

Research on the Application of VR/AR Interactive Design Technology in the Field of Public Security

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Abstract

Disease, earthquake, fire, stampede, malignant injury and so on. In all kinds of sudden events, the design of public emergency rescue facilities is more and more important. Public emergency refers to an emergency that occurs suddenly, causes or may cause heavy casualties, property losses, ecological environment damage and serious social harm, and endangers public security, which is characterized by abruptness, severity and wide impact. The occurrence of these incidents will destroy the normal social operation mechanism and the normal social order, cause a huge social psychological crisis, hinder social stability and development.

Keywords

VR/AR; Interaction Design; Application Research.

1. Research Significance

Public security is an important part of national security. It is the basic guarantee provided by the government and the society to prevent and reduce the occurrence and loss of various major events, accidents and disasters, protect people's life and property safety, maintain social stability and promote the sustained, rapid, coordinated and healthy development of the national economy. It is also an important part of the government to strengthen social management and public services. With the rapid development of economy and complex social environment, the economic conditions have been greatly improved, but there are unexpected public security emergencies lurking in daily life.

At present, the overall environment of our country's public security is good and the safety form is good. There have been no major security accidents in recent years. But with the popularization of science and technology, new types of security accidents such as network telecom fraud and fire safety accidents occurred frequently. Investigate the reasons, the masses of safety awareness are weak, fire safety awareness is not high, escape self-rescue ability is insufficient, lack of necessary safety experience, safety norms, operating procedures are not familiar with. In the face of sudden events or disasters, most people are at a loss, and the massive amount of information in the information age has not played a corresponding role. It can be seen that knowledge is one thing and consciousness is another. The lack of security awareness can hardly be made up by knowledge alone. Weak public security awareness is a problem in the development stage, but also a problem of civilized quality. Therefore, it is urgent to strengthen public safety education.

The existing safety education and training mainly rely on traditional theoretical teaching, safety education films and industry training and other methods, safety education style is single, poor effect because most of the safety simulation experience scene restoration is difficult and dangerous, on-site experiential teaching is prone to safety accidents.

In recent years, the rapid development of virtual reality technology, the national industry 2025 plan is a key development industry, is the future industry development direction. The accelerated integration of 5G network, artificial intelligence, cloud computing, Internet of

Things and other technologies with virtual reality technology, and the recent hot metauniverse, digital twin, NFT and other new technological concepts have given the virtual reality industry a new round of enthusiasm for industrial development. Now VR technology has penetrated into various industries, such as military, technology, education, medical, entertainment, real estate and so on. VR technology is supported by the policy of "mass entrepreneurship and innovation". With the strong support and promotion of the state and government, VR technology is also playing its own development advantages. Many VR enterprises also hope to develop new concepts and technologies in more fields through the support of policies. The Construction Plan of Wenzhou Digital Economy Cluster (2022-2024) also takes the metauniverse as the main direction to accelerate the construction of Wenzhou digital Economy Cluster. Through the application of VR technology, various scenarios are simulated, so that people can get guidance to complete some first aid tasks. And the practical application of VR can also make more people understand the correct use and storage methods of some fire emergency articles. Nowadays, there are many VR interactive experiences. In order to popularize the public's understanding of firefighting knowledge, this interesting way can be more popular among the public. The placement of VR experience technology and firefighting tools in various public areas can continuously improve the awareness of fire safety and disaster prevention and self-rescue awareness of the whole society, and strengthen the awareness of fire safety and the ability of disaster prevention and mitigation of citizens. The experience design of VR enables people to use their hands to complete some specific links in a more real way. The memory is clearer, the operation is simple, and the understanding is strengthened by repeated demonstrations. For teenagers, VR technology is equivalent to an interactive experience, highlighting the participation of the experiencer, stimulating the initiative of children, reflecting the technological elements and the sense of The Times. Join the fire drill, so that you can learn the ability to save yourself in the fire, earthquake and so on, so that the masses learn the correct escape knowledge. Only when people experience it will they understand the impact and significance of VR technology for emergency rescue.

Considering the above factors, using AR/VR technology to simulate safety education and training is a feasible shortcut to solve the problem. Experiential users can intuitively experience typical safety accidents through VR glasses, judge potential safety risks and hidden dangers, and seek correct preventive measures and avoid safety risks.

