A 3DR Solo Quadcopter captures images. Its maximum payload is about 1 pound.

(Photo courtesy U.S. Geological Survey)

FACTORS TO CONSIDER BEFORE INVESTING IN DRONES

Ramesh Sivanpillai

Unmanned Aerial Vehicles (UAVs) – or drones – use has soared because birds-eye photos and videos provide unique perspectives of landscapes, wildlife, and events.

Acquiring a drone is easy. Flying them is not as simple as unwrapping the box, charging and installing batteries, and launching and flying it with a hand-held controller. Much preparation and work is required prior to, during, and after flying these drones, including following rules and regulations.

Do Homework

Learn about the different types (single- and multi-rotor, fixed-wing, and hybrids), payload, battery life, and the details of the on-board camera, and data storage capability, among other things, before buying a drone. Invest time to become familiar with the available options to purchase a drone that best matches your needs. Batteries on many drones limit flying time, so purchase additional batteries to swap during a mission. Consult experts and those who have invested in this technology to obtain as much information as possible prior to buying.

However, as with any technology, newer models with enhanced functionality and additional safety features are introduced periodically. Keep an eye out for the newer models and when they will be available.

Comply

Operators have to be cognizant of privacy rules in the state or county in which they are flying their drones. Once in the air, it can be easy to

Jeff Sloan of the U.S. Geological Survey prepares a fixed-wing drone for flight.

(Photo courtesy U.S. Geological Survey)

collect images and videos of locations owned by others or at private events. Violating privacy laws could result in heavy penalties.

Drone operators, except for very few instances, must comply with several rules and regulations. The drone operator or remote pilot has to meet specific criteria and obtain appropriate certification from the Federal Aviation Administration (FAA) to qualify to operate these aircraft.

The operator or their employer has the responsibility to comply with all the federal, state, and local requirements to avoid stiff penalties and other consequences.

Rules and regulations vary based on the nature of the operation (hobby versus data collection), type of drone, and the location imaged (private versus public land). There are also limits in terms of height and distances from airports. State and local governments may have additional guidelines for operating drones in areas under their jurisdiction.

Consult FAA and pertinent state guidelines to obtain the latest versions since these rules and guidelines are regularly modified and updated.

Operators must register their drones with the FAA to fly in U.S. airspace. Operators receive an identification number for their drone(s) after completing the registration process in the "FAA Drone Zone" (see Drone Information Zone page 10). Unmanned aircraft operators can determine whether there are any restrictions or requirements in effect at the location where they want to fly through the free FAA mobile app B4UFLY available at Google Play or the App Store. The website is included under the Drone Information Zone section.

Train

Flying the drones safely requires a lot – really, a lot – of practice. Fewer knobs and buttons on the hand-held controller might lead one to believe flying a drone is relatively easy. However, several small factors can complicate an otherwise straightforward flight mission. For example, a minor physical defect such as a small crack in one of the rotor blades can cause unexpected variances in flight during a mission. While the drone is in the air, sudden changes in wind speed and direction can cause unexpected shifts in its flight pattern. All evenutalities cannot be prepared for but more practice will certainly help an operator deal with most emergency situations.

Safety

Safety is of paramount importance (safety of the drones, people, animals, and structures). Operators have to follow all the FAA, state and local agency, and manufacturer rules and guidelines to maintain safety levels. These procedures describe pre- and post-flight safety checks, maintaining safe distances during take-offs and landings, presence of spectators at the launch site, emergency handling procedures, airport operations, and much more. Operators are required to maintain logbooks of each flight and record all major and minor incidents encountered in each mission.

Manufacturer instructions and safety protocols will provide instructions on standard operating conditions (wind and temperature ranges, for example) and frequency for replacing components such as batteries.

(Photo courtesy Sam Cox, Bureau of Land Management)

The Bureau of Land Management uses a drone to survey an area.

(Photo courtesy Jeff Sloan, USGS)

The Vapor 55 weighs in at a hefty 55 pounds and can cruise for about an hour.

Having one or more complete first-aid kits is an absolute necessity since injuries such as cuts and nicks are common while operating a drone, especially one with rotors.

Catalog

The sheer volume of images and videos collected in each mission can be quite large. Data volume can be overwhelming when collected over a few days and weeks. Making a data storage plan and investing in devices such as external hard drives to maximize the utility of the images and videos is prudent.

Efficient cataloging and retrieving data for future use will save considerable amounts of time.

Drones provide numerous opportunities for monitoring crop and range lands, wilderness areas, wildlife, especially those found in areas that are not easily accessible. Become a qualified operator with hours of practice and comply with the legal guidelines to get the most out of this technology.

Drone Information Zone

- FAA's Unmanned Aircraft Systems main page – https://www.faa.gov/uas
- FAA Drone Zone – https://faadronezone.faa.gov
- FAA No Drone Zone – http://bit.ly/dontflyhere
- FAA's B4UFLY App – https://www.faa.gov/uas/where_to_fly/b4ufly
- US Geological Survey (USGS), UAS Project Office – https://uas.usgs.gov
- USGS – UAS "In the News" – https://uas.usgs.gov/inthenews.shtml. Contains several videos on drone applications

Scholar Farms (online courses)

- http://www.dronescholars.com/home-page. Founder and CEO Greg Crutsinger has posted numerous videos on UAV technology and applications.

AmericaView tutorials

- http://bit.ly/dronetutorials
  Videos on interpreting aeronautical charts, pre-flight preparations, creating flight plans, and post-processing drone data.

Ramesh Sivanpillai *is a research scientist specializing in remote sensing and is based in the Wyoming Geographic Information Science Center at the University of Wyoming. He can be reached at (307) 766-2721 or sivan@uwyo.edu.*