Research at the forefront from the **UMKC School of Computing and Engineering**

VANGUARD

CONCRETE FOR A CHANGING CLIMATE

How a UMKC researcher is paving the way for sustainability

/FROM THE DEAN

Dear alumni, supporters and friends,

It has been another exciting year at the School of Computing and Engineering. As you'll read here in our latest issue of *Vanguard* magazine, our faculty have been very busy connecting with industry, seeking out new funding and fine-tuning innovative solutions for some of the world's most exciting challenges.

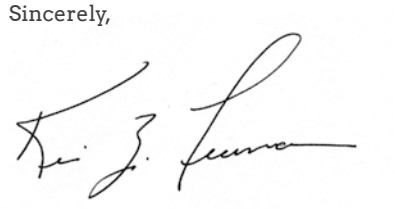
Selecting the stories that fill the pages of our research publication each year is one of the most inspiring things I get to do. We discuss each researcher's newest endeavor and every single one is contributing at a level that demands acknowledgment and deserves a stage. And as we continue to grow, we continue to attract top-tier computer scientists and engineers to come live and work with us here in Kansas City and at UMKC.

In this issue, you'll learn how our team is changing people's lives through advancements in health care and vocational training, and how drones and concrete could protect your homes from flooding and natural disasters. Finally, you will meet one of the newest members of our team who is taking his mission to make flight safer to the sky.

This is the last issue of *Vanguard* we'll release before the opening of our new Free Enterprise and Research Center in Fall 2020. This state-of-the-art building will provide 57,800 square feet for our team to expand and grow. With new laboratories for clean energy, unmanned aircraft, augmented and virtual reality, big data and a clean room, we can't wait to share what comes next.

Stay tuned, there are only more great things to come from SCE.

Sincerely,



KEVIN Z. TRUMAN, PH.D., F.ASCE
Vice Provost, UMKC
Dean, School of Computing and Engineering

VANGUARD

/ VAN,GÄRD/
A group of people leading the way in new developments or ideas

Research at the forefront from the **UMKC SCHOOL OF COMPUTING AND ENGINEERING**

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UMKC
School of Computing and Engineering

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DISASTER INFORMATICS TO THE RESCUE

Harnessing the power of AI to aid disaster relief

BY JENNY MCNAMARA

Imagine you're receiving multiple calls about dangerous levels of floodwater damage, and your job is to prioritize relief efforts. Now imagine you have a statistical map telling you exactly where the damage will be worst.

Creating solutions for real-world disaster-relief situations is the primary focus of the research of ZhiQiang Chen, Ph.D., associate professor of civil and mechanical engineering.

▼ ZhiQiang Chen, Ph.D., is working to harness the power of artificial intelligence to assist first responders in the event of a disasters like flooding and tornadoes, as well as nonemergency situations like a solar eclipse.

Chen is part of a growing field of research that he refers to as "disaster informatics." That is, harnessing the power of cutting-edge technology and using it to respond to natural disasters. His research is part of a much larger collaboration between several entities, including the NASA Jet Propulsion Lab, University of Indiana, Oak Ridge National Laboratory, ImageCat in California and Pacific Disaster Center in Hawaii.

Chen's piece of the puzzle has to do with artificial intelligence (AI)-based computing of remote sensing data for global flood-hazard monitoring and damage assessment. His ultimate goal is to develop a program that automatically creates 3D renderings that clearly show damage and provide decision-makers with stats about damage levels in real time.

"When I first started this research, it was a very small field," Chen says. "However, the increased frequency and severity of natural disasters is attracting more people to this field."

Currently, images of disaster areas are typically taken by satellite, but Chen imagines drones being used more regularly. In theory, a drone could fly over a damaged area, collect an image and either process the image with an edge computing system or send the data to a ground center to be processed. Then a 3D rendering would be sent directly to first responders to help them quickly prioritize areas with the greatest damage.

Chen's first opportunity to test his research's potential was in the aftermath of the 2019 tornado in Jefferson City, Missouri, through support from the Structural Extreme Events Reconnaissance (StEER) program of the National Science Foundation. In the days following the tornado, he and his team flew a drone over an apartment complex to collect images of the damage.

He then processed the data and produced two images: one was an orthomosaic image — stitched together from multiple images — and the other was a digital surface model, showing the volume change of each structure.

These final products were then fed to an AI-based model to determine the extent of the damage to each of the buildings in the apartment complex.

In Jefferson City, Chen used only one drone, but during the 2017 total solar eclipse, he was able to test the use of multiple drones. Local law enforcement officers and emergency responders in St. Joseph, Missouri, had expressed concern over traffic congestion.

