

The sky's the limit for drone technology

Paudie Barry writes about the different types of unmanned aerial vehicles and their many potential applications, from corridor mapping to search and rescue missions

Unmanned aerial vehicles, otherwise known as drones, have been put to extensive use for military purposes over the last 10 years. Now this technology has filtered down into civilian use, as drones can be used for aerial mapping to great effect. In this article, readers are given an introduction to a variety of drone types, their applications and the accuracy of data that can be derived from drone aerial photography.

TYPES OF DRONE

There are a multitude of mapping and inspection drones, weighing in at under 20kgs, on the market, but they can essentially be categorised as two main types: fixed-wing drones and rotary-wing drones. A fixed-wing drone needs a large area for take off and landing, but is far more efficient at flying. As a result, it can survey far greater areas and is much more suitable for surveying areas of over three acres.



Survey copter with laser scanner

The rotary wing, or multicopter, drone needs a minimum of 3m² for a safe take-off and landing and is far more suitable for working in confined or urban areas. It is very suitable for surveying intricately detailed sites up to 10 acres. It is also capable of carrying out aerial structural inspections and low-altitude oblique photography, as the operator can control the camera's field of view.

Both fixed-wing drone and rotary-wing drone are capable of producing very accurate planimetric and height data, all within 5cm, throughout a five-acre site. The orthophotography that is produced can be geo-referenced to ITM or ING75, with a pixel size of only 1.5cm.

APPLICATIONS

This means that drone aerial photogrammetry is as accurate as land surveying, but the data, because it is photographic, is far richer. It is also more complete and is much cheaper to produce than traditional aerial or ground surveying. Drone aerial photogrammetry is extremely useful for land registration, boundary issues and topographical surveying. It is ideal for road, roof or structural condition surveys; volumetric analysis; or planning enforcement issues.



Transparent, Land Registry-filed plans overlaid onto drone aerial photogrammetry

Drone aerial photogrammetry can also be used for corridor mapping, coastal erosion mapping, construction spatial management and environmental monitoring – and that is only with a pocket-grade camera.

The list of capabilities expands dramatically when one adds an infrared or near-infrared sensor. With the use of thermal imaging cameras, drones can detect and pinpoint heat loss through roofs, as well as vegetative diseases and malnutrition in trees and crops.

Other applications include the identification of archaeological sites, shallow graves, pollution plumes in rivers and streams, and structural defects in bridges. Drone aerial photogrammetry also has the potential to play an important role in helping to locate missing people as part of search and rescue missions – and all at a fraction of the cost of the current price for such services.

Further information can be found [here](#), which is a video of an Engineers Ireland CPD lecture delivered in January 2013.



Starting out his career in 1989 with a degree in civil engineering, Baseline Surveys Ltd managing director Paudie Barry worked as an engineering surveyor on two thrust-bore tunnelling contracts on the London Water Ring Main project. He returned to Ireland in 1990 to set up Baseline Surveys Ltd at the age of 22.

As an ESRI silver partner, Baseline currently offers a drone aerial photogrammetry GIS data-capture service. Barry has been invited into University College Cork's GIS Department as a guest lecturer on the subject of drone-mapping technology to their Remote Sensing MA students. Baseline Surveys claims to produce the world's most accurate aerial photogrammetry, with a

maximum RMSE of only 5cm over a five-acre study area. Barry is a committee member of Unmanned Vehicle Systems International.