#### FALL 2022 — KANSAS STATE UNIVERSITY



#### **THE LINK** Fall 2022

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### From the Department Head

#### Greetings from Manhattan,

My name is Mark Wilkins, and I am thrilled to be the new head of the Carl and Melinda Helwig Department of Biological and Agricultural Engineering. First, I want to thank Joe Harner for the many years of service he has given to the department and the people of Kansas, first through his extension and research and second as department head over the past 12 years. He will be a tough act to follow.

I'd like to share with you a little about myself. I was born in Lafayette, Indiana, and went to high school in Zionsville, Indiana, which is close to Indianapolis. I went on to complete a bachelor's in agricultural and biological engineering from Purdue and a master's and doctorate in agricultural engineering from the University of Illinois at Urbana-Champaign.

My work experience includes a post-doc at the USDA Agricultural Research Service in Winter Haven, Florida; a faculty position at Oklahoma State University in biosystems and agricultural engineering; and most recently professor of biological systems engineering and food science and technology, director of the Industrial Agricultural Products Center, and the Nebraska Corn Checkoff Presidential Chair at the University of Nebraska-Lincoln. My teaching and research has been focused on bioprocessing to produce fuels, bioplastics and food products. I have been married to my wife, Lana, for more than 13 years and we have a 10-year-old daughter, Hannah, and an 8-year-old son, Daniel. Our whole family is excited to be a part of and serve the Manhattan community.

While I have focused on processing during my career, as your new department head I look forward to interacting with you to grow all aspects of our department. Kansas State University has a 109-year history of leading our profession to new innovations in agricultural technology and producing the leaders in our profession. The future for biological and agricultural engineering is brighter than ever as the world turns to us to provide solutions to feed, clothe and produce energy for the world using renewable and sustainable solutions. We must lead this effort by



developing "engineering for sustainability" through our education, extension and research programs. I look forward to partnering with you, alumni and friends, to grow our department and become national leaders in this discipline.

Please consider how you can help the next generation of biological and agricultural engineers, whether it be financially, visiting with our students or providing technical support to one of our student competition teams. Any support you can provide the future generation of K-State biological and agricultural engineers will be greatly appreciated by all of us.

I wish you all a great fall. Hopefully we will have plenty of K-State football victories to celebrate.

Go 'Cats!

Mark & Will

Mark R. Wilkins, Ph.D, P.E. Department Head and Professor

### **BIOMANUFACTURING** A growing industry in Kansas with a promising future for BAE

With the recent announcement of a commercial-scale development and manufacturing facility for biopharmaceuticals in Manhattan, Kansas, and expansion of animal and human health product manufacturing in the region, the industry demand for biomanufacturing education is growing.

The department and its engineering and technology management programs are uniquely positioned to provide critical training, educational programs and skilled graduates to meet industries' needs. Lisa Wilken, Mark C. Nyquist - Carl and Mary Ice Cornerstone Teaching Scholar and associate professor, is engaged in collaborative efforts on campus to build and expand training opportunities for students and industry professionals. To facilitate, Wilken recently attended the Biotechnology Bootcamp at the National Center of Therapeutic Manufacturing (NCTM) at Texas A&M University in College Station, Texas, for a week-long observation and evaluation of its workforce training program.

The program included lecture-based and hands-on training in aseptic techniques, biosafety and controlled environments,

process documentation, bioreactor design and operation, cell growth and molecular biology, bioseparations techniques and applications, and industrial bioanalytical methods. Wilken also had an opportunity to discuss program development and collaborations with NCTM associate director in workforce development Jenny Ligon, and NCTM director Zivko Nikolov.

Wilken plans to continue engagement with NCTM and collaborate with other faculty across the Carl R. Ice College of Engineering at K-State and beyond to develop industryrelevant and student-focused education and training to prepare students for biomanufacturing industries. The concepts learned will also be beneficial to current courses taught in the BAE department, including Biological Engineering Fundamentals and bioseparations engineering courses. Wilken also directs the Bioprocessing and Bioseparations Laboratory in the department with training opportunities for students in downstream processing field.



