

KENTUCKY ENGINEERING JOURNAL

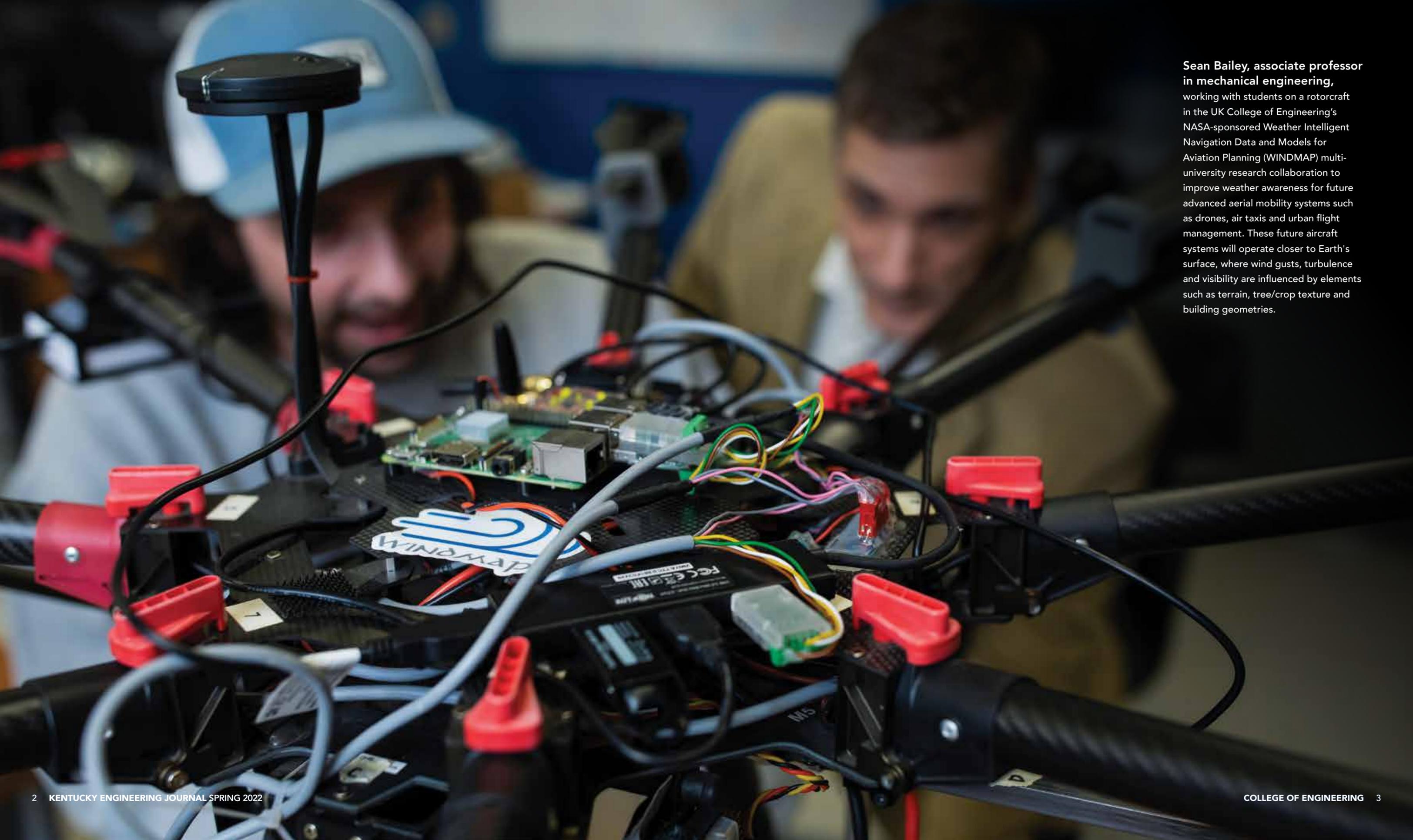
UNIVERSITY OF KENTUCKY COLLEGE OF ENGINEERING

SPRING 2022



ANNOUNCING

Aerospace Engineering



Sean Bailey, associate professor in mechanical engineering, working with students on a rotorcraft in the UK College of Engineering's NASA-sponsored Weather Intelligent Navigation Data and Models for Aviation Planning (WINDMAP) multi-university research collaboration to improve weather awareness for future advanced aerial mobility systems such as drones, air taxis and urban flight management. These future aircraft systems will operate closer to Earth's surface, where wind gusts, turbulence and visibility are influenced by elements such as terrain, tree/crop texture and building geometries.

MESSAGE FROM THE DEAN

A new year has arrived with new challenges and new hope. I am grateful for the talent, commitment, resilience and goodwill that resides within the college that has helped us continue to meet and exceed our strategic goals. We have launched four new academic programs in the past two years, hired 40 new faculty members since 2018 and increased research awards by 60% since 2017. Our college is thriving.

A hallmark of our community has been its willingness to rally support for the college and its mission. The college and its students have benefited greatly from the generosity of our alums and industry supporters. James Hardymon, Jack Cheng and the Young Alumni Philanthropy Council have given particularly profound gifts that will transform the College of Engineering over the next several years. We are grateful for the partnership of these donors and are inspired by their confidence in a bright future.

This fall, we launched Kentucky's first aerospace engineering program for both graduate and undergraduate students. Housed in the Department of Mechanical Engineering, the program is led by a strong group of faculty members who

are researching a broad range of aerospace applications, including controls, propulsion and hypersonics. We are looking forward to watching this program grow in stature, impact and excellence.

“ A hallmark of our community has been its willingness to rally support for the college and its mission. The college and its students have benefited greatly from the generosity of our alums and industry supporters. ”

As the college continues to grow, our physical resources have become strained, and we are looking to expand engineering's physical footprint. We are considering moving into a renovated and expanded Funkhouser Building. This new space will allow us to create enhanced student collaboration spaces, build next-generation wet labs, provide a bridge with the health care campus and bring new life to a signature campus building. We will keep you updated as this project moves forward.

I want to share my sincerest appreciation for this community of alumni who care so much about our students. Thanks to you, we have met our Kentucky Can campaign goals and led the college

through another successful One Day for UK. We would not be able to do what we do without your support.

Thank you.

Sincerely,

Rudy Buchheit
The Rebecca Burchett Liebert Dean



College of Engineering

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An interview with Fusion Cyber's Christopher Etesse

Our incoming students were introduced to the UK College of Engineering at the New Student Orientation on August 20, 2021 in the Singletary Center. The event included a panel Q&A that gave incoming students the opportunity to ask current students about UK's engineering resources.



ONE OF A KIND

Last fall, the University of Kentucky College of Engineering launched the only aerospace engineering undergraduate program in the commonwealth.

Kel Hahn

The University of Kentucky College of Engineering has been approved by the Council for Postsecondary Education to offer undergraduate and graduate degrees in aerospace engineering. The new undergraduate aerospace program is the first of its kind in Kentucky.

"We are proud to be the only academic institution in the state to offer a degree in aerospace engineering at the undergraduate level," said Rudy Buchheit, the Dr. Rebecca Burchett Liebert Dean of the College of Engineering. "Having both the undergraduate and graduate programs enables us to take full advantage of the remarkable expertise represented within our faculty."

Aerospace plays a significant role in Kentucky's economy. The industry leads the state in exports, and nationwide is third, behind only California and Washington. According to the Kentucky Cabinet for Economic Development, the state exported more than \$14.6 billion in aerospace products in 2019. It is home to 79 aerospace-related facilities that employ over 19,000 people. These facilities include General Electric, Lockheed Martin, Belcan Corp., Raytheon, General Dynamics Group, and Sikorsky Aircraft Corp. The aerospace program will support Kentucky's aerospace industry and promote economic development by training aerospace engineers.

"There is clear need for new graduates trained in aerospace engineering to meet industry demand in Kentucky, and we already have a significant number of faculty with cutting-edge research and expertise in a broad range of aerospace applications, including controls, propulsion and hypersonics.

These new aerospace programs are a natural fit for UK," said Michael Renfro, Tennessee Valley Authority Professor and chair of the Mechanical Engineering Department.

The aerospace engineering programs will be housed in the Department of Mechanical Engineering and will foster research and innovation by enhancing collaborations between UK and the local aerospace industry. Numerous UK engineering faculty members spanning several departments already conduct aerospace-related research. Further, current UK faculty members who will support the aerospace programs have degrees from or have previously held appointments at prestigious universities and conducted collaborative research projects with NASA, Air Force Research Laboratory, The Aerospace Corporation, McDonnell Douglas Astronautics Co. (now Boeing), Harris Corporation's Government Aerospace Systems Division and Pratt & Whitney.

"Graduates of the new programs will join and can be inspired by UK engineering alums who have contributed to and led groundbreaking achievements since the early days of aeronautics and space," said Suzanne Smith, professor of mechanical engineering and founding director of the NASA Kentucky programs at UK. "From systems testing at NASA for Apollo to bringing the new and growing commercial space economy to Kentucky, UK alums are enabling future space exploration, advanced propulsion, aerial mobility and so much more."

