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Application of Drone Technology for Site Surveying and Monitoring Progress in Construction

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Abstract -Drone technology has evaded various sectors, among which Construction is an important one. The communication between stakeholders can be improved using Drone technology. Furthermore, the use of drone technology will help them to accomplish the project on time and within budget. One of the monitoring jobs in construction projects is conducting monthly surveys to monitor the work done on the site. However, monitoring progress common for large-scale construction sites is arduous and time-consuming. The manual method for monitoring a project is by taking pictures at the construction site using ordinary digital cameras that lack in ability to capture the overall condition, especially for building structures that are too high or construction sites that are enormous. This study used UAV technology to help control and monitor the progress of monthly construction work at a construction site through visual image recording of the entire construction site.

***Key Words*:** Drone Technology, Construction Projects, Building Structures,

1. INTRODUCTION

The drone is also known as Unmanned Aerial Vehicles (UAVs) or Remotely Piloted Aerial Systems (RPAS). A drone is a recognizable aircraft that has a compact design but is variable in size. Besides images such as video footage and photographs, drones also collect other data and footage to feed directly into other software, such as mapping. There is no pilot or passenger in a drone, and they are either remotely controlled through computer-aided flight routes with the sensors or autonomously. Thus they are often called UASs (unmanned aerial systems). There has been a tremendous improvement in drone technology in recent years, and civilian use of drones has become very popular.

2. Use of `Drone for Surveying and Monitoring Under Construction Site.

Drone technology is being widely used for site surveying and monitoring progress in construction projects. Drones, also known as UAVs (unmanned aerial vehicles), are small aircraft equipped with cameras, sensors, and GPS technology that can capture high-resolution images and data from the air.

In site surveying, drones offer several advantages over traditional methods. They can quickly and accurately create detailed maps of construction sites, providing valuable information about terrain, elevation, and existing structures. This helps engineers and planners make informed decisions about site layout, grading, and infrastructure design.

Drones are also used to monitor progress during construction projects. They can capture aerial footage and images regularly, allowing project managers to track construction activities, identify potential issues or delays, and ensure that work is being carried out according to schedule and specifications.

One of the key benefits of using drones for site surveying and progress monitoring is efficiency. Drones can cover large areas in a relatively short amount of time, reducing the need for manual labor and costly equipment. They can also access hard-to-reach or hazardous areas, providing a comprehensive view of the entire project site.

Moreover, drones enable real-time data collection and analysis. By using advanced software and analytics tools, construction teams can process drone imagery and data to generate 3D models, volumetric measurements, and progress reports. This helps stakeholders visualize project status, identify potential risks, and make data-driven decisions to optimize workflow and resource allocation.

3. OBJECTIVE

This Project carries five objectives as follows:-

a) To do Surveying,
b) To do Site Monitoring,
c) Reduce cost and time of projects,
d) To do data analysis,
e) Real-time monitoring.

PROBLEM STATEMENT

a) Current Challenges

Identifying the limitations in conventional surveying methods for large-scale construction projects.

b) Need for Accuracy

Highlighting the necessity of precise data collection and real-time progress monitoring.

4. METHODOLOGY

The following are the Processes of Drone Surveying:-

a) Planning the Survey:

Start by planning where and when the drone survey will take place, considering the construction phase and weather conditions.

b) Flight Path Design:

Determine the optimal flight path for the drone to cover the entire construction site, ensuring comprehensive data collection.

c) Ground Control Points (GCPs):

Set up ground control points on the construction site – these are marked points with known coordinates that help enhance the accuracy of drone survey data.

d) Sensor Calibration:

Calibrate the drone's sensors, including cameras and LiDAR, to ensure accurate data collection during the survey.

e) Altitude and Overlap Settings:

Set the drone's altitude and overlap settings appropriately to achieve the desired resolution and accuracy in the survey data.

f) Pre-flight Checklist:

Conduct a pre-flight checklist to ensure the drone is in good condition, batteries are charged, and all necessary equipment is functioning properly.

g) Real-time Monitoring:

Monitor the drone's flight in real-time to address any issues and ensure it follows the planned path, capturing the required data.

h) Data Collection:

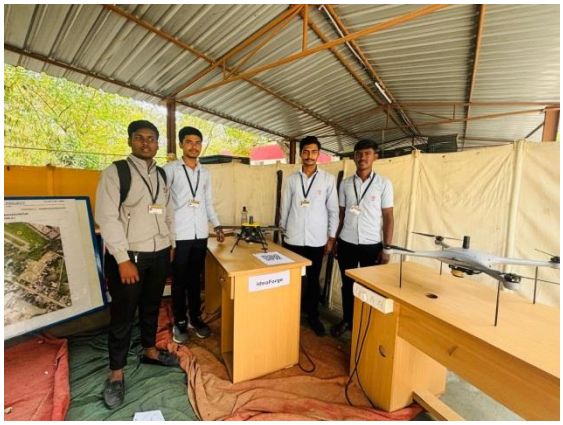
Allow the drone to capture images or LiDAR data during its flight, covering the entire construction site according to the predetermined parameters.

i) Data Processing:

After the survey, process the collected data using specialized software to create maps, 3D models, and other visual representations of the construction site.

j) Analysis and Reporting:

Analyze the processed data to assess progress, identify potential issues, and generate reports for project stakeholders, aiding decision-making.



5. FUTURE SCOPE

a) Drones will continue to enhance efficiency by quickly covering large areas, reducing manual labor, and providing real-time data.

b) Advancements in drone technology, such as improved sensors and navigation systems, will lead to higher accuracy in data collection and analysis.

c) As drone technology becomes more accessible and affordable, the cost of conducting surveys and monitoring construction sites will decrease, making it more accessible to smaller businesses and projects

d) Drone data will be integrated with other technologies like GIS (Geographic Information Systems) and BIM (Building Information Modeling); enabling better collaboration between stakeholders and facilitating informed decision-making.

6. CONCLUSIONS

Drones offer numerous benefits in site surveying and construction monitoring. They provide accurate data quickly, improving efficiency and saving time. Drones can access hard-to-reach areas and capture detailed images for analysis. Real-time monitoring helps detect issues early and make informed decisions. Overall, drone technology enhances safety, productivity, and cost-effectiveness in construction projects.

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