

Inquiring the Application of Mixed Reality in the Traffic Safety Education

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Abstract – As some new information technologies, Virtual reality, augmented reality and mixed reality has attracted widely attention. Using advanced peripherals, virtual reality, augmented reality and mixed reality could provide users with interactive, immersive and conceived experience. Virtual reality, augmented reality and mixed reality are widely used not only in the fields of entertainment, film and television, art, education, medical, military etc. but also in the traffic field. This paper combines mixed reality and traffic safety education, and brings about some applications of mixed reality in the traffic safety education, which include expanding the range of application, improving space utilization, ensuring the parking security, reducing traffic accidents and so on. With mixed reality in the earlier phase, a lot of works need to be done to find new applications of mixed reality in the traffic safety education.

Keywords – Enhancement of Reality, Mixed Reality, Traffic Safety Education, Technology Application, Virtual Reality.

I. INTRODUCTION

With the continuous development of social economy, people's living standards continue to improve, the number of motor vehicles and the rapid growth in the number of drivers, greatly facilitate the people's production and life, at the same time, road traffic safety problems become increasingly serious. According to the survey, China has now become the world's largest number of deaths due to road traffic accidents caused by the country. More than 80% of traffic accidents are caused by lack of safety awareness among the driver and the responsible person. It can be seen that one of the main reasons for the serious traffic safety situation is the lack of awareness of traffic safety. Therefore, it is imperative to raise public awareness of the importance of traffic safety education and to strengthen public safety education. It is the root of reducing the incidence of traffic accidents by strengthening traffic education of traffic participants, promoting traffic safety awareness, regulating traffic behavior and cultivating traffic culture. In recent years, the reality of virtual reality, enhance the reality and the reality of mixed technology and development, for us to solve the problem provides a new way.

II. VIRTUAL REALITY, ENHANCE REALITY AND MIX REALITY

With the continuous development and improvement of science and technology, such as comprehensive simulation technology, multimedia technology, computer graphics

technology, network technology, human-computer interaction technology and three-dimensional display technology, some highly challenging cross - and into the people's vision, such as virtual reality technology, enhance the reality of technology and mixed reality technology.

A. Virtual Reality

Virtual reality (i.e., Virtual Reality, referred to as VR, the term by Jaron Lanier [1]) technology to take advantage of a variety of virtual development platform, computer graphics systems and control interface devices, on the computer to generate realistic, interactive three-dimensional environment, through the external display device to provide users with visual, auditory, tactile and other sensory simulation, so that users immersed in the environment, and with peripherals to achieve human and virtual environment interaction, is a can create and experience the virtual world of the computer Simulation Technology [2]. The main features of virtual reality technology are immersion, interactivity and conception [3] [4]. At present, the virtual reality technology for the use of human-computer interaction peripherals are the main types of data helmet, data gloves, data clothing, three-dimensional projection system, as shown in figure 1.



Fig.1. Virtual reality peripherals

Although the current development of virtual reality technology is still in its infancy, it has become one of the most important technologies in the twenty-first century that affect people's life by virtue of its high discipline and broad development prospects [4]. Virtual reality technology covers a wide range of research areas, including the entertainment, film and television, art, education, medical, military, communications, exploration, psychology, marketing, industrial production, urban planning and aerospace and other fields, and virtual reality technology but also in these areas of application has played an important role.

B. Augmented Reality

The use of computer technology to virtual information and real environment in real time superimposed on the same picture or space at the same time, that will be in the real world of a certain (Such as text, graphics, sound, animation, etc.), the use of digital science and technology to simulate and simulate, by providing users with a display device, so that users perceive the virtual information superimposed on the real world and integrated into the sensual effect of the real new environment. Enhance the reality of technology to provide information is different from the human in general can perceive the information, it can provide users with a virtual world and the real world coexistence of sensory experience. Enhance the reality of the main features of the actual integration of the actual situation, real-time interaction, and three-dimensional registration [6]. A complete enhanced reality system includes display technology, tracking and positioning technology and calibration techniques, as well as interface and visualization techniques [7]. The main peripherals that enhance practical technology are azimuth-tracking devices and head-mounted visual devices (HMDs) connected to computers, such as helmet displays, glasses with a variety of imaging originals, and head-mounted visual devices. As shown in figure 2.