To learn more about the new programs, visit the Aerospace Engineering website at enr.uky.edu/aerospace.

“There is clear need for new graduates trained in aerospace engineering to meet industry demand in Kentucky, and we already have a significant number of faculty with cutting-edge research and expertise in a broad range of aerospace applications, including controls, propulsion and hypersonics. These new aerospace programs are a natural fit for UK.”

— Michael Renfro



MICHAEL RENFRO, PH.D.

Mechanical Engineering
Tennessee Valley Authority Professor; Department Chair

Michael Renfro researches optical diagnostics applied to power production technology and other high-temperature systems, including combustors for gas turbine engines, fuel cell systems, and thermal protection systems for both engines and spacecraft. His current research includes projects aimed at improving our understanding of limiting behavior such as autoignition and extinction that impact flame stability in gas turbine combustors and jet engine augmentors, and characterize the flow and heat transfer within porous materials used for high-temperature thermal protection systems. In both cases, optical-based measurements provide critical information for developing models that can be used for improved designs.



JESSE HOAGG, PH.D.

Mechanical Engineering

Donald and Gertrude Lester Professor in Mechanical Engineering

Jesse Hoagg's research focuses on developing and applying control theory to diverse areas in science and engineering — ranging from formation control methods for autonomous vehicles to the study of human learning. For example, his research group develops new cooperative control methods for swarms — large groups — of autonomous unmanned air vehicles. These methods allow swarms to collaborate autonomously while avoiding collisions. As another example, his research group uses techniques from control theory to study how humans interact with engineered systems such as aircraft, automobiles and robots. This work has potential application in various areas, including robotic-assisted surgery, human-controlled robotic swarms, active prostheses, robotic-therapy devices and autonomous vehicles.



ALEXANDRE MARTIN, PH.D., P.E.

Mechanical Engineering

Professor; Director, Kentucky Space Grant Consortium and NASA EPSCoR Programs

Alexandre Martin's research focuses on the numerical simulation of thermal protection systems for hypersonic vehicles. The materials used for such systems are complex and necessitate a deep understanding of physics at every scale. His Gas Surface Interactions Lab develops advanced numerical modeling tools to understand the interaction of these materials with the aerothermodynamic environment. He also supervises experimental test campaigns such as the KRUPS capsule, which recently completed the first university-led atmospheric entry, coming down from the space station at hypersonic speed.



SUZANNE SMITH, PH.D.

Mechanical Engineering

Professor; Director, UK Unmanned Systems Research Consortium

From BIG BLUE Mars Airplane and CLOUD-MAP to current projects, Suzanne Smith guides multi-disciplinary research teams to develop uncrewed aircraft systems (UAS) and technologies to overcome constraints for space exploration and answer scientific questions in atmospheric physics. UAS observations in the lower atmosphere enable accurate local-scale weather forecasting for sustainable agriculture, safe and efficient transportation, including tomorrow's advanced aerial mobility systems, renewable energy optimization and much more. Precision Meteorology — accurate local-scale weather forecasting — will impact lives and livelihoods in Kentucky, across the U.S. and worldwide.



SEAN BAILEY, PH.D.

Mechanical Engineering

Associate Professor

Sean Bailey's research experience is in the field of experimental fluid mechanics, with much of that experience applied towards turbulent flows. Recently, he has focused on developing uncrewed aerial systems (UAS) for measuring atmospheric turbulence and microscale weather phenomena. His work is helping to improve micrometeorology and better predict subtle changes that might be caused by topology and terrain features that aren't captured in large-scale weather predictions. These subtle differences can significantly impact things like local wind shear, fog formation, or ice accumulation that can affect road and aviation safety.

JACK MADDOX, PH.D.

Mechanical Engineering

Associate Professor, Paducah Campus

Jack Maddox has over 10 years of experience in experimental characterization of extreme environment thermal management materials and convective heat transfer augmentation for high-power and harsh-environment electronics. He has developed a novel experimental method to isolate the modal contributions of solid conduction, gaseous conduction and radiation to the heat transfer within porous insulation materials. He is currently working on the thermal characterization of heat shield insulation materials for re-entry vehicles.



MICHAEL SEIGLER, PH.D.

Mechanical Engineering

Associate Professor; Director of Undergraduate Studies, Aerospace Engineering

Michael Seigler's research interests include most anything involving dynamics and controls, but he is especially fond of aerospace applications. Seigler is a mechanical engineer by training, but his earliest research efforts were directed at aerospace applications, such as shape-changing planes (morphing aircraft) and unmanned drones that can land and perch like birds. He has since expanded into several areas, including intelligent-material systems, large space structures, microrobotics, human-machine systems and small-satellite attitude-and-formation control. NSF, DARPA, DOD and NASA KY have funded those research efforts. Michael's current dream is to put autonomous formation-flying satellites into space.

SAVIO POOVATHINGAL, PH.D.

Mechanical Engineering

Assistant Professor

Savio Poovathingal's Computational Thermophysics and Fluids Laboratory works with multi-scale, multi-physics methods to solve significant challenges at the nexus of fluid dynamics, chemical kinetics, thermodynamics, heat transfer and material science. In addition, the lab addresses critical needs of space exploration, planetary protection (asteroid protection, energy, environment) and national defense. Projects include computational modeling of high-speed flows — velocities greater than 10 times the speed of sound, which require an accurate description of the physical processes that dictate chemical reactions, ionization reactions, gas-surface interactions and high-fidelity microscale analysis.



JULIUS SCHOOP, PH.D.

Mechanical Engineering

Assistant Professor

Julius Schoop is pursuing fundamental new knowledge of the effects of finishing processes on the response and performance of advanced metal alloys. Finish machining processes are widely used in industry and determine many critical surface properties. Pro-active engineering of these properties through a proposed Digital Process Twin approach could significantly increase many structural components' quality, performance and life. For example, improved fatigue life of aerospace components such as landing gears and turbine blades could help to further increase the safety of commercial aviation and green power generation while also helping to reduce costs by extending the useful life of these high-value parts.



XINGSHENG SUN, PH.D.

Mechanical Engineering

Assistant Professor

Xingsheng Sun's lab specializes in the modeling, computation and simulation of materials across multiple length- and time-scales. The lab's missions include advancing fundamental understanding of materials under different operating environments and contributing to material design and discovery for diverse applications. The impact of their work lies in sustainable energy, batteries, aerospace/ocean/civil structures and protection materials/structures, among others.



UK HOSTS 1ST EVENT AT NEW WAARP FLIGHT FACILITY

Researchers from the University of Kentucky Department of Mechanical Engineering hosted collaborators from Virginia Tech and Oklahoma State University for a series of unmanned aircraft systems (UAS) flight experiments last summer at the new Wildcat Agricultural and Atmospheric Research Pavilion (WAARP) flight facility. WAARP is located at North Farm off Ironworks Pike, a 971-hectare agricultural research facility operated by UK.



CONCLUDING THE COLLEGE OF ENGINEERING'S 21ST CENTURY CAMPAIGN

By Ravyn Ladenburger and Derrick Meads

Joe Halcomb understands the value of giving.

A 1974 mechanical engineering graduate, Halcomb holds leadership positions in several nonprofit organizations and has funded the Halcomb Family Endowed Fellowship in Medicine and Engineering at the University of Kentucky. He has also helped revitalize the now renamed F. Joseph Halcomb III, M.D. Department of Biomedical Engineering, which includes an endowed chair in biomedical engineering, two faculty fellowships designed to attract promising junior faculty and four fully funded graduate fellowships in biomedical engineering.

Halcomb chaired the college's committee for Kentucky Can: The 21st Century Campaign, UK's \$2.1 billion campaign that was announced in the fall of 2018.

"Joe's leadership style has been honed over a career working and leading at the intersection of medicine and business," said Rudy Buchheit, the Rebecca Burchett Liebert Dean of the College of Engineering. "One of the most important leadership skills is listening and one of the most important leadership traits is empathy. Joe has plenty of both — and more."

As part of the university's campaign, the committee set a goal of raising \$110 million to help the College of Engineering meet three needs:

1. Provide scholarships that support our students' dreams.
2. Improve our world through pioneering research.
3. Significantly upgrade teaching and research facilities.

Halcomb's vision for leading the campaign committee was threefold. First, he asked committee members to act as the lead givers. Second was for them to discover how vital and rewarding it is to support the college. And finally, they asked their friends and colleagues to make a financial gift to the college.

"The committee members are servant leaders who lead by example," said Halcomb about the committee. "They know that a fully funded College of Engineering can really make a difference for the next generation, and it's exciting to be part of that."

It is a model that worked.

The college exceeded its \$110 million goal by the fall of 2021 by raising over \$130 million.

The average gift for the College of Engineering's Kentucky Can campaign was \$5,000. Nearly two-thirds of the fundraising came from individual gifts from the college's alumni. The rest came from corporate and foundation gifts.

“ Joe’s leadership style has been honed over a career working and leading at the intersection of medicine and business. ”

— Rudy Buchheit

THE COLLEGE EXCEEDED ITS

\$110
MILLION GOAL

BY THE FALL OF 2021
BY RAISING OVER

\$130
MILLION

The new resources have already been put to good use.

