

KENTUCKY ENGINEERING JOURNAL

UNIVERSITY OF KENTUCKY COLLEGE OF ENGINEERING

FALL 2019



MOON TO MARS

THE SPACE ISSUE

Civil engineering senior Leonie Bettel became Kentucky women's golf's first all-conference honoree since 1997 with her selection to the All-SEC Second Team.

Bettel finished 2019 with the best single-season stroke average in school history. She also set the single-season school record with 14 rounds of par or better, which included six rounds in the 60s. Bettel posted five top-10 finishes with two additional top-20 showings, including three individual championships.

Away from the golf course, Bettel found time to engage in undergraduate research. Here she's spending a fine June afternoon collecting sediment and water samples as part of civil engineering professor Jimmy Fox's research group. The team measures the concentrations of nitrogen species and carbon, as well as the isotopic values of DIC, NO₃⁻ and water.

The Austria native is scheduled to graduate in December and will continue her civil engineering education at UK in pursuit of a Ph.D. with an emphasis in environmental water resources.





“Our new faculty colleagues bring impressive credentials, a passion for teaching and research prowess, and I am excited to see what this group will do.”

MESSAGE FROM THE DEAN

Welcome to the fall 2019 issue of *Kentucky Engineering Journal*!

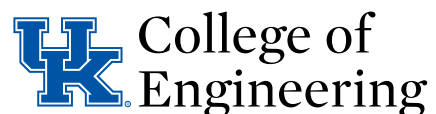
The college surged into the new academic year energized by the enthusiasm of 850 new first-year students, 125 new graduate students and over 20 new faculty members—all record highs. This infusion of talent has already begun to transform the college, making it a bigger, better and more impactful version of itself. Our new faculty colleagues bring impressive credentials, a passion for teaching, and research prowess in autonomy and robotics, engineering for human health, materials and energy, humanitarian engineering, aerospace engineering and more. I am excited to see what this group will do.

We have another big year planned. We are rolling out new academic programming in aerospace, biomedical engineering and bioinformatics, among other initiatives. We are pushing our research programs forward along strategic vectors aimed at autonomy and mobility, computing and information, power and energy, sustainable systems, and advanced materials and manufacturing. In December we are taking possession of the newly renovated and expanded Grehan Building and will formally cut the ribbon next spring. Finally, we are launching a new corporate engagement program to tighten our relationships with business and industry to promote opportunities for our students as they transition into the profession.

We have many irons in the fire, but it is not all work all of the time. The college is hosting tailgates at all home football games this year. Please stop by and stay awhile. We will be located outside of gates 9-10 on the west side of Kroger Field. If you are on campus at other times for other reasons, please stop by to say hello.

Sincerely,

Rudy Buchheit
Dean



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MOON TO MARS

At every level of NASA's ambitious Artemis Program, you'll find passionate UK engineering alumni.

Kel Hahn

We're going back to the Moon!

For some readers, it may come as nothing less than an eyebrow-raising surprise to learn that astronauts haven't set foot on the Moon in a long time. How long? Since the Apollo 17 mission in December 1972—nearly 47 years ago. One might think that after working so hard to achieve such a monumental feat, Moon visits would have become routine. Normally after a breakthrough, future steps involve scaling, streamlining and economizing. That's why your most recent computer didn't cost \$100,000 and occupy an entire room.

So why did we stop going to the Moon?

Depending on who is answering that question, budgetary, political and even technological challenges have prevented further lunar exploration. As a result, no astronaut has added footprints to the Moon's surface since the Nixon administration.

However, on December 11, 2017, President Donald Trump signed Space Policy Directive 1, a new program with designs on putting the first woman and the next man on the Moon and, hopefully, landing humans on Mars. A little over a year later, Vice President Mike Pence set a timeline for landing on the Moon by 2024. The name of the comprehensive program is formally known as Artemis, the twin sister of the Greek god Apollo; informally, it is called "Moon to Mars."

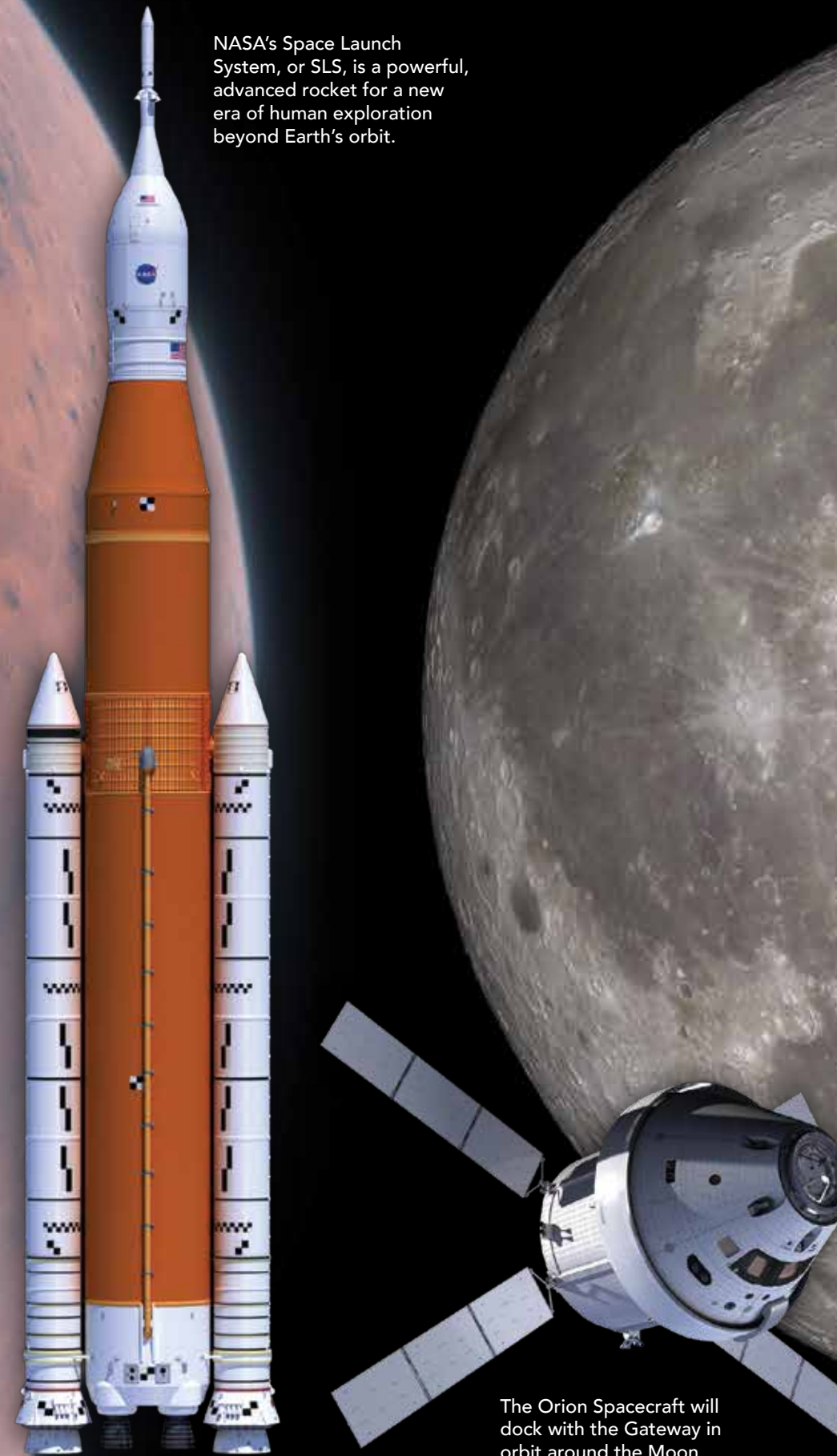
Understandably, the Mars component seizes the imagination more readily than the "been there" Moon. However, renewed study of the Moon is the backbone of NASA's strategy to one day send astronauts to the Red Planet. According to NASA's website, "The Moon is a treasure chest of science that holds many fascinating mysteries to explore—many that will advance our understanding of our home planet and solar system, as well as the cosmos beyond." What we learn about the Moon, especially how to survive on it, will be essential to making headway toward Mars.

As a college of engineering, we naturally geek out on any bold directive that pits sagacious engineering talent against the unknown and unconquered. Further, as the home base for a burgeoning aerospace research department, a co-op and internship pipeline to NASA and the NASA Kentucky Space Grant Consortium and EPSCoR programs, UK isn't merely watching from a distance; we've already embarked on the quest.

But our greatest satisfaction in Moon to Mars lies in the fact that numerous UK Engineering alumni are fully immersed in the project, whether employed by NASA or by one of its commercial partners.

This is the story of how our Wildcats are writing future pages of history.

NASA's Space Launch System, or SLS, is a powerful, advanced rocket for a new era of human exploration beyond Earth's orbit.



The Orion Spacecraft will dock with the Gateway in orbit around the Moon.

LEVERAGING INTERNATIONAL SPACE STATION RESEARCH

While the target for returning to the Moon is roughly five years away, plenty of Moon to Mars research is, and has been, occurring on the International Space Station (ISS). **Mary Walker (BSME 2016)** is a project manager at NASA Johnson Space Center in Houston, overseeing hardware currently used on ISS spacewalks with an eye toward the Moon and Mars.

"We're studying the tools and equipment used during the Apollo Moon missions and exploring how to modify or redesign them to better fit future missions. The hardware will vary from the Moon to Mars because of differing gravity, environments and scientific interests on the two bodies."

Walker's team works with planetary geologists and microbiologists to understand what kind of samples will be collected, and how to best develop resources that will allow them to get the correct science in the right way. For Walker, this sometimes involves scuba diving in the Neutral Buoyancy Laboratory—a giant pool featuring a mockup of the ISS.

"This is how we support our hardware testing with suited astronauts. It enables us to get feedback from the astronauts on the hardware we build for specific tasks on the ISS. Going back to the Moon will be our stepping stone to Mars, but we consider both when developing hardware now."

