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KENTUCKY ENGINEERING JOURNAL

Spring 2016

Joe & Joani Halcomb

are transforming biomedical engineering at UK with a $7 million gift

UK Paducah chemical engineering junior Chandni Joshi prepares the UK Paducah Biodiesel Pilot Plant for a batch run. The plant is designed to convert spent cooking oil into biodiesel suitable for various diesel engines. The purpose of the plant is to give students hands-on experience with industrial equipment and process controls.

Message from the Dean

Shortly after I became dean in 2012, I set an ambitious goal: that the University of Kentucky would have a top 50 college of engineering by 2020. Everything we do springs from that goal. We work hard with the hope that our effort will make a difference.

But planning and striving can only take us so far. That is why when alumnus Joe Halcomb and his wife, Joani, agreed to make a $7 million gift that will transform the Department of Biomedical Engineering, I was elated. Their gift, coupled with a few other game-changing projects that will be announced soon, gives me the highest confidence that we are on the right track.

In this issue, I am pleased to announce the F. Joseph Halcomb III, M.D. Department of Biomedical Engineering—the first named department at UK. I hope you will celebrate this momentous occasion with us and continue to envision an exciting future for the college.

Sincerely,

John Y. Walz
Dean

CORRESPONDENCE AND CHANGE OF ADDRESS
University of Kentucky
College of Engineering
251 Ralph G. Anderson Building
Lexington, KY 40506-0503
(859) 257-9395
alumni@engr.uky.edu

FRONT COVER
Joe and Joani Halcomb are graciously giving $7 million to the Department of Biomedical Engineering.

UNIVERSITY OF KENTUCKY
College of Engineering

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APPRECIATE & ACCELERATE

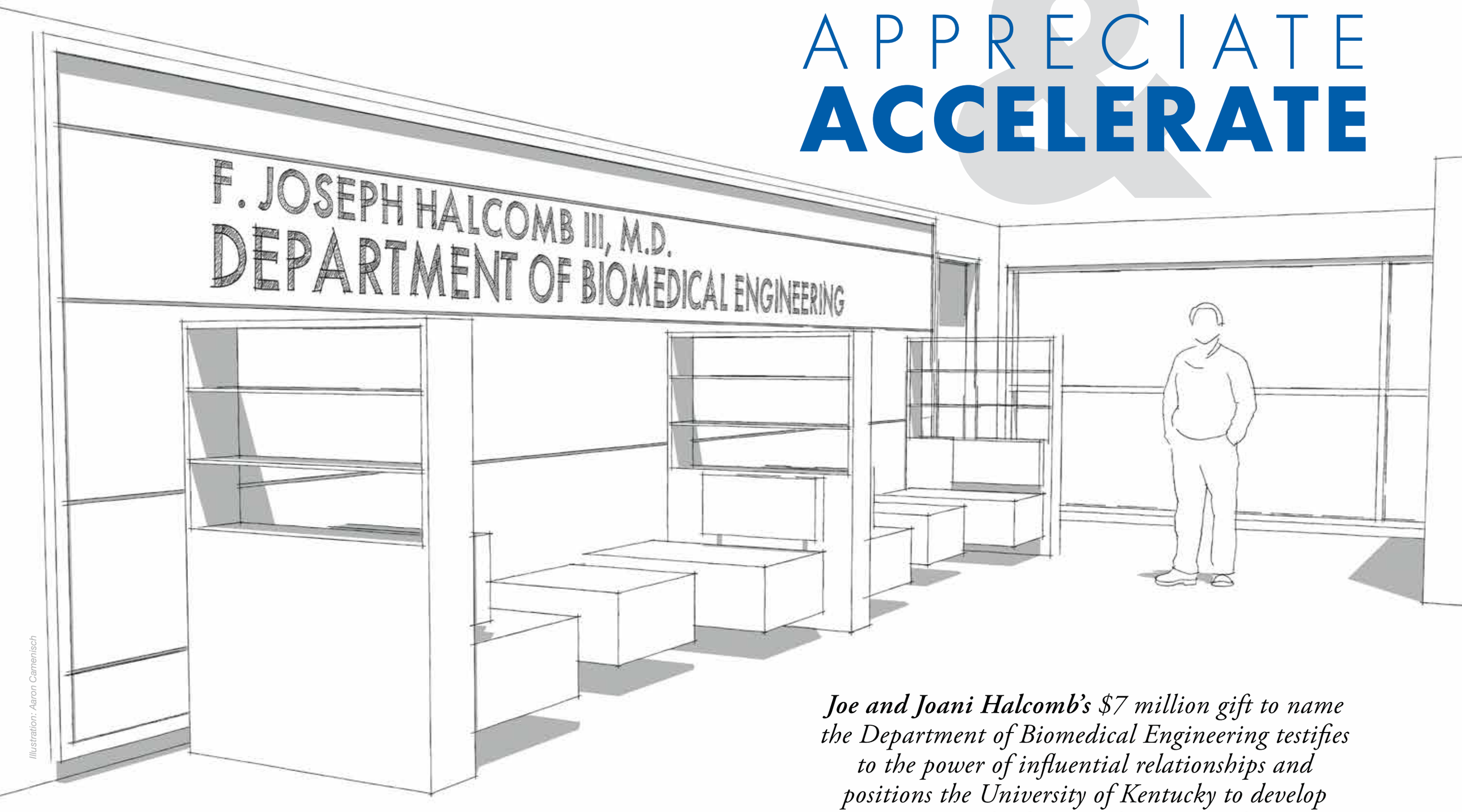
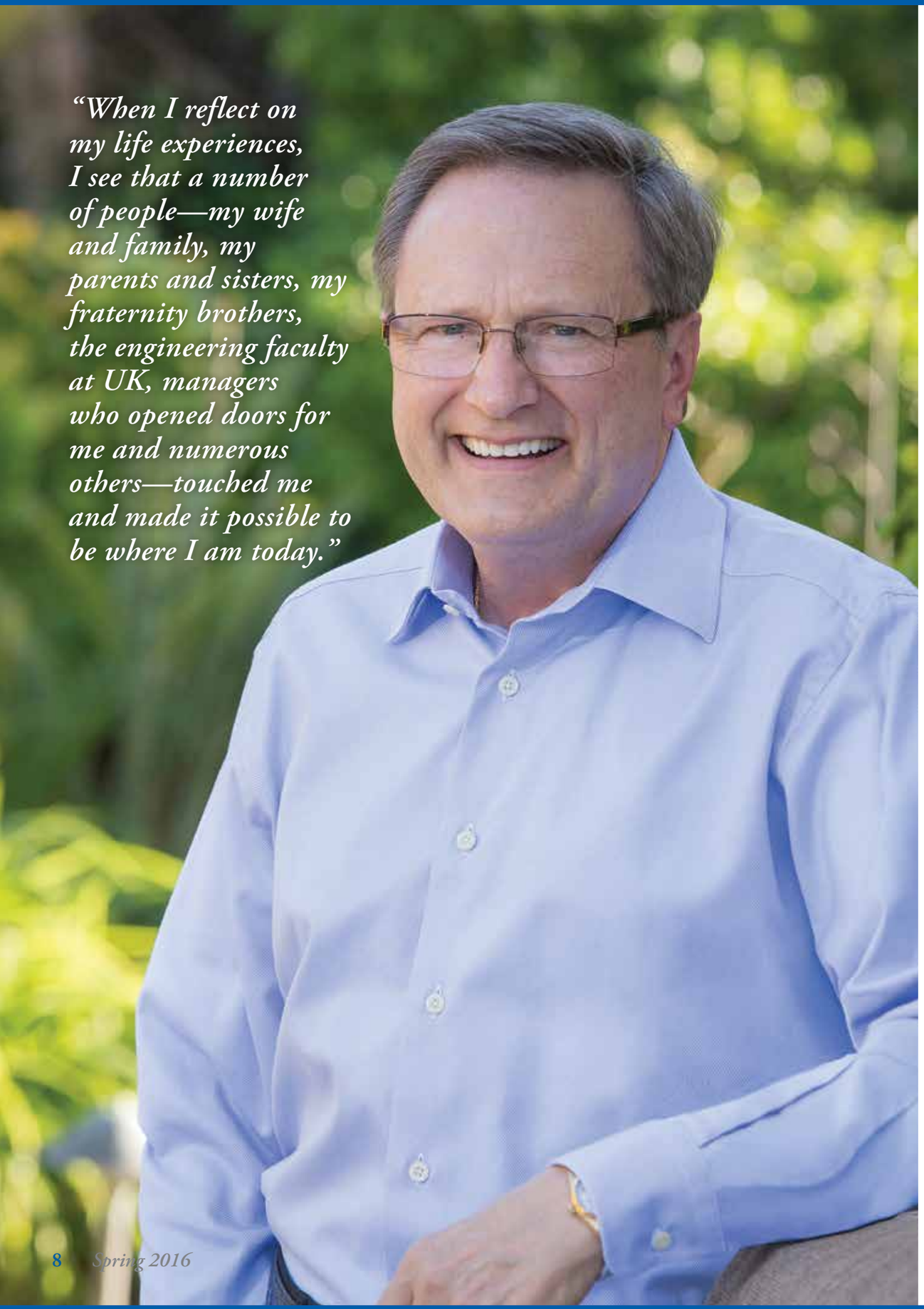


