

人机界面空间几何位置的摄影测量

Photogrammetry Technology on Space Position of Man Machine Interface

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英文关键词: mechanical system, man machine interface, photogrammetry, image processing, computer

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中文摘要:

机械系统人机界面的优化匹配, 空间几何位置是其主要因素之一, 它的准确测量对产品设计、制造和改进都十分必要。该文将近影摄影测量、计算机视觉和图像处理技术用于人机界面空间几何位置的测量, 实现了快捷、方便的非接触式测量。测量仪器采用普通民用摄像机和计算机系统。文中介绍了图像数字化过程和摄影测量的数学模型, 给出其求解方法。并对变换误差进行了分析, 通过试验确定线性拟合的误差修正模型, 详细介绍了修正过程、外部三维控制场的设计和布置, 编制了实用的计算机测量和识别软件, 并给出了人机界面实验台的测量结果和识别误差。试验表明其测量误差小于2%, 可满足一般工程测量的要求。

英文摘要:

The optimization of man machine interface is very important for improving the efficiency of the machine system and increasing the comfortable and safety of operation. The space position is one of the main factor. Its accurate measurement must be much helpful to the design, manufacture and improvement of the system. In this paper, photogrammetry, computer vision and image processing techniques were used to measure the space position. The instruments were composed with a popular video camera, an image converter and a computer. The paper discussed the following items: the processing of image digitalizing; a mathematic model of photogrammetry and the solution method; the line fit error model based on experiment data; a method of reducing the error; the design and arrangement of a three dimensional field used for calibration. Finally, a computer software was developed and its application instance to measuring a man machine interface experimental set up was given. The results indicated that the measured error is less than 2%, which can satisfy the engineering requirement. The experimental result indicated that this non contact measurement system can fast and conveniently be used in the measurement of space position of man machine system with lower cost. Furthermore, it can be used in movement measurement for man machine system if with two camera.

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