Austin Lovan (BSME 2011) has been at NASA Johnson since embarking on a co-op rotation while attending UK. Shortly after graduating, he began full-time employment in the Robotic Systems Technology Branch. Lovan says that while sending human astronauts to the Moon and Mars is the goal, robots will play a key role in getting them there. And keeping them alive.

Robonaut 2, the dexterous humanoid astronaut helper.
CREDIT: NASA

"Working side by side with humans, or going where the risks are too great for people, robots will expand our ability for construction and discovery. For example, before humans arrive on Mars, robotic systems will need to be on the surface to remotely set up habitats, solar panels, resource collection and more—years in advance. Once humans are on the surface, robots will be there to assist the crew with surface exploration through rovers and numerous other robotic devices."

Lovan's primary work has revolved around the design and testing of robotic systems and the intelligent actuators that drive those systems. This has included robotic legs and actuators for a humanoid robot named Robonaut 2 and other robotic manipulators for human exploration assistance.

Lovan says astronauts aboard the ISS currently work out several hours each day to combat muscle atrophy and bone loss in the microgravity environment. Any mission to Mars will also need compact exercise devices. Lovan has been developing devices that will serve as caretakers for astronauts so they can stay healthy.

"Watching astronauts aboard the ISS use my hardware to inform future exercise devices for deep space exploration was an exciting accomplishment. Having robotic support will only make human exploration more successful."

Did you know it's common for astronauts in space to lose their fingernails? **Bobby Jones (BSME 2005)**, who designed spacesuits at ILC Dover for 11 years, says that's partly because even the gloves must be internally pressurized to protect the astronaut from the vacuum of space.

"Sometimes astronauts have to wear their suits for up to eight hours at a time. Because of high humidity created from their sweat, and from banging their fingertips into the ends of the gloves, they often lose their fingernails."

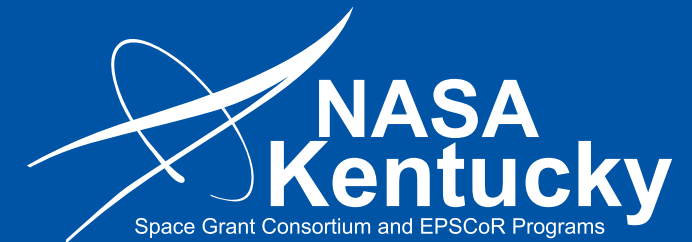
Two years ago, Jones left ILC Dover to join Techshot, located in Greenville, Indiana. Techshot designs and builds payloads that scientists use to conduct research on the ISS. Jones is envisioning 3D printing capabilities able to support astronauts on the Moon or Mars, who can't exactly run to the store when something breaks. Or when they do. One will be able to print metal parts to replace those that break, and the other, a bio-printer, will one day be capable of printing entire organs.

"Future space colonies won't be able to fly everything they need with them to the Moon or Mars, including spares or backups of parts. 3D printing is a way around that. You take raw material with you, and then print whatever you need, whether a wrench or a kidney."

ORBITING THE MOON WITH GATEWAY

Critical to NASA's Moon to Mars plans is an outpost similar to the ISS that will orbit the Moon—sometimes with a crew, sometimes without. The name for the station is Gateway. Assembly is slated to begin in late 2022 with astronauts inhabiting the vessel by 2024.

The Gateway in lunar orbit
CREDIT: NASA



In 1987, Congress authorized NASA to initiate the National Space Grant College & Fellowship program in response to the need for a coordinated effort to help maintain America's preeminence in aerospace science and technology. Like Land Grant, Space Grant institutions provide leadership and support for program objectives in their state and nationally through state-based consortia consisting of universities, government agencies, industries and informal education organizations.

Since 2010, Kentucky's Space Grant program has been hosted by the UK College of Engineering and administered under the leadership of Professor Suzanne Smith. In conjunction with the NASA Established Program to Stimulate Competitive Research (NASA EPSCoR), these programs directly benefit NASA's missions and Kentucky's aerospace research and workforce development with investments of more than \$19 million in Kentucky research, early career faculty, student design teams, student fellowships, internships and public education projects.



REBECCA WINGFIELD
NASA FLIGHT DIRECTOR

UK alumni develop the technology that will take astronauts back to the Moon and later to Mars; but those working in Mission Control play a different role—making sure astronauts in space stay safe.

In July 2018, Rebecca Wingfield (BSME 2007) became one of six women and men selected to join the elite corps of flight directors who will lead Mission Control for a variety of new operations at NASA’s Johnson Space Center. She currently oversees missions related to the International Space Station.

Although Mission Control comprises numerous units dedicated to the astronauts’ safety and the success of each mission—communications, operations support, medical, etc.—Wingfield’s role as flight director puts her in charge of all of them. How rare of company is she in? While there have been over 350 astronauts in NASA’s history, there have only been 93 flight directors. If we make it to Mars one day, it very well may be Wingfield who oversees that landmark mission.

Based at NASA Marshall Space Flight Center in Huntsville, Alabama, **Allyson Thomas (BSME 2010)** has worked on Gateway from two distinct vantage points. Originally, Thomas led the effort from the design and management side to develop a payload adapter that will be used to connect the modules of the Lunar Gateway to the Space Launch System (SLS) rocket for launch.

“The Gateway modules will be larger than any payload previously launched, so the adapter will have to be able to support them through launch and Crew Module docking loads.”

Recently, Thomas became sub-system manager of structures and pressure vessels for the Human Landing System (HLS) descent stage. This Lander will be used to transport humans from the Gateway to the surface of the moon.

Leah Doepke (BSME 2011), also at NASA Marshall, works in the project planning and control group responsible for HLS. She says one of her most memorable experiences at NASA came while sitting in a room with most of NASA’s Lander team and stakeholders, listening to Vice President Pence outline the 2024 Lunar Mission. At the time, the team had been discussing boots on the Moon in 2028.

“It happened right after lunch during the first of three meeting days. The tone between the morning session and the afternoon session went from observations to serious questions. Everyone now understood it was all hands on deck.”

Obviously, if NASA engineers can perfect the systems responsible for delivering astronauts from Gateway to the Moon, they’ll have a leg up on making it work for Mars.

GETTING THERE: SPACE LAUNCH SYSTEM

You’ve met NASA Marshall engineers Allyson Thomas and Leah Doepke; now, meet their husbands, **Alex Thomas (BSME 2009)** and **Brady Doepke (BSME 2010, MSME 2013)**. Both men support the SLS necessary to travel to the Moon and Mars.

According to NASA, SLS will be the most powerful rocket in existence. It will have three different configurations, each one specific to mission objectives. The Block 2 arrangement, which is projected to measure 365 feet tall, will send cargo and crew to the Moon, Mars and potentially other deep space destinations.



NASA’s Space Launch System Liquid Hydrogen (LH2) Static Test Article (STA) is lifted into Cell A at the Michoud Assembly Facility.
CREDIT: NASA

AEROSPACE IN KENTUCKY

When you think of thriving industries in Kentucky, do you think, "Aerospace"? If not, you should. According to the Kentucky Cabinet for Economic Development, Kentucky has 80 aerospace-related facilities that employ over 18,500 people. Further, Kentucky has seen a 63 percent employee increase in the private aerospace products and parts manufacturing industry since 2002, and aerospace exports have increased 183% in the past five years. Google "aerospace in Kentucky" to learn more.

Thomas, a Jacobs Space Exploration Group employee, has spent most of his six years at NASA Marshall working on SLS. He performs stress analysis on special test equipment used for structural testing of the SLS Intertank, a section of the SLS core stage. His work has evolved from drawings and computer-generated Finite Element Models to massive, real-life hardware over 60 feet tall.

“Structural testing of each section of SLS is vitally important to the success of these missions.”

After completing a Ph.D. in aerospace engineering from Virginia Tech, Doepke joined NASA Marshall as a structural engineer in the Structural & Dynamics Analysis Branch of the Propulsion Systems Department.

“My group has the unique opportunity to work with rocket engines from across the entire agency and our commercial partners. We do structural analysis on both liquid engines and solid rocket motors. This includes first-stage engines for leaving Earth, through later stages to get us to the Moon and Mars, and the engines to get us on the surface and back.”

Doepke has also worked on SLS’s Launch Abort System (LAS). This is the structure at the very top of the rocket that, in the event of a core stage failure, will quickly accelerate the Orion crew capsule a safe distance away from the rocket. Safety is always uppermost in Doepke’s mind.

"I vividly remember sitting in a meeting where we were discussing the risk and failure modes of the SLS solid rocket boosters. The two boosters for SLS will carry 2.5 million pounds of solid rocket propellant, and SLS will be carrying a crew of astronauts. The analysis we were doing fed directly into our understanding of the risks. You approach your work very differently after a moment like that."

VENTURING INTO DEEP SPACE WITH ORION

SLS will debut in June 2020 as part of the Artemis 1 mission. The rocket will carry the Orion spacecraft, which will orbit the Moon over the course of three weeks before splashing down in the Pacific Ocean. Orion will not carry a crew this time, but it is scheduled to be inhabited by astronauts for Artemis 2 sometime in 2023.

After circling the Moon, Orion will re-enter the Earth's atmosphere traveling at 25,000 mph (11 kilometers per second), which will produce temperatures of approximately 5,000 degrees Fahrenheit. To prevent Orion from erupting into a fireball, NASA Johnson engineers in the aero-sciences division like **Justin Cooper (BSME 2016, MSME 2018)** figure out how to maximize the spacecraft's heat shield.

"To put it simply, in order to get anywhere in space, you have to go really fast. Because Orion will travel to the Moon and to Mars, as well as back to Earth, it will have a special heat shield for each different entry. That heat shield is directly responsible for keeping the astronauts and the payload alive."

