

THE LINK

BIOLOGICAL AND AGRICULTURAL ENGINEERING

FALL 2018

COLLEGE OF ENGINEERING



Lab promotes innovation and student success

page 16



FROM THE DEPARTMENT HEAD

The 2017-18 academic year seems like a long time ago, even though just a few weeks ago we closed the financial books and moved on to the 2018-19 academic year.

Growing up surrounded by the Appalachian and Blue Ridge Mountains, one learned when a mountaintop is reached, valleys are on either side. Richard M. Nixon once said, “Only if you have been in the deepest valley, can you ever know how magnificent it is to be on the highest mountain.” I remember one fall Sunday afternoon years ago, prior to computers or cell phones, when neither the mountaintop nor the valley turned out to be enjoyable. My dad took six boys under 14 for a climb up Tinker Mountain. After reaching the top, dissension began and a friend decided to run down the trail before anyone could stop him. Those of us who had climbed the mountain before were aware of two trails intersecting partially down the mountain. A right turn was necessary onto a second trail if you wanted to reach the lake where transportation home was waiting. The straight path down the mountain led to trouble. There was trouble and it turned out to be a long day. The boy was eventually found unharmed but not before multiple trips back up the mountainside, even after dusk. Eventually, not certain how, we learned rather than re-climb the mountain after taking the wrong trail, he had decided to hitchhike home. It was not a good Sunday afternoon hike.

During the 2017-18 academic year, BAE experienced some significant mountaintop experiences including historically high numbers of BSE and ATM graduates, and our research portfolio expenditures increasing four-fold. Undergraduate and graduate students showed strong support for the biological and agricultural engineering department during the campaign for excellence. Engagement in collaborative research between BAE faculty and allied industry is at an all-time high. Many of our machinery, environmental and biological research efforts are on the cutting edge of progress. The water tech farms are examples of the impact extension, and public and private partners can make with collaboration and a focused extension program. Our research efforts continue to push to new heights and lead to new discoveries.

Life generally does not allow one to live on the mountaintop except on reality TV. In fall 2018, BAE will experience our lowest incoming BSE and ATM freshman classes. Theodore Roethke said, “Over every mountain there is a path, although it may not be seen from the valley.” The BAE department is committed more than ever to finding a path forward to address the cyclical natural of our undergraduate enrollment. Many factors, options and influences go into young peoples’ choices of a degree/career. Your shared insights from working with young people and professional paths you have traveled are valuable to us as, together, we develop a new path up the enrollment mountain.

We would welcome and encourage you to stop by Seaton Hall and discover how BAE is continuing to follow the “tradition of excellence” path developed through the efforts of students, alumni, friends and faculty. Together we are looking forward to the next magnificent mountaintop.



Joseph P. Harner III
Joseph P. Harner III
Department head and professor



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BIOLOGICAL AND AGRICULTURAL ENGINEERING FALL 2018 COLLEGE OF ENGINEERING



ON THE COVER
AJAY SHARDA, RIGHT, BAE ASSISTANT PROFESSOR, AND HARMAN SINGH SANGHA, M.S. STUDENT, WORK IN THE MACHINERY SYSTEM AND PRECISION AG RESEARCH LAB.

ABOVE
DAN FLIPPO, FOREGROUND, BAE ASSISTANT PROFESSOR, AND BLAKE BROWN, BSE SENIOR, ASSESS ROBOTS UNDER DEVELOPMENT TO BE USED TO FARM HIGHLY SLOPED LAND.

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RURAL MEETS URBAN: CLEANER WATER FOR WICHITA AREA

K-STATE WATERSHED PROGRAM IS 'CATALYST' IN NEW APPROACH

By Mary Lou Peter

With a population of nearly 390,000, the city of Wichita has plenty of people depending on clean, reliable water. Kansas State University brought rural agricultural producers upstream from the city together with Wichita officials, and the results are benefiting farmers and Wichita residents alike.

