Advances in Social Science, Education and Humanities Research, volume 341
5th International Conference on Arts, Design and Contemporary Education (ICADCE 2019)

# Current Situation, Dilemma and Development Trend of Virtual Reality Animation*

Junqiang Hu
College of Design and Innovation
Fujian Jiangxia University
Fuzhou, China 350108

***Abstract*—Virtual reality technology promotes animation to enter an unprecedented stage of artistic perception, especially the subversive revolution of virtual display equipment brings a new thinking to animation creation. In this paper, starting with the development and application of virtual reality animation and the application of virtual reality projects, the problems faced by virtual reality animation are discussed, and the corresponding improvement methods are put forward. Finally, the future development trend of virtual reality animation is prospected.**

***Keywords—virtual reality animation; current situation; dilemma; development trend***

## I. INTRODUCTION

Virtual reality technology (VR technology for short) promotes animation into an unprecedented stage of artistic perception, especially the subversive revolution of virtual display device, which makes VR technology widely used in games, digital tourism, exhibition, education and other fields. The three-dimensional virtual scene constructed by virtual reality technology provides interactive animation plot, visual, auditory, tactile and other sensory experience, which brings a new innovative thinking for animation creation, and then forms a new type of animation, virtual reality animation (referred to as "VR animation"). However, the audience has gradually realized that there are still many problems in VR animation, such as less original digital content, unnatural interaction, poor sensory experience and so on. The author believes that in the early stage of the vigorous development of VR animation, we need to deeply analyze the development and application of VR animation, calmly think about the problems faced by VR animation, further explore solutions, and look forward to the future development trend of VR animation.

## II. THE ORIGIN OF VR ANIMATION

In the development of the animation industry, from traditional hand-drawn techniques to fixed-frame pendulum techniques, plane animation to stereo animation to digital media technology, until the VR technology has gradually matured in recent years, the emergence of each new technology will change the expression of animation works.

### A. Virtual Reality Technology

Virtual reality technology is a combination of simulation technology and computer graphics, man-machine interface technology, multimedia technology, sensor technology, network technology, and many other technologies. It uses computers to create realistic visual and auditory perception, touch, force, motion and other perceptual information, so that people can move through the head, eyes, gestures, or other human behavior, naturally and in the virtual world. The world interacts and experiences various sensory data after feedback.

### B. Virtual Reality Animation

"VR animation" has not yet formed a standard definition. As a practical form of animation art, VR animation is generally regarded as the use of computer and sensor technology to create a three-dimensional environment, simulate five sensory functions (visual, auditory, touch, smell, taste) of human beings, create a virtual environment for human interaction with the virtual world, and achieve a high degree of integration of technology and art. It enables the audience to experience the animation art of the plot. At present, there are about three forms of VR animation, the first is 360 degree panoramic animation image, the audience wearing a virtual reality helmet can enter the animation scene, get immersive feeling, but this kind of animation has almost no story plot; the second is the VR animation with story plot and role, the audience can enter the animation scene as a bystander, to a certain extent, choose the camera. The third is VR animation with interactive design. The audience can interact with the animation and even participate in the animation narrative process to get the experience of manipulating the animation story.

Compared with traditional film and television animation, VR animation is quite different from traditional animation in almost all aspects, such as lens language, shooting, late stage and so on, due to the angle of view. The emergence of VR animation has broken the modern film narrative mode formed by the artistic technique of Montage. The editing of

*Fund: This paper belongs to the project of the Fund Project; Fund Project Type: 2018 FuJian province Young and Middle-aged Teachers Education Scientific Research Project;
Fund project number: JAS180546;
Fund Project Name: Research on Interaction Design and Multi-sensory Expression in New Media Animation.

panoramic animation video takes the visual guidance of the audience as the fundamental principle, and pays attention to the smooth and natural transformation between shots. Compared with traditional film editing, VR animation adds perception and interaction, reduces scene change and lens transformation, and makes the viewer's perspective in the center of theatre. Because of the particularity of VR animation's sensory experience mode, the focus of the lens is also chosen by the experiencer. The creator needs to consider every detail of the lens when shooting the lens, and set up interactive plots to guide the audience to pay attention to the key plot or promote the development of the story. These features of VR animation are the reason why it is so popular.

## III. Analysis of the Current Situation of VR Animation

With the development of VR technology and the maturity of VR hardware devices, the use of VR technology to create animation has become a trend in the animation industry, and other industries have joined the "VR+" project army, expecting VR technology to bring new strength to the development of the industry.

