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The Sounds of STEAM

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When the countdown reaches zero, the Triga Mark II nuclear reactor facility executes its special capability: a reactor pulse. With a loud “ca-chunk,” the reactor ejects a control rod using air pressure, which causes the power to increase by a factor of 100 million in 0.01 seconds and then rapidly return to low power. Six seconds later, a “clink” means the rod has fallen back into place in the core. The special capability produces a large amount of neutron flux in a short period of time, which can be used for analyzing materials and developing radiation detectors, said Jeff Geuther, nuclear reactor manager. The nuclear reactor, part of the mechanical and nuclear engineering department, has other important research capabilities and also supports academic and education programs, industrial service and outreach.

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The Flint Hills are alive with the sounds of … bison, bugs, birds and burning. Those sounds are part of research at the Konza Prairie Biological Station, an 8,600-acre native tallgrass prairie jointly owned by Kansas State University and The Nature Conservancy. The Konza Prairie — nestled in the Flint Hills just south of Manhattan — provides an outdoor laboratory for long-term ecological research, education and prairie conservation.

Research at the Konza Prairie includes watershed-level experiments focused on tallgrass prairie ecosystems and the effects of fire, bison grazing and cattle grazing, as well as other basic biological research. A recent study found that more frequent burnings in the Flint Hills are needed to keep the tallgrass prairie ecosystem from transitioning to woodland, said John Briggs, director of the Konza Prairie. A recent study found that more frequent burnings in the Flint Hills are needed to keep the tallgrass prairie ecosystem from transitioning to woodland, said John Briggs, director of the Konza Prairie.
Think pink
Exercising

and anti-inflammatory drugs that can be administered to veterinary medicine interns and students who are at risk of developing arthritis due to chronic disease in this species.

Listen to an introduction into effect.

operations the day the regulations went into effect.

the FAA’s newest regulations for small UAS for inspections, such as power lines or wind turbines. The new UAS program executive director.

these missions, said Kurt Carraway, UAS program executive director at the Applied Aviation Research Center, which is the principal initiative of the university’s School of Aviation.

The Applied Aviation Research Center, which is nearly complete.

of the sounds of industrial research.

From the whirling of the pellet-making mill.

day sounds at the feed mill. The center includes a modern, automated feed mill and a biosafety level-2 teaching facility.

Several times a week, the mill receives tons of grains from delivery trucks. Researchers scoop the grain, weigh it and then mix it to make cornmeal for animal feed and other feeds that the center, students and other animals in Kansas State University operated and also is used for research and industry projects.

Listen to the day-to-day sounds at the feed mill.

When graduate student Eliza Weber creates a ceramic bowl or vase, she also creates a ceramic chorus.

Weber, master’s student in fine arts, said, “A ceramic chorus starts a new piece of pottery by wedging or throwing the clay to remove all air bubbles. She rolls clay with a spade-like tool, throws clay on the pottery wheel and uses the pottery wheel to form shapes. The clicking noises of the clay as Weber shapes the pieces and the gas inside the kiln signify the artistic process is nearly complete.

Through ceramics, Weber is studying the continuum between form and pattern. Her pottery portfolio includes bowls, vases, plates, cups and other vessels — often decorated with flowers and designs. She is looking to create a piece of ceramic art.

Taking off

Unmanned aircraft systems, or UAS, are a common sight in the Kansas State University Polytechnic Campus. After a few start-up years and some successes, the airlifting of mortars and missiles begins and the UAS is ready for takeoff.

Kansas State Polytechnic is a national leader in UAS research, education and flight training. The UAS program is the principal initiative of the university’s Applied Aviation Research Center, which has comprehensive programs in aviation and allows students to pursue dual degrees in these programs, said Kurt Carraway, UAS program executive director.

Some UAS research projects involve mapping natural resources and using UAS to inspect power infrastructure, such as power lines or wind turbines. The program operates under the university’s FAA operational regulations, including Part 107 — the FAA’s newest regulations for small UAS commercial operations. The program began training doctors in those operations the day the regulations went into effect.

Listen to an unmanned aircraft system take flight.

The harmony of clay

Laser-induced thunder

Researchers at the university’s J.R. Macdonald Laboratory can use ultrafast lasers to create thunderous sound.

The laboratory is part of the physics department, home to one of the country’s largest atomic, molecular and optical physics programs.

Physicists use the laboratory’s ultrafast lasers to create a facsimile of the final sound of the PULSAR laser.

From the lab’s PULSAR laser. A laser pulse generates a shockwave that creates sound, similar to lightning creating thunder. The frequency of the resulting sound is the repetition rate of the laser — 10,000 pulses a second.

The PULSAR laser is a high-harmonic generator, which creates a plasma and induces a shockwave that creates sound, similar to lightning creating thunder. The frequency of the resulting sound is the repetition rate of the laser — 10,000 pulses a second.

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The road to stronger, safer concrete starts with the sound of a breaking. Bob Peterman, professor of civil engineering, manages the Structural Mechanics Laboratory where his research team tests the materials used to manufacture concrete railroad ties. Some machines apply enough force to the materials to determine the compressive strength of concrete, while other pull real metal reinforcing wires in tension until they break.

These tests help Penntex determine at what point concrete and other materials crack. His team uses that knowledge to improve concrete by making it stronger.

Listen to the engineers conduct two tests: a compression test for a concrete cylinder and a tension test for a steel wire used in concrete railroad ties.

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A‘Glimmer’ of sound

Before astronauts explore Mars, NASA has to make sure they are healthy and fit enough for outer space. University knowledge researchers have a solution.

Carl Ade, associate professor of kinesiology, and his research team have designed a Martian obstacle course — complete with water, rocks and shadows that resembles the terrain of Mars. The NASA-funded course is an intense test that asks astronauts to perform on the real planet — making jumps, walking 1.5 kilometers and rescuing a crew member.

A key piece of equipment is a portable rowing course, which NASA plans to send to Mars to measure the crew’s physical abilities and strength.

Listen to the rowing machine and 1.5 kilometer walk on the Martian obstacle course.

For composer Craig Weston, sound begins with an idea: a pattern, an emotion or a tune. He often writes musical compositions in segments — one segment may be about a theme, a story or a place. He then combines segments into a piece. He often writes musical compositions in segments — one segment may be about a theme, a story or a place.

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