Hindawi
Security and Communication Networks
Volume 2023, Article ID 9794571, 1 page
https://doi.org/10.1155/2023/9794571

Retraction

Retracted: Virtual Digital Communication Feature Fusion Based on Virtual Augmented Reality

Security and Communication Networks

Received 5 December 2023; Accepted 5 December 2023; Published 6 December 2023

This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] X. Zhang, "Virtual Digital Communication Feature Fusion Based on Virtual Augmented Reality," *Security and Communication Networks*, vol. 2022, Article ID 6345236, 7 pages, 2022.

Hindawi
Security and Communication Networks
Volume 2022, Article ID 6345236, 7 pages
https://doi.org/10.1155/2022/6345236

Research Article

Virtual Digital Communication Feature Fusion Based on Virtual Augmented Reality

Xi Zhang

Lanzhou Jiaotong University,Lanzhou, Gansu 730070, China

Correspondence should be addressed to Xi Zhang; 201636310127@zjnu.edu.cn

Received 3 March 2022; Revised 27 March 2022; Accepted 4 April 2022; Published 23 April 2022

Academic Editor: C. Venkatesan

In order to have a deeper understanding of the integration of virtual digital communication characteristics, it is studied and combined with virtual augmented reality technology. The progress of science and technology has promoted the development and progress of virtual reality technology. In recent years, virtual reality technology has been more and more widely used in digital media art creation and plays an important role in improving the quality of digital media art. This study introduces digital media art and virtual reality technology and analyzes the specific measures and practical significance of the application of virtual reality technology in digital media art creation. As an emerging technology, virtual reality technology has certain advantages. Its application in digital media art creation can effectively make up for the shortcomings of traditional creation and realize the innovation and reform of art creation.

1. Introduction

With the continuous improvement of people's requirements for the quality of life, people put forward higher requirements for artistic creation. Taking digital media art creation as an example, the forms and methods of art creation should keep pace with the times, constantly meet people's actual needs, and deal with the real-time changes of the market so as to make artworks stand out in the art market and comprehensively improve the quality of art creation. The emergence and application of virtual reality technology obviously provide a new choice for digital art creation [1]. Virtual reality technology establishes an artificially constructed three-dimensional virtual environment. Users interact and influence with objects in the virtual environment in a natural way, which greatly expands the ability of human beings to understand, simulate, and adapt to the world. Virtual reality technology began to rise from the 1960s to the 1970s and began to form and develop in the 1990s. It has solved some major or universal needs in many application fields, such as simulation training, industrial design, and interactive experience. At present, great progress has been made in theory, technology, and application. The main scientific problems of virtual reality include three categories: modeling methods, presentation technology, and human-computer interaction and equipment. However, at present, there are many problems, such as large modeling workload, high simulation cost, insufficient matching with the real world, and credibility. To solve these problems, a variety of virtual reality enhancement technologies have emerged, which match and synthesize the virtual environment and the real **environment** to achieve enhancement. The technology of overlaying the three-dimensional virtual object to the real world display is called augmented reality, and the technology of overlaying the information of the real object to the virtual environment drawing is called enhanced virtual environment [2]. These two kinds of technologies can be vividly described as "virtual in reality" and "virtual reality enhancement." Virtual reality enhancement technology reduces the workload of 3D modeling through the synthesis of the real world and virtual environment, improves the sense of user experience and credibility with the help of real scenes and objects, and promotes the further development of virtual reality technology. Search popularity represents the public's attention to the word. Generally speaking, new technologies will cause a search climax, then slowly decline, a surge in technology breakthroughs or a hot event, and finally stabilize. We compared the global search popularity of virtual reality, augmented reality, augmented virtual environment, and hybrid reality. For reference, we took human-computer interaction (HCI) [3, 4]. The comparison of search results is shown in Figure 1. It can be seen that, like human-computer interaction, the search popularity of virtual reality gradually decreases and tends to be stable, which shows that virtual reality technology is maturing and gradually being accepted by the public.

