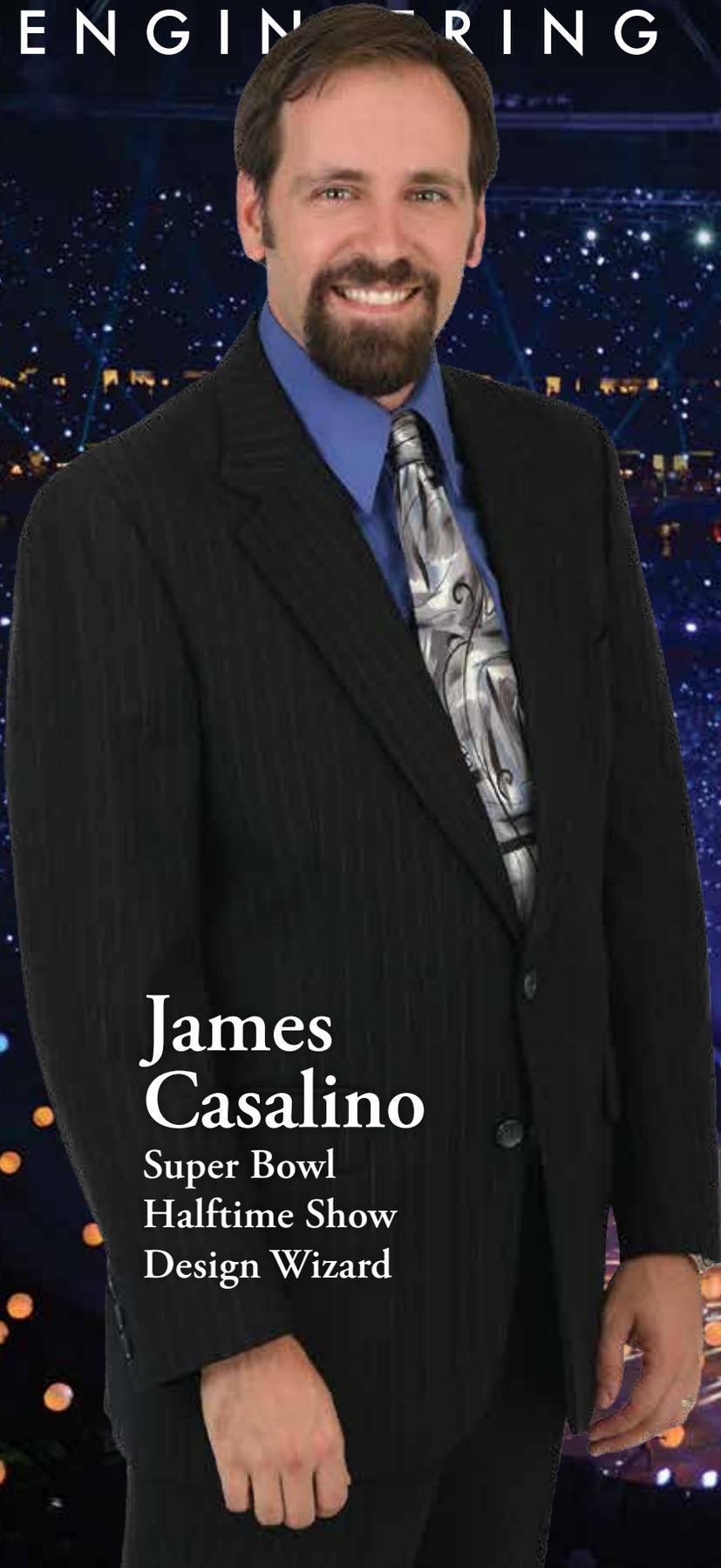


THE MAGAZINE OF THE UNIVERSITY OF KENTUCKY COLLEGE OF ENGINEERING

KENTUCKY

ENGINEERING JOURNAL

Fall 2015



**James
Casalino**

Super Bowl
Halftime Show
Design Wizard

Kozo Saito, director of the Institute of Research for Technology Development (IR4TD), and Nelson Akafuah, assistant research professor of mechanical engineering, were recently published in the prestigious *Proceedings of the National Academy of Sciences* journal as co-authors of a study that reveals how flame dynamics that produce and transport convective heat effectively governs the spread of wildfire.



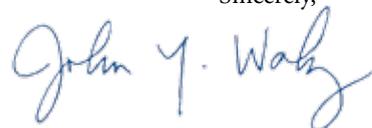
Message from the Dean

The University of Kentucky is a place of change. This has always been true for young men and women who have spent formative years here on campus, but lately the physical infrastructure has told the tale of transformation. Since July 2011, UK has invested more than \$1.8 billion in capital projects to transform the campus, and over the summer crews began working on an unbelievable \$175 million student center. That has created significant buzz, not just on our campus but around the nation. It says, “the University of Kentucky is going places. It is not sitting around waiting for top students and faculty to come to it but creating the best environment to attract and support the best.” This is an exciting place to be.

The College of Engineering is going places as well, and in this issue, we demonstrate where an engineering education can take today’s graduate. We have selected stories of unique employment and research directions made possible by our quality of education as well as research environment. We begin with Sen-Ching (Samson) Cheung, whose research focus changed dramatically when his son was diagnosed with autism spectrum disorder. Dr. Cheung’s shift has resulted in several products designed to help autistic children learn daily living skills. We also highlight alumnus James Casalino, whose mechanical engineering background has proved invaluable in his role as leader of the drafting and design team that produces sets for concerts, television shows and even the Super Bowl. Finally, we focus on electrical engineering major Joshua Morgan, who is excelling not only in the classroom but as a senior member of the UK Solar Car Team. These articles, as well as features on materials engineering professor John Balk and longtime friend of the college Alice Sparks, round out this fall issue. We even have a spot dedicated to the mysterious iron sculpture in the atrium of the Ralph G. Anderson Building.

We look forward to your feedback as we strive to make *Kentucky Engineering Journal* a treat you find in your mailbox. Please don’t hesitate to contact us at alumni@engr.uky.edu with any suggestions you may have.

Sincerely,



John Y. Walz
Dean

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FRONT COVER

2005 mechanical engineering graduate James Casalino designs sets for concerts, television shows and the Super Bowl Halftime Show including Katy Perry’s show earlier this year.

UNIVERSITY OF
KENTUCKY
College of Engineering



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THE DIFFERENCE MAKER

When Samson Cheung's son was diagnosed with autism spectrum disorder, he revamped his research focus to meet the challenge.

Sen-Ching (Samson) Cheung is an associate professor in the University of Kentucky College of Engineering's Department of Electrical and Computer Engineering and a faculty member within the UK Center for Visualization and Virtual Environments. Like most professors, he is deeply involved in engineering research. For most of his academic career, his research has been in the area of multimedia information analysis.

"I enjoy solving problems and developing new theories, working on new technology and future products," Cheung explains. "But something like video surveillance does not impact me personally. At the end of the day, I can leave my research in the lab."

The distance between professional research and personal impact was shortened several years ago when Cheung and his wife began to detect developmental delays with their young son. They noticed he avoided social contact and wouldn't look anyone in the face. Not even his parents. Eventually, they had him tested; the diagnosis: autism spectrum disorder.

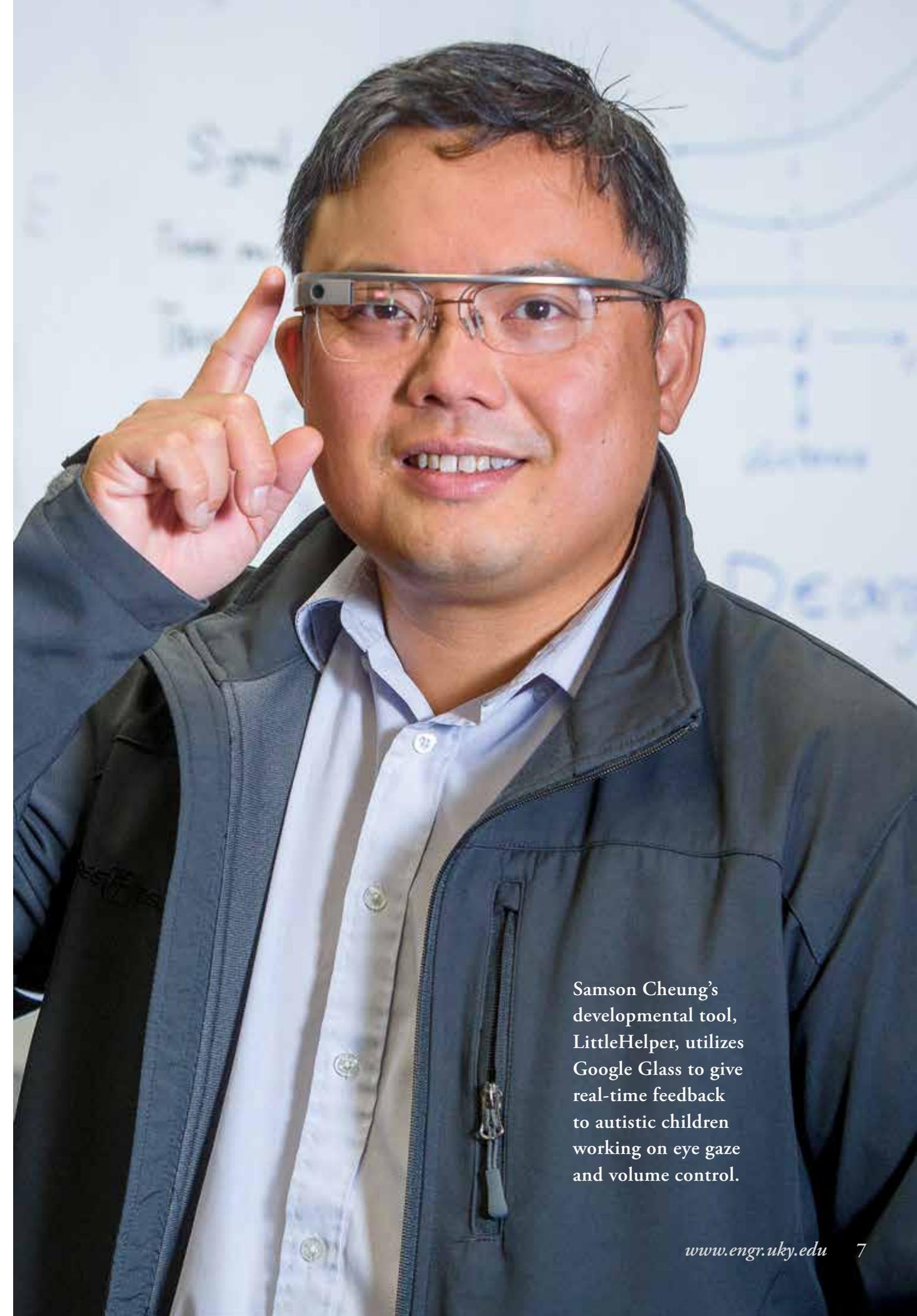
"Though we were disappointed about the diagnosis, we

began taking our son to different therapies and reading about effective ways to help children with autism," Cheung recalls.

