

The Age of Drones

By the end of this decade there may be as many as 30,000 drones flying above the U.S., according to the Federal Aviation Administration. The vast majority will be used for law enforcement, but many will also be deployed for agriculture, environmental management, industrial/inspection, meteorology, public safety/first responder, real estate, surveying, television and movies, and urban planning and design uses.

What exactly is a drone? A drone (also called an Unmanned Aerial Vehicle or UAV) is a powered, aerial vehicle without a human operator that uses aerodynamic forces to provide vehicle lift. It can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload.

The military has used drones for decades, but current advances in technology—including 3-D printing—have made them smaller, easier to operate, and more economical. Very small, autonomous, agile aerial robots, or nanocopters, may be only a few inches in diameter but can carry out extremely complex maneuvers without being piloted.

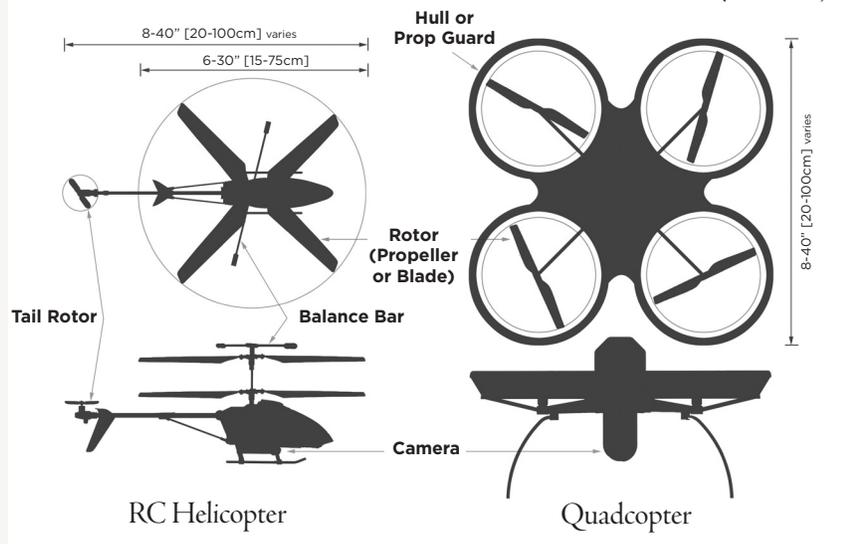
Uses

Numerous cities throughout the U.S. are using or considering drones for law enforcement. One of the first was Arlington, Texas, which used a small UAV to monitor the Super Bowl in 2011. The media focus on drones has centered on military and police uses, but there are many other applications. Drones equipped with cameras and GPS are ideal tools for planning, too. They are currently used to:

- ▶ analyze sites
- ▶ analyze views and viewsheds
- ▶ assess agriculture and open space (including infrared)
- ▶ evaluate postdisaster sites
- ▶ monitor construction and buildings
- ▶ record live events
- ▶ study inaccessible, sensitive, or dangerous environments
- ▶ study operating transportation systems
- ▶ video large-scale development

Drones have several advantages over light aircraft and satellite reconnaissance. The low-level, oblique orientation allows

Drones: Two common unmanned aerial vehicles (UAVs)



The Aeryon Scout, a quadcopter with camera.

more detailed and understandable evaluation; the relatively low cost allows more immediate and frequent use; and drones may be mounted with high-definition video cameras to record activities and interactions.

Controversy

Privacy is the most controversial issue surrounding drone use. Safety concerns include the potential for armed drones, collisions, and other hazards associated with full-scale aircraft. Drone technology has outstripped many current laws regulating these issues, and public agencies are trying to catch up. In February, Charlottesville, Virginia, became the first city to adopt anti-drone legislation, and many states and cities are considering laws to regulate or ban drones.

Large-scale drones are regulated by the FAA, which has authorized unmanned aircraft systems for about 100 organiza-

tions, including universities and an Indian tribe. Drones flying below 400 feet and used for noncommercial purposes do not require FAA permits. Refinements to FAA guidelines will be released in 2015.

Availability

High-quality reconnaissance drones such as the DJI Phantom are now available for less than \$1,200. This remote-controlled quadcopter (four rotors) includes GPS technology and the popular GoPro camera. The drone can be programmed to fly in an autopilot mode and will automatically return and safely land where it was launched. Even more affordable drones include the AR.Drone 2.0 quadcopter, which retails for about \$300. Miniature remote-controlled helicopters with cameras are available for less than \$75, but the size and quality of these microhelicopters make them unsuitable for outdoor reconnaissance. Because almost all new drones have gyroscopes, they are stable and easy to fly.

Planners typically see a static, orthographic map or plan, whereas drone photo and videography offers a multidimensional perspective that can illuminate a sense of place and guide placemaking.

Ric Stephens

Ric Stephens is a planning consultant, university instructor, and planning commissioner in Beaverton, Oregon. He has more than 30 years' experience in aerial photography and is now using small drones for site reconnaissance in the U.S. and China.