2. Literature Review

N Radziwill et al. said that virtual reality technology is literally a technology for virtual reality, which can also be called VR technology. This technology mainly realizes the simulation and restoration of real scenes with the help of computer technology and Internet equipment. Figure 2 shows the application flowchart of virtual reality technology. Users can enter various virtual scenes and obtain real sensory experiences under the application of virtual reality technology [5]. Wei W. et al. believe that virtual reality technology is actually divided into multiple branches, among which sensor technology is the most commonly used technical form. Virtual reality technology has three main characteristics: immersion, interaction, and imagination. Immersion means that users will be immersed in the virtual scene, and everyone's immersion degree is different. Users with high immersion degrees will not even be affected by the external environment and will obtain strong sensory impact and visual enjoyment in the virtual scene. Interactivity is communication and interaction. Users can normally communicate and interact with others in the virtual reality scene and even have a certain impact on people's behavior to enhance the realism of virtual reality. Imagination, that is, virtual reality technology, reserves enough imagination space for users. Users can simulate personal imaginary scenes, characters, or scenes in the virtual space according to their personal imagination [6]. Cannavo A. et al. believe that, based on the technical advantages of virtual reality technology, the application of virtual reality technology to digital media art creation will be the inevitable trend in the development of digital media art creation and inject more fresh blood into art creation [7]. Tao X. M. et al. said that virtual reality technology has been widely used in all walks of life, from education and medicine to sales and film and television production. The visual feast and sensory impact brought by virtual reality technology are unmatched by any other technical form, so there are differences in work processing between this technology and traditional technology [8]. Cao C. et al. [9] believe that traditional audio and video processing equipment lacks basic interactivity, and virtual reality technology can just make up for the shortcomings of traditional audio and video processing technology and integrate VR and AR technology to seek greater benefits for operators. The working principle of computer network processing technology is mainly integrated cloud computing technology. The working principle of AR technology and VB technology is the same [9]. Keighrey C. et al. believe that, in the context of cloud computing, computer networks have broader technical support, allowing users to get a more sense of network interaction. To some extent, the sense of interaction is a form of expression of the vitality of artistic works, which can make artistic works appear in front of the viewer in a more vivid form, so that the viewer can really enjoy the experience of fitting into real life [10]. Colin J. et al. said that the integration of virtual reality technology and digital media art creation is the inevitable result of the development of the industry. Virtual reality technology can continuously improve the technical level in practice, and digital media art creation can also enrich its art forms and achieve more long-term development in the process of integration with virtual reality technology [11]. J Barhorst believes that the realistic role of virtual reality technology in digital media art creation is mainly reflected in three aspects: enriching its art form, integrating the virtual and real worlds, and improving its visual impact [12]. Vergel R. S. et al. said that the most commonly used technology type in virtual reality technology is sensor technology. Integrating digital media art creation into the computer, Internet, and sensor technology can give digital media art creation more visual impact. Dynamic vision is realized and completed with the help of this principle. It not only realizes the image art of digital media art creation works but also realizes the visual impact art of digital media art creation [13]. Ermakova T. et al. believe that the key to judging whether an artistic work is ornamental lies in the fit between the work and the real world, whether the artistic form of expression of the work is novel, and whether the viewer can realize two-way emotional communication when viewing the work and the visual impact of the work. Improving the visual impact of digital media art works is one of the keys to break through the limitations of art creation, and it is also an important demand for artworks. Virtual reality technology can help digital media art creation create a strong visual impact [14].

3. Methods

The following is the technical analysis of augmented reality and augmented virtual environments. It should be noted that the "camera" here refers to the visual acquisition equipment in a broad sense, including not only the camera but also the infrared depth camera and laser scanner. Augmented reality technology can stably and consistently project 3D virtual objects into user viewports through real-time continuous calibration of motion cameras or wearable display devices, so as to achieve the performance effect of "virtual in reality" [15]. As shown in Figure 3, the real world is our physical space or its image space, in which the person and the erected VR card are virtual objects. With the change of viewpoint, the virtual object also carries out a corresponding projection transformation so that the virtual object looks like it is located in the three-dimensional space of the real world. The dotted line objects in Figure 3 and 4 represent virtual environment objects, and the solid line objects represent real objects or their images. Augmented reality also has a special branch called spatial augmented reality or projection augmented model, which directly projects the