Illustration: Aaron Camenisch

Joe and Joani Halcomb's *$7 million gift to name the Department of Biomedical Engineering testifies to the power of influential relationships and positions the University of Kentucky to develop tomorrow's leaders in a booming industry.*



On a mid-February afternoon that surprises even longtime southern Californians with its mid-80s heat, Joe Halcomb tells stories. All of his anecdotes share a common denominator, and that is that none of them are really about him; rather, they are about the people who helped him get to where he is today. So when he is asked the burning question, *Why are you making this gift to the college?* Joe naturally turns the narrative to Father Ed Murray.

Father Murray's earthly service came to a close several years ago, but as Joe shares one of the most pivotal moments in his life, the long-time hospital chaplain is present in the way only gifted storytellers make possible: how he and Joe hit it off during Joe's first year of his residency; how they shared a love of corny jokes and joyfully inflicted them on patients; how he consoled Joe when the pressures of residency life threatened to consume him.

And finally how Joe and his wife, Joani, found themselves short of funds to move to Boston where Joe was set to begin a master's program at MIT and Father Murray appeared on their doorstep holding a thick envelope stuffed with $20 bills.

"I have something for you and I want you to use it," he said, handing Joe the envelope.

Stunned but grateful, Joe promised, "I don't know how I'll ever pay you back, but I will."

"No," Father Murray replied. "You will do this for somebody else one day."

Over many years and through many different philanthropic channels, Joe and Joani have fulfilled Father Murray's proclamation; but with their gift to name the Department of Biomedical Engineering, they have exceeded anything the humble chaplain could have envisioned.

> *"Faculty members should never let go of the possibility that they are making a tremendous impact on their students."*

The F. Joseph Halcomb III, M.D. Department of Biomedical Engineering is the first named department in the College of Engineering and at the University of Kentucky. The impact upon a program that has only existed for 30 years is seismic. Established in 1985, the Center for Biomedical Engineering resided within the Graduate School before joining the college in 2010. In 2013, it became an official department. Now, the Halcombs' $7 million naming gift will add one endowed chair and two endowed fellowships to a faculty of eight—a 27% increase. Additionally, the Halcomb Family Graduate Fellowships in Biomedical Engineering will add fully-funded graduate fellowships to attract top graduate students and support their research. Dean John Walz says this first-of-its-kind gift taps into one of the hottest engineering growth areas available to graduates.

"Engineering technology has been responsible for huge advances in modern medicine. From implanted devices to prosthetics to regenerative tissue, biomedical engineers improve the well-being of those with significant health care needs. The Halcombs' naming gift will ensure we provide the best education and training opportunities available to the students in this flourishing program."

After 30 prosperous years in the medical device and biotechnology industries, Joe knows the demands facing today's graduates and what is required in order to succeed. By the mid-1980s, he was vice president for product development for Zimmer's Orthopedic Implant Division, leading the development of joint replacement implants that revolutionized the industry. In the early 1990s, he was senior vice president of operations and later president at Zimmer's Hall Surgical Division, the

world's leading supplier of powered surgical instruments. He later joined Amgen, a biotechnology pioneer, and helped launch three new products with breakaway potential, generating incremental revenue and expanding Amgen's reach to millions of patients around the world. Joe's success and extensive knowledge of the industry give him a unique perspective on the potential of the Department of Biomedical Engineering.

"There are only seven or eight schools in the U.S. where medicine, engineering, pharmacy, dentistry and a first-rate hospital are within walking distance of each other and UK is one of them," he explains. "The possibilities for interdisciplinary research connected to biomedical engineering are unbelievable. There's no excuse for not collaborating!"

Joe was inducted into the College of Engineering's Hall of Distinction in 2014. The honor is reserved for engineering alumni who have demonstrated distinguished professional accomplishments, outstanding character and commitment to community service; yet, as his Father Murray story reveals, Joe credits his success to the generosity and encouragement of others.

"When I reflect on my life experiences, I see that a number of people—my wife and family, my parents and sisters, my fraternity brothers, the engineering faculty at UK, managers who opened doors for me and numerous others—touched me and made it possible to be where I am today," he says humbly. "They are the reason why I can even consider giving something back."

Two giants who nurtured Joe's interest in combining engineering and medicine were professors James F. Lafferty and Charles F. Knapp. A contrast of personalities, the serious-minded Lafferty complemented Knapp's effusive energy. Lafferty quietly encouraged Joe's enthusiasm and involved him in the Wenner-Gren Research Laboratory's transition from missile development to work with living systems. Knapp told stories.

"I have at times reminded Dr. Knapp of stories he shared in class and he'll laugh and say he doesn't remember telling them; but I remember. I couldn't get enough," Joe reminisces. "Faculty members should never let go of the possibility that they are making a tremendous impact on their students. He didn't know it at the time, but he was speaking on my frequency."

> ***"What I want to see more than anything else is that students in the biomedical engineering program make a difference in patients' lives."***

As much as past friends and mentors factor into the Halcombs' naming gift, Joe also points to present relationships. He serves on the College of Engineering's Dean's Advisory Council and supports the college's goal to make UK a top 50 college of engineering. When it comes to UK President Eli Capilouto, Joe speaks with emotional depth.

"I had not known President Capilouto for a long time, but when my dad passed away, he drove to Scottsville, Ky., for the funeral. Now and then he calls to see how I am doing. He doesn't have to do those things; he does them because that's just who he is. The university has a secret weapon and he's not on the basketball team," Joe jokes. "His name is Eli Capilouto."

"Joe speaks eloquently of how his life was changed by the generosity and mentorship of others. Through his gift, he is having the same impact on the UK family," said President Capilouto. "His support for the College of Engineering and the biomedical engineering department is not about today, it's about tomorrow – it's about the future students, faculty and staff served by his philanthropy and the lasting impact they will make on the people they serve across the Commonwealth."