### *A. VR Animation Status*

The combination of VR technology and animation is a hotspot in the current market development. Famous film festivals at home and abroad, such as the American Sundance International Film Festival and Shanghai International Film Festival, pay more and more attention to VR animation. Hollywood film giants have also thrown olive branches into virtual reality: in 2015, Disney invested $66 million to help Jaunt VR develop its VR animation platform; in 2016, VR studio Felix & Paul received $6.8 million from Comcast; in 2017, 20th Century Fox Film Company.

Fox next was established to promote the development of narrative technology of classical animation IP. While VR technology brings people a brand-new experience of watching movies, it is changing the narrative mode and creative thinking of traditional animation. However, there are few excellent VR animations that can really use these technologies and equipment. At present, the more famous VR animations are *Invasion! Herry*, *Pearl* and so on. *Invasion!* is a few minutes VR animated short film, launched by Baobab Studios in early 2015. In the first episode, which has been released, the story of two rabbits resisting alien invasion is told. The audience can experience the process of eye contact with the rabbit. With its unique audio-visual effect and interactive experience, virtual reality animation has gradually become one of the mainstream forms of animation industry development. Due to the constraints of many factors in the animation industry, the plot-based virtual reality animation has been rare. Up to now, virtual reality animation, which has been paid attention to and widely accepted, mainly focuses on short film animation, and strives to tell a relatively complete and interesting story on the basis of minimizing the production cycle and cost as much as possible.

At present, there are three main companies that focus on the development of VR (film and television) content. The first was Baobab Studios, founded in 2015, which created the first VR animated film in human history, *Invasion!*, in 2016. In this VR animation, the audience can experience the process as a by stander, the rabbit will jump around the audience, and can make eye contact. The audience will be transformed into movie characters, watching animation from the perspective of the role, bringing the audience a strong sense of physical immersion and psychological pleasure to participate in story creation.

It tells the story of two rabbits resisting the invasion of aliens. The audience can incarnate themselves as one of the rabbits and watch the animation from the perspective of the characters. This kind of experience brings the audience a strong sense of immersion and psychological pleasure to participate in the creation of the story. Oculus, the second company, owns a VR studio Oculus Story Studio, which produced two VR animations, Lost and Henry, at the end of 2015. Henry won the Emmy Award for Best Original Interaction in 2016. In 2017, Dear Angelica, the VR animation produced by Oculus, has a prominent performance in the field of interactive narration and won Lumiere's "Best VR Animation Experience Award". [4] The third company, Google Spotlight Stories VR Studio, created the VR animation "Pearl" in 2016, which won the 89th Oscar nomination for best animation short film. The interaction of the VR animation "Pearl" is stronger. The director can pull the viewer's perspective back to the in-car co-driver. In the immersive experience, the viewer can choose to stand up and look out from the skylight of the car while driving. In addition, there are several trigger points in the whole film that allow users to control their time, and viewers can choose how much time they spend watching a particular plot.

In contrast, China's VR animation started late, but also achieved good results. Among them, in 2017, director Cai Mingliang's *Home in Lanruo Temple* lets the audience experience the thrilling story of encountering female ghosts in the dark Lanruo Temple.

### *B. "VR+" Project Application Status*

On December 25, 2018, the Guiding Opinions on Accelerating the Development of Virtual Reality Industry (VR+) was issued, which proposed that we should promote the development of key industries of "VR+", promote the transplantation of existing digital content to virtual reality content, meet the upgrading needs of people's cultural consumption, enhance the multi-sensory experience mode and innovate the mode of cultural communication. At present, more and more industrial innovators use VR technology to expand innovative applications of projects across borders, such as immersion experience in games, real-time interactive experience in architectural exhibitions, virtual experience in folk cultural tourism projects, etc.

*1) Games:* From the earliest word games to 2D games to 3D games, with the advancement of game graphics and game technology, the game's simulation and substitution are getting stronger and stronger. However, because of technical

reasons, it still does not allow players to fully feel immersed in the game. [6] While virtual reality technology can construct realistic game scenes, it can provide natural interactive technology and multi-sensory experience. Players can get real-life experience when playing games. This feature also determines the huge potential of VR technology in the field of video games, and video games are undoubtedly an important entry point for the "VR+" project.

*2) Landscape architecture roaming:* Based on VR technology, three-dimensional modeling and real-time interactive functions can create architectural roaming animation, allowing viewers to browse large areas of three-dimensional terrain, real building space, real-time light and shadow changes. In 2018, the two sides of the Straits and Hong Kong jointly developed the "Entering the Future of Yuanmingyuan" Science and Technology Experience Exhibition on the creation of Yuanmingyuan with VR (Virtual Reality) virtual reality interactive equipment, which was held recently in Hong Kong. The creative team launched a zero-distance and highly interactive VR virtual reality experience, which allows the experiencer to personally create the twelve beast heads of the sea banquet hall, rebuild the historical relics of the "sea banquet hall" and the "twelve beast heads" by the experiencer's hands, and instantly start and reproduce the vivid fountain, so that the audience can personally experience the Qianlong Emperor's landscape design.