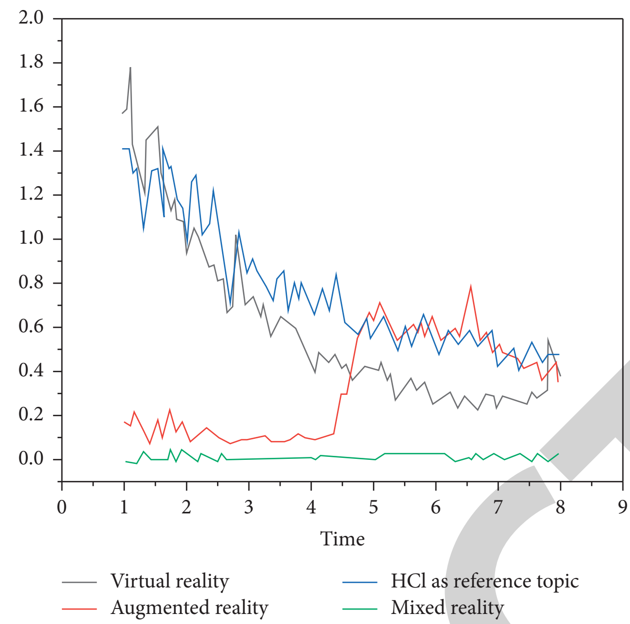

Figure 1: Statistical comparison of search volume of virtual reality, augmented reality, and hybrid reality.

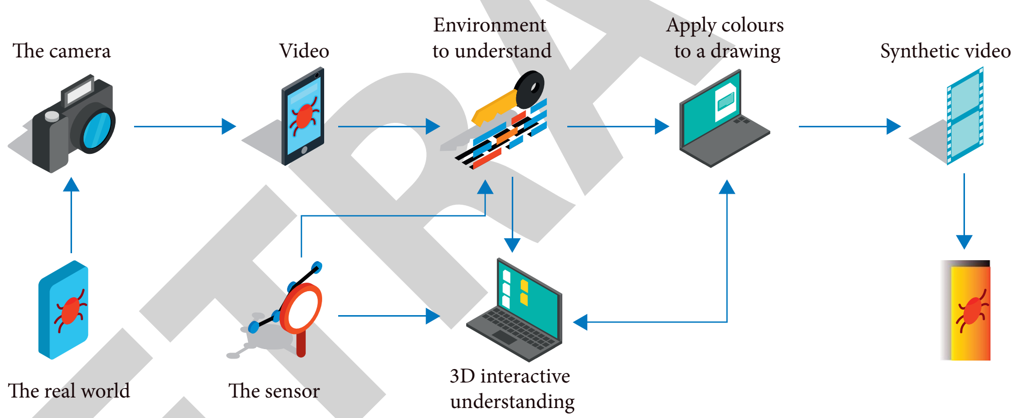

Figure 2: Application flowchart of virtual reality technology.

computer-generated image information onto the precalibrated physical environment surface, such as a curved surface, dome, building, and a group of real objects with fine motion control,. [16–18]. In essence, spatial augmented reality is to project the virtual object generated by calibration to the complete area of the present real world as the surface texture of the real environment object. Different from the traditional augmented reality in which the user wears the camera or display device, this method does not require the user to carry hardware equipment and can support multiple people to participate at the same time, but its performance is limited to the given object surface, and because the projection texture is viewpoint independent, it is slightly insufficient in interactivity [19].

