

The Key to The Future Development of Interactive Art – Virtual Reality Technology

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Abstract

Interactive art is an art form that closely links art creators and art participants. It has been doomed with advanced technology from the very beginning. Virtual Reality is a technology which born in the background of the maturity of computer technology. Its birth has brought immeasurable possibilities for interactive art, especially the interactivity and multi-sensory experience. This paper discusses the current development status of interactive art in the field of interactive art through the characteristics of virtual reality technology and the future development of this technology will bring to interactive art.

Key Words: Interactive Art, Virtual Reality, Technical Impact, Artistic Influence

I. The development of Interactive Art

The earliest concept of interaction can be traced back to the beginning of the last century and the using of digital technology in this area did not appear until the end of last century. Since 1990s, computer technology began to be widely used in interactive art. Nowadays, interactive art has become one of the most popular art form.

At first, most of the artistic expressions are unilateral expressions of art creators: They create a painting or a statue for the spectator. This artwork has been completed before the spectator appreciates the artwork. After that, some of the artists have gradually incorporated the audience as part of the artistic creation. They tried to make the painting looks different at different angles by adjusting the colour or make the sculpture seems to move with the movement of the spectator by using ingenious carving. Marcel Duchamp has said: "The spectator brings the work in contact with the external world by deciphering and interpreting its inner qualifications and thus adds his contribution to the creative act." This shows that the participation of the spectator is also an important part of the creation of artistic works. When time comes to the end of 20th century more art creators are beginning to value the

participation of the audience in their work. Roy Ascott proposed that the interaction between the spectator and the art work is the core of art. The transformation of these concepts laid the foundation for the development of the interactive art.

After the 1990s, computer technology developed rapidly and it becomes a new technical support for interactive art. Many artists are beginning to embrace these new technologies and among all these new technologies, Virtual Reality has become a hot spot. Artists have been trying to express their feelings and vent their emotions through works. Virtual reality technology has provided artists with a convenient and effective means to immerse viewers in their own works. Due to the unique interactivity and immersive multi-sensory nature of virtual reality technology, its application in interactive art is very broad and suitable.

II. Virtual Reality

Virtual reality (VR) is an interactive computer-generated experience taking place within a simulated environment. It incorporates mainly auditory and visual feedback, but may also allow other types of sensory feedback like haptic. It makes users feel as if they are immersive and could observe

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things in 3D space in a timely and unrestricted manner. It is an interactive computer simulation environment that senses the user's state and behavior, replaces or enhances sensory feedback on one or more sensing systems, giving users a sense of being immersed in a simulated environment (virtual environment)[1]. Everything the user does is calculated by the computer and has real-time feedback, making this virtual environment more realistic and giving the user an immersive experience. This technology integrates the latest developments in computer graphics, computer simulation, artificial intelligence, sensing, display and online parallel processing. It is a high-tech simulation system generated by computer technology [2]. Virtual reality technology usually has multi-sensory interactive experience. By using the device to give users multiple sensory stimuli, they are immersed in the virtual world of computer production. In this virtual world, users can experience the realism like the real world.

1. Characteristics of Virtual Reality Technology

Virtual reality technology has many compelling features, but this study mainly explains its two important characteristics: interactivity and multi-sensory immersion. Interactivity refers to the degree to which a user can manipulate objects in a simulated environment and the degree of natural feedback from the environment. Because virtual reality technology is a virtual space simulated by computer and the computer collects user information in real time to generate new images, so interactivity is one of the essential functions and features of virtual reality technology. From the initial simple motion capture to today's retina capture, virtual reality technology has been working to collect more real-time feedback from users to create a more realistic space. This is one of the differences between virtual reality technology and traditional technology. Users are no longer just a passive receiver as in the past they can only observe the beautiful world simulated by the computer from the outside but now the virtual world will respond accordingly with their actions. They have become a member of the magnificent virtual world.

Another important feature of virtual reality technology is multi-sensory immersion. The most important way of presenting virtual reality is to present virtual worlds through virtual reality head-mounted device, which include visual and auditory experience. The first thing we wake up every day is to blink, vision is the most important way we perceive information from the outside world. Whether its shape, color or movement, we all get it through vision. The image of most external things is transmitted to the brain through vision and for this reason sometimes we will have false judgment by visual deception. At the same time, we also frequently link other senses such as taste and smell

through our vision, for example, when we saw a beautifully drawn food image, we felt like the food was in front of us with a tempting aroma. It is precisely because of this particularity of vision that virtual reality technology stimulates the user's vision by making a realistic virtual world, enabling users to gain other senses while gaining visual experience. The virtual reality head-mounted device cooperate vision with auditory sense and make a closed perceived environment, this immerse users in a multi-sensory experience, integrating both mind and body into the virtual world.

