

Exploration Using Drones

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Introduction

Over the last several years, drones have become very popular and have been used for many applications. From construction planning to sports recording, drones can pretty much do it all. One particular use that is helpful with drones is exploration. Utilizing unmanned aircraft systems makes it easier to explore places that may not be easily accessible to reach on foot. Drones also offer safer exploration by not putting people at risk in any sort of unfavorable conditions. For example, some mining companies will use drones to explore caves and other hard-to-reach places to map and figure out the layout from the mine shaft.

Location Mapping

Drones have many capabilities to be precise and have accurate location sensing. By using Global Positioning System satellites or other various sensors, the user, as well as the drone, can receive a proper location on where the drone is at a given time. This is especially important so that if the user loses sight and track of the drone, the user can figure out where it went by tracking it on the map. This is also useful for mapping certain areas. As mentioned previously, mining companies can map out a complicated mine, or a geologist can map out and do research on difficult terrains such as mountains or deep canyons.

Technology

The technology of some of these unmanned aircraft is very impressive. A lot of drones now can take live photos and show a live video feed of what the drone is looking at during the entire flight. This is important so that the user can take pictures of locations and be very specific. Some drones use a different type of system to take data of an area called LIDAR, which stands for Light Detection and Ranging. The LIDAR system uses various sensors and scanners to

determine how far away, the surrounding area is to the drone. This is the main use of drones that map out caves and mines due to the fact they cannot get position sensing from GPS satellites.

Erik Olsen, a journalist, and drone pilot explains that “The robot uses a series of onboard sensors and cameras that rapidly scan an area, gathering 300,000 data points per second, and mapping as it goes along” (Olsen, 2018). This can get the precise mapping of mines.

Some drones are even capable of using both LIDAR sensors as well as high-quality cameras. The combination of these two forms of technology makes these unmanned aircraft a new thing of the future. By utilizing both systems these aircraft can film autonomously without input from the user. If the LIDAR sensors get too close to an object, it will automatically fly the drone away from the obstacle. By exploring new areas, if there are obstacles such as trees or other obstacles that the user might not be able to see, the drone can sense and avoid without crashing. Technology is by far one of the biggest advancements of drones today.

Safety

A cool feature that you get when flying drones is safety from dangerous or scary environments. By staying away from the edges of danger, you can be a mile away and still explore and take a picture of a location. Some examples would include mines, volcanoes, cliff sides, natural disaster sites, and many more. By utilizing drones to get closer to these locations and to not put yourself in danger, still allows you to explore. Another thing that drones help with safety is by allowing people with disabilities to get closer to the edge without putting themselves at risk. “They can fly lower and in more directions, allowing them to easily navigate traditionally hard-to-access areas,” says Ohio University (2021). For someone in a wheelchair, it would not be very easy to make it to the top of a mountain along a trail, or by hiking along a creek to see a

waterfall. Using a drone allows the individual to experience and see some locations safely by staying a certain distance away.

Ease of Use

Drones can be very technical or difficult to fly, but some of them are very easy to fly and will even fly by themselves. Fixed-wing drones could be more difficult due to always the drone always needing to be moving to produce a lift. Other drones like quadcopters and hexacopters do not need to necessarily be moving in any direction at all times. Many of them will hover and be able to maintain the same position over an extended period utilizing GPS satellites. This is a useful feature for those who are trying to focus on a particular location and do not want to be moving at all times. Another major benefit to having a rotary-wing type drone is how they take off and land. As long as there is a flat surface to place the drone on, you will be able to take off and land at that location. For fixed-wing aircraft, you will need to make sure there is enough room to fly and take off as well as land.

For the consumer side of exploration, some drones are small enough to fit into the palm of your hand. This can make it easy to just throw into a backpack or purse and be able to take it out and explore wherever you may be. Even some commercial drones can be taken apart and minimized in size so that it is not taking up a lot of space if there is a lot of equipment that the company may have. The smaller the drone is though, the tighter spaces you can explore and go into.

Conclusion

In conclusion, there are many different ways that drones have helped with exploration. With further advancements of technology, safety improvements, as well as how easy drones can be, exploration of new areas is easier to achieve. As technology continues to be developed the

use of drones for exploration will grow even larger. From consumers to commercial drones, exploring new places around the world can be achieved by almost anyone. All with the help of unmanned aircraft systems.

References

Drones for the Geosciences: A New Eye in the Sky. New Mexico Earth Matters. (n.d.). Retrieved, from https://geoinfo.nmt.edu/publications/periodicals/earthmatters/18/n1/em_v18_n1.pdf.

Ohio University. (2021, May 11). *7 Pros & Cons of drones and Unmanned Aerial Vehicles*. Ohio University. Retrieved, from <https://onlinemasters.ohio.edu/blog/the-pros-and-cons-of-unmanned-aerial-vehicles-uavs/>.

Olsen, E. (2018, June 4). *This new drone can fly to and map places too dangerous for people*. Quartz. Retrieved from <https://qz.com/1296361/this-flying-robot-can-explore-places-where-it-is-too-dangerous-for-humans-to-go/>.