

THE MAGAZINE OF THE UNIVERSITY OF KENTUCKY COLLEGE OF ENGINEERING

KENTUCKY

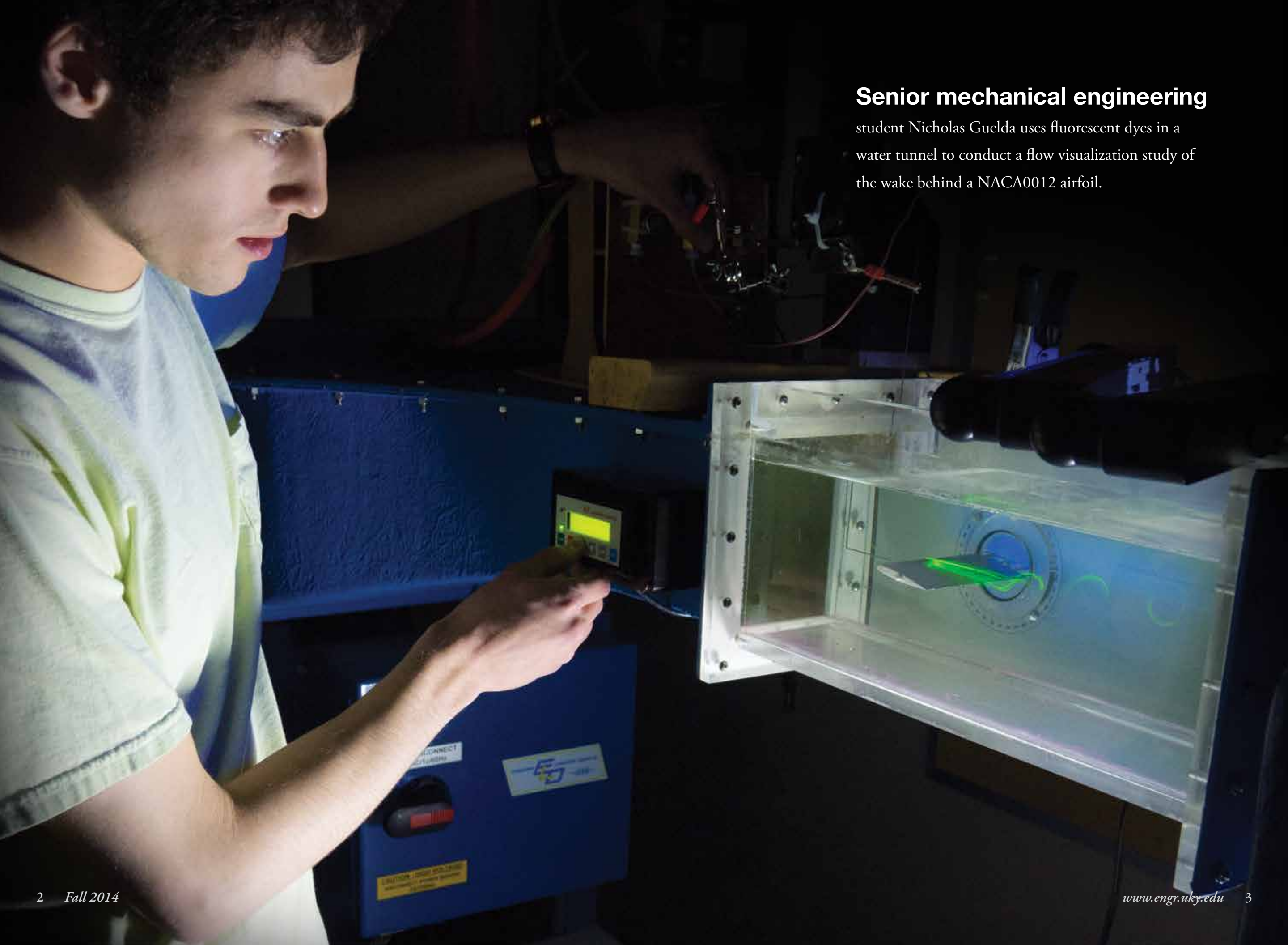
ENGINEER JOURNAL

Fall 2014



Issam Harik

strives to redefine
bridge repair throughout
Kentucky and beyond.



Senior mechanical engineering

student Nicholas Guelda uses fluorescent dyes in a water tunnel to conduct a flow visualization study of the wake behind a NACA0012 airfoil.



Message from the Dean

Welcome to the Fall 2014 issue of *Kentucky Engineering Journal*. I am writing this greeting on the first day of classes for the fall semester—a momentous day for us because with the start of the semester, our undergraduate student body has now officially reached over 3,000 students for the first time. Our incoming freshman class topped 800 for the first time as well. This is unprecedented growth for the college and a testament to the hard work contributed by our faculty and staff.

Dovetailing with the increase in our student population, our Engineering Residential College living learning program has gone from 100 students to 400 students thanks to the program's move to the brand new Champions Court I residence hall. You'll find an article about the program and its new home in this issue. You will also read about civil engineering professor Issam Harik, whose invention of a carbon fiber-based product called CatStrong is changing the way bridge repair is conducted in Kentucky (and soon beyond), 2012 Hall of Distinction inductee Rebecca Cowen-Hirsch, mechanical engineering student James Gwinn and scholarship creator Elaine Duncan. Plus, don't miss our "Out of the Lab" interview with professor Vijay Singh, who is passionate about exploring the nature of reality through poetry.

I am always excited by the start of a new semester—especially here at UK. I hope your tour through our fall issue will give you a glimpse of the people, places and programs that make our college special.

Sincerely,

John Y. Walz
Dean

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FRONT COVER

Issam Harik, the Raymond-Blythe Professor in Civil Engineering, has created an innovative bridge repair product called CatStrong.

UNIVERSITY OF
KENTUCKY
College of Engineering



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LIVE AND LEARN

The Engineering Residential College has a new home, new director, new programming and quadruple the enrollment.

When it comes to understanding the vision for residence hall expansion on the University of Kentucky campus, President Eli Capilouto underscores a transformative element that often goes unsung.

“We are not simply ‘building residence halls,’” he posits. “We are enhancing our ability to create a dynamic Living Learning Program in which more students can grow together both socially and intellectually.”

The statistics are impressive. According to Executive Vice President for Finance and Administration Eric N. Monday, the new residence halls have allowed the number of students participating in UK Living Learning Programs (LLPs) to nearly double. As of the start of this semester, 1,734 students are enrolled in LLPs—up from 960 just one year ago. With more residence halls slated for construction, students in LLPs are expected to grow to over 3,200 in fall 2015, 4,200 in fall 2016 and over 4,500 in fall 2017.

“This is a very exciting time for improving student quality of life,” says Monday. “It’s another example of our commitment to put students first in everything that we do.”

The 285,000 square foot Champions Court I offers 740 beds in 380 units, 13 study rooms, five lounges, a Common Grounds coffee shop and an amazing view of downtown Lexington from the rooftop terrace.



Standing: Ray Grijalba, Rory Pope; Seated: Tony Colella.

The UK College of Engineering's own LLP, the Engineering Residential College (ERC), is among the LLPs benefitting from UK's housing facelift. The program, maxed out at 100 freshmen when located at Ingels Hall, has swelled to 400 students, with freshmen and upperclassmen living in the brand new Champions Court I residence hall that opened in August. Tony Colella, in his first year as director of the ERC, says the 400 allocated beds were filled before March. As he reviews the amenities, it is not difficult to ascertain why.

"I honestly believe you will not find a better quality of life facility located anywhere than here in Champions Court I. All rooms are suite-style where students share a living space with another student but have their own individual bedroom. There's Wi-Fi throughout the entire facility, state-of-the-art security systems to provide a safe living area, each room has moveable furniture, independent climate control and even extra-long Tempur-Pedic mattresses."

Beyond the enviable creature comforts, Champions Court I is well-suited for the ERC's goal of academic excellence in a community environment. The basement contains a Common Grounds coffee shop and study lounge with capacity for over 250 students. The program also melds students with surrounding professionals. The ERC hosts "Root Beer with an Engineer" where College of Engineering faculty, engineering alumni and industry leaders share their wisdom with ERC students over root beer floats. The program also provides workshops designed to help students prepare for graduate school and internships, as well as free tutoring in math, chemistry and physics.