*3) Folklore, history and culture, tourism project experience:* VR technology can reproduce and restore damaged or non-existent historical relics, cultural scenes or tourist scenes that are not easily accessible. In 2017, the Beijing Palace Museum launched the VR experience, which transforms the cultural relics in the Palace Museum and the characters in ancient books into movable images, allowing visitors to touch and repair virtual cultural relics, experience the site of cultural relics inspection, and browse the construction process of the Forbidden City, etc.

*4) Virtual reality learning:* "VR + Education and Training" will simulate a learning environment, especially in difficult or high-risk environments, such as the vast universe, high-risk coal mines and other fields, using VR technology to build training and control systems can reduce operational errors and avoid unnecessary risks. The appearance of virtual classroom and virtual teaching improves the teaching effect, saves the training cost and shortens the practical time.

## IV. THE DILEMMA FACING VR ANIMATION

### *A. Drama Creativity and Lack of Connotation*

With the change of people's life style and aesthetic taste, more and more traditional animation has lost the soil of survival and inheritance. VR technology has been applied to animation creation. However, the development of technology cannot be without the support of animation stories. Otherwise, VR technology will only be a superb gimmick, and the audience will not be able to experience truly impressive animation stories through high-tech VR technology. From the current more classical VR animation, animation plot settings are relatively simple, there are not too many stories conflict, plot ups and downs of the lyric nature of short stories; secondly, animation interaction, sensory experience settings are less, experience emotional weakness, it is difficult to achieve empathy with the viewers; thirdly, there are more VR animation works imitating the trend, often only by the immersion of the first point of view to bring viewing. The physiological feelings of the people are similar to those of the early roaming virtual animation. All these clearly expose the lack of innovative ideas in current VR animation.

### *B. Poor Experience of Virtual Reality Equipment*

VR animation requires higher technical means and equipment, and Simulation of the real three-dimensional world imposes stricter requirements on virtual reality equipment. When the motion of the lens in VR animation changes greatly, the frame rate of the output and display image of VR display device will be faster, and the audience will feel dizzy and nausea. In addition, in order to complete the story, VR animation sets less interactive plots, which greatly weakens the entertainment of the sensory experience of VR animation. Moreover, the interaction mode in VR animation is not natural enough, and the immersion of audience experience is also poor.

### *C. VR Animation Education System Is Not Perfect*

According to the preliminary research on the demand for technical jobs of VR industry by Chongqing Arts and Science College and Dana Technology, Netlong Network and other related enterprises, the development and maintenance, art design and film processing are ranked in the top three, accounting for 3l%, 20% and 15% respectively. [9] However, at present, there are very few virtual reality majors in colleges and universities across the country. It is only in the setting of virtual reality in a similar profession. For example, the animation art of Nanjing Art College opens the direction of virtual reality art. In addition, the training system in the animation industry market is not perfect, only the virtual reality technology course is set up, the supporting virtual reality hardware facilities cannot keep up, and there is no basic art training course; the virtual reality course utilitarian in the school-enterprise cooperation mode Strong, single direction, the course is only suitable for the target enterprise's demand for talent.

### *D. Hardware Standards Are Not Counted, VR Technology Is Difficult to Be Compatible*

Virtual reality hardware vendors have not formed a unified standard, and every hardware vendor is trying to build its own ecosystem, which leads downstream content producers to selectively develop VR animations for a certain hardware. [10] In addition, the virtual reality industry lacks unified production technology standards, resulting in VR animations being technically strong, versatile and easy to use, and there is no recognized virtual reality development engine

in China. Different individuals and enterprises are cooperating. When communicating, communicating, and creating VR animations, there are certain limitations. [9]

## V. IMPROVEMENT STATEGY OF VIRTUALITY ANIMATION

### *A. Excavating the Characteristic Content and Expanding the Creative Thought*

Interaction in VR animation content has always been a pain point for producers. Unlike VR games, because narrative plays a central role in VR movies, all VR content explorers have to face the problems of not using interaction, where to use interaction and how to use interaction well. In real-life VR movies, the greatest interaction should be the dialogue between all the characters in the story and the viewers, as well as the plot around the role played by the audience themselves. Only in this way can the viewer have deep inner resonance and touch, forget himself, become the role of the play completely, and achieve 100% immersion.