Not only did Cheung immerse himself in the latest autism therapies, he also began applying his engineering background to a field of research he had never anticipated engaging. Working with UK researchers in the Colleges of Education, Arts & Sciences and Medicine, Cheung applied for and received a multi-year \$800,000 grant from the National Science Foundation in 2012 to enhance the delivery of behavior therapy to individuals with autism and related disorders. In the three years since receiving the award, Cheung has not only developed therapy technologies for children but also aids for the therapists and teachers who work with the children.

"Every autistic kid is different, which is why it is called autistic spectrum disorder," states Cheung. "So I am trying to empower the parents and therapists by creating tools they can use and even customize for each child."

The training mechanisms Cheung and his group have produced employ interactive gaming, wearable



Samson Cheung's developmental tool, LittleHelper, utilizes Google Glass to give real-time feedback to autistic children working on eye gaze and volume control.



technology and even new approaches to surveillance. They also tap into well-known devices like Google Glass and Microsoft Kinect. Although each is in a different stage of development, Cheung says reception within the autism community has been positive.

“Whenever I go to an autism-related conference, I meet a lot of people and everyone has a story to tell. These are people who can really use some help. The recent

diversification of my research has come from talking to people who say, ‘This is our problem; can you look at this and engineer something to help us?’ I get a lot of business cards and ideas from those kinds of conversations. Technology is playing a big part in autism therapy right now and it will only play a bigger role in the future.”

Among his projects in the works, Cheung is excited about three that could make substantial contributions

to the crucial area of social skills training.

LITTLEHELPER

As mentioned earlier, some individuals with autism possess behavior traits that make social communication difficult, such as lack of eye contact or inappropriate conversation volume. LittleHelper, which uses Google Glass, is designed to strengthen those social skills by giving immediate visual feedback in training sessions.

Because wearing Google Glass is similar to wearing glasses, it has the advantage of being unobtrusive.

Using Google Glass’s camera and peripheral display, LittleHelper detects whether a user is looking at his or her conversation partner. If they are maintaining what is technically termed “eye gaze,” they will see a yellow happy face in the display. If they break eye gaze, feedback comes in the form of a red frowning face. Because many autistic



Part story book, part interactive game, MEBook is an innovative approach to helping autistic children with crucial social skills.

children are visual learners, they are likely to turn back to their partner in order to once again see the happy face. A similar program offered by LittleHelper gives feedback of “SOFTER” or “LOUDER” on the display depending on the user’s speaking volume relative to the noise level in the room.

“That is why I call it ‘LittleHelper,’” clarifies Cheung. “It gives a little help in a few very important areas.”

MEBOOK

MEBook is part story book, part interactive game that helps autistic kids learn the social skills of saying ‘hi’ and ‘bye.’ While such responses come almost automatically from most children, Cheung says they do not come naturally from children with autism.

Using a “social narrative,” MEBook allows the child to be the main character in a story and his or her face appears on the screen via a Microsoft Kinect. In the story, the child meets his friends and teachers, saying, ‘hi’ and ‘bye’ to them. After finishing the story, the child is ready for the game component. On the screen, cartoon friends appear, each saying, ‘Hi _____’ to the child. The goal is for him or her to wave and return the greeting or farewell. Gesture and sound recognition determines if there has been a successful response. If so, the game says, ‘Great job!’ and confetti showers from the top of the screen. According to Cheung, developing habits is the key to MEBook’s success.

“We ran three children on the spectrum through a clinical study around MEBook. We measured social interaction prior to playing the game, as well as after, and we brought them back to see if they remembered what to do without playing the game. The kids really began to learn the skills. A couple of them went from not paying attention to anyone in the room to, weeks later, remembering to say hi and bye to other kids and adults in the room without even playing the game.”

PRIVACY BUBBLE

With the Privacy Bubble, Cheung has applied his extensive research in surveillance to classroom interactions in a novel way.

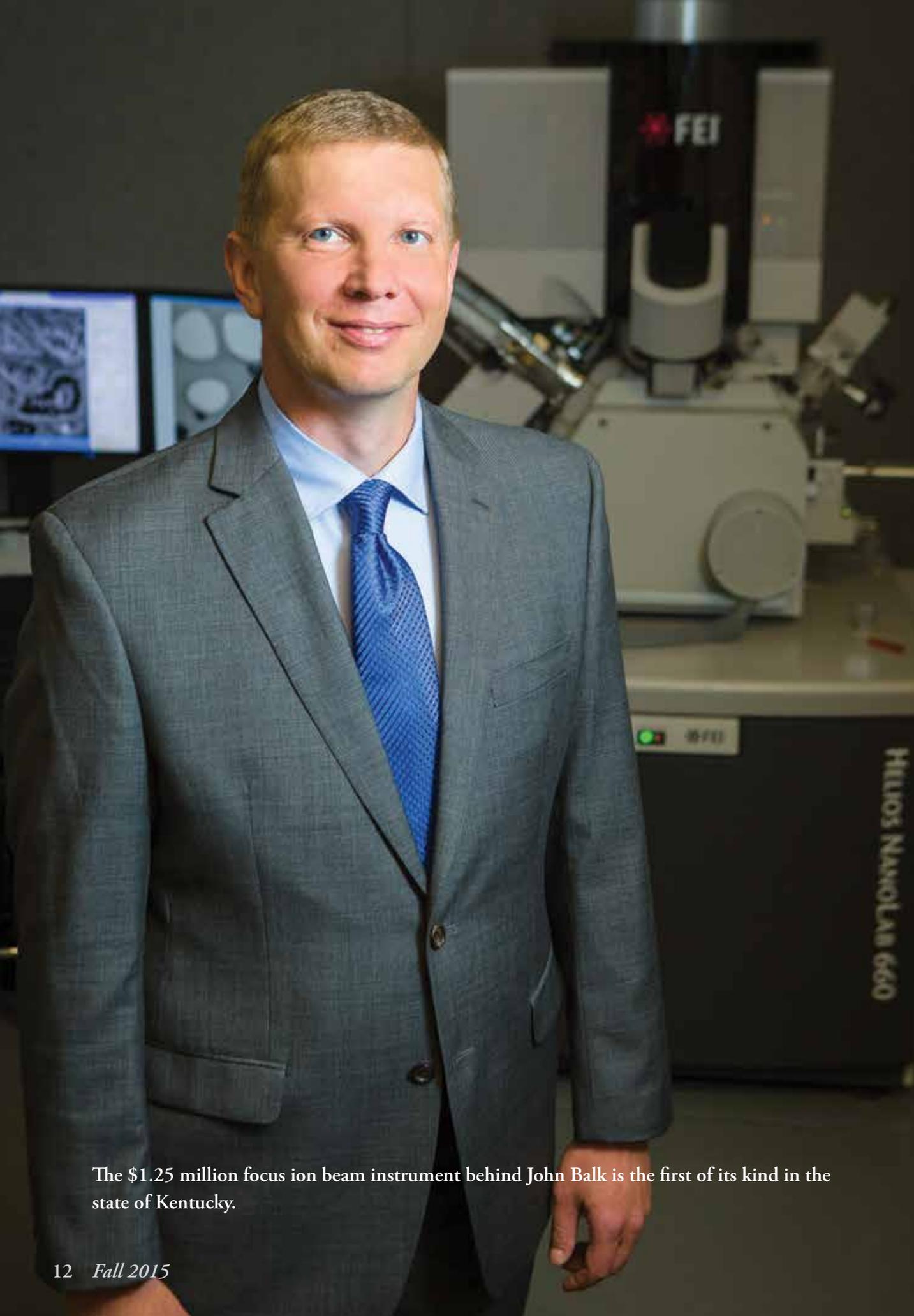
“Video cameras can make for a great instruction tool,” Cheung begins. “When my son comes home from school, I ask him how it went and what he learned; but he is not able to tell me much. When I ask his teachers they might send me a checklist about his behavior or a list of the work he did, but I can’t replicate any of it because I didn’t see it. If the classroom had a video camera, it would be possible for them to extract the important parts and share that video with me. Then I would know the new things they taught and I could do the same things at home. That would be very valuable for me.”

Almost as soon as Cheung describes his vision for cameras in the classroom, he quickly concedes the number one objection to it: privacy. In a classroom with multiple children, it would be nearly impossible to keep other kids off-camera during video-recorded training times. Hence, the Privacy Bubble. Utilizing a Kinect, Cheung’s surveillance expertise has enabled him to black out everything on the screen with the exception of the teacher and student. This “bubble” protects the privacy of other students while giving parents a helpful tool for staying abreast of what is going on in the classroom.

“Plus,” Cheung adds, “if I could see the teachers having trouble getting my son to do certain things, I would know if something we tried at home would be worth sharing with them.”

Cheung had the opportunity to demonstrate LittleHelper and MEBook at the International Meeting of Autism Research in Salt Lake City in May—a conference that features the world’s top researchers in the field of autism and showcases new technology aimed at improving autism spectrum disorder therapies. Cheung says the enthusiastic reception for his nascent technology encourages him to stay the course.

“Academics are like kids in the sense that we really like to share things we think are cool. And when people share your joy in an area so personally important to you, it makes all the difference.” **KEJ**



The \$1.25 million focus ion beam instrument behind John Balk is the first of its kind in the state of Kentucky.

BUILT TO LAST

John Balk, one of the college's most popular professors, is exploring the new frontier of high-entropy alloys.

