

Perspectives



Winter / Spring 2015

Message from President Kirk Schulz and Vice President for Research Karen Burg

Kansas State University is an industry hotbed for innovation, talent and professional training.

Three years ago we embarked on an aggressive visionary plan that will launch Kansas State University to Top 50 public research university recognition by 2025. Part of our strategic road map includes developing value-added research that helps our corporate partners drive the regional, national and world economies through new solutions and technologies. In return, these partners have invested in Kansas State University research.

How are we doing three years into our plan? We think the results speak for themselves.

Our licensed intellectual property commands more money per patent than Harvard University, Duke University, Pennsylvania State University and other high-profile institutions, according to data from the Association of University Technology Managers, or AUTM. In part, the culture at Kansas State University is to maximize the value proposition to the university. That culture and the two nonprofit corporations that handle our intellectual properties — the Kansas State University Research Foundation and the Kansas State University Institute for Commercialization — are backed by the talents of our world-class researchers.

In 2014, some of our notable patents included a biomedical substance that can be used for tissue engineering and drug delivery, technology to help cattle and other food animals be healthier, and a genetics-based method of controlling pest insects (Page 2). It's easy to see why we stand out in AUTM's data: Kansas State University is synonymous with quality.

Our startup company TechAccel is an innovation fast track for industry. The company accelerates promising technology and research to feed a world population projected to reach 9.6 billion people by 2050 (Page 20).

Similarly, our Olathe campus (Page 10) and Electronics Design Laboratory (Page 12) are helping entrepreneurs and researchers turn their ideas into products for the marketplace.

As Kansas State University invests in the future, we're seeing others invest in our future as well.

Starting in July 2013, we received our first Feed the Future Innovation Lab grant from the U.S. Agency for International Development, or USAID. That award quickly grew to four labs over 14 months, and a more than \$100 million investment by USAID in our research, teaching, leadership and outreach efforts in the global food systems (Page 6). We look forward to focusing our expertise in animal health, plant science, food safety and food security to develop solutions for one of the biggest challenges this century of feeding a growing world.

It's not all work and no play, though, for another "note"-able investment: having our School of Music, Theatre, and Dance designated an All-Steinway School, thanks to a generous donation for new Steinway pianos. It is a distinction fewer than 200 schools in the world can claim, and one that is music to our ears (Page 18).

Through investments that stretch both the science and the arts, we are well on our way to the Top 50.



A handwritten signature in black ink, appearing to read "Kirk Schulz". The signature is fluid and cursive.

President Kirk Schulz



A handwritten signature in black ink, appearing to read "Karen J. Burg". The signature is cursive and elegant.

Vice President for Research Karen Burg

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Quality assurance

Substantial discoveries at Kansas State University are sparking innovation for the private sector, economic growth in the state



A recent 40 percent increase in patents awarded to Kansas State University — and success in licensing this technology — shows the university packs a powerful one-two punch when it comes to discovery and commercialization.

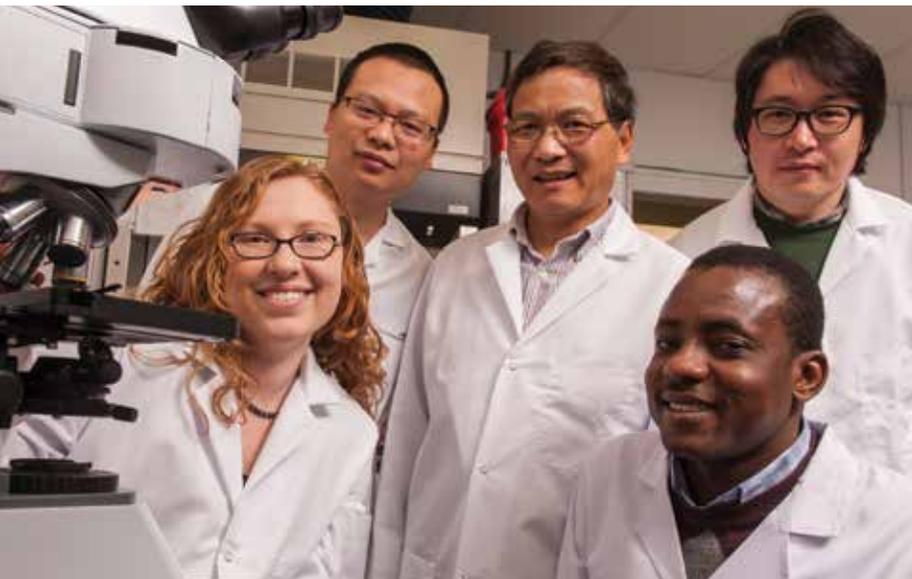
“Kansas State University is quality-focused,” said Kent Glasscock, president of the Kansas State University Institute for Commercialization. “We have an outstanding system that takes quality disclosures and converts them into meaningful partnerships with companies that take our inventions into the global marketplace.”

The Kansas State University Research Foundation and the Kansas State University Institute for Commercialization work together to help university researchers take their ideas and inventions and make them profitable. The foundation handles researcher disclosures and the patent process, and the institute works with companies to license the new technology.