The enhanced virtual environment technology establishes the three-dimensional model of the virtual environment in advance, extracts the two-dimensional dynamic image or three-dimensional surface information of the real object through the prior or real-time calibration of the camera or projection device, and integrates the object image area or three-dimensional surface into the virtual environment in real time, so as to achieve the performance effect of "virtual in reality" [20]. As shown in Figure 4, real-time images from the real world appear in the virtual environment, in which the texture on the VR card and the human body are from the images collected by the camera, and the human body can even be a real-time three-dimensional object with a surface texture image. Contrary to the projection enhancement model technology in augmented reality, there is also a corresponding technology in enhanced virtual environment technology. The image collected by the camera covers the whole virtual environment; that is, as the texture of the virtual environment model, users can carry out interactive 3D browsing with high realism. When this three-dimensional model is the inner surface of spherical, cylindrical, cube, and other general shapes, this technology is now

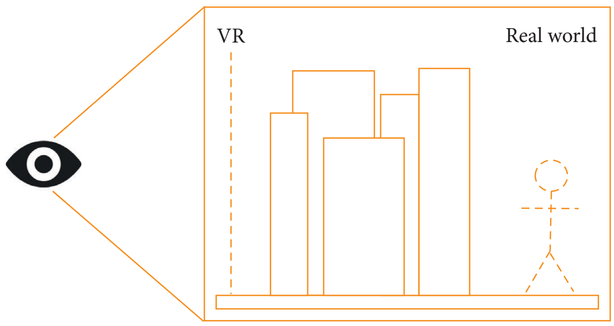

Figure 3: Augmented reality technology "virtual in reality."

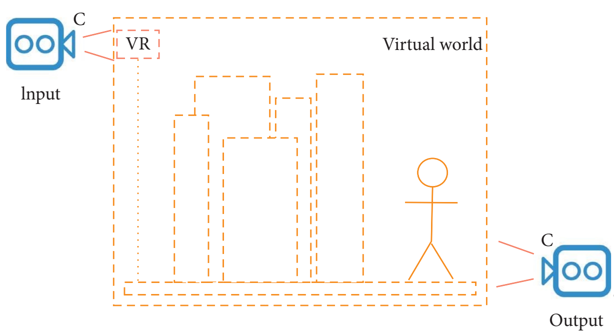

Figure 4: Enhanced virtual environment technology "virtual in reality."

very popular for panorama pictures or videos [21–23]. Panoramic video projects a fisheye or multiple conventional images from the real world onto the three-dimensional model to construct a single-point omni-directional fusion effect. The stitching between multiple images can be image feature point matching or camera precalibration. This enhancement method can reflect the spatial geometric relationship of various images in the same place. Users can browse the panorama freely, just like in the scene, resulting in a more realistic virtual environment effect [24].

4. Results and Analysis

The integration of content carriers is the inevitable result of the vertical division of media-driven by digital technology. Content carrier integration means that, under the condition of mature digital technology and the possibility of taking digital technology as an application technology at both production port and consumption port, the whole industrial system from production to consumption forms a connected whole with digital technology. The maturity of digital technology makes the original contents of various forms become two simple pulse signals, "0" and "1." Text, image, and sound can be transformed into digital form through coding technology. More importantly, digital technology breaks the barriers between printing, radio waves, and new media so that the production and exchange of content can be carried out on a common platform [25]. Content carrier integration is expressed in the form of specialized production of media content. Specialized content production breaks the original clear-cut ownership of media content. Content production institutions comprehensively use multimedia digital technology to produce and process various media products, no matter what form of media products will be stored and transmitted by digital carriers. On the communication channels and receiving terminals, the combination of media content is more in line with the sensory characteristics of human information reception [26].

4.1. Unified Information Carrying Mode of Digital Communication Technology. From the definition of content carrier fusion, it can be seen that the primary premise of content carrier fusion is the digitization of communication content, and the essence of digitization is to encode and express various content forms with unified digital pulse signals. Compared with the media content bearing mode in the predigital technology period, digital media has strong universality. No matter which kind of traditional media has limitations in media integration carrier technology, newspapers can only carry printed texts and pictures; broadcasting can only carry sound, even the most powerful TV media can only be said to have the "multidimensional" form of communication content [27].

The digitization of content refers to the conversion of text, image, sound, and other media content into the result of coding with "0" and "1" symbols after sampling and quantization. "0" and "1" here can be expressed by various physical quantities, such as current, voltage, and light. In different environments, modern information technology can realize the conversion between different physical quantities, such as photoelectric conversion; that is, digital signals have relative universality. Since the current information technology has reached a high level in the physical signal level, the application level does not need to pay too much attention to the physical signal carrier. In the field of information technology, this operation mode is called "transparency" of the physical layer to the application layer [28]. With the help of the transparent physical layer, as a communication technology at the application level, more attention is paid to the two logical variables "0" and "1," and the digital content is unified as a bearing method of "0" and "1" coding. The digital content bearing mode is shown in Figure 5.