Public safety prevention is still based on publicity prevention, and the project proposes to combine online and offline publicity, as shown in Figure 1. Using the current hot and novel meta-universe virtual human technology, design a virtual image to broadcast and publicize public security related news on the short video platform and expand the publicity channels. Combined with offline VR public safety education experience, a typical safety accident scenario experience module is formed. Experiential users can intuitively experience typical safety accidents through VR glasses, and judge potential safety risks and hidden dangers through virtual reality environment, as well as how to seek correct preventive measures and avoid safety risks. Thus play a warning education, improve the safety awareness of the role. Through paper safety brochures, AR technology is used to enhance the publicity effect. Users can "scan" and scan the publicity brochures directly through wechat, and corresponding virtual three-dimensional scenes, videos, special effects and so on will appear on the mobile phone, enriching the presentation of the publicity brochures and optimizing the dissemination and display effect, as shown in Figure 1.



Figure 1. Publicity mode

The application and research significance of VR/AR interactive design technology in the field of public security are as follows:

- 1) Virtual person live broadcast, which makes use of popular short video platforms to meet the needs of the society; Virtual person image situation is novel, can attract young all;
- 2) It is experiential learning, which is more likely to stimulate the interest of relevant personnel to participate in safety education and strengthen the perceptual understanding of experiencers to safety accidents;
- 3) The virtual scene construction is not restricted by the site, which can simulate the safety accidents in the real scene to the greatest extent, and avoid the waste of materials and labor, in line with the concept of green construction;
- 4) After experiencers enter the virtual environment, they can learn detailed nodes and correct practices, and obtain relevant data information.
- 5) It is AR technology that enhances the publicity effect, enriches the display way of the publicity manual, and optimizes the communication and display effect.
- 6) VR/AR technology breaks the traditional passive training, enabling personnel to feel all kinds of dangerous scenes that may occur in the process, so as to personally feel the danger brought by illegal operations, and actively master safe operation skills and improve safety awareness.

2. Research Status and Development Trend at Home and Abroad

At present, there are not many research results on the application of VR/AR technology in public security at home and abroad, and the theoretical research mainly focuses on the concept, structure level, content, function, formation mechanism and dynamic mechanism of public security awareness. For example, Kou Liping proposed to enhance public security awareness through cultural, legal and economic approaches: Xu Xiangdong analyzed the concept of safety consciousness from the perspective of philosophy, and put forward the safety concept of people-oriented, quality-oriented education and technology-based; Qi Xu et al. discussed the change of public security consciousness from the perspective of culture. From the perspective of carrier, Hong Yuxiang proposed the information service mode of public safety awareness enhancement. In addition, public safety awareness is also related to the study of public security,

which has produced a lot of research results in psychology, social psychology, sociology, criminology and other disciplines.

Research on practical application mainly focuses on safety education and safety experience. For example, Zheng Fei et al. proposed VR technology as a means of practical training and teaching of safe and civilized construction. Li Changning et al. believe that VR technology plays an important role in construction engineering management and brings changes to the safety management and quality control of construction engineering. Yang points out that VR technology can improve the ability to ensure underground production safety to some extent. Research on the application of VR in the field of security is mainly focused on industrial safety training, with less research on security accidents such as fraud prevention and fire escape.

With the development of digital economy, especially the global deployment of 5G technology with VR/AR as one of the core business scenarios, the maturity of all links of the VR/AR industry chain continues to improve, coupled with the rising home-based demand driven by the epidemic, investment and financing activities of the VR/AR industry are increasingly active. In 2021, the VR/AR industry recorded an investment growth rate of 544% year-on-year, ranking first among all industries. The VR/AR industry is facing a major inflection point of breakthrough development. In the long run, its deep integration with the meta-universe will also bring huge development opportunities for VR/AR technology enterprises. It is believed that VR will be more and more widely used in various fields. The VR security experience on the market has complex features and software, with uneven quality. Domestic public security incidents frequently occur, although the country increases the investment in the public security industry, the construction of our security system is still not perfect, the security industry there is huge market demand and improvement space. In addition, with the acceleration of urbanization in recent years, the concept of safe city and smart city has been mentioned constantly, driving the rapid development of related industries. Driven by many factors, the recent prosperity of our security industry is rising rapidly, and has formed a huge industry prospect.