"The best aspect of my job is that I get to work with students," claims materials engineering professor John Balk. Then, as if perceiving an eye-roll from some corner of the universe, he doubles down. "That's not just a cliché; that is the real reason I am teaching at a university."

Balk need not protest; his teaching awards more than back his claim. Balk has taught materials engineering at the University of Kentucky for 11 years. In seven of those years, he received the materials engineering program's outstanding teacher award. In 2009, he collected not only the program's award, but also the College of Engineering's Henry Mason Lutes Award for Excellence in Engineering Education and the university-wide Provost's Award for Outstanding Teaching. Clearly, Balk's efficacy as a professor stems from an earnest love of teaching.

"What I look for in students is what I call 'intellectual curiosity,'" he explains. "That means they want to learn more—not just get a good grade in the class. Intellectually curious students are genuinely interested in understanding. When I see that, I try to develop it through research opportunities."

In describing the intellectually curious student, Balk autobiographically reveals the approach he took to his engineering studies at UC Berkeley where he double-majored in materials science and mechanical engineering as an undergraduate student.

"I liked thinking about how to build structures that had integrity, yet also understanding the properties of the material and the difference those properties made," Balk recalls. "So I double-majored. Later, when I went to graduate school at Johns Hopkins, I found a materials

science advisor whose primary appointment was in mechanical engineering. It was a perfect fit. I have always been very comfortable in both fields and both are essential to my research."

While Balk's research to date has largely focused on nanoporous materials and thin film coatings for improved electron emission, his newest area of research—and his enthusiasm for it—proves his intellectual curiosity is as strong as ever. The 2008 NSF CAREER Award winner has a new grant from the Kentucky Science and Engineering Foundation to explore the budding field of high-entropy alloys. So what are high-entropy alloys and how do they differ from traditional alloys? Balk explains:

"Entropy is disorder and if you can increase the disorder in the alloys, you can actually make it more difficult to deform the material. That makes it stronger. Or you can make it more resistant to high temperatures, which usually weaken materials. Common alloys typically have one base metal; if you have copper and add zinc to it you get brass; or if you add tin you get bronze. With high-entropy alloys, you add five or more materials together in equal proportion. This is uncharted territory in physical metallurgy, so people don't really know what they are going to get. Right now it is at the level of mixing materials together and hoping you hit a winner. The grant I've gotten will allow me to take a more systematic approach to optimizing high-entropy alloys for a given structure."

Balk became interested in high-entropy alloys due to their unprecedented material properties and possible use in demanding application environments. For example, because turbine blades in jet engines must be able to

withstand extremely high temperatures, high-entropy alloys have potential to become a viable choice for turbine blade materials. Although few studies have been undertaken, some combinations have produced encouraging results.

“What I’m most curious about is why a material behaves the way it does and then being able to explain it or understand it on the basis of its structure,” Balk adds. “So this new area gives me a lot to explore. I really like it and am glad to have funding for further research.”

Besides relishing innovative work in an emerging field, Balk has another exciting challenge on the horizon. He is one of five meeting chairs for the 2015 Materials Research Society (MRS) Fall Meeting & Exhibit to be held November 29 – December 4 in Boston. The MRS meeting is the major materials science conference, and Balk and his fellow meeting chairs are responsible for determining the programming for a conference with over 7,000 abstracts submitted for presentations. Balk is the only academic from the United States among the meeting chairs.

“I’m honored to be in good company,” Balk smiles. “In 2008 I was nominated to be chair of a smaller conference—the Gordon Research Conference on Thin Film and Small Scale Mechanical Behavior—and served as chair for that conference in 2012. I was the youngest person to ever be elected for that position and the experience has helped me as we prepare for the Boston conference.”

With a career built through exceptional teaching, accomplished research and extensive service, Balk is

thriving at UK. For him and his wife, Ilka, who serves as director of engineering career services in the college, the work-life balance and cultural heritage available in Lexington make it something of a well-kept secret.

“I have lived in Michigan, along the Gulf Coast, in San Francisco, Baltimore and Stuttgart, Germany, but I’ve never been as pleasantly surprised as I’ve been to find all that we have enjoyed here. It is a great place to live, work and raise a family.” [KEJ](#)

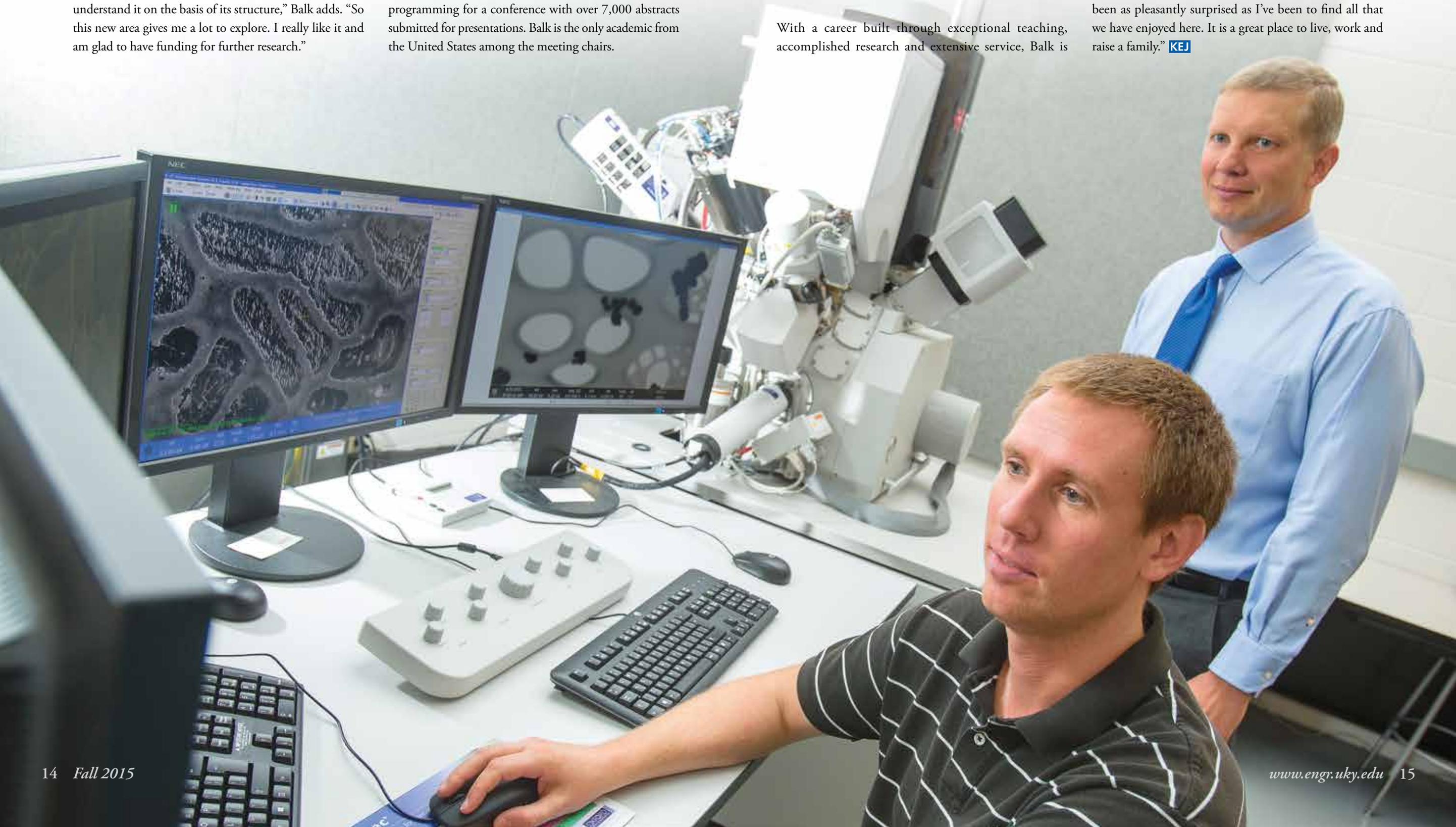




Photo: Bob Hughes

The stage from season 13 of “American Idol,” produced in 2014.

ALL ACCESS

James Casalino turned his love for engineering and the theatre into a career designing sets for everything from television shows to the Super Bowl Halftime Show.

If you have a major production in the works and want to make it memorable, mechanical engineering alumnus James Casalino and his team can make it happen. Want a video wall to pop out of the stage? No problem. Want a three-story seating area for an audience? They’ve done it. Rising staircases, wrap-around stages, structures that seem to appear out of thin air? Why not? This is the outfit that has constructed the Super Bowl Halftime Show set for the past five years.

James leads the drafting and design team at All Access Staging Productions located in Los Angeles. In addition to Super Bowl Halftime Shows, James has designed sets for concerts, television shows, awards ceremonies, political conventions and more. It is not a job for the faint-hearted.

“Clients give us conceptual designs for ideas like ‘floating drum riser’ or ‘stair that appears out of the stage’ as well as other structures that at first glance would seem impossible to actually build,” describes James. “Then it’s our job to turn those artistic ideas into reality.”

No matter how crazy the inspiration or imminent the deadline, James and his team fight the impulse to freak out and, instead, put their training and talent to work. After all, they can’t say no.

“I used to have a saying that I would only do the impossible once a day,” James laughs. “Then my boss

asked, ‘Who told you it could only be once a day?’”

Do the impossible. That’s the job.

Perhaps James isn’t averse to spontaneous requests because he has been known to make them himself. While visiting the University of Kentucky as a high school student from just outside Chicago, James showed up at the College of Engineering on a whim. He had no appointment and no contacts. Fortunately, electrical engineering professor Bruce Walcott dropped what he was doing and gave the Casalino family a personal tour of the college.

“There was a friendliness at UK that I loved,” James reminisces. “I felt like if I went to Kentucky, I would be more than just a name or a number but part of a community.”

As with many engineers, James grew up with an interest in how things work, taking apart plenty of remote control cars along the way; however, he also nurtured his artistic side—both on the stage and behind the scenes. Particularly, James loved building the scenery for productions; however, when it came time to choose a major, he was concerned about the tenuous job security of professional theatre and opted for mechanical engineering.

“I went into mechanical engineering mainly out of curiosity. Just as many people see doctors and say, ‘I wish I could do that,’ I saw robotics and everyday products and thought, ‘I wish I could design that,’” he remembers.