Wilken estimates the concentration of the carbon source, glycerol, in the media using the biochemistry analyzer.



Wilken checks the expression of green fluorescent protein in the E. coli cell culture using ultraviolet light.

### Hurla selected for NSF's undergraduate research program

Reagan Hurla, biological systems engineering senior in the biological option, was selected for the National Science Foundation-supported Research Experience for Undergraduates, or REU, program "Collaborative Teams in Bioprocessing for Conversion of Waste Into Products of Value," at Auburn University for summer 2022.

Hurla was a member of Sushil Adhikari's laboratory studying the effects of catalyst and reactive atmospheres on the hydrothermal liquefaction of lignocellulosic biomass. The research experience aims to support team-based research with an emphasis on converting biological wastes into products of value and working toward a sustainable future. Hurla's project taught her about experimental work, physiochemical analysis and data analysis. Outside of the laboratory, Hurla was able to work with Brendan Higgins on the ins and outs of working in academia, conducting research, and reading and writing scientific articles. The lab work and external workshops provided insight on effective team practices and scientific communication.

Through the diverse coursework over the fundamentals of bioprocessing and biomaterials, the biological systems

#### Senior design class tackles variety of projects

While a stream bank, mosquitoes and a tractor may bring visions of a hot summer day to many, to students in the biological and agricultural engineering department, it brings memories of a successful semester of senior design. The fall 2021 senior design class encompassed all of these and more. The class undertook projects for industry partners, a farmland owner, a research lab in the biology department at K-State, a zoo near Salina and the Helwig Farms Quarter-Scale Tractor Team.

The work from these senior design projects yielded the following results: a device and process to create accurate "wells" in agar plates for experiments on mosquito hymolymph; a high efficiency, multi-belt and clutch transmission for the Helwig Farms Quarter-Scale Tractor Team; a streambank stabilization plan for Prairie Creek near Topeka; two different test stands for Great Plains Manufacturing; a water harvesting plan for Rolling Hills Zoo; and a stream flow sensor for Campus Creek on K-State's Manhattan campus.

Kristen Michel of the Michel Lab in the biology department was looking for a way to create one microliter "wells" in a



Hurla sets up a hydrothermal liquefaction reactor prior to an experiment

engineering program at K-State has provided Hurla with great opportunities. With this and her experience in Lisa Wilken's bioseparations laboratory, Hurla is excited to continue her education by pursuing graduate studies within bioseparations engineering.



special bacterial infused agar. One team designed a device to create these "wells" consistently. The project was more than just creating a device. To make the "wells" correctly, a process had to be developed as well. The resulting device and process improved experimental accuracy and reduced the time necessary to prepare agar plates.

# Reading the river

Using a river's natural stabilizing tendencies in stream restoration strategies

Kari Bigham, teaching assistant professor, completed her dissertation this past spring titled, "Streambank erosion downstream of a flood control dam: Processes, rates, and management." For the past eight years, Bigham has been monitoring various types of streambank stabilization systems throughout the state of Kansas, from rock flow deflectors to woody revetments to man-made beaver dams. After watching woody revetment structures installed on the Smoky Hill River south of Salina get washed out during high flows in 2019, Bigham focused her doctoral research on understanding why. Potential reasons included lack of streambank cover (e.g., vegetation) following construction, inadequate anchoring of the structures and overall construction disturbance (i.e. loosening of the streambank material through excavation and packing). However, Bigham was most interested in investigating the impact of high, extended-flow releases that occurred in 2019 due to operation of upstream Kanopolis Dam.