Colella points to past ERC participants' cumulative grade point averages as demonstrable indicators that the LLP concept works. In the fall of 2013, the 94 students residing in Ingels Hall achieved a 3.3 GPA for the semester (3.2 in spring 2014). Twenty-four students in the ERC earned a 4.0. With the move to Champions Court I, four times as many engineering students are now exposed to the programming and social context that has often led to such results.

"We're excited to see how simply surrounding our students

with others who share a common academic interest really does impact their success here at UK," Colella adds.

Keys to the success of the ERC are 18 peer mentors who provide mentoring to freshmen and transfer students. Sixteen of the 18 are sophomores and juniors and two seniors—civil engineering student Rory Pope and materials engineering student Ray Grijalba—anchor the team as Colella's top-level mentors who help with planning and programming.

"The coolest thing is being able to impact students' lives. We want to make students comfortable and feel that they can thrive here at UK with the many resources the ERC provides. As peer mentors, we take seriously the responsibility to help students be successful not only at the academic level but also in their professional careers," says Pope.

Because more than 100 students were unable to get into the ERC due to space limitations, Kimberly Ward Anderson, associate dean for administration and academic affairs, submitted a proposal for an increase to 600 beds for the 2015-2016 school year. Not only was the proposal approved, the ERC will be relocated to Woodland Glen III which, upon opening in fall 2015, will be situated near the Johnson Recreation Center, William T. Young Library and a new \$32 million commons called "The 90" that will host a new dining area, classrooms, office spaces and more. The 90 will also feature the first on-campus Panera Bread restaurant in the nation. The ERC plans to occupy all of Woodland Glen III's 700 beds in the 2016-2017 school year.

"There is no doubt the UK College of Engineering is doing all the right things to attract high quality students who want to sharpen their academics through our LLP, and UK leadership is supporting the College of Engineering all the way," affirms Anderson. "If students want to surround themselves with other high-achieving students, share in academic success, learn how engineering and computer science are changing the world through real-life information sessions and live in outstanding, modern facilities, then they should look no further than the Engineering Residential College right here on the UK campus." [KEJ](#)

UK ALUMS AT MESSER BUILD FOR THE FUTURE



Champions Court I is just one of several residence halls recently finished or under construction. Over the next few years, UK plans to continue replacing existing residence halls with brand new facilities, adding more than 5,500 new beds and elevating the total occupancy number to 9,000. Messer Construction Co. has been at the heart of the campus' transformation. A regionally-based, employee-owned construction firm that

specializes in complex commercial construction in higher education, health care, life sciences and industrial market segments, Messer employs 24 UK engineering alumni who have worked on the massive project that began in 2012.

"We have had great success with engineers from the University of Kentucky," says 1996 civil engineering alumnus and Messer Senior Project Executive Mike

Wedding. "I know I speak on behalf of the other 23 UK grads actively working on campus when I say that it gives us great pride to be able to return to the place where we started. So many of our employees spent the most influential years of their lives living and learning on this campus. This place has helped make our employees who they are today."

In addition, 12 students in the college's Cooperative

Education Program have worked on UK's housing projects for Messer. Mike vouches that their contributions have been substantial.

"Many of the co-op students we bring aboard have the opportunity to join Messer's student housing projects on the UK campus. We've found that they add value to our projects from the very start and quickly become a critical part of our team."



CAT STRONG

Issam Harik's carbon fiber-based innovation is making bridge repair easier, safer and more cost-effective.

Here's a fun fact: The U.S. has more than 600,000 bridges over 20 feet in length, with Kentucky claiming more than 14,000 of them. Here's a not-so-fun fact: a number of these bridges are past their design life and are still serving the public while carrying traffic and loads that exceed their design capacity. Almost 25% of the bridges are considered "functionally obsolete" (e.g., narrow traffic lanes, no shoulders, etc.) or "structurally deficient" (e.g., deterioration, damage, etc.).*

Issam Harik, the Raymond-Blythe Professor in Civil Engineering and structures program manager at the Kentucky Transportation Center, says the term "deficient" often prevents the public from understanding the true nature of the problem.

"Every bridge in the nation is inspected for deficiencies, at a minimum, once every two years. Bridges with known issues are inspected more frequently to insure the safety of the traveling public. Each bridge has to be assessed individually in order to understand whether repair is needed."

And when repair is needed, Harik can do more than simply analyze or make recommendations; he can bring the goods. Through funding from the Federal Highway Administration, the Kentucky Transportation Cabinet and Kentucky Science and Engineering Foundation, he and a team of students developed CatStrong CRP (carbon rod panels). The lightweight carbon fiber product has been used in the repair of several Kentucky bridges with impressive results due to its portability and ease of application.



The CatStrong CRP 195 displayed above can resist 195,000 pounds per foot of width.

“If you were to take a sheet made of the carbon fiber material used in CatStrong, it would be equivalent in strength to a steel plate that is seven to eight times as thick; yet it would be 30 times lighter than that steel plate,” details Harik. “This makes CatStrong a better option for making overhead repairs—something extremely difficult to do with other repair materials.”

Currently, CatStrong rod panels come in two different strengths. The strongest version can resist 195,000 pounds per foot of width, yet can be applied by a single worker.

“CatStrong was created so that it could be applied by one worker, whether in a bucket truck or on special scaffolding over rivers, valleys, roadways, etc., where access is limited. This helps significantly with reducing the number of man hours and traffic control—usually the biggest expense on a job—required to make the repair,” he says.

Harik is quick to point out that carbon fiber is one of many available options when it comes to construction materials and that using it for bridge repair is not a novel concept; however, the limitations he noticed in other carbon fiber-based products since the mid-1990s inspired him to conceive what would become CatStrong. Its first official application became a part of then-Ph.D. student Abheetha Peiris’ doctoral dissertation.

“I never expected what was initially a small part of my dissertation research to end up where it is now,” Peiris reflects. “Dr. Harik hadn’t coined the name CatStrong then, so we called them carbon strip panels, as they were

made of carbon fiber strips and not rods. After numerous laboratory tests, we finally came up with the carbon rods we use today.”

Peiris is now a full-time researcher with the Kentucky Transportation Center and works with Harik in the structures program as well as on bridge repair projects involving CatStrong. To assure CatStrong is applied correctly, repair workers must be personally trained by either Peiris or Harik. As a result, Peiris is at every repair site from the first minute

until the last—day or night. This is because prior to applying CatStrong, deteriorated material must be purged.

“Sometimes you end up removing half of a concrete structural member,” Harik explains. “The steel bars in a concrete member could be rusted so badly that by the time you sandblast and clean them, you’re down to 30% of the original bar size. But you

have to get down to that level because the success of CatStrong depends on how well you repair the damaged structure and treat the surface.”

If the timeline for a project is five days, Harik says the majority of the time will be spent in this preparatory stage. Only a half-day or so will be needed to apply CatStrong.

“Once the structural member section is built back to its original shape, we make a paste from a two-part resin and spread it on the surface. Then we press CatStrong into it, add another layer of paste over it and that’s it. Once applied, it will gain 80% of its strength within 24 hours.”

Interestingly, neither Harik nor Peiris physically produce

“We have seen CatStrong go from development to design to field application to monitoring. Along the way, we’ve involved many undergraduate and graduate students and made Kentucky bridges safer.”



Before and after photos of the KY 81 bridge in McLean County, Ky.
The project was completed in one month.



the CatStrong panels; that is the work of undergraduate students in Harik's research group who are lovingly referred to as "well underpaid labor." He grins as he recalls an instance when CatStrong was used on a bridge located near the homes of two students.

"They actually came to the site because they were so excited to see what they had produced in the lab employed in the field. Whenever they would go home, they would check on the bridge and report how the repair was doing. You could see the pride they felt."

