED APRIL 21, 2017



ALLAN W. BROWN

B.S. IN ELECTRICAL ENGINEERING, 1987

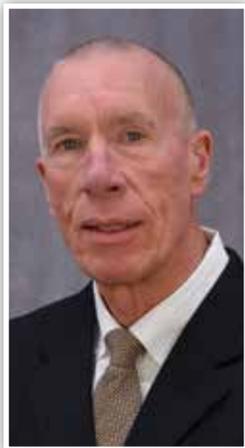
Allan W. Brown is vice president and program director of Boeing's Missile Defense National Team. His demonstrated expertise successfully led teams of talented people to address the national need for defense against intercontinental ballistic missiles and created a culture to provide a solid systems engineering foundation resulting in superior mission effectiveness for the entire Ballistic Missile Defense System. Brown's leadership roles at Boeing have given him a reputation for setting the direction for engineering solutions in the nation's missile defense architecture and in other key national defense systems that have long-term effectiveness. Brown has received several National Security Program awards, as well as several technical and management honors. He also holds an MBA from the Cox School of Business at Southern Methodist University.



JAVOID MASOUD

B.S. IN COMPUTER SCIENCE, 1982

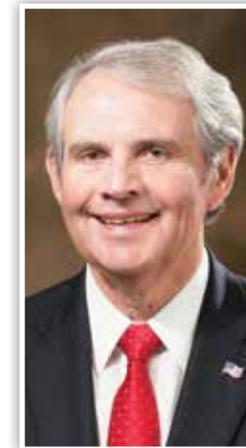
Since 2015, Javaid Masoud has been chief technical officer at Cellnovo, leading the world's first mobile diabetes management system. He works closely with industry and leading academic institutions in United States, France and United Kingdom on artificial pancreas projects to treat Type 1 diabetes by implementing artificial intelligence algorithms in the system. Prior to joining Cellnovo, Masoud spent 20 years at Medtronic, a global leader in medical technology and services. Masoud's cumulative achievements were recognized when he was awarded the Medtronic Technical Fellow designation, the company's highest technical honor. He received numerous other honors, including Medtronic's highest Star of Excellence, the Customer Focus Quality and the Initiative Creativity Excellence awards. Masoud has been granted 20 patents and has 32 patent applications submitted.



WILLIAM TODD JOHNSON

B.S. IN METALLURGICAL ENGINEERING AND MATERIALS SCIENCE, 1979

Todd Johnson is part owner and vice president of technical services at Alexin, LLC in Bluffton, Ind., an aluminum billet casting company he opened with business partners in 2008. In spite of the severe recession that followed, Alexin not only survived, but prospered. The company currently employs more than 90 team members and offers one of the best benefits packages in their community. At Alexin, Johnson is responsible for the metallurgical and quality processes of the facility. In his career, he has learned nearly every aspect of the aluminum industry while working at several prominent aluminum companies, including ARCO, Logan Aluminum, Alcan and Alcoa. In addition to Alexin, Johnson has participated in the design, building and startup of greenfield facilities in Kentucky, Texas and Spain.



MARK D. WHITLEY

M.S. IN CHEMICAL ENGINEERING, 1975

Mark Whitley has become widely known for revolutionizing the energy industry by the application of fracturing technology (popularly known as fracing) to shale formations across the United States. During Whitley's 20 year career with Mitchell Energy Corporation and Devon, he led the engineering team that perfected the use of slick water fracs used to develop oil and gas in the Barnett Shale and assisted other companies in acquiring Barnett Shale assets. He joined Range Resources in 2005 to start their Barnett Shale activity as well as evaluate and develop the Marcellus Shale, which has become the largest producing shale field in the world. Whitley is currently president and chief executive officer of Chisholm Energy Holdings, a new startup company headquartered in Fort Worth, Texas.