Drawn primarily to project-based classes that resemble the real world experience of working in teams, James enjoyed his education and learned valuable skills; yet he discovered that he missed the energy of stage production. He wondered if he could apply what he was learning to find employment with Disney Imagineering or a cinematic special effects company. After conducting preliminary research, James hand-wrote approximately 50 letters to every special effects company in the Los Angeles area asking for an internship. Of the 50, four responded. But only two offered an interview and during the 2004 Spring Break, James flew to L.A. to interview with All Access. After the interview, they offered him a summer internship.

The week before James arrived, one of All Access’s two principal drafters left the company. Immediately, James was thrust into the action, working directly with the principal designer and drafter on concert tours. Among the 25-30 projects James worked on that summer, his two biggest undertakings were the “American Idols LIVE!” tour and Rascal Flatts’ “Here’s to You” tour. James excelled. Just before his internship ended, he divulged a secret to his co-workers: he had never before been to a live concert—at least not one at a venue larger than a county fair. Thrilled with his work, All Access asked him to stay. Although it had been an amazing internship, James was determined to finish his degree and declined.

But seeds had been sown. Before graduating, James sent letters once again to the same 50 or so special effects companies in Los Angeles. This time he interviewed with three companies, but it was All Access that gave him the best offer. In the summer of 2005, James moved to California for good.

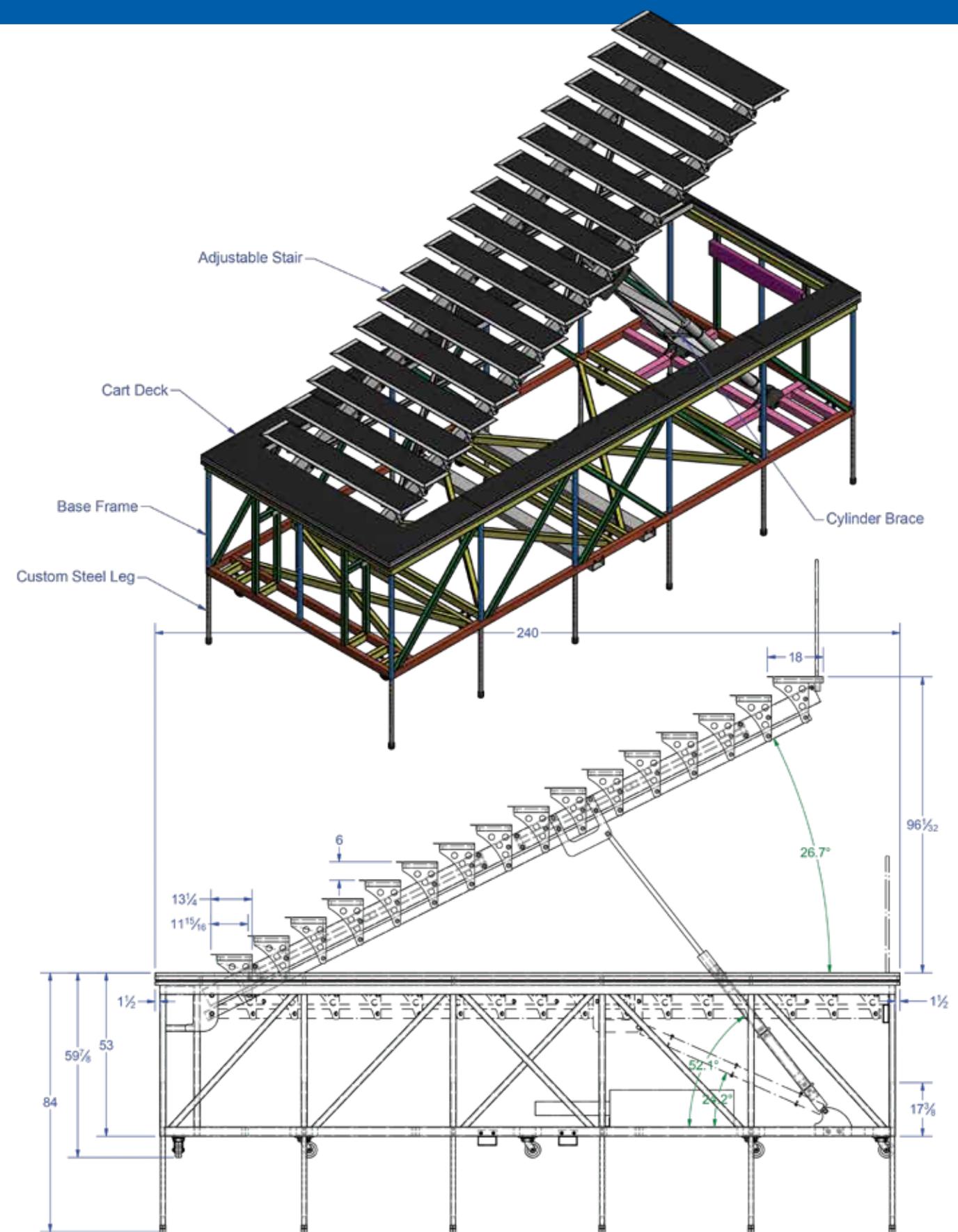
All Access has been doing the Super Bowl Halftime Show set construction since 2011 and James says each year poses unique challenges.

“We created the video wall that flipped up from the stage for Beyoncé’s Super Bowl XLVII Halftime Show and we created lifts and a quick deployment slackline for Madonna’s Super Bowl XLVI Halftime Show. This past year for Katy Perry’s Super Bowl XLIX Halftime Show, almost the entire set was fabricated from scratch; but no matter what we do, everything is reviewed and calculated by an independent engineering team to confirm our structural design is adequate.”

The list of shows and events James has contributed to is impressive, crammed with familiar names: “The Monster Tour” featuring Eminem and Rihanna, tours by Van Halen and “Dancing with the Stars,” the “World Poker Tour,” “The 48th Annual GRAMMY Awards” in 2006, “Are You Smarter Than a Fifth Grader?” and more. When he thinks about how an engineering degree helped him get into such an exhilarating field, James speaks positively of his experience at UK.

“I believe the UK College of Engineering helped open doors for me. Even with all of the challenges I have

“I believe the UK College of Engineering helped open doors for me. Even with all of the challenges I have had in my job, getting my engineering degree was the hardest thing I have ever done—and also one of the most rewarding.”



A hydraulically-powered staircase designed by James Casalino for “The Monster Tour” featuring Eminem and Rihanna. “Making something that looks simple is often the hardest part about designing,” James says.

James and his team designed the set for the “Boys of Zummer Tour” featuring Fall Out Boy and Wiz Khalifa.



Photo: Steve Garfinkel

had in my job, getting my engineering degree was the hardest thing I have ever done—and also one of the most rewarding. I am so thankful for the time I spent at UK and all of the great people who were a part of my education.”

When he isn't conjuring the impossible, James enjoys

spending time with his wife, Meredith, daughter, Hannah and dog, Rocket Toes. When time permits, he engages in photography as a hobby. While it hasn't worked out to make it back to campus since he graduated, James keeps in touch with friends and faithfully follows Kentucky basketball, even keeping a conspicuously out-of-place

Kentucky flag in his office.

So what is next for James Casalino? There isn't a whole lot in his industry that he hasn't done. When asked, James admits that while he has done design work for almost every kind of major production possible, there is one

event he would love to be a part of someday, a landmark show that would not only hold the rapt attention of the nation but the entire world.

The opening ceremonies of the Olympic Games. **KEJ**

DRIVER'S SEAT

Singletary Scholar and Buick Achiever Joshua Morgan is a big reason the UK Solar Car Team is once again competing in national competitions.

In the University of Kentucky College of Engineering, sometimes the most formative educational experiences happen outside the classroom. While few would argue against the assertion that informative classroom instruction coupled with rigorous study is the foundation of a solid engineering education, extracurricular activities often reinforce course material and spur new avenues for investigation. Senior electrical engineering major Joshua Morgan is a prime example of the college's double-pronged approach to producing top-notch engineers.

"Joshua is a highly motivated student, gifted in academic and leadership skills," says Kevin Donohue, DataBeam Professor in the Department of Electrical and Computer Engineering. "It is a delight to see students propose experiments driven solely by personal curiosity and involve themselves in engineering experiences outside the classroom."

Joshua has held a spot on the Solar Car Team since freshman orientation. Having never heard of such a thing as a solar-powered car before beginning college, Joshua was fascinated with the concept as well as the way the team designed and built different facets of the car. He joined the electrical team and increasingly assumed leadership responsibilities as each new academic year triggered team turnover. For 2015-2016, Joshua is team manager—the top spot on the team. He says the learning experience will pay dividends long after graduation.

"Working on the car provides situations where we face

totally unique problems, like building a circuit board for our battery pack on our solar car. We can't just look that up on YouTube because no one else has our exact equipment. Plus, because our team members come from all engineering majors, we get the experience of working collaboratively on a real engineering team."

Throughout his tenure on the Solar Car Team, Joshua has been part of a multi-year effort to build Gato del Sol V, the team's newest iteration to take the field in national competitions. Gato V made its racing debut in 2014 at the American Solar Challenge in Austin, Texas.

"We actually finished building the car in Austin," Joshua says with a grin. "We only got about six or seven laps in and didn't qualify for the road race."

In July, the team returned to Austin to compete in the Formula Sun Grand Prix. The year spent fine-tuning the car paid off: Gato V completed 84 laps and achieved the fastest measured speed on the track. Confidence is high as the team looks to the 2016 American Solar Challenge and the chance to participate in the road race that will take them from Ohio to South Dakota.

"One of the cool things about the race is that it makes people think about the future of solar cars. I think we will see more solar cells on vehicles, as well as ways for people to charge them through solar panels on their houses," says Joshua.





The son of an electrical engineer, Joshua was personally taught how to build circuits at a young age. Joshua says that because he was homeschooled, he often had extra time for diving into what interested him.

“Homeschooling allowed me to spend a lot of time concentrating on electronics as well as music. I could build circuits for a while and then practice piano and violin for two hours and still finish my school day by four o’clock.”

