

Survey and GIS Drone Uses

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GEOG 270 – Introduction to Small Unmanned Aircraft Systems

Drones have been making an appearance more and more and new technology is getting more advanced. Many careers rely on drone technology to carry out their daily work. One such use is for surveying and GIS purposes. This paper will talk about different methods, technology, and advantages of drones for use with surveying and GIS.

Before construction begins a lot of work has to be done. Surveying is one of the processes they need to do before the planning phase. By hand, this can take quite a chunk of time and resources, which can be costly to the client or company. One advantage of drone technology for survey use is the decreased time and cost. Since large sites can take several days or weeks to gather and compile survey information using traditional methods, drone technology makes this much faster reducing the time, labor, and cost of a project. Most drones can fly for around 30-90 minutes and can cover a lot of ground in that time compared to a pedestrian. With drones, you typically do not have many disruptions, as you do not need to close down roads or service areas since the drone will be flying above which is a benefit as this requires fewer resources and disturbance. Sometimes there are difficult terrains to survey, and they can be hazardous. Drones allow you to avoid risky terrain and survey areas that are hard or impossible to traverse. They can also get different angles and vantage points that we cannot normally get. Drones also gather accurate information and can help reduce human error.

Drones can do many things with surveying. They can take aerial photographs which can be used for planning or master plans. These can also be used to analyze the environmental conditions. They can detect topography which can give slope measurements as well as they can monitor the earth's movement which can prevent costly landslides. They can also calculate volumes of material; this could be used in instances where you need to know how much ore/rock you have in a mine/quarry or it could help you figure out how much cut/fill you need. They can

also create detailed 3D models on land which can aid in the map creation process. They can also be used to map and plan for utilities/roads. Another service drones provide is simply taking photographs, as some clients and stakeholders need photographs of progress or confirmation of progress.

Drones collect survey data in a variety of ways. One way that drones collect data is by flying over an area of land taking hundreds or thousands of pictures along the way. Then, using computer software the images are stitched together to create a site model. This is a way of using photogrammetry to create a 3D model of the site. Drones can only be as accurate as the equipment involved. If your drone is equipped with a high-quality camera that has high resolution and focal length, then your data should be more accurate. A lower quality camera will result in lower accuracy but can still produce sufficient results in most cases. In all cases there is relative and absolute accuracy. Relative accuracy is not the most accurate data but is helpful with analysis and small projects. This type of accuracy deals with object positioning in association with another object. Absolute accuracy is the most accurate data and refers to an exact position of an object such as its coordinates. This allows for more advanced analysis as the data is truly accurate and can be measured correctly.

Drones are also very useful for geographic information systems (GIS) applications. So far, safety regulations and privacy are among the biggest concerns for commercial use in these areas, which is one of the big limiting factors of drone use. Some of the biggest uses of drones in GIS are in agriculture, emergency services, conservation, geospatial services, and atmospheric science. Precision agriculture has been increasing in use in recent years, farmers are looking at ways to increase yields, decrease costs, and increase profits. Drone technology allows farmers to monitor their fields and locate diseased areas or problems before they spread and become

expensive. They can track down diseased plants or figure out where they need to apply chemicals to prevent their crops from dying. Drones do not get tired, do not have sick days, and are always available. This makes them great for disaster relief operations. Although these operations are still a work in progress and need further development, this will become better with time. Geospatial technology is a common use for drones, and they can be made autonomous to carry out functions daily. Drones can also monitor the weather as well as observe the Earth's surface.

There are many different drones out there for commercial use and it can be hard to choose what drone you want to use. Ultimately the type of drone you need depends on what size of areas you are dealing with and what you need to drone to do. There are plenty of drones that can take aerial photographs and just photograph the site in general. When picking one out for this, the main consideration is the camera. The DJI Mavic or Phantom drones are decent drones for basic survey data, and they are very portable and fit inside a backpack with ease. The Yuneec H520 RTK is a great drone for mapping. This drone has a built-in RTK module, thermal camera, and high-speed camera. A good drone for aerial mapping is the senseFly eBee X, which is a fixed-wing drone.

Drones are a technology that is increasing in popularity and will continue as the demand for new technology increases. Drone technology is getting better and more reliable every day and it can be especially helpful in GIS and survey applications. They can be used for agriculture, planning, measurements, photography, and many more uses. Whether they are used to reduce costs, time, or just complete tasks that are too difficult for most people they will continue to be a useful tool in the industry.

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