According to the foundation’s records, the university averages four to six patents per year. In 2014, that number rose to 14 patents — but the actual number of patents awarded to university researchers isn’t necessarily the focus.

“Kansas State University’s increase is noticeable in regard to the number of disclosures and patents awarded, but what we also are really good at is converting the patents we generate into licenses that create revenue,” Glasscock said. “We are ranked 36th in the nation by the Association of University Technology Managers for licenses and options to license per 100 disclosures.”

The rankings place Kansas State University ahead of Harvard University,



Duke University, Pennsylvania State University, Johns Hopkins University and Purdue University, among others, in earning more revenue per licensed patent.

In fiscal year 2014, the institute generated \$2.4 million in university revenue and \$3 million in value of equity holdings. It also has created 384 jobs in the region with salaries averaging \$57,200.

As well as fostering industry growth, these successes are helping the university with its visionary plan to be a Top 50 public research university. The K-State 2025 plan includes increasing intellectual capital from research.

“K-State 2025 sets a vision in which Kansas State University is a center of innovation and research for the state, the nation and the world,” said Jim Guikema, Kansas State University Research Foundation president and associate vice president for research. “To be effective, the product of research has to have value. If you give something away freely to everyone, it has no value. If you tell a company here is something you can make money on and we can do it together, now it has value.”

Three innovations — among many — benefited from the Institute for Commercialization and Research Foundation partnership in 2014.

New opportunities for biomedicine

Xiuzhi “Susan” Sun, university distinguished professor of grain science and bio- and agro-engineering, and Hongzhou “John” Huang, a 2012 doctoral graduate, conducted research that led to U.S. Patent No. 8,835,395, “Novel Protein Peptide Hydrogels.”

The hydrogels are formed from various combinations of short peptides — compounds created from amino acids — and may have numerous biomedical research uses. They also can be used for medical device application, such as scaffolds or artificial extracellular matrix for tissue engineering and healing wounds; cell

therapies; combining with stem cells to repair or replace organs; drug delivery; an adjuvant for vaccines; and drug and cell encapsulation.

This hydrogel patent is licensed to PepGel LLC. The company is an inventor-owned startup and was chosen by CIO Review as one of its 20 most promising biotechnology solution providers.

Improving livestock health

Jim Drouillard, professor of animal sciences and industry; Tom Herald, food chemist and adjunct professor of grain science and industry; and Matthew Greenquist, former graduate student, conducted research that led to U.S. Patent No. 8,828,421, “Method for Encapsulation of Orally Ingested Materials to Alter the Site of Digestion, Site of Action, or Stability.”

The encapsulation is a candy-like coating — visually similar to peanut brittle — that protects vitamins and other micronutrients given to cattle and other ruminant animals from being prematurely digested by bacteria in the animal’s digestive system. Once the material bypasses the rumen and ends up in the gastric portion of the animal’s stomach, strong acids in the stomach dissolve the coating, releasing the nutrient so the animal can absorb it.

The patent is licensed to AFGRI Operations Limited, part of the South African food group AFGRI. The technology is deployed through AFGRI Animal Feeds, one of South Africa’s leading animal feed manufacturers.

Safer pest control

Kun Yan Zhu, professor of entomology; Xin Zhang, research associate in the Division of Biology; and Jianzhen Zhang, visiting scientist from Shanxi University in China, conducted research that led to U.S. Patent 8,841,272, “Double-Stranded RNA-Based Nanoparticles for Insect Gene Silencing.”



Double-stranded RNA, or dsRNA, is a microscopic, genetics-based technology that can help safely kill mosquitos and other insect pests by using a biological process known as RNA interference, or RNAi, to destroy the genetic code of an insect in a specific DNA sequence. The technology can have great potential for safe and effective control of insect pests without harming unintended species, such as pets.

The Kansas State University Institute for Commercialization is working with several companies interested in obtaining a license to the patent.

By Stephanie Jacques



FOCUSING ON THE FUTURE

Four federal research laboratories at Kansas State University are helping solve the world's looming food crisis

“Kansas State University is internationally recognized in sorghum, millet and wheat — from the plants’ genetics and genomics, to how they’re grown, to applications such as baking with the produced raw material.”

**— John Floros
Dean, College of Agriculture**

In the next 35 years, the world will need to produce more food than ever before in human history to feed a projected 9.6 billion people. Much of this population growth will be in developing regions such as China, India and Africa, where food production is low, crop losses are high, natural resources are dwindling and agricultural innovation is financially limited.

Kansas State University is helping smallholder farmers in key food producing nations solve these problems through four Feed the Future Innovation Labs.

The federal labs focus on reducing global hunger by helping smallholder farmers in developing nations grow better crops, improving methods for defending food crops against disease and insect pests, and establishing more efficient methods of distributing the harvests — all while helping these small-scale farmers in those countries turn a profit. Smallholder farmers are the majority in agricultural production.

Over the course of 14 months, Kansas State University was awarded four of the highly competitive Feed the Future Innovation Labs from the U.S. Agency for International Development, or USAID. The four labs are newly created by the federal agency and total more than \$100 million in funding — rivaled only by the University of California, Davis with five labs.

