Analysis on the Application and Development of Virtual Reality Technology

Lv Chao

Haojing College of Shaanxi University of Science and Technology, Xi'an, 712046, China

Keywords: virtual reality technology; Virtual environment; Sensing equipment

Abstract: With the advent of the information age, computer technology has been rapid development, virtual reality is one of them. This paper expounds the concept and characteristics of virtual reality technology, analyzes the application of virtual reality in medicine, industrial manufacturing, education industry and other fields, and predicts the current development of virtual reality technology and its future development direction.

1. Introduction

Virtual reality technology is a combination of simulation technology, computer graphics, man-machine interface technology, multimedia technology, sensing technology, network technology and other technologies. Before 1963, virtual reality technology was still in its infancy. People's understanding of it is still in the dynamic simulation of sound and form. In 1973, the concept and theoretical system of virtual reality were gradually formed. In the late 1990s, the theoretical system of virtual reality technology was further improved and applied in real life. In recent years, virtual reality technology has been applied more and more widely and attracted great attention.

2. Introduction to virtual reality technology

2.1 Definition of virtual reality technology

Virtual Reality technology, English called Virtual Reality, referred to as VR technology, also known as Indie Vision technology or artificial environment [1]. The term was first coined by Lanier in the United States in the early 1980s. As a high-end technology, virtual reality is a new achievement integrating computer graphics technology, computer simulation technology, artificial intelligence, sensing technology, display technology and other technologies. It is a kind of computer-generated high technology simulation system, including simulation environment, perception, natural skills and sensing equipment and other aspects. It first appeared in the U.S. military's combat simulation system. In the early 1990s, it gradually attracted the attention of all walks of life and was applied and developed in the business field.

2.2 Development history of virtual reality technology

The development of virtual reality technology (VR) can be divided into four stages.

2.2.1 The first stage: the embryonic stage

Before 1963, it was called the embryonic stage of virtual reality thought theory. This stage has formed some thoughts and theories about virtual reality. Major events: Morton Heilig developed and developed a full-sensor simulator, and patented the invention in 1962. The invention embodies the ideology and theory of virtual reality technology[2].

2.2.2 The second stage: the early stage

From 1963 to 1972, it was the early stage of virtual reality technology theory. Major events: in 1968, Ivan Sutherlan, an American known as the father of computer graphics, developed the first computer-graphically-driven helmet display HMD and head position tracking system, which became an important milestone in the development history of virtual reality technology[3-4].

2.2.3 The third stage: the initial stage

1973-1989 was the initial stage of virtual reality technology concepts and theories. There are two major events during this period. One is the emergence of VIDEOPLACE system, which was designed and proposed by M.W. Krueger. The system can generate a virtual graphics environment, so that the projectors can respond to the activities in real time. The other thing is the completion of the VIEW system. The system was led and completed by m. Greevy. Experiencers wear data gloves and head tracker, and form a virtual reality environment through language, gesture and other interactive ways[5].

2.2.4 The fourth stage: improvement and application stage.

Since 1990, virtual reality technology theory for the improvement and application stage. Major events: Japanese game companies Sega and Nintendo launched Sega vr-1 and Virtual Boy respectively in 1994. However, due to the high cost of equipment, the application of virtual reality technology in the game industry is just a flash in the pan[6]. In 2014, Google and Samsung launched Google Cardboard and Gear VR respectively. In 2016, apple released the view master VR headset, which costs $29.95. HTC and SONY also developed HTC Vive and PlayStation VR. Until today, virtual reality technology has been widely used in medicine, education, aerospace, industrial manufacturing and other aspects[7].

3. Characteristics of virtual reality technology

The greatest significance of virtual reality technology is that people can experience things they have never experienced firsthand through virtual environment and interactive actions. This effectively improves their cognitive means and extends the scope of their field of knowledge. Virtual reality technology is characterized by the use of computers to produce a virtual artificial environment. This virtual environment consists of computer graphics forming a three-dimensional digital model. These models result in a synthetic and perceptible artificial environment. This environment is mainly based on visual perception. At the same time, including hearing and touch, it can make people feel immersed in it visually. Moreover, people can directly operate, touch, observe and detect changes in the environment and surrounding environment, and "interact" with them. This technology integrates human and computer, and makes people feel "immersive"[8]. As an emerging technology, virtual reality technology mainly has three characteristics: immersion, interaction and conceiving [9].

(1) Immersion. The use of computer graphics technology, the generation of a three-dimensional virtual environment, so that people live in it, in the visual generation of a sense of immersion, give people a sense of immersive.