The project involves farmers voluntarily using best management practices, also called BMPs, including not tilling their fields. That helps reduce sediment and phosphorus going into public waterways, which in this case, flow into Wichita, said Ron Graber, watershed specialist with K-State Research and Extension. The result is cleaner water downstream in the Little Arkansas River, a key source of water for the city.

This project aims to address water quality holistically, targeting water

quality practices to priority areas of the watershed by giving developers in Wichita the option to contribute to a yearly fee rather than installing storm water treatment systems as part of their developments. The fee is then paid to farmers via a one-time, five-year contract for implementing water quality BMPs upstream of Wichita.

"This off-site storm water BMP program is the first agreement of its kind in Kansas in which an urban area is paying landowners for practices that reduce pollutants, including sediments, in public waterways," said Trisha Moore, K-State assistant professor of biological and agricultural engineering. "Rural and urban entities within the same watershed typically implement water quality programs separately, but rural-urban partnerships are increasingly viewed as the most effective way to manage water quality."



The program is designed to keep water cleaner, reduce costs for developers and provide financial incentives for farmers (estimated at \$30 to \$40 per acre per year), which partially offset the cost to farmers to implement BMPs, save money for the city of Wichita and potentially reduce homeowners' water bills if the city spends less to remove pollutants.

Through K-State's Watershed Restoration and Protection Strategies (WRAPS) program, which works to protect water resources all across the state, Graber and Moore, along with Scott Schulte, environmental planner at Vireo, brought key people together in the urban and rural areas, and developed the proposal.

After approval by the Wichita City Council, Kansas Department of

Health and Environment and the U.S. Environmental Protection Agency, the program is in its first year.

Already, it is estimated to have reduced sediment loads in runoff by 370 tons through adoption of no-till practices upstream of Wichita.

"This represents about 8.5 times more sediment than is estimated to be generated by new developments and redevelopments participating in the program," Moore said.

The cost to achieve this sediment reduction through the off-site program is estimated at \$42 per ton of sediment, Moore said. To remove sediment from storm water with hydrodynamic separators typically used in Wichita to

address water quality issues would have cost nearly \$20,000 per ton.

"K-State Research and Extension's experience in the rural watershed management arena provided a catalyst for the program," said Alan King, director of the department of public works and utilities for the city of Wichita. "The city relies on the relationships that have been established with producers through the successful Little Ark WRAPS program. The experience and relationships combine to ensure effective management of the offsite BMPs. This is critical, as sustaining the program in perpetuity is the key element of the program."



FISH AS A FOOD SOURCE IN NAMIBIA

Mackenzie Cline, BSE junior, spent the summer at a farm in Namibia conducting a feasibility study. The farm is just across the road from the Namib Desert, so residents struggle to get reliable rainfall each year.

The aim of the study was to determine whether development of an aquaponics system would be a worthwhile means of diversifying farming practices there. Ideally, the aquaponic system would be able to grow feed for the fish and for a small herd of sheep. Then, no matter how much it rains, the farm would be able to safely raise sheep.

From Cline's research on available fish, she chose the African catfish, *Clarias gariepinus*, as the best option. After researching growth rates, stocking densities and nutritional requirements, she estimated how much food would be

needed in total to raise the amount of fish that could fit in the existing reservoir — 13,500 kg of feed for 5,000 fish.

Cline is also researching what plants the farm could grow and if they would provide a diet sufficient in protein.

"Professor Stacy Hutchinson introduced me to aquaponics as a freshman in BAE 101, and I explored it further in Professor Lisa Wilken's BAE 231 course for my semester group project," Cline said.

"For this feasibility study, I'm utilizing skills I've learned in my BAE courses such as tricks on Excel and how to structure a professional report for the results. Perhaps this engineering experience abroad will lead me to a career in international aquaponics."

