The Application and Innovation of Virtual Reality Technology in Network Media

Tong Zheng[a], Xin Shuo Feng[b*]

College of Humanities and Arts, Shenyang University of Chemical Technology, Shenyang, Liaoning, China

Abstract. virtual reality is a technology that can create virtual environments and provide users with an immersive experience. Its features include the creation and presentation of immersive experiences, real-time interactions, and more. In the application of online media, VR technology breaks the limitations of traditional media and brings audiences a brand new artistic experience. However, current VR technology still faces challenges such as high equipment costs, limited mobility and portability, lack of adaptability, and sports fatigue. To address these challenges, it is necessary to find solutions, including reducing device costs, improving mobility and portability, improving user experience, and so on. These solutions will promote the popularization and further development of VR technology.

1. The connotation and characteristics of VR technology

1.1. The connotation of VR technology

Virtual Reality, (VR), is a technology that creates virtual environments in the human perceptual system and gives the user an immersive experience. Through the use of specialised equipment, such as Head-Mounted Displays (HMDs) and joysticks, users can interact with virtual environments. VR technology creates immersive virtual experiences by simulating the senses of sight, sound and touch[1]. When a user puts on a VR headset, they will be completely surrounded by a computer-generated virtual environment and can feel as if they are there. Through VR technology, users can experience and participate in various scenes and activities in the virtual environment, providing a more immersive experience and interaction[2].

1.2. Characteristics of VR Technology

Virtual reality technology is based on new scientific and technological means, and VR technology brings users a unique virtual experience, allowing people to explore and interact with the virtual world, surpassing the limitations of traditional media and flat screens. Virtual reality technology has the following main characteristics[3].

1.2.1. Immersive experience

Through head mounted displays and other interactive devices, users can fully immerse themselves in the virtual environment, feeling as if they are immersed in it. This immersive feeling can enhance the user's emotional participation and experience.

1.2.2. Real-time interactivity

Users can interact with the virtual environment in real-time through controllers, gesture recognition, and other interactive devices. They can touch, grasp, manipulate virtual objects, interact with virtual characters, and explore different areas of the virtual environment.

1.2.3. Multi-sensory stimulation

VR technology can simulate various sensory experiences, including visual, auditory, and tactile senses. Through directional audio, vibration feedback, and tactile gloves, users can experience realistic sound, touch, and motion.

1.2.4. Creating and presenting virtual environments

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2. The Application of VR Technology in Network Media

The application and innovation of VR virtual reality technology in online media are receiving increasing attention. With the continuous progress of technology, VR has become a hot topic in many industries, especially in the media field. Through VR technology, users can immerse

[a]email: 105958187@qq.com, [b*]email: 1205680101@qq.com

themselves in various imaginative scenes, breaking the spatial and temporal limitations of traditional media and bringing a brand new immersive experience to the audience[4].

2.1. The Application of Virtual Reality Technology in Visual Arts

Virtual reality technology has a wide range of applications in visual art, providing viewers with immersive and interactive artistic experiences. A notable case is "Tilt Brush" in Google's Art and Culture project(Figure 1). Tilt Brush is a virtual reality drawing tool developed by Google that immerses artists in a virtual environment, allowing them to create 3D art works using their controllers. With Tilt Brush, artists can freely draw, create three-dimensional patterns, graffiti, and create unique and exquisite artistic creations in virtual spaces.

Figure 1. Tilt Brush, a virtual reality drawing tool developed by Google.

This virtual reality environment is completely different from traditional painting, providing viewers with an immersive experience, allowing them to feel the beauty and creativity of artistic works. The emergence of TiltBrush breaks the limitations of traditional painting, allowing artists to freely create in virtual spaces and share their creativity and ideas with the audience. In addition, this creative approach also provides the audience with the opportunity to interact with the artwork, allowing them to freely rotate their heads, observe different angles of the artwork, and even interact with virtual particles and elements. Overall, through virtual reality technologies such as TiltBrush, artists are able to create in a completely new way, bringing viewers into an imaginative virtual world, providing them with opportunities to interact with artworks, and creating a unique visual art experience.