At the application level, digital communication technology can realize the following: digital storage of media content, retrieval, query and browsing of digital materials, reprocessing and reuse of media content, and digital network management of media content and e-commerce of content materials. Based on the unified characteristics of the digital information bearing mode, the significance of media content digitization is that the media content created at one time can be fully utilized in different physical forms and different environments.

4.2. Technical Barriers to Media Content Conversion Disappear. The traditional way of dividing the media population according to content product carrier cannot adapt to the development of communication technology. The corresponding relationship between the traditional content product carrier and the corresponding media organization engaged in content production is deconstructed.

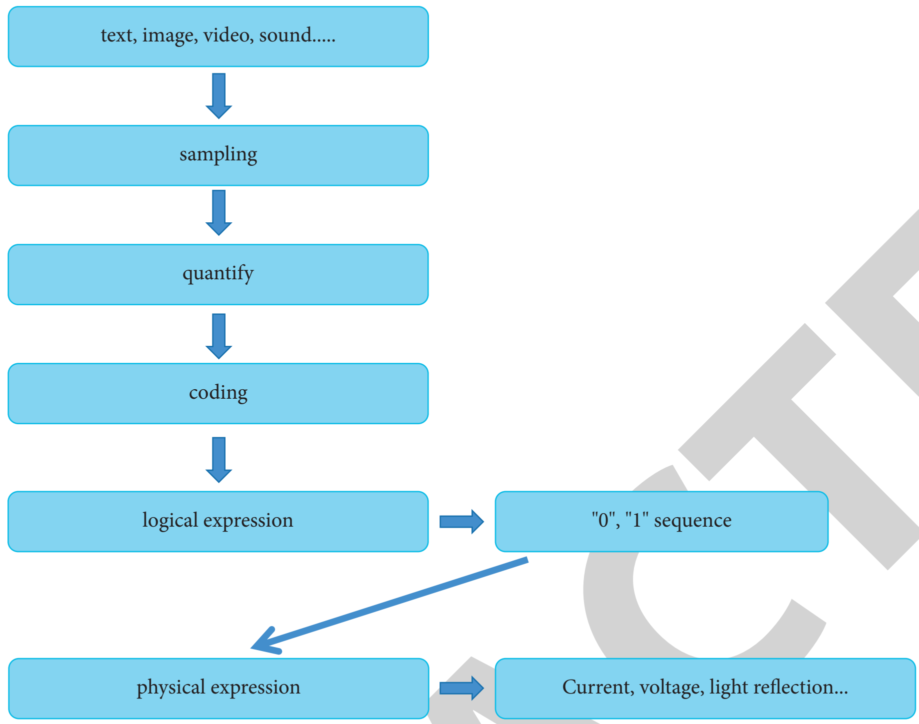

Figure 5: Digital content bearing mode.

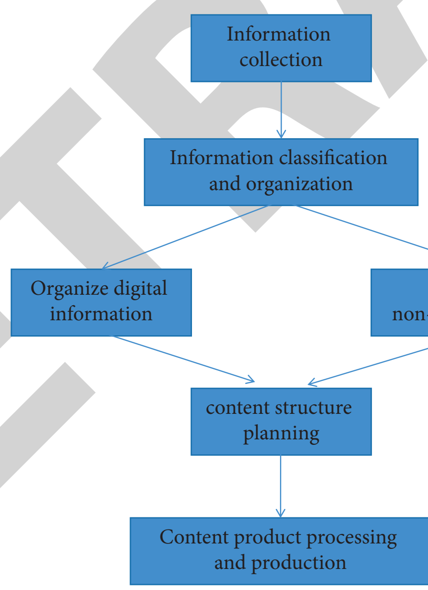

Figure 6: Operation process of Tampa mode.