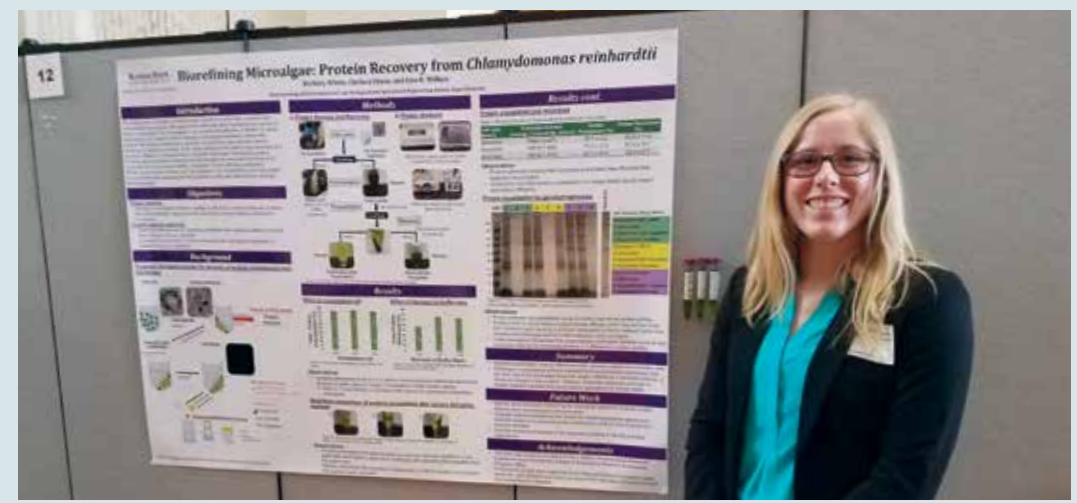


UNDERGRADUATE CITED FOR RESEARCH PROJECT SUCCESS

Berkley White, senior in BSE, received the 2018 Raj and Diana Nathan Undergraduate Research Experience Award. The \$5,000 research grant is the top undergraduate research award in the College of Engineering and funds one year of research with an adviser in the awardee's chosen field.

White worked with Lisa Wilken, BAE associate professor, and Chelsea Dixon, BAE Ph.D. candidate, to recover protein from the microalgae species *Chlamydomonas reinhardtii* as part of a larger bioprocessing method that seeks to efficiently extract lipids and protein using an environmentally friendly, enzyme-assisted extraction process.

White's poster, "Biorefining Microalgae: Protein Recovery from *Chlamydomonas reinhardtii*," placed second in the 2018 Engineering Undergraduate Research Poster Competition. She also placed second in the 2018 K.K. Barnes student paper competition at the 2018 Annual International Meeting of the American Society of Agricultural and Biological Engineers in Detroit, Michigan.



COLLABORATIVE STUDY OF *ARCTIC WARMING TRENDS AND EFFECTS*



ABOVE: BLACK MOUNTAIN, ELEVATION 1,600M, IN THE POLAR URAL; RIGHT: ALEKSEY SHESHUKOV, RIGHT, AND VALERIY IVANOV, UNIVERSITY OF MICHIGAN, CELEBRATE INSTALLATION OF A WEATHER STATION IN A TREE-INVADDED AREA.

With Arctic warming accelerating over past decades, the resultant invasion of trees and shrubs into tundra in Alaska, Canada and Russia has altered surface-energy fluxes and hydrology. A team of scientists from three U.S. universities, including Aleksey Sheshukov, associate professor of biological and agricultural engineering, has been funded by the National Science Foundation Arctic Research Opportunities Office of Polar Programs to develop a mechanistic and quantitative understanding of the changing seasonality and thinning permafrost due to the vegetation shift. During summer 2018, Sheshukov and Valeriy Ivanov, a collaborator from the University of Michigan, traveled to three sites within the Arctic Circle in the Polar

Ural region of Russia for field work as Phase 1 of the project.