- The college has increased the number of scholarships available to our students by \$35.4 million, including several new scholarships that target students of color and first-generation students.
- The college's research portfolio has also continued to soar. Research awards have increased by 60% since 2017, expanding the college's competitive strengths in human health, aerospace, advanced manufacturing, materials, energy and environmental sustainability.
- Since the campaign began, the college has started four new undergraduate programs: biomedical engineering, computer engineering technology, Lean systems engineering technology and aerospace engineering. The college has also moved into a renovated Grehan Building.

The committee's work also led to the creation of the Young Alumni Philanthropy Council, which consists of engineering alumni who are 40 years old and younger and are passionate about giving back to the college.

"Starting the Young Alumni Philanthropy Council is just one example of the long-lasting effects of the Kentucky Can Campaign," said Halcomb. "This council will continue to change the culture of philanthropy among our young alumni for years to come."

Thanks to the college's engaged alumni and inspired donors, the Kentucky Can campaign will allow the college's students and researchers to flourish for generations.

But what's next?

For over 150 years, the College of Engineering has transformed smart and curious students into discerning problem-solvers.

This talent has not gone unnoticed. Demand for engineering graduates has escalated across many business sectors, especially in Kentucky, where the economy is dependent upon an advanced technology workforce.

"We intend to meet this demand," said Buchheit. "Our goal is to put as many ambitious and capable individuals into the profession as possible. However, we need more space for our student enrollment and research enterprises to grow."

The college is looking at moving into a renovated and expanded Funkhouser Building. Since the building already exists, more resources can be invested in creating cutting-edge teaching and research spaces.

The Funkhouser Building's location also creates meaningful opportunities.

Because the building sits between the engineering and health care campuses, it can act as a bridge between the two, creating opportunities for cross-disciplinary collaboration.

Joe Halcomb, who also bridges the gap between health care and engineering, is now leading this effort.

"No good deed goes unpunished!" said Buchheit, who has asked Joe Halcomb to reprise his role as chair of a new college campaign committee

that will guide the efforts to fundraise for the Funkhouser Modernization Project.

"No one is better suited to lead this building campaign than Joe Halcomb, a leader in biomedical engineering," said Buchheit. "His commitment to human health, engineering and the well-being and success of our students are what this campaign needs to be successful."

If you would like to learn more about this project as it develops, please visit www.engr.uky.edu/funkhouser. ■

Starting the Young Alumni Philanthropy Council is just one example of the long-lasting effects of the Kentucky Can Campaign.

— Joe Halcomb



THANK YOU! TO OUR KENTUCKY CAN COMMITTEE

GREGG A. COLEMAN
F. JOSEPH HALCOMB III, M.D.
JAMES F. HARDYMON
C. GREG HARPER
FLOYD E. HENSON, JR.
KEVIN L. HOBBS
THOMAS W. LESTER
KAREN M. MAXWELL
ASGHAR "OSCAR" NOSRATI
L. STANLEY & KAREN PIGMAN
G. MIKE RITCHIE

KENTUCKY CAN. 



Isabel Escobar

MEMBRANE FILTERS

We asked chemical engineering professor Isabel Escobar to explain her research related to membrane filters in her own words.

People in the Middle Ages were often a bit tipsy. Back then, it wasn't safe to drink water. The only thing people could safely drink was alcohol because it was fermented. To stay hydrated, people drank ale in the morning, wine at lunch and spirits at night.

This all changed in 1804 when a town in Scotland introduced the first municipal water treatment plant, which used sand filtration to treat its water. More innovations quickly followed, such as adding chlorine to the treatment process and installing water pipes in urban areas — all important precursors to the industrial revolution.

In the 1960s, water treatment technology took another leap in response to President John F. Kennedy's commitment to transforming the world through desalinization. Researchers such as Sidney Loeb at UCLA, who were working on desalination processes, developed the first membrane filter — a sheet of plastic with tiny pores. Water treatment plants throughout the world now use this technology to treat their water.

To create a membrane filter, we take a polymer — plastic — and put it in a solvent, such as acetone. With the addition of other materials, we can make a filter with a very fixed pore size and other helpful properties. What makes a membrane different from a regular filter, like a coffee filter, is the level of control we have over its design. With really small pores, we can remove ions from water, or with larger pores, we can target microbes.

Creating membranes for specific purposes is like writing a recipe. With the right recipe, we can give a membrane a positive, negative or neutral charge, or it can be made to attract or dispel water. We can also add materials to make the membrane respond to temperature by collapsing or

expanding. I am a terrible cook, but my job is to create recipes for membranes with multiple functions.

For instance, when water passes through a membrane filter, gunk accumulates on the surface, which means more and more pressure has to be applied to pass the water through the filter. Not only that, but the accumulating gunk might contain harmful toxins that need to be destroyed.

For example, under certain conditions, such as improper nutrients, lack of predators, etc., algae can form toxins inside their cells, and when they die, they release these toxins into the water. Common forms of water treatment don't remove these toxins, but we have developed membranes with specific pore sizes and qualities that can remove them. We are working on methods to take this one step further and destroy the toxins as they are filtered.

We are also researching membranes that can remove and destroy per- and polyfluorinated alkyl substances (PFAS). These are known as the forever chemicals because they never break down and remain present in the human body. I am part of the UK Superfund Research Center, funded by the National Institute of Environmental Health Sciences, to investigate membrane filters that are made using nanomaterials that can catalyze and destroy PFAS.

In collaboration with Dr. Tequila Harris from Georgia Tech, I recently received an NSF grant to develop mosaic membranes with multiple functionalities. In other words, different parts of the membrane's surface can be doing different things, creating a simplified filtration system.

Membranes have only been around a few decades, and it is exciting to be advancing this technology to new horizons. ■

“ Creating membranes for specific purposes is like writing a recipe. With the right recipe, we can give a membrane a positive, negative or neutral charge, or it can be made to attract or dispel water. ”

ADVANCING THE COLLEGE OF ENGINEERING

By Ravyn Ladenburger

James Hardymon cares about the advancement of engineering students. A civil engineering alum, his strong ties to the University of Kentucky have culminated in a \$3 million gift to provide renovations and expansions for laboratory space for biomedical engineering, engineering technology and aerospace engineering. All of these undergraduate programs have been launched in the past two years.

"We are deeply grateful for James Hardymon's investment in the University of Kentucky College of Engineering. We know it will help us build a brighter future for Kentucky," said UK President Eli Capilouto.

Hardymon's generous gift will help fuel the UK College of Engineering's mission to advance the commonwealth of Kentucky through discovery, economic advancement and workforce development. It further embeds ingenuity and innovation into the distinctive experience provided at the college.

"The UK College of Engineering does an outstanding job of educating young people for the task of improving our world," said Hardymon. "I am pleased to make this gift that directly supports student success in the college's exciting new undergraduate programs."

Hardymon has a strong history of supporting his community. His past gifts have helped create the James and Gay Hardymon Center for Student Success in the historic F. Paul Anderson Tower. The centers focus on the academic, emotional and mental well-being of current students. Students have already reported that the center has made a

significant difference in their college experience.

"The College of Engineering success center prioritizes the wellness of students," said Kyle Lastimosa, a sophomore studying computer science. "It has set me up in the best place possible to graduate from UK and succeed as an engineer."

Hardymon received his bachelor's degree and master's degree in civil engineering from UK in 1956 and 1958. After two tours of duty with the U.S. Army, he returned to his hometown of Maysville, Kentucky in 1961 to begin

his business career at Browning Manufacturing Company. He held various field and sales management positions both before and after Browning's acquisition by Emerson Electric Company.

From 1976 to 1979, Hardymon served as president of Emerson's Special Products Division. In 1988, he was elected president. He joined Textron, Inc., as president and chief operating officer in December 1989, at which time he was named to its board of directors.

He became chief executive officer in January 1992 and was elected to chairman a year later.

Hardymon is a member of the UK Board of Trustees and is a UK Fellow. He was inducted into the College of Engineering Hall of Distinction in 1995. He retired in 1999.

"My hope is that this commitment will lead to the college achieving higher graduation rates," said Hardymon. "We need more engineers who can make a difference in our world." ■

“The UK College of Engineering does an outstanding job of educating young people for the task of improving our world.”





#ONEDAYFORUK

We are in awe of the generosity of our community. Because of the support of our donors, we can provide scholarships, create new lab spaces and support student organizations.

We are especially appreciative of Jack Cheng's gift of \$1 million. Cheng is the founder, president and CEO of AA Metals. He completed his Ph.D. in materials science from the UK College of Engineering in 2000 and his MBA from UK's Gatton College of Business and Economics in 2003.

"I give to the UK College of Engineering because so many alumni gave in ways that benefited me when I was an engineering student," Cheng says. "I'm proud to be part of the UK Engineering legacy of lifting up the future generation."