Currently, Harik and Peiris are writing design and construction guides that will enable workers to use CatStrong without their direct oversight. Once completed, there will be great potential for CatStrong to be used in other states and internationally. Despite having only been used on Kentucky bridges, Harik is often asked about CatStrong's commercial availability because of presentations and published articles he has authored. The University of Kentucky has applied for a patent, which is pending. Harik insisted that the names of the four students who were involved in the initial development of CatStrong be listed on the intellectual property and patent applications. The proceeds from the sale of CatStrong rod panels will be donated to the College of Engineering.

How did the name "CatStrong" come about? "Well, I am proud of our Wildcat legacy and the product is very, very, strong," says Harik with a smile.

The CatStrong family has recently grown to include carbon fabrics for structural repairs in buildings and bridges and carbon wraps for the rapid repair of bridge piers and piles above and below water and columns in buildings and other structures.

"We have seen CatStrong go from development to design to field application to monitoring," Harik says thoughtfully. "Along the way, we've involved many undergraduate and graduate students and made Kentucky bridges safer. This has certainly been one of the most enjoyable and rewarding projects I have ever undertaken." [KEJ](#)

*U.S. Department of Transportation, Federal Highway Administration, "2013 Status of the Nation's Highways, Bridges, and Transit: REPORT TO CONGRESS EXECUTIVE SUMMARY."



THE PIT & THE PENTAGON

*One of the leading players in the satellite industry, **Rebecca Cowen-Hirsch** has made a career out of demolishing barriers.*

As a high school senior, Rebecca Cowen-Hirsch knew she wanted to study engineering at the University of Kentucky; however, attending UK violated an unwritten family guideline regarding where the Cowen kids could go to college. The problem? UK was *too close* to home.

“As a high school student, I was always on UK’s campus; but my parents had an expectation that we were to go out of state for college so we could learn how to live on our own. I told them that even if I went to UK, they wouldn’t see me until Thanksgiving—even though we would be living in the same city. And that’s exactly what happened.”

Once allowed to attend UK, Rebecca began researching the disciplines offered by the College of Engineering. When finished, she came to the conclusion that electrical engineering was by far the toughest program in the college.

So, she chose it as her major.

“I picked electrical engineering because I believed it would pose the biggest challenge, but also because of its breadth. I could focus on power, electronics or numerous other areas.” This wide range of technical specialty options proved to be more beneficial to her widely varied career

than she could have possibly imagined at the time.

What does Rebecca remember most fondly about her time at UK? Certainly the camaraderie of her fellow students at basketball games and other extracurricular activities. Playing intramural volleyball. Dorm life. But few memories rival the long, arduous study sessions in “The Pit,” a study area located in Anderson Hall.

“I spent a lot of time in The Pit,” Rebecca, then known best as “Becca,” recalls. “I distinctly remember working with students on projects or solving lab work together. We ate from vending machines and drank far too much really bad coffee. Some of our best learning was done in The Pit, however. Those friendships formed during the long study hours in The Pit have endured the passage of time.”

Amid a wide range of job offers upon graduation, Rebecca again chose an atypical path by electing to work for the United States Air Force in 1989. She describes her decision as an epiphanic moment.

“I realized I would get to work with the most amazing technology, have unprecedented opportunities and serve my country. How could I possibly turn that down?”

Rebecca took a low-level entry position as a systems engineer at the 4950th Test Wing at Wright-Patterson Air Force Base in Dayton, Ohio. Not surprisingly for that time, she was the only woman in her unit. Undaunted, Rebecca worked on several multi-million dollar projects before accepting her first program manager assignment—an optics program valued in excess of \$155 million that supported the Star Wars space program. For someone as young as Rebecca to hold such a leadership position was unprecedented; nevertheless, she led her team to perform extraordinary missions that redefined the manner in which the United States and its allies operate in space.

Rebecca continued to establish a reputation for breaking new ground. In addition to her program management responsibilities, she was provided the opportunity to train as a mission commander on board the Air Force Advanced Range Instrumentation Aircraft (ARIA). This role had never been filled by a female civilian prior to her successful completion of the year-long training. As an ARIA mission commander, Rebecca led military aircrews on worldwide deployments in support of shuttle missions, satellite launches, reentry vehicle tracking and cruise missile support. These missions were critical to the United States' preeminence in space. Her role as a mission commander taught her invaluable lessons about collaboration as she worked with many levels of professionals boasting a wide array of experiences and backgrounds. She has carried these lessons throughout her career.

“Not only was I surrounded by a crew of all men, but most of them had been in the Air Force longer than I had been alive. I learned so much from them and, over time, I developed a capability and competence that allowed me to earn their respect and ultimately to lead this amazing crew of professional airmen.”

Following a time at Edwards Air Force Base in California where she continued her professional advancements in systems engineering and experimental flight testing, in 1994 Rebecca moved to Annapolis, Md., to work for another part of the Department of Defense called the Joint Spectrum Center. She was handed responsibility for all of the DOD's spectrum interference resolution and electronic system development processes. Soon after,

she led the team that coordinated all of the U.S. military and national satellites for the U.S. government. As the technical advisor for the United States Ambassador to the International Telecommunications Union, she also provided leadership and oversight for all of the international treaty negotiations for satellite orbital coordinations and global spectrum policy.

Rebecca's rising stock in the spectrum management arena led to a personal call from the Deputy Secretary of Defense. He invited Rebecca to start a new organization called the Defense Spectrum Office. Its charge was to bring together all of the various spectrum divisions across each of the four branches of the U.S. military into a single organization and design a well-coordinated strategy across the entire Department of Defense. The promotion made her the youngest senior executive service appointee in the Department of Defense at that time. She would later oversee the commercial satellite communications program for the entire Department of Defense and overhaul the way it manages and utilizes commercial satellite communications for mission-critical communications around the world.

After 20 years in the Department of Defense, Rebecca left the government to join Inmarsat, a British-based company specializing in global mobile satellite communications. She is currently senior vice president for government, strategy and policy and is responsible for leading the strategic direction, development and execution of Inmarsat's government business across key markets around the world. In this role, she leverages her rich expertise in government and in the satellite business to develop innovative commercial satellite communication capabilities that provide unique and affordable solutions to governments' most critical communication challenges.

“I find it fascinating to go into the Pentagon, gain an understanding of the contemporary challenges they're having and turn industrial investment dollars into a global constellation of satellites, ground stations and user terminals that meet their needs in a complementary fashion—all without a dollar of taxpayer money spent,” she explains, adding that beginning in 2010, Inmarsat began investing \$1.6 billion

The Inmarsat Alphasat on an Arianespace launch vehicle in French Guiana just prior to its successful launch in July 2013.



Photo: Jim Guillon

into a brand new constellation of satellites and ground stations designed to support the U.S. government and allied nations.

“One of the things I love about what I’m doing is that the satellite industry is such a global environment,” Rebecca says. “We are working with some of the most captivating technology against the backdrop of global economic and geopolitical situations. I constantly have the opportunity to lean on my diverse defense and technical experience to solve interesting problems in new, strategic ways. It truly makes my heart sing.”