Fig. 2. Head mount display with augmented reality

Augmented reality technology is a new field of research developed on the basis of virtual reality technology [9]. There are technical differences between them, but there are obvious differences. Virtual reality users are completely perceived in the virtual world, while the reality is perceived by real world and virtual information (i.e., digitized information). Enhance the combination of reality and technology, real-time interaction of the novel features, making it popular public attention. With the continuous development and improvement of relevant technologies to enhance the reality, the exploration and research of the field of reinforcement has been studied from the early research of the laboratory, and its application field involves entertainment, education, medical, military, aviation, tourism, archaeological, visualization, machinery industry, automobile industry, cultural relics display, cultural e-commerce and water conservancy and hydropower survey design [10].

C. Mixed Reality

Mixed Reality (MR) technology is based on virtual reality technology and enhance the reality of technology based on the development, which is, mixed reality integration of the real world, virtual world and digital information [11]. Hybrid reality technology can be real world, virtual world and digital information integration [12], to establish a new visual environment, allowing users to see the real world at the same time will see the virtual world, and the real world of objects and virtual the world's objects can exist at the same time, the same scene real-time interaction, which cannot feel the difference between virtual and reality. The main features of the hybrid reality technology are authenticity, conception and real-time interaction [13]. The main peripherals in the hybrid reality technology are basically the same as the main peripherals that enhance the real technology. The hybrid reality includes both the characteristics of the virtual reality and the characteristics of the enhancement reality, so there is a certain connection between the technical characteristics of the three [14]. Some argue that the reality of reinforcement is the same concept as the hybrid reality [8], but in fact it is noticeably different from the reality of the reality. Enhance the reality of the emphasis is that virtual technology services in the real environment, and in the mixed reality, both virtual objects can be integrated into the real environment, can also be real objects into the virtual environment.

Mixed reality technology combines virtual reality technology and enhances the characteristics of realistic technology, so it is more imaginative space, for people to explore and experience the unknown space field provides a great possibility. With the continuous development and application of virtual reality technology and practical technology, hybrid reality technology has been developed rapidly and widely in recent years. It is mainly used in entertainment, art, education, medical, military, industrial design and so on field.

III. APPLICATION OF VIRTUAL REALITY TECHNOLOGY AND AUGMENTED REALITY TECHNOLOGY IN TRAFFIC FIELD

A. Application of Road and Bridge Design and Maintenance

Virtual reality technology in the early road design and post-road maintenance work played an important role. The emergence of virtual reality has changed the traditional plane and drawing of the road design (as shown in figure 3), to achieve information technology and automation of three-dimensional measurement and modeling, to complete the design work, you can dynamically simulate the road traffic status, and a number of routes for panoramic perspective and roaming. In the virtual reality technology support, but also can carry out wind tunnel test, physical experiments, destructive tests and a series of scientific experiments, test the road and the bridge of the indicators, according to the indicators reflect the reality of real-time maintenance and maintenance of roads and bridges [15].

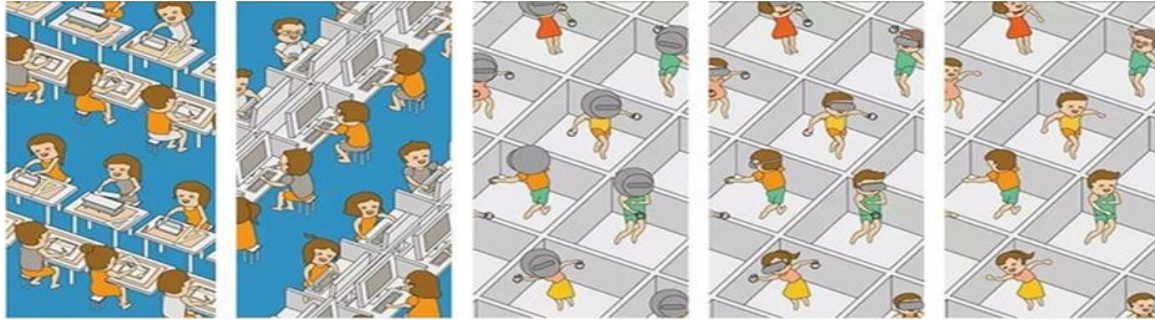


Fig. 3. The evolution of the designer's manner of working

The application of virtual reality technology enhances the optimization ability of complex terrain and geomorphic routes and the ability of calculation and analysis of large complex structures, which greatly improves the automation degree of road and bridge design and maintenance.