With a group of about 20 residents and a total of 10 drones, Chen and his team collected images and funneled them to a single location for processing. Local officials received the final outputs on iPads and used the images to assess traffic throughout the day.

"With this experience, we confirmed the notion of community-based, connected remote sensing where citizen scientists can participate in disaster response and provide key input to first responders," he says.

> *When I first started this research, it was a very small field. However, the increased frequency and severity of natural disasters is attracting more people to this field.*
>
> — ZHIQIANG CHEN, PH.D.

While it is exciting to see the potential of Chen's research, there is one major obstacle to overcome. Aviation regulations require approval to fly in order to maintain safe and open airspaces for other aircraft like medical helicopters. Currently, there are not many ways for helicopters and other aircraft to identify a flying drone in their airspace. The new Unmanned Aircraft Systems (UAS) Remote Identification Program may soon resolve this issue, opening up the civilian market for use in projects like this.

Another equally important challenge is the nature of disaster response in general. With so many social factors at work, the application may not be straightforward. Chen stated that at a certain point this research will have to become interdisciplinary in order to study social implications and how they affect implementation.

"For me, the greatest success would be to see my research being used to make a difference and help people when they need it most," Chen says. "The possibility that my research could someday become a regular part of disaster relief is what fuels my passion for this work."

COMPUTING TERMS

REMOTE SENSING is the process of collecting data from far away and is regularly performed by satellites and other sensors. The cognitive component is where artificial intelligence (AI) is involved. Chen's model utilizes AI to speed up the damage assessment process.

EDGE COMPUTING is another method of speeding up the process. Edge computing brings the data source and the computing method closer together to reduce delays due to long distance communication.

//ZHIQIANG CHEN, PH.D.
Associate Professor of Civil and Mechanical Engineering

RESEARCH INTERESTS
Physical modeling and dynamic system identification, multi-hazard civil infrastructure resilience, remote sensing and machine vision for civil infrastructure monitoring and disaster response, applied artificial intelligence for civil systems

JOINED UMKC
2010

BRANDON PARIGO

Professor Masud Chowdhury, Ph.D. (right), shown here with his family in their Lee s Summit home, became interested in asthma research when one of his children was diagnosed with the condition.

BRANDON PARIGO

ASTHMA SUFFERERS MAY BREATHE EASIER

BY PATRICIA O'DELL

Professor Masud Chowdhury, Ph.D., and his postdoctoral fellow, Mahrukh Khan, Ph.D., are in the beginning phases of developing a new approach that would detect the severity of asthma at different stages without subjecting patients to invasive measures.

Their work is somewhat personal. Chowdhury has a child with asthma and has experienced the anxiety of identifying and treating asthma attacks. Khan went through the difficulty of trying to diagnose a young child with a persistent cough.

"My son suffered from the time he was a year old until he was four. My daughter, who is five years old, had to go to the emergency room twice last year," Chowdhury says. "Now I know firsthand the severity of the condition. We carry two types of nebulizers."

Khan has experienced similar challenges.

"My daughter was having problems breathing when she was very young," Khan says. "Her daycare teacher mentioned that asthma was very common here in Kansas City and that may be the cause. It was so alarming for me. I did a lot of research."

Asthma is a chronic condition that inflames and narrows the airways of the lungs. This narrowing creates symptoms such as shortness of breath, a persistent cough and a feeling of tightness in the chest. Some people can easily manage their asthma, but it can be extremely serious for others. Every day ten Americans die from asthma, and many of these deaths are preventable with treatment.

Adults generally monitor their own breathing, and when situations escalate can use a nebulizer — or inhaler — to deliver medication directly to the lungs. Monitoring children with asthma can be a particularly stressful responsibility, as children don't always recognize symptoms until they escalate.

"This can be a big hurdle in monitoring, because parents cannot always determine if children need to be taken to the hospital or treated," Khan says. "If we develop a low-profile wireless monitoring device, we can improve the accuracy of monitoring and help parents and other caregivers make better decisions."

Currently, people with asthma monitor symptoms with a peak flow meter. The device looks like a kazoo, with a gauge that measures how well air is flowing. To achieve an accurate reading, the patient needs to close their lips tightly around the mouthpiece, keep their tongue away from the opening and blow as hard as possible. That physical maneuvering is often difficult with young children and older adults.

Detection of an impending attack can be tricky — sometimes even for doctors. A wireless system could relieve the asthma sufferer and their caregivers from being

Parents cannot always determine if children need to be taken to the hospital or treated. If we develop wireless monitoring, then we can improve the accuracy of detection and help parents and other caregivers make better decisions.

