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The Application of Folk Art with Virtual Reality Technology in Visual Communication

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ABSTRACT
At the end of the 20th century, the emergence and development of virtual reality display methods based on virtual reality technology is one of the most remarkable achievements in the field of digital design. In the late 20th century, rapidly developing virtual reality technology was gradually combined with computer multimedia display technology, and emerging digital information display means thus quickly became widely used in the design field. In today's information multimedia display field, multimedia display design using virtual reality technology has become one of the most important means of information display. In fact, in many fields, virtual reality display has been widely used and has produced certain social and economic benefits. At present, its specific application mainly focuses on commercial product display, architectural environment display, cultural heritage display and so on. This paper discusses its application and practical significance in the field of cultural heritage-folk art, while analyzing and discussing it, it provides a reference for further exploration of the development and innovation of virtual reality display design.

KEY WORDS: Folk art; visual communication; virtual reality technology.

1 INTRODUCTION

VIRTUAL reality is a new world created by computers and electronic technology. It consists of a seemingly real simulation environment. Through a variety of sensing devices, users can use the natural skills of people to perform objects in the virtual world according to their own feelings (Grigore Burdea, Philippe Coiffet, 2015), investigate and operate, and participate in the event. It also provides intuitive and natural real-time perception of sight, hearing, and touch, and "immerses" participants in the simulation environment. With the rapid development of social science and technology, virtual reality has become a way of knowing the world and a way of life for human beings. Similarly, virtual reality is also a method of transmission of civilization and a means of transmission of art. The art created by human beings is a way of life for displaying virtual reality. We can describe a virtual world in words. We can paint a virtual world with colors of paintings and photographs. We can use virtual art such as songs, dramas, movies, etc. to present a virtual one world. The progress of mankind cannot be separated from advanced science and technology. It is also indispensable for the edification of art. Folk art is the aesthetic standard and national character shared by the masses of the people in China for thousands of years (Maples-Keller J L, Bunnell B E, Kim S J, et al.2017). Most of the folk art has its rich visual form language and profound symbolic meaning, carrying the simplest aesthetic taste of the Chinese people. Therefore, applying virtual reality technology to folk art allows people to examine and experience folk culture from different angles, and appreciate more realistic, more vivid and dynamic visual effects, which makes them feel the same and experience the profound connotation of folk art (Sang Y, Zhu Y, Zhao H, et al.2016).

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2 OVERVIEW OF VIRTUAL REALITY TECHNOLOGY AND THE STATUS QUO OF VISUAL COMMUNICATION OF FOLK CULTURE

2.1 Virtual Reality Technology Features

Ivan Sutherland, the founder of computer graphics in 1965 published the "The Ultimate Display" paper and presented a new graphic display technology. In his paper, he proposed to immerse observers directly in a computer-generated three-dimensional world rather than through windows (computer screens) (Xiao-Na Q I, 2014).

The development of virtual reality technology is not achieved overnight. According to the different characteristics of different periods, we can divide it into the following two stages (Paloczandresen M, 2013).

The first phase. The time spent at this stage mainly includes the 1950s and 1960s of the last century, and is marked by the concept of the motorcycle simulator sensorama and the ultimate display but this stage is still relatively primitive, because the computer technology in this period is relatively backwards (Hines, M, Carnevale, N, 2014).

The second phase of the development of virtual reality technology began in the 1980s. It is also from this stage that virtual reality technology has developed rapidly. The scope of the research content of this technology has been determined after discussion, and its unique basic features are further understood. Moreover, virtual reality technology has been widely used at this stage (Peng B, Kimmel M, 2005).

At present, virtual reality technology is already in the third stage and has a great impact on all aspects of people's lives. There are two main events at this stage: One is the development of a helmet display and the other is the acquisition of (OculusHelen Higgs, Andrew C, 2004).