To correctly predict the amount of energy transferred to the heat shield, Cooper develops models that leverage the ability

of modern supercomputers to evaluate equations.

"Without the aero-sciences and the aero-thermodynamic engineers, we could not have a safe mission."

Even UK co-ops and interns have had opportunities to contribute to Orion and Artemis 1. **Emily Essex**, a computer engineering and computer science major who interned during the spring and fall semesters of 2018, wrote code to automate tests for the Orion Flight Software.

"Orion cannot fly without having the flight software tested, and testing assures it is as safe as possible. The code I wrote automated these tests so they could be run overnight and be more quickly completed."

Actual missions to Mars will depend largely upon our success in returning to the Moon. In all likelihood, it could be into the 2030s before astronauts make their first visit. The timespan can appear daunting.

But not to our alumni. Keep in mind, *we've never before landed human beings on a planet other than our own.* If you love space exploration, is there a better way to spend one's career than in pursuit of that?

"The time frame is not a big deal because engineers are always tackling problems, day in and day out," asserts Cooper. "Engineering is science on a timeline. The big vision doesn't really occur to you on a day-to-day schedule. But every once in a while, you stop to take a breather and *then* you realize the awesomeness of what you're accomplishing." ■



During Exploration Mission-1, Orion will venture thousands of miles beyond the moon during an approximately three-week mission.

CREDIT: NASA

HOW DID THE UK COLLEGE OF ENGINEERING PREPARE YOU FOR MOON TO MARS?



"The ineffable Alexandre Martin, mechanical engineering professor. He got me interested in the science of simulating ablative materials, which is what we use in the heat shield. Everything I learned from him and my lab mates helps me in my job every day."

JUSTIN COOPER

"Working on projects like the 2017 Solar Eclipse Ballooning Project taught me a lot about working with people in different majors and fields of engineering. Working at NASA means collaborating with people with different backgrounds, and at UK I've learned how I can use my computer engineering and computer science skills to add value to projects requiring diverse teams."

EMILY ESSEX



"UK opened the doors to NASA through the co-op program. Being able to take real-world experiences back to school each semester motivated me even more in the classroom. The hands-on experience I gained wouldn't have occurred without the excellent support team at UK."

AUSTIN LOVAN





CO-OP OF THE YEAR: KELLY LYNCH

Kel Hahn

Kelly Lynch has wanted to be an astronaut since discovering constellations at the age of 5. When considering which university to attend, she knew mechanical engineering served as the most frequent route to a career in aerospace. But she loved chemistry and decided to see if chemical engineering could get her in the door at NASA.

Six NASA co-op rotations and internships later, Kelly says chemical engineers are crucial to aerospace research. "There actually aren't enough chemical engineers at NASA."

At the College of Engineering Awards Banquet sponsored by Tau Beta Pi, Kelly received the Lou Takacs Engineering Co-op Award, given annually to the co-op of the year. Because commitment to the co-op program means graduating in five years instead of four, Kelly wasn't sure she should accept NASA's offer to co-op midway through her academic career.

"I remember calling my parents and explaining, 'If I take it, I will have to graduate an entire year later, but I'll most likely have a job at NASA at the end of it.' They said, 'No question. Do it.'"

BIOGRAPHICAL INFORMATION

From Glasgow, Kentucky. Junior majoring in chemical engineering; slated to graduate in May 2020.

NASA MISSIONS

(co-ops and internships)

Five at NASA Marshall in Huntsville, Alabama; one at NASA Johnson in Houston, Texas.

HIGHLIGHTS

Developing a hybrid propellant for the Mars Ascent Vehicle. "Knowing I'm working on Mars-related projects motivates my work every day. It makes me excited about what I'm doing, even if it's cleaning pots for the next batch of rocket fuel."

Working on the life-support systems for the Orion capsule that will take astronauts to Mars. "The life-support systems team had a high concentration of chemical engineers, because the systems themselves are chemical engineering processes."

Handling International Space Station hardware. "I planned and completed surveillance testing, which is taking a piece of hardware out of storage once a year to make sure it can still be used. One piece I performed testing on is a backup for the one on the International Space Station right now."

ON BECOMING AN ASTRONAUT

"All of the astronauts are at NASA Johnson in Houston. Whenever they came to speak to our group, I would hang around afterward and ask, 'Tell me how to become an astronaut!' But they said there is no set path."

"The Orion capsule is extremely small, yet an astronaut crew going to Mars will have to live together inside it for the 6 to 12 months it will take to get there. So you need more than just smarts to be an astronaut. You have to be someone other people will want to be around for the duration of the trip! I believe I am that kind of person."

OVER 20 NEW FACULTY MEMBERS JOIN THE UNIVERSITY OF KENTUCKY COLLEGE OF ENGINEERING

In September 2018, Dean Rudy Buchheit announced the largest faculty hiring initiative in the college's history. One year later we welcomed 22 faculty members, including 20 who are tenure-track. Combined, they bring impressive credentials, a passion for teaching and research prowess in autonomy and robotics, engineering for human health, materials and energy, humanitarian engineering, aerospace engineering and more. We are excited to see what they will do. Two additional faculty members will be announced shortly.

BIOMEDICAL ENGINEERING

RAMKUMAR ANNAMALAI
Assistant Professor

Ph.D. Biomedical Engineering,
Wayne State University, Detroit, 2014

FANNY CHAPELIN

Research Assistant Professor
Ph.D. Bioengineering,
University of California San Diego, CA, 2019

CHONG HUANG

Research Assistant Professor
Ph.D. Optoelectronic Science and Engineering,
Huazhong University of Science and Technology, 2011

MARK SUCKOW

Professor
D.V.M. Veterinary Medicine,
University of Wisconsin, Madison, WI, 1987

SHENG TONG

Associate Professor
Ph.D. Biomedical Engineering,
Duke University, 2003

CAIGANG ZHU

Assistant Professor
Ph.D. Biomedical Engineering, Nanyang
Technological University, Singapore, 2014

CHEMICAL & MATERIALS ENGINEERING

BRITTANY RASSOOLKHANI

Assistant Professor, Chemical Engineering
Ph.D. Chemical and Biochemical Engineering,
University of Iowa, 2019

PAUL ROTTMANN

Assistant Professor, Materials Engineering
Ph.D. Materials Science & Engineering,
Johns Hopkins University, 2017

CIVIL ENGINEERING

DIANA BYRNE

Assistant Professor
Ph.D. Energy-Water-Environment Sustainability,
University of Illinois at Urbana-Champaign, 2019

SHAKIRA HOBBS

Assistant Professor
Ph.D. Civil Engineering,
Clemson University, 2017

HALA NASSEREDDINE

Assistant Professor
Ph.D. Civil and Environmental Engineering,
University of Wisconsin-Madison, May 2019

COMPUTER SCIENCE

JAMES BRUSUELAS

Research Associate Professor
Ph.D. Classics,
University of California Irvine, 2008

STEPHEN WARE

Associate Professor
Ph.D. Computer Science,
North Carolina State, 2014

ELECTRICAL & COMPUTER ENGINEERING

JIHYE BAE

Assistant Professor
Ph.D. Electrical and Computer Engineering,
University of Florida, 2013

LUIS SANCHEZ GIRALDO

Assistant Professor
Ph.D. Electrical and Computer Engineering,
University of Florida, 2012

PENG WANG

Assistant Professor (Joint Appointment in ECE & ME)
Ph.D. Mechanical & Aerospace Engineering,
Case Western Reserve University

BIYUN XIE

Assistant Professor
Ph.D. Electrical Engineering,
Colorado State University, 2019

MECHANICAL ENGINEERING

SCOTT BERRY

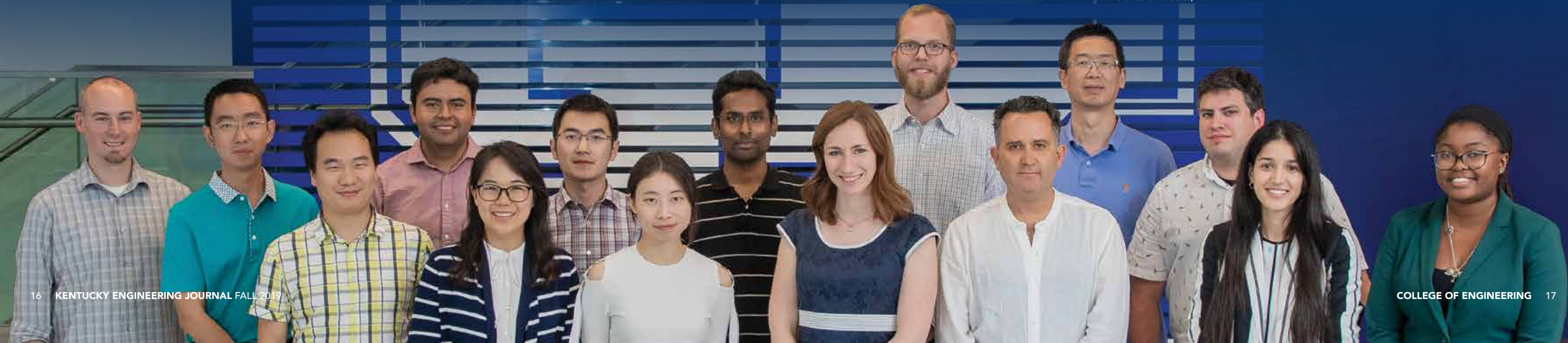
Associate Professor
Ph.D. Mechanical Engineering,
University of Louisville, 2008

XU JIN

Assistant Professor
Ph.D. Aerospace Engineering,
Georgia Institute of Technology, Atlanta, GA, 2019

SAVIO POOVATHINGAL

Assistant Professor
Ph.D. Aerospace Engineering,
University of Minnesota, 2016



THE CONNECTOR

Attending veterinarian Mark Suckow has a knack for producing winning collaborative research ventures

Kel Hahn

When Mark Suckow (pronounced SOO-koh) interviewed with University of Kentucky Vice President for Research Lisa Cassis for the position of attending veterinarian, he posed a simple question: Could he do more?