Like many of the large dams in Kansas, Kanopolis Dam was installed by the United States Army Corps of Engineers to control flooding downstream on the Smoky Hill River, as well as larger downstream rivers such as the Kansas, Missouri and Mississippi. Precipitation was well above average not only in Kansas in 2019, but also throughout the Great Plains. To control flooding locally, as well as further downstream along the Missouri and Mississippi rivers, highflow releases from Kanopolis Dam were extended over much of the summer in 2019. While flood-control dams

have saved billions of dollars in flood damage over the years, this kind of controlled hydrology mimics that of a snowmelt-dominated hydrology system having a step-like hydrograph common in mountainous regions rather than a storm-dominated, or flashy, system common in Kansas. Bigham investigated how this change in hydrology might have impacted streambank erosion rates and thus, woody revetment failure, downstream on the Smoky Hill River.

While investigating the downstream effects to rivers caused by installation of upstream dams is not new, understanding how to manage these effects through streambank stabilization and/ or stream restoration has not yet been thoroughly investigated. Through historical analyses of river dimension, pattern and profile, as well as hydraulic, sediment transport and bank erosion computer modeling, Bigham observed the Smoky Hill River shifting from a stable form prior to dam installation, to several different, yet unstable forms, and more recently, evolving to a new, stable form, different than what was observed prior to dam installation. Furthermore, Bigham was able to identify the dominant type of bank erosion occurring at the woody revetment sites, as well as throughout the Smoky Hill River, affected by upstream dam operation. These findings will assist stream practitioners and managers in planning and designing future stream restoration projects on the Smoky Hill River. To further understand the application of these findings, Bigham is currently working on conducting similar assessments downstream of five other flood-control dams in Kansas.

### Goldwater Recipient

Avanelle Stoltz, sophomore in biological systems engineering from Leawood, Kansas, was one of two K-State students to receive the prestigious recognition from the Barry Goldwater Scholarship and Excellence in Education Foundation.

Also receiving the scholarship from K-State was Lexe West, junior in psychology from Junction City, Kansas.

Established by Congress in 1986 to honor Sen. Barry M. Goldwater from Arizona, the scholarship was awarded to 417 college students across the country for the 2022 competition. The awardees were selected from a pool of 1,242 applicants from 433 institutions. Awardees receive up to \$7,500 annually for college-related expenses. Both K-State students have active undergraduate research projects and intend to pursue careers in mathematics, science or engineering — a requirement of the scholarship.

"When we search for Goldwater candidates, our K-State nominating committee looks for individuals who are outstanding academically," said Jim Hohenbary, director of the K-State Office of Nationally Competitive Scholarships. "However, we are also looking for people who have been passionate participants in undergraduate research individuals who demonstrate the potential to thrive in future research environments. Both Ava and Lexe fit that description perfectly. It is gratifying to know that the Goldwater selection committee saw those attributes as well."

Stoltz is working with Nicholas Wallace, associate professor of biology, on research involving human papillomavirus, or HPV. She is working on a project involving the E7 oncogene in the alpha-HPV strain. For the past three summers, she also has worked at the University of Kansas Medical Center in a reproductive research lab under the direction of Lane Christenson, professor of molecular and integrative physiology. Her project aims to understand the effects of spaceflight and microgravity on the adrenal gland. She has given both oral and poster presentations on her research for K-INBRE, or the Kansas Idea Network of Biomedical Research Excellence, and at the American Society for Gravitational and Space Research annual conference.



She has been a K-INBRE summer scholar two times and received an award of excellence from K-INBRE for her poster presentation during a symposium. Stoltz has received multiple K-State awards and scholarships, including an Office of Undergraduate Research and Creative Inquiry Research Grant, a Wabash Cannonball Scholarship, a Distinguished University Scholar Award and the Rathbone Scholarship.

She is the sergeant-at-arms for the K-State student branch of the American Society of Agricultural and Biological Engineers and is involved in Engineering Ambassadors. She serves as the recruitment data assistant for Kappa Alpha Theta sorority.

Stoltz attended Notre Dame de Sion High School in Kansas City, Missouri, and is the daughter of Doug and Elizabeth Stoltz.

K-State has produced 80 Goldwater scholars since the first Goldwater scholarship was conferred in 1989.