— MAHRUKH KHAN, PH.D.

in a constant state of alert. It could also send notifications to patients, caregivers and health-care providers in real time.

"If a child or older person is having an asthma attack away from caregivers, we can integrate a warning system they can use within the monitor," Chowdhury says. "It could be programmed to notify the doctor and the family if the patient is unable to respond."

The research is focused on detecting the concentration of mucus and water content in the lungs and bronchial system. To make the system effective, Khan and Chowdhury would need to expose the device to existing information so it can "learn."

"We would have to train the system with microwave images of healthy lungs and bronchial systems and then images of different levels of asthma so that it can recognize the severity of the condition," Chowdhury says.

This data collection may not be as far-fetched as it seems. The technology has been in use in the medical field for years and is currently in place for monitoring blood glucose without collecting blood samples through needle pricks. Kahn is also developing electromagnetic wave-based technology that can be used for detection of breast cancer.

The doctors view this as a long-term project because of the prototype development. The initial phase — collecting data, testing information-gathering methods and developing and testing the resulting device — will take a few years, but Kahn and Chowdhury are dedicated to its completion, both professionally and personally.

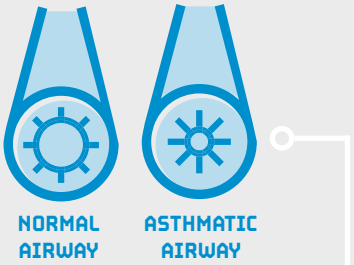
"When you witness an asthma attack firsthand, it's very scary — especially if it's a young child," Chowdhury says. "We are hoping to use this evolving technology to identify reliable early detection so patients can receive early and effective treatment. This will provide peace of mind for asthma sufferers and their caregivers."

/HOW THIS TECHNOLOGY WORKS

UMKC researchers are working on the technology behind a noninvasive device that would monitor four symptoms of asthma — shortness of breath, mucus accumulations, wheezing and cough rate — to provide a scattering profile.

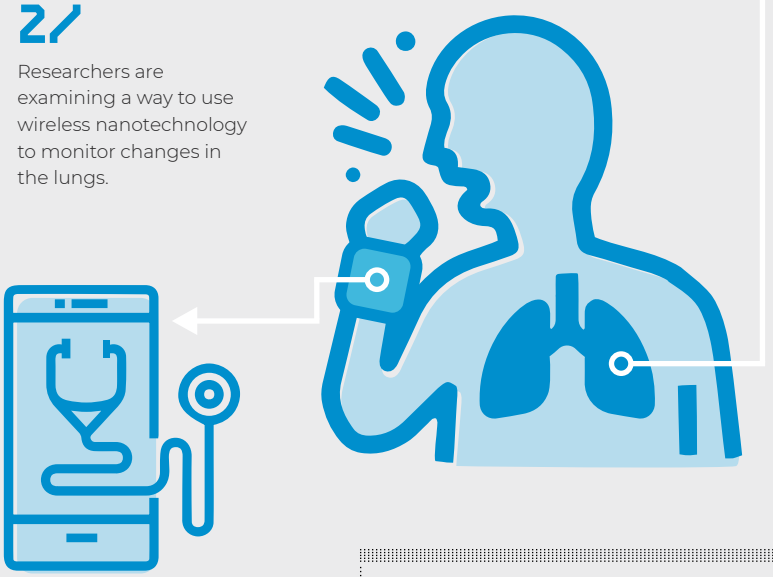
1/

Patients with asthma have narrower, more inflamed airways in their lungs, which create symptoms such as shortness of breath, a persistent cough or a feeling of tightness in the chest.



2/

Researchers are examining a way to use wireless nanotechnology to monitor changes in the lungs.



3/

If a severe change occurs, that technology would then alert the patient or their doctor, so the patient can receive immediate treatment. Someday, researchers hope this information will even be available through an app or wearable device.

//MASUD CHOWDHURY, PH.D.
Professor of Computer Science
Electrical Engineering

RESEARCH INTERESTS
Microelectronics, nanotechnology and post-silicon technologies for computing, communication, biomedical, sensing and energy applications

JOINED UMKC
2012

Mujahid Abdulrahim, Ph.D. — shown here in the cockpit of a plane he built himself and houses in the Lee s Summit Municipal Airport is researching how to make autopilot technology even safer for pilots and passengers.

BRANDON PARIGO

UPGRADING AUTOPILOT TO SAVE-A-PILOT

Researcher looks to computer modeling to enhance aviation safety

BY BRYCE PUNTENNEY

Assistant professor Mujahid Abdulrahim's passion for flying once led him to devise a way to commute to work in his personal plane. That passion also drives his research on helping pilots and passengers get home safely.