As former associate vice president for research at the University of Notre Dame, Suckow believed he could make significant contributions beyond his specific role as attending veterinarian. Cassis agreed. Today, Suckow is not only UK's attending veterinarian but also associate vice president for research and full professor in the F. Joseph Halcomb III, M.D. Department of Biomedical Engineering. Combined, his tripartite position allows Suckow to do what he does best: connect people.

"As an institutional veterinarian, I have a pretty good idea of the overall scope of work going on across campus. An investigator in engineering may be entirely unaware of what an investigator across campus is doing, and they need to meet because there's potential synergy there. Several times in my career I've been able to connect people in meaningful ways, and that's very satisfying."

Born and educated in Wisconsin, Suckow did a postdoctoral fellowship at the University of Michigan before working at Purdue University, Notre Dame and the University of Minnesota over a 30-year span.

Clearly, he isn't bothered by cold weather.

"Well, I'm used to it," he says, chuckling. "The day my wife and I moved to Kentucky, it was minus 36 outside."



“In an academic environment, you always feel like anything can happen. Any minute, someone can walk through your door with a great idea.”

What led you to veterinary medicine?

I came to veterinary medicine because it blended the two things I liked the most: animals and science. My mom didn't feel I was responsible enough to have a dog for a pet, so I had other animals—mice, gerbils, frogs, everything. All of that helped develop my interest in veterinary medicine.

Do you have an area of specialization?

My specialty is comparative medicine and laboratory animal medicine. I'm specialty board certified in laboratory animal medicine. I work with mice, rats, rabbits—those kinds of animals. But I've worked with everything from fish to horses and cattle, raccoons, almost anything you can name.

What is comparative medicine?

Let's say you have an idea for a drug or a treatment. First, you have to try it on something other than a person. That's where comparative medicine comes in. Animals' systems, anatomy and physiology have similarities to those of humans, so we can compare them. Where there are similarities, we can do modeling and understand more about human diseases and human physiology.

What discoveries have you made over the course of your career?

I've had the opportunity to work with some great people. Some chemists I knew had a compound in development, and I had the idea that this compound might have some application to diabetic wound healing—something they hadn't thought about. I shared the idea. We conducted some experiments and together found that it did have a benefit for healing diabetic wounds, which are a huge problem. That work ended up becoming very well-funded, and intellectual property, as well as a company, resulted from it. Going from an initial idea, moving through pre-clinical animal models and then translating that into the clinic was extremely gratifying.

I've worked with biomaterials of different kinds for wound healing and for hernia repair. I also worked with cancer models and developed intellectual property that's now a product on the veterinary market for treating dogs with cancer.

UK Vice President for Research Lisa Cassis

Did you ever think about owning a private veterinary practice and seeing patients?

I thought about it a little, either having my own practice or maybe working for a large Wisconsin dairy farm. But I went the research route because I'm intrigued by the biology of animals. I love animals, but I was more interested in academia than private practice. In an academic environment, you always feel like anything can happen. Any minute, someone can walk through your door with a great idea.

You are UK's attending veterinarian, associate vice president for research and a professor of biomedical engineering. What will the combination of these responsibilities look like?

Every day is different, and I'm figuring it out as I go. Many days I will have administrative responsibilities as attending veterinarian, but I also hope to have days where I'm teaching and instructing students in the research lab, as well as doing my own work and collaborating with other investigators whose work might be bettered by my veterinary experience.

How have you developed as a researcher?

I had a tremendous mentor at Notre Dame who was a veterinarian but worked as a cancer investigator. He had a rat model of prostate cancer, and he said, 'If you want to work with this, it's available to you.' So I worked in his lab, and he taught me things. That was really very formative for me in terms of becoming a researcher, even though I was well into my career at the time.

Once you master something, it's easy to get complacent or lazy, but it's fun to learn and do new things.

What do you like to do in your leisure time?

I like to go ice fishing, but that's probably not going to happen a lot here. But I also like to go running and lift weights. I've heard that the UK Arboretum is a great place to run.

Did you ever get a dog?

Yes! We only have one now, a mixed breed named Rudy. But at times we've had as many as three. ■

“This coming year stands to be one of the most exciting I have ever known.”



RESEARCH IN THEIR OWN WORDS: W. Brent Seales

“Twenty years from now you will be more disappointed by the things you didn’t do than by the ones you did do. So throw off the bowlines. Sail away from the safe harbor. Catch the trade winds in your sails. Explore. Dream. Discover.” – Mark Twain

Fabrizio Diozzi, director of the Officina dei Papyri at the Biblioteca Nazionale di Napoli, walked me to the balcony where we could see the Tyrrhenian Sea stretching from the library in Naples toward Capri and beyond. We were getting to know each other, admiring the beauty of the Bay of Naples and talking about music. He had a passion for the American music recording industry, and his wide-ranging interests and knowledge inspired me.

“Muscle Shoals,” he chanted as he turned to me with a smile.

The name of the tiny, nondescript river town in rural north Alabama was not what I expected to hear from the Neapolitan conservator who was overseer of the world-famous papyri from Herculaneum. But during the middle decades of the 20th century, two small recording studios in Muscle Shoals had produced amazing results, turning the town into a legendary session retreat. Artists from all over the world sought the unique R&B funk of the “Muscle Shoals sound.” Otis Redding, Aretha Franklin, The Rolling Stones and many others achieved their dreams with help from the excellent, innovative and talented Muscle Shoals team.

Excellence attracts dreamers, who are shaped by their tenacious pursuit of dreams. Having risen to the pinnacle of his

profession, Fabrizio recognizes excellence and understands its power. The potential of our own joint pursuits brought to his mind the story and symbol of Muscle Shoals.

This conversation with Fabrizio really moved me, because the fact is, excellence is hard to achieve, and no one has exclusive rights to it. Collaborative research programs like ours must fight their way to excellence in their own way and time. We are fortunate to have a clear pathway to research excellence at the University of Kentucky thanks to our talented students, enterprising faculty members and support from colleges like Engineering, where we have strong entrepreneurial values, visionary leadership and accomplished, dedicated alumni willing to invest in our future success.

My research program, called the Digital Restoration Initiative (DRI), is focused on engineered systems and software (imaging systems, software algorithms, data science) that are designed to realize the dream of reading the invisible library. The invisible library is the plethora of existing written material—manuscripts, scrolls, fragments—too badly damaged to open physically. Surprisingly, a wealth of material like this resides in museums and libraries around the world. It is at once mysterious, rare and ugly. Things that are too damaged to read or even to be handled safely are not usually

considered beautiful, but I have come to see these objects through different eyes, those of the problem-solving engineer. I imagine the future beauty that will emerge with the rescue of their unique and ephemeral narratives.

This dream includes Fabrizio’s scrolls from Herculaneum. The first one I saw in person was in 2005 in Naples. Even then, as a newcomer to the world of classical antiquities, I understood the elusive, enigmatic nature of the scrolls. Rescued 250 years ago from the remnants of the legendary A.D. 79 explosion of Mount Vesuvius, the scrolls have undergone painstaking study by renowned scholars from around the world and were even immortalized in poetry by none other than William Wordsworth. Later that summer at Oxford University, I presented my own idea about the scrolls—a specific technical plan for how I thought one could be virtually opened and read. This material is the stuff of dreams.

My collaboration with the talented Fabrizio is remarkable for its rapid coalescence, and it has been accelerated by the convergence of three crucial elements in my research program at the University of Kentucky. This coming year stands to be one of the most exciting I have ever known.

The first and central element, which is



beloved by those of us who are engineers and computer scientists, is the technical approach. After pushing for more than five years against seemingly insurmountable limits in imaging technology and data science, we broke through last year with an artificial intelligence-based approach to “virtual unwrapping.” We already have a working software pipeline that provides a pathway to recover and redeem writing from damaged material when the ink responds well in X-ray tomography. But this year we were the first to show that the special, elusive ink from Herculaneum (carbon “lamp” black that effectively “hides” in tomography) and materials that have similar composition can also be seen

and read from documents without first opening them. We use a machine-learning approach, creating a large-scale neural network that can recognize and enhance the ink even while evidence of that same ink cannot be seen with the naked eye. We published our approach earlier in the year. Similar methods are also being developed for clinical applications in order to flag health concerns well before they are even visible to the trained eye of a radiologist.

The second key element is funding. Bridging our way and cheering us onward to external research support is the generosity of UK alumni and supporters John and Shirley Kyle, John and Karen

Maxwell, Craig Adams, and Lee and Stacy Marksbury. Premised on the successful completion of three major NSF awards over the past two decades, this year we received support from the National Endowment for the Humanities, the Andrew W. Mellon Foundation and the Humanities Research Council of Great Britain.

Finally, with Fabrizio's help and support, the DRI has signed a digital rights agreement with the Biblioteca Nazionale di Napoli. This agreement gives me the opportunity to digitize the entire Herculaneum papyrus collection and release all the results as open scholarship. The collection represents 1,800 scrolls found

at Herculaneum: 6,000 trays of opened scrolls with visible text that is very difficult to see and almost 900 intact scrolls and scroll chunks. Only 17 scrolls from Herculaneum are not in the collection in Naples, and we now have access to those as well.

Our goal? To produce the best digital images of the already opened scrolls that the world has ever seen, and to read the ones that have never been opened...without the need to open them.

The Neapolitan papyrus conservator and I are not so different. We love challenges and we are inspired by excellence. Together we are approaching the Herculaneum papyrus

collection in Naples, hoping to change the world of papyrology and the classics forever by moving the Herculaneum scrolls from the invisible library into the visible, digital one.