2.2. The Application of Virtual Reality Technology in Sound Art

There are many applications of virtual reality technology in sound art, and one interesting case is "Gloomy Eyes"(Figure 2). "Gloomy Eyes" is a virtual reality animated short film that combines virtual reality technology with sound art to create an immersive artistic experience. "Gloomy Eyes"is an animated trilogy and emotional story, with fantasy animated 3D models revolving around you. The nostalgic and heartwarming story of chasing a zombie boy Gloomy and a human girl Nena who dares to play with love. Their scattered love may just be the last seed of hope. Premiered at the Sundance Film Festival (2019), won the "Best VR Experience" award at the Anastasy International Animation Film Festival (2019), and won the "Storytelling Jury Award" at SXSW (2019). Through virtual reality headsets, the audience can enter this dark world and experience the development of the story as an observer. In "Gloomy Eyes" sound is carefully used to enhance emotions and atmosphere. The audience hears the dialogues of the characters, the sound effects in the environment, and the sad music, all of which add depth and emotion to the story plot. Virtual reality technology provides new possibilities for sound art. By utilizing location-based audio and 3D sound effects technology, viewers can experience the effects of sound coming from different directions and distances, creating a sense of being present in the environment. This immersive sound experience can better convey the emotions and atmosphere of the story, allowing the audience to have a deeper understanding and experience of the artwork. In general, the application of virtual reality technology in sound art can enhance the audience's artistic experience by creating immersive sound environments and implementing targeted audio technology[5]. "Gloomy Eyes" is a great example of how to create unique and unforgettable works of art through the combination of virtual reality and sound art.

Figure 2. "Gloomy Eyes"

2.3. The application of virtual reality technology in interactive and experiential art

Virtual reality technology has a wide range of applications in interactive and experiential art, such as the works of MeowWolf(Figure 3). The MeowWolf art team combined virtual reality technology and interactive exhibitions to create an art experience called "The House of Eternal Return". This is an interactive device with a surreal theme, allowing the audience to freely explore and participate in it. In "House of Eternal Return", the audience enters a seemingly ordinary door of a house, but once inside, they discover a world full of supernatural elements and magical landscapes. Through virtual reality headsets and interactive devices, viewers can interact with elements in the virtual environment, such as touching, dragging objects, solving puzzles, and generating sound effects. This interactive and experiential art form has attracted a large audience and sparked their exploration and surprise. Viewers can explore this art installation based on their own interests and

curiosity, and each person's experience is unique. The application of virtual reality technology allows viewers to interact with artworks in an immersive way, creating an immersive artistic experience. This case demonstrates the potential of virtual reality technology in interactive and experiential art. By combining virtual reality, interactive installations, and creative art design, artists can present a unique and highly interactive artistic experience to the audience. This creative approach breaks the distance between traditional art and the audience, bringing them into a world of wonder and interaction in art.

Figure 3. "The House of Eternal Return"

The application and innovation of VR technology in online media is a constantly evolving field. It not only brings viewers a richer and more diverse viewing experience, but also endows the media industry with more creative possibilities. With the advancement and popularization of technology, it is believed that VR technology will play a more important role in online media in the future, bringing audiences a more exciting media experience.

3. Challenges and solutions in the current application of VR technology

3.1. Current challenges

Although VR technology has many innovative applications and enormous potential in online media, there are also some problems that need to be solved with the development and progress of technology, which will further promote the development and popularization of VR technology[6].

3.1.1. High equipment costs

The price of VR devices is still relatively high, which limits the purchase and use of general users. This includes the cost of hardware devices such as head mounted displays, motion capture devices, and controllers, as well as the demand for high-performance computers compatible with VR technology. This still limits VR technology to specific fields and user groups.

3.1.2. Limited mobility and portability

Some high-end VR devices require connection to computers, or due to the limited mobility and portability of the device's connection cables and sensor sensing range, it may lead to inconvenience in movement or potential collision hazards. At the same time, it also limits the user's realism and freedom in the virtual environment. Although some independent VR devices have emerged, their functionality and performance are relatively limited.

3.1.3. Inadaptation and exercise fatigue

Long term use of VR devices may lead to discomfort reactions such as exercise fatigue, dizziness, and nausea, which are caused by the user's perception not being synchronized with actual physical movements. Especially for those who are prone to motion sickness or seasickness, it limits the time users can continue to use VR devices.

3.1.4. Shortcomings in content quality and quantity

Although there have been some excellent VR applications and content, the quality and quantity of VR content are still limited compared to traditional media. Especially in the fields of movies, games, and education, there is still a need for more development and promotion of excellent VR content.