Abdulrahim's specialty is in autonomous aircraft development, but he stresses that autonomy isn't just drones — it is everywhere in aviation. He wants to take autopilot functionality to a new level, not to take flying away from pilots, but to make their safety net stronger.

"I don't want to replace pilots with computers," Abdulrahim says. "I love the idea of preserving everything that makes airplanes fun to fly, but I also love the idea of coming home to my children after every time I take to the air."

A self-described "air safety geek," Abdulrahim is working on a computer algorithm that would interpret the equations of motion for each individual aircraft with predetermined models on how it should be performing. At any given time, moving the elevator stick of an airplane results in a specific response, and this technology would try to determine whether the flight matched the expected motion for that specific aircraft.

He's also interested in the human element of these models. That's why he's looking to study how pilots learn and how they react to certain aviation situations. He's especially interested in studying how pilots react when they're at the edges of the flight envelope — the term "pushing the envelope" comes from testing the operating limits of an aircraft.

Abdulrahim's goal is to incorporate pilot behavior into these models, to help indicate when the pilot could use assistance. He compares this supervisory system to lane-change warnings in modern automobiles: to detect an irregular driving pattern and let the driver know.

One area that will play a big part in this supervisory system is something called "task saturation." According to Abdulrahim, it's a concept that's not limited to pilots.

//MUJAHID ABDULRAHIM, PH.D.
Assistant Professor of Civil and Mechanical Engineering

RESEARCH INTERESTS
Air and ground vehicle autonomy, aircraft design and optimization, human-machine interaction, handling qualities for manned and unmanned vehicles, aeroservoelasticitym and dynamics and control of high-agility vehicles

JOINED UMKC
2019

I don't want to replace pilots with computers. I love the idea of preserving everything that makes airplanes fun to fly, but I also love the idea of coming home to my children after every time I take to the air.

— MUJAHID ABDULRAHIM, PH.D.

"If you're taking notes and someone asks you to solve a math question while also jumping on one foot and reciting the alphabet — you'll eventually hit your task saturation point," he says. "From there you'll stop receiving inputs and only focus on one thing at a time, and you probably aren't going to do that one thing very well."

In aviation, this can happen to any size of aircraft but is more common when pilots of small airplanes fly into bad weather. For example, a pilot can be talking to air traffic control while scanning for other aircraft, with limited visibility and high winds affecting air speed — suddenly that pilot has hit saturation.

With Abdulrahim's supervisory system, a model can be built to monitor the flying skills a pilot exhibits as they fly — how well they hold airspeed, how well they hold altitude. If those skills suddenly take a turn for the worse, the system can intervene to improve safety.

Abdulrahim sees far-reaching potential for his modeling technology. He's looking at replacing or enhancing aircrafts' airspeed sensor — the only aircraft sensor exposed to the elements and thus more susceptible to being corrupted mid-flight. There are also ride-sharing companies looking at autonomous aviation as the future of transportation. Abdulrahim is looking at how his models could help make that a reality.

His passion for flying will continue to drive his research into safer skies so everyone — pilot and passenger — can keep coming home to their families.

▼ Students of John Kevern, Ph.D., use water to test its effect on pervious concrete in cold temperatures. The pervious concrete was installed in the parking lot of the KC Water building at 10th and Harrison for experiments like this one.

BRANDON PARICO

CONCRETE FOR A CHANGING CLIMATE

How a UMKC researcher is paving the way for sustainability

BY JULIE WHITSITT

Our global temperature is on the rise, oceans are warming and extreme weather events have been steadily increasing. According to NASA, "the current warming trend is of particular significance because most of it is extremely likely (greater than 95% probability) to be the result of human activity." Luckily, humans at the UMKC School of Computing and Engineering are developing ways to make their respective research areas more environmentally friendly.

John Kevern, Ph.D., P.E., professor and civil and mechanical engineering department chair, has been working with Kansas City architects, builders and concrete companies to increase the amount of pervious concrete used around the city. Pervious or permeable concrete is a porous mixture of cement, water and gravel. The beauty of the lumpy, holey concrete that has the consistency of a rice cake is that it serves as pavement and stormwater mitigator in one. It can also help prevent floods, control erosion, allow groundwater recharge and improve water quality through filtration.

Bonus: Pervious concrete doesn't freeze like normal pavement. It's less slippery, because the water has a smaller surface area on which to freeze. Recently, $55,000 in funding from an Early-concept Grant for Exploratory Research (EAGER) — which supports exploratory work in early stages with opportunity for high risk-high reward — from the National Science Foundation allowed Kevern, mechanical engineering faculty Greg King and SCE students to experiment with de-icing and slip and fall.