And Muscle Shoals is such an apt image. The Alabama studio that hosted musicians from all over the world and inspired them to do their best work is exactly what I hope to build at the University of Kentucky. Well, not a music studio, but the DRI Lab. Centered in the UK Department of Computer Science, and in partnership with the best collections worldwide, the DRI could become the premier place for damaged manuscripts to come for restoration, analysis and new discoveries—

a magical retreat for the repair and restoration of seemingly lost manuscripts, if you will.

While we currently lack the equipment and sustained funding for the laboratory I envision building here at UK, we hold something very powerful: collaborators like Fabrizio; the courage to explore and discover; and the dream to drive us onward.

As happened with Muscle Shoals, sustained excellence will soon have people asking not how this could be possible at the University of Kentucky, but what will be our next dream? ■

STUDENT SPOTLIGHT: EDWARD OJINI

Kel Hahn

As a high school student in Lagos, Nigeria, Edward Ojini wasn't sure the University of Kentucky offered the right situation for him to pursue an engineering degree.

"Most international students don't get to take a tour of campus, and I had never been in this part of the country before. All I could do was use Google images, talk to Nigerian students attending UK and try to visualize what living on campus would look like," he recalls.

With financial questions settled, Edward gave UK a more serious look. He says that, in the end, one critical factor cemented his decision to become a Wildcat.

"Kentucky basketball," he says, smiling.

Now a junior majoring in electrical engineering, Edward is taking all he's learning inside and outside the classroom and analyzing how it will help him once he returns to Nigeria.

For Edward, academics are only one component of becoming a professional engineer. He knows he will also have to work well with others. To that end, his active participation in the UK chapter of the National Society of Black Engineers (NSBE) has provided a support base and a place to learn crucial interpersonal skills.

"I've been in NSBE since my freshman year. As engineering students, we're going through the same challenges. We

“ I see it as a puzzle. I have all these pieces: My classes give me the knowledge base, and NSBE gives me the teamwork skills. When the puzzle is finished, I'll be able to see the big picture of how I can best help my country. ”

Edward also wasn't sure the finances would work. He says that in Nigeria, parents usually assume the responsibility of paying for their children's education. Because initial scholarship offers from UK were low, Edward did not want to burden his parents with high bills for tuition and living expenses.

"It was shaky at first," says Edward. "Fortunately, in addition to the Kentucky Heritage Scholarship, I later received a William C. Parker Diversity Scholarship from UK and the Lester Scholarship through the College of Engineering."

"Nigeria has poor power distribution and transmission systems, so I'm trying to hone my skills in the power sector so I can eventually go back and contribute toward solving some of the problems."

Edward understands that gaining the necessary expertise will take time. He plans to work in industry and sharpen his research skills while he is in the U.S.

"When I feel like I'm standing on my own two feet and can call myself a good electrical engineer, then I will go home and use my skills to help my country."

share each other's successes, help each other through tough times and motivate each other to become creative thinkers and problem solvers."

Semester by semester, Edward can see his future coming together.

"I see it as a puzzle. I have all these pieces: My classes give me the knowledge base, and NSBE gives me the teamwork skills. When the puzzle is finished, I'll be able to see the big picture of how I can best help my country."



STAFF SPOTLIGHT: FLOYD TAYLOR

Kel Hahn

One way to describe Floyd Taylor is “the scary old machinist in the RGAN basement.”

But those are his self-deprecating words, and he says them with a laugh.

Another way to describe Floyd is “outstanding staff member.”

That’s the perspective of appreciative students who made Floyd a finalist for the 2018 UK Staff Senate Outstanding Staff Award. According to Alexandre Martin, associate professor in the Department of Mechanical Engineering, that take is much closer to the truth.

“Floyd has been instrumental to the success of the students, as well as to the research of the department. His willingness to teach the techniques, instead of merely performing them, makes his contribution even greater.”

As senior machinist for the College of Engineering, Floyd works with undergraduate and graduate students, faculty and staff on senior design projects, research endeavors and more. With three decades of designing and building industrial equipment under his belt—including 23 years at Clark Machine Tool & Die in nearby Nicholasville, Kentucky—Floyd has more than enough experience to impart to students.

“I like working with students because they’re like sponges. They’re eager for information that will help them get on their way,” says Floyd.

Often, however, the best wisdom Floyd can proffer to students comes with an unexpected price.

“**I like working with students because they’re like sponges. They’re eager for information that will help them get on their way.**”

“Ninety-percent of the time, they bring me a design and I have to change it,” he explains. “Students always expect that their drawing is going to be right the first time, so they get upset and hung up on what they did wrong. I always tell them that I’ve been designing and building machines for over 30 years, and to this day I’ve never gotten it completely right the first time.”

A significant component of Floyd’s hands-on education involves expanding students’ ways of thinking.

“Because students work with formulas and equations, they usually think there’s only one way to do something. I try to show them that there might be many ways to design something, depending on the machines you have and what the customer wants,” he says.

Given the college-wide scope of Floyd’s work, his goal is to build “a large machine shop where faculty, staff and students can use their knowledge and intelligence to freely build.” Since Floyd’s arrival, the college now operates a computer numerical control (CNC) mill, CNC lathe and a large-scale 3D printer, among other key pieces. A flow waterjet will be installed by the end of the year.

“The more things I can show students how to do, the more they can take with them to become better employees when they leave. It’s very important to me that we turn out good graduates.”

Mike Renfro, chair of the Department of Mechanical Engineering, observes, “Floyd’s work with the students gives them practical insight into making their designs complement the theoretical material they learn in class. His considerable machining experience adds a lot of value to their education.”

Now, does that sound like someone scary to you?



WALK A MILE

UK Paducah alumnus Corey Whinton (BSME 2016) put his engineering skills to use by serving the people of Panajachel, Guatemala.

Kel Hahn

Corey Whinton had been in the workforce for three years after graduating with a mechanical engineering degree through the University of Kentucky College of Engineering Extended Campus at Paducah when he decided that it was time to give back to society.

"Since God blessed me with an education and a great job, I felt it was necessary that I give part of my time and resources to those who are less fortunate than me."

When an opportunity came along for Whinton to go on a mission trip with the "Walk A Mile" project, he

immediately gave an enthusiastic "Yes!"

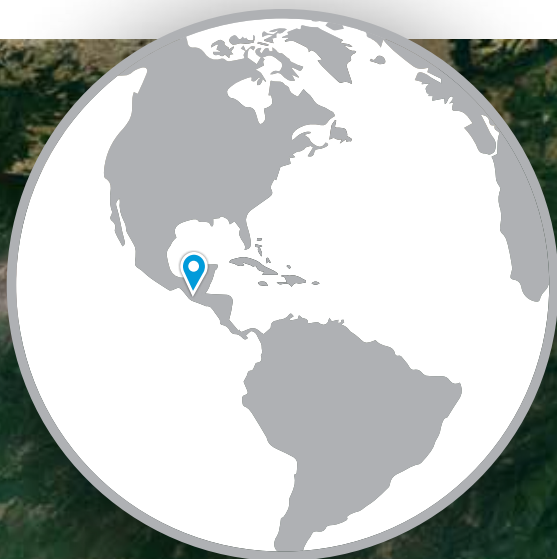
The mission group traveled to Panajachel, Guatemala, and surrounding villages. The mission group consisted of a medical team and a construction team. Together, they were able to build 17 houses and provide various medical treatments to approximately 550 patients. Whinton served on the construction team, building houses for needy families.

"It was very humbling to see how extremely grateful the families were to receive the houses. In the United States, we would compare these houses to something like a toolshed. But to the people of Guatemala, it was a house.

And not just a house, but a home! It brought me a great deal of joy to serve these precious families. We were able to show love and kindness to the people of Guatemala, as well as share the Gospel message with them."

Whinton credits his education at UK Paducah for supplying him with the skills that enabled him to serve.

"This experience reminded me of just how fortunate I am to live in the United States, where I am given limitless opportunities. I am very privileged to have obtained a top-notch education at a university that was right in my backyard."





INDUSTRY INVOLVEMENT IN THE UK COLLEGE OF ENGINEERING

Fill your talent pipeline while promoting your brand with a UK College of Engineering sponsorship. It's good for business, good for UK and good for the Commonwealth. Engagement opportunities include:

RECRUITMENT

RECRUITER-IN-RESIDENCE. Have your own space in which to conduct "office hours" during prime co-op, internship and full-time employment recruiting seasons.

EMPLOYER PARTNER ON THE PATIO. Meet new and returning students at a college-sponsored picnic during the first week of classes.

LEADERSHIP

WILDCAT CAGE COMPETITION. The college's twist on the "shark tank" concept puts you in the investor's seat as student organizations pitch projects seeking investments.

EMPLOYER PARTNERSHIP COUNCIL. Work with the college's Career Development Team and area employers to shape the college's strategy for developing graduates able to thrive in tomorrow's workforce.

OUTREACH

ENGINEERS DAY OPEN HOUSE (E-DAY). Secure your premium exhibit location at E-Day, the college's annual celebration, which hosts over 3,000 guests of all ages.

CAMPS AND EVENTS. Make your business part of our outreach camps and events, such as the Women in Engineering (WiE) Explore Camp for high school women, the Creating Advancement Through STEM (CATS) Camp for underrepresented minority students, the Dean's Academy Weekend for high-achieving high school students, Go Girl! Sleepover for elementary school-aged girls and more.

PROFESSIONAL DEVELOPMENT

CAREER CONNECTIONS. Assist students preparing to interview for co-ops, internships and full-time employment by critiquing resumes, reviewing LinkedIn profiles, participating in mock interviews and more. Career Connections takes place prior to the fall and spring career fairs.

SPEAKING OPPORTUNITIES. Get your company in front of students by presenting to engineering student organizations, the Engineering Living Learning Program (ELLP), Scholars in Engineering and Management (SEAM) Honors students and the application-only, limited enrollment Dean's Leadership Class.

Corporate partner sponsorships will be used to fund scholarships, student organizations, outreach and career development.



