

Use of Drone Technology in Infrastructure Projects

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Abstract - Construction industry is one of the oldest industry in world. Now a days many modern methods integrated with conventional methods are used on filed. Most of challenging part of project are monitoring activities, Safety of labours, Quality and Cost control, which are very difficult to control and handle. This paper contributes to an understanding of use of drone for controlling different construction activities. It is very effective tool for monitoring project, improve communication, increase quality and safety of project. Using this technology we can monitor project from anywhere in the world. Drone can use in building construction, Infrastructure project and Surveying work. Drone systems are now using thermal imaging and sensor technology to deliver quantifiable data about materials, processes and personnel on site.

Key Words: Drone in Infrastructure, Advance construction method, Monitoring of project, Use of drone.

1. INTRODUCTION

People are constructing and developing the things from long time. Construction will be around for many years, but the methods of design, Planning and Execution will change. All the things are modernized and developed. As every year new technology is entering in constructions industry things are moving so faster than earlier.

That's why to match the speed of work we need to modernize our monitoring and controlling methods. Here drone are started to make big impact. Drone doesn't help in actual construction but it help in important part of project that is growth.

2. WHAT IS DRONE TECHNOLOGY?

An unmanned aerial vehicle (UAV), commonly known as a drone, is an aircraft without a human pilot aboard. UAVs are a component of an unmanned aircraft system (UAS); which include a UAV, a ground-based controller, and a system of communications between the two. The flight of UAVs may operate with various degrees of autonomy: either under remote control by a human operator or autonomously by onboard computers.

2.1 Components of Drone

1. Body.
2. Power Supply platform.
3. Sensors.
4. Softwares

2.2 Classifications of Drone

1. Reconnaissance – providing battlefield intelligence
2. Combat – providing attack capability for high-risk missions. (see: Unmanned combat aerial vehicle (UCAV))
3. Logistics – delivering cargo
4. Research and development – improve UAV technologies.
5. Civil and commercial UAV.

By a report by PwC Infrastructure mostly in railways, Mining, Oil and gas the value of drone powered solutions is \$45.2 billion.

3. USE OF DRONE IN DIFFERENT ACTIVITIES

Infrastructure projects are one of the most challenging Projects as they required consistent control on daily activities, Cost, Resources. This project work should stick to their timeline in order to complete project before deadline. In this daily work, drones can play an important role. Use of drone technology in projects are as follows,

3.1 Survey

Site survey is one of the critical task. This requires heavy machines, Costly survey tool and Resources. Survey is one of the costly work for infrastructure projects. Taking aerial photography using helicopter will very costly. So we can use drone instead of it. It is much cheaper than all things. Drone will give us live images of site from which we can get idea about current situation of site without going anywhere. Drone survey is a time saving technology which ultimately saves cost as well.

Some advantages of use of drone in survey are as follows,

1. Faster data collection- We can collect data for land much faster than old methods.

2. Access to Unreachable area. We can access the are we can't reach easily or very difficult to go there and collect data
3. High quality of data- Areal view give us high resolution of data which we can insert in software for 3D modeling.
4. Reduces risk – Reduces risk related to safety and accident may be due to sloppy surfaces.

3.2 Inspection of work

Some infrastructure project are very difficult to inspect like Bridges, Highways and Dams, Railways etc. Also inspecting this daily need lots of time. Here drone can help to inspect site and give you access to any area you want. Inspection work is some time very difficult in sense of location or safety, but drone reduces this risk as you can control it from anywhere and get real time images of work. This is beneficial for health as you can reduce lots of physical work.

Sometimes peoples are not on site but they want to see activities going on but telling to employees can take lots of time. Drone can provide you live video to inspect work. In short it saves climbing, harness and most importantly time.

3.3 Documentation

Everyone knows documentation is very important in infrastructure projects. We have to maintain the work progress documents to show our client regularly. Even this documentation is important to clear bills. Taking real time video and images is one of the best way to do it. Drone can capture some images of regular work and we can show them to our client. When they saw it, they will get the clear idea of work progress. This is one of the effective way of work presentation.

3.4 Identifying off track activity

In infrastructure projects numbers of activities are going on, like concreting, material transportation, fabrication, Installation work, RMC plant etc. Sometimes any of them can go off tack like some columns alignment are not as per actual drawings etc. By regular inspection we can found it but, going at every place is not possible some time. By using drone we can observe all the work progress by sitting at one place and stop the off track activity before it's too late.