Joe and Joani Halcomb have been married nearly 42 years and live in Camarillo, Calif. Their daughter, Allison, and her husband Jim, have four children: Reese, Autumn, Brit and Jillian Fessenden. They live in San Diego. Their daughter, Alyssa, and her husband, Lt. Michael Shaughnessy, also live in San Diego.

If Joe has one predominant hope for this naming gift it is that patients will be served. His father, a rural southern Kentucky physician, brought his young son on his rounds. As Joe envisions it, the naming gift will serve the very students and faculty whose innovations will improve the lives of patients in Kentucky and beyond.

"What I want to see more than anything else is that students in the biomedical engineering program make a difference in patients' lives. It would thrill me if their advances in research lead to the development of products with clinical applications. Think of the impact: students get a head start on their careers, people with debilitating medical issues are helped and UK enlarges its reputation within the biomedical engineering industry. My mission is to give back from what I have been given and I believe this gift will accelerate the program in ways that will multiply over many decades and lifetimes."

Thus, inspired by the good doctor's own vision, the University of Kentucky College of Engineering is pleased to announce the F. Joseph Halcomb III, M.D. Department of Biomedical Engineering: where tomorrow's leaders in biomedical engineering come to achieve their dreams. KEJ

WHAT THIS ENDOWMENT WILL DO

The Halcombs' naming gift will create endowed faculty positions, graduate fellowships and a lecture series. Here are the components of the agreement:

1. **F. Joseph Halcomb III, M.D. Chair in Biomedical Engineering:** an endowed chair that will attract faculty with notoriety in their area of research and enhance the college's reputation.
2. **Halcomb Family Department of Biomedical Engineering Program Fund:** discretionary funds to provide faculty training, purchase upgraded equipment and capitalize upon unanticipated opportunities that advance the department's mission.
3. **Charles F. Knapp and James F. Lafferty Faculty Fellowships in Biomedical Engineering:** two faculty fellowships to attract junior faculty who demonstrate promise in strategic areas.
4. **Halcomb Family Graduate Fellowships in Biomedical Engineering:** four fully-funded graduate fellowships designed to attract top graduate students who can take faculty research to a new level.
5. **Halcomb Fellowship in Medicine and Engineering:** fellowship available to students in engineering or medicine.
6. **Lecture Series in Biomedical Engineering (currently untitled):** endowed lecture series that will bring renowned faculty to the UK campus for interaction with faculty and students.

RANGE OF MOTION

*Computer science professor **Ruigang Yang** has forged a brilliant academic career through groundbreaking research in 3-D modeling. Now, he's taking his models to the market.*

Ruigang Yang has 3-D modeled everything from faces to flower petals to running water. "One of my colleagues jokes that I open a dictionary and ask, 'Can we model this? No. Has anybody done this? No, but it's doable, so let's do it!'"

It is the summer of 2009. Ruigang Yang is enjoying the three month respite between semesters as a visiting professor at Microsoft. One day, technicians familiar with Yang's papers on computer vision, computer graphics, image processing and multimedia burst into his office. They want his opinion on a project they have in development and the way they comport themselves tells Yang it's something big. As they talk, he realizes they are pitching a new kind of motion tracking device—one that relies on a single low-cost camera. The device will be called the "Kinect."

Microsoft will sell 8 million units during its first 60 days on the market.

As the fall semester commenced, Yang pondered the Kinect's possibilities. Microsoft had developed it as a way to enhance their gaming experience; but what else could such a device do? Could the technology be employed for purposes unrelated to gaming and what would need to be different?

"I shared this idea with my students: these interesting new low-cost cameras—what can we do with them?" Yang recounts. "One of my students got a motion tracking algorithm running and I started looking for collaborators across campus interested in the idea of using a single camera to track motion."

That is how Yang began an ongoing project with Brian Noehren, associate professor of physical therapy in the College of Health Sciences, and Robert Shapiro, professor of kinesiology in the College of Education with a joint appointment in the Department of Biomedical Engineering. Since 2012, the team has endeavored to create a low-cost, high-accuracy motion tracking device that physicians and physical therapists can use in their office, in rural areas, at injury sites—virtually anywhere. In particular, Yang says, they want to enable physical therapists to determine the rehabilitation effectiveness of anterior cruciate ligament injuries.

"Right now physical therapists don't really have a way to quantify outcomes for their patients. If we can give them a low-cost device that lets them measure and say, 'Okay, last time you could bend your leg only five degrees, but today's measurement shows you can bend it 10 degrees,' then they can demonstrate quantifiable improvement. That is important for their work with patients, but also gives them something to show insurance companies that are moving toward outcome based reimbursement models."

Relying on Noehren and Shapiro's expertise, the team has identified 72 distinct markers on the human body that signify joints for motion tracking. When an individual is scanned, the 72 points are plotted automatically, giving the team an anatomically correct map of his or her body; and because timing is everything, the software operates at 10-15 frames per second which generates a whole 3-D motion model in seconds.

"What we have built is a low-cost motion tracking capture system that works in real time," Yang says. "Our algorithm is the best in the published literature and the device is more accurate than if we were to use the tracking software provided by Microsoft for the same purpose. The feedback has been very positive."

Although Yang is a full professor at UK, has won a National Science Foundation CAREER Award and his research was cited over 1,700 times just last year, he has never developed a product for the market. His extensive contributions to the field of 3-D modeling and sensing, which are often consulted by product developers, are mostly found in technical papers. But thanks to Noehren, Shapiro and funding through the NSF, their motion tracking device is closer to becoming a reality.

"This collaboration has been quite different from writing a paper," Yang laughs. "I have done a number of research projects and published papers in some of the best journals, but this is the first time I have tried to make a product that would potentially be used by hundreds of thousands of people. It is a new and exciting venture for me." KEJ

Photo: Courtesy of the FBI

SIGNAL TO NOISE

***Carey Buxton's** personal determination and love for her country has led to a thriving career where she had never thought to look for one: the Federal Bureau of Investigation.*

"There just aren't many girls in engineering."

"Have you thought about being a math teacher instead?"

"It will be harder to find a husband and have children if you are an engineer."