SATURDAY
FEBRUARY 22
2020



SPONSORSHIP LEVELS

GOLD: \$25,000 (all Silver and Bronze benefits plus)

- Receive two seats at the Wildcat Cage Competition
- Take an active role in two outreach camps or events
- Be recognized as an elite sponsor at Employer Partner on the Patio
- Be recognized as an elite sponsor of SEAM Honors program
- Be recognized as an elite sponsor of the Dean's Leadership Class
- Elite brand placement in the James and Gay Hardymon Center for Student Success

SILVER: \$15,000 (all Bronze benefits plus)

- Take an active role in one outreach camp or event
- Host two student organization meetings
- Present to the SEAM Honors program
- Present to the Dean's Leadership Class
- Be recognized as a premier sponsor at Employer Partner on the Patio
- Premier brand placement in the James and Gay Hardymon Center for Student Success

BRONZE: \$10,000

- Receive one seat at the Wildcat Cage Competition
- Host one student organization meeting
- Enjoy Recruiter-in-Residence space and office hours
- Participate in Employer Partner on the Patio
- Take an active role in one outreach event
- Premium exhibit location at E-Day
- Engage students at Career Connections
- Speak at the Engineering LLP
- Become a member of the Employer Partnership Council
- Recognition on the Industry Scholarship Plaque in the Engineering Commons
- Brand placement in the James and Gay Hardymon Center for Student Success

DEPARTMENT SPONSORSHIPS

Sponsorship opportunities are also available at the department level through capstone senior design projects, conference sponsorships, endowed professorships, graduate student fellowships and more.

NAMED SPACE

The college offers naming opportunities for most of its buildings, laboratories, office suites, social spaces and more. Ask how your company can become synonymous with some of the college's most iconic locations.



To begin your partnership with the UK College of Engineering, contact Kim Sayre, director of industry engagement, at:

Office: (859) 257-3343
Cell : (859) 699-9090
Email: kim.sayre@uky.edu

Sponsorships can be renewed annually.



THURSDAY
JANUARY 30
&
FRIDAY
JANUARY 31
2020

GREHAN HALL RENOVATION UPDATE

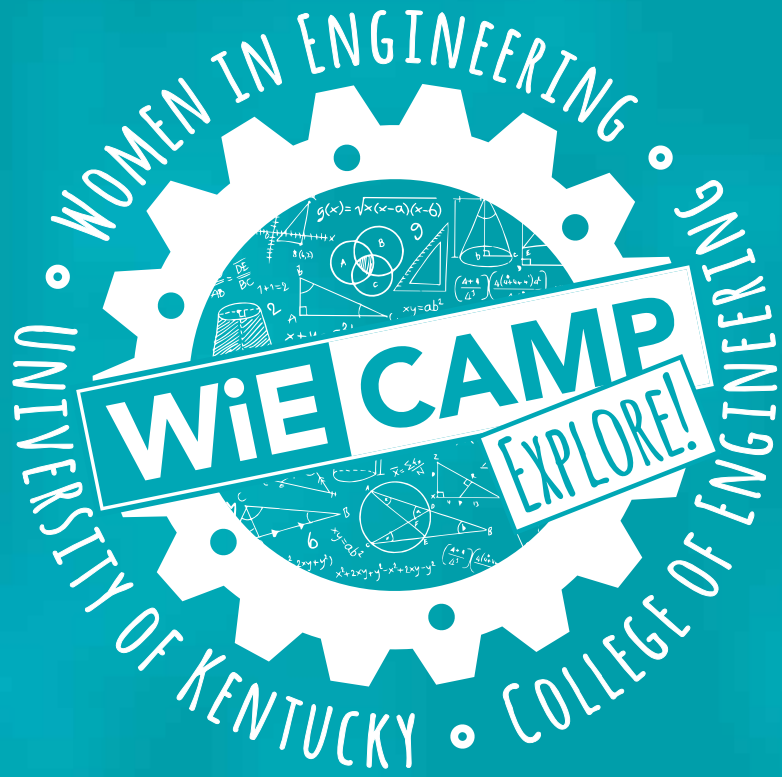
We're in the homestretch of Grehan Hall's renovation!

Once completed, Grehan will add 45,000 square feet to the college's total of 275,000 square feet of space. A three-story staircase shelled in glass will connect Grehan to McVey Hall, and a large skylight has been added to the third-story roof.

Grehan Hall is slated to open for business in December.

Jose Paredes graduated from UK in 2018 with a bachelor's degree in civil engineering. ▶





In June, over 40 high school girls received a glimpse of life as a UK Engineering student through the Women in Engineering (WiE) Explore Camp. Through hands-on activities, campers learned about UK's nine engineering majors, visited local engineering companies and engaged professional women engineers. This is the second year of the week-long camp, during which campers reside in Woodland Glen III—home of the college's Engineering Living Learning Program.

"It's belief, not ability, that makes girls think STEM is not for them," said WiE Explore Camp director Micaha Dean Hughes. "If we can create space for girls to feel confident in STEM, we will all benefit from more diverse teams with better ideas and more innovation."



FOUR UK ENGINEERING GRADUATES RECEIVE NSF GRADUATE RESEARCH FELLOWSHIPS

Whitney Hale, UKPR

Four UK College of Engineering students and alumni have been selected to receive government-funded National Science Foundation (NSF) Graduate Research Fellowships. In addition, two other UK Engineering students received honorable mention recognition from the NSF.

NSF Fellows receive a three-year annual stipend of \$34,000 along with a \$12,000 cost of education allowance for tuition and fees for a research-based master's or doctoral degree in a STEM (science, technology, engineering or mathematics) field. Annually, the NSF awards approximately 1,500 fellowships from an applicant pool of over 12,000.

"Receiving a GRFP award from NSF is an incredible honor," NSF Fellow Lauren Mehanna said. "The GRFP gives me more independence with my research project, as I will not have to rely on outside funding for support. It also gives me access to numerous other resources provided by NSF. I am looking forward to guiding my own research project in the direction of where my interests take me, which hopefully will lead to significant discoveries in the chemical and biomedical engineering realms."



AWARDEES FROM THE UK COLLEGE OF ENGINEERING INCLUDE:

Rachel Boone, a 2019 UK chemical engineering graduate from Stanton, Kentucky, now pursuing research in chemical engineering at Vanderbilt University;

Lauren Mehanna, a doctoral student from Lexington, pursuing research in chemical engineering at UK;

Ava Vargason, a 2017 UK chemical engineering graduate, Lewis Honors College member and Chellgren Fellow from Iowa City, Iowa, pursuing research in pharmaceutical sciences at University of North Carolina at Chapel Hill; and

Stephen Wright, a 2019 UK mechanical engineering graduate and Lewis Honors College member from Nicholasville, Kentucky, now pursuing research in aerospace engineering at University of Michigan.

Tri Andrew Phan, a 2016 UK biosystems engineering graduate from Lexington pursuing research at University of California, Irvine and **Mujan Seif**, a UK doctoral student in materials engineering from West Bloomfield, Michigan, received honorable mention recognition from the NSF Graduate Research Fellowship Program.

HUGHES AND LUMPP WIN SARAH BENNETT HOLMES AWARDS

Lynn Hiler

Two University of Kentucky women who profoundly contribute to issues that affect women at the university and across the Commonwealth received the 2019 Sarah Bennett Holmes Award on March 27 during a luncheon ceremony at the Gatton Student Center Ballroom. Staff recipient was Micaha Dean Hughes, and the faculty recipient was Janet Lumpp, both from the College of Engineering.

The award recognizes one female faculty member and one female staff member who promote growth and well-being of women at the university and across Kentucky. Created by the UK Women's Forum, the Sarah Bennett Holmes Award has been among the most esteemed accolades bestowed at the University of Kentucky and brings recognition for efforts that might otherwise go unnoticed.

Micaha Dean Hughes is the director of outreach and community engagement at the UK College of Engineering, where she creates and leads K-12 outreach programs to get young students and their families engaged in engineering. Hughes also works to specifically recruit more women into UK Engineering and hosts special events to encourage greater female participation in the traditionally male-dominated field. She holds a bachelor's degree in integrated strategic communication from the University of Kentucky, and she is currently seeking a master's degree in STEM Education.

For 25 years, Janet Lumpp has been a faculty member in the Department of Electrical and Computer Engineering, teaching and researching microelectronics, circuits and lasers. She was associate director of NASA Kentucky for five years before serving as director of the First-Year Engineering (FYE) Program from 2015-2019. Lumpp has always been active in K-12 STEM outreach as well as cross-disciplinary research. She received her bachelor's and master's degrees from Purdue University and her doctorate from the University of Iowa.

Sarah Bennett Holmes, a distinguished former dean of women at UK, tirelessly championed the rights of women throughout her career. Widowed at a young age, Holmes raised four children while completing her own education. She then began a successful career at the university, where she inspired young women to persevere in the face of hardship and pursue their career goals. Among her accomplishments, Holmes developed work programs for women during the Depression. In her honor, the UK Women's Forum created the Sarah Bennett Holmes Award and since 1994 has been honoring women at UK who demonstrate the same principles as Holmes through their work and service.



MICAHA DEAN HUGHES
Director of Outreach and
Community Engagement



JANET LUMPP
Professor, Department of Electrical
and Computer Engineering

COREY BAKER RECEIVES UK INCLUSIVE EXCELLENCE AWARD

Ryan Girves

The University of Kentucky Office for Institutional Diversity recognized students, faculty and a department with the Inclusive Excellence Awards at the 2019 University of Kentucky Awards Ceremony. The award recognizes the accomplishments of individuals and academic or professional units that demonstrate a sustained commitment to diversity and inclusion through campus and community involvement and exemplary leadership. Five awards were granted in four categories: student (undergraduate and graduate), faculty, staff and academic or professional unit. Corey E. Baker, assistant professor in the Department of Computer Science, received his award in the faculty category.