3. Research and Development Contents and Key Technologies

This project mainly includes three parts: virtual digital person, VR project design experience, and AR project production experience, as shown in Figure 2. Using the current hot and novel meta-universe virtual human technology, design a virtual image to broadcast and publicize public security related news on the short video platform and expand the publicity channels. VR technology is used to simulate a realistic three-dimensional virtual world, so that the experientialists who receive public safety training and education can experience the occurrence and handling of security risks in a virtual space without any danger. Virtual reality scenes can be customized according to training needs, forming a typical security accident scenario experience module. Experiencers can experience typical security accidents intuitively through VR glasses, and judge potential security risks and hidden dangers through virtual reality environment and "first-hand experience" security events, as well as how to seek correct preventive measures and avoid security risks. Thus play a warning education, improve the safety awareness of the role. The main experience modules developed by this project include VR projects such as telecom fraud and fire escape. Combined with offline paper safety brochures, AR technology is used to enhance the publicity effect. Users can "scan" and scan the publicity brochures directly through wechat, and corresponding virtual three-dimensional scenes, videos, special effects and so on will appear on the mobile phone, enriching the display way of the publicity brochures and optimizing the dissemination and display effect, as shown in Figure 2.

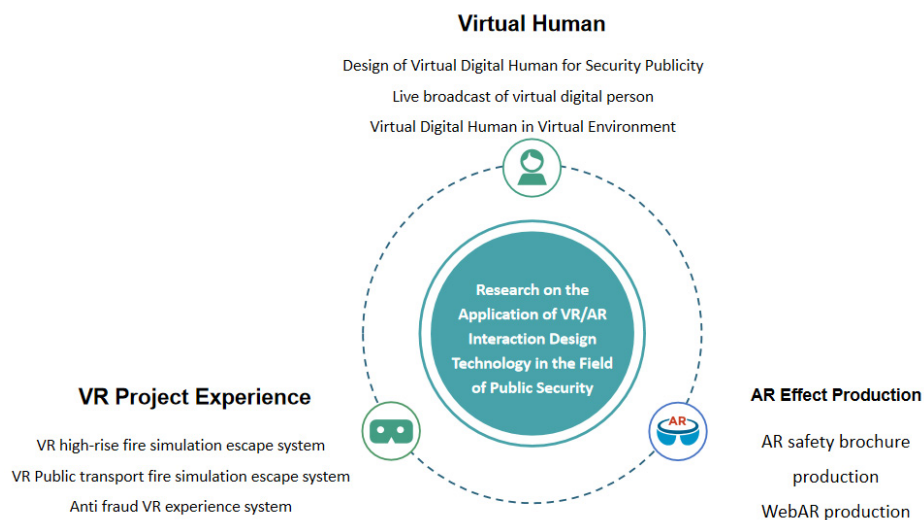


Figure 2. Main contents of the project

The main key technologies of this project are the metaverse virtual man technology, virtual reality technology and augmented reality technology. Unity3D engine was used as the development platform, Maya 3D software was used to construct 3D model, Substance Painter drew 3D model map, combined with HTC VIVI, Pico and other VR hardware helmets carry out display and experience-based training, and build a virtual reality public safety training system to realize a series of practical safety training and experience functions such as public safety knowledge explanation, network telecom fraud experience, fire escape experience, etc. Users can receive safety education and training personally and deepen their understanding of public safety under the condition of ensuring personal safety Total cognition. For traditional paper safety brochures and product manuals, AR technology is used to enhance the publicity effect; By using WebAR technology, users can "scan" and scan the brochure directly through wechat, and corresponding virtual three-dimensional scenes, videos, special effects and so on will appear on the mobile phone, enriching the presentation of the brochure and optimizing the dissemination and display effect.

4. Research Program

To understand the current research status of public safety in Wenzhou through literature research, to understand the public awareness of public safety through questionnaire interviews and other forms, to use online "virtual digital person" live broadcast to publicize public safety knowledge, to organize offline experience of public safety VR system, to experience typical safety accidents directly through VR glasses, and to "personally experience" safety events through virtual reality environment. Judge the potential security risks and hidden dangers, and how to seek the right preventive measures and avoid security risks, so as to play a warning education, improve the safety awareness; Experience the on-site distribution of AR scanning brochures. Compared with traditional brochures, users can scan the pictures or text in the brochures through wechat and three-dimensional virtual scenes, video, audio, pictures, etc., greatly enriching and extending the effect of the brochures. Finally, through the form of interview or questionnaire to understand the experienter reflected effect.

