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Design and Application of Industrial Robot Integrated Control System Based on Virtual Reality Technology

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Abstract

Aiming at the objective trend of the development of virtual reality technology, starting from the research status of virtual reality technology, this paper introduces the research status of virtual reality technology through the analysis and comparison of a large number of references. Secondly, it analyses the design idea of industrial robot integrated control system and the design steps of industrial robot integrated control system. The design of integrated control system for industrial robots is presented. Finally, the application of integrated control system for industrial robots is studied from two aspects: the expression of three-dimensional scene and the automatic modeling, and the simulation platform based on virtual reality. It is hoped that this research can provide effective reference for relevant technical personnel to design and apply integrated control system for industrial robots.

Keywords

Virtual reality technology; Industrial Robot Integrated Control System; Design; Application.

1. INTRODUCTION

In recent years, with the rapid development of virtual reality technology in China, higher requirements have been put forward for the design and application of industrial robot integrated control system based on virtual reality technology. Therefore, the topic of "the design and application of industrial robot integrated control system based on virtual reality technology" has become the focus of social attention. In order to promote the rapid development of virtual reality technology, on the one hand, we should attach importance to the design of integrated control system for industrial robots, on the other hand, we are very involved in the application research of integrated control system for industrial robots, which plays a vital role in improving the application level of virtual reality technology.

2. RESEARCH STATUS OF VIRTUAL REALITY TECHNOLOGY

As we all know, virtual reality technology plays a very important role in improving the level of future scientific research and research. This technology mainly makes users immerse themselves in the interactive virtual environment with robots by creating a human-computer interaction platform. There is an obvious advantage of using this technology, that is, it can generate virtual simulation environment in the form of computer to carry out scientific research. Research, in this way can effectively avoid the phenomenon of expenditure on equipment purchase. Therefore, the research status of virtual reality technology is very obvious [1].

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3. DESIGN OF INTEGRATED CONTROL SYSTEM FOR INDUSTRIAL ROBOTS

Through the scientific and reasonable design of this system, we can provide users with a comprehensive control system of industrial robots with perfect functions and good experience. In addition, the design of this system is mainly to provide users with an intelligent human-computer interaction platform. In order to achieve this design goal, next, the key points that need to be paid attention to in designing the integrated control system of industrial robots are detailed. Detailed introduction.

(1) Design of Integrated Control System for Industrial Robots

In order to effectively achieve the design objectives of the system and enable users to observe the spraying process of industrial robots, the system needs to be divided into two functions, one is the control menu, the other is the image display. The control menu is mainly used to control and output information, and the image display is mainly used to display and present the image to users [2].

In order to effectively realize the function of control menu, it is necessary to decompose the large function of control menu into several small functions, which mainly include database management, code generation, remote communication and other functions. As shown in Figure 1, users can flexibly control the spraying action of robots by using control menu, at the same time, they can flexibly set up according to their own needs. In addition to the parameters of spraying, users can check the spraying time of the robot in time by controlling the menu [3].