COREY BAKER
Assistant Professor, Department of
Computer Science

"Creating inclusive excellence throughout our campus community requires us to work in collaboration with each other," said Sonja Feist-Price, vice president for institutional diversity. "We have students, faculty, staff and academic and professional units that give of themselves beyond what anyone would ask or expect. And they do so because of their love for our campus community, and because they recognize what it takes to become a university where everyone—irrespective of identity or perspective—feels a sense of belonging."

Winners exemplified one or more of the following characteristics:

- Builds awareness, understanding and relationships in the name of diversity and inclusion.
- Creates leadership opportunities, teams, organizations and support systems that promote a diverse and inclusive environment.
- Sponsors or actively promotes programs, initiatives or projects in the area of diversity and inclusion.
- Collaborates with others in the sponsorship, development and implementation of innovative projects and/or programs.
- Acknowledges and rewards exemplary individual and team behaviors that promote diversity and inclusion.
- Secures funding to promote and sustain programs in response to challenges that can affect the fostering of a diverse and inclusive cultural climate.

Since joining the college in January 2018, Baker has focused his diversity and inclusion efforts on the demographic concerns in computer science and engineering by successfully recruiting underrepresented graduate students to the computer science program. Through his leadership of the newly launched Graduate Student Campus Visit Program, the Department of Computer Science has the largest number of Black doctoral students in its history. Baker's efforts have made a long-term impact and brought change to the College of Engineering.



SUZANNE SMITH
Professor, Department of
Mechanical Engineering

SARAH WILSON
Lecturer, Department of Chemical
and Materials Engineering

SMITH, WILSON RECEIVE OUTSTANDING TEACHING AWARDS

The University of Kentucky recognized exceptional faculty and teaching assistants with the Outstanding Teaching Awards during the 2019 UK Faculty Awards Ceremony. Mechanical engineering professor Suzanne Smith and chemical engineering lecturer Sarah Wilson received awards.

The Outstanding Teaching Awards annually recognize faculty and graduate teaching assistants who go above and beyond what is expected and demonstrate outstanding performance in the classroom or laboratory. Selected via nomination, candidates are reviewed by a selection committee empaneled by the Office for Faculty Advancement and the Center for Enhancement of Learning and Teaching.



DZIUBLA INDUCTED INTO AIMBE COLLEGE OF FELLOWS

The American Institute for Medical and Biological Engineering (AIMBE) has announced the induction of Thomas D. Dziubla, Ph.D., to its College of Fellows. Dziubla was nominated, reviewed and elected by peers and members of the College of Fellows for "seminal contributions to biomaterials and advanced drug delivery, establishing the field of biomaterials capable of regulating oxidative stress."

Election to the AIMBE College of Fellows is among the highest professional distinctions accorded to a medical and biological engineer. The College of Fellows comprises the top two percent of medical and biological engineers. College membership honors those who have made outstanding contributions to "engineering and medicine research, practice or education" and to "the pioneering of new and developing fields of technology, making major advancements in traditional fields of medical and biological engineering, or developing/implementing innovative approaches to bioengineering education."

A formal induction ceremony was held during the AIMBE Annual Meeting at the National Academy of Sciences in Washington, D.C., on March 25. Dziubla was inducted along with 156 colleagues who comprise the AIMBE College of Fellows Class of 2019.

Dziubla joined the UK College of Engineering in 2006. He became chair of the Department of Chemical and Materials Engineering July 1.

BHATTACHARYYA ELECTED NORTH AMERICAN MEMBRANE SOCIETY FELLOW

UK Alumni Professor Dibakar Bhattacharyya (DB) was formally recognized as a Fellow of the North American Membrane Society (NAMS) at the 2019 Annual Meeting held May 11-15 in Pittsburgh, Pennsylvania. Fellows are recognized for their service to NAMS, as well as for their highly significant professional accomplishments in the membrane field.

A UK staple for over 50 years, Bhattacharyya has received numerous awards for his accomplishments, including the 2009 Gerhold Award from the AIChE Separations Division for his outstanding contributions in Membrane Separations Technology Development and the Larry K. Cecil AIChE Environmental Division Award for outstanding membrane technology developments in the water-related field. In June 2018, he served as co-chair for the 2018 NAMS Annual Meeting hosted in Lexington, Kentucky.

"DB is one of the leading authorities in the world on membrane and water research," says UK chemical engineering professor and 2018 NAMS Annual Meeting co-chair Isabel Escobar. "He has given invited lectures in all continents but Antarctica. His name is known by all doing membrane research as one of the people always on the cutting edge."



Eric Sanders, Derrick Meads, Aaron Camenisch and Kel Hahn

MARKETING AND COMMUNICATIONS OFFICE TAKES LOCAL AND REGIONAL HONORS

The Marketing and Communications Office for the University of Kentucky College of Engineering took honors at three different awards ceremonies.

At the annual Council for the Advancement and Support of Education (CASE) District III awards ceremony, the team earned a Grand Award (first place) for Magazine Improvement, an Award of Excellence (second place) for the Total Website Design and Organization, and a Special Merit Award (third place) for the illustration on the cover of the spring 2018 *Kentucky Engineering Journal* magazine. CASE District III consists of member institutions in Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Virginia.

In December, 2018 the team won an award at the 2019 Lexington American Advertising Awards ceremony (also known as the ADDYs). Competing against advertising agencies and production companies in the Lexington area, the group's "UKY Engineering Sneak Peek" video took gold in the Branded Content & Entertainment for Online Film, Video & Sound, 60-seconds or less category.

Also in December, CASE Kentucky, which comprises member institutions within the Commonwealth, awarded the office Grand Awards for the spring 2018 issue of *Kentucky Engineering Journal* (Multi-Page Publication and Folder) and the redesigned website.

The Marketing and Communications Office is led by Derrick Meads, senior director of marketing and communications. Aaron Camenisch serves as associate director of marketing, Kel Hahn as associate director of communications and Eric Sanders as media production manager. Scott May (not pictured) joined the team as web manager in September.



REESE S. TERRY JR. RECEIVES HONORARY DOCTOR OF ENGINEERING DEGREE

Reese S. Terry Jr. (BSEE 1964; MSEE 1966) received an honorary doctor of engineering degree at the May 2019 Commencement ceremony.

Terry, from Mt. Sterling, Kentucky, earned his bachelor's and master's degrees in electrical engineering from UK. He began his professional career at Cordis Corporation, a heart pacemaker manufacturing company, and later joined Intermedics Inc., a medical device and electronics company, where he continued his interest in pacemakers and co-developed the first programmable dual-chamber pacer in 1980. Eventually, Terry moved into the neurological medical technology area and co-founded Cyberonics Inc. to develop, manufacture and market neuromodulation therapies for patients with epilepsy and other neurological disorders. He helped develop Vagus Nerve Stimulation Therapy, a breakthrough seizure reduction treatment for epilepsy, which was later approved to treat depression and migraine headaches.

Terry is recognized internationally for his work. He holds numerous patents and was recognized twice by Industrial Research Inc., for making one of the top 100 inventions in a year. Terry also received both the Professional Career Achievement Award from the Engineering in Medicine and Biology Society and the World Changer Award from the Epilepsy Foundation of America in 2012.

Through all of his success, Terry has made giving back a priority. Among his philanthropic efforts, his company helped establish a fund to pay travel expenses for needy epilepsy patients and their families to obtain appropriate treatment, and he endowed a professorship in UK's Department of Electrical and Computer Engineering. Terry has worked tirelessly on behalf of the UK Alumni Association and was honored with its Distinguished Service Award in 2018. He is a member of the College of Engineering's Hall of Distinction and the UK Hall of Distinguished Alumni.



UK NOW OFFERING THREE ONLINE GRADUATE CERTIFICATES

The UK College of Engineering is now offering online graduate certificates in power systems, structural engineering and manufacturing systems. The design and content of each fully online program is ideal for working professionals seeking to increase their knowledge base in a schedule-friendly way.

POWER SYSTEMS

The Online Graduate Certificate in Power Systems is designed to provide students with the core knowledge and latest advancements in analysis, modeling, operation, control, optimization and integration of renewable energies. In addition to being exposed to the various aspects of power systems theories, students will master the tools and techniques for planning, problem solving and operating power systems.

STRUCTURAL ENGINEERING

The Online Graduate Certificate in Structural Engineering prepares students for career advancement by giving them core knowledge in prestressed concrete, steel structures and matrix structural analysis. The courses will be beneficial to civil engineering students and practicing structural engineers.

MANUFACTURING SYSTEMS

The Online Graduate Certificate in Manufacturing Systems is perfectly suited to students who are interested in pursuing graduate education in manufacturing systems engineering but are not quite ready to commit to UK's fully online Manufacturing Systems Engineering master's program. The certificate is structured as a four-course program that provides graduate-level qualifications for engineers and manufacturing professionals in industry. Learn about sustainability, global issues in manufacturing, ethics, leadership and more.

More online graduate certificates are scheduled to open for registration by spring of 2020. Visit www.uky.edu/online.

CLASS NOTES

Alex Castle, BSCE 2010, is master distiller at Old Dominick Distillery in Memphis, Tennessee. She is the state's first female distiller.

Kimra H. Cole, BSCE 1988, has been named president and chief operating officer of Columbia Gas of Kentucky. Cole had been vice president, distribution operations for Columbia's parent company, NiSource Inc. Cole has served in various leadership roles in marketing, engineering and operations during her 22 years with Columbia Gas of Kentucky and NiSource.

Taylor Corbett, BSCE 2016, has been named the VC-25B Interiors Program manager for the United States Air Force at Wright-Patterson Air Force Base. In this role, Taylor will be managing the colors, material finishes and interior architecture of the new Air Force One. Corbett participated in the Engineering/MBA Dual Degree program.

Laurie Cummins, BSME 1983, has been promoted from director to vice president of program and systems advisory at Lone Star Analysis. Cummins has more than 30 years of experience in the defense industry, 13 of which have been at Lone Star.