### *B. Improving VR Device Experience Performance and Interaction Technology*

Dizziness is a common discomfort that is commonly seen in virtual reality movies. If you want to completely solve this problem, you must first solve the hardware problems of display and production. In terms of head-mounted devices: First, reduce the weight of the helmet to reduce the pressure on the neck; second, improve the quality of the screen display, refresh to 90 Hz or higher, make the human eye feel more comfortable; third, the helmet The human brain tracking technology also needs to be more sensitive, thereby reducing the sense of delay, and the delay time does not exceed the tolerance of the human eye for 20 milliseconds. In addition, in ensuring high-configuration VR hardware devices, the output frame rate of VR animation content needs to be improved. In the case that the existing VR game works at an output frame rate of 90 frame rate per second, the experiencer does not appear dizziness when watching the motion lens. [8]

### *C. VR Animation Professional Education*

In the training of VR animation talents, the government should also guide relevant colleges and universities to actively build VR majors (or rely on other professional VR directions), explore and establish VR talent training programs, curriculum systems, experimental training conditions, series of teaching materials, and teaching staff, and many more. In 2017, Chongqing University of Arts and Science relied on the Ministry of Education's industry-university cooperation and education project, and the VR class that jointly developed the training program and jointly implemented the talent training work in the same year in July of the same year, the related school experience can be worth learning. [9]

### *D. Policy and Regulation*

The development of any emerging industry requires the support of the government. The VR animation industry also needs the guidance of national policies and regulations to standardize virtual reality hardware devices, VR technology, virtual reality professional education and so on. At present, the national "13th Five-Year Plan" outlines the promotion of virtual reality animation creation, "VR+" project innovation and VR technology research and development. As of 2016, Tianjin, Qingdao, Nanchang and Qinhuangdao have successively established a city-level "virtual reality industry base"; in June 2016, Beijing Film Academy and LeTV jointly established a "virtual reality content research and development center" for film, music, education, etc. Application areas, research on virtual reality forward-looking technology and "VR+" project creation; [7] In addition, the government and related agencies will also plan to develop VR hardware standards, including communication protocol standards, input and output devices, etc., to standardize VR animation standards and Engine technology compatibility specifications.

## VI. CONCLUSION

The essence of VR animation is to create a three-dimensional dynamic animation environment through VR technology, realize the natural interaction between the audience and the virtual animation, simulate the multi-dimensional senses of the viewer's experience of viewing, listening, touching, smelling, smelling, etc., thus creating a new type of animation that can be interactive and experiencing. In the future, rapid and low-cost 3D modeling technology, real-time 3D graphics generation and display technology, new interactive experience devices, intelligent and natural interaction technologies, and the development of distributed virtual reality technology will greatly enhance the level and sense of VR animation creation. Experience the effect. [11] In addition, the future of virtual reality technology will be more closely integrated in the audio-visual entertainment industry such as animation, and more comprehensive integration plans and industry standards will bring further development to all related fields.

## REFERENCES

[1] Xu Xin. Current situation and development of Chinese VR animated films [J]. Contemporary TV. 2018, (8): 96-97.

[2] Liao Jingli. Film Review [J], 2014, (7): 84-86.

[3] Wu Weihe, Wang Yiqiang, Wang Wentao and others. Research on natural interactive design of digital media [D]. Art and design. 2010, 04

[4] Zhang Min. The development status and bottleneck of virtual reality VR (video) content [J]. China Radio and Television Journal, 2017 (9): 8-10.

[5] Ji Yuanyuan. Research on Digital Animation Short Film Creation Based on Virtual Reality Technology [J]. Education Modernization, 2018, (4): 144-145.

[6] Huang Xinyuan, Chen Baijun. Virtual Reality Art Design Strategy Based on Immersion Communication [J]. Modern Communication: Journal of China Media University. 2017, (1): 85-89.

[7] Wang Nan. VR image based on the interactive mode of "Tie-Mu" [J]. Journal of Anqing Normal University (Social Science Edition). 2018, (10): 111-115.

[8] Lu Lu, Zhang Fengwei. Deconstruction of Film Lens in the Context of Virtual Reality [J]. Journal of Zhejiang Vocational College of Art, 2017, (2): 81-84.

[9] Luo Wancheng. Virtual Reality Technology and Talents Training of "New Subjects" — Taking Chongqing University of Arts and Sciences as an example [J]. Re-higher Research, 2018, (1): 65-76.

[10] Guo Yunpeng, Zhang Gong, Han Zhangxiu, etc. Applied research and development trend of virtual reality technology [J]. Television technology, 2017, 41 (9/10): 129-134.

[11] Hu Junqiang. Expressions and characteristics of virtual reality animation [J]. Journal of Putian University, 2018, (12): 72-76.