"For society, from an equity and access perspective, any surface where we can reduce the chance of a slip and fall makes both a safer surface and allows us to use fewer de-icing agents like salt," Kevern says of his NSF research. "Salt is not only bad for the environment, but it also reduces the lifecycle of concrete,"

Kevern, who is a member of the advisory group for the American Public Works Association's Sustainable Stormwater Task Force, is also researching a greener way to produce the cement used in concrete by reducing the amount of carbon dioxide (CO_2) emitted throughout the process. Using recycled ingredients — like the byproducts of coal-burning power plants or iron and steel production — in the concrete mixture drastically lowers CO_2 emissions.

Kevern looked at the data regarding CO_2 in Kansas City and found that the city used 2.5 million cubic yards of concrete in 2018, which releases 663,375 tons of CO_2. The average Kansas City vehicle is responsible for more than 10,000 pounds of CO_2 each year. Transitioning to a concrete made of 35% recycled byproducts would be the equivalent of taking 42,000 cars off the road. An increase to 50% recycled byproducts, and the equivalent is 60,000 vehicles.

"The production of cement for concrete is somewhere around 8-10% of the human-produced carbon dioxide in our atmosphere. There are many other things that are more, but cement's contribution is not insignificant," Kevern says. "Anything we can do to replace cement and reduce the CO_2 footprint of our concrete is helpful from a climate change perspective."

CONCRETE AND BEYOND

The increased greenhouse gases can also account for an increase in extreme weather changes. In Kansas City, stormwater and runoff create a particular challenge.

Kevern regularly works with KC Water, the city division responsible for accessibility and quality of water services around the city, including School of Computing and Engineering alumni like Tom Kimes (B.S.C.E. '87), manager of stormwater engineering, and Jose Lopez (B.S.C.E. '15), watershed planner.

KC Water recently installed several different types of concrete, including contracting Kevern to specify pervious concrete, in the parking lot of its offices to test the long-term benefits of each. Kimes and Lopez are also working on a way to combat the long-standing stormwater and sewer issues that have plagued the city for years and will be exacerbated by the added rainfall that climate change brings.

After several years of repeated flooding from nearby Indian Creek, the City of Kansas City, Missouri, bought the land and demolished the strip mall that stood at 103rd Street and Wornall Road. The mall was home to Coach's Bar & Grill, where two employees had to be rescued from the roof by firefighters during severe flooding in 2017.

Now, the city, along with KC Water and the Army Corps of Engineers, is constructing a 70-by-25 foot physical model of the area inside a KC Water building downtown, to better identify flood risks and how to combat them.

> *Building physical models is nearly a lost art. When computers arrived, everyone thought they'd take the place of physical models, but unfortunately they aren't able to predict flooding as accurately.*
>
> — JOHN KEVERN, PH.D., P.E.

It's an innovative approach. Kimes says not many places are able to produce physical models and having two experts in the city — UMKC adjunct professor Don Baker and associate professor Jerry Richardson — is especially valuable. Lopez has been working on the model since its inception — he started working on the scaling for the project while still a student at UMKC.

Kevern agrees, "Building physical models is nearly a lost art. When computers arrived, everyone thought they'd take the place of physical models, but unfortunately they aren't able to predict flooding as accurately. I'd estimate there are less than a handful of places left that have people with the knowledge and technique needed to build physical models."

That's not to say computers are totally out of the picture. Lopez says they will "flood the model several times to get the flow patterns, then make the computer model reflect those."

Once the research on flooding is done, the area will become a park complete with pervious concrete, green space and information about Indian Creek.

FOCUSING ON STORMWATER

In May, Kevern and the School of Computing and Engineering will team up with KC Water and several other stakeholders — including the Unified Government of Wyandotte County, FEMA and the Army Corps of Engineers — to launch the Center for Urban Stormwater Research. The first project the center will focus on is a FEMA grant exploring ways to educate the public about the risks of flooding using augmented and virtual reality.

Kimes hopes that Kansas City is able to manage stormwater in a way that leads the nation and turns the city's "wild rivers" into community assets even with added rainfall.

"Instead of something to be protected from, I'd like to see us embrace rivers as the valuable parts of our ecosystem that they are," Kimes says.

//JOHN KEVERN, PH.D., P.E.
Professor and Department Chair of Civil and Mechanical Engineering

RESEARCH INTERESTS
Concrete mixture proportioning, development of sustainable construction materials related to concrete, pervious concrete mixture design, construction and testing, concrete material analysis, development of testing procedures and pavement performance, durability of concrete materials, beneficial material byproduct utilization

JOINED UMKC
2008

ROOS KEEPING KANSAS CITY SAFE

Professor John Kevern, Ph.D. (left), regularly partners with SCE alumni at KC Water to examine stormwater and sewer issues that have affected the Kansas City area for years.