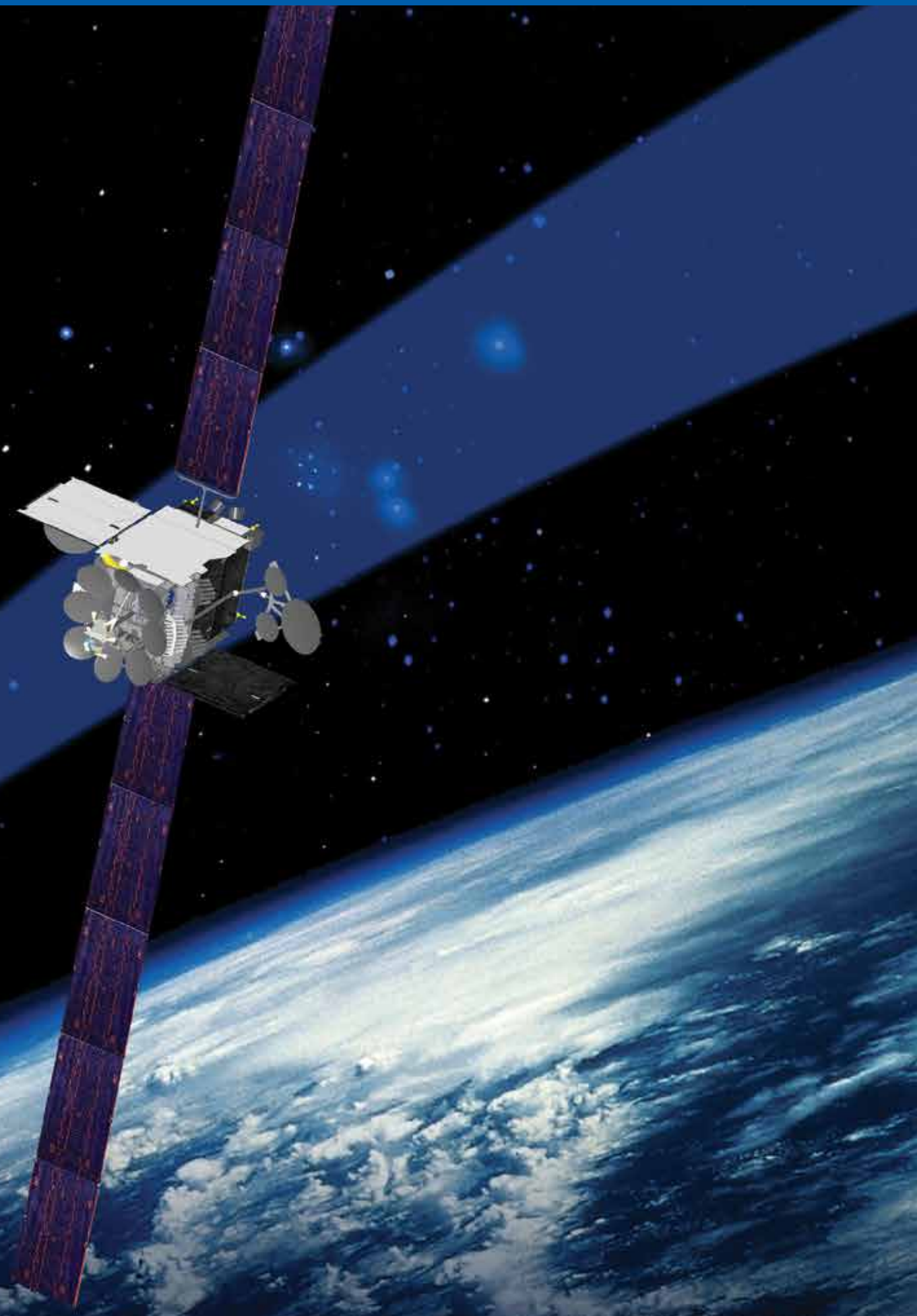
Also close to Rebecca’s heart is her work with WIN–Women in NOVA (Women in Northern-Virginia), a group within the Armed Forces Communication & Electronics Association (AFCEA). She founded the non-profit organization in 2012 and has seen its membership grow from a handful of women to over 180. The group provides women in communication and information technology opportunities to increase their visibility, expand their professional networks and receive mentoring. Profits generated by Women in NOVA activities are funneled into STEM education scholarships.

“Leading Women in NOVA is a high priority for me and I am passionate about giving back to other professionals by being able to share my experiences and help others grow,” Rebecca affirms.

From The Pit to the Pentagon, Rebecca cherishes her vocational journey and the platform it has provided her to help young professional women in her field. As a way of honoring her achievements and contributions to the world through engineering, Rebecca was inducted into the UK College of Engineering’s Hall of Distinction in 2012.

“I am proud to use the strong technical foundations, experiences and capabilities I learned at UK and bring them to bear, both technically and in a public policy context, while serving my country at the same time,” Rebecca reflects. “It’s been an honor to have the opportunities and career I’ve had.” [KEJ](#)

An artist’s rendition of the Inmarsat 5 Global Xpress® satellite, a part of Rebecca’s current program. The first of three satellites in Inmarsat’s newest constellation is on orbit and operational.





A WISE MAN ON CAPITOL HILL

James Gwinn's perseverance and tenacity made him a perfect candidate to spend two months interning in the nation's capital.

On a summer evening in 1998, heading to a party and driving too fast, James Gwinn hit a utility pole doing approximately 65 mph. He was not wearing a seatbelt. The result? A collapsed lung, two broken femurs, a concussion and paralysis from the waist down. He was 18 at the time.

Faced with a serious injury bearing lifelong implications, James began constructing an outlook for his future.

"It came down to choice. I could either sit around feeling sorry for myself, telling myself that the world owed me for a mistake that I made, or I could get up and do the best I could with what I had," he says matter-of-factly. "I didn't want paralysis to define who I am or what I do."

Now 34, James has benefitted from his determination. From establishing a woodworking and jewelry business in his hometown of Paducah to currently pursuing a mechanical engineering degree through the University of Kentucky's engineering program in Paducah, James has continued to experience, learn and grow. This past summer, he was one of 11 students to be selected for the Washington Internships for Students of Engineering (WISE) program, which is organized by a collaboration of seven professional engineering organizations. The honor earned him a nine-week stint in Washington, D.C., where he learned about the public policy process—especially how engineers can contribute to legislative and regulatory public policy decisions. A

faculty mentor, William Murphy, suggested James apply.

Deena Crouch, UK Paducah Campus recruiting officer, says she wasn't surprised the American Society of Mechanical Engineers (ASME) picked James for the internship.

"James is a humble student who does not always recognize the infectious passion he has for learning. He is hardworking, passionate and driven to succeed—a role model to others around him."

The two months in Washington gave James an inside perspective on the unique way Congress works, a process James says he came to appreciate.

"What surprised me most is that while people complain about the inefficiency of Congress, it's actually not designed to be efficient. The economist in me hates it, but the way Congress works gives the free market economy more chances to solve its own problems first."

When asked if James envisions himself entering the political fray one day, he laughs and gives a firm no.

"I managed to get out of Washington without contracting 'Potomac Fever'; however, the WISE internship did give me a better understanding of how I might be able to work within the political system to make future projects happen. That certainly made the experience worthwhile." **KEJ**



A WARM WELCOME

Elaine Duncan wanted to inspire high school students from the Commonwealth to study engineering at UK; so she started a scholarship.

If you ask Elaine Duncan what she would say to a student debating whether an engineering education at the University of Kentucky is right for them—or if they could afford it—she doesn't mince words.

“Just apply!”

Elaine, a UK alumna and Anderson County High School graduate, can't say it strongly enough: Kentucky high school students should see an engineering education at UK as within their reach. They need only apply. To provide financial aid toward realizing that goal, Elaine, who is president of Paladin Medical in Stillwater, Minn., has funded the Elaine Duncan Women in Engineering Scholarship. The scholarship is available to any qualified student who has graduated from a Kentucky high school and is pursuing a degree in engineering. Both men and women are eligible for the scholarship, with preference given to female applicants.

“I want Kentucky high school students to see themselves at UK. I hope that by supporting a scholarship aimed at students within the Commonwealth, I can entice Kentucky graduates to consider the UK College of Engineering. Students in Kentucky high schools—especially young women—may need a little extra encouragement to see themselves in an engineering career. Plus, those who may think of engineering may still think UK is unattainable. Perhaps this scholarship can help

students in some way to feel they are welcome—as I felt when I applied.”

Elaine says that being able to customize her scholarship to target Kentucky high school graduates has helped reinforce her ongoing involvement with activities in the college. Elaine mentors biomedical engineering students from time to time, and when her schedule permits, she attends the annual David K. Blythe Society scholarship luncheon that gives donors and recipients a chance to connect.

“In addition to the luncheon, I receive a letter each year from the individual who has been awarded the scholarship. When I read the letter, I am on cloud nine for days. I love hearing about their studies, the different student organizations in which they participate and what they plan to do when they graduate.”

Elaine advocates that potential donors consider creating a targeted scholarship of their own.

