Design of an Industrial Robot Exhibition Based on VIRTOOLS

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Abstract. This paper studies the traditional industrial robot theory curriculum design, and puts forward the basic framework of virtual reality training. The design process of virtual reality is studied in this paper. The virtual exhibition hall can effectively provide advanced experimental environment and simulation means for the basic introduction and internal structure of industrial robots, and can cultivate the students' ability to understand the basic characteristics of industrial robots quickly. The application of virtual reality technology in industrial robots, the development of virtual exhibition system is of great significance to the reform of practical teaching in professional teaching and research section. It can effectively solve many problems of industrial robot teaching, such as complex equipment structure, high price, and the limitation of site, quantity, model and low training efficiency. Therefore, in this paper, a virtual exhibition system is designed for an industrial robot. It provides an effective solution for the virtual display of industrial robots.

Introduction

On the basis of analyzing and summarizing the design methods of virtual reality technology and traditional industrial robot theory course, this paper puts forward the basic framework of virtual reality training. The research plan should be able to give the corresponding virtual reality design process, and it can explain the implementation process of the proposed system through an example.

The virtual exhibition hall can effectively provide advanced experimental environment and simulation means for the basic introduction and internal structure of industrial robots, and can cultivate the students' ability to understand the basic characteristics of industrial robots quickly. The application of virtual reality technology in industrial robots, the development of virtual exhibition system is of great significance to the reform of practical teaching in professional teaching and research section. It effectively solves the problems of complex industrial structure, high price, limited site, quantity and type, and low training efficiency. Therefore, in this paper, a virtual exhibition system is designed for an industrial robot. It provides an effective solution for the virtual display of industrial robots\(^{[1-6]}\).

The Overall Structure Design of the Virtual Simulation Display System

According to the system function requirement analysis and the selected realization way, the virtual simulation display system is composed of four parts: actual installation introduction, virtual display, virtual industry, performance development display. The software design of the system is as follows:

This system uses Visual C++6.0 and Virtools 5 of Dassault company of France as the development platform of the system, uses Dassault's Solidworks 3D design software and 3dsmax as a modeling and animation generating tool, and uses Access as the system database to store the fault knowledge base, sample part library, special tool library, testing tool library and one. Some work samples\(^{[7-10]}\).
The Establishment of an Industrial Robot Model

With the development of computer technology, many computer aided design software, such as Unigraph.ics of Unigraphics Solutions company, Pro / Engineer of PTC company, SolidWorks of DSO company, have powerful functions of 3D solid modeling, surface modeling, virtual assembly and generating engineering drawing, through software analysis and calculation, It can significantly reduce design time and significantly reduce the number of prototype or sample performance tests. The three dimensional model of the cycloid reducer is shown in Figure 1. The 3D modeling of an industrial robot is shown in Figure 2.

![Model of cycloid reducer.](image1)

![Overall modeling of industrial robot.](image2)

The Establishment of Virtual Model Display

The 3D model of equipment is the foundation of the whole equipment maintenance simulation system. Its quality directly affects the authenticity of virtual maintenance. Because Virtools has no modeling function, it is necessary to use modeling software to build 3D solid models. But because this article is a mechanical product model, we first use the professional mechanical 3D drawing software Solidworks for modeling, and then import the built model into the 3dsmax, and then from 3dsmax to Virtools 5. Before establishing the model, a preliminary analysis should be carried out, and the complex mechanical products can be decomposed into several simple parts, and then the three-dimensional modeling of each component is carried out. After the model is established and successfully introduced into the 3dsmax, the model is given the material and the map, thus increasing the authenticity of the model, reducing the unnecessary polygons, and improving the refresh rate of the display.

The conversion of keyboard control and mouse triggering behavior is designed to simulate equipment building in the exhibition hall, so we need to view the appearance and internal composition of the equipment from different angles. There are two ways to achieve that, using the keyboard to control the camera or mouse to trigger the camera animation, and the two methods can not run at the same time, that is, when the keyboard is used to control the camera, the mouse triggers the camera behavior, and the opposite is true. The specific scripting process is shown in Figure 3.
Interaction setting of system interface

The interactive function of industrial robot virtual exhibition system is very complicated. After completing the function of the system, we need to use modules to realize these functions. The specific scripting process is shown in Figure 4.

Complex equipment through three-dimensional structure, sectional view and so on can well display the structural features of the equipment, connection, and can also master the movement through the way of animation. This will lay a solid foundation for a comprehensive grasp of the structure of the equipment. The demonstration program of virtual assembly and virtual maintenance is established through Virtools 5, and the existing knowledge points are demonstrated. It makes the students' operation to follow. The realization of this part is mainly to grasp the conversion of camera lens. Light angle of view and equipment material. Switchover from different perspectives can be achieved by setting up cameras at different locations. As shown in Figure 5.

Conclusion

Based on the analysis and summary of the virtual reality technology and the traditional product display mode, this paper puts forward the basic architecture of the virtual product display system, gives the corresponding design process of the product display system, and expounds the implementation process of the presented display system through an example. Through the test of the system, the system has basically achieved the expected effect. It can show the product from different angles and simulate the various functions of the product. It can also play a good role in propaganda and improve the competitiveness of the enterprise itself. However, there are still some shortcomings in the system. Due to the limitation of the server module, the multi-user online control system has not yet been implemented. I believe that with the rapid development of information technology, new technology will bring more surprises to society.

References