During four weeks in July, they erected 11 weather-monitoring stations with towers ranging from 8 to 16 meters in height, and scientific equipment attached and instrumented at the top of the tower and underground. The stations were established in areas where old and new trees (mainly larch) had invaded, as well as in traditional tundra with no or minimum trees. Measurements include micrometeorology, snow depth, tree-scale sap flows, and subsurface moisture, ice, and temperature. Equipment at all stations was initiated, and set to acquire and record high-resolution real data.

In the following years during Phase 2 of the project, the data will be processed and analyzed to identify unique physical features that alter energy balance, hydrology and permafrost in tree-invaded areas as compared to tundra.

Activities in Phase 3 will include simulations of present and future surface-energy and hydrologic conditions using remote-sensing and computer modeling. Societal questions about the role of the Arctic in global environmental change will also be addressed by communicating research outcomes to Arctic communities and the general public through museum exhibitions and various meetings.



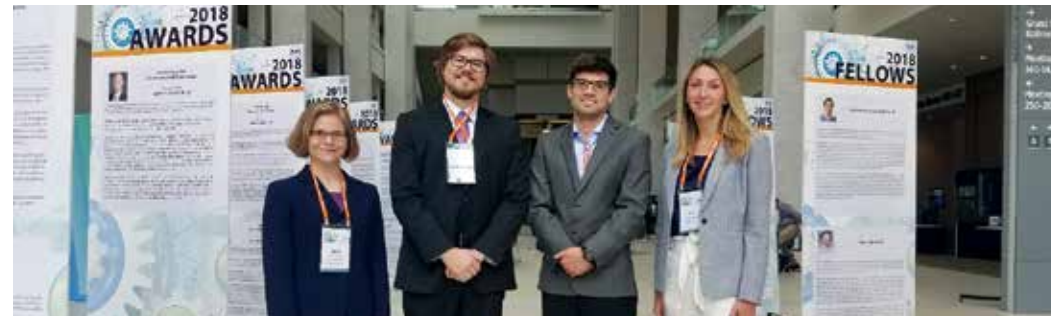
BAE STUDENT MAKES THE MOST OF A SUMMER JOB



Lilly Schmitz, BSE, Westmoreland, Kansas, spent the summer of 2018 with the organization Meds and Food for Kids outside of Cap Haitien in Haiti. Schmitz worked as an engineer assisting in a system expansion of a production line.

Meds and Food for Kids is a nonprofit organization dedicated to treating and preventing child malnutrition in Haiti by producing fortified peanut-based foods. It uses a peanut-based feeding approach called Ready-to-Use Therapeutic Food, also known as Medika Mamba, Haitian Creole for "peanut butter medicine."

STABLE HANDS



TEAM "STABLE HANDS" JULY 2018, FROM LEFT: ANNA KUCERA, NATHAN HANSEN, NICK SOSAYA AND STACY ROTTINGHAUS

BAE senior design project teams have a tradition of undertaking projects to help those in need. A team from the 2017-18 edition of the senior design class continued this tradition with a project to help a disabled client. A former K-State engineering student, a paraplegic with limited hand and arm functions, wanted to be able to eat yogurt and soup on his own. The design team, "Stable Hands," accepted this challenge and went to work.

Utilizing existing technology, a commercially available self-leveling spoon and an open-source, 3D-printed thermoplastic brace, the team designed a clamping system that provided the

client with the ability to pick up and use the self-leveling spoon on his own. Leveraging the 3D printing equipment available in the BAE department, the team built and delivered a device to the client in late spring for testing. The client was able to use the device and provided feedback for a redesign. With the final version of the "Stable Hands" design, the client was able to eat yogurt on his own.

The team, "Stable Hands," then placed third with this design in the 2018 ASABE Gunlogson Open Design Competition in Detroit, Michigan, during ASABE's 2018 Annual International Meeting.