The process design and department division of internal production of traditional media have changed, and the media organization across traditional media has gradually emerged and evolved to the media organization of media integration. Content production may be independent from media organizations (media enterprises) to form the upstream industry of media integration, the content industry [29]. Websites, TV stations, and newspapers produce news under one office platform to realize resource sharing and content optimization among different media, so as to maximize the effect of news communication. “Tampa mode” is gradually being promoted all over the world and has become the main manifestation of media integration in the content production port at this stage. The operation process of Tampa mode is shown in Figure 6.

After collecting, sorting out, and digitizing information materials, the planning of content structure on the production platform is a work that traditional media organizations (media enterprises) cannot complete. The unified working platform for dealing with various forms of media content products can

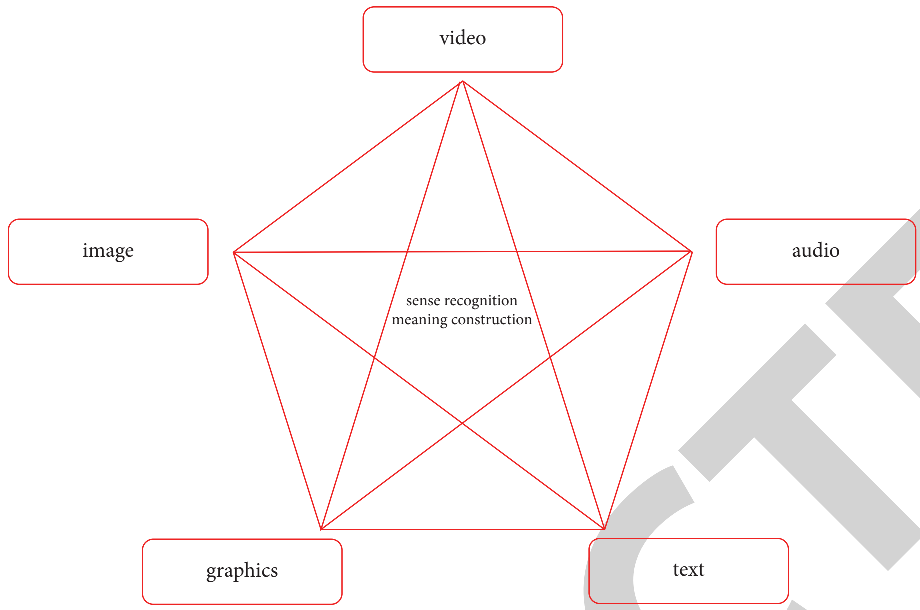

Figure 7: The technical logic model of intelligent recognition transformation.

select the most favorable content form according to the obtained information materials. Media content form planning can be divided into two technical stages: the man-machine recognition stage and the intelligent computer recognition stage. In the stage of man-machine recognition, although various media contents can be digitized through digital communication technology, it needs human recognition and understanding to realize the transformation among different digital contents [30]. In the intelligent computer recognition stage, the transformation of digital media content can be completed by computers with semantic recognition and reengineering ability, and various content forms can realize efficient transformation. In the intelligent recognition stage, the process of editing and watching videos into text will be completed by the computer. At present, this technology has entered the experimental stage. Figure 7 describes the technical logic model of intelligent recognition and transformation between various content forms.

There are two points to note from Figure 7: first, the current multimedia technology mainly solves the audio-visual problem, and Figure 7 only lists the conversion of audio-visual content. With the development of holographic technology, sensory fusion communication will need the assistance of other sensory media. Olfactory, tactile, and taste media will also be able to record, store, transmit, and display with the help of communication technology, and the form planning of media content will be more complex. Second, the transformation of media content form is based on the information carried by the content. Therefore, the content transformation system can only realize the transformation from high information content to low information content without external information injection. For example, the video content with high information can be accurately transformed into text content, while on the contrary, the text content is difficult to be accurately transformed into video content.