## BIOPLASTICS WITH REGENERATIVE AGRICULTURAL PROPERTIES

Plastic films and mulches have been used in high-value and specialty crop production as a physical barrier to weed growth since the 1950s. Over the last decade, due to the environmental issues associated with conventional plastics, use has begun shifting from conventional plastics to biodegradable polymers. These films are used to control soil moisture and nutrients, improve irrigation efficiency, manage temperature, suppress weeds and improve agricultural product quality.

However, installation, removal and decompositional control of films have been a concern. The use of effective, lowcost, spray-on bioplastic films or coatings in commodity crop production would be transformative. However, the management, science and engineering fundamentals need to be well understood to identify pathways that minimize negative long-term tradeoffs.

To address this concern, a consortium of 15 researchers from Kansas State University, the University of Nebraska–Lincoln and the South Dakota School of Mines and Technology will develop and test spray-on, biodegradable polymers that could be applied on row crop fields to reduce plastic and herbicide use and enable technology transfer from specialty crop production to field cropping, and ultimately, practical use.

Vaishali Sharda, assistant professor in BAE, will lead a nearly \$6 million NSF-funded project called "Bioplastics with Regenerative Agricultural Properties," or BioWRAP. The



overarching goal of this is to reduce the use of plastics, herbicides and associated environmental impacts in agricultural production.

"New, locally sourced types of bioplastics that fully break down into safe by-products can be made," Sharda said. "These new materials could provide farmers with a green way to control weeds, fertilize crops, protect soil and water resources, and work with nature to better manage their fields."

Through collaboration with the teams on the other two campuses, Sharda and her colleagues at K-State — Ajay Sharda from biological and agricultural engineering, Pascal Hitzler from computer science and Kate Nelson from geography — will work toward engineering the biopolymers, study the impact of the developed biopolymers on strengthening of agroecosystems and assess broader impacts of this disruptive technology.



Field plot testing of sprayable bio-based formulation

The envisioned product will be a spray-on biodegradable plastic that can be administered to row crop production systems. Three types of biopolymers will be tested: Polyhydroxyalkanoate (PHA)-based, protein-based and hybrid polymers. The product would be locally produced from plant and animal proteins like corn stover and chicken feathers and infused with nutrients and microbes that will add to soil health as the covering degrades.

"We are working to create a tunable bioplastic," said Rajesh Sani, professor of chemical and biological engineering at the South Dakota School of Mines and Technology and a coprincipal investigator with BioWRAP.

The idea is to create and functionalize bioplastics that are the perfect home for beneficial bacteria so that the bacteria can feed on the biodegradable plastic compound and give nutrients to the soil throughout the crop cycle as the bioplastic degrades.

The biopolymers are being developed and tested at the partner institutions at lab and greenhouse scales. Once the biopolymer slurries are developed and tested, Ajay Sharda will start testing the spraying of the different types of biofilms using a customizable robotic sprayer. Ultimately, the team will spray these bioplastics to field sites to assess their degradation and ability to achieve the goals of the project. areas socioeconomically through new infrastructure, job creation, economic growth and market access across the three jurisdictions involved. In addition to the 15 participating faculty, the consortium has a major focus on workforce development that will include three post-doctoral researchers, nine undergraduates, 12 graduate students, 40 high school students and 40 middle school students.

<sup>€€</sup> These new materials could provide farmers with a green way to control weeds, fertilize crops, protect soil and water resources, and work with nature to better manage their fields. <sup>99</sup>

- Vaishali Sharda

Control of invasive and resistive weeds is the keystone of the second leg of this project that will investigate how bioplastics can improve agroecosystem health. Recent increases in herbicide-resistant weeds have elevated concerns over environmental contamination, human health risks and productivity losses. Vaishali Sharda will lead this area with additional research planned around modeling and studying interactions between the spray on biopolymer, environmental factors and crop production along with soil and water quality, life-cycle assessment and resource use, and inventory impact. Hitzler will lead the sustainable data provision in the project, developing modular knowledge graph organization schemas and principles that formally capture relevant notions from the diverse research fields involved.