5. Research Process

The application and research of VR/AR interactive design technology in the field of public security are mainly divided into four stages. Firstly, through literature research, the research

status of Wenzhou public security, the research status of VR in the field of public security and the development status of virtual reality technology are analyzed. The public safety awareness of residents was investigated through questionnaires and interviews. Secondly, in the implementation stage, the online "virtual digital person" live broadcast form is adopted to publicize public safety knowledge, enhance public safety awareness, experience typical safety accidents intuitively through VR glasses, experience the on-site distribution of AR scanning support brochures, enrich and extend the effect of the brochures; Understand the effect of experiencers through interviews or questionnaires; In the last stage, I organized materials, applied for software copyright, wrote papers and research reports, as shown in Figure3.

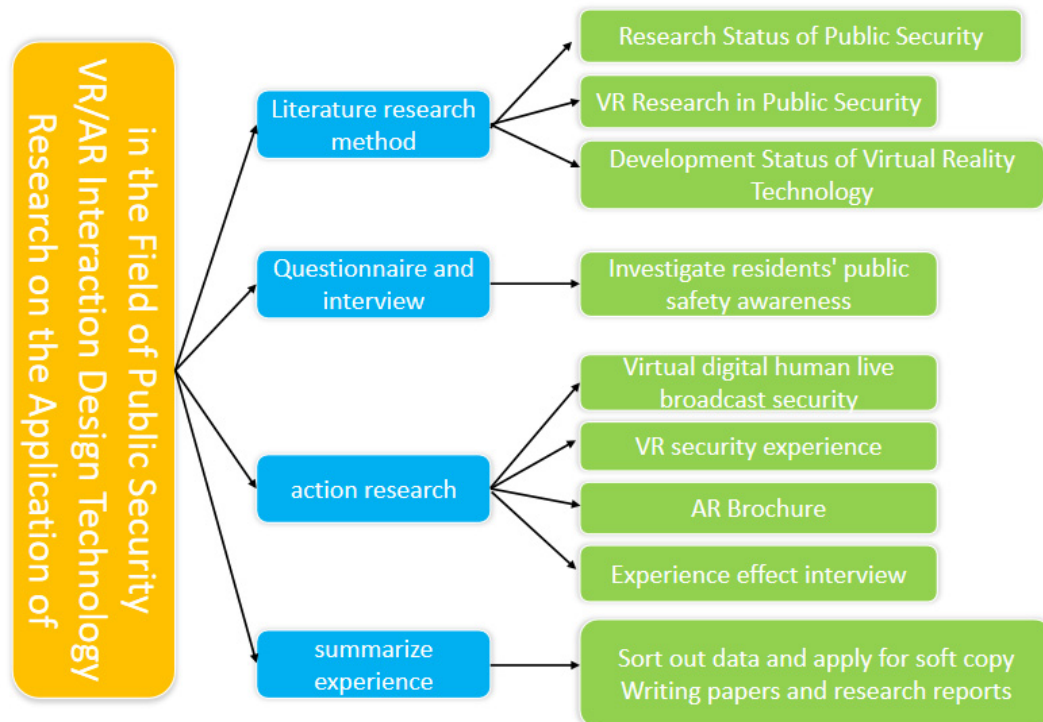


Figure 3. Technical routes

6. Research Results

Application value of VR technology to public emergency rescue facilities: As a human-computer interaction technology, VR is a scene-oriented rescue experience. The application of VR will help people to upgrade their ability to cope with emergencies from various aspects, and improve people's ideological quality and emergency handling methods while improving emergency rescue facilities.

Social value: Nowadays, public emergencies occur frequently, but there are few types of emergency rescue facilities, incomplete rescue goods, and people are very lack of rescue awareness and response to emergencies. With social order and security as the center, by emphasizing the improvement of people's response time to emergencies and correct handling measures, the stability of social order can be reduced and the loss caused by emergencies can be avoided. The emergency rescue facilities combined with the Internet and VR technology have integrated public safety education, VR drills on emergency handling methods, and guidance on the use of first aid items. It is helpful to the normal operation of social order, greatly reduce and avoid the loss caused by emergencies, and also provides an important idea for the development of public emergency rescue field, which is of great significance to this field.