Kansas State University was a natural fit for the USAID’s four new Feed the Future Innovation Labs, said John Floros, dean of the College of Agriculture and director of K-State Research and Extension.

“As a university and in the College of Agriculture we have in-depth knowledge in the area of agriculture and the food system,” Floros said.

“The university is internationally recognized in sorghum, millet and wheat — from the plants’ genetics and genomics, to how they’re grown, to applications such as baking with the produced raw material,” he said. “We’re also leaders in how to minimize losses when taking food from the field to the consumer’s table and in intensifying agriculture sustainability so that our grandkids and their grandkids can continue to feed themselves in a sustainable way. Because of this expertise, USAID has decided to invest in us.”





Over the course of 14 months, Kansas State University was awarded four of the highly competitive Feed the Future Innovation Labs from the U.S. Agency for International Development, or USAID. Kansas State University has the second most Feed the Future labs in the nation.

The labs

- The Feed the Future Innovation Lab for Collaborative Research on Sorghum and Millet focuses on the African nations of Ethiopia, Senegal and Niger. Experts are using science and technology to produce innovations such as climate-resilient varieties of sorghum and millet as well as more profitable market approaches for the farmers in the three target nations. The lab is directed by Timothy Dalton, associate professor of agricultural economics.

The lab is funding several research projects in Ethiopia and West Africa that focus on genetically improving sorghum against environmental stresses and pathogens as well as expanding markets for farmers through entrepreneurship and more nutritious products.

- The Feed the Future Innovation Lab for Applied Wheat Genomics is working to develop wheat varieties that are resilient to the warning effects of climate change. Initially, the concentration will be in South Asia, which typically produces 20 percent of the world's wheat crop. The lab is directed by Jesse Poland, assistant professor of plant pathology.

Currently, the lab is conducting heat stress screening of wheat as well as looking at the food plant's genetics to develop new strains of wheat that produce more grain in the hottest and driest parts of the world.

- The Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss will focus initially on helping the countries of Bangladesh, Ethiopia, Ghana and Guatemala reduce their postharvest losses and food waste for grain and oil seed crops, tuberous root crops, and peanut and legume crops. The lab is directed by Dirk Maier, professor of grain science and industry.
- The Feed the Future Innovation Lab for Sustainable Intensification is the newest lab. It is identifying technologies that will help smallholder farmers in key African and South Asian countries improve their management of land, water, soil, crops, trees and livestock while simultaneously improving yields and sustaining natural resources. The lab is directed by Vara Prasad, professor of crop ecophysiology and director of the Great Plains Sorghum Improvement and Utilization Center.

"It's a great honor to the College of Agriculture to have these labs from USAID, but it's important to understand that we didn't get these labs alone," Floros said. "We got them because the whole university is behind us. We recently started a universitywide initiative on global food systems and it shows the commitment and expertise that the whole university has in agriculture and food production, not just the College of Agriculture. That's imperative to improving the global food system."

By Greg Tammen

GETTING DOWN TO BUSINESS

K-State Olathe, a successful hub for company collaborations



Establishing its headquarters at Kansas State University Olathe is proving to be a smart choice for SmartVet.

The animal health company develops, manufactures, commercializes and markets veterinary medicines and vaccines.

“One of the most compelling features of establishing headquarters at K-State Olathe was having the immediate access to world-class animal health research, facilities, programs and people at Kansas State University,” said Randall Tosh, executive vice president of SmartVet and an alumnus of the university.

Through a collaboration that began with expertise from Kansas State University, SmartVet patented its newest product, the SmartVet VetGun™, which is transforming the application of parasite control in cattle — and eventually in the administration of pharmaceuticals. The VetGun system was launched nationally in 2014 through AgriLabs.

“We’ve had help from K-State Olathe and the university’s Advanced Manufacturing Institute in product modifications,” Tosh said. “The College of Veterinary Medicine and the animal sciences and industry department assisted in refining product goals, introducing our technology

to industry through leaders, and identifying new possibilities for collaborative research in vaccine delivery and the potential use of our platform in rapid response to zoonotic disease outbreaks.”

K-State Olathe’s location in the heart of the Animal Health Corridor also is a benefit to companies like SmartVet. The corridor is a region stretching from Manhattan, Kansas, to Columbia, Missouri, and has one of the nation’s largest concentrations of animal health companies. SmartVet anticipates building a manufacturing facility in Kansas for 50-plus employees at average annual salaries of about \$60,000 each.





Microbial Surveillance Lab

Kansas State University Olathe is the site of a new Microbial Surveillance Lab, a partnership between Merck Animal Health and the Kansas State Veterinary Diagnostic Laboratory. The Microbial Surveillance Lab has capabilities for microbiology culture, identification and antimicrobial susceptibility testing.

Here are the focuses of the Microbial Surveillance Lab:

- Providing diagnostic support services to meet the needs of animal health industry partners.
- Creating high-quality student educational and training programs.
- Increasing the visibility of the Kansas State Veterinary Diagnostic Lab in the animal health community and Kansas City Animal Health Corridor.