The Young Alumni Philanthropy Council also gave \$25,000 on One Day for UK. The Young Alumni Philanthropy Council brings together engineering alumni under 40 years old who are passionate about making a difference for engineering students. The chair of the council, Michael Graehler, says, "We hope future UK engineers understand that they have a community of fellow alumni who support them."

Together, we showed the world how and why Kentucky Can change lives.

THANK YOU!



“I give to the UK College of Engineering because so many alumni gave in ways that benefited me when I was an engineering student. I’m proud to be part of the UK Engineering legacy of lifting up the future generation.”

– Jack Cheng

YOUNG ALUMNI PHILANTHROPY COUNCIL

The Young Alumni Philanthropy Council invites alumni under the age of 40 to assist the University of Kentucky College of Engineering in its mission to inspire supporters to create a world that works by providing life-changing opportunities for future generations.

“Young alumni frequently ask how they can help the College of Engineering achieve its mission,” said Rudy Buchheit, the Rebecca Burchett Liebert Dean of the College of Engineering. “This council presents a great opportunity for them to materially support and influence the mission of the college.”

To join the Young Alumni Philanthropy Council, members must donate \$1,000 each year to the college. All donations will be pooled, and members will vote on what the funding supports each year. Members will also get an opportunity to mentor current engineering students, serve as alumni ambassadors and network with other young engineering professionals.

The next application period begins in June.

Learn more about the council and its members at enr.uky.edu/yapco.



“ This council presents a great opportunity for them to materially support and influence the mission of the college. ”

– Rudy Buchheit



STUDENT SPOTLIGHT: BIG TIME

By Kel Hahn

So many exciting opportunities at UK but so little time ... unless you're Andrew Lin.

The summer before Andrew Lin's first semester at the University of Kentucky, he received a book in the mail from alumnus and scholarship benefactor L. Stanley Pigman, "The Magic of Thinking Big" by David J. Schwartz. After reading the book, Lin discovered Pigman didn't merely intend to send him the book; he wanted to discuss it with the incoming freshman.

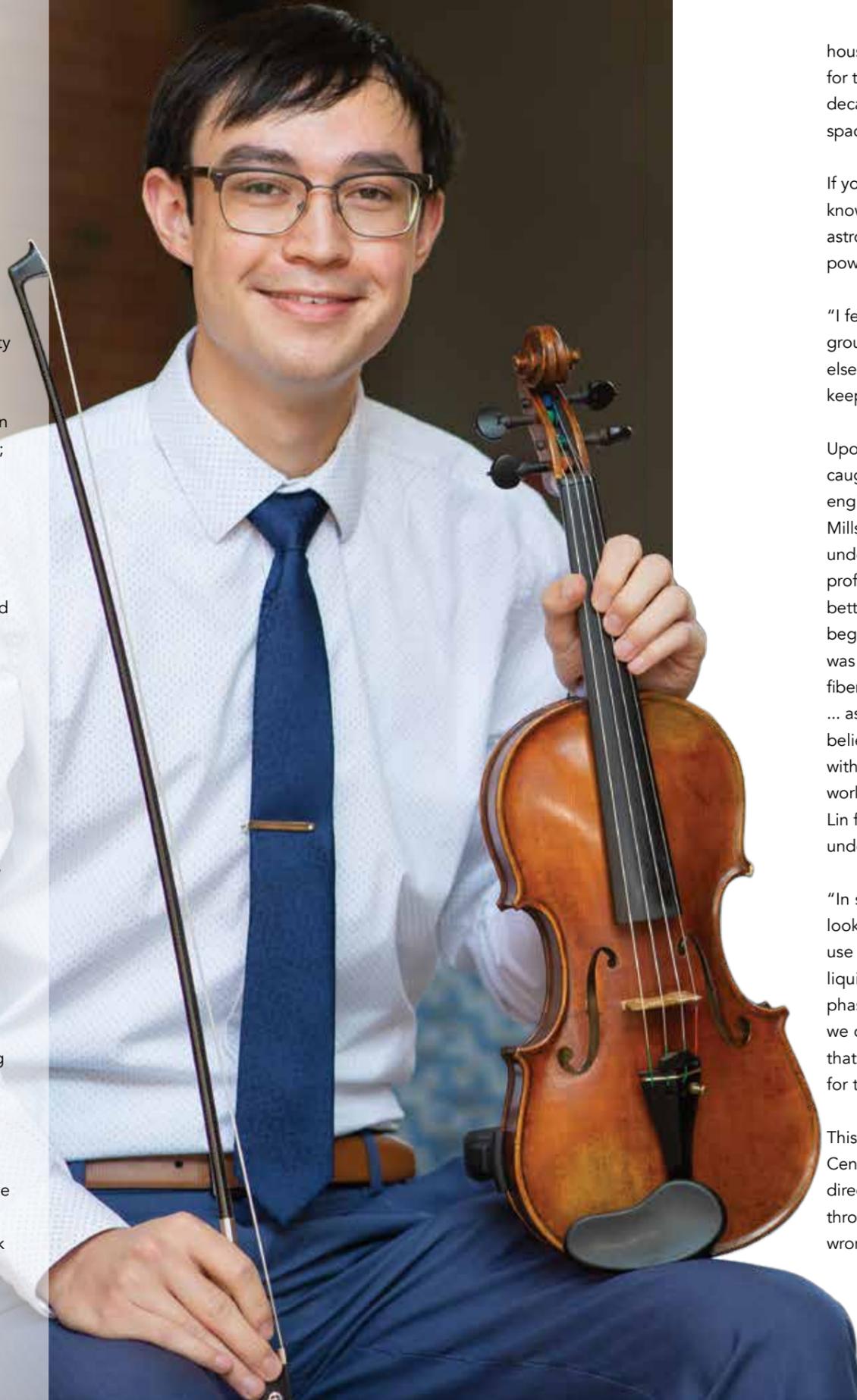
"We had a phone conversation about going into college thinking big," Lin recalls. "What kind of things would I do at UK? What were my first steps going to be, because the transition from high school to college takes a little getting used to. Mr. Pigman was an incredible guide."

Now a senior double majoring in chemical engineering and music performance at UK, Lin says remaining a close friend to the Pigmans — which naturally expands his thinking — has played a big part in making his dreams become reality.

"As a freshman, I'd tell people, 'I think it would be really cool to work at NASA one day.' But in the back of my mind I had doubts that would ever be possible for me. There are so many other really smart people who I thought were more likely to get to work there. But Mr. Pigman has always encouraged me to take advantage of opportunities that come my way and continue thinking big as I go."

Lin made it to NASA as an intern for the fall semester of 2020, an experience that began virtually but ended with him working on-site in Houston. Assigned to the crew and thermal systems group that focuses on astronaut spacesuits, Lin worked on the "portable life support system," or PLSS.

"Every time an astronaut does an extravehicular activity outside the International Space Station, they wear that recognizable big white suit with a rectangular backpack on it. That backpack



houses all of the life support systems and communications for the astronaut. Because the suits in orbit right now are decades old, we're looking at adding new technologies to the spacesuit," Lin explains.

If you're wondering how a college student lives with the knowledge that their work has a life or death impact upon astronauts in space, Lin says the heaviness is offset by the power of teamwork.

"I felt that responsibility but it was reassuring to work with a group of people. I made sure I was connected with everyone else's projects because, in the end, our work was necessary to keep people alive in space."

Upon returning from Houston, Lin caught up with fellow chemical engineer and good friend Rollie Mills, who is pursuing a Ph.D., under the supervision of famed professor Dibakar Bhattacharyya, better known as "D.B." Rollie began detailing a cool project he was undertaking: improving hollow fiber membranes that are used on ... astronaut spacesuits! Lin couldn't believe it. He was even familiar with the membrane and how it worked with the suit. Before long, Lin found a place in D.B.'s lab as an undergraduate researcher.

"In space, there's no air. It's essentially a vacuum. So, we're looking at what's called a vacuum membrane," says Lin. "You use the vacuum as a pressure-driving force to evaporate liquid. In space, we're using that to evaporate water. And the phase change of the water removes heat from the system. So we can use this membrane to cool down the spacesuit, and that helps regulate the temperature inside for electronics and for the astronaut."

This past summer, Lin interned again at NASA Johnson Space Center. This time, however, he switched to working with flight directors — the people in Mission Control walking astronauts through procedures, especially when something has gone wrong. Lin was able to sit in Mission Control and connect with

the flight controller on his team.

"My experiences at NASA have definitely paved the way for areas I never knew were possible," says Lin, who will return to the Johnson Space Center this spring to work on propulsion, pyrotechnics, in situ resource utilization and battery testing in its Energy Systems Test Area. "I thought I would use my chemical engineering knowledge toward petroleum or refining or reactions for pharmaceuticals. But now I know that there's another path that I could take — working on life support systems in the aerospace industry."

As if a chemical engineering major weren't challenging enough, Lin is also pursuing a major in music performance, specializing in violin performance. He began playing at the

age of five, eventually competing in fiddle competitions around the country. Accomplished? Lin was named the 2018 National Young Adult Oldtime Fiddle Champion in Weiser, Idaho and the 2012 Grand Master Youth Fiddle Champion in Nashville, Tennessee.