Still, some worried that homeschooling would leave him unprepared for the difficulty of college coursework. A Singletary Scholar and recipient of a Buick Achiever Scholarship, Joshua has had no problems making the grade. As a University Scholar, he will graduate in December 2016 with not only his bachelor’s degree, but also a master’s degree in electrical engineering. Further, he has already fulfilled two internships with medical device and surgical instrument manufacturer Ethicon Endo-Surgery in Cincinnati. Joshua says he discovered the company at a campus career fair.

“I was leaving the fair when I happened to see a cool-looking device on a company’s table. I was curious and went over to talk with them and when I asked about internships, they weren’t so sure since I was an electrical engineering major. But after telling them about my experience on the Solar Car Team and how I regularly work across disciplines, they found a good fit for me and I have really enjoyed it.”

Unwilling to decisively settle upon a post-graduation career route, Joshua sees all options as possibilities. While he thinks a job as an industrial researcher would be a good start, he also entertains getting his doctorate one day and becoming a professor. The allure of forming a startup company with some of his friends also appeals to him.

“We have bounced the idea around,” Joshua shares. “Biosensors, prosthetics, biomedical devices—with what we are studying, there are a lot of directions we could go.” [KEJ](#)

“One of the cool things about the race is that it makes people think about the future of solar cars. I think we will see more solar cells on vehicles, as well as ways for people to charge them through solar panels on their houses.”



LIVING MEMORY

Alice Sparks has kept her husband's love for the college alive through a memorial scholarship.

Joe Sparks graduated from the University of Kentucky with a bachelor's degree in civil engineering in 1958. For the remainder of his life, Joe, whose engineering and business expertise resulted in his promotion from chief engineer to vice president to executive vice president and eventually majority owner of The Harper Company, credited the UK College of Engineering with giving him the foundation for a successful career and life. When he passed away in 1998, Alice, his wife of 38 years, wanted to do something for the college that reflected his appreciation. The result is that since 1999, a D. Joseph Sparks Memorial Scholarship has been awarded each year to a student pursuing civil engineering studies at UK.

"His memory lives on in the students who receive the scholarship," she says.

Since founding the scholarship, Alice has attended nearly all of the annual David K. Blythe Society Recognition Luncheons—the annual event that connects donors with their scholarship recipients. She says it is an event not to be missed.

"Attending the luncheon always renews my faith that creating this scholarship was by far the best thing I could do with our funds. Getting to know the parents of some of the recipients is icing on the cake."

This year's scholarship recipient is Desiree Staton. At this

year's luncheon, Alice spent time getting to know her—something that deeply impressed Desiree.

"She wanted to know who I was as a person and shared personal experiences of her life. I felt honored to be selected for a scholarship from such a prestigious woman," Desiree reflects.

A non-traditional student finishing her senior year in civil engineering, Desiree says the scholarship provided much-needed help to her and her seven year-old son.

"Every semester I struggle to provide for my son in order for us to have a better way of life and it's thanks to people like Alice who help people like me change our situations. Her contributions have made our lives a little easier."

Stories like Desiree's are perpetual reminders of not just the power of philanthropy to change lives, but the touching bond that forms through the years between the scholarship founder and grateful recipients.

"Not only is she a generous lady, she is sincere in her cause," Desiree affirms. "I love her and will never forget her."

Joe Sparks' memory lives on, indeed. [KEJ](#)



Michael W. Renfro:
Chair,
Department of Mechanical
Engineering

New mechanical engineering department chair Mike Renfro comes to UK from the University of Connecticut, where he began teaching in 2002. During his tenure, he also served as director of graduate studies and associate department head in the Department of Mechanical Engineering. Renfro brings research, teaching and administrative experience to complement that of the department and college in energy and aerospace. He received his doctorate in mechanical engineering from Purdue University in 2000. Renfro's research is in the area of optical diagnostics applied to power production technology, particularly combustion, gas turbine and fuel cell systems. A National Science Foundation CAREER Award recipient, he has received extensive research support through various granting agencies and industry partners.



William T. Smith:
Associate Professor,
Department of Electrical and
Computer Engineering

Bill Smith is a Kentucky native who graduated from UK with an electrical engineering degree in 1980. After receiving his master's and doctoral degrees from Virginia Tech, he returned to campus as an assistant professor in 1990. In his 25-year career, he has won his department's teaching excellence award three times and Tau Beta Pi's Outstanding Engineering Professor Award three times. This spring, Smith's dedication to student success at UK earned him his second Henry Mason Lutes Award for Excellence in Engineering Education—exactly 20 years after he first won the award. Smith has been the department's director of undergraduate studies for electrical engineering since 2006 and serves as the associate chair. A stalwart on the Engineering Alumni Association board of directors, Smith became its president in July and will serve a two-year term.



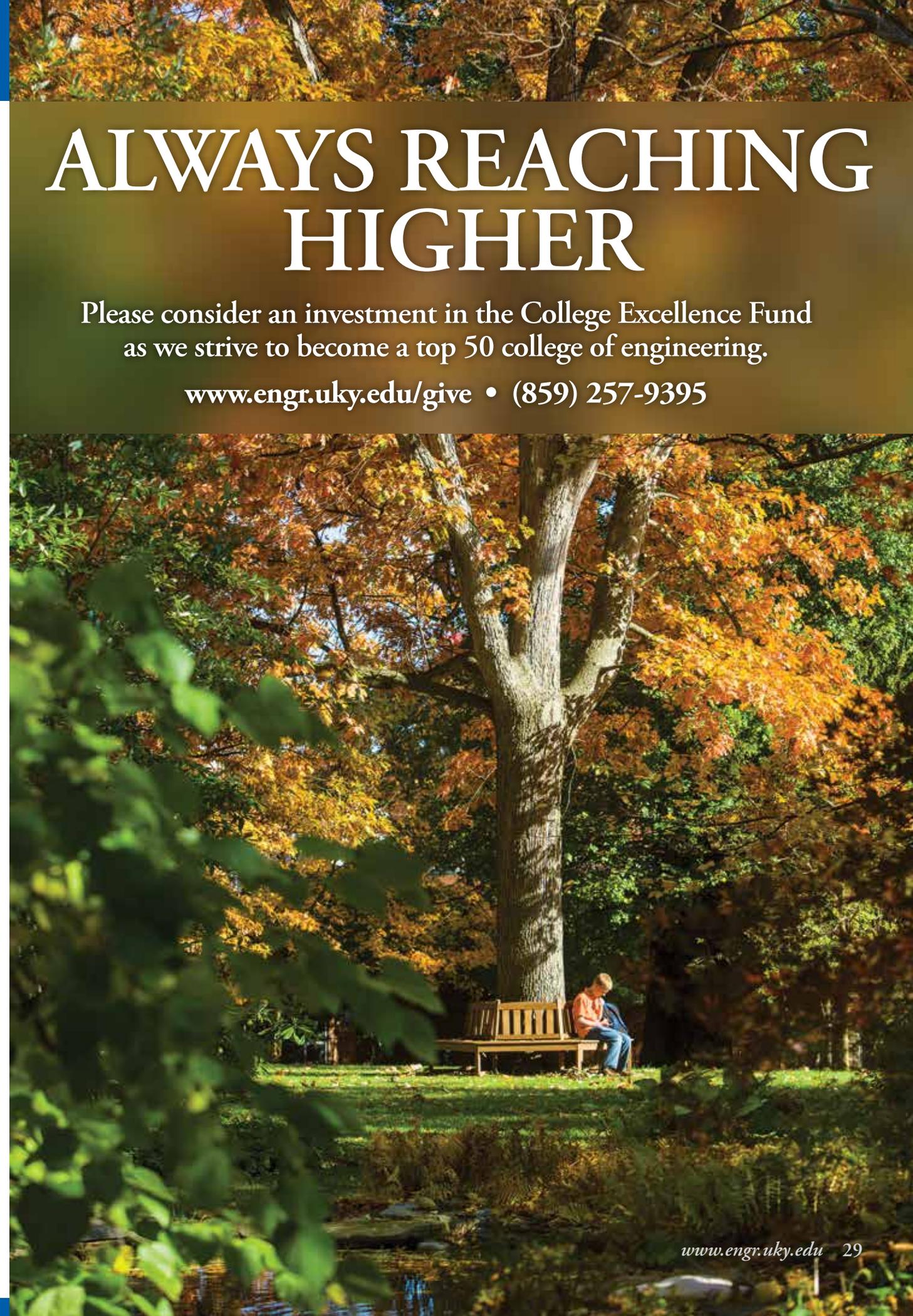
Jonathan D. Kellogg:
Senior,
Civil Engineering

Although a senior, Jonathan Kellogg has already begun to channel his skills and civil engineering education toward humanitarian ends. In the fall of 2014, he journeyed to the Ugandan cities of Kampala and Jinja, where he spent the semester not only gaining hands-on experience as a soon-to-be engineer but laying the groundwork for the nearly \$7 million Amazima Academy, which will educate hundreds of Ugandan students. Kellogg viewed the trip as a way to not only gain valuable professional experience but also follow in the footsteps of his grandparents who were missionaries to Kenya. Among his tasks, Kellogg drafted the site utility plan and electrical and plumbing plans, created a water distribution model and also designed the wastewater treatment system. On weekends, he would teach and play with local orphans.

