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UNMANNED AERIAL VEHICLES IN LAND SURVEYING

Unmanned aerial vehicles (UAVs) or drones have now become an essential component of surveying as they can capture accurate and instant aerial photographs. Sophisticated drones possess high-resolution cameras and laser scanners that allow them to create three-dimensional models of landscapes, scan extensive areas and monitor buildings and structures. Among the main advantages of drone technology in geodesy is that they can reach remote, hard-to-reach areas, such as mountain or forest areas, where traditional measurement methods are limited. Drones avoid endangering employees as they never have to be in perilous or out-of-reach locations.

Using UAVs in surveying enhances the capabilities of surveyors and simplifies their activities. They are used for:

1. Aerial Photogrammetry and Mapping. Equipped with high-resolution cameras and LiDAR sensors, UAVs can capture high-resolution images that are processed into orthophotos, 3D terrain models, and digital elevation models. Compared to traditional ground surveys, UAV-based photogrammetry saves significant time and cost of data acquisition with high accuracy.

2. Monitoring Land and Infrastructure. Drones are widely used for infrastructure object and road network monitoring as well as monitoring construction. They provide frequent and accurate reports about land development, allowing engineers and urban planners to make decisions.

3. Land Management and Precision Agriculture. Multispectral and thermal sensors aid in the monitoring of soil health, vegetation density, and water distribution.

Environment specialists and farmers utilize this to optimize land usage and increase yield.

4. Environmental Monitoring and Disaster Assessment. UAVs help in damage estimation following a calamity by swiftly surveying and providing accurate geospatial data.

A UAV for geodetic surveying should have a number of characteristics:

- a powerful battery that will allow the UAV to stay in the air for a long time without the need to recharge;
- a camera with good resolution and good signal transmission power, as the drone must climb to a given height and remain controllable;
- the ability to perform thermal imaging of an object is an extremely handy feature, especially useful when checking roofs or industrial buildings;
- introduction of laser scanners that can detect objects hidden by dense vegetation.

Compared to traditional geodetic surveys, surveys carried out based on UAVs have many advantages, including efficiency, cost-effectiveness, safety, high-resolution information. Day by day, the use of UAVs in geodesy will increase even more, helping even more with land surveying and environmental monitoring.

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