"There are a lot of engineering students who are minoring in music, but I only knew one person who was doing a double-major in engineering and music," says Lin. "I figured I might as well try, even though it would add a couple of semesters to my degree."

“Because of all these opportunities at UK, a lot of doors have been opened to me. I've always had dreams, but the difference now is that I have a lot more confidence that I can achieve them.”

As a member of the symphony orchestra at UK, Lin participates in performances throughout the year, which provides an outlet to practice and play with fellow musicians. In 2019, the orchestra played at Carnegie Hall in New York City as part of the UK School of Music's 100th anniversary.

How many undergraduate students have done stints at NASA and Carnegie Hall? Without question, Lin took "The Magic of Thinking Big" and his resulting conversations with Stan Pigman to heart.

"Because of all these opportunities at UK, a lot of doors have been opened to me. I've always had dreams, but the difference now is that I have a lot more confidence that I can achieve them." ■

TAKING THE LONG ROAD

AN INTERVIEW WITH FUSION CYBER'S CHRISTOPHER ETESSE

By Kel Hahn

After living and working in Washington, D.C. a few years after receiving his master's degree in computer science, Chris Etesse (MSCS 1999) informed his father, a mechanical engineer who graduated from the Rochester Institute of Technology, that he was joining a 20-employee startup company.

The news was not enthusiastically received.

"Don't join a startup," he counseled. "Get a job with an established corporation."

Etesse went with the startup anyway, and that's a good thing because the company — Blackboard — became an international leader in the e-learning industry. Etesse's experience there prepared him to lead Fusion Cyber, a cybersecurity talent management and services company that is partnering with the University of Kentucky to fill 4.5 million open positions in the cyber industry.

We visited with Etesse to learn more about Fusion Cyber, his background, his achievements and the danger of leaving so many cyber positions unfilled.

Your undergraduate degree is in American history. How did you go from that to a graduate degree and career in computer science?

I was originally going to go into accounting. Then I wanted to go into law. Finally, I settled on American history. As I was finishing my degree, I noticed momentum gathering behind the internet thanks to early browsers, like Mosaic a2 and a4. So, I went to the UK Department of Computer Science and talked with Jerzy Jaromczyk, who was the director of undergraduate studies. I told him I wanted to pursue graduate studies in computer science. When he asked what my undergraduate major was and I told him American history, I thought he might laugh. But he didn't. Instead, he said it would take a year of post-baccalaureate work to catch up. Within a year, I became a teaching assistant, and eventually, I got my master's in computer science.

How grave is the situation regarding open cybersecurity positions?

Pre-pandemic, there were 3.5 million open cyber positions worldwide. Currently, it's 4.5 million. In the 1990s, the United States graduated about 75,000 computer science graduates annually. Today, we graduate half of that number. From a competitive perspective, China graduated 2 million high

schoolers each year in cyber. So, we're really behind the eight ball.

If you think about all the cyber hacks that have happened recently, from SolarWinds to the Colonial Pipeline, it only argues that we need more talent — and more diverse talent at that. The cyber workforce is 96 percent white male dominated. There is no way we are going to fill the 600,000 open positions in the U.S. if we don't open the top of the pipeline and encourage underrepresented minorities to choose cyber for a career.

Finally, 75% of the workers currently in cyber positions are going to retire in the next five to 10 years. So, we've got a graying of the talent pool in addition to all the unfilled positions. Basically, it's a tsunami heading right for us. If cyber were a baseball game, it would be the first inning, and the first up at bat. No offense to basketball, of course!

How does Fusion Cyber convert interested learners into cyber professionals?

Each course is eight weeks. Depending on the program, someone working with us is looking at 32–40 weeks total. They're getting certification from UK — powered by us — and

then they can sit for industry certification exams. If you have the right industry certifications, most cyber positions start at \$132,000 per year. If you get a security clearance and work as a government contractor, you can double that.

As I look around the Beltway here in Washington, D.C., there are so many companies with hundreds or even thousands of unfilled positions. Booz Allen Hamilton has 2,500 open cyber positions. Leidos, Raytheon, Northrop Grumman — I could go on and on. These are not companies that want to hire people and then win business; these are contracts that they already have and could bill if they had the people in those positions — and you can stay in Kentucky and work virtual in a six-figure career!

How has your career brought you to this moment and opportunity?

When I was in the computer science program, I was also

running a small consulting business on the side. One of the things I built while I was teaching CS270 was an early website that allowed students to enter a special code that let them see their grades. After graduating, I moved to the Washington, D.C. area and went to work for Thompson Publishing. Because I had built an early learning management system, I then built one for them called World Class Syllabus that was later acquired by Pearson.

After about a year, I joined Blackboard and spent eight years there building products, using my right brain/left brain in legal technology negotiating with Oracle and others, helping Microsoft invest \$10 million into the company and running the international services business. I stayed at Blackboard until the company went public. Since then, I've been building enterprise technology businesses with a focus on workforce training and education.

Who is your ideal customer?

It's typically an employee already in network engineering or a junior position in cyber security who is looking to take the next step in their career development. With these certifications they can distinguish themselves from peers and grow into a leadership role at their current employer or qualify for a promotion in a new job. Also, adult learners or upskillers — people between 25 and 55 years old with some technical propensity. They may be someone who has worked on HIPAA privacy in health care or FERPA in higher education and now wants to move into cyber security risk management. It could be someone who handled risk and safety for mines, law enforcement, especially veterans, even gamers!

The professional we envision needs to be able to think creatively and translate deep, technical matters and discoveries to executives for business strategy and continuity of operations.

If you picture the cybersecurity job market as a pyramid, it's that middle of the pyramid that's so key, and that's where we focus, especially on zero-trust environments. It's an excellent niche for veterans.

Are you seeking corporate partners for scholarships and placement?

Yes! We already have a multi-million-dollar relationship with an enterprise software company out of Silicon Valley seeking to fix the equality problem in the cyber workforce and are also

looking for corporate partners to donate scholarships and get first looks at the talent going through the program, as well as attend our twice-yearly virtual speed dating career fair to fill their open positions. On average, the chief information security office turns over every 12-18 months, and 50% of their positions are open and unfilled. Fusion Cyber in partnership with the University of Kentucky can help create a steady and reliable partnership for talent now and into the future!

What is UK's involvement in this partnership?

It's interesting; if you look at the data over the past 30 years, people typically choose a college or workforce training opportunity based on the university or institution that's within 30-40 miles of where they live. UK was established as a land-grant institution for the commonwealth of Kentucky, so when people in Kentucky think about education and career, the UK brand stands front and center. So, we thought UK was the logical choice to be the first university in this state for a partnership.

And we envision a long-term relationship with our customers. We want folks to keep coming back, earn more certification, re-up their skills and keep identifying with the UK brand.

The first cohort launched in January. How did that feel?

We've been working in this space for almost four years now, so it's great to have courses underway. It's a crazy, interesting market, and I like to help solve crazy, interesting problems, so I'm having a blast and doing it with a great group of friends — old and new alike. ■



Learn more about Fusion Cyber's industry-accepted cybersecurity certifications and their programs in zero-trust risk management, defense and cyber offense at kentucky.fusioncyber.co >>

JULIUS SCHOOP RECEIVES NSF CAREER AWARD

Julius Schoop, assistant professor in the Department of Mechanical Engineering at the University of Kentucky and the Institute for Sustainable Manufacturing, has received a National Science Foundation (NSF) Faculty Early Career Development (CAREER) Award.

The CAREER Award is one of the "most prestigious awards in support of the early career-development activities of those teacher-scholars who most effectively integrate research and education within the context of the mission of their organization," according to the NSF.

ADVANCED CHARACTERIZATION AND MODELING OF STRUCTURE-PERFORMANCE RELATIONSHIPS IN FINISHING PROCESSES

This project will pursue fundamental new knowledge of the effects of finishing processes on the response and performance of advanced metal alloys.

Finish machining processes are widely used in industry and determine many critical surface properties. Pro-active engineering of these properties through a proposed Digital Process Twin approach could significantly increase the quality, performance and life of many structural components. For example, improved fatigue life of aerospace components such as landing gears and turbine blades could help to further increase the safety of commercial aviation and green power generation while also helping to reduce costs by extending the useful life of these high-value parts.

Additional benefits of the proposed approach include improved productivity and competitiveness of the U.S. advanced manufacturing industry, with wide application potential in the aerospace, biomedical and automotive sectors. To ensure project outcomes yield the most benefit to society, the project team will collaborate closely with leading regional and national aerospace manufacturers to identify key technical requirements and workforce education needs in industry. Collaboration with the Society of Women Engineers will be leveraged to recruit and train a more diverse workforce with the full participation of female and underrepresented minority students. The principal investigator will pursue the establishment of a collaborative working group that will bring together experts from both academia and industry and provide much-needed pedigreed process model input data.

Schoop joined the UK College of Engineering faculty in 2018.



