

Research on the application status, problems and countermeasures of VR/AR technology in industrial robot education

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Abstract: This paper mainly studies the application of VR/AR technology in industrial robot education. Firstly, the basic concept and development trend of VR/AR technology are introduced; Then, the status quo and existing problems of industrial robot education are analyzed. Then, the application advantages and challenges of VR/AR technology in industrial robot education are discussed. Finally, the application strategies and suggestions of VR/AR technology in industrial robot education are put forward.

Key words: VR/AR technology; Industrial robot education; Learning effect; Countermeasure research

Introduction

With the rapid development of science and technology, VR/AR technology has gradually become an important means of industrial robot education. VR/AR technology can provide students with a more real and intuitive learning experience, and help them better understand and master industrial robot technology. However, the application of VR/AR technology in industrial robot education is still in the initial stage, there are many problems and challenges, and it has not reached the stage of widespread application. Therefore, it is of great theoretical and practical significance to study the application of VR/AR technology in industrial robot education.

I. The basic concept and development trend of VR/AR technology

Virtual Reality (VR) and Augmented Reality (AR) technology are collectively referred to as VR/AR technology. Virtual reality is a completely virtual environment generated through computer simulation, allowing users to be fully immersed in it and feel an immersive experience. Augmented reality is a combination of virtual information and the real world, so that users can see virtual information in the real world and experience augmented reality. The development trend of VR/AR technology is mainly reflected in the popularization and optimization of hardware equipment, the continuous innovation and optimization of software technology, and the continuous expansion and deepening of application fields. The popularization and optimization of hardware equipment is an important basis for the development of VR/AR technology, including the type, performance and price of hardware equipment. The continuous innovation and optimization of software technology is an important driving force to promote the development of VR/AR technology, including the algorithm, platform and application of software technology. The continuous expansion and deepening of the application field is the ultimate goal of the development of VR/AR technology, including education, medical care, entertainment, industry and other fields. The application of VR/AR technology will bring great changes and improvements to various fields, and improve people's quality of life and work efficiency in the future.

II. The status quo and existing problems of industrial robot education

The goal of industrial robot education is to enable students to master the basic knowledge, skills and methods of industrial robots through teaching and practice, and improve their innovative ability and practical ability. With the rapid development and wide application of industrial robot technology, industrial robot education has been widely concerned and valued. However, there are still some problems and challenges in the education of industrial robot.

First, the curriculum system of industrial robot education is not perfect, and the content and methods are not scientific and effective enough. The curriculum system of industrial robot education should be systematic and complete, including the basic knowledge, application technology and practical operation of industrial robots. At the same time, the curriculum method should be practice-oriented, focusing on the cultivation of students' hands-on ability and innovative ability. For example, Japan's "Industrial robot technology education system" attaches great importance to the cultivation of students' practical operation and innovation ability. The system adds major practical operation and other contents in addition to the basic knowledge and application technology of industrial robots. Through the simulation of real practice and experimental projects, students can learn and master the technology of industrial robots in operation.

Second, the teaching resources of industrial robot education are still relatively scarce, and the hardware facilities such as equipment and software are not advanced and complete. Industrial robot education needs a lot of teaching resources, including industrial robot equipment and software and other hardware facilities, teaching tools and experimental materials. However, at present, many developing countries and regions schools and institutions of industrial robot education equipment and software and other hardware facilities are still relatively scarce, unable to provide sufficient opportunities for computer operation, affecting the learning effect of students and the cultivation of innovation ability, but also limited the development of industrial robot education.

Third, the teaching methods and evaluation system of industrial robot education are not scientific and reasonable enough, and there is a lack of effective assessment and evaluation mechanism. The teaching method of industrial robot education should be based on practical operation, and pay attention to the cultivation of students' skills and innovative ability. At the same time, the evaluation system should be scientific and reasonable, and pay attention to the evaluation of students' operation and application ability. However, many schools of industrial robot education teaching methods and evaluation system still have some problems divorced from practice, lack of effective

assessment and evaluation mechanism. For example, some schools pay too much attention to theoretical teaching when carrying out industrial robot education, ignoring the cultivation of students' operational skills and the ability to solve on-site problems, resulting in the inability to adapt to the job quickly after graduation.

III. The application advantages and challenges of VR/AR technology in industrial robot education

The application of VR/AR technology in industrial robot education has significant advantages.