Here he is pictured with watershed planner Jose Lopez (B.S.C.E. '15) (center) and manager of stormwater engineering Tom Kimes (B.S.C.E. '87) (right) with a model they are constructing inside the KC Water building to identify various flood risks and ways to combat them.

BRANDON PARIGO

TECHNOLOGY EDUCATION FOR WOMEN IN TRANSITION

NSF funds $1.4 million project to improve job placement after prison

BY KELSEY HAYNES

There are currently more than a million incarcerated women in United States prisons. Nearly two-thirds of them have children under the age of 18.

Associate professor Baek-Young Choi, Ph.D., says women are the fastest growing segment of the nation's prison population, increasing nearly 834% within the last 40 years. Missouri and Kansas have had even steeper increases. Yet prison education systems are still primarily designed with men in mind.

Choi, alongside associate professor Sejun Song, Ph.D., and a group of graduate-level students, is partnering with a team from the University of Kansas on a $1.4 million National Science Foundation-funded project to help address this issue.

"Many women going into prison are underprivileged, and then in prison there's a lack of access to the internet," Choi says. "This leaves women vulnerable because when they are released, it'll be difficult for them to find good jobs."

The team of faculty and student researchers, led by Hyunjin Seo, Ph.D., associate professor in the KU School of Journalism, is designing a three-course learning management curriculum that will help women exiting prison advance their technology skills. The goal is to improve their eligibility for job opportunities and their ability to support their children's education.

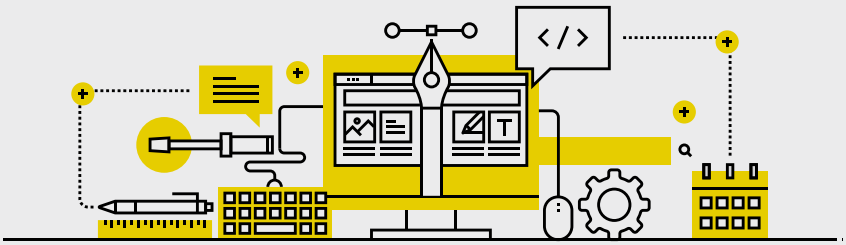
The program, designed by a team primarily consisting of women, will teach approximately 300 women the basic technological skills required for jobs in science, technology, engineering and math. Women enrolled in the program will attend weekly classes at public libraries in the Greater Kansas City area and in Topeka, Kansas.

Choi, working alongside her UMKC team of computer science experts, is using her expertise in systems development to build the learning management system that will host course materials and instructional videos. She and her team are also participating in experiential research to understand the effectiveness of different education models — face-to-face, online-only and a hybrid of the two — with women-in-transition.

> *We really want this program to be informed by research — to learn what the participants' needs and interests are, then incorporate that information into the STEM curriculum.*
>
> — BAEK-YOUNG CHOI, PH.D.

"We really want this program to be informed by research — to learn what the participants' needs and interests are, then incorporate that information into the STEM curriculum," Choi says. "We also want to know what the most effective way of teaching STEM is for this population, so we're testing multiple modes of education."

The duration of each course depends on the needs of the women, but the research team is anticipating 12 to 16 weeks per course while the full project, including research and development, will last about three years. The project kicked off in September 2019, and the online learning system is set to launch in early 2020. The team is also hoping to garner industry and other support to enrich and sustain the program after its NSF sponsorship concludes in 2022.



/COURSE 1

The introductory course will teach computational thinking, which is not only helpful for understanding technology but also for everyday problem-solving skills. Choi said the team hopes that this program will help improve women's self-esteem and confidence as they face new challenges and how they feel about themselves as their attachment and sense of belonging evolves in this group, which will help their employment in the long run.

/COURSE 2

This course will test online-only learning against hybrid and lead women in learning basic website elements, HTML and development environments.

/COURSE 3

The final course will teach women website building for business, including form building and use of FinTech tools. This course is a combination of hybrid and online-only courses.

//BAEK-YOUNG CHOI PH.D .

Associate professor, Department of Computer Science Electrical Engineering

RESEARCH INTERESTS
Cloud computing and software defined networks, network algorithms and protocols, data storage and management systems

JOINED UMKC
2005

//SEJUN SONG, PH.D.