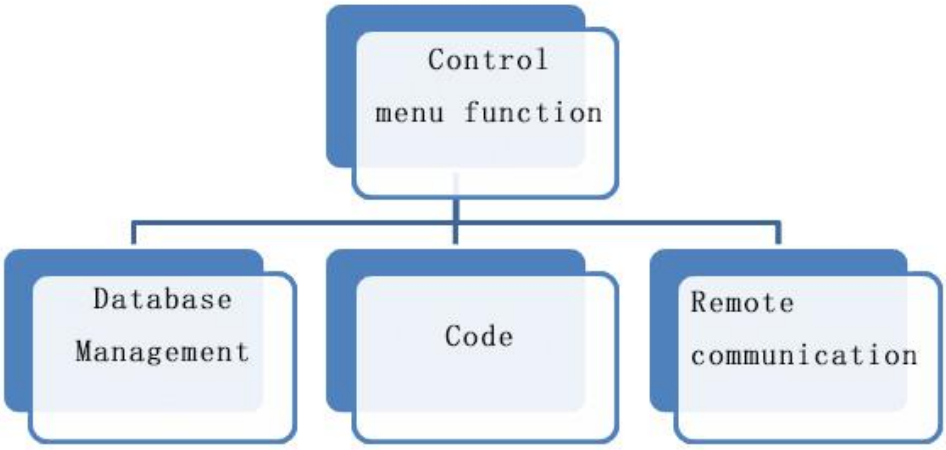

Fig 1. Control Menu Function Diagram

Similarly, in order to effectively realize the function of image display, it is necessary to decompose the large function of image display into several small functions, which mainly include three-dimensional model display of spraying space, three-dimensional dynamic display of spraying robot and spraying effect display. As shown in Figure 2, in order to improve the authenticity of virtual scene, it is necessary to provide image display. Enough light, so that users can accurately observe the spraying effect and the actual work of the robot through image display, so as to know in advance whether the spraying effect of the robot achieves its own satisfaction [4].

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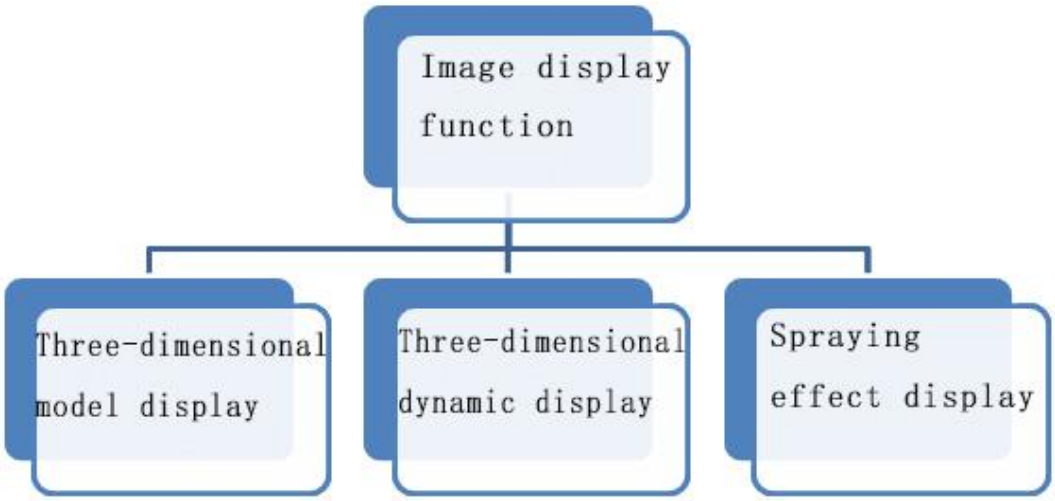

Fig 2. Image Display Function Diagram

(2) Design steps of integrated control system for industrial robots

According to the design idea of the industrial robot integrated control system mentioned above, the following design steps need to be formulated, as shown in Figure 3: First, to build a virtual working environment, usually the virtual working environment is mainly composed of Spraying Robots and objects to be sprayed. In order to maximize the authenticity of the virtual scene, relevant technical personnel need to add virtual scenes. Work platform. Secondly, three-dimensional modeling and display of spraying robots. Generally, in order to effectively improve the performance of virtual simulation system, it is necessary to build three-dimensional model of spraying robots. Generally, there are two types of three-dimensional modeling of spraying robots. The first type is geometric model, and the second type is kinematics model. Among them, the geometric modeling mainly uses the form of computer graphics to describe the internal structure of a real robot on the computer, which is the process of geometric modeling. Kinematics modeling mainly uses the kinematics of the robot to depict the rotational positions of each joint in the coordinate system. Thirdly, three-dimensional modeling and display of spraying objects. In the process of three-dimensional modeling and display of spraying objects, firstly, relevant technical personnel should design spraying parts by using computer graphics. At the same time, the designed CAD data should be saved in the database. Secondly, the geometric parameters and the nature of the parts need to be set reasonably. Fourth, dynamic virtual simulation of spraying process. The system allows users to visualize the trajectory of the robot according to their actual needs, so that users can visually and intuitively see the whole process of workpiece spraying by using the system. In addition, users can also view the joint position and acceleration curve of the robot. At the same time, users can also interact with each other through human-computer. The interface is used to observe whether the workpiece collides with the workpiece during the spraying process. Fifthly, download the results of robot programming. The system has a remarkable function, that is, allow users to conduct pre-drilling on the spraying process of workpiece in virtual form on the computer, so as to maximize the efficient drive of the robot to the program, and then improve the working performance of the system, so that the robot can work normally and steadily, which plays a key role in improving the spraying effect. Important impact [5].