“I know there are people who could start a scholarship to encourage certain students in this way, but who think, ‘Funding a scholarship is for rich or dead people.’ But I didn't wait until then! I see this fund at work right now. It really is simple to start and one of the most rewarding returns on an investment in the future that an alumnus can make—right now.” **KEJ**



Yvonne Johnson:
Sophomore,
Computer Science

Yvonne Johnson confesses she would have eight different majors if it were allowed; however, when she arrived at UK, she whittled her wide-ranging interests down to two majors: English and computer science. For Yvonne, the two majors complement each other because she has been teaching herself how to build websites and code in order to showcase her creative writing projects since the sixth grade. This summer Yvonne was one of two UK students selected to participate in the Fulbright Scotland Summer Institute, studying for five weeks at the University of Dundee and the University of Strathclyde in Glasgow. The program covered topics such as literature, history, science and technology and Yvonne had the opportunity to tour castles, museums and the Scottish Parliament. Upon graduating with computer science and English degrees, she plans to attend graduate school.



Lindell Ormsbee:
Raymond-Blythe Professor in
Civil Engineering

Lindell Ormsbee has been actively engaged in research, teaching and consulting in water resources and environmental engineering, generating over \$22 million in research funding and publishing more than 250 technical papers and reports on topics within his field. Ormsbee is the director of the Kentucky Water Resources Research Institute (KWRRRI) and the associate director of the University of Kentucky Superfund Research Center—one of 19 national centers. As a result of his leadership, the KWRRRI was recognized in 2011 by the U.S. Environmental Protection Agency as a Center of Excellence for Watershed Management. Ormsbee was recently elected as a Fellow of the American Society of Civil Engineers Environmental and Water Resources Institute, and in April, he was inducted into the Virginia Tech Department of Civil and Environmental Engineering Academy of Distinguished Alumni.



Braden Lusk:
Associate Professor,
Department of Mining
Engineering

Mining engineering professor Braden Lusk has developed an extensive explosives and blasting research program that has significantly impacted the methods used to blast near residential areas. Blasting and explosives industry leaders have indicated that Lusk's novel ground vibration fundamentals and prediction capabilities will change the way operators design mine blasts. Over the last two years, Lusk has received funding awards from the National Institute for Occupational Safety and Health and the Appalachian Research Initiative for Environmental Science at Virginia Tech, among others. Lusk's research is conducted in a world class underground laboratory that he personally developed and where many companies test their products. In 2009, Lusk had a regular role on the Discovery Channel show, *The Detonators*, which featured explosives experts engaged in challenging demolition projects.



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BY THE NUMBERS

805

FRESHMEN
(up 36% from fall 2009)

3,130

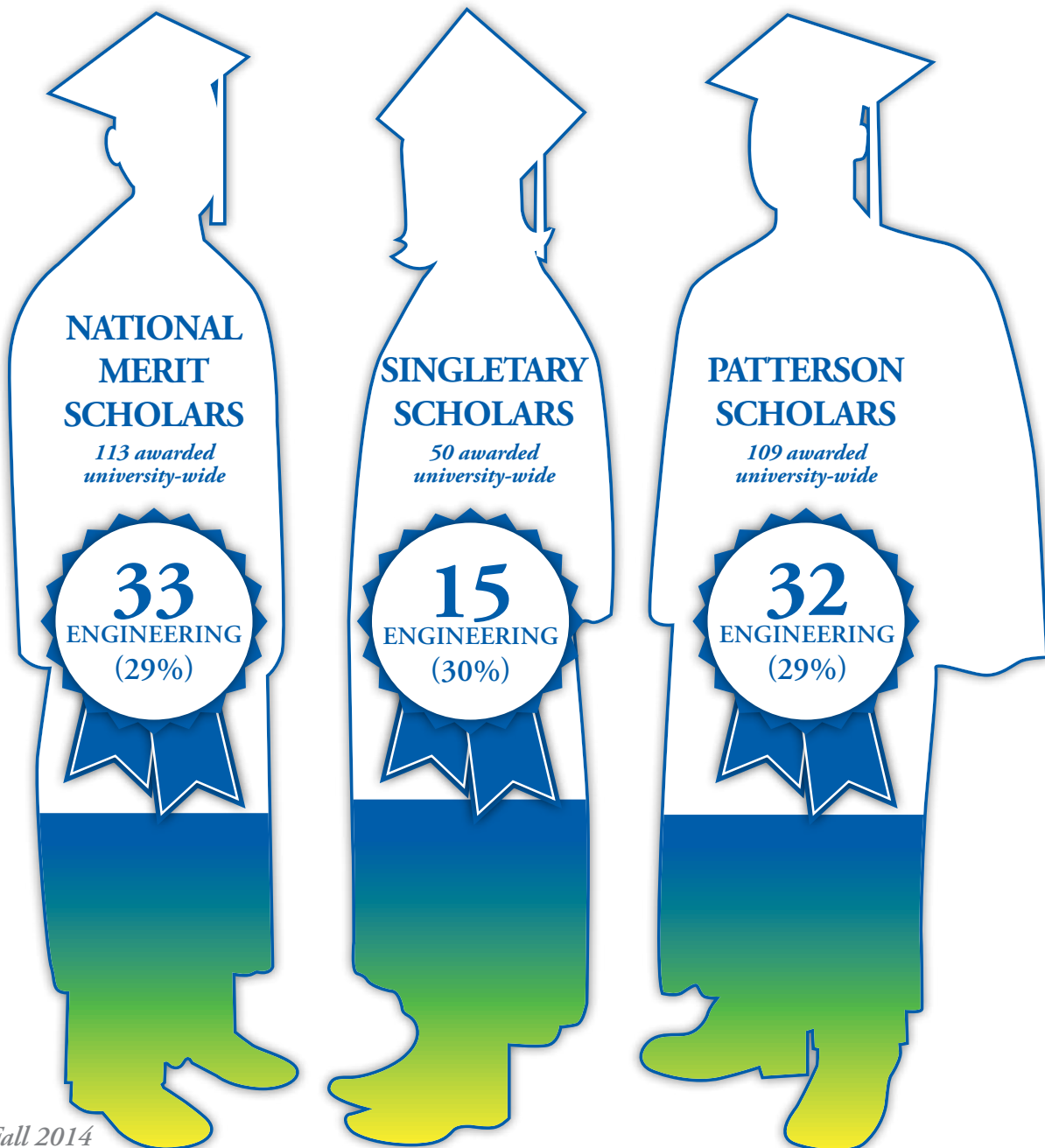
UNDERGRADUATES
(up 50% from 2009)

28.0

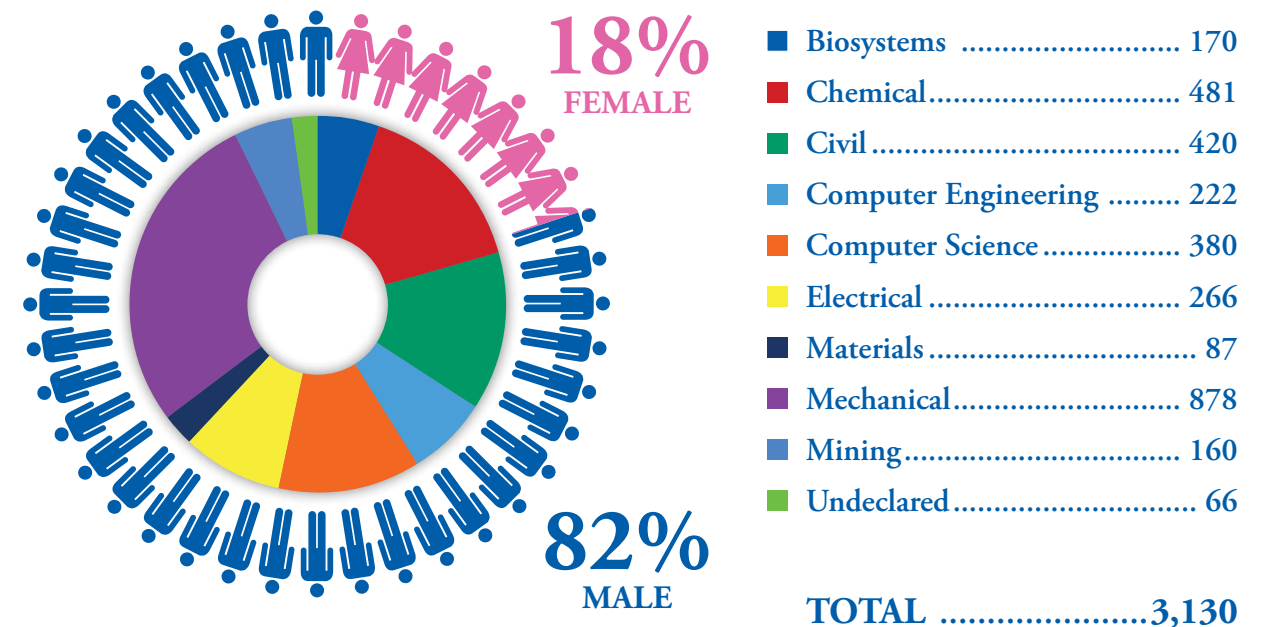
ACT COMPOSITE
(comparable SAT of 1250)