Associate professor, Department of Computer Science Electrical Engineering

RESEARCH INTERESTS
Software defined networks, cloud computing and data center networks

JOINED UMKC
2013

▼ (Left to right) Lohitha Yenugu, M.S. student; Sejung Song, Ph.D; Benjamin, Ph.D. student; Rafida Zaman, Ph.D. student; Kaushik Ayinala, Ph.D. student;

BRANDON PARIGO

VANGUARD AWARDS 2020

2020 VANGUARD AWARD WINNERS

Congratulations to our 2020 Vanguard Award winners, who have shown outstanding commitment and dedication to the School of Computing and Engineering at UMKC. Please join us in thanking them for their service.

George White Jr.

YOUNG ALUMNI AWARD

George White Jr. (B.S.C.E. '13) is a standout young SCE alumnus with a passion for supporting young people. He is currently a civil site engineer supporting power and oil and gas projects at Black & Veatch, and recently served two terms on the SCE Alumni Board. He serves as an alumni advisor to the UMKC student chapter of Engineers Without Borders and volunteers with Big Brothers Big Sisters of Kansas City and Christmas in October.

Sherry Lumpkins

SUPPORTER AWARD

Sherry Lumpkins (B.A. '93) is an SCE alumna, a local business owner and a dedicated servent to STEM education in the community. Her company, Blue Symphony LLC, provides in-depth coaching to UMKC students through internships, and she has personally volunteered with more than a dozen community organizations, including the KC STEM Alliance, Delta Sigma Theta Sorority Inc. and the UMKC African American Leaders Council..

PREP-KC

STEM OUTREACH PARTNER OF THE YEAR

PREP-KC: Kansas City's Partnership for Regional Educational Preparation is Kansas City's leading urban education intermediary. Its mission is to increase college readiness and access to high-quality employment for the 60,000+ mostly low-income students served by six of Kansas City's bistate urban school districts. The program is currently in 54 schools, reaching a total of 69,730 local students.

KC Water

ORGANIZATION OF THE YEAR

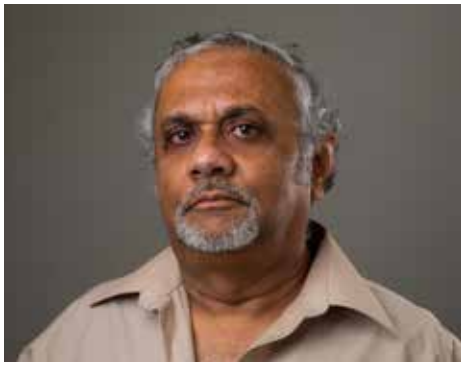
KC Water is committed to providing excellent water, wastewater and stormwater services that ensure the health and safety of half a million Kansas City residents while safeguarding regional water resources for future generations. KC Water has a long-standing reputation of recruiting and retaining SCE graduates. Currently, there are nearly a dozen UMKC graduates in KC Water's engineering department alone.

/MAJOR GRANTS AND AWARDS AT SCE

CONGRATULATIONS

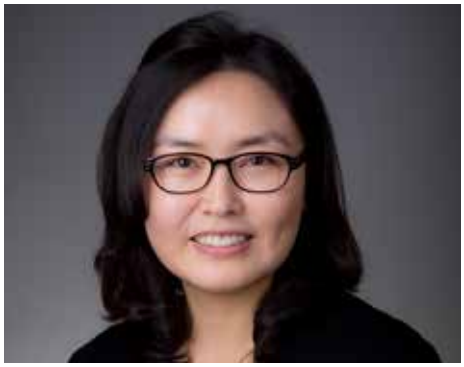
to our many faculty members who received financial support for their work in 2019 through grants and other major awards.

KENDALL BINGHAM, M.S. was awarded $2,000 for his project titled, "Budgeting App: An Outward Facing Application That Will Keep Banking Customers Informed About Fraudulent Purposes."



DEB CHATTERJEE, PH.D. was awarded $21,000 by Kalscott Engineering Inc. for his project titled, "Through the Hull Data Transfer."

ZHIQIANG CHEN, PH.D. was awarded $178,000 by the Jet Propulsion Lab for his project titled, "Advancing Access to Global Flood Modeling and Alerting Using the PDC DisasterAWARE Platform and Remote Sensing Technologies."



BAEK-YOUNG CHOI, PH.D. was awarded $15,000 by the National Science Foundation's Department for Computer and Information Sciences and Engineering.

She was also awarded $243,583 by the National Science Foundations Directorate of Education and Human Resources for her project titled, "Collaborative Research, Technology Education for Women in Prisons."

REZA DERAKHSHANI was awarded $10,803 from EyeVerify LLC for his project titled, "Multi-scale Spectral Eyebrow Recognition," and $5,203 for assessment of alternative optokinetic stimulus.