First, VR/AR technology can provide a more real and intuitive learning experience, bring better teaching results, and help students better understand and master industrial robot technology. For example, the Massachusetts Institute of Technology in the United States uses VR technology to allow students to simulate industrial robot operations in a virtual environment, which greatly improves the learning effect and students' learning interest.

Second, VR/AR technology can improve teaching efficiency and quality, and reduce teaching costs. Using VR/AR technology, distance teaching can be carried out, and students can study at home or any place with Internet, which greatly saves students' time and transportation costs. On the other hand, it can also help teachers to better display the teaching content. For example, the University of Tokyo in Japan uses AR technology to allow students to simulate industrial robot operation in a virtual environment, reducing the demand for robot equipment and greatly improving students' interest in learning.

Third, VR/AR technology can expand teaching resources and methods, and improve the diversity and flexibility of teaching. Using VR/AR technology, teaching resources and methods can be extended to the virtual environment, so that students can learn and practice in the virtual environment, such as simulating repeated disassembly, inspection troubleshooting and other teaching processes that are difficult to achieve on real products, which greatly improves the diversity and flexibility of teaching.

However, the application of VR/AR technology in the education of industrial robots is also facing some challenges.

On the one hand, the cost of hardware facilities such as technical equipment and software is high and requires a large amount of investment. For example, a complete VR/AR system, including hardware equipment and software, may cost hundreds of thousands of yuan, although it is cheaper than a complete set of industrial robot systems, but it is still a considerable investment for many schools and institutions.

On the other hand, the effect and impact of technology application still need to be further studied and evaluated. Although the application of VR/AR technology in industrial robot education has many advantages, the operation method and feeling of VR/AR are still significantly different from the operation of real equipment, and the teaching effect still needs further research and evaluation to determine its application value and precautions in industrial robot education.

IV. The application strategy and suggestions of VR/AR technology in industrial robot education

First of all, strengthen technology research and development and innovation, improve the maturity and applicability of VR/AR technology. VR/AR technology is an emerging technology, and its development is still in its infancy, requiring a lot of technology research and development and innovation. For example, a research team at Shanghai Jiao Tong University has launched the VR+ Human-Computer Interaction: Technology and Application of Virtual Reality and Augmented Reality research project for undergraduates and high school students, aiming to use VR technology to improve the function of human-computer interaction in industrial robot operation simulation software, so as to enhance students' learning interest and effect. This shows that by strengthening technological research and development and innovation, the maturity and applicability of VR/AR technology can be improved, so as to be better applied in industrial robot education.

Secondly, teaching resources and facilities should be improved to improve the convenience and efficiency of teaching. The application of VR/AR technology in the education of industrial robots requires a large number of teaching resources and facilities, and must continue to increase investment. Beihang University, for example, has set up an industrial robot education center on campus, which has a variety of advanced VR/AR equipment and software to provide rich teaching resources and facilities, greatly improving the convenience and efficiency of teaching.

Finally, the teaching methods and evaluation system should be improved to improve the effectiveness and quality of teaching. The application of VR/AR technology in industrial robot education needs reasonable teaching methods and evaluation system. For example, Shenzhen Vocational and Technical University uses AR technology to develop a new "hybrid" teaching method, which allows students to simulate the operation of industrial robots in a virtual environment first, and only after passing the virtual evaluation system can they enter the real station for corresponding entity operation, so as to help the virtual reality and integrate the virtual and real. Greatly improve the efficiency and effect of practical teaching links.

To sum up, in order to better apply VR/AR technology in industrial robot education, it is necessary to strengthen technology research and development and innovation, improve teaching resources and facilities, improve teaching methods and evaluation system. Only in this way can we make better use of VR/AR technology in industrial robot education and improve the effect and quality of teaching.

Conclusion

The application of VR/AR technology in industrial robot education is of great significance and value, which can provide real and intuitive learning experience, help students better understand and master industrial robot technology, and improve teaching effect and students' learning interest. However, the cost of hardware facilities such as technical equipment and software is high, the specifications and

standards of technical application are not perfect, and the effect and influence of technical application need further research and evaluation. In order to better apply VR/AR technology in industrial robot education, it is necessary to strengthen technology research and development and innovation, and improve the maturity and applicability of VR/AR technology; Improve teaching resources and facilities to improve the convenience and efficiency of teaching; And improve teaching methods and evaluation systems to improve the effectiveness and quality of teaching.

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