

# Application of Animation Scene Art to Virtual Reality Technology

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## Abstract:

This article briefly introduces animation scene art and virtual reality technology, and analyzes the application of virtual reality technology to support animation scene design in realizing plane and three-dimensional visual transformation, enhancing picture expressiveness, innovating and expanding animation production mode, reducing costs and shortening the time. cycle, sharing and utilization based on real-time cooperation, etc., and focused on the construction principles of 3D movie animation scenes in virtual reality scenes, automatic generation of 3D animation scenes, and the application of virtual reality technology in different animation scenes, etc., discussed the art of animation scenes Strategies for the application of virtual reality technology.

## Keywords:

Animation Scene, Virtual Reality Technology, Scene Automatic Generation

## 1. Introduction

The vigorous development of virtual reality technology has greatly changed people's perception of virtual space, and it has been widely used in various fields and industries. Among them, in the field of animation, the application of virtual reality technology can not only change the way and experience of people watching animation, but also bring earth-shaking changes to animation production itself. It can be said that with the support of virtual reality technology, animation scene design has ushered in great changes and adjustments, and scene design and production will become simpler and more efficient.

## 2. An Overview of Animation Scene Art and Virtual Reality Technology

### (1) Animation scene art

The animation scene is the most basic part of the entire animation, which can provide occasions and environments for animation character activities and performances. Animation art is a branch of film and television art. Its scene design not only needs to consider practicality, but also artistry. Therefore, scene art design has

always been a part that cannot be ignored in scene design. The animation scene design must not only meet the needs of the content, but also need to consider the art style and artistic expression. On the one hand, animation scene design should serve animation, whether it is architectural animation, traffic animation, etc., it is necessary to design scenes that match the content; on the other hand, the same scene can be presented through different art styles, and the scene art should be consistent with The unity of character art and so on can strengthen artistic expression and emotional expression, improve animation quality and explore the development path of animation art. As the animation industry has matured, the role of scene design in animation is becoming more and more obvious. Whether it is in the medical field, in the field of architecture, or in the field of film and television, scene design has become the top priority of animation design. Heavy, excellent animation scene art is the key to ensuring the overall quality of animation.

## (2) Virtual reality technology

As a brand-new technology based on computer and digital technology, virtual reality technology integrates a number of advanced technologies including three-dimensional graphics technology and simulation technology, and can form a visual, auditory, tactile, olfactory and other aspects that are close to reality. virtual world. The biggest advantage of virtual reality technology is that it allows people to experience real feelings in the virtual world, making people feel like they are there. Whether it is a thrilling adventure or a certain dangerous professional training, it can be realized with the support of virtual reality technology. In view of the value and advantages of virtual reality technology itself, it has been effectively applied in many fields, such as film and television entertainment, education, design, medicine, military, aerospace, industry, etc. Innovative development has brought strong support. It is foreseeable that with the continuous development and maturity of virtual reality technology, its application scope will be further expanded, and its application effect will also be effectively improved.

## **3. Application Advantages of Virtual Reality Technology in Animation Scene Design**

### (1) Realize the visual conversion between plane and three-dimensional

In the modern animation industry, 3D animation has the advantages of low cost, good visual effects, etc., and can present various types of high-precision machinery and can realize film-like mirror movement. Therefore, 3D animation has gradually become the main mode of commercial animation in recent years. The production process of 3D animation is relatively complicated, and it is necessary to make preparations first, and implement basic work such as script production, modeling design, and scene design. After that, it is necessary to create a three-dimensional shape model, and make the model move by artificially defining key frames and computer processing to synthesize intermediate frames, and then perform post-production such as textures, light control, material design, rendering, and sound synthesis. In the whole process of 3D animation production, animation scene design and production run through the whole process, producers are easily restricted by the limited three-dimensional space, which affects the quality and efficiency of animation production, making it difficult to present the best animation effect. The application of virtual reality technology can form a highly realistic virtual world, which means that the producer can freely adjust and switch the viewing angle in the animation scene

according to the needs, realize the visual conversion between plane and three-dimensional, and better produce and present animation. In addition, using virtual reality technology can make 2D animation more easily, and make appropriate changes by establishing a 3D scene, effectively reducing the effort spent on manually drawing a 2D plane scene.

#### (2) Enhance the expressiveness of the screen

With the continuous development of the animation industry and the gradual improvement of audience requirements, more and more attention has been paid to the image expressiveness of animation works, and good image expression has become a major requirement for high-quality animation. Traditional 3D animation scene creation is cumbersome, and scene-based animation creation is easily limited by perspective and space, which affects the continuity of the picture and is not conducive to picture performance. With the support of virtual technology, scene design and production become easier and more efficient. At the same time, scene-based animation production can also become simpler. It can realize the same scene, different positions and angles at will, and greatly enhance the animation picture. The coherence of the image enhances the expressiveness of the image. In addition, animation production based on virtual reality technology can better distinguish characters or subjects from scenes, forming a more obvious depth-of-field effect, which is more in line with the film expression mode, and can bring people a better viewing experience.