(2) Interactivity. In the computer-generated virtual environment, people can interact with some sensing devices and generate the same perception as in the real environment [10]. For example, when you hold an object in a virtual environment, you will feel the same grip force as in a real environment.

(3) Conceptualization. When users are immersed in the virtual environment, they can acquire new knowledge, improve perceptual and rational knowledge, and thus deepen and generate new associations with concepts. Therefore, virtual reality can inspire people's creative thinking and conceive new ideas.

4. Application of virtual reality technology

With the maturity of virtual technology, it has been applied in medicine, education, industry, agriculture, entertainment and other industries, and has made great progress and development.

4.1 Medical applications

At present, virtual reality technology has been applied in medical treatment. In the early 1990s, virtual technology has been applied in anatomy abroad. The use of human body slicing technology

can simulate the human anatomy site realistically, without worrying about the cost and ethical issues. Some university medical schools have also built virtual reality systems for human bodies. Students wearing helmets can simulate virtual anatomy training operations, just like in real life. In addition, the virtual laboratory can also be repeated to train an operation, but also to avoid some toxic experiments brought about by the injury. Traditional surgical experiments are performed by field observation and experimental operation on animals, which cannot be repeated. Virtual reality experiment solves these problems. At present, the most extensive and mature virtual endoscopic surgery in medicine is an application example of virtual reality technology in medical students.

4.2 Industrial applications

At present, the world industry does not need to adopt the tactics of sea of people, but the investment of high and new technologies[11]. Some large enterprises in the world have widely applied virtual reality technology in various industrial links and played an important role. It greatly improves the development efficiency of enterprises, improves the ability of data collection, analysis and processing, effectively reduces the mistakes in decision-making and reduces the risks of enterprises to a certain extent.

4.3 Application of education industry

Virtual reality technology has also been widely used in education industry. It promotes the development of education industry with a qualitative leap[12]. In recent years, the emergence of various online classes has provided learners with a convenient and effective way to learn. Students do not need to walk into the classroom again. When they open the online class, they can see the learning content and learning plan assigned by themselves, hear the teaching of the designated teacher, and have one-to-one interaction with the teacher. In the teaching, various teaching modes combining sound, light and electricity are adopted to improve the traditional boring teaching mode and make it easier for students to understand.

5. Development and prospect of virtual reality technology

Virtual reality technology has been widely used in practice. But now the real virtual reality technology equipment is very expensive, and it cannot be popularized in ordinary families and life. Virtual reality technology is ushered in a period of rapid development, a variety of software and hardware equipment is also in a large number of increases. Whether it is software or hardware products, only when ordinary people can afford to be popular. Only when it enters thousands of homes can it become more popular.

With the development of science and technology, one of the development trends of virtual reality technology is that it will become more mainstream[13]. The equipment cost of virtual reality will also become cheaper and cheaper, and with the richer application and popularization in people's life, our virtual reality era will also come!

References

[1] Hu Xiaoqiang. Virtual reality technology [M]. Beijing: Beijing university of posts and telecommunications press, 2005

[2] Chen Chaoliang, Zou Yi. VR virtual reality technology [J]. Electronics technology and software engineering, 2016(16): 16-17.

[3] Li Min, Han Feng. Overview of virtual reality technology [J]. Software guide, 2010,9(6): 142-144

[4] Ning Xiang. On the application of virtual reality technology [J]. Modernization of shopping malls, 2008(36): 127-127.

[5] Liu Jiali. Current status and future trend of VR technology development [J]. China star

communications, 2016(10): 81.

[6] Yu Huahong. Application status and development of virtual reality technology [J].   2009(04): 182

[7] Liang Yutao. Virtual reality technology and its application in experimental teaching [J]. Experimental technology and management, 2006(3):81-85

[8] Chen Haolei, Zou Xiangjun et al. The latest development and prospect of virtual reality technology [J]. Chinese science and technology paper, 2011(1)1-5.

[9] Zhang Zhanlong, Luo Ci, He Wei. Overview of virtual reality technology [J]. Computer simulation, 2005, 22(3): 1-3

[10] Lu Xinwen. Research on the development and application of virtual reality platform [D]. Chengdu: university of electronic science and technology, 2008

[11] Shi Jiaoying. Virtual reality basics and practical algorithms [D]. Beijing: science press, 2002

[12] Wang Nana, Wang Niu. Research on interactive virtual product display design platform [J]. Journal of Qingdao university, 2006, 19 (2)69-73

[13] Ning Xiang. On the application of virtual reality technology [J]. Modernization of shopping malls, 2008(36):127-127