COMPLETED CLASP AND BRACE FOR HOLDING THE SELF-LEVELING SPOON AS DELIVERED TO THE TEAM'S CLIENT IN SPRING 2018



MONITORING SMOKE IN THE FLINT HILLS

Zifei Liu, BAE assistant professor, is working on a joint project with collaborators from the Kansas Department of Health and Environment, T&B Systems and a K-State Polytech team to monitor smoke from prescribed fires in the Flint Hills region using drones. The objective is to develop smoke emission factors that best represent Flint Hills fires. Nearly 180 acres was burned with both head fire and back fire for the sampling event on April 16, 2018.



FOOD, ENERGY, WATER:

A GLOBAL PERSPECTIVE

Stacy Hutchinson, professor of biological and agricultural engineering, and Shawn Hutchinson, professor of geography, presented research July 9-12 at the third joint European Association of Remote-Sensing Laboratories and NASA Landuse/Landcover Change Workshop at the Mediterranean Agronomic Institute of Chania in Chania, Crete, Greece.

The workshop, hosted in conjunction with the EARSeL Symposium, focused on the impact of land use and land cover change on the water-energy-food nexus.

K-State research presentations included "Large-Scale Soil Moisture Trend Analysis in the Missouri and Arkansas-Red-White River Basins" by Stacy Hutchinson, Kelsey McDonough and Shawn Hutchinson; and "Time Series Analysis of Phenometrics and Long-Term Grassland Trends across the Great Plains Ecoregion Using Moderate Resolution Satellite Imagery" by Shawn Hutchinson and Hilda Onuoha. Co-authors McDonough, Jamestown, Rhode Island, and Onuoha, Abuja, Nigeria, are doctoral students in biological and agricultural engineering and geography, respectively.

The Hutchinsons enjoyed touring the Mediterranean Agronomic Institute and learning more about agriculture production in Crete — a top industry there, second only to tourism, with primary products of olives, oranges, sheep and goats. Extreme topography, from sea level to a peak elevation of 8,058 ft., and minimal precipitation, less than 18 inches per year, require innovative agricultural techniques, but Crete is considered "food secure."





WATER TECHNOLOGY FARMS REMAIN FOCUS OF BAE EXTENSION IRRIGATION PROGRAMS

K-State BAE extension engineers continue to assist with water technology farms across Western and South Central Kansas. The farms employ various technology and management strategies selected as potential best management practice options for use by irrigators. Various levels of technological assistance, monitoring and data analysis are provided by KSRE engineers. The number of farms increased to 10 units for the 2018 growing season, requiring coordination of efforts between various public and private entities contributing resources to the project — all with the common goal of improving irrigation water productivity and conservation.

A less visible activity has been additional upgrades added to the KanSched3, an online ET- (climatic) based irrigation scheduling program. KanSched3 is available for access at bit.ly/ksu-mil. ET-based irrigation scheduling is the foundation of irrigation water management that can work in tandem with other irrigation technology, whether based on plant, soil or aerial sensors, providing complimentary information generated from independent data streams to assure sound water management decisions.



RESERVOIR SEDIMENTATION: USING WATER VELOCITY ENERGY FOR SEDIMENT MOVEMENT

Vahid Rahmani, BAE assistant professor, collaborates with the state of Kansas and U.S. Army Corps of Engineers on reservoir sedimentation management. An advanced acoustic Doppler is used to measure water movement velocity at Kansas reservoirs and create current profiles throughout the depth of the lake. Measurements are made at various discharge rates to assess the water energy used for moving the sediment from the bottom of the lake. The sediment has been filling Kansas surface-water

reservoirs, particularly during extreme storms and flooding events. The goal of the project is to develop techniques to remove the sediment from the reservoir and recover water-holding capacity.



2018 ATM INTERNS

After graduation, some agricultural technology management (ATM) students will become employees of their intern businesses and some will seek careers elsewhere. Either way, internships provide students and employers a three-month interview, enabling students to determine if the internship is the best career path for them and employers to determine if the intern is a good "fit" for their business. Congratulations to all 11 ATM students for completing these valuable internships.