ELMER T. LEE

B.S. IN ELECTRICAL ENGINEERING, 1949; POSTHUMOUS INDUCTION

Aside from close friends and family, few people know that the man responsible for revitalizing the bourbon industry actually graduated with an electrical engineering degree from the University of Kentucky. Elmer T. Lee graduated with honors in 1949 and proceeded to take a position with George T. Stagg Distillery in Frankfort (renamed Buffalo Trace in 1999). Over the next 36 years, Lee established a career that would equate his name with premium bourbons. In 1969, he became the distillery's first master distiller. In 1984, Lee created Blanton's Single-Barrel Bourbon, which became the first single-barrel bourbon to be sold commercially. One of the highest-rated bourbons available, Blanton's marked the beginning of a renewed interest in bourbon and sparked the industry's comeback.



College Celebrates Chemical Engineering Laboratory Renovation

University of Kentucky engineering students have a new laboratory space. A renovation of the Chemical Engineering Unit Operations Laboratory in the basement of the F. Paul Anderson Tower will accommodate the recent increase in undergraduate chemical engineering class sizes.

Over the past year, the laboratory underwent a full renovation, including upgrades of the utilities, lighting, lab benches and floor. The overall size of the lab increased by 30 percent, and a number of new experimental modules were added.

“The undergraduate laboratory experience in engineering is one of the most formative elements of the curriculum, as our students are called upon to apply and extend classroom knowledge, function effectively in teams and grapple with observations and data sets that don’t always come out textbook perfect,” said Department of Chemical and Materials Engineering Chair Douglass Kalika.

The renovation of the lab was made possible by financial gifts from engineering alumni Michael Marberry and the late S.J. “Sam” Whalen. The flooring was donated by alumnus Rick Crouch, whose company, Desco Coatings, specializes in the highest quality of technical surfacing.

Juniors and seniors use the facility to conduct experiments that explore the core concepts of fluid flow, heat and mass transfer, reaction engineering and separations, and range from traditional operations, such as distillation to bioprocessing and membrane separation technology.

“Outstanding facilities breed creativity and collaboration,” said UK College of Engineering Interim Dean Larry Holloway at the lab’s dedication. “They are critical for attracting the best faculty and students to our program, as well as allowing our faculty, staff and students to achieve their fullest potential.”



Doing Good: There’s an App for That

Last fall, computer engineering junior Bill Miller and economics and computer science sophomore Genghis Goodman took first place honors in JPMorgan Chase & Co.’s Code For Good hackathon in Columbus, Ohio. The event gives students across the nation a chance to develop innovative technology solutions for non-profit organizations and learn from expert instruction.

The pair of UK students, along with two other teammates from the University of Maryland and Ohio State, were intrigued by the challenge Feeding America posed. The organization is the nation’s largest domestic hunger-relief organization with a network of 200 food banks and 60,000 food pantries and meal programs across the nation.

Feeding America asked teams to increase use of its fundraising programs and inform people of hunger issues and statistics in America. Teams were tasked with doing

this while keeping users in a “gameified” experience. In only 24 hours, Miller and his team developed an innovative app and their concept of “The Grain.”

The app incentivizes people to learn about hunger and buy certain products where a percentage of the sale would go to Feeding America. App users grow grains of stalk based on their activities—reading articles or watching informative videos, sharing on social media, completing a daily hunger quiz, donating directly and contributing donations through certain products purchased at the store.

JPMorgan Chase employees will now work to expand or complete the app for the organization. Someday, the UK students’ work may be on the App Store, helping Feeding America continue its impact on more than 46 million people each year.



Yu Wins National Science Foundation CAREER Award

University of Kentucky computer science assistant professor Tingting Yu has received a CAREER Award from the National Science Foundation. The CAREER Award is one of the “most prestigious awards in support of the early career-development activities of those teacher-scholars who most effectively integrate research and education within the context of the mission of their organization,” according to NSF. Yu’s submission was titled “Testing Evolving Complex Software Systems.”

