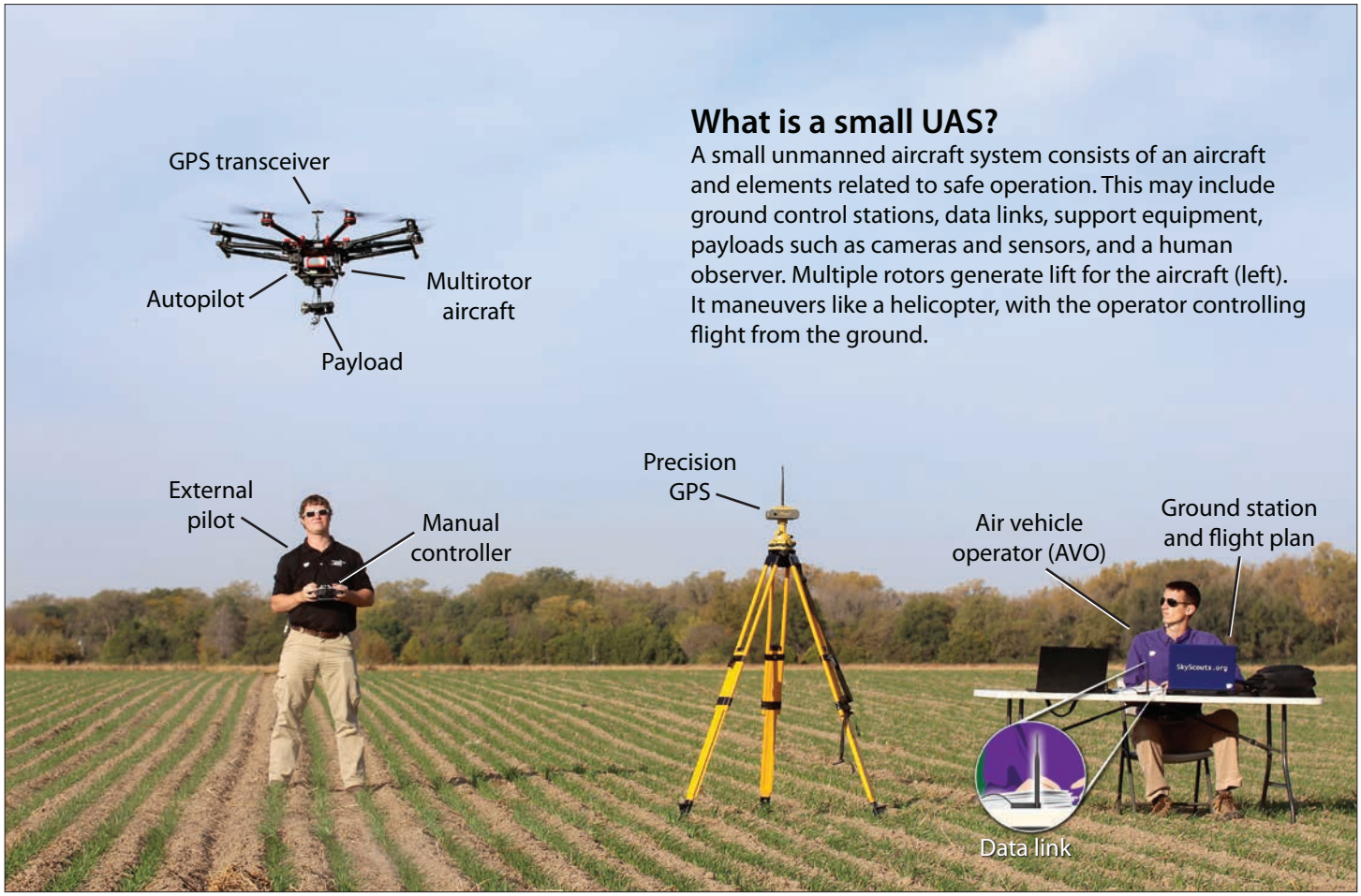
K-STATE Research and Extension

What You Should Know About Small Unmanned Aircraft Systems (UAS)



What is a small UAS?

A small unmanned aircraft system consists of an aircraft and elements related to safe operation. This may include ground control stations, data links, support equipment, payloads such as cameras and sensors, and a human observer. Multiple rotors generate lift for the aircraft (left). It maneuvers like a helicopter, with the operator controlling flight from the ground.

Small unmanned aircraft systems (UAS), also known as drones, are fixed-wing or rotary-wing vehicles that do not carry humans on board. The term sUAS applies to any unmanned aircraft weighing less than 55 pounds. The smallest vehicles weigh less than a pound and fit into the palm of your hand. Small, electric-powered versions can fly for 15 to 25 minutes. Larger, gas-powered models fly for up to 24 hours.

Safety Regulations

Interest in recreational and commercial use of small UAS has grown with advancing technology and the development of nonmilitary applications. The increasing number of small, unmanned aircraft operating in the public airspace led the Federal Aviation Administration (FAA) to issue new safety rules for nonrecreational use of these vehicles. Individuals who fly for commercial reasons must follow these regulations. Guidelines for specific types of users are listed on page 4.