Karina Schoengold, the lead Pl at UNL, along with Nelson, will study product adoption, rural sustainability, ecosystem services and markets. The team hypothesizes that if implemented carefully and strategically, BioWRAP will strengthen rural areas socioeconomically through new infrastructure, job creation, economic growth and market access across the three jurisdictions involved.

### **FLIPPO LEADS DEPARTMENT ROBOTICS EFFORTS**

#### BAE 750

BAE 750 – Analysis and Design of Off-Highway Vehicles, taught in the fall, is a course that has been used to teach further design aspects to upper classmen or graduate students. Usually, this class has individual projects for students, such as zapping aphids with lasers, dairy cooling sensors for cattle, using small robotic vehicles to cut down cedar trees in pastures and pond algae measure vehicles, among others. It's a way for students to learn design aspects and chase down some interesting ideas that no one else would waste time on.

In the fall of 2022, Dan Flippo, Patrick Wilburn Keystone Research Scholar and associate professor in the department, and his students enrolled in the course, Ben Weinhold, Noah Nivett, Alex Burton and Gavin Alexander, grouped together to work on a robot that would clean the tops of the cooling towers at Jeffery Energy Center. Affectionally named "scum baby," this robot would scour the water drain holes in the tower so that human cleaning would not be necessary. The group presented its work to the manager and three Jeffery engineers at the end of the year. Further work needs to be done on "scum baby," but it's already proved to be a good experience for four BAE engineers.



BAE 750 class with JEC engineers on top of one of the cooling towers

#### **Battle Bots Team**

Dan Flippo, Patrick Wilburn Keystone Research Scholar and associate professor in the department, has been coaching the middle and high school battle bots team in Manhattan, Kansas, since 2015. In April, he took six students to the BotsKC regional competition in Kansas City, Missouri. Flippo is on the board of directors for BotsKC, which is a STEM organization created to foster and encourage engineering and manufacturing. The 2022 robot was called Ericius, which is Latin for porcupine. The students learn topics during the year, such as computeraided drafting, failure mode analysis, electronics and power usage, traction, metal and plastic material properties, testing procedure and basic time management. The students have to write a report detailing out their year-long experience.



### Sharda travels to India

Ajay Sharda, Patrick Wilburn – Carl and Mary Ice Keystone Research Scholar and associate professor of biological and agricultural engineering, traveled to Punjab Agricultural University in Ludhiana, India, May 23-25, to visit with faculty and students of its College of Agricultural Engineering and Technology. PAU is one of the premier agricultural engineering and technology institutes in India. Continued dialogue at PAU not only helps to maintain a pipeline for graduate students, but also provides opportunities to explore collaborative research endeavors. Sharda, along with Vaishali Sharda, assistant professor of biological and agricultural engineering, met with faculty and graduate students to share open graduate research positions, engaged in oneon-one meetings with potential students and shared the skills needed for ongoing innovative research projects.

The Shardas also visited with Absolute® founder and CEO, Agam Khare, and director of strategy and partnerships, Shivam Sharma, while traveling abroad. Absolute® is a company developing a completely controlled and

> "Such partnerships will extend capabilities of faculty and students at K-State to engage in international research activities and broaden their reach to extend research-based technological solutions for international food production."

> > - Ajay Sharda

traceable, seed-to-market platform, which connects directly with the farmers to efficiently capture all farm activities. In return, Absolute® provides actionable insights to improve every cycle of crop growth.

Absolute® Innovation Platform, which is specifically crafted as an international cross learning platform to ideate future innovations, innovation technology development and validation, and collaborative engagements with research institutes, grabbed Sharda's attention. Absolute<sup>®</sup> and BAE faculty at Kansas State University are actively working toward signing a collaborative research partnership, especially in image analysis for crop yield estimation and innovative crop protection technologies, including using unmanned aerial systems.