By Jennifer Tidball

“We’re solution finders for business,” said Prema Arasu, CEO and vice provost at K-State Olathe. “As a business-centric university campus collaborating with companies such as Merck Animal Health and SmartVet, students at K-State Olathe are able to work on real-world challenges in the lab and the field. Our working professional students are learning in actual scenarios they are facing in their careers. Businesses also engage with us to help fill skill gaps in their workforce as we develop ‘just in time’ courses and enhance our curriculum to meet their needs.”

The K-State Olathe campus has a current mandate through the Johnson County



Education Research Triangle Authority to promote regional growth and economic development. The collaborations with Merck Animal Health and SmartVet are examples of how the campus is cultivating university-industry alliances that benefit this region and all of Kansas, Arasu said.

“Being beneficiaries of the K-State Olathe experience has accelerated every part of our company’s successful establishment, our SmartVet VetGun™, our staff development and future product planning,” Tosh said.

By Angela Cummins



Veterinary and Biomedical Research Center

Midwest Veterinary Services recently built the \$5 million Veterinary and Biomedical Research Center in Pottawatomie County. The center, owned by Kansas State University veterinary medicine alumnus Kelly Lechtenberg, will focus on large animal contract research. The center also will involve Kansas State University faculty in designing and conducting research that guides potential products through the approval process for vaccine and pharmaceutical manufacturers.

By Jennifer Tidball

Built to work

How the Electronics Design Laboratory moves ideas by researchers and entrepreneurs into the marketplace



It's easy to think of the Electronics Design Laboratory at Kansas State University as an in-house MacGyver. The lab's production design engineers can seemingly build and modify anything.

During its 19 years of operation, the laboratory has developed everything from components used to create particle acceleration in the European Council for Nuclear Research's Large Hadron Collider to devices that heat cows' ears, all to develop monitoring that improves livestock health in large-scale feedlots.

Timothy Sobering, laboratory director, oversees a team of production design engineers that include Russell Taylor, electrical engineer; David Huddleston, technician; and four student interns. The lab specializes in circuitry, software, commercial equipment and data acquisition systems. Using these skills, the team develops electronics for the

university and industry, which in turn help Kansas businesses and the state's economy.

"Our philosophy is whatever somebody wants, we'll find a way to buy it, build it, borrow it or modify it to fit the client's needs," Sobering said. "The nature of research is that you're doing something new and different, so it's unlikely that you're going to be able to buy a piece of equipment that does exactly what you need. You may need something in between your research and what's commercially available. That's where we come in."

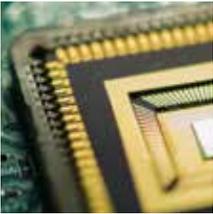
Of its more than 400 projects, here are some of the lab's successes with Kansas entrepreneurs:

- A digital braking system for large trailers that is safer than the currently used pendulum braking systems.
- An ultrasonic device that prevents insect repopulation in grain bins.

- A redesigned probe that measures the moisture in dried foods and bulk solids to increase quality control.

Recently, the Lawrence-based company Avatekh Inc. partnered with the lab, which is priming the Kansas company's products for the commercial market. The lab is helping Avatekh develop technology and hardware algorithms to make smartphones run faster and have improved battery life. A Phase 1 Small Business Innovation Research grant from the National Science Foundation is funding the collaboration.

Bill Kuhn, professor of electrical and computer engineering, is working with the lab to produce various circuit boards for his National Aeronautics and Space Administration Experimental Program to Stimulate Competitive Research project,



the goal of which is to develop wireless wearable physiological sensors for spacesuits as well as low-power devices that monitor astronauts' health.

The lab also is beginning a multimillion dollar project with faculty in high-energy physics to develop new equipment that will help scientists at the Fermi National Accelerator Laboratory, or Fermilab, conduct experiments.

The following are among some of the clientele and collaborations of the lab:

- Honeywell Federal Manufacturing and Technology.
- Sandia National Laboratories.
- University of Kansas.
- University of Missouri, Kansas City.
- University of Tennessee.
- Advanced Manufacturing Institute at Kansas State University.
- Developing radiation detectors for the Semiconductor Materials and Radiological Technologies, or SMART, Laboratory at Kansas State University.
- Multiple longstanding working relationships with university faculty in mechanical engineering, nuclear engineering, electrical, computer engineering and high-energy physics.

In addition to its work with researchers and industry, the lab is an incubator for young talent. Student engineers selected to intern in the lab are frequently fast-tracked in their education, as the students work alongside professional engineers to develop hardware that fits the clients' needs.

"I've had classes in which the professor will introduce something new and I remember doing that six months ago in the lab," said Jake Sobering, a senior in electrical and computer engineering whose first project involved modifying a Nike+ FuelBand to see if it could be adapted to monitor radiation levels rather than exercise performance. "I want to go into the fields of either bio- and neuroprosthetics or robotics. I need to be skilled for those, and I feel like I've been learning those skills and gaining confidence since day one."