UNIVERSITY OF KENTUCKY
COLLEGE OF ENGINEERING

Hall of Distinction

John Wesley Gunn, Class of 1890, earned the first engineering degree awarded by what eventually became the University of Kentucky. Since that modest beginning over 130 years ago, more than 28,500 individuals have followed his example and received degrees in engineering and computer science. Through their extraordinary achievements, our alumni have established a lasting legacy of excellence. Initiated in 1992, the Hall of Distinction recognizes and honors those alumni who have demonstrated distinguished professional accomplishments, outstanding character and commitment to community service. This recognition serves to encourage exemplary achievements by current students and others. It is a symbol of the respect and admiration held by the University of Kentucky College of Engineering for these esteemed individuals. Below are the 2020 inductees.



DAMON BARBER

B.S. in Mining Engineering, 1990

Since 2014, Barber has been the senior managing director of Liberty Metals & Mining. In his 30-year investment banking career, Barber has advised and assisted companies on over \$70 billion of mergers and acquisition activities and over \$20 billion of debt and equity capital raisings. Barber has served on the board of directors of Yara Dallol B.V., Atalaya Mining PLC, Ram River Coal Corporation, CST Mining Group, Marcobre S.A.C. and Baralaba Coal Company. While managing director of Baralaba from 2018–2021, he oversaw and directed the development of the Baralaba North metallurgical coal mine into commercial production. He graduated with his MBA from the Wharton School of Business in 1996.

JESUS CABAN

M.S. in Computer Science, 2006

Jesus Caban is the chief of Clinical and Research Informatics at the Walter Reed National Military Medical Center National Intrepid Center of Excellence. His software design has received the Defense Health Agency Innovation Award, the Association of Military Surgeons of the United States HealthIT Award and the Federal HealthIT Innovation Award. In 2016, he was selected as the vice chair of the Institute of Electrical and Electronic Engineers Visualization conference. In 2017, he founded the American Medical Informatics Association Visual Analytics Work Group. In the past eight years, he has been an adjunct professor at Johns Hopkins University and Uniform Services University. He received his Ph.D. in computer science from the University of Maryland Baltimore County in 2009.



GREGG COLEMAN

B.S. in Electrical Engineering, 1986

Gregg Coleman is the founder and president of InLine Automation Group, a production line company that operates in three states. He sold it to Gray, Inc. in 2018, and it now operates as InLine Engineers LLC, a Gray Company. In 2001, he also founded CRG Technologies, which was sold in 2021 and now operates as CRG Automation. Previously, Coleman was the vice president of engineering for automation technologies, Inc. Under his leadership, the company grew 300%. Coleman supports scholarships in the UK College of Engineering and Children of Fallen Patriots; he is a supporter of the Kentucky Science Center; and he serves on the UK advisory board for the Department of Electrical and Computer Engineering.

UDAY DESHPANDE

M.S. in Electrical Engineering, 1992
Ph.D. in Electrical Engineering, 1999

Uday Deshpande is the chief technical officer of D&V Electronics, which produces solutions for test components and modules used in electric vehicles. Deshpande has worked for Sunbeam-Oster, Globe Motors, Black & Decker, DeWalt, General Atomics, Ingersoll Rand and CNH Industrial. He speaks five languages, has 10 U.S. patents awarded or pending, and has several publications. Deshpande continues to serve as an active member of the Society of Automotive Engineers and the Institute of Electrical & Electronics Engineers. Deshpande is passionate about supporting teachers and has worked with Classroom Central, United Way and Habitat for Humanity for several years. He has also organized fundraisers for Voice of World, an orphanage for disabled children in India.



LISA ERNST

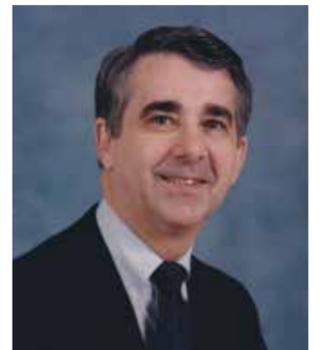
B.S. in Chemical Engineering, 1986

In her 35 years at Procter & Gamble, Lisa Ernst served as engineer, director of research and development, and vice president of research and development. She retired as senior vice president of R&D for Oral Care and the consumer health sector leader of R&D in 2022. During her tenure, Crest and Vicks became \$1 billion brands, and Oral B Power and Head & Shoulders became \$2 billion brands. She has sponsored P&G's R&D Hispanic Affinity Network, African American Network and Women's Network. P&G awarded her the Kathy Fish North Star Award for her work toward setting product standards. At UK, she has served on the board of the Gaines Foundation, the Dean's Engineering Advisory Council and the Lewis Honors College Advisory Council.

DON KELLY

B.S. in Civil Engineering, 1965
M.S. in Civil Engineering, 1967

Don Kelly was the Kentucky secretary of transportation from 1991-1995, the longest anyone had held the position at the time. In this position, he was chairman of the American Association of State Highway & Transportation Officials Advanced Transportation Systems, the ADVANTAGE I-75 Policy Committee and the ITS America Advanced Rural Transportation Systems Committee. In 1995, the American Public Works Association named him one of the Top Ten Public Works Leaders in North America. Previously, Kelly worked at Murray State University as associate professor of Engineering Technology, interim vice president for University Relations, assistant to the president for Budget and Legislative Affairs, director of Rural Development and executive director of the MSU Foundation.



GRANT AWARDS

Akinbode Adedeji, associate professor in the Department of Biosystems Engineering, received a \$50,000 from the USDA NIFA (A1521 program area) for his project "Envisioning 2050 in the Southeast: AI-driven Innovations in Agriculture."

Ramkumar Annamalai, assistant professor in the F. Joseph Halcomb III M.D. Department of Biomedical Engineering, was awarded a two-year competitive grant in the basic research category from the Orthopedic Trauma Association.



Fanny Chapelin, research assistant professor in the F. Joseph Halcomb III, M.D. Department of Biomedical Engineering, was selected for an Institutional Research Grant from the American Cancer Society (ACS-IRG) for her project "Magnetic Resonance Imaging of Tumor-Associated Macrophage Changes with Therapy."

Samson Cheung, Blazie Professor in the Department of Electrical and Computer Engineering, was awarded an Oracle for Research Cloud Grant for the project titled "Privacy Preserving Video Machine Learning on Autism Risk Prediction."

Sayed Ahmad Salehi, assistant professor in the Department of Electrical and Computer Engineering, received a \$400,000 award from the National Science Foundation for a three-year project "FET: SMALL: New Abstraction and Design Automation for Complex

Computations with DNA Using Fractional Coding."

JiangBiao He, assistant professor and L. Stanley Pigman Faculty Fellow in the Department of Electrical and Computer Engineering, received a \$1.71 million award from the U.S. Department of Energy Advanced Research Projects Agency–Energy for a two-year project "Ultra-High-Performance Nano-Liquid Insulation for Upgrading Large Power Transformers (UPLIFT)."

JiangBiao He, assistant professor and L. Stanley Pigman Faculty Fellow, and **Dan Ionel**, L. Stanley Pigman Chair in Power, were selected to serve as PI and co-PI for the UK's participation in NASA's University Leadership Initiative.

Yuan Liao, professor in the Department of Electrical and Computer Engineering, with co-PIs **JiangBiao He**, **Aaron Cramer** and **Dan Ionel**, also in ECE, received a \$876,408 award for the Department of Defense University Research Instrumentation Program funded through the Office of Naval Research.

Wayne Sanderson, professor in the Department of Biosystems Engineering and director of the Southeast Center for Agricultural Health & Injury Prevention (SCAHIP), was part of a \$500,000 award from the U.S. Department of Agriculture to allow the Kentucky Department of Agriculture to work with the University of Louisville School of Nursing, SCAHIP and the UK College of Agriculture, Food and Environment to help farmers and agriculture producers with strategies to aid mental health awareness.

Rachel Schendel, **Akinbode Adedeji**, and **Tyler Barzee**, faculty members in the Department of Biosystems Engineering, received a \$274,500 USDA-NIFA Foundational and Applied Science Program, Novel Foods and Innovative Manufacturing Technologies-Priority Area award for their project "Transforming Distillers' Spent Grains into Novel Food Ingredients with Prebiotic and

Antioxidant Characteristics."

UK Center for Applied Energy Research, received a \$1.3 million award from the U.S. Department of Energy's National Energy Technology Laboratory to develop technology that will capture carbon dioxide directly from the atmosphere.

Guigen Zhang, professor in the F. Joseph Halcomb III M.D. Department of Biomedical Engineering, received a commercialization grant from the Kentucky Network for Innovation and Commercialization (KYNETIC), an NIH-funded Research Evaluation Commercialization Hub.

PROFESSIONAL RECOGNITION

Carmen Agouridis, extension professor in the Department of Biosystems Engineering, received the 2021 William Barfield Award for Outstanding Contributions in Water Resource Research.

Abdullah Al Hadi, postdoctoral researcher, **Hope Anderson**, undergraduate research fellow, **Dan Ionel**, professor and L. Stanley Pigman Chair in Power, and **Evan Jones**, doctoral student and GAANN Fellow, received a Best Paper Award at the 10th edition of the International Conference on Renewable Energy Research and Applications for their paper "Power Factor and Reactive Power in U.S. Residences — Survey and EnergyPlus Modeling."