#### (3) Innovate and expand the animation production mode

For a long time, animation production has been very difficult, requiring creators to process it frame by frame. Even now that 3D animation technology is very mature, the animation production mode is still subject to considerable restrictions, and it is difficult to do whatever one wants like film production, and animation design and production are often completed through relatively fixed scenes. The application of virtual reality technology in the field of animation can fundamentally promote the innovation and expansion of animation production models. On the one hand, animation scenes based on virtual reality technology are more realistic, and creators can create freely in the scene, just like shooting movies with the lens in the real world, and can break the restrictions and rules of the physical world to achieve more. With more breakthroughs, the corresponding production effect will be significantly improved; on the other hand, virtual reality technology is gradually accepted and favored by the public, and virtual reality animation is gradually becoming possible. Compared with 3D animation, it can bring audiences a more immersive experience, allowing the audience to fully experience all the details of animation works in the virtual world, and the corresponding animation production concepts and methods naturally need reasonable innovation based on traditional models.

#### (4) Reduce costs and shorten the cycle

With the support of virtual reality technology, animation production has actually become easier, simpler and more efficient. On the one hand, the application of virtual reality technology makes animation scene design and production more efficient. Creators can use advanced rendering engines such as UE5 to complete 3D animation production, and quickly complete scene design, construction, and rendering through the rich functions that come with the engine, and even import scenes directly by scanning photos, create high-precision scenes in a short time, and then freely complete the shooting of animation stories in the scenes, with lower costs and shorter

cycles; on the other hand, virtual In the field of animation production, reality technology can realize real-time changes in animation pictures, eliminating the need for drawing technology and CG operations, effectively saving manpower and time, and the corresponding production efficiency can be further improved.

#### (5) Shared utilization based on real-time cooperation

Animation production often requires a large number of people to work together, but it is difficult to realize real-time sharing and communication between different personnel, and the inability to perform real-time processing on animation scenes and modeling is a major factor restricting animation production. Especially for some film and television animation works with high production specifications and involving a large number of people, the problem of multi-person cooperative production has a huge impact on production quality, cost, and efficiency. With the effective application of virtual reality technology in the field of animation production, this problem will be solved. Animation scenes, characters, models, etc. based on virtual reality technology can be used repeatedly, and personnel on the same platform or system can share these materials in real time, that is, different creators can adjust scenes and models in real time through different terminal devices, other people can obtain the corresponding adjustment information in real time, which is of great significance for further improving the quality and efficiency of animation production.

## **4. Application Points of Animation Scene Art to Virtual Reality Technology**

### (1) Construction principles of 3D movie animation scene in virtual reality scene

The use of virtual reality technology for animation scene design and construction has many advantages, and can be optimized in terms of animation production quality, cost, and efficiency. To ensure the rationality and effectiveness of animation scene construction based on virtual reality technology, it is often necessary to follow certain basic principles in practice.

(a). The virtual reality scene construction process simplifies the model as much as possible. Using virtual reality technology to construct scenes can be fast and efficient, but it also faces certain performance challenges. When constructing high-precision and complex scenes, there are high requirements for the computing power of the computer's central processing unit and graphics card. If you blindly pursue high precision and screen expressiveness when constructing a scene model, resulting in too many model faces, it will not only put a huge computing pressure on the computer, but also cause the overall file capacity to be too large, which will affect the subsequent animation production. This will not only fail to give full play to the advantages of virtual reality technology in the production of animation scenes, but may also cause negative effects, which in turn will have a negative impact on the quality and efficiency of animation production.

(b). Prioritize the selection of triangles for model polygon mesh construction. Polygon meshes are collections of vertices, edges, and faces, which are widely used in graphics and modeling, mainly for simulating the surface of complex objects. That is, the surface of any object can be decomposed into a large number of polygonal meshes, and the larger the number of polygonal meshes, the higher the accuracy of the model, and the finer the animation factory scene will be. With the support of polygonal mesh, the 3D surface of any object can be represented by lines and polygons. By increasing

the number of vertices in the mesh, more details can be added to the model, which further improves the authenticity of the 3D scene model. When creating a model polygon mesh surface, try to build a triangular mesh. This is because triangles, as the simplest polygons, can be rendered more easily and effectively, and can avoid problems such as low efficiency, blurred textures, and obvious aliasing caused by the selection of long strips for rendering.

(c). Reasonable use of textures. As a feature of the surface of an object or several surfaces, a map determines the characteristics of the surface of the object when it is colored, including color, brightness, self-illumination, and opacity, which in turn affects the performance of the screen. When applying virtual reality technology for animation scene design and production, texture processing can be performed for complex scenes and complex models. This can not only enhance the expressiveness of the scene, but also effectively reduce the operating pressure of the scene on the computer, and can actually improve the efficiency of scene production. Reasonable use of textures can often ensure that the loading and running process of animation scenes is extremely smooth, so as to prevent creators from spending a lot of time waiting for scene loading during animation production.

