

Application of Unmanned Aerial Vehicle Remote Sensing in Surveying and Mapping Engineering

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Abstract: The development of unmanned aerial vehicle remote sensing will inevitably replace the current traditional technical methods. With the continuous improvement of digitalization and automation, it provides technical guarantee for accurate measurement. Therefore, it is very important for the development of surveying and mapping technology in China to strengthen the remote measurement technology of unmanned aerial vehicle (UAV) and make it play its role and advantages in practical application.

Keywords: Unmanned Aerial Vehicle Remote Sensing; Engineering Surveying and Mapping; Applied Analysis

1. Introduction

Unmanned aerial vehicle (UVA) remote sensing is a combination of UAV, remote sensing and communication technology. It is widely used in geographic information acquisition, environmental monitoring, geological and geomorphological research. Remote sensing technology includes remote sensor, input, output device, data processing system, etc. With the more practical application, the analysis and research of UAV remote sensing has been paid increasingly attention by scientists and technicians.

2. Application advantages of unmanned aerial vehicle remote sensing

Because of its simple operation, convenient carrying and flexibility, it plays an important role in many fields, such as urban management, film and television recording, and emergency rescue. The advantages of unmanned aerial vehicle remote sensing in application are as discussed in the following contents.

2.1 Large monitoring scale

To a certain extent, this technology can realize large-scale object mapping, get more accurate data in measurement and mapping, and carry out local small-scale measurement. Therefore, in terms of measurement, UAV sensor is a very effective control technology. Through this technology, we can intuitively and stereoscopically understand the actual situation of various regions, and provide technical support for related project construction. At the same time, these problems can also be fully reflected in related systems, thus providing more accurate information for experts.

2.2 High monitoring efficiency

It is a very effective way to monitor emergencies. Emergencies are often very urgent. If the monitoring is not effective enough, it will be impossible to deal with emergencies in time, which will lead to delays and even cause greater losses in emergencies. It is very effective to use drones for remote monitoring. Using this technology in emergencies can not only understand the specific situation of the target area, but also provide the basis for emergency response measures to ensure the smooth handling of accidents.

2.3 High system compatibility

In practical measurement, omissions often happens when one only relies on long-distance measurement. There are some limitations in the measurement of single unmanned aerial vehicle remote sensing. In order to ensure comprehensive

collection of measurement data, it can be combined with remote measurement technology. This method is used to measure the area, and the obtained data is transmitted to the information processing system in real time. Therefore, automatic data processing is realized, and the timely use of map data is ensured. UAV remote sensor is a compatible technology and lays the foundation for joint testing with other technologies.

3. Remote sensing technology for engineering surveying and mapping using unmanned aerial vehicles.

3.1 Obtaining survey and drawing data

When UAV remote sensing is used for surveying and mapping, it is necessary to carry out relevant research in surveying field, scientifically plan the flight path of UAV, and make a scientific choice by combining it with the corresponding test instruments. Compared with other remote sensing technologies, there are significant differences in the images of unmanned satellites. Using this method, the UAV will have a large deflection angle in the flight process. Therefore, it can be measured from multiple angles, which is convenient to obtain detailed stereoscopic image data. Only by ensuring the high quality of digital cameras can we ensure the final shooting effect.

3.2 Surveying and mapping data collection

According to the different measurement objects, it can be divided into manual or automatic encryption. Users can check, record and completely control the required data according to their own wishes, and thus greatly improve the accuracy of data collection. In actual measurement, the UAV remote sensing can be used to store the relevant information into the acquisition system, and encrypt the data after obtaining the corresponding authorization, thus making the measurement results of UAV more reliable.

3.3 Low altitude operation

In the transmission of UAV image data, we must ensure the photography quality in dimly light. Because of the flexibility and operability of UAV remote sensing, this technology plays an important role in disaster relief, environmental protection, monitoring and urban construction, etc. With the progress of science and technology, the degree of automation of remote sensing images has been continuously improved, which has greatly improved the shooting effect of images and made it more convenient to use. This technology will play an increasingly important role in the future.