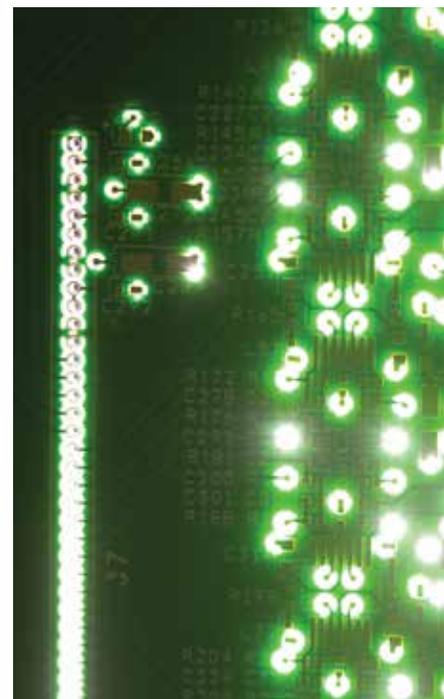
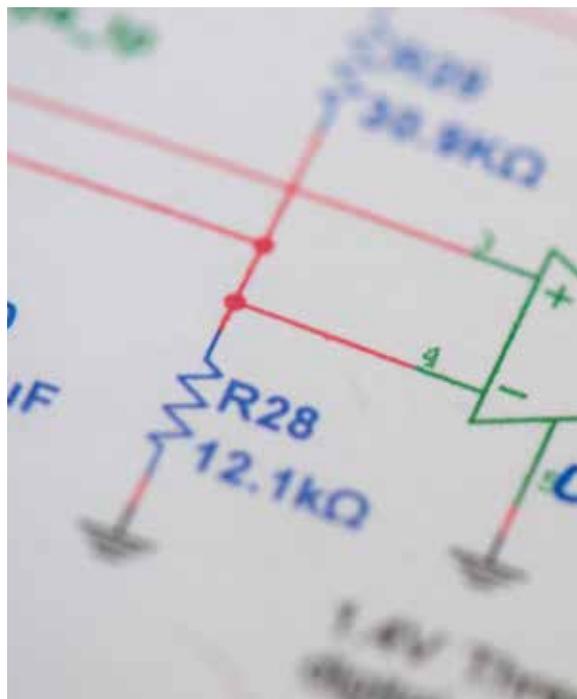
By Greg Tammen

Extracurricular education

Electronics Club is a student-run organization where members use their own money and free time to design and build anything they can imagine. Among those ideas are an automated air hockey table with a robot opponent; a high-definition multimedia interface adapter that uses light-emitting diodes to create ambient backlighting to complement what's on the TV screen; and sword-fighting robots.

The club is another venue for students to gain practical, hands-on experience, said Timothy Sobering, director of the Electronics Design Laboratory and a faculty adviser to the club.

"The idea is to target freshmen coming in so they can build something and show people what they built," Sobering said. "As they learn to build something, they start asking questions about what they built, such as what this microchip does and how the product can be modified to work better or do something different. You end up with some students who are really engaged and involved in what they're doing."



A new energy

Electrical Power Affiliates Program empowers engineering faculty, students

As the world's population increases and the demand on our power grids grows, how will we keep the lights on?

That's where Kansas State University fits in. Through the Electrical Power Affiliates Program, or EPAP, the College of Engineering is leading the charge in solving future problems for the power and energy industry.

The program, housed in the electrical and computer engineering department, partners with eight industry organizations. Since its establishment in 2008, EPAP has supported relevant research projects and provided engineering students with real-world experience, said Noel Schulz, program director and the College of Engineering's associate dean for research and graduate programs.

"Interaction with industry is a key component of our goal to become a Top 50 public research university by 2025," said



Schulz, who also is the university's first lady. "Many of the research projects funded by EPAP are in line with industry issues. By interacting with corporate partners, we can get a better understanding of what industry challenges might appear in the next five to 10 years. We can make sure our faculty and staff know what challenges might happen tomorrow and in the future so they can help solve those problems."

Faculty and student research

A key component of EPAP is providing support for faculty and student research projects on numerous relevant topics: wind power, smart grids and electric vehicles.

For the past three years, the program has given more than \$110,000 each year to support small projects for undergraduates and graduate students. During that time, 18 faculty and staff from seven departments and Engineering Extension have received more than \$300,000 in support for their activities.

"Funding from EPAP can support researchers in getting preliminary data and that makes them more competitive for larger external funding," Schulz said. "Researchers are able to use it as a steppingstone for larger projects on the federal landscape."

Behrooz Mirafzal, assistant professor of electrical and computer engineering, used the Electrical Power Affiliates Program funding and other funding sources to develop a new research power electronics laboratory. Because of this preliminary research, Mirafzal was able to apply and receive a \$400,000 National Science Foundation CAREER award to help develop grid interactive converters for the next generation of power grids.

"Programs like the Electrical Power Affiliates Program support the faculty members who are active in power and energy areas to run small projects and obtain preliminary results, which are typically required for preparing large grants," Mirafzal said.

Here's a look at some of the research projects funded for the 2014-2015 academic year:

- Wind turbines and grid interaction.
- Secure and reliable openflow networks for smart grids.
- Understanding condensation mechanisms and coating wear.
- Constructed wetland treatment systems and the treatment of flue gas desulfurization effluents.
- Electric vehicle charging.