TOP: WILL MORELAND, GROWER SEGMENTATION AND SEED ADVISER RELATIONS INTERN FOR SYNGENTA SEEDS-GOLDEN HARVEST, KANSAS CITY, MISSOURI

RIGHT: CONOR HAMILTON, INTEGRATED SOLUTIONS INTERN FOR PRAIRIELAND PARTNERS JOHN DEERE, ANDALE, KANSAS



BAE HOSTS ASABE CONFERENCE

The 2018 Kansas section ASABE Conference was held in conjunction with the K-State Engineering Open House. In addition to technical speakers, participants heard remarks from ASABE president, Maury Salz, and presentations by BAE students on senior design projects and ASABE competition teams.

New officers for the Kansas section for 2019 are Ryan Zecha, past chair; Fumela Bhadra, chair; Dan Spare, first vice chair; Duane Mueting, second vice chair; and Jim Koelliker, treasurer. Troy Kolb was announced as the Kansas Section Member of the Year and Kari Bigham as the Kansas Section Young Member of the Year.

The 2019 meeting will be held in conjunction with K-State Engineering Open House, April 5, 2019.



LAB PROMOTES INNOVATION AND STUDENT SUCCESS



The Machinery System and Precision Ag Research Lab headed by Ajay Sharda, BAE assistant professor, is leading multiple sponsored projects to innovate machinery system automation, and enhance food production and profitability of U.S. producers. The broader goal of the lab is to develop nationally recognized research through industry and federal funding, and engage undergraduates and graduate students in research, teaching and outreach activities.

Students are encouraged to develop critical skills for lab and field-scale machinery systems research, real-time large-scale data acquisition and control, cutting-edge sensing and automation for precision ag, mechatronics and imaging for unmanned

systems. Currently students are engaged in projects on precision planting systems (Sylvester Badua, Ph.D. student); precision liquid application system (Jonathan Fabula, Ph.D. student); hay and moisture sensing (Jacob Schwindt, M.S. student); protein sensing and integration with combine harvesters (Lukas Koch, M.S. student); tractor system validation and scenario of small tractors for the U.S. (Dalton Owen and Jared Cullop, M.S. students); and sensors and imaging systems for small unmanned aerial systems to assess spatial crop health (Harman Singh Sangha, M.S. student).

Current research collaboration includes partners in India, Germany, Italy, the U.S., and state and federal agencies. Sharda said one of the exciting parts of the lab is seeing students



interacting within a group to develop skills, and extend help during lab and field projects.

"Students are learning critical software, hardware and experimental design skills to work in a team environment, professionally interact with peers and collaborators, and develop communication and writing skills," he said.

"We always put students front and center during industry professional visits, regional and international meetings, and when interacting with other stakeholders. The biggest satisfaction is seeing them proudly and professionally representing BAE and taking pride in the work they conduct at K-State."





KANSAS STATE UNIVERSITY RESEARCHERS STUDY WAYS TO STABILIZE RIVER BANKS

PROJECT TO REDUCE STREAMBANK EROSION NOW IN ITS THIRD YEAR

By Pat Melgares

Along a two-mile stretch of the meandering Smoky Hill River, Kari Bigham is earning a nickname among the locals she's pretty proud of.

Bigham, a graduate student at Kansas State University, has been called "The Streambank Lady," a tribute to her steady work to monitor changes in this part of the river.

"What drives this work," Bigham says, "is the fact that landowners in general are losing acreage to streambank erosion every year."

Streambank erosion is a natural process caused by the force of flowing water against the resistance of the bank. When the force of water wins out, adjacent land or sediment essentially "falls" into the waterway and is washed downstream along with sediment-attached pollutants.

Those pollutants create risk to aquatic life and humans, and in some cases, can end up in downstream lakes as well.

Bigham's work, which began in 2016, aims to slow erosion on parts of the Upper Lower Smoky Hill Watershed. She is currently monitoring six sites on the river between Salina and Lindsborg.