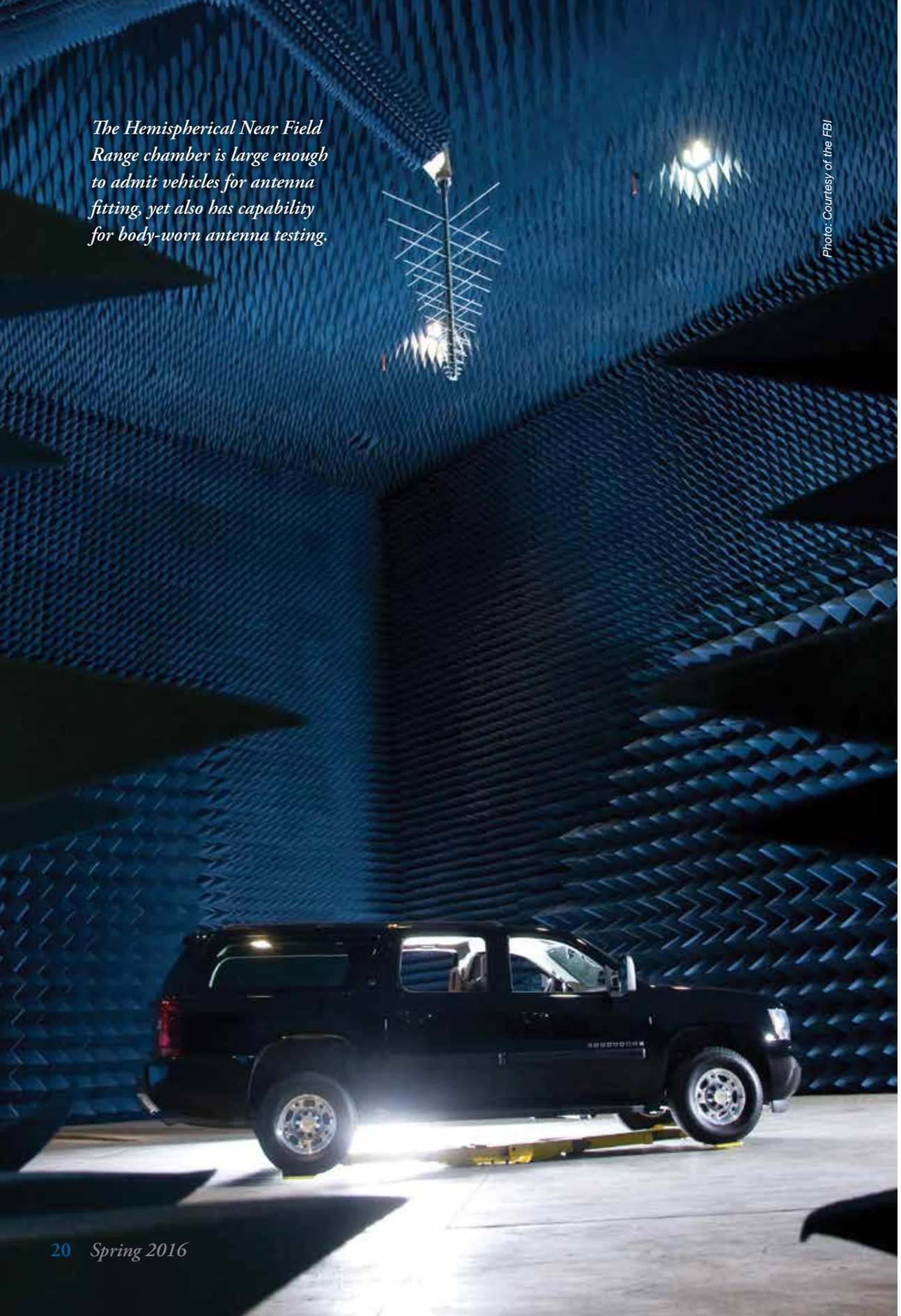
"Women don't do well in engineering."

We begin Carey Buxton's story here—with echoes of kind yet dispiriting advice that emanated from friends and guidance counselors whenever Carey floated the idea of majoring in engineering. In recent years, programs aimed at increasing opportunities for girls interested in engineering have grown. STEM camps, engineering open houses, in-class experiments and demonstrations, as well as private and government-backed programs like Project Lead the Way, are making it easier for girls of all ages to envision themselves as engineers. But that support wasn't available when Carey's enthusiasm was met with bleak prophecies of failure and loneliness; fortunately, she countered resistance with steely resolve.

"I probably would have liked being a math teacher," Carey admits, "but I took the negativity as a challenge. I was determined to prove that I could be an engineer and not compromise anything that was important to me."

Carey, who has been married for 23 years and has two daughters, is program manager of the FBI's Antenna Systems Development Facility. When it comes to government expertise on antennas, she is literally it. As a science and technology fellow for the Director of National Intelligence, Carey is an authoritative expert on antennas for the entire U.S. government.

The daughter of a horticulture professor in the University of Kentucky's College of Agriculture, Food and



The Hemispherical Near Field Range chamber is large enough to admit vehicles for antenna fitting, yet also has capability for body-worn antenna testing.

Photo: Courtesy of the FBI

Environment, Carey aspired to teach engineering at a research institution. In addition to her master's degree studies in electromagnetics and later her doctoral work in antenna design at Virginia Tech, Carey studied effective teaching methods. To this day, her colleagues joke, "If you ask her how something works, be careful what you ask for; she's going to tell you exactly how it works." After earning her Ph.D. in the summer of 2001, Carey and her husband, Charlie, welcomed their first daughter into the world. She was well on her way to realizing her family and career dreams. And then…

"9/11 happened," Carey says quietly. "We were sitting on the couch with our six week-old daughter, watching the towers burn and fall. That's when Charlie suggested we look into ways we could use our education to contribute to the nation's security. After doing some research, I discovered the government was building an advanced facility for antenna research but didn't have anyone formally trained to run it. When they asked if I thought their design could work, I said, 'Absolutely, and if the contractor can't make it work, I'll make it work.'"

> *"I was determined to prove that I could be an engineer and not compromise anything that was important to me."*

It was a monster of a job. Building a program is one thing, but Carey was charged with overseeing the actual construction of the $10 million Hemispherical Near Field Range facility. That meant on-the-fly learning about government contracts, government funding, construction and a host of other things that had nothing to do with electrical engineering—in addition to designing and building antennas. Before long, Carey had to make good on her promise to "make it work" when the contractor couldn't write codes that worked.

"Thankfully, I had taken a series of courses on numerical electromagnetics that UK offered, so I wrote the codes myself," she recalls. "It turned out to be one of the best things to happen within our program because now we have an in-house code we can modify as needed."

The cavernous Hemispherical Near Field Range chamber is a unique resource for the U.S. government. Festooned with perforated cones that muffle sound, it is large enough to admit vehicles for antenna fitting, yet also has capability for body-worn antenna testing. Since antenna expertise and equipment are rare and expensive investments, Carey stewards the facility's resources in order that knowledge, designs and materials may be shared in a collaborative environment that represents each entity within the U.S. government. Even law enforcement entities from other countries utilize the facility.

"From day one my goal was to turn the Antenna Systems Development Facility into a national resource that is well-recognized for its expertise and support to the U.S. government. I'm proud to say that we've been able to make that happen. When you do things for the right reasons, good things result," Carey says.

Carey has silenced the ghosts of "you can't," but she is taking no chances with her own daughters or the next generation of women engineers. Whether teaching a four-week class at her daughter's school where students build their own Yagi-Uda antennas or getting permission to shut down the antenna chamber for four hours so 28 schoolkids can measure and build antennas, Carey says she loves exposing future engineers to science.

"I tell girls that if they want to be an engineer, they *can* be successful and they *can* have a family if they want one. When I met my future husband, he was glad I was an engineer! I'm happy to be a role model and show girls of all ages what I believed then and I believe now—we *can* do this." KEJ

PANORAMIC VIEW

*From leading a team of Google engineers to marinating in the culture of Peru, **Stephen Parsons**' expansive interests and experiences have prepared him for a new job at Microsoft.*

Senior Stephen Parsons is putting the finishing touches on a double major in computer science and international studies. If that juxtaposition strikes you as odd, you're in good company; Stephen himself has only come across one other student with the same double major and he was stunned to find one. The tandem is unconventional, perhaps, but little about Stephen qualifies as conventional.

For example, after graduating in May, Stephen will begin full-time employment at Microsoft. That sounds normal enough—until Stephen begins describing how he wants to bike from Yorktown, Virginia to Seattle to begin his job. So much for the ordinary.

> *"Theory is interesting, but I find it quite challenging and I prefer to think about problems we can actually solve with technology."*

Then there is the fact that computer science and international studies were Stephen's fourth and fifth majors since enrolling at the University of Kentucky and the previous three—biosystems engineering, physics, chemical engineering—weren't what he originally wanted to pursue in the first place (biomedical engineering). In fact, Stephen admits that a computer science major was a kind of internal compromise, a way to move forward without worrying about missing out.

"I thought that since I was indecisive, computer science's breadth would apply to a number of fields," he laughs. "I don't know why I hadn't originally thought of majoring in it."

However he arrived at it, computer science touches the heart of what most interests him: solving problems with technology.