3.4 Emergency treatment of emergencies

Because of landslide, debris flow, earthquake and other unexpected events, the conventional measurement methods can't meet the requirements, and the methods are backward and the detection period is long, so it is difficult to dynamically monitor the measured objects. At the same time, in some extreme climatic environments, it is impossible to dynamically monitor and measure the seismic images because it is impossible to obtain them in real time. This problem can be well solved by applying remote control of UAV. The system can better deal with emergency situations, dynamically monitor and carefully measure earthquake disasters, and obtain accurate measurement data, which provides an important basis for emergency response.

3.5 Data processing with unmanned aerial vehicle remote sensing

Using UAV remote sensing to process the data of measurement can maximize the efficiency and quality of data processing. Generally speaking, the manufacturing of it can be realized, but also needs some software processing to realize the production of products. The digital camera on the UAV has obvious irregular characteristics, which makes it difficult to obtain high-quality images and data. Moreover, because the inclination and regularity of each image are not perfect, it is difficult to realize it directly. There will be some overlapping problems when shooting, which generally occur when drones dive and turn. In this case, if the running angle of the UAV can't be reasonably controlled, the image will be in a static state, resulting in blurred and distorted images. Usually, some digital cameras with unmanned aerial vehicles can realize automatic zoom. Therefore, when using unmanned aerial vehicle remote sensing surveying and mapping, it is necessary to properly adjust the parameters and focal length to obtain the best shooting effect, thus improving work efficiency and ensuring the

accuracy of image data.

3.6 Caution to the maintenance inspection of unmanned aerial vehicle remote sensing

In the process of applying UAV remote sensing, the maintenance and inspection of the machine is a critical work. In daily work, people often focus on the remote monitoring of unmanned aerial vehicles, but neglect the maintenance of equipment. Proper maintenance can prevent the aging of the machine effectively. Therefore, in addition to ensuring that its performance will not be damaged, it is also necessary to strictly abide by the relevant operating procedures during the operation. According to items to be measured, it is necessary to adjust data to ensure the accuracy of the results. The maintenance and management of support equipment of UAV remote sensing should not only ensure its qualification, but also lay a good foundation for future surveying and mapping work. By improving the resolution of UAV remote sensing images, the overlapping, blurring and even distortion of images can be effectively avoided. On this basis, we need to focus on the color and brightness of the image to achieve better results.

4. The trend of unmanned aerial vehicle remote sensing in engineering surveying and mapping

4.1 Improvement of take-off and landing technology and wind resistance

At present, UAV remote sensing has been fully applied in all aspects, but it must be improved to make better use of the imaging effect. At the end of aerial photography, it is difficult for large drones to find landing sites when doing aerial detection in some plateau areas. For small unmanned aircraft, during the flight, due to the interference of mountain airflow, the flight data will be inaccurate, resulting in the repetition of aerial images. In order to prevent this kind of incident from happening again, we need to deeply discuss "the take-off, landing and wind resistance of UAVs to realize their complete protection without interference from flight conditions.

4.2 Improve the control of sensor structure and separation performance

Due to the limitation of UAV's volume, some small ones are difficult to install accurate sensors, which affects the accuracy of aerial data. At the same time, operators often correct the heading and aerial angle of the UAV in order to obtain accurate mapping results. However, from the existing control methods of UAV, its characteristics are complicated. A unskilled operator will cause great interference to the measurement results of the data. Therefore, related technical workers must conduct a deeper research on it.

5. Conclusion

In summary, with the rapid development of science and technology, all kinds of scientific and technological achievements have been widely used in engineering construction. At present, the rapid development of UAV remote sensing has laid a solid foundation for its application in various fields. China has rich experience in the long-distance detection technology of UAV, which is very beneficial to the sustainable development of China. This can not only effectively improve the engineering quality, but also find some problems in difficult-to-explore areas in time, and provide accurate data support for future engineering construction.

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