"Such partnerships will extend capabilities of faculty and students at K-State to engage in international research activities and broaden their reach to extend research-based technological solutions for international food production," Sharda said.



## **Bio-Environmental Systems Teaching Laboratory**

The biological and agricultural engineering department at K-State is committed to providing transformative learning experiences to its students. The department recently developed the Bio-Environmental Systems Teaching (BEST) laboratory in Seaton Hall to provide modern and fully equipped workstations that will enhance undergraduate experiential and inclusive learning opportunities for students in the biological systems engineering and the multidisciplinary environmental engineering programs.

Lisa Wilken, associate professor and lead faculty in the renovation, said, "the newly renovated lab will facilitate student understanding of physical, chemical, rheological, thermal and mechanical properties, which is foundational to students' ability to engineer systems that handle or interface with biological materials.

"During the spring of 2022, students had an opportunity to use the new equipment as part of our Properties of Biological Materials Laboratory course," Wilken explains. "Students studied biomaterial composition and converted biomolecules into bioplastic and biodiesel; evaluated soil samples from local rain gardens (bioretention cells) and completed an environmental forensics assessment; characterized fluids and modeled their flow behavior properties; and measured water activity and its relationship to microbial proliferation and storage stability of biological materials."

BSE senior Emily Cranwell said she appreciated getting to use the new facilities.

"We were able to use the lab for team collaboration as we learned about and experimented with a wide range of biological and environmental engineering applications," she said. "The lab also provided materials and space to work on projects for other classes, making it a valuable resource to all students in the department."

In parallel, additional space was remodeled to create the BEST studio with flexible classroom seating and workspace, movable power stations, tablets for recording and evaluating



Bioplastic created by biological systems engineering and environmental engineering students in the new Properties of Biological Materials Laboratory course

laboratory data and lockers to promote active learning and collaborative work. Student teams from the departmental introductory design course identified student needs and desired features and then proposed designs for the space. The studio is currently being used for pre- and post-lab exercises, team-based course activities and project meetings, and as a collaborative learning space for students.

Cranwell said the space works for individual study or group project work.

"I enjoyed studying in the studio and suggested that it would be a great place to work on a team-based instrumentation and controls project," she said. "Our team used the dry-erase tables to draw project diagrams, the lockers to store materials and prototypes and the monitors to practice presenting. It is a functional space that facilities collaboration and teamwork."

## **Outstanding Seniors**

#### **Biological Systems Engineering**

#### **Shelby Martinez**

Shelby Martinez, biological systems engineering environmental option graduate from Peculiar, Missouri, was selected as Outstanding Senior in BSE. Shelby was a member of the Engineering Leadership and Innovation program, teaching assistant for the general engineering and engineering student success seminar, Society of Women Engineers

member and officer, and a Snyder Leadership Legacy Fellow. She is currently employed at CDM Smith as an environmental engineer in Kansas City, Missouri. Her favorite thing about studying BSE at K-State is the family atmosphere. "Family is talked about a lot at K-State, and I have felt at home ever since joining the BAE department."

#### Elizabeth G. Seidl

Elizabeth G. Seidl, biological systems engineering - biological option graduate from De Soto, Kansas, was selected as Outstanding Senior in BSE. Elizabeth was a two-year member of the ASABE executive team, Steel Ring Honorary co-membership chair and undergraduate researcher in Lisa Wilken's bioseparations laboratory for three years.

She placed second at the 2021 undergraduate engineering poster competition and second overall in student poster/oral presentations at the 2021 ASABE conference. She believes the

best part about BSE is the incredibly supportive faculty and staff and the close-knit feel of a small unit. She was proud to be named the 2022 St. Patricia for the Carl R. Ice College of Engineering and will pursue a doctorate degree in biomedical engineering at the University of Pennsylvania.

### Agricultural Technology Management



#### John H. Sullivan

John H. Sullivan, agricultural technology management technology option graduate from Superior, Nebraska, was selected as the Outstanding Senior in ATM. He served as the ATM club president from 2019-2021 and earned the American FFA degree, the highest achievable degree in the National FFA organization. One of his favorite

accomplishments during his time at K-State was helping increase ATM enrollment and awareness.