27.9

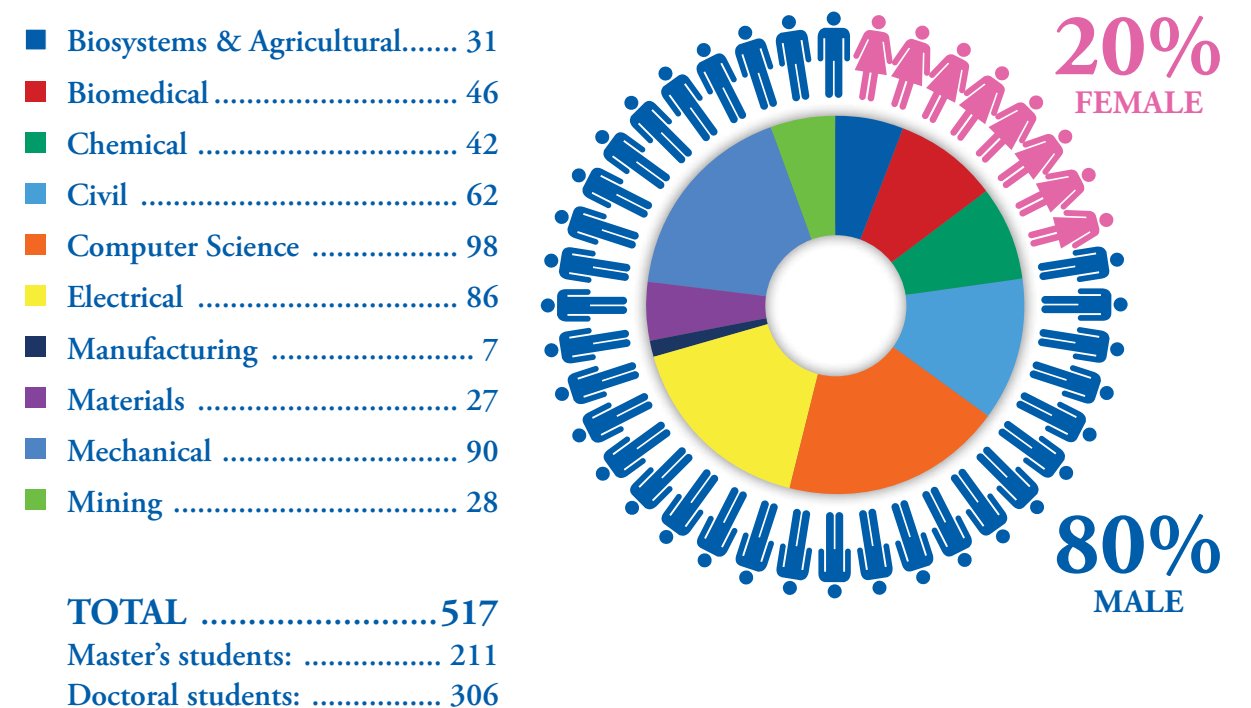
ACT MATH
(comparable SAT of 628)



UNDERGRADUATE MAJORS IN THE COLLEGE



GRADUATE MAJORS IN THE COLLEGE





UK Helping Afghanistan Mine its Rich Resources

by Derrick Meads, UK International Center

The University of Kentucky College of Engineering Department of Mining Engineering is helping Balkh University (BU) in Mazār-e Sharīf, Afghanistan build the capacity and quality of its mining engineering program. Mazār-e Sharīf is the second largest city in Afghanistan and was controlled by the Taliban from 1998 until late 2001 when it was taken with little violence by a coalition of Afghan, U.S. and allied forces. The city is now considered peaceful and safe for travelers.

Northern Afghanistan, where Mazār-e Sharīf is located, has a very large, though unexplored mineral base. Extracting these natural resources could have a tremendous impact on Afghanistan's economic well-being. To help access these natural resources, Afghanistan will need a large number of engineers, particularly in resource estimation and mining.

"The goal of the project is to help the Afghanis to be as self-sufficient as possible," said Rick Honaker, chair of UK's Department of Mining Engineering. "When the

U.S. divests and reduces its military presence, Afghanis will need to generate an economy that is fruitful, strong and based on the resources that they have."

Honaker and mining engineering assistant professor Jhon Silva-Castro recently visited BU's campus to meet with the chancellor of BU and the dean of BU's mining engineering program, tour their campus and discuss how the partnership could be most effective. The U.S. Embassy in Kabul hopes that UK and BU's partnership will continue long after the three-year project through student and faculty exchanges and collaborative faculty research.

"Our presence in Afghanistan, not as government officials, conveys the interest of the American people in developing friendly, close relationships, not just government to government, or institution to institution, but person to person, people to people," said Gary Gaffield, assistant provost for international partnerships. "I think there's real value in that."



UK Students Win Design Competition

by Aimee Nielson, College of Agriculture, Food and Environment

The University of Kentucky quarter-scale tractor team is back on top. After settling for second place at the American Society of Agricultural and Biological Engineers (ASABE) International Quarter Scale Tractor Student Design Competition in 2013, UK brought home the overall trophy as well as category wins in manufacturability, safety (tied), first-time-through tech (tied), report, second place presentation, three out of four pulls and the overall pulling award.

The competition is designed to reflect a realistic 360-degree workplace experience. Student teams are given a 31-horsepower Briggs & Stratton engine and a set of Titan tires. The team then determines the design of their tractor. A panel of industry experts judges each design for innovation, manufacturability, serviceability, maneuverability, safety, sound level and ergonomics. Teams also submit a written design report in advance of the competition, and on-site, they must sell their design in a formal presentation to industry experts playing the role of a corporate management team. Finally, the

teams put their machines to the test in a performance demonstration consisting of four tractor pulls.

UK team advisers Michael Sama and Tim Smith are faculty and staff members, respectively, in the college's Department of Biosystems and Agricultural Engineering.

"This process is a great hands-on experience," Smith said. "It teaches them how to do things they'll be doing when they get out there working in industry; it teaches things that we just can't teach in the classroom."

This year's winning team members were Cody and Angela Rakes, Michael Blum, Shawn O'Neal, Alex Kloentrup, Brad Wilson, Brent Howard and Charles Crume.

The team relies heavily on sponsors to provide supplies and fuel. Altec Industries, Inc., supplied the laser-cut steel, Qualex Manufacturing provided metal forming assistance and the Kentucky Corn Growers provided funding for the team and also sponsored all of the fuel at the competition.

Computer Science Juniors Fahrbach and Saarinen Named Goldwater Scholars

by Whitney Hale, UKPR



Scholars were selected on the basis of academic merit from a field of 1,166 mathematics, science and engineering students who were nominated by the faculties of colleges and universities nationwide.

Fahrbach is majoring in computer science and mathematics. He credits computer science associate professor Jerzy Jaromczyk with guiding his studies toward algorithms and plans to pursue a doctoral degree in computer science to research mathematical algorithms upon graduating from UK.