Real-world experiences

The Electrical Power Affiliates Program is key to the university's — and the state of Kansas' — goal of providing more engineers,

Schulz said.

The program gives engineering students the opportunity to research, learn, network and engage in professional development. In 2014, 22 students attended a Chicago conference, presented posters and papers, and interacted with industry members.

Additionally, EPAP sponsors EPAP Day every fall semester. The annual event includes a mini career fair, mock interviews for students, lunch, research poster sessions and opportunities for students to network with power and electric companies.

"Through EPAP and the partnership between industry and academics, we are able to give our students real-world experiences beyond what we are able to teach in the classroom," Schulz said.

By Jennifer Tidball

A smart laboratory

The Burns & McDonnell Smart Grid Lab is boosting education, research and recruitment in the College of Engineering.

The lab, in Rathbone Hall, includes power grid and network communication equipment to support undergraduate and graduate research projects. It is one of the first facilities to test how emerging software-defined networking technology can more efficiently manage, distribute, use and secure electrical power.

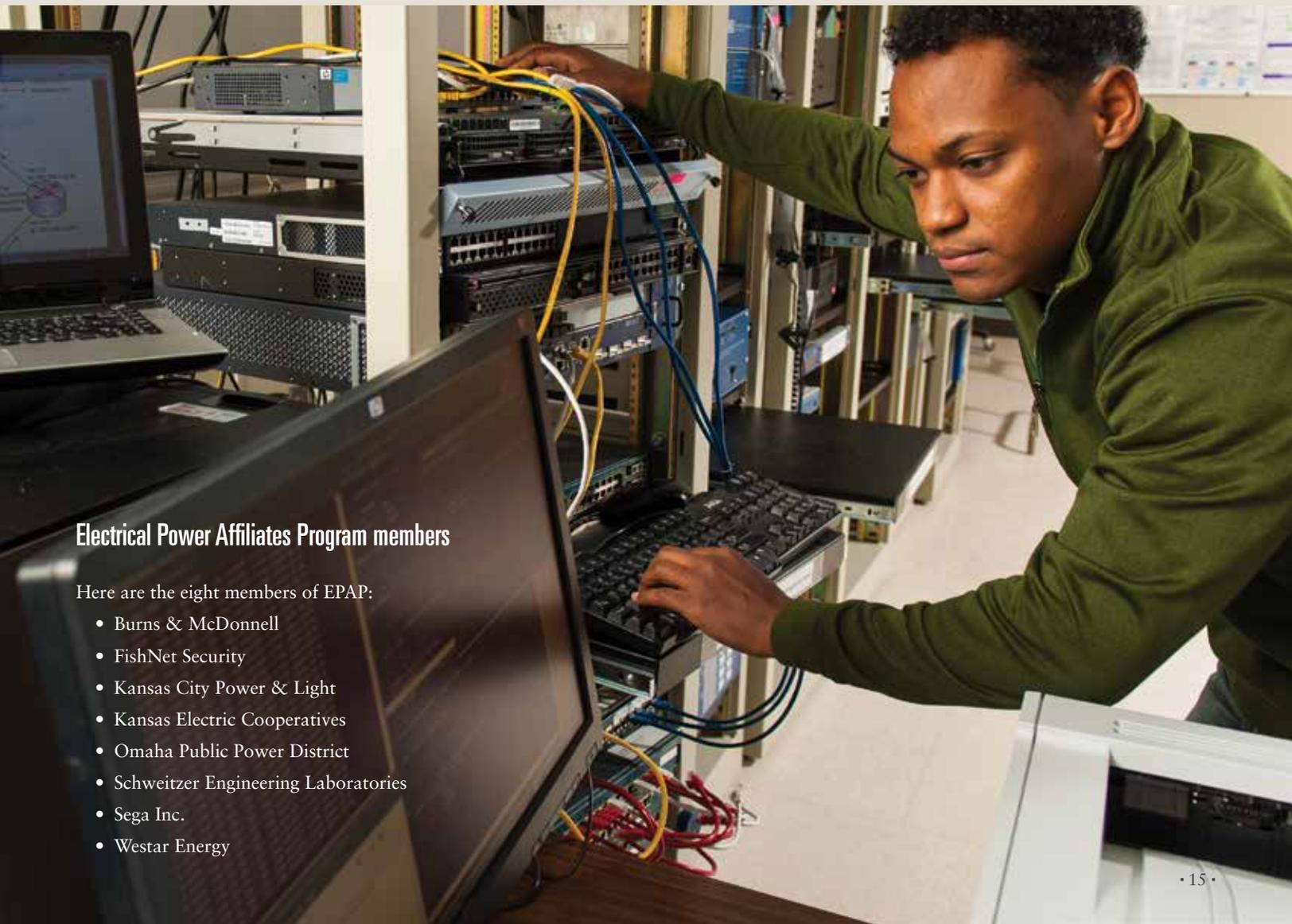
“The lab has been a tremendous tool to help with teaching and research,” said Don Gruenbacher, head of the electrical and computer engineering department. “The lab is used for many of our senior-level design courses, including our power systems and computer networking courses. Our students also have used the laboratory and its capabilities for research projects involving power systems and power systems protection.”

