

*Original Research Article*

# Advantage and Application of Unmanned Aerial Vehicle Remote Sensing in Engineering Survey

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**Abstract:** Unmanned aerial vehicle remote sensing can fly at low altitude, shoot high-pixel, good-imaging images, and quickly acquire the geographic characteristics of the measurement area. It has the advantages of high periodic service quality, high work efficiency, wide monitoring range and good monitoring effect when applied in engineering survey. Unmanned aerial vehicle remote sensing has played a great role in the field of engineering survey, which can achieve data collection, data analysis and other work. At the same time, it can also obtain geographic information of the survey area in harsh environment, which has fast measurement speed and good measurement accuracy, and has very good application and development value.

**Keywords:** Unmanned Aerial Vehicle Remote Sensing; Engineering Survey; Application

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## 1. Introduction

The traditional engineering survey method is inefficient, cumbersome and low in accuracy. With the continuous development of science and technology, unmanned aerial vehicle remote sensing has slowly replaced the traditional survey method and played a huge role in surveying and mapping engineering survey. Unmanned aerial vehicle remote sensing has lower requirements for the survey environment, and has fast measurement speed and high measurement accuracy, which is conducive to promoting the further development of surveying and mapping engineering survey. This paper focuses on analyzing the advantages of unmanned aerial vehicle remote sensing in engineering survey, and puts forward the main ways of applying unmanned aerial vehicle remote sensing in surveying and mapping engineering survey, so as to promote unmanned aerial vehicle remote sensing to play more value in engineering survey.

## 2. Analysis of the current situation and advantages of unmanned aerial vehicle remote sensing

### 2.1 Current situation of unmanned aerial vehicle remote sensing

Unmanned aerial vehicle (UAV) technology came into being under the background of continuous innovation and development of China's science and technology level. It has achieved rapid development in recent years and has been widely used in many industries. Similarly, UAV technology has also played a very important role in engineering survey. At present, low-altitude unmanned aerial vehicle remote sensing provides more possibilities for engineering survey, which can achieve lower flying height, shoot images with high pixels and good imaging performance, and quickly obtain information such as geographic characteristics of the survey area. In addition, unmanned aerial vehicle re-

remote sensing can also bring great help to environmental monitoring, and detect the environment in the region in real time. The use of remote sensing technology needs to be combined with other related technologies, so that the advantages of remote sensing technology can be brought into full play. This limitation also applies to unmanned aerial vehicle remote sensing, and it must be used together with other remote sensing technologies to better play its own value. Through the integration of various technologies, the shortcomings of unmanned aerial vehicle remote sensing can be compensated and made better use of the strengths of unmanned aerial vehicle remote sensing. Then the foundation for promoting the further development of unmanned aerial vehicle remote sensing can be laid.

## **2.2 Advantages of unmanned aerial vehicle remote sensing**

With the improvement of modern science and technology, unmanned aerial vehicle remote sensing has also achieved rapid development, and has been widely used in various industries and fields, and has shown great advantages in engineering survey application, such as high periodic service quality, high work efficiency, wide monitoring range and good monitoring effect. Good remote sensing technology must have higher monitoring efficiency, because there are often many uncertain emergencies in the monitoring process, and higher monitoring efficiency can quickly find problems and deal with them immediately, thus effectively avoiding greater losses. Unmanned aerial vehicle remote sensing has a very high monitoring efficiency. When an emergency occurs, it can quickly intervene and solve the problem, so as to prevent small problems from causing great economic losses. The introduction of unmanned aerial vehicle remote sensing in engineering survey can greatly shorten the measurement time in the region. Using unmanned aerial vehicle remote sensing in monitoring can grasp the information in the region comprehensively and accurately in a short time, and at the same time have very good image quality.

In information processing, good picture quality and high processing speed are helpful to increase the accuracy of the final result information, which is of great significance to promote the further development of engineering survey. In the actual use of unmanned aerial

vehicle remote sensing, it is necessary not only to accurately identify the larger objects in the area, but also to capture the smaller objects, so as to ensure the measurement effect and accuracy. With the support of science and technology, unmanned aerial vehicle remote sensing has reached this standard, and the actual monitoring range has been improved and strengthened obviously. Applying unmanned aerial vehicle remote sensing to engineering survey can flexibly change the measurement range and realize the key measurement in a specific area according to the actual measurement requirements. Through the application of unmanned aerial vehicle remote sensing, the UAV can transmit the acquired data to the processing system in time during the measurement process, thus reflecting the real situation of the measurement points and effectively improving the intuitiveness of the engineering measurement results.

## **3. Application of unmanned aerial vehicle remote sensing in engineering survey**

With the continuous development of modern engineering survey, the measurement accuracy is required to be higher and higher. Unmanned aerial vehicle remote sensing can meet the needs of modern engineering survey well, complete engineering survey tasks in various environments, and has been widely used in many aspects such as information collection, information processing and harsh environments.

### **3.1 The application of information collection**

Information collection is a very important link in engineering survey, and the quality of information collection will also affect the accuracy of engineering survey results. It is easy to cause information confusion, poor overall effect, unreasonable collection methods and other problems by using the previous information collection methods. By applying unmanned aerial vehicle remote sensing to engineering survey, the above problems can be well avoided. When using unmanned aerial vehicle remote sensing for information collection, the corresponding flight modes are set according to different regional characteristics, so as to accurately obtain the geographic information of the measurement area, and automatically encrypt the acquired information

to ensure that the collected geographic information will not be modified. At the same time, unmanned aerial vehicle remote sensing can automatically screen and analyze the collected geographic information, automatically shield and delete the information irrelevant to the measurement results and useless, which greatly simplifies the complexity of information data and improves the accuracy of engineering measurement data. After using the unmanned aerial vehicle remote sensing to complete the information collection, the acquired information data can also be converted into a computer three-dimensional model, so as to improve the visibility of data information and strengthen the engineering survey effect.