2. Characteristics of Virtual Reality Technology

Virtual reality technology first appeared in the 1950s, and it was the era when the third technological revolution began. Virtual reality technology in this time is consists of cumbersome equipment, imperfect computer simulation technology and less realistic sensory experience. But it opens up a technique that only appeared in the novel in the past, opens a door for human to pursue the virtual world. After the development of technology, especially the rapid development of computer technology in World War II, virtual reality technology is constantly breaking through the bottleneck. After all, the reality that virtual reality technology really enters the ordinary people is attributed to the carrier of game. In 1991, SEGA released SEGA VR virtual reality headset arcade game and Mega Drive. It uses a liquid crystal display, stereo headphones and inertial sensors to allow the system to track and respond to user head movements. In the same year, the game *Virtuality* launched and became the first most popular virtual reality online entertainment system. With the focus on attention, the development of virtual reality technology has grown by leaps and bounds.

In the 21st century, virtual reality technology began to address the two issues of miniaturization of devices and authenticity of virtual images. In 2010, the virtual reality head-mounted display Oculus Rift was designed. In 2014, Sony announced the development of PlayStationVR. By 2016, more than 230 companies have participated in the development of virtual reality technology. It is also at this time that virtual reality devices for individuals have been introduced, and virtual reality technology is no longer a castle in the air. At the beginning of this year, a worldwide VR "game platform" VRchat was released. This platform is set up on a network server. It is visually a scene similar to a large bar. Users with VR devices around the world can access the platform through the client and communicate with online users with a virtual character image set by themselves. On the Steam platform, there are also many virtual reality development software such as VRCat and TlitBrush. Users can create or use all kinds of existing VR

scenes provided by other users as long as they have VR devices. In addition, various museums are now gradually using VR technology to display exhibits. On the one hand, they are full of scientific and technological interest, and on the other hand, they can better restore the appearance of the exhibits.

III. The Effect of Virtual Reality Technology on Interactive Art

Interactive art works need to be realized through five stages: “linking”, “integrating”, “interacting”, “transforming” and “first entering”. Roy Ascott believes that the most striking feature of new media art is his “interactivity” [3]. The core of interactive art is obviously “interaction”. Interaction is a kind of mutual behavior. In interactive art, this is a kind of behavior that connects art creators and art viewers through art works. Computer technology, or narrowly speaking, virtual reality technology has a significant impact on interactive art. The constructiveness and interactivity of virtual reality technology is the core of interactive art. Just like the innovations brought by various new materials in the past, such as painting, architecture and other art forms, virtual reality technology brings a revolution of both technical and artistic to interactive art.

1. Technical Impact

Technically, computer simulation in virtual reality technology can help artists express their inner feelings more realistically and accurately, whether figurative or abstract. It is said that the artist's thinking is jumping. The powerful processing function of the computer can feedback information in real time, change flexibly, and realize the interactivity that cannot be completed in the past. Multi-sensory experience can make the artistic world created by the artist more realistic and immerse the spectator in the works of art. As mentioned above, the widely used head-mounted virtual reality device can fully satisfy the technical support and provide real experience in visual and auditory sense. For other senses, special induction gloves can stimulate the touch through pressure sensing to create a “touch” experience. Odor molecular devices can stimulate the sense of smell by making odors from chemical materials. On the basis of head-mounted virtual reality devices, there is still the existence of naked-eye virtual reality technology to enable viewers to see and interact with virtual images presented on electronic screens without using their own devices. The TeamLab team can be said to be one of the best. Their work creates a colorful and interactive virtual world through a large number of screens and projections. It

inherits the characteristics of traditional art and has the unique mobility interactivity and creativity of virtual reality interactive art.

2. Artistic Influence

The influence of virtual reality technology on interactive art is not only reflected in the technical aspect but also in the art. Its new structure and the communication between the human and the machine bring convenience to the interactive art and the artists. Every technological revolution brings not only pure technological innovation, but also new technologies that enable people to have a new way to observe the world, leading to the birth of new thinking. The technological revolution and the thought revolution in history always complement each other. The virtual antonym is true, but interestingly, virtual reality is a real technology that allows people to experience virtual reality. The simulation world it generates is only written in a computer language. In essence, it is actually just a bunch of 0 and 1. However, it is the images generated by these codes that are passed into our senses through the device and make us immersed in the real feelings. The dialectical materialism describes the world as material and conscious. The two complement each other and influence each other. Creating reality in imaginary, seeking virtual in reality is just like light and shadow. Virtual reality technology brings us a kind of philosophical thinking, a dialectical experience. On the other hand, since virtual reality relies mainly on computer technology, the interaction it generates must be human-computer interaction and as a result how to treat the relationship between man and machine brings new inspiration to artists. Since the emergence of computer technology, human-computer relationship has become a topic of great concern. Many articles on the relationship between computer and artificial intelligence have emerged. Virtual reality technology has brought people to the inside of the computer world - the digital world created by computer code. The distance between man and machine is further narrowed. The human-computer ethics relationship has also become an important research topic in art creation. In the pursuit of high-tech art, artists are also thinking about ethical relations. The subtle balance between man and computer is full of charm, prompting many artists to make thought-provoking works of art.