TRAVIS FIELDS, PH.D. was awarded $56,134 by the Naval Postgraduate School for his project titled, "Ummaned Aircraft Autonomous Pursuit via Proportional Navigation."

He was also was awarded $8,084 by Bloostone Division LLC for his project titled, "Low-Cost Aerial Delivery of Medical Supplies."

MEGAN HART, PH.D. was awarded $20,000 by Geosyntec Consultants Inc. for her project titled, "PFAS Destruction Using a Novel Ex-Situ Photocatalytic Treatment Unit."

/MAJOR GRANTS AND AWARDS AT SCE

AHMED HASSAN, PH.D. was awarded $44,074 by EyeVerify LLC for his project titled, "Advanced Biometric Technique Based Microwave Imaging."

JOHN KEVERN, PH.D. was awarded $24,692 by Evolution Paving Resources, LLC for his project titled, "Cement Based Filters for Inorganic Nutrient Removal of Golf Course Runoff and Dairy Effluent."

AMIRFARHANG MEHDIZADEH, PH.D. was awarded $10,000 by the University of Kansas Medical Center Research Institute for his project titled, "Optimizing Polypectomy and Endoscopic Resection Therapies."

MOSTAFIZUR RAHMAN, PH.D. was awarded $42,000 by BlueRiSC Inc. for his project titled, "FPGA Vulnerability Analysis Tools."

He was also awarded $10,000 by Honeywell Federal Manufacturing and Technology for his projects titled Weight Efficient RF Shielding, Design of an FPGA-based modular sensing architecture, and design of a charge measurement device.

PRAVEEN RAO, PH.D. was awarded $100,000 by the Griffiss Institute for his project titled, "Detecting Malware-Based Tampering of Big Data Programs."

JERRY RICHARDSON, PH.D. was awarded $21,250 by Water Resources Solutions, LLC to create a hydraulic model of Rock and Brush Creeks.

SEJUN SONG, PH.D. was awarded $6,000 by the NASA Goodard Space Flight Center for his project titled, "TREC: Toward Reliable and Efficient CubeSat Swarm Format."

He was also awarded $16,885 by Electronics & Telecommunications Research for his project titled, "Load Balancing Algorithms for Optimizing Multiple Access."

DIANXIANG XU, PH.D. was awarded $45,337 by Boise State University for his project titled, "Capacity Building: Integrating Data Science Into Cybersecurity."

He was also awarded $285,157 by the National Science Foundation's Department for Computer and Information Sciences and Engineering for his project titled, "Capacity Building: Integrating Data Science Into Cybersecurity."

/GET INVOLVED

EVENTS

ROBERT W. PLASTER FREE ENTERPRISE AND RESEARCH CENTER GRAND OPENING
Fall 2020
UMKC Volker Campus

STUDENT TEAMS FUNDRAISER
Sept. 12, 2020
Armacost Museum

SCHOLARSHIP RECOGNITION LUNCHEON
Oct. 9, 2020
Atterbury Student Success Center

Find more SCE events online at **sce.umkc.edu/events**

CONTINUING ED

CIVIL P.E. REVIEW COURSE
Classes held Aug. 18–Sept. 29, on Tuesdays and Thursdays from 6-9 p.m., with morning practice exam on Oct. 3

Deadline to register: Aug. 14, 2020

Register at:
sce.umkc.edu/continuing-ed/civil-pe

PROJECT MANAGEMENT PROFESSIONAL (PMP) CERTIFICATION PREP COURSE
Custom classes available for groups of 10 or larger. Email **scecontinuinged@umkc.edu** for details.

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SCE offers authorized training from Unity, one of the leading 2D, 3D and virtual reality applications in the world. This curriculum from Unity Certified Instructors includes real-world 3D design and development experience, and can help you earn globally recognized credentials. Email **davischristina@umkc.edu** for details.

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VR INNOVATION ACADEMY

GENERAL KNOWLEDGE TRANSFER, PHASE 1

DATES: Aug. 24–Dec. 11, 2020
SCHEDULE: Monday–Thursday with Fridays optional, from 6:15–9:15 p.m.
LOCATION: Flarsheim Hall, Room 463 and 456, 5110 Rockhill Road, Kansas City, MO, 64110
TUITION: $3,200
DEADLINE: Aug. 1 or when class is full

The VR Innovation Academy is a gateway to the dynamic and exciting world of Augmented and Virtual Reality (AVR) occupations and applications. This course is a dynamic, rigorous learning experience that engages learners in hands-on, immersive learning activities as content developers in the field of augmented and virtual reality.

To enroll or get more information, contact Christina S. Davis at **davischristina@umkc.edu**