Modern computer systems span a wide range of domains, ranging from consumer electronics to safety-critical systems. These systems evolve rapidly because the competition for market share pushes developers to come up with new features or improve capabilities

over existing ones. Software developers must ensure that changes do not cause any unintended impact to the existing quality of the systems. Yu’s research is to create a novel regression testing framework that can be applied to real-world complex software systems throughout their lifetimes to help software developers assess whether changes have adversely affected system behavior. The associated education agenda of this research paves the way for teaching that crosses traditional boundaries among multicore computing, embedded systems and software engineering.

Yu earned her Ph.D. from the University of Nebraska-Lincoln. She joined the Department of Computer Science in 2014.

IN OTHER NEWS



- NASCAR Camping World Truck Series driver Ben Rhodes (pictured above) visited the University of Kentucky campus on January 28, 2017 to meet with the UK Solar Car and Formula Kentucky racing teams. Rhodes, a Louisville native, even took a turn behind the wheel as the weather permitted taking the vehicles outside.
- The Kentucky Science and Engineering Foundation has made Associate Dean for Administration and Academic Affairs and Gill Eminent Professor Kimberly Ward Anderson a member of their inaugural class of Fellows. The honor “recognizes distinguished persons who have made significant contributions to the advancement of excellence in science and engineering in Kentucky, thereby helping to foster an innovation-based entrepreneurial culture in the Commonwealth.”
- Jennifer Doerge and Laura Letellier were selected as the Institution Faculty/Staff “Of the Month” from the National Residence Hall Honorary (NRHH). NRHH is an organization consisting of the top 1% of student leaders who live on the UK campus. Every month, university community members can submit nominations and a winner is chosen by the NRHH members. Doerge is a freshman advisor who also serves as director of advising. Letellier is a First-Year Engineering program faculty member.
- Kentucky Industrial Assessment Center received the Industrial Assessment Center Center of Excellence award. KIAC sends teams of faculty members and engineering students to conduct plant assessments and make recommendations for potential savings. Through Department of Energy funding, the assessments are conducted entirely free of charge.
- Computer science major Steven Liu was one of 850 undergraduate students from 359 colleges and universities across the United States selected to receive the prestigious Benjamin A. Gilman International Scholarship. The scholarship offers grants for undergraduate students in the United States to pursue academic studies or career-oriented internships abroad. Liu, a Lexington native, received \$4,000 to complete the Nagoya University exchange program in Japan.
- Jordan Garcia and Tyler Stoffel, mechanical engineering students in the University of Kentucky College of Engineering Paducah Campus, were selected to present their research at the National Conference on Undergraduate Research April 6-8 at the University of Memphis.
- Jonathan Wenk, assistant professor of mechanical engineering, was named to the SEC Faculty Travel program, which provides support for selected individuals to collaborate with colleagues at other SEC member institutions.
- The UK Mining Safety Team, rescUKats, placed first in the Society for Mining, Metallurgy & Exploration’s Eastern Collegiate Mine Rescue Contest Competition held at the Buchanan Mine Rescue facility in Buchanan County, Virg., last October.

Arloe W. Mayne, BSME 1963, MSME 1964, was honored by the Greater Huntsville Section of the American Institute of Aeronautics and Astronautics for his 50-plus years of service during an Emeritus Ceremony on August 26, 2016. Dr. Mayne had a distinguished career in the aerospace industry.

Robert Hans, BSCE 1970, is now a senior project manager at CT Consultants, Inc. He has over 27 years of experience and has held several leadership roles while working for the Kentucky Transportation Cabinet.

Lonnie Bellar, BSEE 1971, has been promoted to senior vice president-operations at LG&E and KU Energy. He had previously served as vice president-gas distribution. Bellar has more than 25 years of experience in the electric and natural gas utility industry.

Rickey D. James, BSCE 1971, was reappointed commissioner of the Mississippi River Commission by President Barack Obama on January 5, 2017. President Ronald Reagan appointed James as a civil engineer civilian member to the Mississippi River Commission in 1981. He was reappointed in 1991 by President H.W. Bush and in 2003 by President George W. Bush. James is managing member of A.C. Riley Company, LLC, a position he has held since 2001.