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BY THE NUMBERS

806

FRESHMEN
(up 17.9% from fall 2010)

3,297

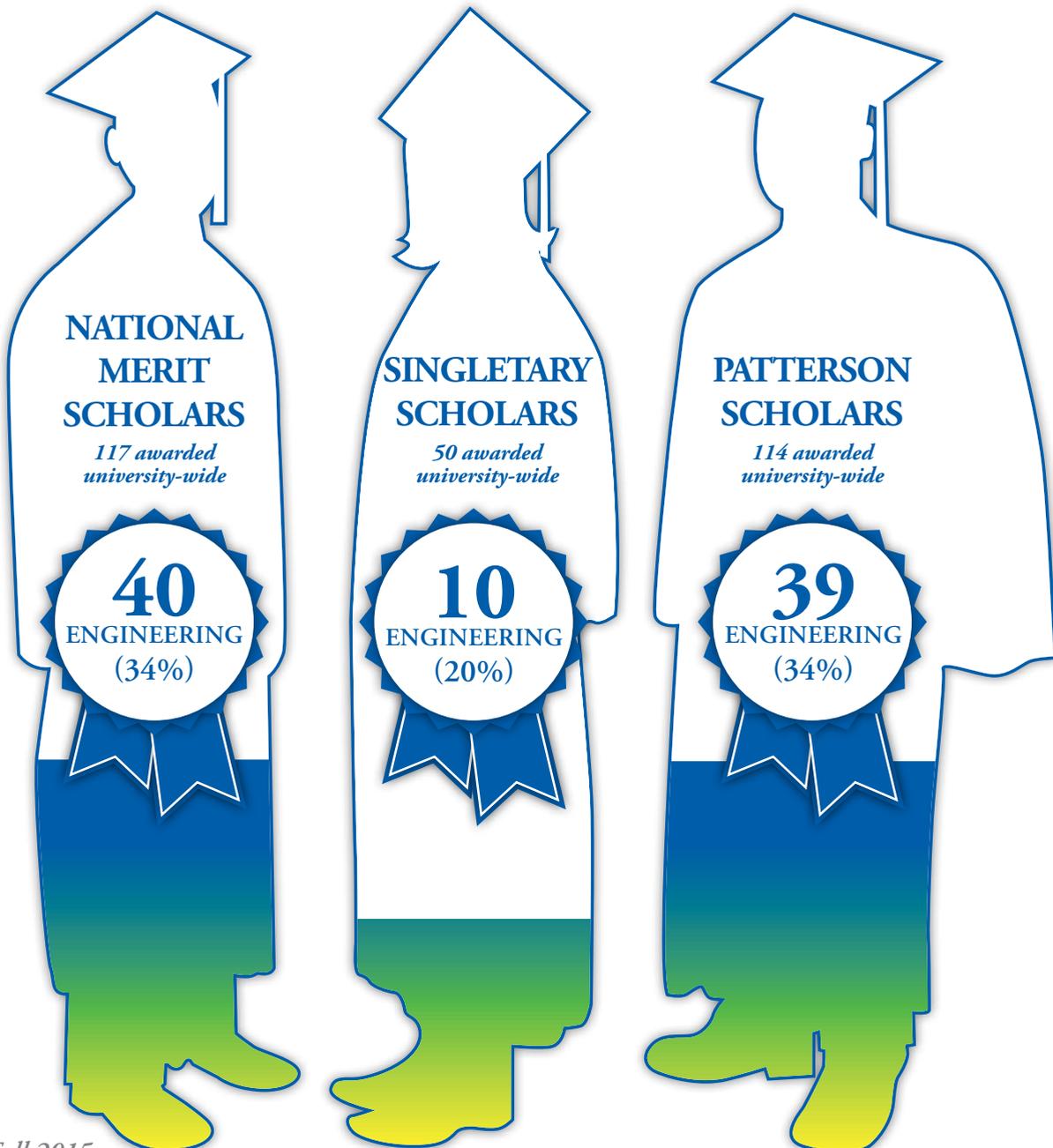
UNDERGRADUATES
(up 40.7% from fall 2010)

28.1

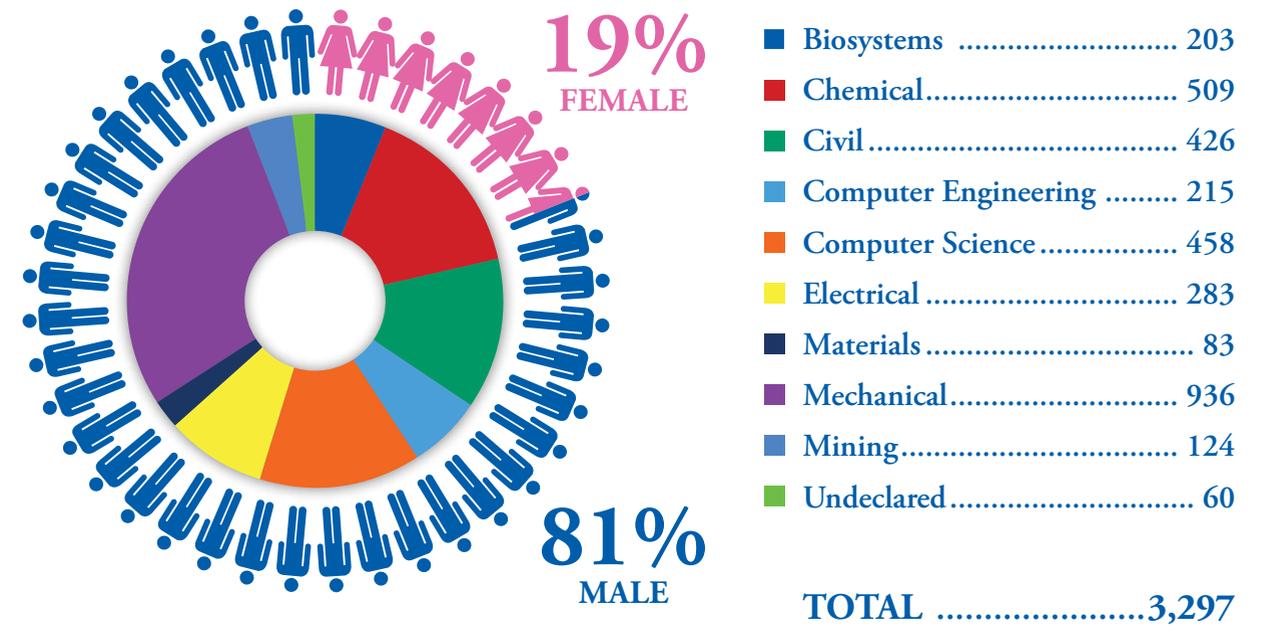
ACT COMPOSITE
(comparable SAT of 1260)

28.6

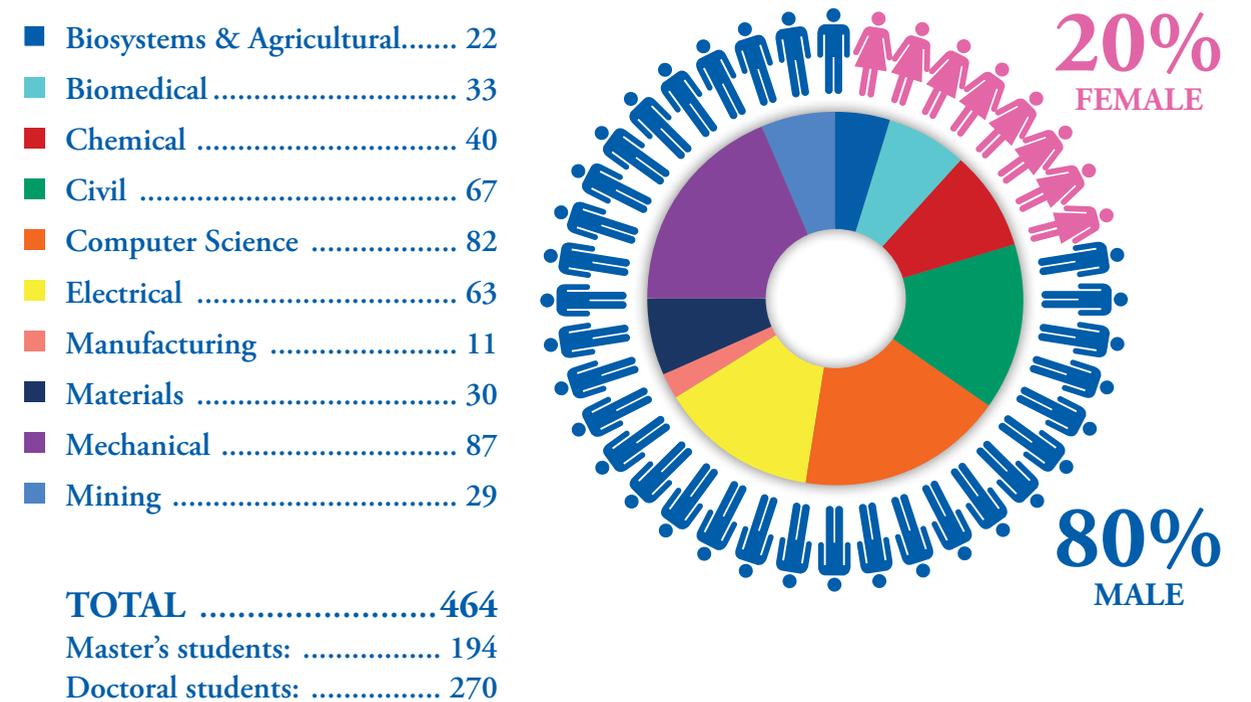
ACT MATH
(comparable SAT of 635)



UNDERGRADUATE MAJORS IN THE COLLEGE



GRADUATE MAJORS IN THE COLLEGE





Four Teaching Areas Dedicated for Civil Engineering

On June 25, the College of Engineering held a ceremony in the Joseph G. and Suzanne W. Teague Courtyard of the engineering quadrangle to dedicate four teaching and laboratory spaces that were updated through generous personal and corporate donations. The spaces will be used by the college's Department of Civil Engineering.

"Outstanding facilities breed creativity and collaboration," said John Walz, dean of the UK College of Engineering. "They are critical for attracting the best faculty and students to our program, as well as allowing our faculty, staff and students to achieve their fullest potential."

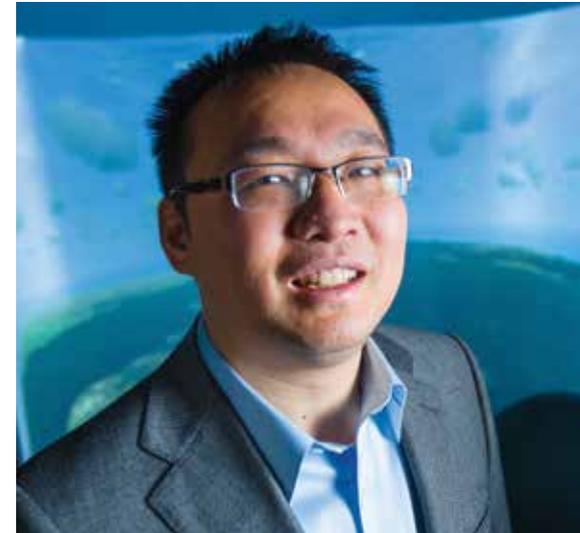
The spaces dedicated are as follows:

- David & Margaret Houchin Intech Contracting Construction Management Lab
- Palmer Engineering Classroom
- Stantec Civil Engineering Design Lab
- Stantec Civil Engineering Materials Lab

David Houchin formed Intech Contracting LLC, a Kentucky-based construction contracting company. Houchin is a charter member of the Construction Management Founders Society in the Department of Civil Engineering and received its Lifetime Achievement Award in 2009.