B. In the Design and Manufacture of Vehicles

Virtual reality technology with its interactive features in vehicle design and manufacturing are widely used. Designers and engineers are freed from the original boring work, with virtual reality technology to participate in the vehicle design and manufacturing work, not only the location of each vehicle parts and work conditions are at a glance, and can be effortless to view and replace any parts, both to increase the work of fun and improve work efficiency. Ford Motor Company has used virtual reality technology to provide users with Ford FIVE laboratory immersive experience.

The application of the enhanced reality technology in the vehicle manufacturing process also brings good results. With the support of realistic technical support, each vehicle structure and components have joined the virtual information, engineers can follow the display of virtual information debugging to create more in line with industry standards of vehicles, reducing the human factors caused by product differences, an increase of customer products the degree of satisfaction. General Motors has released an application called myOpel, as long as the application of the camera will be aimed at the car or the hood, we can identify the car logo and components, instant access to their information and use, so that we know more about our car.

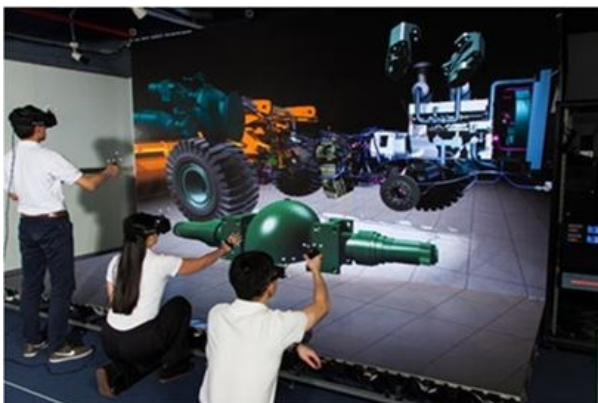


Fig. 4. Application of virtual and augmented reality in industrial designing and manufacturing

C. In the Vehicle Simulation Driving Application

Virtual reality technology vehicle simulation driving is used to create a completely virtual cockpit for us and a completely virtual external environment, we can complete the virtual environment in the virtual drive difficult to achieve the driving training, scientific experiments, crash test, accident reproduction and other tasks, for the promotion of traffic safety has a good role in promoting. Earlier, Peugeot had a headset electronic helmet to simulate virtual driving, and Ford recently developed 3D CAVE virtual technology is more advanced, as shown in figure 5.



Fig. 5. "3D CAVE" tested out by Ford

D. Application in Traffic Geographic Information System

Based on the virtual reality technology and geographic information system technology to build the traffic management information system, real-time control of road traffic conditions, real-time analysis of large data to achieve intelligent traffic control, greatly improve the road

traffic network capacity [14]. Enhance the combination of realistic technology and geographic information system, improve the traditional data expression, geographically synthesized holographic three-dimensional image as an immersive virtual environment, making the geographical data more intuitive, three-dimensional expression, enhance the sense of reality [15].



Fig. 6. The application of virtual reality and augmented reality technology in GIS

IV. APPLICATION OF MIXED REALITY TECHNOLOGY IN TRAFFIC SAFETY EDUCATION

The realization of the hybrid reality technology requires the virtual scene and the reality of things with each other, interact with each other. If everything is virtual, it is virtual reality. Conversely, if the virtual information can only be superimposed on the real thing, that is to enhance the reality. The development of hybrid reality technology is relatively late, so the current application of mixed reality in the field of transportation is very limited, and no mixed reality technology is applied to traffic safety education in the example. Therefore, this chapter makes a preliminary study on the application of hybrid reality technology in traffic safety education on the basis of studying the concept, characteristics and application of hybrid reality technology. The key to the hybrid reality technology lies in the real-time acquisition of information and the real-time interaction between the virtual world and the real world. Real-time and interactive are the characteristics of traffic safety education. Mixed reality technology can be combined with the traffic safety education to play its greatest potential, and into the mixed reality of the traffic safety education for the current traffic safety education to solve the existing problems will have a considerable impetus.