Tom Eade, BSEE 1992, has been named senior vice president and CTO of Lexmark. In this leadership role, he is responsible for Lexmark's global research and development (R&D) operations. Eade joined Lexmark at its inception in 1991 and has held numerous management positions in R&D.

David Herrin, Ph.D. ME 2000, was selected as the recipient of the 2019 INCE-USA Outstanding Educator Award for Excellence in the Teaching of Noise Control Engineering. The award is intended to honor a person who has significantly advanced the technology and practice of noise control engineering through unique contributions to the education of future noise control engineers. Herrin is a professor in the Department of Mechanical Engineering and director of the Vibro-Acoustics Consortium at UK.

George Justice, BSCE 1981, has been

promoted to vice president of Electric Operations at Ameren Illinois. In his role, he will be responsible for leading the company's electric modernization program and overseeing more than 50,000 miles of distribution and transmission power lines for 1.2 million customers. Justice has been with the company for 37 years.

Whitney (Epperson) Marrero, BSMAT 2011, received the 2019 GE Power Women in Technology Award. The award recognizes early to mid-career women engineers across GE for their dedication and leadership.

Jeremy McKinney, BSCE 1996, has joined Haberberger, Inc., as a project manager. He will be responsible for overseeing projects and project estimation. He is a registered Professional Engineer with more than two decades of heavy industrial experience that includes process and mechanical engineering design and construction and the management of several \$100 million projects.

Joseph K. Papp, BSCE 2015, received an NSF graduate fellowship in 2015 and is conducting research in lithium-ion battery electrode chemistry research as part of the McCloskey Lab at UC, Berkeley. He is currently a visiting researcher at Uppsala University in Sweden.

Bharat Kumar Peddu, MSCE 2006, project engineer at Gannett Fleming and project manager at Maryland Transit Administration, was honored in Maryland as the state's Young Engineer of the Year and received a Special Citation from the Maryland General Assembly.

Cassandra Porter, BSCE 2016, received an American Membrane Technology Association-National Water Research Institute Fellowship. Recipients of this fellowship are conducting research that pertains to the advancement of membrane technologies in the water, wastewater or water reuse industries. Porter is pursuing graduate studies at Yale University.

David B. Ratterman, BSME 1968, was given the 2019 Lifetime Achievement

Award by the American Institute of Steel Construction (AISC) at the North American Steel Construction Conference. The Lifetime Achievement Awards honor individuals who have provided outstanding service to AISC and the structural steel design/construction/academic community for a sustained period of years. Ratterman spent 30 years as AISC secretary and general counsel. He is senior member (partner) of Stites & Harbison in the Construction Service Group.

Walter Roark, BSME 1985, received a Distinguished Alumni award from Hardin County Schools in September. Roark is an MDA TEAMS Quality and Mission Assurance contract technical lead for a.i. solutions, a business that offers products and engineering services to enable space missions.

Harry S. Warford, BSME 1966, has authored "Heirs to The Legacy—How the Cold War, Arms Race, and Space Race Shaped a Generation." The book is a memoir of the author's generation as stories from 20-plus contributors reveal the greater extent of the Legacy across America, as well as on the other side of the Iron Curtain.

Allen Waugerman, BSEE 1994, was selected to serve as president and chief executive officer of Lexmark. Waugerman joined Lexmark in 1991 and had recently been Lexmark's senior vice president and chief technology officer.

Karen White, MSCHE 1997, became president and CEO of the Northwest Minnesota Foundation July 1, 2019. She is the fourth president since NMF was established in 1986 to help revitalize northwest Minnesota communities. White has been serving as NMF's chief strategy officer.

Bradley Wilder, BSCE 2005, has received a Technical Achievement Award from the Society for Protective Coatings (SSPC). The award recognizes outstanding service, leadership and contribution to the SSPC technical committees. He is currently manager of the Bridge Painting Division at Intech Contracting in Lexington, Kentucky.

In Memoriam

<i>Carl L. Combs</i>	Civil Engineering	1942
<i>John R. Warren</i>	Metallurgical Engineering & Materials Science	1949
<i>Donald R. Russell</i>	Mining Engineering	1950
<i>Charles W. Sullivan</i>	Civil Engineering	1950
<i>Winford R. Addison</i>	Civil Engineering	1952
<i>Harold R. Black</i>	Civil Engineering	1952
<i>Robert B. Morrison</i>	Civil Engineering	1953
<i>Benjamin M. Simcox</i>	Civil Engineering	1955
<i>Frederick A. Meyer, Jr.</i>	Civil Engineering	1956
<i>Stuart J. Bohne</i>	Civil Engineering	1958
<i>William H. Brown</i>	Civil Engineering	1958
<i>Joseph Y. Roberson</i>	Civil Engineering	1959
<i>Norma F. Blankenship</i>	Chemical Engineering	1961
<i>Benny R. Spicer</i>	Electrical Engineering	1963
<i>E. M. Cope</i>	Mining Engineering	1964
<i>Frederick W. Wolfe</i>	Mechanical Engineering	1968
<i>Michael L. Luscher</i>	Agricultural Engineering	1971
<i>James L. Connor</i>	Chemical Engineering	1972
<i>Charles R. Harrison</i>	Mechanical Engineering	1973
<i>Michael W. Montgomery</i>	Chemical Engineering	1976
<i>John D. Culp</i>	Metallurgical Engineering & Materials Science	1977
<i>Ronald L. Pepper</i>	Electrical Engineering	1980
<i>Robert A. McNeese</i>	Mechanical Engineering	1981
<i>Jeff Lawless</i>	Mechanical Engineering	1982, 1990

Elaine Duncan Inducted into AIMBE College of Fellows

The American Institute for Medical and Biological Engineering (AIMBE) inducted Elaine Duncan, BSME 1974, MS, RAC, president, Paladin Medical, Inc., and adjunct professor in the F. Joseph Halcomb III, M.D. Department of Biomedical Engineering to its College of Fellows. Duncan was nominated, reviewed and elected by peers and members of the College of Fellows for "outstanding contributions to the applications of biomaterials, medical device safety, performance and commercialization."

Election to the AIMBE College of Fellows is among the highest professional distinctions accorded to a medical and biological engineer. The College of Fellows comprises the top two percent of medical and biological engineers. A formal induction ceremony was held during the AIMBE Annual Meeting at the National Academy of Sciences in Washington, D.C., on March 25.

DEAN

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NOTES:

p. 5: One Day for UK, the university's inaugural day of giving, took place April 17. Alumni and friends of the college answered the call with 222 gifts totaling \$129,975. The original fundraising goal for Lester Scholarships was \$100,000. A huge thanks to all who participated, especially Terry and Sue Strange, whose \$50,000 matching gift paved the way for our success.

p. 10: Many thanks to Rebecca, who conducted Dean Buchheit and several alumni on a special tour of NASA's Johnson Space Center July 10. The group got to observe Mission Control, visit the Neutral Buoyancy Laboratory and explore the Space Vehicle Mockup Facility where NASA astronauts train.

p. 10: In addition to Rebecca, alumni Sujit Sinha (BSME 1983) and Andrew Clem (BSME 2000; MSME 2001) have also worked in Mission Control.

p. 22: Brent Seales is on sabbatical this year, continuing his work on the Herculaneum scrolls as a Getty Conservation Institute Scholar at The Getty in Los Angeles, California.

p. 24: Seth Parker oversees the day-to-day aspects of software development and works with students to plan and implement technical goals. He has been with the project since 2012 and is currently pursuing a master's degree in computer science at UK.

pp. 26-27: Last spring Edward received the H. Alex Romanowitz Memorial Award for Academic Excellence. The recipient of the award is chosen by the electrical engineering faculty, who select an academically deserving undergraduate student with advanced standing in electrical engineering.

pp. 38-39: It was a busy summer. In addition to WiE Camp, the college launched two new camps: Creating Advancement Through STEM (CATS) Camp for underrepresented minority students and the Dean's Academy Weekend for high-achieving high school students.

p. 43: Suzanne Smith will be inducted into the Kentucky Aviation Hall of Fame November 16 at the Aviation Museum in Lexington.

p. 45: "Look aspirational," they said.

p. 48: Elaine Duncan was inducted into the college's Hall of Distinction in 2000.

Back Cover: One of the more epic move-in days. The temperature reached 95 and the heat index hit triple digits. That didn't faze civil engineering major Raven Overall, who welcomed new and returning students with her infectious smile.

GIVING BACK

USE YOUR IRA TO MAKE A SIMPLE AND TAX-SMART GIFT

There is a simple and tax-smart way for you to make annual gifts to the University of Kentucky. By making a direct transfer from your individual retirement account, this charitable IRA rollover gift can satisfy all or part of your required minimum distribution for the year, lower your adjusted gross income and possibly reduce your tax liability.

HOW IT WORKS

- You must be 70 1/2 years old or older at the time of your gift.
- You may transfer up to \$100,000 tax free directly from your IRA to UK.
- Notify your IRA administrator that you wish to send a portion or all your required minimum distribution to the University of Kentucky for its general purposes or to benefit a particular UK college, program or fund.
- Ask your broker to let us know that the gift has been distributed from your account. Checks from the broker do not always include donor-specific information and designation instructions.

Gordon "Stonie" Glenn (BSME 1970) recently took advantage of the charitable IRA rollover gift to create a new scholarship.

"I love giving back to the College of Engineering. When I learned that I could change a life through a scholarship simply by utilizing the charitable IRA rollover, I signed up immediately."

FOR MORE INFORMATION: (859) 257-7886; giftandestate@uky.edu; plannedgiving.uky.edu





College of Engineering
Office of the Dean

351 Ralph G. Anderson Building
Lexington, KY 40506-0503



**ENGINEERING LIVING LEARNING
PROGRAM (ELLP) MOVE-IN**