Ralph Palmer and Dick Nunan founded Palmer Engineering in February 1969. Through their vision and leadership, the company has grown to nine offices in four states. Palmer Engineering offers surveying, environmental, land development, structure, transportation and water resources services.

The Stantec community unites more than 15,000 employees working in over 250 locations. Since 1954, they have specialized in professional consulting in planning, engineering, architecture, interior design, landscape architecture, surveying, environmental sciences, project management and project economics.



Yang Receives Microsoft Award to Develop Real-Time Tele-collaboration

Ruigang Yang, professor of computer science, has received a Microsoft Surface Hub for Research award totaling \$25,000 to develop tele-collaboration/presence using the Surface Hub.

The Microsoft Surface Hub is a new large-screen pen and touch device designed to advance team collaboration and productivity. Microsoft is currently developing business productivity and collaboration applications, but the company has awarded grants to 10 researchers across the world to explore the potential of the Surface Hub for education.

Funds from the award and a complimentary Surface Hub will allow Yang and a graduate student to develop a real-time detailed motion capture system that is able to generate complete and water-tight 3-D models of humans in motion, providing a more convincing experience for teleconferencing. Further, Yang's project seeks to limit the input to a single camera so it can be integrated into the Surface Hub without the need for calibration and a large footprint.

Yang's research interests include computer graphics and computer vision, specifically in 3-D reconstruction and data analysis. He has taught at UK since 2003.



Cramer Receives 2015 Office of Naval Research Young Investigator Award

This spring, the Office of Naval Research (ONR) named electrical engineering assistant professor Aaron Cramer one of its 2015 Young Investigator award recipients. Of the 383 research proposals aimed at "potential breakthrough advances for the Navy and Marine Corps" submitted to the ONR, Cramer's was one of 36 to earn funding from a pool of \$18.8 million.

The focus of Cramer's work is part of the growing trend toward smarter modes of transportation—in his case, naval warships powered entirely by electricity. According to Cramer, such ships are the future.

Cramer notes that ships currently populating the naval fleet are hindered by an energy imbalance; that is, almost all of the ship's energy is directed toward enabling the ship to move. With the transition to all-electric power, an abundance of options emerge. Determining where the energy should go is the core of the proposal that made Cramer a Young Investigator. His project, titled "Market-Based Control of Shipboard Engineering Plants," combines electrical engineering with economic theory to develop value-based models for control.

Cramer has taught at UK since 2010.

National Science Foundation Awards \$6 Million to UK and Three Partner Schools to Develop Weather Research Drones

A \$6 million National Science Foundation grant will allow researchers at the University of Kentucky, Oklahoma State University, University of Oklahoma and University of Nebraska to develop unmanned aircraft systems, otherwise known as drone systems, to study atmospheric physics for improved precision agriculture and weather forecasting.

The project, called CLOUD MAP for “Collaboration Leading Operational UAS Development for Meteorology and Atmospheric Physics,” was awarded through the Experimental Program to Stimulate Competitive Research (EPSCoR) and is being led by Oklahoma State University. Led by Suzanne Smith, the Donald and Gertrude Lester Professor of Mechanical Engineering



and director of the NASA Kentucky Space Grant and EPSCoR Programs, the UK team will include mechanical engineering associate professor Sean Bailey, mechanical engineering assistant professor Jesse Hoagg, biosystems and agricultural engineering assistant professor Michael Sama and chemistry assistant professor Marcelo Guzman.

Unmanned aircraft systems are currently used in search and rescue, infrastructure inspection and in many other ways to gather information via cameras and specialty sensors. The four-university interdisciplinary team will develop small, affordable systems to measure wind, atmospheric chemistry, soil moisture and thermodynamic parameters. Doing so will provide meteorologists with data needed to build better forecasting models.

UK Part of Consortium Awarded \$6 Million NSF Grant for Brain Imaging



The National Science Foundation has awarded \$6 million to researchers in Kentucky, Oklahoma and Rhode Island to develop innovative and broadly accessible brain imaging technologies to provide insight into how the nervous system functions in health and disease. Sridhar Sunderam, assistant professor in the Department of Biomedical Engineering is co-principal investigator of the project. His team of UK researchers

includes Abhijit Patwardhan, interim chair, professor and director of graduate studies in the Department of Biomedical Engineering; Guoqiang Yu, associate professor of biomedical engineering; and Bruce O’Hara, professor in the Department of Biology.

Brain-machine interfaces (BMIs) are increasingly being used not only as assistive devices for individuals with motor impairment, but also to augment rehabilitative treatment and to interact with media such as video games. Sunderam will develop algorithms and test interactive protocols for modulating the sensorimotor rhythm of the brain using a BMI.

Undergraduate students with an interest in neural engineering, as well as graduate students and postdoctoral scholars, will have opportunities to participate in projects related to brain imaging and function.

In Other News...

- The quarter-scale tractor team won the American Society of Agricultural and Biological Engineers International Quarter-Scale Tractor Student Design Competition for the second year in a row. The team has three first-place finishes in the past four years. In 2013, it placed second.
- David A. Puleo, chair of the Department of Biomedical Engineering, was named Associate Dean of Research and Graduate Studies. He began his duties July 1.
- Dean’s Awards for Excellence in Research went to the James F. Hardymon Chair in Manufacturing Systems I.S. Jawahir and biomedical engineering associate professor Guoqiang Yu. Awards for Excellence in Service went to materials engineering professor John Balk and chemical engineering associate professor Jeffrey Seay.
- Materials engineering assistant professor Matt Beck and computer science lecturer Debby Keen received Provost’s Outstanding Teaching Faculty Awards.
- 2015 mechanical engineering graduate Jake Ingram won the Otis A. Singletary Outstanding Senior Male Award.
- Jim Kurose, Assistant Director of the National Science Foundation for Computer and Information Science and Engineering, delivered the annual Dean’s Lecture Series talk on April 13. It was titled “An Expanding and Expansive View of Computing.”
- The Engineering Residential College (ERC) living learning program moved into the brand-new Woodland Glen III residence hall this fall. After a record 400 students in 2014-2015, there are 512 students in the ERC for 2015-2016.



Shelby Clark, BSEE 1960, retired after a 45-year career working at the Martin Company in Orlando, Fla., Bell Labs in New Jersey, General Dynamics in California, ARINC in Maryland and finally as a consultant at NAVAIR in Washington, DC.

Wood McGraw, BSCE 1964, MSCE 1966, completed 46 years as an engineer with the US Army Corps of Engineers and the Department of Housing and Urban Development. He has designed dams, sanitation systems, site developments and analyzed multifamily apartment projects. Prior to working for the U.S. government, he worked for the Kentucky Highway Department at the Division of Materials specializing in highway fill stabilization.

Larry E. Whaley, BSCE 1968, is president and CEO of Cardno Haynes Whaley in Houston, Texas. He was named a Fellow in the American Society of Civil Engineers.

Michael L. Munday, BSCE 1974, is an engineer with Summit Engineering Inc. in the company's civil engineering group in Henderson, Ky.

William T. Simpson, BSCE 1976, is director of operations at Zeon Chemicals LP in the company's Louisville office.

David Garner, BSCE 1982, senior vice president, operations for Brenntag North America, Inc., received The Chlorine Institute's 2015 Peter M. Mayo Award. The award recognizes an individual for service and safety leadership in the chlorine industry through participation in The Chlorine Institute.

Paul F. Boulos, BSCE 1985, MSCE 1986, PhD CE 1989, has been appointed to the advisory group for the Center for Engineering, Ethics and Society (CEES) at the National Academy of Engineering. He serves as president,

COO and chief technical officer at Innovyze, a leading global innovator of business analytics software and technologies for smart wet infrastructure.

Casey Krawiec, BSME 1986, is director of sales and marketing at Quik-Pak, a hi-tech firm in San Diego. He recently summited Mount Whitney, the highest peak in the lower 48 states, at 14,505 feet. He lives in La Jolla, Calif.

Steve Waddle, BSCE 1987, MSCE 1990, recently retired as the Kentucky State Highway Engineer. He was awarded the 2015 Alfred E. Johnson Achievement Award by the American Association of State Highway and Transportation Officials.

Kenneth Pearson, BSEE 1989, is the PMO director at Tolteq, LLC, a company specializing in the field of "Measurement While Drilling." He lives in Liberty Hill, Texas.

Harlen D. Wheatley, BSCE 1994, is the master distiller at Buffalo Trace Distillery in Frankfort, Ky.

Rachel Mills, BSCE 1999, a 16-year employee of the Kentucky Transportation Cabinet, has been appointed director of the Division of Construction Procurement. She lives in Lawrenceburg, Ky.

John A. Barber, BSCE 2001, is a project manager with the Kentucky Transportation Cabinet in Frankfort, Ky. He is the assistant state highway engineer/project manager for the Louisville-Southern Indiana Ohio River Bridges project.

Wendy Harper, MSCE 2003, has rejoined the Lexington, Ky., office of Parsons Brinckerhoff as a supervising engineer. She will supervise engineering teams working on bridge design and rehabilitation projects in the Lexington area.

Daniel Anderson, BSME 2006, is manager of continuous

improvement at Open Universities Australia.

Eric Ringer, BSME 2010, is co-founder and strategic projects engineer at Skyward, the first information management solution designed for commercial drone operators. He lives in Portland, Ore.

Michael Delfino, BSCS 2011, was among only 34 high school mathematics and science teachers in the U.S. named to the 2015 cohort of Knowles Science Teaching Foundation teaching fellows. Previously a firmware engineer at Lexmark, he teaches at the STEAM Academy in Lexington, Ky.

Brent White, BSME 2011, is a category supply planner at Procter & Gamble in Cincinnati, Ohio.

Andrew Goderwis, BSMNG 2012, is a project engineer at Modern Ice Equipment & Supply.

Limin Zhou, PhD ME 2013, received the 2015 Homer Addams Award from ASHRAE. This is the top research award given to a graduate student by ASHRAE.