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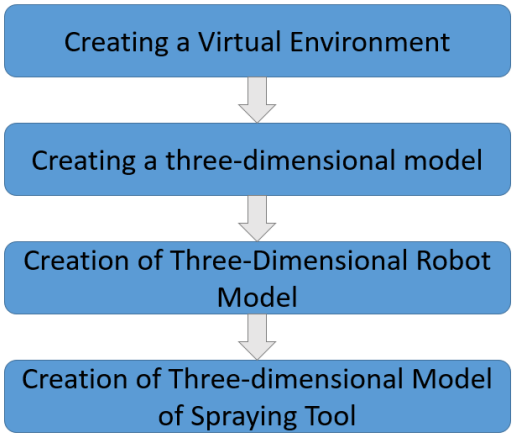

Fig 3. Design flow chart of industrial robot integrated control system

4. APPLICATION OF INTEGRATED CONTROL SYSTEM FOR INDUSTRIAL ROBOTS

Through the application of virtual reality technology to the development of industrial robot integrated control system, technicians improve the intelligence and advanced nature of the system, and at the same time improve the versatility of the industrial robot integrated control system. Therefore, industrial robot integrated control system has been widely applied in many fields. Next, in order to deepen the comprehensive control system for industrial robots, the application of the integrated control system for industrial robots is introduced in detail.

(1) Three-dimensional scene representation and automatic modeling

The integrated control system of industrial robots based on virtual reality technology can be used to express and model three-dimensional scenes automatically. Generally, three-dimensional scenes are widely used in daily life. On the one hand, the use of three-dimensional scenes can create a sense of immersion for users, on the other hand, it can also meet the actual needs of users to the greatest extent. Industry based on Virtual Reality TechnologyRobot integrated control system can achieve the expression effect of three-dimensional scene very well. In addition, because the workload of manual modeling is very large, in order to solve this problem, the industrial robot integrated control system designed by virtual reality technology can automatically model the data model. This form of automatic modeling is efficient and accurate. In a word, three-dimensional scene representation and automatic modeling are typical applications of industrial robot integrated control system based on virtual reality technology [6].

(2) Virtual reality-based simulation platform

The integrated control system of industrial robots based on virtual reality technology can not only realize the expression and automatic modeling of three-dimensional scene, but also provide users with a simulation platform based on virtual reality. The platform achieves a realistic effect by virtualization of reality on the basis of combining the actual needs of users, so that users can have a sense of immersion and improve users' performance. In addition to the good experience, it effectively avoids the phenomenon that users spend a lot of manpower and material resources to arrange real scene equipment, and provides users with great convenience to study some scientific research results. In a word, the simulation platform based on virtual reality is another typical application of industrial robot integrated control system based on virtual reality technology.

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5. CONCLUDING REMARKS

In summary, with the continuous development of virtual reality technology in China, the design and application of industrial robot integrated control system based on virtual reality technology have achieved gratifying research results. Nowadays, industrial robot integrated control system has been widely used in teleoperation robot system, three-dimensional scene expression and automatic modeling, virtual reality-based simulation platform and other fields. In addition, in order to promote the rapid development of virtual reality technology, more and more technicians use virtual reality technology to devote to the design and application of industrial robot integrated control system, and constantly improve their professional literacy, which lays a certain theoretical foundation for the future development of virtual reality technology.

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