### **3.2 Application in information processing**

Unmanned aerial vehicle remote sensing can not only collect data, but also analyze and process the collected data. In the past engineering survey, the acquired data and information were calculated and analyzed manually, which can solve the simple engineering survey data with high accuracy. However, with the continuous development of modern engineering survey field, the survey area is expanding, the survey complexity is getting higher and higher, and the obtained information and data are huge, so it is obviously unrealistic to calculate manually, while unmanned aerial vehicle remote sensing can complete the information processing work well. For example, it is very necessary to introduce unmanned aerial vehicle remote sensing into mine survey, which can not only obtain accurate measurement results, but also have good practicability. With the rapid development of energy industry, mine survey is facing great challenges. The most important task is the exploration of coal resources. Applying unmanned aerial vehicle remote sensing to mine survey can significantly enhance the survey speed. In addition, with the support of unmanned aerial vehicle remote sensing, the collected complex data can be analyzed quickly, the data processing can be completed in a short time, and the mine ecological environment can be effectively protected. Compared with traditional manual information processing, unmanned aerial vehicle remote sensing has faster speed and higher accuracy. Finally, the UAV can complete the information collection task at a lower altitude, which is helpful to improve the accuracy

of data information collection, increase the efficiency of information processing, and avoid the damage to mine environment caused by the information collection process.

### **3.3 Obtain surveying and mapping image data**

Traditional ground surveying and mapping methods are affected by geographical environment factors such as topography, so the collection of image data is limited. However, when UAV remote sensing surveying and mapping technology is used for surveying and mapping collection, it can ensure that the acquired image data meet the needs of engineering surveying and mapping work through scientific flight platform and the selection of suitable landforms in advance. Unmanned aerial vehicle (UAV) can integrate the whole process of photography through the application of aerial triangulation technology in flight, and correct the problems in surveying and mapping in time, thus laying a good foundation for the analysis and processing of later data. Technicians need to fully grasp these parameters, effectively control them, and comprehensively control the photographic exposure delay, so as to improve the application level of UAV remote sensing mapping technology and upgrade and optimize the technical structure.

### **3.4 Introduction of unmanned aerial vehicle remote sensing under complex conditions**

Under some special complex conditions, such as low cloud coverage, unsatisfactory landing conditions, high mountains or low-altitude flight, the ideal results can not be obtained by manual mapping. At this time, by applying the UAV remote sensing mapping technology, the UAV can be guided into the mapping work, which can make the complex terrain mapping work simple and ensure the quality and safety of mapping. Unmanned aerial vehicle remote sensing should be combined with aerial photography equipment in concrete application. The role of photography equipment is to shoot image data of complex terrain, which can provide information basis for rescue work. In addition, unmanned aerial vehicle remote sensing can be used to reasonably and effectively carry out large-scale urban planning projects, new rural construction, various resource

development and utilization projects and land resource utilization. Engineering survey by aerial photography is limited by many geographical factors. For example, when the altitude of the survey area is high and the cloud height is low at that time, aerial photography cannot make normal survey. However, because UAV aerial photography mainly completes the measurement task at low altitude, it will not be affected by these factors and has good applicability. When the terrain of the survey area is complex and the environment is harsh, unmanned aerial vehicle remote sensing can also carry out the survey work normally, and at the same time, the measurement efficiency is high, and the accuracy of obtaining relevant geographical location information is also high. With the continuous development of modern engineering survey industry, the characteristics of the areas to be measured are also very different. There are not only flat areas, but also some areas with complex terrain and harsh environment. The traditional survey method can not obtain the geographical location information effectively and accurately. However, the application of unmanned aerial vehicle remote sensing can solve the engineering survey problems in harsh environment, improve the accuracy and applicability of engineering survey, and help promote the further development of engineering survey industry.

### **3.5 Application in traffic and marine survey and other projects**

In traffic engineering construction site selection and marine robbery engineering, the use of UAV remote sensing mapping technology can ensure the stability of the overall engineering construction on the one hand, and for complex traffic engineering such as marine engineering, bridges and railways, due to the difficulty in development, the effectiveness and scientificity of surveying and mapping can be improved by using artificial satellites to shoot regional inspection maps, which lays a foundation for reducing risks and

maximizing the role of remote sensing mapping technology. In order to improve the application effect of UAV remote sensing mapping technology, it is necessary to make full use of aerial cameras, make reasonable and effective lens combination and effectively adjust the lens of digital cameras. For example, using zoom lens to calibrate the lens scientifically, analyzing and processing the calibration results scientifically, and finding the main parameters of the camera and the relationship between focal length and distortion parameters effectively can improve the effectiveness of zoom lens calibration and distortion parameters, and improve the application efficiency and application effect of UAV in surveying and mapping.

## **4. Conclusion**

To sum up, the application of unmanned aerial vehicle remote sensing brings great convenience to the field of engineering survey, effectively improves the efficiency and accuracy of engineering survey, and can also realize the measurement in complex areas and harsh environments, thus solving the problems that cannot be completed in traditional aerial survey. Unmanned aerial vehicle remote sensing has the advantages of high working efficiency, wide monitoring range and good monitoring effect, and is widely used in engineering survey data acquisition and data processing.

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