University of Kentucky juniors Matthew Fahrbach, of Louisville, Ky., and Samuel Saarinen, of Shelbyville, Ky., have been awarded the Barry M. Goldwater Scholarship worth up to \$7,500 per year. Fahrbach and Saarinen are among 283 students nationwide awarded the Goldwater Scholarship this year. This year's Goldwater

Saarinen is majoring in computer science and physics. He has participated in undergraduate research with computer science professor Judy Goldsmith and after graduating intends to obtain a doctoral degree in computer science with a focus on artificial intelligence.

Souleyrette Succeeds Blandford as Civil Engineering Department Chair

On July 1, Reginald (Reg) Souleyrette became chair of the Department of Civil Engineering.

Born in Lexington, Souleyrette became the Commonwealth Chair of Transportation Engineering in 2011 after an 18-year tenured residency at Iowa State University. He received his undergraduate and graduate degrees from the University of Texas and earned his Ph.D. at UC Berkeley.

“Our department works hand in hand with the professional engineering community and our alumni base offers valuable input that shapes our classroom instruction and research directions in inestimable ways. My excitement grows each day and I appreciate the support shown to me so far by faculty, staff, students and the engineering community at large,” said Souleyrette about his new role.

John Walz, dean of the UK College of Engineering said, “Reg possesses an unmistakable enthusiasm for students, research and enriching Kentucky’s economic growth and quality of life. He will make a fantastic chair.”

Souleyrette replaced George Blandford, who served admirably as department chair for nine years and will remain on the Department of Civil Engineering faculty.

Bhattacharyya Elected President of North American Membrane Society

By Alexa Bacon and Allison Perry, UKPR



The North American Membrane Society (NAMS) recently elected UK chemical engineering Alumni Professor Dibakar Bhattacharyya (known as “DB”) as their new president starting in June 2015.

NAMS promotes further development and understanding of membranes and the membrane process. It is the only professional society in North America that promotes all aspects of membrane science and technology. NAMS chose DB for this position because of his leadership in the field of membrane technology, where his group pioneered a membrane system to provide a green method for the remediation of ground water.

“Dr. Bhattacharyya being elected as president of NAMS is a remarkable testament to his outstanding record of productivity in membrane research,” said Allan Butterfield, director of the Center of Membrane Sciences at UK. “He certainly deserves this honor and recognition, which is so good for the University of Kentucky and the UK Center of Membrane Sciences.”

Lean Systems Program Celebrates 20th Anniversary

by Keith Hautala, UKPR



Former UK College of Engineering dean Thomas Lester with Fujio Cho.

On March 15, 1994, Fujio Cho, president of Toyota Motor Manufacturing U.S.A. in Georgetown, Ky., sent a brief but historic letter to Kozo Saito, UK professor of mechanical engineering, outlining the goals of a proposed collaboration between UK and Toyota. That letter marks the establishment of a partnership for research on painting technology and lean systems training that has flourished now for 20 years.

Working with Toyota, the UK College of Engineering established the Lean Systems Program, which provides training in the Toyota Production System. Starting in 1996, the program began to offer certification in Lean Systems, featuring former Toyota employees as instructors.

“Cooperation between UK and Toyota was a success from the start,” said Saito, now director of the Institute of Research for Technology Development (IR4TD). “In keeping with the lean philosophy, Toyota wanted to learn and share knowledge, which is the basic mission of UK. It’s a natural fit.”

Over the two decades since Cho’s letter, the Lean Systems Program at UK has grown into a successful and fully self-funded program. Through the Lean Certification Program, the Lean Executive Leadership Institute, and a variety of custom-tailored training opportunities, an average of 1,500 attendees from about 75 different companies are served by the program each year.

Gordon R. Garner, BSCE 1968, MSCE 1970, was recognized by the Kentucky Environmental Quality Commission with the 2014 Earth Day Lifetime Achievement Award for his 32-year career devoted to engineering and design of public works. He served as the executive director of the Metropolitan Sewer District for 18 years. He is a vice president at CH2M HILL. He resides in Prospect, Ky.

David B. Ratterman, BSME 1968, is a construction attorney with Stites & Harbison PLLC in Louisville, Ky. He received the American College of Construction Lawyers Past Presidents' Award for exemplary service. He was also named president-elect of the UK Alumni Association board of directors for 2014-2015. He lives in Louisville, Ky.

John R. Chapman, BSCE 1970, recently retired after nearly 44 years of employment with the U.S. government. He resides in Huntsville, Ala.

Jeff A. Lowe, BSCE 1979, MSMNG 1982, is the chief operating officer of Avanti Mining Inc., and president of Avanti Kitsault Mines Ltd., based in British Columbia, Canada. He is the former general manager of the Brazion Coal Group in Canada and held a variety of positions over 30 years with Chevron Mining.

Tim A. Byers, BSCE 1981, is senior vice president of the federal defense sector at Atkins North America where he is responsible for business development, sales, financials and program and project execution. He manages the Army, Navy, Air Force, Marine Corps, National Guard Bureau and other defense client markets worldwide. He retired in 2013 from the U.S. Air Force as a major general and The Civil Engineer. He resides in Lorton, Va.

Boyce L. Ross, BSCE 1982, received the Engineer of the Year Award from the Huntsville Post of the Society of American Military Engineers. He is director of the Huntsville Center Engineering Directorate. He lives in Huntsville, Ala.

Joel T. Arnold, BSMNG 1984, BSCE 1985, is the president of ATJ Consulting, LLC, specializing in land development. He lives in Orlando, Fla.

Joe M. Arnold, BSCE 1992, is senior vice president for the Mid-Atlantic Region at HBE Corporation, the leading hospital design-build firm in the U.S. He lives in Reston, Va.

Christopher S. Perry, BSEE 1993, was named president and chief executive officer of the Kentucky Association of Electric Cooperatives. Perry has served as CEO of the Fleming-Mason Energy Cooperative in Flemingsburg, Ky., for the past eight years. He also will serve as president and CEO of United Utility Supply Cooperative, Inc. UUS is an affiliated organization that is managed by KAEC. He lives in Ewing, Ky.

Rodney S. Switzer, BSEE 1998, was honored by the Donaldson Company with the Richard M. Negri Manufacturing Excellence Award. The award recognizes an employee who has created and implemented significant process technology and product improvement for manufacturing operations. He is the first engineer from the Nicholasville plant to receive the award. He lives in Nicholasville, Ky.

John P. Fulton, MSBAE 1999, Ph.D. BAE 2003, is an associate professor in biosystems engineering at Auburn University and a specialist with the Alabama Cooperative Extension System. He was awarded

the Alabama Farmers Federation Agriculture Professorship, a three-year appointment. He lives in Auburn, Ala.

Jason E. Lowe, BSCE 2001, is the office manager at Barge Waggoner Sumner and Cannon Inc., in Huntsville, Ala. He is the former civil engineering department manager of the SSOE Group and served as a captain in the U.S. Air Force. He resides in Huntsville, Ala.

Charlie Dale, BSMNG 2003, is the office manager at Summit Engineering in Charleston, W. Va. He joined the company in 2003 as a project engineer. He lives in Pikeville, Ky.

Stephanie G. Febles, BSME 2008, was recognized, along with CMTA Consulting Engineers, by the American Society of Heating, Refrigerating and Air-Conditioning Engineers with an ASHRAE Technology Award. She received first place in the new educational facilities category for the Locust Trace AgriScience Farm, Fayette County Public Schools, Lexington, Kentucky. She lives in Lexington, Ky.

Taylor A. Begley, BSEE 2005, MSEE 2009, is a faculty member at the London Business School in London, England. He recently completed a Ph.D. in finance at the University of Michigan.

Twyman S. Clements, BSME 2009, MSME 2011, is a space systems engineer for Kentucky Space, a global space company in Bardstown, Ky.

Aaron K. Hunter, BSME 2010, is a product engineer at Campbell Hausfeld. He lives in Covington, Ky.

Alumna Browning Named Engineering Dean at UTSA



Photo: Deborah Silliman Wolfe/UTSA College of Engineering

JoAnn Browning, who earned her bachelor's and master's degrees in civil engineering from the University of Kentucky, was named dean and David and Jennifer Spencer Distinguished Chair of The University of Texas at San Antonio College of Engineering. She began her duties August 1.