Michael Richard, BSEE 1971, has been named general manager of the Greer Commission of Public Works in Greer, S.C. He was previously general manager for the Sylacauga Utilities Board in Sylacauga, Ala.

Bob Yeager, BSCE 1974, was named chief district engineer for the Kentucky Transportation

Cabinet District 6 office in Covington, Ky. Yeager began his career with the Kentucky Transportation Cabinet in 1975.

G. Michael Calebs, BSCE 1989, was named chief district engineer (CDE) for the Kentucky Transportation Cabinet District 11 office in Manchester, Ky. Previously, Calebs was the engineering branch manager for project development and preservation in the District 11 office. Calebs has worked in District 11 since May 1989.

Mary Beth (Willis) Hudson, BSCHE 1989, was promoted to vice president of Wacker Chemie's Polysilicon Division for the North America, Central America and Andino Norte regions. In this role, she is also site manager of Wacker's new polysilicon manufacturing site north of Chattanooga, Tenn. She has been with Wacker for 18 years, most recently as vice president and site manager of their Calvert City, Ky., polymers facility.

Connie Lea Allen, BSCE 1990, retired from the United States Air Force Reserve in October 2016 after 30 years of commissioned service. Colonel (Ret.) Allen now devotes all her time to Salt River Engineering in Harrodsburg, Ky.

Susan M. Moore, BSME 2000, received a Research Excellence Award from the Society of Mining and Exploration for her advancement of the development and implementation of critical health and safety technologies and improvement of the nation's capacity in ventilation and ground control. Moore joined the National Institute for Occupational Safety and Health in 2006.

Brandon Delis, BSME 2001, has been hired by Dewberry, a privately held professional services firm, for its energy division. In this new role, he will work with power generation clients across the country to understand their needs and offer solutions relevant to their financial parameters. Delis is based in the firm's Charlotte, N. C., office.

Craig Duvall, BSAE 2001, received the prestigious Presidential Early Career Award for Scientists and Engineers (PECASE). He is an associate professor of biomedical engineering and director of graduate recruiting in biomedical engineering at Vanderbilt University.

Lindsay Walker, BSCE 2001, MSCE 2003, has joined the national consulting firm of Kimley-Horn. Walker is involved in several Institute of Transportation Engineers (ITE) initiatives, such as Strategic Planning Annual Committee Chair for the ITE Southern District, director on the Kentucky Section of ITE board and graduate of the 2016 Leadership ITE class.

Richard Svindland, MSCE 2005, was named president of California and Hawaii American Water effective March 1, 2017. Svindland has more than 25 years of experience in the water and wastewater fields, most recently serving as California American Water's vice president of operations.



UK Building Named for Former University President Lee Todd

The 11th president of the University of Kentucky, Lee T. Todd Jr., will now have a building on the UK campus named in his honor. On December 13, 2016, the UK Board of Trustees renamed the Biological-Pharmaceutical Building, located at 789 South Limestone, the Lee T. Todd, Jr. Building. The Advisory Committee on Naming University Property recommended the name change and current UK President Eli Capilouto agreed.

From July 1, 2001, to June 30, 2011, Todd's decade-long tenure was marked by profound growth in UK's health care and research enterprise. It was his belief that "the campus of the University of Kentucky is the Commonwealth of Kentucky," and his priorities in addressing the Commonwealth's chronic health maladies were integral to UK's pursuit of becoming a "Top 20" public research university.

Todd, who graduated with a bachelor's degree in electrical engineering from UK in 1968 and was inducted into the college's Hall of Distinction in 1997, saw the need for larger and improved facilities for the UK College of Pharmacy, consistently ranked among the top five pharmacy schools in the nation. He traveled the Commonwealth extensively to meet with elected officials and alumni to garner support for a new pharmacy building.