Ratterman Becomes UK Alumni Association President

After serving as president-elect of the University of Kentucky Alumni Association for the 2014-2015 fiscal year, David B. Ratterman of Louisville, Ky., assumed his new duties as president on July 1.

Ratterman has been involved with student recruitment, special events, diversity activities and the Greater Louisville UK Alumni Club. He has also been a member of the UK Advocacy Network since the group's inception. Ratterman is a member at Stites and Harbison PLLC in Louisville and is a Fellow of the American Bar Foundation, a Fellow of the American College of Construction Lawyers and is listed in "Kentucky Super Lawyers" and "The Best Lawyers in America." Ratterman serves on a variety of professional committees and organizations, including as secretary and general counsel to the American Institute of Steel Construction. He is also a retired U.S. Navy commander.

Ratterman received a bachelor's degree from UK in mechanical engineering in 1968.

Charles Arvin, 40, staff member in the college's Institute for Sustainable Manufacturing, died following a motorcycle accident on June 17, 2015. He received a bachelor's degree in mechanical engineering in 1998 and a master's degree in manufacturing systems in 2006.

Roger Eichhorn, 84, passed away May 4, 2015 in Houston, Texas. Eichhorn served as mechanical engineering professor and chair before becoming dean of the UK College of Engineering from 1975-1982.

Ira "Joe" Ross, 82, passed away August 22, 2015. He retired in 1994 after teaching agricultural engineering for over 30 years and serving as department chair.

Frederic L. Dupree, Jr.	Mining Engineering	1948
Burkett Ragan Barrett III	Metallurgical Engineering	1950
Elza F. Burch	Mining Engineering	1950, 1951
Charles S. Little	Electrical Engineering	1950
Clark B. Cox	Civil Engineering	1952
Arthur W. Francis	Civil Engineering	1952
Richard W. Lyon	Civil Engineering	1952
Raymond T. Whitson	Mechanical Engineering	1952
Joseph J. Schmitt, Jr.	Mechanical Engineering	1954
Clayton B. Flynn, Jr.	Mechanical Engineering	1955
Joseph F. Moore	Mechanical Engineering	1955
Alexander R. Innes	Metallurgical Engineering	1956
William F. Diersing	Civil Engineering	1957
Kenneth D. Handy	Electrical Engineering	1957
William T. Montgomery	Civil Engineering	1957
Terry M. Regan	Civil Engineering	1957
James A. Roberts	Civil Engineering	1957
Aubrey D. May	Civil Engineering	1958, 1960
Ernest E. Brown	Civil Engineering	1959
Stathis G. Linardos	Electrical Engineering	1959
Kenneth M. Brantferger	Mechanical Engineering	1962
Dean W. Trunnell	Mechanical Engineering	1962
Reginald L. Bethel	Mechanical Engineering	1963
Gordon Edward Bloom	Electrical Engineering	1963
Douglas C. Griffin	Civil Engineering	1963, 1965
Richard L. Shell	Mechanical Engineering	1963
Habib Jafarzadeh	Civil Engineering	1964
William Prentice Smith	Chemical Engineering	1964
Joseph D. Hicks, Jr.	Electrical Engineering	1966
William A. Isaacs, Sr.	Mechanical Engineering	1966
William G. Russell	Chemical Engineering	1967
Gary S. Poole	Civil Engineering	1969, 1975
Donald R. Herd	Civil Engineering	1971, 1974
Linda R. McCall	Computer Science	1971
Dennis K. Magruder	Electrical Engineering	1974
Gregory E. Houck	Civil Engineering	1976
John W. Bassett, Jr.	Mining Engineering Civil Engineering	1979 1980
Michael K. Spurlock	Electrical Engineering	1979
Dean P. Molino	Electrical Engineering	1982
Clifford R. Miller	Civil Engineering	1991

BE INCLUDED

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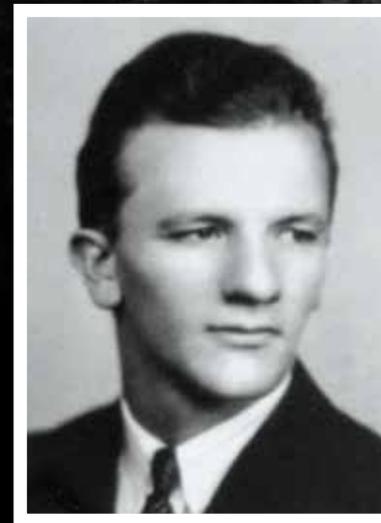
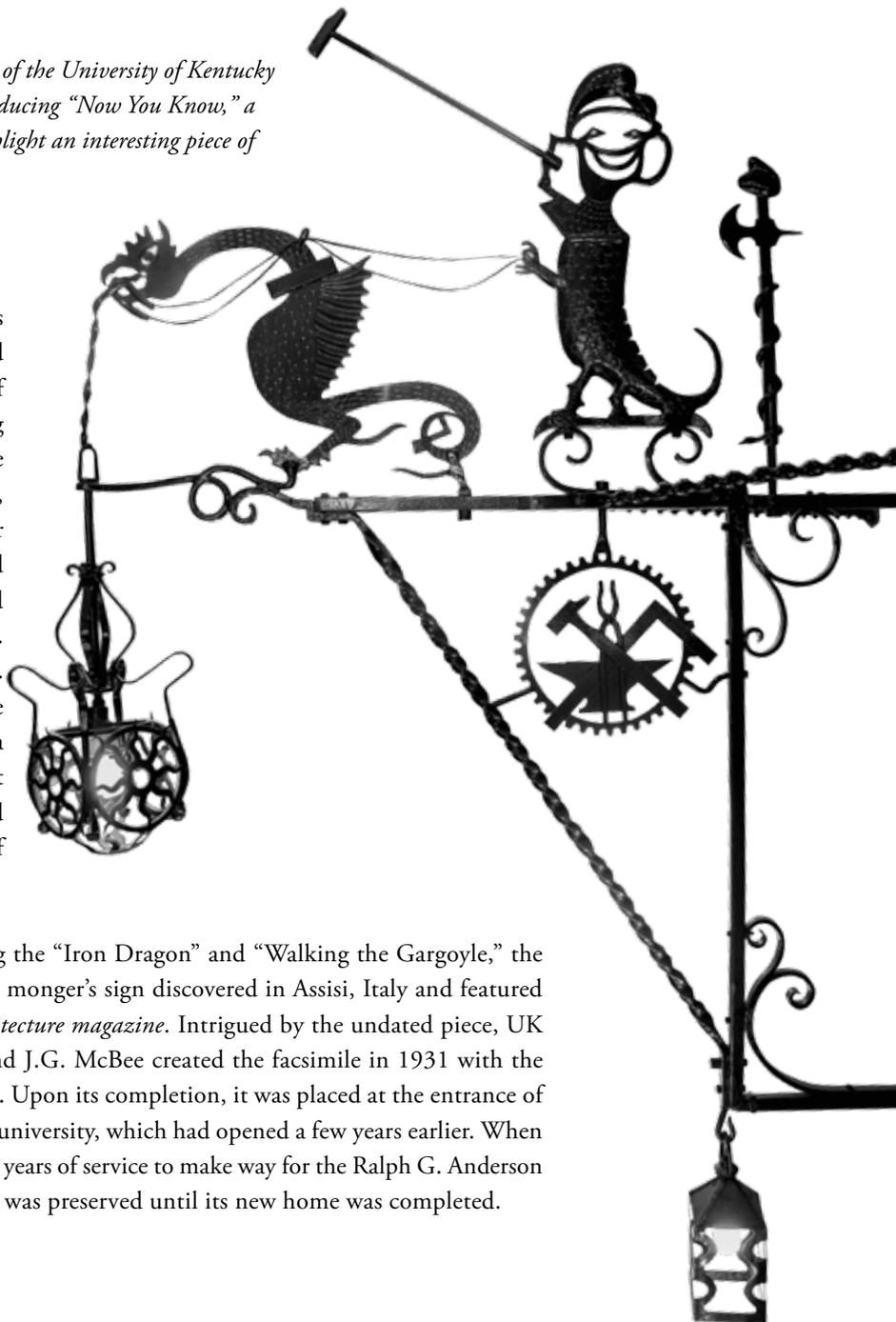
WALKING THE GARGOYLE

In light of the 150-year anniversary of the University of Kentucky College of Engineering, we are introducing "Now You Know," a new back page feature that will highlight an interesting piece of history connected to the college.

"What is that thing?"

Every now and then, curious students in the Joseph G. and Suzanne W. Teague Atrium of the Ralph G. Anderson Building notice the bizarre iron sculpture attached to the north-facing wall, roughly even with the second floor walkway. The scene depicts a scaled creature blowing a horn preceded by a gargoyle or similar creature. A lantern dangles from its mouth. Less obvious details include a battle axe encircled by a serpent and a collection of ironworking tools. It is a piece worth one's attention and has been a staple in the College of Engineering for 84 years.

Known by many names including the "Iron Dragon" and "Walking the Gargoyle," the work is a reproduction of an iron monger's sign discovered in Assisi, Italy and featured in the August 1927 issue of *Architecture magazine*. Intrigued by the undated piece, UK instructors Stephen T. Saunier and J.G. McBee created the facsimile in 1931 with the assistance of engineering students. Upon its completion, it was placed at the entrance of the Henry W. Wendt Shop of the university, which had opened a few years earlier. When the Wendt Shop was razed after 71 years of service to make way for the Ralph G. Anderson Building in 1998, UK's rendition was preserved until its new home was completed.



Thurston H. and Kathleen Strunk

Thurston Strunk received his bachelor's degree in mining engineering from the University of Kentucky in 1940 and worked in the coal industry for 40 years. He served as president of the Virginia Pocahontas Division of Island Creek Coal Company and was employed as executive vice president of Powellton Coal Company in Mallory, W. Va. When he passed away in 1982, his wife, Kathleen, established the Thurston H. Strunk Scholarship to support students pursuing a career in the engineering profession. The scholarship has been aiding students for over 30 years and continues to grow. For the 2015-2016 academic year, 26 students received the scholarship and the total amount dispersed was \$60,750.

For more information about supporting engineering education through estate planning, contact Jeff Snow, Director of College Advancement at (859) 257-9191 or jeff.snow@uky.edu.

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