The lab has received financial support from Burns & McDonnell, an international engineering, architecture and consulting company based in Kansas City, Missouri. FishNet Security, an Overland Park, Kansas-based information security provider, has donated, integrated and managed software-defined networking equipment.

Gruenbacher and Caterina Scoglio, professor of electrical and computer engineering, have used the lab to research the development of software-defined networking approaches to communications for smart grids. Noel Schulz, director of the lab and the College of Engineering’s associate dean for research, also has conducted smart grid research in the lab.

“We are able to use the laboratory as an outreach tool for students ranging from kindergarten to 12th grade,” Schulz said. “The lab provides us with the opportunity to let the public know about how research affects day-to-day activities with electrical power. Such public outreach is key to our 2025 goals.”

By Jennifer Tidball



Electrical Power Affiliates Program members

Here are the eight members of EPAP:

- Burns & McDonnell
- FishNet Security
- Kansas City Power & Light
- Kansas Electric Cooperatives
- Omaha Public Power District
- Schweitzer Engineering Laboratories
- Sega Inc.
- Westar Energy



Eye in the sky

Project uses unmanned aircraft systems to monitor fields for pests, disease

For years, it's worked the same way. A crop consultant stands in front of a 250-acre wheat field, knowing he/she has 10,000 more acres to scout. He/She walks the recommended pattern, looking for signs of pest damage and potential yield losses. Often, the consultant makes an assessment based from a finite vantage point, and moves on to the next field, especially when time is limited.

Researchers at Kansas State University are hoping to give producers and consultants access to the bigger picture by using unmanned aerial systems, or UAS. Brian McCornack, associate professor of entomology, is exploring UAS as an efficient method to detect pest insects and diseases — including invasive species — in food crops such as wheat before outbreaks occur.

McCornack is the U.S. principal investigator on the three-year \$1.7 million project “Optimizing Surveillance Protocols Using Unmanned Aerial Systems.” The project also involves Kansas State University Salina and the Plant Biosecurity Cooperative Research Centre, a consortium of Australia's leading governmental research institutions and entities.

“Australia and the U.S. share similar agricultural systems and concerns,” McCornack said. “Unmanned aerial systems hold a lot of promise because they're relatively inexpensive and you can cover a lot of ground in a short amount of time. Instead of only seeing a

section of the field, we can take the UAS, fly over the field and quickly assess the crop for areas of interest.”

Initially, the project will target the Russian wheat aphid and wheat stripe rust, also referred to as “yellow rust.” Researchers are working with landowners and the Federal Aviation Administration for approval to begin conducting approved UAS flights in wheat fields around Kansas in spring 2015.

Researchers will use UAS to repeatedly monitor wheat fields during the growing season in coordination with landowners and crop consultants. Aerial images captured by UAS will be compared and used to identify field sections that have abnormalities, possibly caused by insects or diseases.

“Currently, early detection requires a great amount of luck and sweat,” said McCornack. “A farmer or scout has to make an educated guess regarding where to check for infested plants. It works, but if a producer has several thousand acres to manage, it's not very efficient. With the help of remote sensing, you can scan a wide area in a short amount of time. It's not a guarantee, but it can help us understand how to quickly manage existing pests or even spot new ones.”

In addition to testing for accuracy, researchers will study how to refine the aerial images captured by the UAS to provide landowners with the most useful data. This could include comparing images taken at varying heights, camera resolutions or optimal flight speeds.

“Most of the technology we're using is commercially available,” said McCornack. “We're still not going to be able to tell you with 100 percent certainty that this species is in the field, but our hope is to improve first rates and increase sampling efficiency using current technologies.”

The research team from Kansas State University is collaborating with the Kansas Department of Agriculture, K-State Research and Extension, and many Australian partners.

“We'll first look at different cameras and sensors to find those that will detect our target species. Once existing sensors have been identified, we'll fly them over production fields that landowners have given us permission to scout.”

Brian McCornack, associate professor of entomology

By Megan Saunders



Notable achievement

All-Steinway School designation strikes right chord



To be the best, the best is needed.

That's why Kansas State University's School of Music, Theatre, and Dance is an All-Steinway School — a distinction fewer than 200 schools in the world can claim.

Awarded in fall 2014 by Steinway & Sons, the All-Steinway School designation means at least 95 percent of the pianos used at the school are Steinways, which are considered to be the finest pianos in the world. A Steinway concert grand piano is handcrafted and takes nearly a year to create.

"The School of Music, Theatre, and Dance aspires to be the very best it can be in all areas of instruction and performance," said Gary Mortenson, the school's director and professor of music. "To do that to the fullest extent possible, the school needs the tools of the trade that allow creative minds to flourish. Steinway-line instruments make that happen in this very important area of our daily activities."

The All-Steinway School initiative started with the school's keyboard division faculty and captured the attention of Kansas State University alumnus Mark A. Chapman. His donation allowed the purchase of 40 new Steinway-line pianos and the refurbishing of six existing Steinway grand pianos.

A new Steinway can cost up to \$150,000, while refurbishing can cost \$25,000 per piano.