3.1.5. Privacy and data security issues

The sensors and cameras used in VR technology may collect user action and visual data, and the user's personal privacy may be violated. For users, privacy and data security are important considerations that require relevant enterprises and institutions to ensure the security of user data and the protection of privacy rights.

3.2. Solution

3.2.1. Regarding the issue of high equipment costs

In response to the high cost of equipment, more cooperation opportunities and resource investment can be sought to further reduce the price of VR equipment. For example, cooperation with mobile phone manufacturers can be explored to integrate VR technology into smartphones, allowing users to use smartphones with simple VR headsets to achieve an entry-level VR experience. In addition, subscription or rental models can be adopted to allow users to obtain VR devices at a lower cost and enjoy related services.

3.2.2. Addressing limited mobility and portability issues

To address the problem of limited mobility and portability, lighter and more portable VR devices can be developed to expand the functions and performance of stand-alone VR devices. Develop VR devices with wireless connection to eliminate the limitation of connecting wires, so that users can move and operate more freely. At the same time, utilise indoor positioning technology to accurately map the

user's position in the virtual environment to the real space, and provide sufficient warning through the device to prevent collision or going out of bounds. This will increase the user's sense of realism and freedom in the virtual environment while providing a safer experience of use.

3.2.3. Targeting issues of maladaptation and exercise fatigue

By improving and optimizing the display and rendering technology of VR devices to address issues of discomfort and exercise fatigue, it is possible to reduce user motion dizziness. For example, using higher refresh rates and lower response times to provide a smoother and more realistic sports experience. In addition, eye tracking technology and personalized customization algorithms can be used to dynamically adapt to users' exercise habits, further reducing the impact of motion dizziness.

3.2.4. Addressing the issue of insufficient content quality and quantity

To address the issue of insufficient content quality and quantity, open standards and cross platform compatibility should be implemented to promote the development and promotion of VR industry standards, achieve device interoperability and content universality. This will promote compatibility between devices and provide more diverse VR content choices. Encourage developers to use open platforms and tools to lower the threshold for content creation, stimulate creativity and diversity.

The above creative ideas can help overcome the problems in the current application of VR virtual reality technology and promote its wider application and popularization (Figure 4). With the continuous evolution and innovation of technology, it is believed that more solutions will emerge to promote the development and popularization of VR technology.

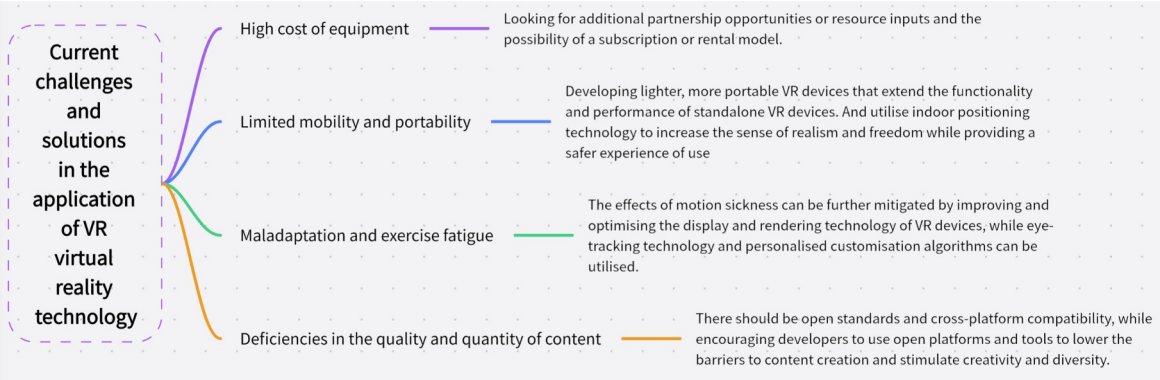

Figure 4. Current challenges and solutions in the application of VR virtual reality technology

4. Peroration

VR virtual reality technology can create virtual environments that give users an immersive experience and bring new art experiences to audiences. However, issues such as high cost, portability, user discomfort and content shortages remain to be addressed. Addressing these challenges requires lowering costs, improving user experience, enriching content, and enhancing privacy protection and security measures. Investing in R&D, improving performance, and developing regulations and standards can drive the development of VR technology and bring better experiences to users.

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