Browning, who earned her Ph.D. at Purdue University, was most recently associate dean of administration and professor of civil engineering in the School of Engineering at the University of Kansas (KU). At KU, Browning served on numerous department, college and university committees. She twice was awarded the university's Miller Award for Distinguished Professional Service (2004 and 2011) and was the 2012 recipient of the Henry E. Gould Award for Distinguished Service to Undergraduate Education.

"Joining UTSA is an incredible opportunity to take what I have learned about managing healthy growth in an engineering program and apply my knowledge so that the growth benefits UTSA's talented and diverse student body and supports the goals of the College of Engineering," said Browning shortly after accepting the position.

James T. Roberts	Civil Engineering	1938
James M. Carigan	Civil Engineering	1942
Richard W. Storey	Civil Engineering	1944
Alex H. Anderson, Jr.	Electrical Engineering	1948
James C. Stites	Electrical Engineering	1949
Fred J. Huffman	Electrical Engineering	1950
Charles W. Young, Jr.	Mechanical Engineering	1950
Conley C. Congleton	Mining Engineering	1951
James R. Denham	Mechanical Engineering	1951
Willis L. Lyons, Jr.	Mechanical Engineering	1951
Charles Richard Denham	Civil Engineering	1956
Joseph G. Teague	Mechanical Engineering	1956, 1958
Paul D. Gravely	Civil Engineering	1961
Lionel J. Updyke	Chemical Engineering	1961
James H. Bond	Civil Engineering	1964
Clifford A. Flood, Jr.	Agricultural Engineering	1966
Enos S. Burkhart	Electrical Engineering	1971
James R. Lile	Civil Engineering	1971
Kenneth E. Frazee	Civil Engineering	1974

Forbes Downer Lewis, 72, who taught computer science at UK from 1978-2000, passed away on May 17, 2014. He received his bachelor's, master's and doctoral degrees in computer science from Cornell University. Lewis taught at Harvard and the State University of New York (SUNY) at Albany before becoming the chair of the Department of Computer Science at UK. He was passionate in his involvement with Native American educational efforts and devoted time to projects intended to encourage minority students to continue their education by attending graduate school in computing, thus adding to the diversification of researchers and educators in the field.



For most people, engineering and poetry are academic worlds apart. For Vijay Singh, the Earl Parker Robinson Chair in Engineering, both generate knowledge and the thrill that comes from a new discovery. Singh's passion for poetry easily makes one wonder: is he an engineering professor who writes poetry or a poet who teaches engineering? After reading the interview below and a sample of Singh's poetry, perhaps you can decide the answer for yourself.

How long have you been writing poetry?

Singh: When I was a teenager in New Delhi, I wrote poetry in Hindi; but in ninth grade, I had to choose between the pursuit of science or of the arts. I chose science and didn't write poetry for over four decades. When I resumed writing poems—this time in English—I couldn't stop! Now I spend most weekend mornings writing poetry. For me, it's not work, just pure joy.

How many volumes have you written?

Singh: I have written three volumes, the most recent of which is called *Waves of Light and Being*. It was published in 2013. I have a new volume coming out in 2015 that does not yet have a title.

What subjects do you explore in your poetry?

Singh: I like to write about the nature of reality. That is a mouthful, of course, but I often write about time, light and waves. With regard to time, I think we are often slaves of clocks. But clocks are like a map of the city, which is, of course, not the city; clocks represent time, but reveal little about the nature of time. The best moments of our lives transcend time and bring great joy. I write about those times. **KEJ**

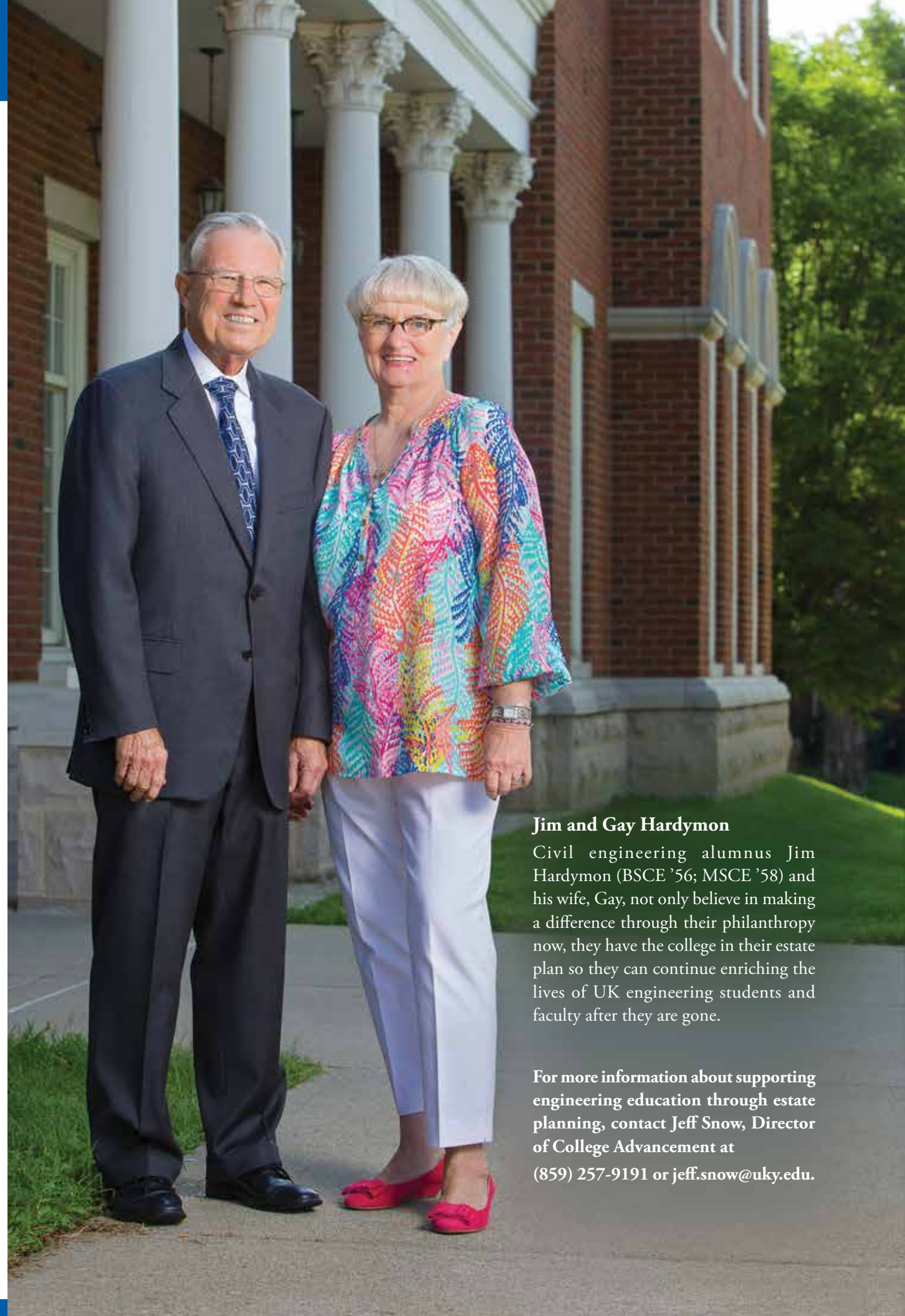
OUR TIME

*Age of this universe
Is neither five thousand nor
Thirteen point six billion years,
But just this instant of light on
Dewdrop, sun rising over the horizon*

*Trillions of years are rolled
Into this moment now present*

*How sweet then
That you loved me
For so many dewdrops
I must have been good!*

- Vijay Singh



Jim and Gay Hardymon

Civil engineering alumnus Jim Hardymon (BSCE '56; MSCE '58) and his wife, Gay, not only believe in making a difference through their philanthropy now, they have the college in their estate plan so they can continue enriching the lives of UK engineering students and faculty after they are gone.

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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