The building is home to both educational and research activities for about 420 pharmacy students, 100 graduate students, 90 faculty and 120 staff members.

Warren J. Gordonwood	Electrical Engineering	1948
Roy L. Cole	Electrical Engineering	1950
William E. Endicott, Jr.	Civil Engineering	1950
George W. Lockin	Mining Engineering	1951
Harry S. Sutton, Jr.	Civil Engineering	1951
John H. Tiao	Mechanical Engineering	1951
Harold D. Fox	Civil Engineering	1952
Jack E. Turman	Civil Engineering	1952
Robert W. Hodges	Civil Engineering	1954
O. Morris Swofford	Electrical Engineering	1954
Vincent Jack Ruck, Jr.	Mechanical Engineering	1955
Gerald F. Dodge III	Electrical Engineering	1956
Keith Marshall	Mechanical Engineering	1956
Jennings G. Hall	Electrical Engineering	1958
Freeland Harris, Jr.	Civil Engineering	1958
L. J. Horne, Jr.	Electrical Engineering	1958
Robert V. Jones	Electrical Engineering	1958
Lowell C. Strunk	Civil Engineering	1958
Dr. Gabriel R. Wallace	Electrical Engineering	1958
Jack F. Miller	Civil Engineering	1959
Ronald R. Johnson	Civil Engineering	1960
Norman N. Menser	Mechanical Engineering	1960
Brents Dickinson III	Civil Engineering	1961
Franklin T. Doepel	Electrical Engineering	1962
Forrest E. Frazier, Jr.	Mechanical Engineering	1968
James C. Moses	Electrical Engineering	1970
James L. Vance	Chemical Engineering	1975
George E. McCollom	Civil Engineering	1977
Rodney W. Carpenter	Agricultural Engineering	1978
Van E. Newberry	Civil Engineering	1978
Timothy A. Philpot	Civil Engineering	1979
Kenneth R. Schneider	Civil Engineering	1981
Benjamin Powell	Mechanical Engineering	1986
David A. Charley	Computer Science	1987
Terry G. King	Civil Engineering	1993
Thomas John Duffy, Jr.	Civil Engineering	2012

BE INCLUDED

Please send Class Notes to
alumni@engr.uky.edu



CLASS COMPOSITES

Every fall and spring, graduates-in-waiting from the University of Kentucky College of Engineering have their picture taken for their class composite. Alumni visiting campus love showing younger versions of themselves to their children and grandchildren and legacy students take a keen interest in finding relatives who preceded them at UK.

While the most visible composites, covering the classes of 1950-2016, are on the second floor of the Ralph G.

Anderson Building and the Oliver H. Raymond Building, the college has composite photos for every graduating class—stretching all the way back to its first graduate, John Wesley Gunn in 1890. The classes of 1890-1949 are hanging in the basement of the Ralph G. Anderson Building in two separate hallways. Counting separate composite photos taken for summer graduates, there are 137 total frames in the college. Surprisingly, the first color composite wasn't added until 2003. [KEJ](#)

GIVING BACK

Margaret Ingels became the first woman to receive an engineering degree from the University of Kentucky when she earned her bachelor's degree in mechanical engineering in 1916. She also became the first female to earn a graduate degree in engineering in the United States when she received a master's degree in mechanical engineering in 1920. Ingels worked in air conditioning at Carrier Corporation, became a spokesperson for the engineering profession and was an inspiration to women interested in engineering. Miss Ingels was posthumously inducted in the College of Engineering's Hall of Distinction in 1993.

In 1972, Miss Ingels' estate created a scholarship in memory of her sisters, Kate Ingels Peak and Belle Ingels. Forty-five years later, her scholarship continues to support female engineering students hoping to follow in her footsteps.

For more information about supporting engineering education through estate planning, contact Matthew Briggs, Director of Development at (859) 218-3506 or matthew.briggs@uky.edu.

 College of
Engineering

251 Ralph G. Anderson Building
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