Sadly, Chapman died just as many of the pianos were being delivered. But his contribution is remembered through special plaques that are posted in the school's atrium in McCain Auditorium and at the entry to keyboard faculty teaching studios.

"Mark A. Chapman's generosity of spirit allowed this to happen," Mortenson said. "We are so fortunate that he came to believe in this initiative. Without his assistance we would not have this designation."

Now tickling the ivories, for both faculty and students, is a joy and a commitment to being the best.

"Having superior pianos demands exactitude in my teaching," said David Pickering, assistant professor of music. "No longer can anyone blame inferior equipment for less-than-stellar results, which holds one to a higher level of accountability in their teaching."

The All-Steinway School designation also is striking the right note with students.

"The opening of the 2014-2015 academic year represented the finest in the recent history of the keyboard division, not only in quality of students, but in the number as well," Pickering said. "No doubt the Steinway pianos they experienced as they either visited campus or read about from afar were a contributing factor to their choosing Kansas State University. We are the first university in the state of Kansas to be awarded this prestigious designation."

Having the best instruments for teaching and learning does make a difference, Mortenson said.

"Students and parents can sense quality when they see it. Steinway instruments are stunning to look at visually and a great joy to play," Mortenson said. "The better pianist you are, the more you recognize just what wonderful instruments these pianos are — and that makes a big difference. You don't really have to say anything. The quality of the pianos speaks volumes about Kansas State University's commitment to excellence."

By Beth Bohn





Challenge accepted

Partnership addresses technological gaps for feeding the world's expected 9.6 billion population

Kansas State University is using a new business strategy to help the world conquer the challenge of feeding 9.6 billion people by 2050.

The university has created a third-party startup company, Technology Acceleration Partners LLC, or TechAccel. The company establishes partnerships with global agriculture and animal health industry leaders to address gaps in technology innovations that are needed to increase food production, improve food quality and enhance animal health.

“A lot of promising innovations struggle to find a way to the marketplace because there is not money to advance the science to the point at which it is market-ready,” said Kent Glasscock, president of Kansas State University’s Institute for Commercialization and one of TechAccel’s founders.

TechAccel is one of the first companies to create partnerships with global food system corporations that are focused solely on research advancement of promising technologies for the global market. The partners identify market opportunities that have unfunded science gaps. Promising technologies are identified, acquired and advanced.

“A researcher might have created a promising innovation, but the funding necessary to advance and validate that promising innovation is not there,” Glasscock said. “Sometimes transformational innovation is so risky that the private sector hesitates to fully fund it and the innovation is stalled in the lab.”

TechAccel is designed to create new momentum behind innovation connected to global food systems. The company establishes a 50-50 partnership to ease the financial risk to the corporation.

“The business model concentrates on advancing promising science in direct partnership with established companies that have robust product development systems and global distribution,” Glasscock said.

After TechAccel has established a partnership, it looks for the researcher and appropriate innovation. TechAccel does not limit the researcher search to Kansas State University, although it does begin there. Kansas State University researchers are evaluated first as part of the founding agreement, which offers a revenue stream for the university in addition to being a founding equity partner.

“The TechAccel concept is really unlike anything else,” Glasscock said. “The business model and K-State’s leadership position in helping to form the company sets us apart from other universities. This is a unique and innovative response to a well-recognized challenge.”

By Stephanie Jacques





Quick
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Heartland Plant Innovations

Heartland Plant Innovations is partnering with Kansas State University researchers to accelerate plant breeding and improve genetics in wheat and sorghum. The organization provides advanced plant breeding services and contract research to accelerate novel variety development with the goal of delivering new products to help farmers and food companies in short time frames. Heartland Plant Innovations — a collaboration of Kansas State University, Kansas Wheat, the University of Kansas and several private investors — is headquartered at the Kansas Wheat Innovation Center on the Manhattan campus.

By Jennifer Tidball

Quick
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Center for Outcomes Research and Education

Animal health company Zoetis has contributed \$250,000 toward a new center of excellence in the College of Veterinary Medicine. In February, the Center for Outcomes Research and Education launched under the guidance of director David Renter, an epidemiologist and professor of diagnostic medicine and pathobiology. With a goal of improving effectiveness and efficiency in animal health care and its associated impacts on human health, the center focuses on demonstrating the value of animal health interventions.

“Zoetis has been a leader in outcomes research for animal health and its support of the center is significant as it allows us to build the vision and infrastructure for research and training efforts that extend beyond the traditional case-by-case approach typically used for individual grants and contracts,” Renter said.

By Jennifer Tidball

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Confucius Institute

Kansas State University is increasing its international presence by establishing a Confucius Institute. Confucius Institutes promote, enhance and elevate understanding of the Chinese language and culture, as well as create exchanges between Chinese and U.S. academic institutions and communities.

The institute at Kansas State University — the 102nd Confucius Institute in the U.S. and the second institute in Kansas — also plans to focus on promoting research collaborations in animal health and food safety. The Confucius Institute will engage not just faculty and students, but also the Manhattan community and the greater Manhattan business community.

Kansas State University signed an agreement with Hanban, which is the worldwide headquarters of Confucius Institutes and is affiliated with the Chinese Ministry of Education.

By Jennifer Tidball