"That is why I wanted to major in biomedical engineering in the first place," he says. "I get more out of thinking about what we can create that will be useful to people."

International studies, then, complements Stephen's overarching desire to help people in tangible ways by providing insight into the dynamics of developing nations and poorer communities. On-the-ground stories about such needs prompt Stephen to consider ways technology can intervene; thus, the two disparate majors reinforce each other in inspiring and challenging ways.

Stephen's specific interest in Latin America has roots in his participation in a Spanish Immersion Program that plunged him into the Spanish language from the time he was in kindergarten. Over 12 years, half of Stephen's classes were taught in Spanish and class trips took him to Costa Rica and Spain. As he planned his coursework for his senior year at UK, he saw that the door was open for another trip abroad, this time to Cusco, Peru.

"Peru is smaller than Alaska, yet you don't have to go far to see amazing biological and geographical diversity. Ocean coastline, mountain ranges, jungles—Peru has all of it," Stephen summarizes.

Although the program put Stephen with 25 other Americans—which created a more encapsulated experience than Stephen thought he would have preferred—he found plenty of time to explore the people and places of Peru. He stayed with a Peruvian family and spent off days getting to know locals, including an instrument shop owner who allowed Stephen to come in a few mornings each week to build his own ten-stringed instrument called a charango. To return the shop owner's kindness, Stephen helped him get his phone and computer connected to the Internet.

As Stephen looks ahead to launching his career at Microsoft, he not only has an international study experience under his belt, but also an internship at one of the most recognizable tech brands in the world: Google. The summer before leaving for Cusco, Stephen

Stephen holds a ten-stringed instrument he built in Peru called a charango. Thanks to a book his brother gave him for Christmas, Stephen is attempting to play it.

received a product management internship at Google's San Francisco office.

"I was looking for software development internships on Google's website and stumbled across the product management internship, which I had never even heard of," Stephen explains. "But it excited me because of my interest in how we apply technology. As a product manager, I was on a team of engineers working on the Google Maps desktop interface; but whereas they spent their time coding, I would set a vision for the product, determine what problems were important, defend it with data and define solutions. It is a totally different focus than what the engineers are doing, and I was fascinated by the opportunity to think about those kinds of problems all the time."

> ***"Imagine streamlining systems so that the public could navigate forms and processes as easily as they do most areas of the Internet."***

Stephen will fulfill a similar role when he arrives at Microsoft this summer. If he continues to enjoy immersing himself in the big picture questions pertaining to products, Stephen says he envisions applying technology to government and civil systems.

"Long-term I would like to get involved in something similar to Code for America and work with local governments to make their services more accessible to the public. Imagine streamlining systems so that the public could navigate forms and processes as easily as they do most areas of the Internet; I would like to be a part of that." KEJ

IN THE SPOTLIGHT

Lindsey Gillaspie:
Junior,
Computer Engineering

Of the 215 computer engineering majors in the college, only 20 are female. That doesn't bother Singletary Scholar Lindsey Gillaspie; she loves the flexibility the major offers and frequently toggles between computer engineering and computer science interests. Last summer, Lindsey wrote code as a positron emission tomography (PET) scan reconstruction specialist for GE Healthcare in Milwaukee. She says her engineering education enabled her to absorb a steady stream of information quickly. The current president of UK's Society for Women Engineers, Lindsey strives to be a role model for young women interested in engineering. She is one of the college's Ambassadors, engineering students who meet with prospective engineering students to share their University of Kentucky experience. Lindsey says the question most frequently asked by students and parents is: "Is engineering as hard as it seems?" Her reply? "If you like it, it won't be."

J. Zach Hilt:
William T. Bryan Professor,
Department of Chemical and Materials Engineering

On April 4, the American Institute for Medical and Biological Engineering (AIMBE) inducted J. Zach Hilt to its College of Fellows. Membership in the College of Fellows consists of the top two percent of medical and biological engineers in the country. Hilt was elected by peers and members of the College for pioneering contributions to bionanotechnology, specifically the development of nanocomposite hydrogels as remotely controlled biomaterials and analyte-responsive drug delivery systems. The formal ceremony took place during AIMBE's 25th Annual Meeting at the National Academy of Sciences Great Hall in Washington, DC. Hilt is a three-time winner of the department's outstanding teacher award and is also the faculty advisor for the American Institute of Chemical Engineers (AIChE) student organization. He joined UK in 2004 after receiving his Ph.D. from The University of Texas at Austin.

Gail Brion:
Chellgren Endowed Professor,
Department of Civil Engineering

Gail Brion was recently named a Chellgren Endowed Professor with a stipend to facilitate undergraduate research and curriculum development. Chellgren Endowed Professors are expected to maintain an active research program in their discipline, teach courses in one of the university's programs of excellence or within their college or department and direct a specific project intended to advance progressive reform of undergraduate education. Director of the Environmental Research and Training Laboratories (ERTL) since its inception in 2002, Brion was recently awarded an NSF research grant titled, "EAGER: The Role of Engineered Systems in Adaptation of Staphylococcus Aureus," and is working on a plan to provide research experiences to a wide variety of undergraduate students. She has specialized in areas pertaining to environmental engineering since joining the Department of Civil Engineering faculty in 1995.

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 2016

INDUCTED APRIL 15, 2016

JACKIE J. BRYANT

M.S. in Computer Science, 1990

Retired Colonel Jackie J. Bryant is strategic communications officer for the 7th Signal Command of the United States Army. Since 1990, Colonel Bryant has played a significant role in all facets of the Army's communications. As chief of staff for the Signal Center, Bryant's expertise enabled him to manage an annual budget of $125 million, including $85 million in contracts. Prior to that role, he served as chief of the Joint Warfighter Division, where he directed four branches responsible for providing C4 support to U.S. Army Forces Command units consisting of 85 percent of the total Army Force and identified signal resources for Operation Enduring and Iraqi Freedom. Bryant earned 14 different honors and accolades during his distinguished military career.

GREGORY R. CARMICHAEL

M.S. in Chemical Engineering, 1976; Ph.D. in Chemical Engineering, 1979

Gregory R. Carmichael is the Karl Kammermeyer Professor of Chemical and Biochemical Engineering at the University of Iowa. In his 37-year career at the University of Iowa, Carmichael has become a leading authority in the areas of environmental engineering, atmospheric science and air quality through numerous research initiatives, publications and awards. A prolific author whose reputation has led to over 12,000 citations, Carmichael's curriculum vitae boasts approximately 340 career publications, as well as six books and monographs. In addition to his own writing, Carmichael has been a longtime editorial board member of four academic journals. Carmichael is a fellow of AIChE and was the 2012 recipient of the AIChE Lawrence K. Cecil Award.

C. GREGORY HARPER

B.S. in Mechanical Engineering, 1987

C. Gregory Harper has spent his entire 29-year career in the energy sector. Currently president of gas pipelines and processing for Enbridge, Inc., operator of the world's longest and most sophisticated crude oil and liquids transportation system, Harper is responsible for all natural gas and natural gas liquids activities in North America including its significant presence in the deepwaters offshore in the Gulf of Mexico. In addition, he is principal executive officer for Midcoast Energy Partners, which serves as Enbridge's primary vehicle for growing its natural gas and natural gas liquids midstream business in the United States, and is president of Midcoast Holdings, LLC. Prior to joining Enbridge, Harper spent 20 years with Duke Energy; then, as group president of CenterPoint Energy.

