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Design and Preliminary Realization of Virtual Installation based on Binocular Vision

Currently operating fusion devices and future fusion reactors share common features such as complex systems, limited space, expensive components, and some nuclear-related aspects. Consequently, traditional component installation or maintenance is inefficient. The immersive virtual installation achieved on EAST provides researchers with functionalities such as scheme discussions and installation simulations before the actual installation. Issues related to low model accuracy, inability to provide early warnings for collision detection, and poor system comfort are addressed. The study focuses on a method for 3D scene reconstruction using binocular vision, enabling real-time reconstruction of EAST. Utilizing deep learning techniques, component recognition and distance calculations as well as collision warnings are investigated. Finally, a stereovision system is established, generating depth information through high-definition stereoscopic displays. Taking electromagnetic measurements for diagnosis component installation as an example, a remote component installation simulation system is developed, providing researchers with a virtual platform that integrates virtual and real component installation, enhancing the efficiency of component installation. Preliminary realization and design of remote component installation are described.

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