Experiential cognitive value: Through experiential public rescue drills under VR technology, we can improve our skills, understand first aid knowledge and improve our cultural literacy in a

pleasant experience. Under VR technology, users can conduct drills as long as they are immersed in the virtual reality environment, which greatly reduces the consumption of financial and material resources and the use of venues. In such experiential products, users' experience can better stimulate people's cognition and response to the real situation.

At present, the total category of emergency facilities on the market is few, the emergency supplies are not complete, the first aid method is not clear, which proves that the market is not saturated, so the development prospect is considerable. Although people's living standard has been improved, but the ideological quality and the handling of emergencies are still very low. In terms of product types, it is exploitable, and VR technology has been applied more and more widely in the market at present, and the technology is becoming more and more mature. The company can develop emergency rescue facility products under VR technology to meet various needs in different places. VR technology is also close to our lives, so it can be seen that the development potential of emergency rescue training products based on VR technology is huge. Relying on the development of the Internet and VR technology, public safety training has got rid of the traditional shackles, increased many functions and roles, and developed into a diversified, scientific and technological product. It not only reduces the high cost of public safety education and training, but also allows the public to have a drill in the fun experience, and improves people's calm handling of emergencies. With the development of economy and increasingly innovative science and technology, the state attaches more and more importance to public safety. Scientific and technological products have become the mainstream of the market, and the country's attention to people's livelihood is also an important reason for the development of rescue products. The combination of VR technology and public security not only guarantees the society and people's livelihood, but also maintains social stability.

In this process, the promotion of public safety awareness is the first task, which is of great significance for perfecting the public safety prevention system with the participation of the whole people, enhancing the effectiveness of early detection and real-time response to public crisis, and improving the effect of local government public safety management.

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References

- [1] Kim HaeOk, Lee Insook, Lee ByoungSook. Nursing leaders' perceptions of the state of nursing leadership and the need for nursing leadership education reform: A qualitative content analysis from South Korea. [J]. Journal of nursing management, 2022.
- [2] Daminda Kuruppu Kuruppu Achchige Dulani. Education Reform as a Platform to Improve Interactions of the Engineering Students During Online Teaching and Learning at Higher Education Amidst Covid-19 Pandemic[J]. International Journal of Educational Reform, 2022, 31(2).
- [3] Parra Perez Lizeth Guadalupe, Gloeckner Gene W., Valdés Cuervo Angel Alberto, Addo Reuben, Harindranathan Priya. Mexican education reform: elucidating dissenting teachers' resistance[J]. Discourse: Studies in the Cultural Politics of Education, 2022, 43(1).
- [4] Ostrowicka Helena. Economization of discourse on education and pedagogization of economic problems: media debate on higher education reform in Poland[J]. Discourse: Studies in the Cultural Politics of Education, 2022, 43(1).
- [5] Ibrayeva Laura. Educational reform and internationalisation: the case of school reform in Kazakhstan[J]. Educational Review, 2022, 74(1).
- [6] Miyamoto Yuichi. Wilhelm von Humboldt's; Bildung; theory and educational reform: reconstructing; Bildung; as a pedagogical concept[J]. Journal of Curriculum Studies, 2022, 54(1).

- [7] Tareen Sher Afgan. Policy Patrons: Philanthropy, Education Reform, and the Politics of Influence by Megan E. Tompkins-Stange (review)[J]. Journal of Education in Muslim Societies,2022,1(1).
- [8] Haddad Nabih. Policy patrons: Philanthropy, education reform, and the politics of influence (review)[J]. Philanthropy & Education,2022,2(1).
- [9] Dilworth Mary E.. Historically Black Colleges and Universities in Teacher Education Reform[J]. Journal of Negro Education,2022,81(2).
- [10] Walker Vanessa Siddle. The 2014 Charles H. Thompson Lecture-Colloquium Presentation. School "Outer-gration" and "Tokenism": Segregated Black Educators Critique the Promise of Education Reform in the Civil Rights Act of 1964[J]. Journal of Negro Education,2022,84(2).