"My favorite thing about ATM is the faculty, staff and fellow peers. Collectively, we all interact as a family. At any given point, you can find another student or faculty member to bounce ideas off of or confide in. Faculty members' doors are always open and they are happy to meet."

Sullivan plans to return to the family farm and start his own operation. He would also like to use his computer-aided design software experience and expertise to design and fabricate agriculture solutions as a side business.

#### Department News

#### Harner retires after 38 years at K-State



**Joe Harner**, professor and head of the Carl and Melinda Helwig Department of Biological and Agricultural Engineering at K-State, retired in June 2022 after 38 years of service to K-State.

Harner came to K-State in 1983 after earning his bachelor's, master's and doctorate from Virginia Tech, took over as interim head of the department in 2009 and spent 12 years in the role after securing the job on a permanent basis.

His scholarly efforts improved production efficiency and animal welfare, protected and conserved natural resources, and enhanced worker safety. Harner is internationally recognized for advancing engineering principles, innovative ideas and agricultural structure designs. He received the ASABE Henry Giese Structures and Environment Award and the G.B. Gunlogson Countryside Engineering Award for engineering contributions in advancing the knowledge and science of livestock facilities and improvement of the countryside. He was a member of the K-State team receiving a USDA team award for outstanding integration of research and extension.

Harner is an ASABE fellow and member of the Rural Builders Hall of Fame.

#### Graduate student spotlight: Mingqiang Han



Mingqiang Han came to K-State for a direct doctoral program in late 2018. Befor his arrival, he was a major programmer with the student robotics team of China Agricultural Universi that won the international championship of the ASAB Student Robotics Design Competition in 2017.

During his studies at K-Sta Han has maintained a

perfect GPA of 4.0. He has made major contributions to sever research projects, including an experiment of a frequency response-based soil permittivity sensor in simultaneous

#### Jacobson's 40th year at K-State



Arlene Jacobson, accountant for the department, celebrated her 40th anniversary with K-State in June. She was hired in 1982 to be a clerk stenographer and has done a variety of jobs within the department in the years since, including word processing typist, secretary, office assistant and senior administrative assistant in addition to her current role. She is known for

her work ethic, often being the first to arrive in the morning and last to leave each evening.

When Jacobson began at K-State, she frequently used manual typewriters to transcribe handwritten notes from faculty, among other now-retired technology.

"I believe we learn by doing and we learn from others," Jacobson said. "I am blessed for all the faculty, staff, coworkers and students who helped me learn new skills over the last 40 years."

#### Gomez joins BAE



**Margo Gomez** joined the Carl and Melinda Helwig Department of Biological and Agricultural Engineering department in July 2022 as an academic program specialist. She previously was an office specialist III for Lafene Counseling and Psychological Services at K-State.

Gomez's primary responsibilities include

creating and managing databases and reports, assisting students with academic advising and general questions, course planning and transfer analysis, coordinating and leading new student orientation and enrollment for the department, and disbursing information on internship, career and undergraduate research opportunities.

"It is my mission to support the success of students through the power of positivity, inclusion and engagement," she said.

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	measurement of multiple soil properties – water content,
te	nitrate, ammonium and density. During the past three years,
re	Han has become a major force in teaching of the laboratory sections of three core courses for the biological systems engineering and agricultural technology management
	undergraduate programs and the biological and agricultural
ty	engineering graduate program.
E	Not only has he been independently teaching these lab
	sections, he also made significant contributions to major
	improvement of the BAE Instrumentation and Control
	Laboratory, including additions of six sets of advanced
te,	National Instruments teaching tools and creations of six new
	laboratory exercises for the students. To make this happen,
ral	Han spent countless hours in the laboratory while overcoming
	some health issues. Without his effort, the major improvement
	would have been delayed for at least a year.

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