L. Sebastian Bryson, Hardin-Drnevich-Huang Professor in the Department of Civil Engineering, has been elected to

the American Society of Civil Engineers' College of Fellows.

Czarena Crofcheck, professor, and **Rosemary Fama**, agriculture extension associate in the Department of Biosystems Engineering, were recognized as Kentucky Leaders for their exceptional commitment to advancing opportunities for girls and women in STEM at the national Million Women Mentors Summit.



Jennifer Doerge, director of advising and engineering student services, received the National Academy Advising Association (NACADA) Region 3 Award for Excellence in Advising, Primary Role Advisor.

Isabel Escobar, professor in the Department of Chemical and Materials Engineering, has been elected to serve as board chair for the Association for Women in Science.

Gisella Lamas-Samanamud, lecturer in the Department of Chemical and Materials Engineering at the Paducah Extended Campus, received a 2022 WE Local Award — Engaged Advocate from the Society of Women Engineers.

Abhijit Patwardhan, named interim chair of the F. Joseph Halcomb III, M.D. Department of Biomedical Engineering.

Tim Taylor, professor and Terrell-McDowell Endowed Chair in the Department of Civil Engineering, received the 2021 Best Paper award for "Young Talent Motivations to Pursue Craft Careers in Construction: The Theory of Planned Behavior," at the 2022 CI & CRC Joint Conference.

Guigen Zhang, professor in the F. Joseph Halcomb III, M.D. Department of Biomedical Engineering, has been

elected to the Fellow Class of 2021 of the Biomedical Engineering Society.

Caigang Zhu, assistant professor in the F. Joseph Halcomb III M.D. Department of Biomedical Engineering, was featured as a thought leader by Photonics Media.

STUDENT AND ALUMNI AWARDS AND RECOGNITION

Toby Adjuik, a doctoral student in the Department of Biosystems Engineering, has been awarded a professional development grant from UK's Center for Graduate and Professional Diversity Initiatives.

David Alexander, a junior in the F. Joseph Halcomb III M.D. Department of Biomedical Engineering, won first place for Outstanding Undergraduate Poster Award at the 23rd Gill Heart and Vascular Institute Cardiovascular Research Day.

Hope Anderson and Steven Poore, undergraduate students in the Department of Electrical and Computer Engineering, were awarded a 2021/2022 national IEEE Power and Energy Society (PES) Plus Initiative Scholarship.

Matthew Bernard, **Lucas Bertucci** and **Anicah Smith**, undergraduate researchers in the Department of Chemical and Materials Engineering, have been chosen to present their research at the 2022 Posters-at-the-Capitol event at the Kentucky state capitol in Frankfort.

Makram Bou Hatoum, a doctoral candidate in the Department of Civil Engineering, placed second in the AKC10 Construction Management Committee's Poster Competition at the 2022 Transportation Research Board's annual meeting in Washington, D.C.

Makram Bou Hatoum and Alyssa Donawa, doctoral students, have been named Southeastern Conference (SEC) Emerging Scholars.

Anna Compas, a senior in the Department of Mechanical Engineering, received a Brooke Owens Fellowship. The nationally acclaimed program awards exceptional undergraduate

women — and other gender minorities — with aviation and space internships and provides senior mentorship and professional networking opportunities.

Luke Fortner, a recent graduate from the Department of Mechanical Engineering, has been named a semifinalist for the 2021 William V. Campbell Trophy.

Molly Frazier, a doctoral student in the Department of Chemical and Materials Engineering, is the 24th recipient of the Karen Wetterhahn Memorial Award.

Nolan "Deon" Harvey, **Armando Penalzo** and **Crystal Wicks** were selected as the inaugural class of Engineering Technology Scholars.

Nathaniel Hudson, a graduate student in the Department of Computer Science, has been selected as a Diverse Rising Graduate Scholars by the Diverse Issues in Higher Education magazine. Ten graduate students were selected from around the country.

David Lu, a second-year doctoral student in the Department of Chemical and Materials Engineering, won the 2021 Most Outstanding Graduate Poster Presentation at the 2021 Kentucky Water Resources Annual Symposium.

Matthew Russell, **Evan King**, **Chad Parrish**, graduate students, and **Peng Wang**, assistant professor in the Department of Electrical and Computer Engineering, were recognized by the North American Manufacturing Research Institution and SME Scientific Committee with the Outstanding Paper Award in the Manufacturing Systems Track at the 49th North American Manufacturing Research Conference for their paper "Stochastic Modeling for Tracking and Prediction of Gradual and Transient Battery Performance Degradation."

Peyton Schroeder, a recent graduate from the Department of Mechanical Engineering, was selected by UK President Eli Capilouto to speak at the Fall 2021 Commencement Ceremony.

REBECCA LIEBERT ELECTED TO NATIONAL ACADEMY OF ENGINEERING

By Derrick Meads

UK alumna Rebecca Liebert, executive vice president of PPG Industries, has been elected to the National Academy of Engineering (NAE). Membership in the NAE is one of the highest professional distinctions given to an engineer.

Liebert, who graduated from the University of Kentucky with a Bachelor of Science in Chemical Engineering in 1990, donated more than \$6 million to establish the Rebecca Burchett Liebert Dean's Fund. The fund provides scholarships to undergraduate students from Eastern Kentucky — emphasizing support for female students and those who would strengthen UK's commitment to diversity and inclusion.

Liebert was elected to the NAE in recognition of her leadership in developing and executing innovative initiatives to strengthen the U.S. manufacturing industry. NAE membership honors those who have made major advancements in engineering fields, like Liebert has, as well as those who have developed new fields, implemented innovative approaches to engineering education or made outstanding contributions to engineering literature through research, practice or education.

She is one of 111 U.S. members and 22 international members of the 2022 NAE class. This class will be formally inducted later this year during NAE's Annual Meeting. The new appointments bring NAE total membership in the U.S. to 2,338 and internationally to 310.

"Dr. Liebert's achievements are an inspiration to Kentucky students who want to make an impact on the world," said Rudy Buchheit, the Rebecca Burchett Liebert Dean. "She also reminds us of the important contributions of women leaders in our field and the need to continue to strengthen diversity."

After graduating from UK, Liebert received a doctorate in chemical engineering from Carnegie Mellon University and an MBA from Northwestern University's Kellogg School of Management.



In 2004, Liebert became president of Alcoa's Reynolds Food Packaging and Kama divisions. She remained with Alcoa until 2006, when she joined Honeywell to become vice president and general manager of the electronic materials business. In 2012, Liebert was made senior vice president and general manager of Honeywell UOP. In 2016, she was named president and CEO of the division.

In 2018, Liebert joined PPG as senior vice president. She assumed her current role as executive vice president in 2019. At PPG, she focuses on engineering the best paints and coatings for the global automotive industry and the company's mobility initiatives. Liebert also leads global operations for the industrial segment, the procurement function and the Asia Pacific region.

In 2021, Automotive News named Liebert one of the 100 leading women in the North American automotive industry.

CLASS NOTES

Martha B. Allard (BSEE 1988) was appointed as an administrative trademark judge at the Trademark Trial and Appeal Board. Judge Allard has practiced intellectual property law for more than 20 years.

Valmiki Bhargava (PhDEE 1975) retired from the University of California San Diego and the San Diego VA Hospital after 45 years of service. Valmiki is a Life Fellow of IEEE, and is a Fellow of American College of Cardiology, a Fellow of the American Gastroenterology Association and a member of the American Heart Association.

Craig Farmer (BSCE 1998) has been appointed as director of the Capital Improvement Program at the Metropolitan Nashville Airport Authority. After designing airports, Craig served 15 years as chief aviation engineer for the State of Kentucky, overseeing 58 General Aviation Airport projects before joining the Blue Grass Airport as manager of design and construction.

Greg Gabbard (BSCE 1986) has been named a vice president for GRW. Gabbard is an accomplished transportation engineer with more than

33 years of experience, including 23 with GRW.

Rebecca Liebert (BSCE 1990), executive vice president of PPG Industries, has been elected to the National Academy of Engineering (NAE). Membership in the NAE is one of the highest professional distinctions given to an engineer.

Jonathan Mirgeaux (BSBAE 2001, MSBAE 2004) has been named the new director of Noblesville Utilities in Indiana. Mirgeaux has 18 years of experience as a wastewater and storm water engineer. Prior to joining the city, Mirgeaux worked as a consultant at R.W. Armstrong, CHA Consulting and HWC Engineering.

Joe Pavoni (BSCE 1998, MSCE 2000) has been named a vice president for GRW. Pavoni has taken on numerous responsibilities as a water resources engineer during his 20 years of experience, including 16 with GRW.

J. Anthony "Tony" Powell (BSEE 1959) has been inducted into the Glenn Research Center Hall of Fame as part of its 2021 class.

Mohammad Rezaee (MSMNG 2014, PhDMNG 2016), assistant professor of mining engineering in the John and Willie Leone Family Department

of Energy and Mineral Engineering at The Pennsylvania State University, was selected to receive the Centennial Career Development Professorship in Mining Engineering in the College of Earth and Mineral Sciences.