It is always better to rectify errors in work before time, so we can solve them and run project on time. This will also help in growth of organizations as this will save our time and cost of rework. Also it can be new way of mitigate technical risks.

3.5 Making decisions

Drone can provide real time, actionable and in-depth data for taking any future decisions. This is one of the reason for growth of drone in market. This data can use for 3-D modeling and to create plans. Also any objectionable thing noticed on site can help to update our plan.

Using all data client can decide any change he needed or need if yes then we can do it before most of work gone complete.

3.6 To show progress to client.

Clients are those who fund projects. It is important to show them regular progress to get finance. Client's need regular progress report may be daily, weekly or monthly to get idea of work. Sometimes clients are not able to visit sites then we can use drone to film the site regularly and show them actual progress. Showing film of work also avoid interfere of client in work.

3.7 Monitoring of work

Experienced and well known contractors are not able to stay on site throughout the project. They are dependent on supervisor or engineers for daily update of work. Now they are using drones for get real time work progress.

A drone operator can provide contractors clear aspects of site. This will help them to know what is done and what is still pending, also help to take decisions what else changes are required.

Contractors or architects working on large scale uses UAV to monitor their regular work. By this way they can handle many sites. And makes sure work is running.

3.8 Marketing.

Huge finance is required to run infrastructure projects. For that you need to convince the clients. Taking video and images from drone with different angels is one of the great idea.

To show clients how your imaginations is transferring on ground is very effective way to assure them.

In some projects we can use them to give information about our project to local peoples. It is much better way to show your project to anyone.

3.9 Labour safety and tracking.

During construction work environment must be safe and productivity of Labour must be high. To ensure that you can't assign extra men force of supervisor and engineers who will continuously monitor them. But you need to ensure that are they really working hard or not?

Drone can keep eye on the labours and make sure that they are doing their work or not. We can conduct surveillance on specific person or group of workers to track their activities. You always need to take preventive measures to ensure work is going on right way and safely.

3.10 Operation and Maintenance

Drone technology gives ease to collect data from inaccessible area like bottom of bridge, Top of building, Busy Highway etc., without additional safety risks to personnel.

This help us to find any errors during operation and maintenance period and maintain records for the same.

Drone can easily detect defects from structure by providing high quality data which we can attach to our progress report.

Some places are very difficult to reach, sometime it become very risky during maintenance period there we can use drone to avoid risk.

4. LIMITATIONS

As every things have their own advantage and limitations. Drone technology have their own as follows.

1. High initial cost.
2. Proper system required to maintain.
3. Skill persons required to run.
4. Limited range of access.

5. PRACTICAL USE OF DRONE

A. Andhra Pradesh Real Estate Regulatory Authority (APRERA) and CIDC.

CIDC and APRERA recently signed an MOU for real time monitoring of 2,950 construction projects across Andhra Pradesh. Average three persons are deployed to ensure effective application of technology, resulting in the employment of 8,850 drone operators in the state. Extrapolating these numbers for Pan-India, translates into a demand for 1,68,000 drone operators for monitoring alone.

B. National Highway Authority of India (NHAI)

NHAI has been leveraging to use drone technologies to build 14,799 km of roads. Drone technology is using for highway inspection, monitoring, aerial mapping and other project progress aspects.

C. Namami Ganaga Program

Drones can be used for site surveys, monitoring, and mapping. Sample water can be taken from distant locations for random quick checks.

D. Get Survey 6x faster

All American Surveying (AAS) is a full-service survey firm run by Jake and JT Thompson. This team contracted for 90 acres survey project. This will take time around 18 to 20 days for survey and process data. But client need this within very short time. But with site scan using drone they are able to do this task in 3 days. That is about 6x faster than regular method.

6. CONCLUSIONS

As we know construction industry is one of the fast growing industry. Also this industry contribute major part in economy of any nation. Day by day many technologies are updating the way of construction work. Drone technology is one of them. From this study we can conclude that,

- We can use drone in pre-construction, during construction and post construction work.
- Drone technology is one of the fastest growing technology in construction industry.
- Drone technology is one of the fastest method and cost saving method for any work.
- This will give new shape to conventional methods of reporting and documentation.
- Drone will make monitoring and control process easy and effective.
- Also this will help to mitigate safety related risk.
- Use of drone technology in planning and daily inspection will reduce risk of delay of project.
- It is very useful in 3D modeling work.

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