In other respects, various technologies related to virtual reality technology bring new inspiration to artists. In interactive art, the interaction behavior contains much psychological knowledge. The research generated by the study of virtual reality technology also plays an important role in the study of interactive psychology.

IV. The Future Development of Virtual

Reality Technology in Interactive art

About the impact of virtual reality technology on the future development of interactive art, first talk about the future development of virtual reality technology itself, than talk about the influence of virtual reality technology and interactive art on artists.

1. Development of Virtual Reality Technology

Virtual reality technology has been going on for a long time since its birth. During this period, scientists have been constantly overcoming technical difficulties and finally made this technology have the opportunity to enter ordinary people's homes in recent years. However, it still has many problems. First of all, the audience did not really enter the virtual world. The current popular head-mounted devices and handles have data lines connected to the computer. These devices cover our eyes and only change our view, but they do not cover all of our field of vision. Even with wireless devices, users still need to be careful to avoid accidents. The naked eye VR device solves the problem of the device to a certain extent, but in reality, the head wear device is better. In addition, there are many problems surrounding the two characteristics of the virtual reality technology introduced in the previous article. Although it is possible to achieve a multi-sensory experience by the sense-link effect, in the final analysis, it does not include the five senses of the users into the virtual world.

The scientists have not stagnated, and the above problems have gradually solved the rudimentary form under unremitting research. Virtual reality devices are getting smaller and smaller under the technological advancement. In 2016, some technical teams have launched VR glasses. For the problem of authenticity, it is now possible to scan the user's eyes through the virtual reality device, and to simulate different images according to the different information received by the two eyes, and finally achieve binocular imaging. In 2018, a team in Shanghai first broke through the technical difficulties. At the CES conference, it launched a commercial personal 8K resolution computer VR glasses, each with 4K each, effectively eliminating the window effect of the human eye when viewing the display at close range. As for the multi-sensory problem, there is currently a technology that uses a laser to heat the air to create a proximity touch, and believes that the future can be applied to virtual reality technology.

2. The Future Direction of Interactive Art

The difficulty of the above virtual reality technology is another difficulty in its impact on the future interaction art. Interactive art is always pursuing better interactivity and

lighter virtual reality devices can enable viewers to have a more relaxed and calmer mindset to interact with works of art. This makes it easier for artists to figure out the impact of psychological factors on interaction.

Not only interactive art are pursuing multi-sensory interactions but also many other art forms. Multi-sensory interactions can mobilize the spectator's full attention, allowing the audience to fully engage in the appreciation of the works of art, thus better conveying the ideas and emotions of the art creators. Multi-sensory can also have another way of developing, presenting one sensory feature to another and causing sensory interoperability. For example, whether it is played by traditional instruments or by computer, the traditional music art works mainly provide auditory stimulation. Relying on computer technology, music can not only hear, but also "see". Myles, a musician and visual artist from the United States, was born with deafness. He and his team jointly invented the audiovisual visualization system AUDIOLUX ONE. AUDIOLUX ONE is a device that can display changes in sound with light. It consists of two parts, the controller and the LED strip. Through analysis, AUDIOLUX ONE can intelligently "translate" sound and music into light, color and motion [4]. In this case, even if the user can not hear the sound and cannot experience the emotion of the music with the sense of hearing, the emotions contained in the music can be understood and visually stimulated. Combining this technology with virtual reality can create the artistic effect of sense-link. Although the art work "Empty Window" created by Chinese artist Huang Shi and Li Jingfeng, is not a virtual reality interactive work, this work is calculated by capturing the subtle movements of the audience, such as blinking or breathing, plus the acquisition of brain waves. And these actions are reflected on the work to complete the interaction. This work makes us realize that it is also feasible to "communicate" art directly through the brain. The five senses connect the brain, and the stimulation of the five senses can achieve the control of the brain in a certain sense. This kind of behavior may directly "introduce" the artist's thoughts into the brains of the audience through research. Achieve direct exchange of ideas. The rapid development of multi-sensory virtual reality technology has brought a fantastic experience to both artists and viewers, but sometimes too much sensory stimulation will make people lose their judgment, blur the boundary between the virtual world and the real world, and in the future it will become a challenge for artists.

Art has always been a means of interpreting social problems. Human-machine relationship is still one of the research points of virtual reality interactive art. With the gradual improvement of computer technology development, human-machine relationship will become a key topic of

discussion.

The advancement of science and technology has promoted the development of art. On the other hand, the development of art has also led to the advancement of science and technology. I believe that the results of the future virtual reality technology and interactive art can link art creators and art participants without barriers, and build a bridge to exchange ideas and emotions.

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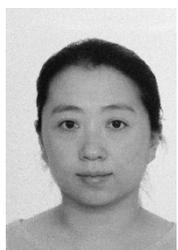
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the silver medal at the Asian Fine Art Exhibition in South Korea. In 1999, the watercolor was selected for the China People's First People's Exhibition and won the Excellence Award. In the same year, he won the Bronze Award of the Provincial Youth Art Exhibition.