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Taking Commercialization to New Heights: Unmanned Aerial Systems Research Takes Off

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Taking commercialization to new heights:

Unmanned aerial systems research takes off

Some of the newest research at Kansas State University is taking place on the Salina campus, and the sky is the limit when it comes to its potential.

"Unmanned aerial systems research is the major thrust of work at the Applied Aviation Research Center at Kansas State University Salina, and we're one of the first programs in the country to offer a program in this area," said Kurt Barnhart, the center's executive director and professor and head of the university's department of aviation.

Unmanned aerial systems are rapidly growing in terms of engineering, operations, intelligence gathering, search and rescue, and more, he said.

"Research at the center involves both commercial, off-the-shelf technology and new design technologies, such as wireless power transmission and new antenna design," said Josh Brungardt, director of the university's unmanned aerial systems program.

Unmanned aerial or aircraft systems look much like the remote-control miniature planes hobbyists have long enjoyed — but these aircraft can do much more than fly in a circle at a pilot's command, said Kirk Demuth, chief pilot for the unmanned aerial systems program. These unmanned systems can be programmed to fly long distances — even across oceans — and land about anywhere; can be reprogrammed — or rerouted — in flight; can carry small payloads of 8 to 10 pounds; and, most importantly, can send data, including live camera feeds, infrared imaging and a multitude of sensor information, to a ground station. Such information could be crucial in search-and-rescue missions.

Staff at the Applied Aviation Research Center work closely with aviation-related manufacturers and the military.

"We've had numerous industry come through and work with us," Brungardt said. "We're able to take those design and research elements from industry, vet them through safety protocols and actually do testing so the manufacturer can take these vehicles or new products to market."

The star of the university's unmanned fleet is an Aerosonde Mark 4.7. Produced by AAI Corp., it weighs about 50 pounds and is not much larger than a Canada goose. While small, the Aerosonde can fly up to 20 hours on a full tank of fuel. Another vehicle in the fleet is the Wolverine 3, a helicopter used for shorter distances.

Current research at the center involves the Aerosonde and the world's smallest aviation transponder, the XPS-TR made by Sagetech Corp. The aircraft is the first anywhere to have this cellphone-size transponder, which communicates key data about the aircraft, such as altitude and flight plan information, to air traffic control radar. Unmanned aircraft systems are naturally invisible to such radars, so learning how to equip these tiny transponders to unmanned aircraft will open up their use for civilian missions in the national air space, Brungardt said.

The center also includes the Advanced Avionics Miniaturization Laboratory, where technology can be shrunk and mounted on a printed circuit board for testing in an unmanned aircraft system.

The center has already received two grants from the U.S. Air Force Office of Scientific Research in Arlington, Va. The multimillion-dollar grants are for the continued development of mission planning, operations and a disaster training center for the university's unmanned aerial systems program.

By Beth Bohn, Communications and Marketing

Why unmanned aerial systems?

The unmanned aerial systems program at Kansas State University Salina was born from disaster, according to Kurt Barnhart, professor and head of the department of aviation.

It all started in 2007, a bad year for weather-related disasters in Kansas. Heavy snow storms, an ice storm that knocked out power and power transmission equipment and a devastating tornado that wiped out the town of Greensburg had the National Guard responding on multiple fronts. But the Guard itself was shorthanded and under-equipped because of deployments.

"There was a call for the ability to put an eye in the sky without necessarily putting a person in the sky," Barnhart said. "This can be done quickly and cheaply with unmanned aircraft systems, and you can get the same — or better — information."

"Unmanned aerial systems are good for three things — the three D's in our industry: dull, dangerous and dirty," said Josh Brungardt, director of the unmanned aerial systems program.

"In a disaster, you have all three," he said. "The dull side is that the incident commanders or generals need to have eyes-on capabilities for a long time. Being able to send a UAS to a town badly damaged by a tornado can help authorities figure out unblocked routes for emergency vehicles. Seeking heat sources through the system's infrared imaging capabilities can be dirty but save lives."