"The goal here is to protect land and improve water quality," Bigham said.

The team of researchers and engineers began this project nearly three years ago by installing dead trees and similar woody structures into the bottom of the streambank, also called "toe" of the bank.

"What we're trying to do by putting these woody structures into the toe of the streambank is to try to dissipate that energy and move that erosive current (called a thalweg) to the center of the bend," Bigham said. "You're reducing the energy and the amount of stress being placed on the streambank."

The team is also looking at the effect vegetation and re-shaping the slope of the bank has on reducing the rate of erosion.

"We put in these structures and it moves that erosive high-energy current away from the streambank, but what we really want to happen is for the sediment the stream is carrying to drop and build up between the structures so that vegetation can establish along the bank and protect it from further erosion," said Trisha Moore, assistant professor of biological and agricultural engineering at Kansas State University, who is supervising Bigham's doctoral work.

Before beginning classes for the doctoral degree, Bigham worked as a consultant for a company designing streambank

stabilization systems, but she said there was no quantitative data collected after a system was installed to show it worked.

In this project, Bigham collected pre-construction data at some of the sites, and has been taking yearly measurements to determine if the woody structures are helping to reduce the rate of erosion on the streambank.

"It's a great opportunity to be able to monitor streambank erosion," Moore said. "A lot of times we use the money to put the structures in, but don't get to study them. We can't understand if it's cost-effective if we don't have the data."

Bigham said the results are mixed. The design they have implemented in the sections she's working in "doesn't seem to work as well when we have banks with high sand content. That's not surprising."

The researchers are also learning more about the force of water around tighter curves in the river, and the benefits of having vegetation on the streambank. They also learned what trees not to use in a woody structure.

"Mulberry trees...beavers like them," Bigham said. "The beaver went to town on it, so we replaced it with a hedge. We learned the hard way what tree to use."



BACKHOE ON STREAMBANK INSTALLING TREES

Bigham noted she's also interested in learning more about what effects installing a stabilization system has on areas upstream and downstream.

"My concern is that we are redistributing the energy and causing accelerated erosion downstream," she said. "I'm looking at a reach scale rather than just one site. Most of the research that's been done so far looks at just that particular site, and yeah, they work, but are we causing landowner B downstream more

problems and that's why he had to do this project the next year?"

"That's the part that bugged me when I was working with these designs — I was afraid I was causing more harm than good. I wanted some quantitative data to show that I was or was not. Hopefully we can learn from it and have better solutions, or just keep with this one if it works."

The current project is expected to continue for at least two more years.

"We're not just interested in how erosion occurs, or why it occurs or that these things are working, but really we want to improve the design of the structures we are putting out there," Moore said.

"This is engineering," Bigham said. "Putting something out there to see if it works, and if it doesn't work, what we can do to fix it. This is applied science."



SHARDA ATTENDS CONFERENCE IN GERMANY

Ajay Sharda, BAE assistant professor, attended the 75th International Conference on Agricultural Engineering, Land.Technik AgEng 2017, Nov. 10-11 in Hannover, Germany. The conference was organized in cooperation with the "Max Eyth Society for Agricultural Engineering," a technical division of the Association of German Engineers and the European Society of Agricultural Engineers.

Sharda's presentation, "Development and Utilization of a Planter Automatic Downforce Evaluation Test Stand to Quantify System Response and Accuracy," is part of the broader precision planter technology research going on within his Horsch Advanced Planting Systems Lab. The paper was published in the proceedings of the 75th conference "LAND. TECHNIK – AgEng 2017," with co-authors Ryan Strasser, BAE graduate student, and Matthias Rothmund.

"This is one of the premier international agricultural engineering conferences in the world and select presentations are invited after a rigorous peer-review process," Sharda said. "This event provided an excellent platform to truly represent K-State, present innovative research, and network with diverse international participation from academia and industry."