These rules are subject to change. Before you fly, know the rules for operating a small unmanned aircraft system. Learn more about the regulations at knowbeforeyoufly.org.

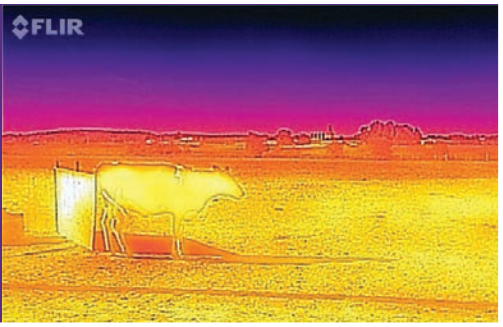
Applications

The following information shows some of the practical advantages of small UAS for those working in food production, transportation, public and environmental safety.

Small UAS at Work

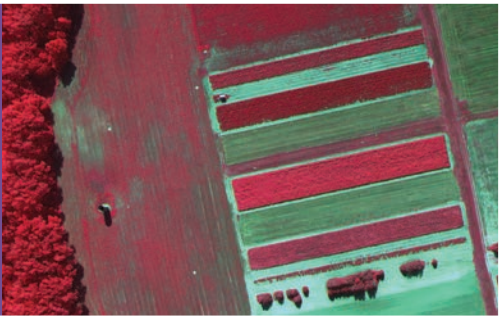
Practical applications for agriculture, transportation, energy, and safety are shown on the next page.

The rigid wing and streamlined shape (airfoil) lift the aircraft as it accelerates. A single propeller driven by an internal combustion engine or electric motor produces forward thrust and enough airspeed to keep the payload aloft.



Food Production

Sensors allow farmers and ranchers to monitor plant health and detect problems with rangeland and livestock long before they are visible to the unaided eye. They can be equipped to estimate crop yield, collect precision agriculture prescription data, and track livestock migration. The thermal image, left, shows animal location.



Crop Protection and Plant Biosecurity

Early detection of pests and invasive species and implemention of sophisticated pest management strategies are possible with remote-sensing technology. Using small UAS to create vegetation maps, researchers can chart field patterns to identify and manage damaging infestations of crop pests.

Infrastructure Inspection

Small unmanned aircraft systems permit evaluation of hard-to-reach structures such as wind turbines, power lines, and smokestacks without endangering inspectors. The ability to relay information in real time at a lower cost, increases the economic efficiency of the power system.

Transportation

The ability to capture images tagged with the time and location increases the utility of small UAS for road and bridge inspection, pothole detection, accident reporting, environmental assessment, and post-disaster surveys.

Public Safety

The aerial view provides an advantage for emergency responders who must locate victims quickly in wilderness or large urban areas. Site details help search and rescue teams make better decisions, saving lives and protecting property.

Water Quality

Small UAS are used to monitor shorelines, swimming beaches, and farm ponds for algae that may be harmful to humans and livestock. Routine checks enable rapid response to changing environmental conditions.

The following FAA restrictions were in place at the time of publication. For the latest rules regarding the operation of unmanned aircraft systems, visit the FAA at www.faa.gov/uas.

Guidelines for use of small UAS in Federal airspace

	Hobbyist UAS Flights	Commercial Part 107 UAS Flights
Pilot requirements	None	Must have Remote Pilot in Command (RPIC) certificate Must be age 16 or older Must be vetted by the Transportation Safety Administration (TSA)
Aircraft requirements	Must weigh less than 55 lbs	Must weigh less than 55 lbs Must be registered Must undergo pre-flight check to ensure UAS is in an airworthy condition
Location requirements	5 miles from airports unless air traffic authorization is obtained	Class G Airspace
Operating rules	Must yield right-of-way to manned aircraft Must fly less than 400 above the ground Must keep aircraft in visual line of sight Must follow local laws	Must yield right-of-way to manned aircraft Must fly under 400 feet Must fly during the day Must fly at or below 100 mph Must not fly over people Must not fly from a moving vehicle
Example applications	Recreational flying with no compensation	Aerial survey Cinematography Flight incidental to a business Roof inspections Real estate purposes
Legal reference	Public Law 112-95, Section 336 – Special Rule for Model Aircraft	Title 14 of the Code of Federal Regulations (14 CFR) Part 107

14 CFR Part 107

This regulation requires commercial UAS operators to obtain a remote pilot in command (RPIC) certificate. Pilots holding a part 61 license must complete the FAA online training course: Part 107 small Unmanned Aircraft Systems (sUAS). Individuals who are not licensed pilots must pass the written exam at an FAA-approved testing facility. Kansas State University Polytechnic, Salina, Kansas, is one of the few testing sites in the state. The school offers a Part 107, sUAS Commercial Pilot Training course to prepare professionals for the exam. Learn about pilot certification and testing opportunities on the school's website.

Section 333 Exemption

A Section 333 exemption allows a sUAS operator with an FAA airworthiness certificate and COA to fly in approved airspace. The exemption is required for commercial use. Other operators may be granted an exemption for commercial use. To apply, visit the FAA Section 333 web page. If you previously obtained a Section 333 exemption from the FAA, it is valid through the expiration date on the document.

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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

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