5. Conclusion

Augmented virtual environment technology has developed slowly and has not been recognized by the public such as augmented reality. Different from augmented reality technology, this technology uses "canvas" instead of a realistic 3D virtual environment, which is difficult to achieve good enhancement effect with the 2D video images and other information. In addition to the key technical problems of acquisition device and modeling accuracy, the existing methods cannot achieve realistic synthesis effects, such as the correct occlusion relationship of virtual and real objects, the fusion processing of virtual and real illumination effects, and the theoretical problems of multisensor data fusion. Enhancing virtual environment technology also needs in-depth research, which needs to be promoted by the breakthrough of the above key technologies and new hardware devices. In general, there has been significant progress in the theoretical research, system development, and application promotion of virtual reality enhancement technology, especially since the arrival of the mobile Internet era, which has brought broad application groups and rapid technological progress to enhancement technology. At the same time, the unbalanced development of virtual reality enhancement technology has also brought a large number of problems to be solved in this field.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

This work was supported by the Humanities and Social Science Fund of the Ministry of Education project "The Transmution of the National Image: A Study on the Cultural Identity of the Silk Road Documentary," in 2018.

References

[1] J. Jang, Y. Ko, W. S. Shin, and I. Han, "Augmented reality and virtual reality for learning: an examination using an extended technology acceptance model," *IEEE Access*, vol. 9, p. 1, 2021.

[2] J. H. Park and B. Lee, "Holographic techniques for augmented reality and virtual reality near-eye displays," *Light: Advanced Manufacturing*, vol. 3, no. 1, pp. 1–14, 2022.

[3] X. Zhou, L. Tang, D. Lin, and W. Han, "Virtual & augmented reality for biological microscope in experiment education," *Virtual Reality & Intelligent Hardware*, vol. 2, no. 4, pp. 316–329, 2020.

[4] X. Yu, Z. Xie, Y. Yu, J. Lee, and A. Vazquez-Guardado, "Skin-integrated wireless haptic interfaces for virtual and augmented reality," *Nature*, vol. 575, no. 7783, pp. 473–479, 2019.

[5] N. Radziwill, "Quality considerations for ethical design of virtual and augmented reality," *Software Quality Professional*, vol. 21, no. 4, pp. 34–46, 2019.

[6] W. Wei, "Research progress on virtual reality (vr) and augmented reality (ar) in tourism and hospitality," *Journal of Hospitality and Tourism Technology*, vol. 10, no. 4, pp. 539–570, 2019.

[7] A. Cannavo and F. Lamberti, "How blockchain, virtual reality and augmented reality are converging, and why," *IEEE Consumer Electronics Magazine*, vol. 10, no. 5, p. 1, 2020.

[8] M. Taox, "Virtual and augmented reality enhanced by touch," *Nature*, vol. 575, no. 7783, pp. 453-454, 2019.

[9] C. Christopher and J. C. Robert, "Virtual or augmented reality to enhance surgical education and surgical planning," *Thoracic Surgery Clinics*, vol. 29, no. 3, pp. 329–337, 2019.

[10] C. Keighrey and R. Flynn, S. Murray and N. Murray, A physiology-based qoe comparison of interactive augmented reality, virtual reality and tablet-based applications," *IEEE Transactions on Multimedia*, vol. 23, p. 1, 2020.

[11] C. J. McCarthy and R. N. Uppot, "Advances in virtual and augmented reality—exploring the role in health-care education - sciencedirect," *Journal of Radiology Nursing*, vol. 38, no. 2, pp. 104-105, 2019.

[12] J. Brannon Barhorst and G. McLean, E. Shah and R. Mack, Blending the real world and the virtual world: exploring the role of flow in augmented reality experiences," *Journal of Business Research*, vol. 122, pp. 423–436, 2021.

[13] R. S. Vergel, P. M. Tena, S. C. Yrurzum, and C. Cruz-Neira, "A comparative evaluation of a virtual reality table and a hololens-based augmented reality system for anatomy training," *IEEE Transactions on Human-Machine Systems*, vol. 50, no. 4, pp. 337–348, 2020.

[14] T. Ermakova, A. Hohensee, I. Orlamünde, and B. Fabian, "Privacy-invading mechanisms in e-commerce - a case study on German tourism websites," *International Journal of Networking and Virtual Organisations*, vol. 20, no. 2, pp. 105–126, 2019.