LISA MARIE MAXSON

B.S. in Computer Science, 1989

Lisa Marie Maxson is the founder and managing partner of 10x People, a company that specializes in software development of products and services as well as training in 10x methodology. Maxson's first company, Telecom Software, became a key player in phone number portability and her original industry interface specification is still in use today. In 2004, Maxson founded Transydian, which provided custom software development of telecommunications systems. Eighty percent of all production systems to date utilize Transydian software for communication of ported number routing data. In 2013, Maxson spun Transydian into 10x People, which provides software development framework and test tools products that support continuous repeatable automated testing.

DAVID B. RATTERMAN

B.S. in Mechanical Engineering, 1968

David B. Ratterman is a member of the Construction Service Group at Stites & Harbison PLLC. A general construction law expert specializing in the fabricated structural steel industry, Ratterman has developed a national legal practice and advanced the study and practice of construction law in the United States. He has also become an internationally recognized writer and speaker on a wide variety of legal and engineering topics. Ratterman has been lead trial counsel for numerous contractors, design professionals, material suppliers and construction owners involved in complex matters of litigation, arbitration and construction mediation. He is a Life Fellow of the American Bar Foundation, and a Fellow and former Governor of the American College of Construction Lawyers.

ROBERT E. SHAVER (Posthumous Induction)

B.S. in Civil Engineering, 1927; M.S. in Civil Engineering, 1931

Over 37 years as professor, program director and dean, Robert E. Shaver made immeasurable contributions to the University of Kentucky College of Engineering. After serving as a professor from 1931-1957, Shaver became dean of the UK College of Engineering in 1957. During his nine-year tenure, Shaver made numerous improvements to the college's infrastructure and quality of education. He took steps to rebuild the curricula and upgrade the academic standards of the college. He introduced new scholarships as well as a course in nuclear engineering for upperclassmen. Shaver also initiated the construction of the $2.25 million F. Paul Anderson Tower, which essentially doubled the capacity of the college through new classrooms, laboratories, offices and a library.

College Dedicates Asit K. Ray Student Commons

A new student commons named after Asit K. Ray, longtime University of Kentucky chemical engineering professor who passed away in November 2014, opened January 15 in F. Paul Anderson Tower. A nearly 1,850-square-foot area was renovated into a new student study, teamwork and computer laboratory space primarily for chemical engineering and materials engineering undergraduates. With mobile workstations and comfortable seating, the space is especially fit for teamwork activities related to undergraduate engineering laboratories and teaching assistant office hours and tutoring.

Professor Ray, who dedicated his career to teaching and researching aerosols, received his doctoral degree from Clarkson University in 1980 and became assistant professor of chemical engineering at UK shortly afterward. From 2007-2012, he held the William T. Bryan Professorship in the Department of Chemical and Materials Engineering. In 2003, he received the UK College of Engineering's Henry Mason Lutes Award for Excellence in Engineering Education.

Funding for the Asit K. Ray Student Commons came from a former student of Ray's, Michael Marberry, president and CEO of J.M. Huber Corporation. Marberry graduated from UK with his bachelor's degree in chemical engineering in 1981 and his master's degree in 1983. He was inducted into the UK Engineering Hall of Distinction in 2005.

"I can't think of a better way to honor Dr. Ray's memory than with the student commons," Marberry said. "I feel undoubtedly that he would be pleased by it, not for the recognition itself, but for the fact that it's associated with something so important, the life of the students here in the engineering college."

Jacobs, Payne Receive NSF CAREER Awards

Earlier this year, computer science professor Nathan Jacobs and chemical engineering professor Christina Payne each earned prestigious CAREER Awards from the National Science Foundation. The CAREER Award is one of the NSF's highest awards and it supports junior faculty who "exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations."

Nathan Jacobs, Ph.D.
Assistant Professor of
Computer Science

Christina Payne, Ph.D.
Assistant Professor of
Chemical Engineering

Billions of geotagged and time-stamped images are publicly available via the Internet, providing a rich record of the appearance of materials, objects and scenes across the globe. These images are a largely untapped resource that could improve our understanding of how the world changes over time. Jacobs' research seeks to extract useful information from this imagery and fuse it into high-resolution global models that capture geo-temporal trends. His proposal presents a unified research, education, outreach and collaboration plan that will fill many important gaps in this area.

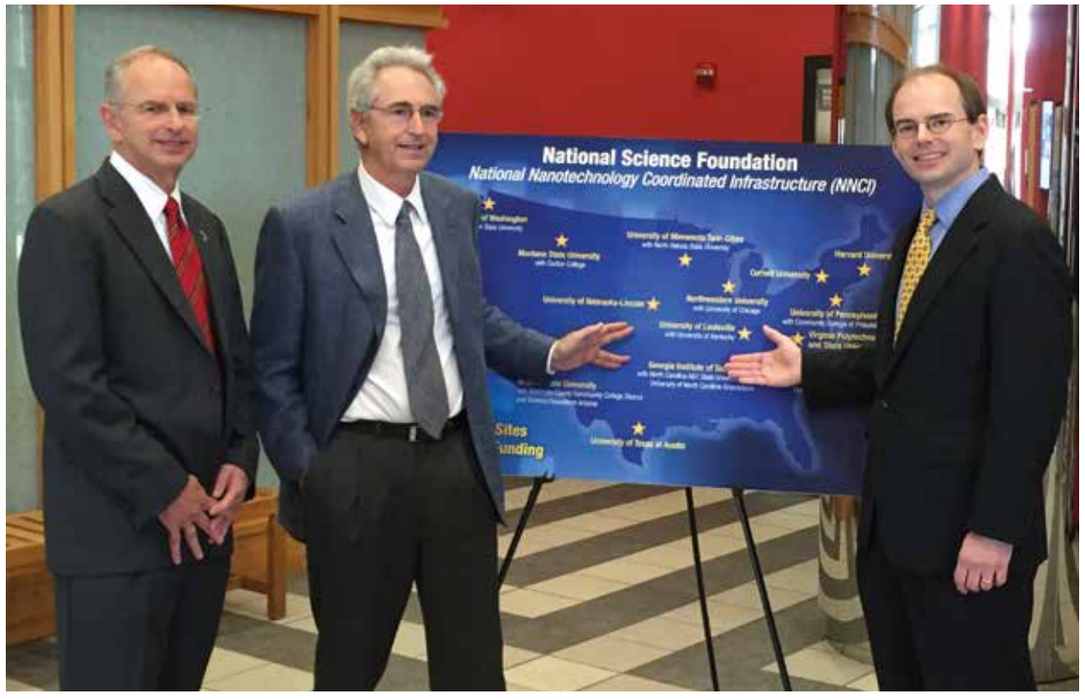
Jacobs said, "I am excited about the proposed research and its potential impact on a broad range of applications, from environmental monitoring to education. This award will make it possible for me to make important advances in research and education for many years to come."

Jacobs received his Ph.D. from Washington University in Saint Louis in 2010.

Glycoside hydrolases are enzymes responsible for breaking down crystalline biomass such as cellulose or chitin. The most efficient glycoside hydrolases are capable of processive hydrolysis (or processivity), where the enzyme repeatedly cleaves the covalent bonds that hold the biomass material together. Payne's research will focus on developing a molecular-level understanding of the mechanisms governing glycoside hydrolase processivity through molecular modeling and thermodynamic calculations backed by experimental biochemical characterization.

Payne said, "I am thrilled to have this opportunity. Ultimately, this research will enable us to identify thoughtful strategies to improve enzyme efficiency, and accordingly, the economics of biofuels. I cannot imagine a more exciting way to contribute to the solution of a global problem."

Payne received her Ph.D. from Vanderbilt University in 2007.



UK, UofL Win Large Federal Grant, Join New National Nanotechnology Network

In September, the University of Kentucky and University of Louisville announced a $3.76 million grant to create a national center of excellence in micro/nanotechnology. The highly competitive grant from the National Science Foundation was one of just 16 awarded to universities across the country.