## (2) Automatic generation of 3D animation scenes

The automatic generation of 3D animation scenes requires the application of virtual reality technology and the construction of corresponding parameter models, and the calculation, analysis and processing of scene fusion characteristics by means of template feature matching, and then 3D virtual reconstruction. In practice, it is necessary to fuse the 3D animation scene information, construct the corresponding virtual vision reconstruction output model, and then realize the automatic generation and reorganization of the scene according to the fuzzy information fusion results. On this basis, further virtual reality reconstruction is required, relying on normalized probability distribution function, pixel gray value, edge intensity feature distribution, closed contour standardized estimation, scene component set, scene similarity feature distribution function, and vector machine learning function etc., fully promote the automatic generation and reconstruction of animation scenes supported by virtual reality technology, so as to improve the efficiency of corresponding animation scene design and production. The animation creator only needs to obtain the original image, and then use virtual reality technology to reconstruct the virtual features of the scene, image fusion processing, image similarity feature comparison and automatic scene generation, and then the corresponding animation scene can be automatically generated, and the original scene can be maintained. art style. As shown in Figure 1, the original image is fused to generate a corresponding virtual animation scene, which can save a lot of energy and time for animators, and can also provide strong support for subsequent animation production.



**Figure 1.** Scene virtual automatic generation

(3) Application of virtual reality technology in different animation scenes With the vigorous development of the animation industry and the gradual maturity of virtual

reality technology, virtual reality technology can be effectively used in various animation scenes. According to the needs of the animation scene, with the help of virtual reality technology to optimize the scene construction, strengthen the expressiveness of animation, and further expand the audience and application children of animation in the new era.

a. Film and television animation field. The gradual increase in the production cost of film and television animation is a major trend worldwide. At present, the production cost of Hollywood animation generally reaches 100 million US dollars. The use of virtual reality technology can realize the combination of virtual characters and real shooting scenes, virtual scenes and real shooting scenes, effectively innovate the animation production mode, and help improve the efficiency of animation production. The cost of animation production is directly linked to the production cycle, the use of virtual reality technology is conducive to shortening the animation production cycle, and the corresponding cost can be effectively controlled. With the support of virtual reality technology, the scene design of film and television animation will become more efficient. Not only can the virtual scene design be combined with the real shooting scene, but also the art style can be well unified, and it can be directly carried out in the created scene. The production of animation stories will form an integrated production mode, and the overall production efficiency of animation will also be significantly improved. The application of virtual reality technology can not only improve the efficiency of animation scene design and production, but also greatly improve the quality of scene production, especially in the construction of complex scenes and high-precision models, which can effectively enhance the expressiveness of animation pictures.

b. The field of architectural animation. Animation based on virtual reality technology has great application value in the field of architecture. For building construction, the application of virtual reality technology to build corresponding building models can help construction personnel complete architectural design and construction plan formulation more intuitively, thereby improving the quality and efficiency of building construction and strengthening cost control. Moreover, customers can directly see the simulated panoramic view of the community and the specific conditions of the buildings through the digital real estate, and truly grasp the relevant information before buying a house, and view it at any position and angle through simulation. For the protection, restoration and restoration of ancient buildings, virtual reality technology plays a vital role. It can be combined with laser scanning technology to quickly collect information such as three-dimensional coordinates, reflectivity, and texture of a large number of dense points on the building surface. The ancient building model is quickly reconstructed by real scene modeling software, and relevant personnel are allowed to freely explore and try to repair in the virtual architectural scene, further strengthening the protection of ancient buildings. Of course, the animation based on virtual reality technology is also conducive to the publicity of buildings, especially the protected ancient buildings. cause havoc. Recreating the designated buildings in ancient times through virtual simulation can also convey architectural culture and historical civilization across time and space. As shown in Figure 2, the virtual Forbidden City is a new form of experience that the Forbidden City uses VR animation to bring to the audience, allowing the audience to freely walk and watch in the high-precision virtual Bauhinia City.

The field of medical animation. The continuous development of the medical industry has higher requirements for the overall quality of medical workers, and the

animation supported by virtual reality technology is conducive to the training of medical personnel. Especially for doctors, simulation training with the help of virtual reality animation is beneficial for them to master skills, accumulate experience, and promote the development of surgical capabilities. Doctors can simulate different surgeries through virtual reality animations, as if they are actually performing surgeries through visual, auditory, and tactile simulations, so that they can stabilize their mentality, master the surgical process and key points through repeated simulated training, and can also target surgical procedures. Handle all kinds of accidents that may occur, and try and make breakthroughs in difficult operations.



*Figure 2. Virtual Forbidden City.*

## 5. Conclusions

To sum up, the innovation and development of the animation industry requires the strong support of advanced technology, and virtual reality technology is the key technology. At present, the field of film and television animation has been actively exploring the value of virtual reality technology application and animation production. Other animation fields such as architectural animation, medical animation, transportation animation, military animation, aerospace animation, etc. are also supported by virtual reality technology. In order to strengthen the role of simulation, it is necessary to promote the large-scale and standardized application of virtual reality technology from the level of animation scene production.

## Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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