Wayne Roberts (BSEE 1999) has been named a vice president for GWR. Roberts is a highly skilled and respected electrical engineer with more than 20 years of experience, all with GRW.

Jeremiah Sloan (MSEE 2016) has been named the next CEO of Craighead Electric. Sloan has been with CECC since 2016 and held the roles of engineer, manager of Fiber Assets, and chief operating officer of empower, Delivered by Craighead Electric. Prior to joining CECC, Sloan spent six years as an officer in the U.S. Air Force. While serving on active duty, he functioned as a development engineer and a professor of aerospace studies.

Beth Weeks (BSCS 1985) has been promoted to executive vice president, development at Planview. Beth is also a member of the UK College of Engineering Dean's Advisory Council. She has also been honored as one of the Top 25 Profiles in Power & Woman of Influence by the Austin Business Journal.

BE Included

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



Thurlow R. Robe
Jan. 25, 1934 - Jan. 7, 2022

Thurlow Richard Robe, Ph.D., PE, passed away on January 7, 2022. He was hired in 1966 as an assistant professor in the University of Kentucky College of Engineering. During his 15 years at UK Engineering, he held the positions of professor, associate dean for academic affairs and special assistant to the

president. He also served on the UK Athletic Board from 1975 to 1980.

Robe earned a Bachelor of Science in civil engineering from Ohio University in 1955. He worked for the General Electric Company and served active duty as an officer and supersonic jet fighter pilot in the United States Air Force (USAF).

Upon completing his military service, he earned a Master of Science in 1962 from Ohio University in mechanical engineering. Robe earned a Ph.D. in applied mechanics from Stanford University in Palo Alto, California, between 1963 and 1965. Upon graduation, he was hired by the University of Kentucky.

In 1968, Robe served as a NASA-ASEE Fellow at Langley Research Center on a team that produced a satellite that could orbit Earth while one satellite portion remained stationary. This engineering feat produced numerous technologies utilized today — like our cell phones.

After his time with the UK College of Engineering, Robe served as dean of the Ohio University College of Engineering and Technology from 1980 to 1996. Robe helped educate more than 10,000 engineering students during his academic career.

Robe is survived by his loving wife of 66 years, Eleanora Clara Komyati Robe, four children and five grandchildren.



Theodore R. Tauchert
Sept. 3, 1935 - Dec. 10, 2021

Theodore Richmond Tauchert, D.Eng., PE, passed away on December 10, 2021.

Tauchert became a faculty member in the University of Kentucky Department of Engineering Mechanics in 1970. He served as department chair until 1997.

Tauchert published extensively, including a textbook titled "Energy Principles in Structural Mechanics." Following his retirement in 2003, he remained at UK as a professor emeritus and continued publishing, including extensive work on the "Encyclopedia of Thermal Stresses."

Tauchert was born in New York City on September 3, 1935, received a Bachelor of Science in Engineering in Civil Engineering from Princeton University in 1957. He then attended Yale University, where he received a Master in Engineering degree in solid mechanics and a Doctor of Engineering degree in 1964.

Tauchert served as a second lieutenant in the U.S. Army Corps of Engineers from 1957 to 1958. He then worked for Sikorsky Aircraft from 1958 to 1961.

Before coming to UK, Tauchert was a faculty member in the Department of Aerospace and Mechanical Sciences at Princeton University.

Tauchert was a humble, quiet and terribly funny gentleman. He traveled the world with his family, spending much time in England and Italy. He was an excellent tennis player. He drove a moped he called "Wanda the Honda" to and from work and tennis matches in his later years.

Tauchert is survived by his wife, Ann Dudley Bradlee Tauchert, his five children and his five grandchildren.

In Memoriam

<i>Clyde P. Baldwin</i>	Civil Engineering	1965
<i>Richard D. Baldwin</i>	Civil Engineering	1955
<i>Ray A. Bucklin</i>	Biosystems and Agricultural Engineering	1982
<i>Frederick A. Coots</i>	Electrical Engineering	1958
<i>Roger T. Crittenden</i>	Civil Engineering	1964
<i>William J. Donovan</i>	Mechanical Engineering	1948
<i>Melvin L. Downs</i>	Civil Engineering	1952
<i>Steven J. Fellner</i>	Mechanical Engineering	1966
<i>Edward C. Gieseke</i>	Electrical Engineering	1964
<i>Thomas O. Glenn III</i>	Civil Engineering	1962
<i>Charles R. Ham</i>	Civil Engineering	1949
<i>William J. Hulsey</i>	Materials Science Engineering	1958
<i>Ben A. Johnson</i>	Electrical Engineering	1959
<i>Charles F. Judd</i>	Civil Engineering	1956
<i>Samuel R. Kegley</i>	Mechanical Engineering	1961
<i>John J. Kinsler</i>	Mining Engineering	1965
<i>John E. LaRue</i>	Civil Engineering	1970
<i>Ronn J. Leaf</i>	Mechanical Engineering	1969
<i>Richard K. Lehman</i>	Mechanical Engineering	1958
<i>Sushil G. Munshi</i>	Electrical Engineering	1964
<i>Harold A. Rice</i>	Electrical Engineering	1956
<i>Robert C. Roberts</i>	Electrical Engineering	1963
<i>Orby R. Sanders</i>	Mining Engineering	1953
<i>Christe M. Shekro</i>	Electrical Engineering	1954
<i>Jim W. Simpson II</i>	Civil Engineering	2007
<i>Arthur J. Steilberg, Jr.</i>	Civil Engineering	1956
<i>James H. Young</i>	Biosystems and Agricultural Engineering	1962



UK Senior Anna Compas Awarded Prestigious Brooke Owens Fellowship

Anna Compas, a Lexington senior studying mechanical engineering at the University of Kentucky, is the recipient of a Brooke Owens Fellowship.

The nationally acclaimed program awards exceptional undergraduate women with aviation and space internships, as well as provides senior mentorship and professional networking opportunities.

"This fellowship will not only connect me with amazing mentors who will help me throughout my entire career, but it will also connect me with mentees," Compas said. "This fellowship is creating a positive cycle of support for women and gender minorities who need a strong community to reach their goals."

Compas will intern at Zipline in San Francisco. The company aims to revolutionize the medical supply chain by designing, manufacturing and operating drones to deliver medical products to countries such as Ghana and Rwanda.

"I want to be part of the pushing the envelope of engineering — that's the fun part of it," Compas explained. "But if you can push the envelope in a way that actually helps people and use this new technology in a way that saves lives, it's incredible."

HENRY VICKERS LEAVES BEHIND MORE THAN \$1 MILLION TO PAVE PATH FOR FUTURE ENGINEERS

By Lindsey Piercy

Henry Vickers spent the majority of his life as a public servant working in civil engineering, and now, his memory will live on in the engineers of the future.

Accepted by the University of Kentucky Board of Trustees, Vickers' recent gift totaling more than \$1 million will support the existing Henry C. Vickers Endowed Scholarship Fund in the UK College of Engineering.

"We in the UK College of Engineering believe engineers play a crucial role in creating a world that works," said Rudy Buchheit, the Rebecca Burchett Liebert Dean. "I am gratified that Mr. Vickers not only felt the same way about the engineering profession but also generously provided the college with an endowment that will enable more of our students to concentrate their effort on becoming excellent engineers."

Established in September of 2015, the fund supports students majoring in civil, mechanical or electrical engineering. While all Kentucky students are eligible, preference is given to applicants from McLean County or Hopkins County.

For many high school students, college can be financially daunting. The combined costs of tuition and living expenses threatens to exclude more and more hard-working students from receiving an engineering education.

Born and raised in McLean County, Vickers understood this struggle all too well.

A dedicated student, Vickers persevered and graduated from UK in 1959 with a bachelor's degree in civil engineering. He went on to earn a master's degree from the Massachusetts Institute of Technology.



Vickers also worked to fund scholarships for students whose financial situations would prevent them from earning a degree.

"UK is most grateful for Mr. Vickers' extraordinary philanthropic generosity," J. Ford Stanley, assistant vice president for major gifts, UK Philanthropy, said. "The Henry C. Vickers Endowed Scholarship will help well-deserving students from our commonwealth pursue their dreams of studying civil, mechanical or electrical engineering, and through his scholarship, Henry Vickers' legacy of generosity will live on, as he planned, to accomplish his dream of positively impacting generations of our students."

Additionally, Vickers was a devoted civil servant — spending his entire career with the U.S. Army Corps of Engineers. He worked on various projects, including the infrastructure at Wright Patterson Air Force Base. Upon retiring, Vickers lived in Evansville, Indiana, until his death.

An additional gift of approximately \$1.3 million is expected from Vickers' estate — for an anticipated total gift of more than \$2.3 million.

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For a second year, E-Day Live! was live-streamed online allowing students across Kentucky to tune in, participate in demonstrations and ask engineers questions in real-time. The program was hosted by current engineering students, who shared their infectious enthusiasm for the profession and the college.