A. Extend the Scope of Application

One of the main reasons for the serious traffic safety situation is the lack of awareness of traffic safety. Therefore, it is imperative to raise public awareness of the importance of traffic safety education and to strengthen public safety education. It is the root of reducing the incidence of traffic accidents by strengthening traffic education of traffic participants, promoting traffic safety awareness, regulating traffic behavior and cultivating traffic culture. With the help of mixed real technology, virtual reality technology can be used to create a variety of virtual environment for traffic participants to explain traffic safety regulations and civilized driving methods, but also through intuitive various non-compliance with road traffic regulations caused by traffic accident scene to

alert the user to road traffic regulations. In addition, the reality of technology can be used to show the location of the participants around the forecast, to help users to the surrounding environment for real-time analysis and judgment, to prevent the existence of security risks.

It can be seen that the integration of the practical skills of mixed traffic safety education, change the passive education as active education, allowing users to experience virtual traffic accidents, experience the traffic accidents brought about by the pain and life and help traffic participants on the surrounding environment analysis and judgment.

B. Reduce Traffic Accidents

Compared with the traditional teaching methods, the integration of the practical reality of traffic safety education, to better solve the problem of the effectiveness of traffic safety education. Traffic Safety Education, which incorporates mixed real technology, is targeted at all traffic participants, including motor vehicle drivers, nonmarket motorists and pedestrians, for different traffic participants. Therefore, the integration of the practical reality of traffic safety education, can effectively reduce the occurrence of traffic accidents.

C. Reduce Casualties

Traffic accidents have become "the world's first harm", the World Health Organization data show that the world's annual road traffic accidents due to the death toll of about 1.25 million, equivalent to the global daily 3,500 people died due to traffic accidents. The data show that tens of millions of people are injured or disabled each year. The integration of the practical knowledge of traffic safety education, can effectively reduce the occurrence of traffic accidents, reducing the occurrence of traffic accidents can reduce the casualties due to traffic accidents. In addition, traffic safety education, which incorporates mixed reality technology, can also educate users how to take measures to protect themselves and others in traffic accidents and reduce the occurrence of secondary traffic accidents, thereby reducing casualties.

D. Reduce Economic Losses

In addition to the public health impact, road traffic injuries are an important development issue: road traffic accidents to countries, said Etienne Krueger, head of the Department of Non-communicable Diseases, Disability, Violence and Injury Prevention at the World Health Organization the estimated costs are estimated at about 3% of gross domestic product, while economic losses in low- and middle-income countries are as high as 5% of gross domestic product. At the same time, the number of road traffic deaths is uneven throughout the world. Low-income and middle-income countries account for 90% of the world's road traffic deaths and people in these countries have only about half of the world's vehicles.

The integration of the practical technology of traffic safety education, can effectively reduce the occurrence of traffic accidents, thereby reducing economic losses. In addition, traffic safety education, which incorporates mixed reality technology, can also educate users how to take measures to scientifically and reasonably reduce economic losses in traffic accidents.

V. CONCLUSION

Virtual reality, enhance the reality, mixed reality want to better use in daily life, but also must overcome its peripherals are too diverse, technical coordination work more difficult problem. Such as different scenes of people, the use of different user interface, through different devices, see different content of virtual information, so hinder the expansion of virtual reality in the practical application.

In the road traffic safety work, traffic safety education is a long-term permanent solution, is a social system engineering. Effective and comprehensive traffic safety education has played a huge role in reducing traffic accidents, reducing casualties and reducing economic losses. With the development of a number of advanced technologies such as virtual reality, enhanced reality, mixed reality, the future of the city's key infrastructure will provide people with more effective services in the wisdom of the city's vision to achieve people and society, people live in harmony. I believe in the "Internet +" model driven by the application of the hybrid reality of the traffic safety education will have a broad market prospects.

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