The two universities are joining a new national network which will make university facilities, tools and expertise in nanoscale science, engineering and technology available to outside users.

Eight key nanotechnology and advanced manufacturing facilities at UK and Louisville will provide a collaborative center for academia, small businesses and industry to "build miniature solutions for applications in healthcare, energy, security and beyond," said Todd Hastings, director of the UK Center for Nanoscale Science and Engineering and Reese S. Terry Professor in the Department of Electrical and Computer Engineering.

The five year grant will be used to:

- Enhance and upgrade advanced manufacturing equipment at UK and UofL research facilities.
- Add staff to help train and support up to 500 additional external users.
- Provide seed money for research projects in key advanced manufacturing areas.
- Engage more minorities and women in nanoscale science, engineering and technology.

Cutts Receives Honorary Doctorate of Engineering

Matt Cutts (left), pictured with Department of Computer Science chair W. Brent Seales, received an Honorary Doctorate of Engineering during the December commencement ceremonies.

Cutts, a Singletary Scholar from Morehead, Ky., graduated with bachelor's degrees in 1995 in computer science and mathematics. He was one of Google's first 100 employees and his leadership resulted in safer web searching for families and children, improved ranking schemes and "search encryption."

In Other News...

- James F. Hardymon Chair in Manufacturing Systems and Institute for Sustainable Manufacturing director I.S. Jawahir was announced as the winner of the William Johnson International Gold Medal. The selection made Jawahir the first researcher from the United States to receive the award.
- Raymond-Blythe Professor in Civil Engineering and Director of the Kentucky Water Resources Research Institute Lindell Ormsbee was the 2016 recipient of the Julian Hinds Award. The honor recognizes significant achievements that advance engineering in the field of planning, development and management of water resources.
- Alumni Professor and North American Membrane Society president Dibakar Bhattacharyya was the focus of two honorary sessions that took place during the annual meeting of the American Institute of Chemical Engineers in Salt Lake City.
- Computer science professor Judy Goldsmith received a 2016 Computer Research Association Committee on Education Undergraduate Research Faculty Mentoring Award. This national-level award recognizes individual faculty members who have provided exceptional mentorship and guidance in computing.
- Chemical engineering assistant professor Brad Berron was elected to participate in the 2015-16 SEC Faculty Travel Program. The program provides support for faculty to collaborate with colleagues at other SEC member institutions.
- Mechanical engineering assistant professor Alexandre Martin received a $500,000 Early Stage Innovations Award from NASA to improve the software and thermal property models of the Orion spacecraft's heat shield.
- Cato Laurencin, the Albert and Wilda Van Dusen Distinguished Professor of Orthopaedic Surgery, Professor of Chemical and Biomolecular Engineering, Professor of Materials Science and Engineering and Professor of Biomedical Engineering at the University of Connecticut, delivered the annual Dean's Lecture Series talk, "Regenerative Engineering: Innovative Technologies to Answer Grand Challenges."

CLASS NOTES

Louis Withers, BSME 1951, is a retired engineer in Oxnard, Calif. During his career, he worked on nuclear weapons for the U.S. Navy. He also worked for Sandia National Laboratories and Lockheed Aircraft.

Edward Nairn, BSME 1965, is a governing board member of the Highlands Hospital Corp. and Highlands Health System in Prestonsburg, Ky. He was presented the Healthcare Governance Award for his nearly 40 years of dedication to Highlands and the region's medical and health care needs. He is president and corporate officer of Nairn Inc., a building and design company, and was the owner of Elliot Co.

Ed Glasscock, BSCE 1966, is chairman emeritus at the law firm of Frost Brown Todd LLC in Louisville, Ky., where he was the managing partner. He was awarded a 2015 Presidential Medal by University of Louisville President James Ramsey, which recognizes organizations and individuals for advancing the mission of the University of Louisville.

Nicholas Nicholson, MSCE 1973, is the owner of Nicholson Engineering Associates in Brooksville, Fla. He is chairman of the Hernando County Commission and has served on the county's planning and zoning commission and on the Hernando Waterway Restoration Council and the Florida Building Commission.

Robert Patterson, BSCS, 1977, lives in Nicholasville, Ky., and is a retired senior information technology specialist after nearly 31 years with IBM.

Ronald Foster, BSME 1979, is the owner and president of Foster Supply Inc., headquartered in Scott Depot, W.Va. He is also president of A+ Medical Equipment and a member of the Putnam Rotary Club.

Javaid Masoud, BSCS 1982, has been appointed as chief technology officer at Cellnovo Group, a medical technology company marketing the first mobile, connected, all-in-one diabetes management system. He previously worked at Sorin Group and Medtronic USA.

Anne Wright Hornback, BSCS 1987, is a managing partner of the women's wealth division at Lamkin Wealth Management in Louisville, Ky.

Robert Osborne, BSEE 1988, is the chief operating officer of the Ohio Valley Electric Corp., in Piketon, Ohio. He was the managing director of field and support services for American Electric Power.

Nathan Boyd, BSME 1993, is the director of product integrity at Harley-Davidson in Milwaukee, Wisc. He previously worked for Brother International Corp.

John Leland, Ph.D. ME 1994, is the vice president for research for the University of Dayton and executive director of the University of Dayton Research Institute.

Charles White, BSCE 1994, is the senior managing engineer at Barton & Loguidice, headquartered in Syracuse, N.Y. He was elected president of the Syracuse section of the American Society of Civil Engineers.

Harsha Wijesiri, BSCE 1998, MSCE 2005, is president of Integrated Engineering, a consulting engineering firm he founded in 2006. The company was named the 2015 Small Business of the Year at the Commerce Lexington Salute to Small Business Awards luncheon.

Patrick Leighty, BSCE 2001, is an engineer for Lawrence County in Ironton, Ohio. He was an engineer with E.L. Robinson Engineering in Ironton.

Jason Lowe, BSCE 2001, is the office manager of the Huntsville, Ala., office of Barge Waggoner Sumner and Cannon, Inc., which is headquartered in Nashville, Tenn. He was the civil department manager for SSOE Group and a civil engineer in the U.S. Air Force.

Casey Tyree, BSCE 2001, is a company vice president and the Knoxville civil group leader for Barge Waggoner Sumner and Cannon, Inc., which is headquartered in Nashville, Tenn. He is also a U.S. Navy veteran and was a reaction propulsion division officer aboard the USS Nimitz.

Scott Walker, BSCE 2001, is a facility engineer at Toyota USA in Erlanger, Ky. He was previously a senior traffic engineer at Parsons Brinckerhoff. He was recently named a Rising Star by the Institute of Transportation Engineers.

Jeremy Arnold, BSCE 2002, is the vice president of Waldrop Engineering PA, which has offices in Bonita Springs and Riverview, Fla. He was the director of engineering in Waldrop's Bonita Springs office.

Aaron Sprowl, BSME 2002, is a project engineer at the Louisville division of the M.G. Newell Corp. He was plant engineer at Dean Foods.

Jonathan Black, Ph.D. ME 2006, is an associate professor of aerospace and ocean engineering and associate director of research for aerospace systems at the Ted and Karen Hume Center for National Security and Technology at Virginia Tech. He was recently named a Northrup Grumman Senior Faculty Fellow by the Virginia Tech Board of Visitors.

Tathagata Ghosh, Ph.D. MNG 2013, is an assistant professor of mining engineering at the University of Alaska Fairbanks. He was named to the executive committee of the Coal and Energy Division of the Society of Mining, Metallurgy and Exploration.