[15] W. P. Walters, "Virtual chemical libraries," *Journal of Medicinal Chemistry*, vol. 62, no. 3, pp. 1116–1124, 2019.

[16] B. An, F. M. Elstein, and W. Sang, "New applications of numerical simulation based on lattice Boltzmann method at high Reynolds numbers," *Computers & Mathematics with Applications*, vol. 79, no. 6, pp. 1718–1741, 2020.

[17] L. H. Kauffman, "Virtual logic-laws of form and the transfinite ordinals," *Cybernetics and Human Knowing*, vol. 26, no. 1, pp. 73–90, 2019.

[18] S. Okolo, "Can virtual reality improve the health of older sports fans?" *IEEE Potentials*, vol. 38, no. 3, pp. 17–19, 2019.

[19] L. J. Zhang, J. Peng, S. Y. Wu et al., "Liver virtual non-enhanced ct with dual-source, dual-energy ct: a preliminary study," *European Radiology*, vol. 20, no. 9, pp. 2257–2264, 2020.

[20] S. Park, Y. I. Kim, and H. Nam, "Foveation-based reduced resolution driving scheme for immersive virtual reality displays," *Optics Express*, vol. 27, no. 21, pp. 29594–29605, 2019.

[21] J. Woo and J. Ih, "Generation of a virtual speaker and baffle on a thin plate controlled by an actuator array at the boundary," *IEEE*, vol. 24, no. 3, p. 1, 2019.

[22] G. A. Heckman, K. Kay, A. Morrison et al., "Proceedings from an international virtual townhall: reflecting on the covid-19 pandemic: themes from long-term care," *Journal of the American Medical Directors Association*, vol. 22, no. 6, pp. 1128–1132, 2021.

[23] C. Booz, J. Nske, L. Lenga, S. S. Martin, and J. L. Wichmann, "Color-coded virtual non-calcium dual-energy ct for the depiction of bone marrow edema in patients with acute knee trauma: a multireader diagnostic accuracy study," *European Radiology*, vol. 30, no. 1, pp. 141–150, 2020.

[24] G. Foti, A. Beltramello, M. Catania, S. Rigotti, G. Serra, and G. Carbognin, "Diagnostic accuracy of dual-energy ct and virtual non-calcium techniques to evaluate bone marrow edema in vertebral compression fractures," *La radiologia medica*, vol. 124, no. 6, pp. 487–494, 2019.

[25] A. Sanchez-Macian, L. A. Aranda, P. Reviriego, V. Kiani, and J. A. Maestro, "Enhancing instruction tlb resilience to soft errors," *IEEE Transactions on Computers*, vol. 68, no. 2, pp. 214–224, 2019.

[26] J. S. Yun and J. Y. Sim, "Virtual point removal for large-scale 3d point clouds with multiple glass planes," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 43, no. 2, p. 1, 2019.

[27] C. Wei, L. Yang, Z. Huang, and L. Guo, "Research on the propagation characteristics of thz waves in spatial inhomogeneous and time-varying and weakly ionized dusty plasma," *IEEE Transactions on Plasma Science*, vol. 47, no. 10, pp. 4745–4752, 2019.

[28] W. Tang, H. Cha, M. Wei, B. Tian, and Y. Li, "A study on the propagation characteristics of ais signals in the evaporation duct environment," *Applied Computational Electromagnetics Society Journal*, vol. 34, no. 6, pp. 996–1001, 2019.

[29] H. U. Xiao-Yan, L. Jin, K. Z. Huang, Z. Zhong, and S. J. Zhang, "Physical layer secret key generation scheme based on signal propagation characteristics," *Tien Tzu Hsueh Pao/Acta Electronica Sinica*, vol. 47, no. 2, pp. 483–488, 2019.

[30] J. I. Katsuta, S. Yamashita, H. Ogata et al., "Fracture toughness and fatigue crack propagation characteristics at bonded interface of duplex stainless-clad steel plate for chemical tankers," *Journal of High Pressure Institute of Japan*, vol. 57, no. 1, pp. 4–12, 2019.