

3D Mapping with Drones

Drones have become an essential part of everyday life and work; their uses are being expanded every day by people who create solutions to reoccurring problems using drones. Today drone usage is one of the most versatile instruments available to a company since their potential can be almost anything you dream it to be. We can take for example Amazon who has been pushing the idea of a drone delivering packages to homes for a couple of years now, security and search and rescue all the way to photography. With photography to me comes one of the most practical uses for drones which is mapping, whether it is photography for Google Street View or 3D imaging. In this paper I am going to talk about the uses for 3D imaging and Mapping with drones as well as some recommendations I think can be made to increase their usage in everyday work environments.

3D mapping is still a very new subject and has only become more popular in recent years since the arrival of the technology. Since it has become more accessible to the everyday person everyone has found ways to use it in their line of work. 3D mapping is used in many video games to provide a realistic experience as well as speed up time frames to make designing the game easier. In the real world, it is used for engineering and architecture to make designing and building a structure safer and more efficient. In the Midwest, we see drones used a lot in land surveying and insurance for farmers. After some strong winds the damage to a cornfield might not be seen from the edge of the property but once you are above it you can get a better picture of the profit loss they would have had if not for the drone.

The reason drones are so effective in work environments is due to their low cost easy to use aspects. A drone capable of 3d mapping can cost around two thousand dollars and software

for it can be around one hundred dollars a month. Besides the monthly cost and a registration fee every 3 years the cost of running a drone is the cost to charge it which in the long run if it is being used often is more than worth the price tag. The reason drones are so popular for this aspect is due to their similar capability to hover like helicopters, it allows the user to be positioned wherever they please and get a good look at whatever they are trying to map out or video. Before drones all aerial photography was done by aircraft or rotorcraft which was more expensive as well as more regulated by the FAA, now the FAA recognizes drones as a part of their watch and guarantees safety and accountability to those who use them by adding licensing and airspace restrictions to maintain separation from other aircraft.

3D mapping is the act of making a virtual model from measurements in photographs. Imagine taking every frame of a video and measuring your desired object from every possible angle to create a scale copy of it. Though this technology does provide some limitations such as not perfect quality and distortion, it can be adjusted to near perfection, and it is still very new, so the technology is improving every day. This process can also be time-consuming if the details are necessary because the software must calculate a lot of information and store it to create this image. Aside from using it to map out structures or landscapes it has some very promising potential in forestry, search, and rescue operations as well as hazard prevention. Capabilities such as night vision and infrared provide a very similar aspect to 3d mapping in their ability to show what might not be visible to the naked eye by creating a virtual image from the camera's perspective.

Where 3D mapping creates an accessible image that can be placed into CAD software to be closely examined and get precise larger measurements and big picture ideas, infrared will show that to you in real-time without the accessibility to view it on its own. If we take for

example a forest fire, a drone with an infrared camera can show where the heat is traveling, if it is traveling along the ground, or if there is anyone trapped amongst the blaze. For night vision it can be used in the same way where if a fire department cannot access a certain area of a building, they can send in a night vision camera to assess the area to determine if they need to provide resources or assistance there.

In a work-related sense, construction companies, land surveyors, and engineering companies all claim to save up to 60% using PIX4D software over conventional surveying techniques and with it being precise enough to measure within 3 centimeters there is almost no need for double-checking saving employees from exhausting manual labor and providing the other crews more time to meet their deadlines with the land surveying getting done almost 5 times faster than normal. If it were necessary to map out an area that might be difficult to survey or considered less than safe to have employees on such as cliffsides and other steep or dangerous terrains, there is no reason not to survey with a drone especially since you can hire companies that do it professionally at a great price and will have it done 5 times faster than if it were to be manually surveyed.

In conclusion, the use of drones has been skyrocketing in recent years since people found out how useful they could be to everyday work activities and how much faster, easier, and better work they can do with such a small investment and a little training. The possibilities for drone mapping are endless in their capabilities and what mapping can change perspective-wise for work sites. In just a couple of months, an individual can get their drone license and increase their work capability to reach new clients and new opportunities. Doing jobs, they would have never considered because of difficulty is just any other day. Whether it is a simple task or not, big, or small, 3D mapping is the future of blue-collar work and eventually there will be a 3D mapping

opportunity in every career, interior design, aircraft maintenance, engineering, architecture, demolition, first responders, and many more.

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