The meeting helped strengthen existing industry collaboration and provided an opportunity to extend new partnerships



to develop infrastructure for the latest innovations, machine development, and technical concepts for research and teaching in the biological and agricultural engineering department at K-State.



HARNER INDUCTED TO HALL OF FAME

Joseph Harner, professor and department head of biological and agricultural engineering at Kansas State University, was inducted into the Rural Builder Hall of Fame at an awards luncheon Feb. 15 at the 2018 Frame Building Expo in Columbus, Ohio.

The award was presented to Harner in recognition of his "leadership, service and outstanding contributions to the rural construction industry."

Additional information about the event and awards can be found at bit.ly/2018rbhof.

study abroad brings discovery of ireland

During his study abroad experience, Tristan McCallister, senior in BSE, traveled to Northern Ireland to study at Ulster University for a semester. Ulster University had few prerequisites for incoming international students, and McCallister took advantage of this opportunity by selecting courses in mechatronics and computer-aided engineering to learn new skills outside of his major.

"These classes taught me how to perform 3D modeling/printing, controlled system design and coding," he said.

During his studies, he also went on various trips to see the rest of Ireland, traveling to places such as the Halloween capital of Ireland, Londonderry. Dublin was another place he visited and spent a few days experiencing hostels, and the hearty and bold Irish culture.

"I traveled to the northern coast of Ireland to visit Giants Causeway with its green mountainous landscapes and rocks along the coast that appear to be crafted into brick," he said.

The bricks are thought to be the remains of bridges built by feuding giants in old Irish folklore.

"Despite all of my trips, I never managed to try the iconic fish and chips," McCallister said, "although I still had many great experiences during my stay in Northern Ireland."



GRADUATE STUDENT PLACES THIRD IN COMPETITION

Dalton Owen won third place in the 2018 ASABE-AABFEIO Graduate Student Research Paper Competition, M.S. category. The title of his paper is "Developing a Data Acquisition System to Quantify Necessary In-Field Tractor Performance Characteristics."

The AABFEIO Graduate-Research Paper Awards were instituted to recognize

excellence among members in the conduct and presentation of research related to agricultural, food and biological engineering.

Ajay Sharda, Owen's adviser, is co-author of the paper. The work is part of the project funded by Mahindra & Mahindra, India, to conduct product validation and development on next-generation tractors.

"This project has provided our students an opportunity to work with one of the leading tractor manufacturers and provide critical input on product development based on U.S. producers' references, as well as provide critical validation results and insight on automation strategies," Sharda said.



ZHANG CONTINUES WINNING WAYS

In 2017 and 2018, Naiqian Zhang, BAE professor, used summertime to advise two student teams of China Agricultural University for the ASABE Student Robotics Design Competitions in Spokane, Washington, and Detroit, Michigan, respectively. Both teams won the championship — Zhang's latest champions at this competition.

These international activities gave the BAE department opportunities to recruit high-quality graduate students, especially Ph.D. students.

Previously, he had advised K-State teams to first-place wins nine consecutive years, 2007-15.



BAE ALUM RECOGNIZED FOR CAREER SUCCESS

Kyle McKinzie, Altamont, 2008 graduate of Kansas State University in biological and agricultural engineering, was awarded the department's Professional Progress Award for 2018.

McKinzie is manager of drivetrain controls and systems engineering for John Deere Coffeyville Works in Coffeyville, where he leads a development team for transmission control software for John Deere construction and forestry equipment, as well as supporting John Deere hybrid

powertrain systems architecture and vehicle systems integration. In his 10 years with John Deere, he has engineered current production products, served as a Six Sigma process pro and led technical development of new, hybrid electric drivetrain hardware. This work has led to 12 U.S. patents issued, with eight patent applications pending. He has been involved in recruiting for John Deere at the university for the past six years, and during this time helped John Deere fill more than 30 internships and 15 full-time positions with K-State engineers.



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