BE INCLUDED

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

Alumnus Worthington Wins GE Edison Award

Thanks to 1982 electrical engineering alumnus Tim Worthington, the college was presented with a $25,000 gift from GE last fall. The donation was part of GE's Edison Award program, which is presented each year to individuals from across GE who demonstrate technical excellence, customer impact and organizational citizenship.

Edison Award recipients receive a $25,000 grant to fund research at the university of their choice. Worthington, who has been working with the College of Engineering for several years on various projects, including the Solar Decathlon and as part of the Power and Energy Institute of Kentucky advisory board, chose his alma mater to receive the monetary award.

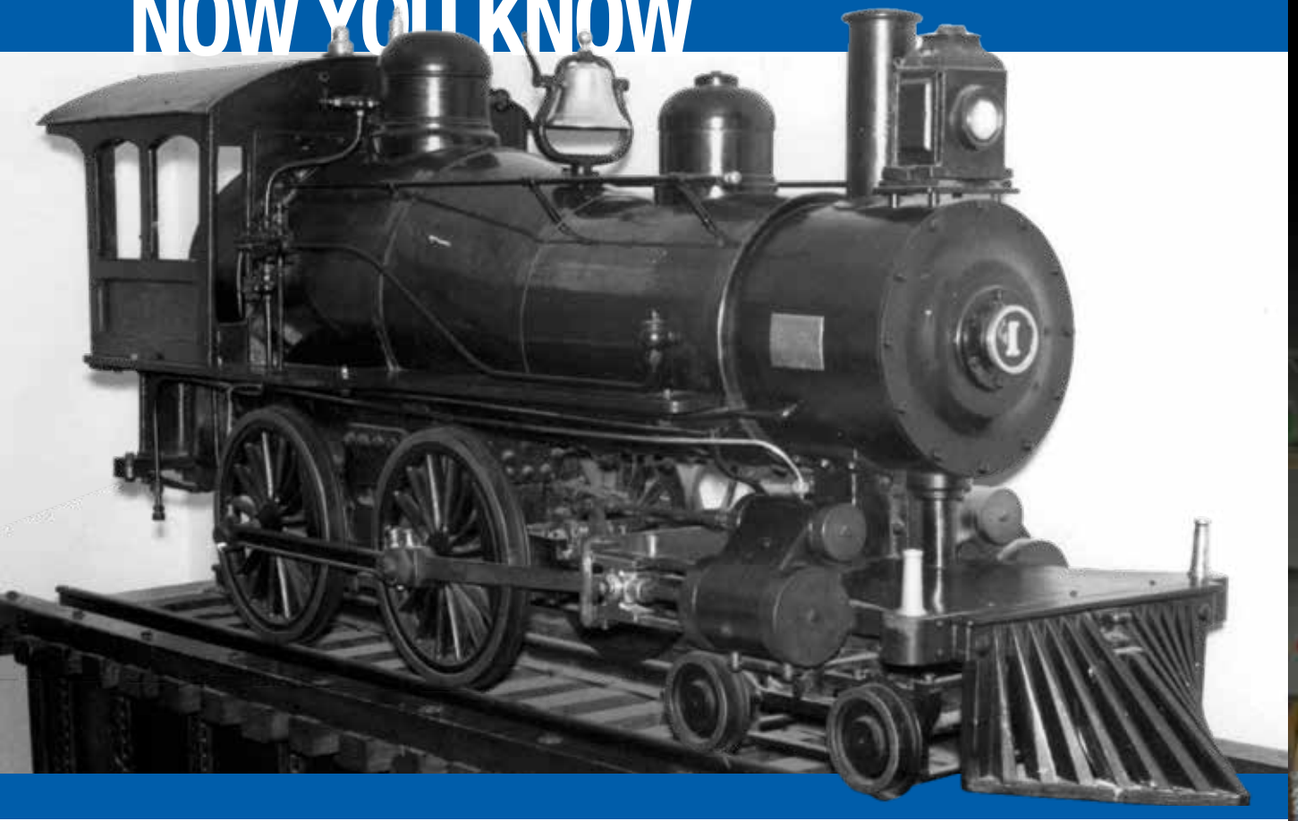
At UK, Worthington also met his wife of 31 years. His oldest daughter graduated from the university in 2012 and his youngest daughter is currently a junior.

"I have a lifetime of ties to UK through sports and education," Worthington said.

The funds will support research focused on developing cost-effective zero energy housing—a renewable energy system that can offset all or most of its annual energy consumption. The funds will allow engineering students to learn about sustainable energy sources that can supplement the growing demand for larger power plants and could reduce negative impacts on the environment.

IN MEMORIAM

Edward R. Hermann	Civil Engineering	1942, 1953
Caroline P. Wade	Civil Engineering	1942
Norman A. Chrisman, Jr.	Civil Engineering	1945
William D. Hatcher, Jr.	Mechanical Engineering	1945
Austin L. Shelley	Electrical Engineering	1947
Donald K. Saylor	Electrical Engineering	1949
Frederick L. Walker	Civil Engineering	1949
Raymond G. Bauer	Mechanical Engineering	1950
Alwyn B. Perry	Mechanical Engineering	1950
L. Wayne Tune	Civil Engineering	1950
Robert L. Vines	Mining Engineering	1951
Todd Crutcher	Mechanical Engineering	1954, 1961
G. Hawley White	Mechanical Engineering	1955, 1962
Donald R. Clark	Electrical Engineering	1957
Richard G. McGuire	Mechanical Engineering	1958
Earl D. Quirey	Electrical Engineering	1958
John N. Schneider	Electrical Engineering	1958, 1961
Garland D. Taylor	Mechanical Engineering	1958
William Troll Young	Civil Engineering	1958
Charles J. Barnes	Mechanical Engineering	1960
Dale J. Kauzlick	Civil Engineering	1960
James W. Whitt	Electrical Engineering	1960
John G. Ziegler	Electrical Engineering	1960
Robert C. Armstrong III	Mechanical Engineering	1961
Henry B. Baker, Jr.	Civil Engineering	1963
Howard B. Hester	Electrical Engineering	1964
Bennie R. Maffet	Civil Engineering	1966, 1967
Larry G. Copeland	Chemical Engineering	1968
Robert T. Surface	Metallurgical Engineering	1970
Mickey T. Smith	Civil Engineering	1971
Stephen L. Cross	Chemical Engineering	1974
Richard K. Alley	Electrical Engineering	1984
Robert E. Clarke II	Computer Science	1985
Sam R. Elam	Computer Science	1990
Christopher C. Stovall	Mechanical Engineering Manufacturing Systems Engineering	1998 2008
Laura Katherine Carr	Computer Science	2001



LITTLE SENTINEL

In 1904, University of Kentucky engineering senior Stuart M. Morris, whose father worked for a railroad company, built a small-scale replica of a locomotive in the UK shops—just for fun. Later, he and a friend built cars and a track for it and began giving rides to kids across the Commonwealth.

Yes, it actually *ran*.

After Morris moved to New Zealand, he offered the engine to the College of Engineering. Over time it was encased and displayed in different buildings. Named "Little Sentinel," the pony engine resided in the Raymond Student Commons of the Ralph G. Anderson Building until its renovation in 2014. Currently resting in the basement of the Oliver H. Raymond Building, it is frequently visited by children attending the annual Engineers Day Open House.

In the December 6, 1932 edition of the Kentucky Kernel, F. Paul Anderson, the first dean of the College of Engineering, shared the story of how "Little Sentinel" became part of the College. In the article, Dean Anderson says that many of the kids who rode Morris' engine ended up coming to UK, eventually graduating with an engineering degree. Now 112 years old, "Little Sentinel" continues to testify to the power of inspiration. KEJ

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