The core technology of virtual reality is as follows:

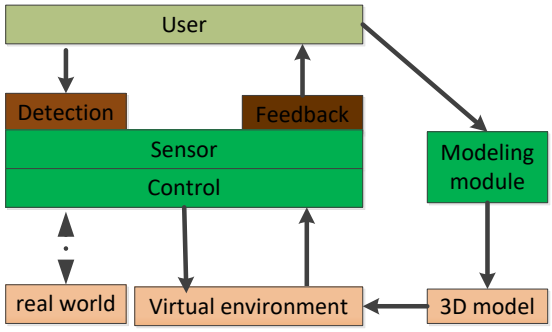

Figure 1. The Core Technology of Virtual Reality.

The basic characteristics of virtual reality: The typical characteristics of virtual reality are summarized as "31", namely immersion, interaction and imagination. First, immersion refers to a feeling of the participants themselves, a sense of existence based on the senses of the person. Second, interaction refers to the exchange of information between the two in a virtual environment. Immersion and interaction allow virtual reality participants to anticipate what hasn't happened and to reinforce the participants' thinking skills (Toussaint K, Pouliot N, 2010). At present, the development and application of big data technology and cloud computing technology have promoted further development of virtual reality technology. The adaptability of virtual reality is also increasing (Cutzu F, Hammoud R, Leykin A, 2005).

2.2 The Development Direction of Virtual Reality Technology

The development direction of virtual reality technology has three points: First, popular technology, taking the mass line use at home, mobile, and desktop systems. The second is the professional field, the industry application has made breakthroughs, resulting in killer-level applications. National strategic needs are national defense, medicine, and education (Nascimento S M C, Linhares J M M, Montagner C, et al. 2017). The third is high-precision, proprietary equipment to achieve high-end breakthroughs, accurate, sophisticated, cutting-edge applications, and international peer recognition (Maquet J, 2010).

With continuous development of technology and industrial ecology, the concept of virtual reality is constantly evolving. Virtual reality is a new generation of information communication technology, to include near-eye display, perceptual interaction, rendering processing, network transmission and content creation, to build a new format that spans the end-pipe cloud, and promotes the user's experience in immersive situations. Also, the expansion of information consumption and the integration and innovation of traditional industries (Glăveanu V P, 2013). According to the "2018-2023 Virtual Reality Industry Development Prospects and Investment Opportunity Analysis Report" released by the China Business Research Institute, the scale of China's virtual reality market will reach 5.28 billion yuan in 2017. With the gradual maturity of virtual reality technology, capital Gradually entering the market scale will be further expanded. It is expected that the scale of China's virtual reality market will exceed 10 billion yuan in 2018.

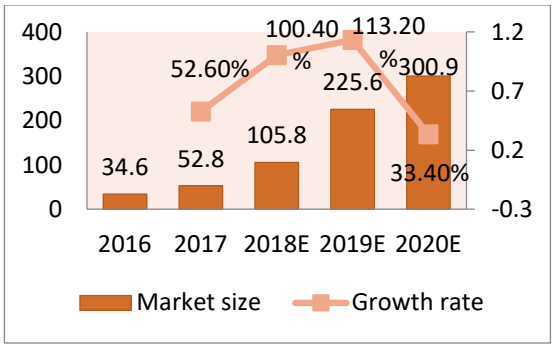

Figure 2. China's Virtual Reality Market Scale and Forecast from 2016 to 2020.

A new generation of virtual reality puts a higher standard on model replication, interactive methods, and system components. In order to meet these requirements, virtual reality research has also revealed some new features and trends and has achieved rapid development in recent years. Relevant scientists have summarized these characteristics and now analyze them as follows: (Frenkel K A, Sutherland I, 2008).

1) People's culture in which people interact with computers.

The original idea of virtual reality was to create a harmonious virtual environment. In general, helmets and other equipment may have some impact, but the actual application is not good. Improving the interactivity of virtual reality through the most natural human visual, auditory, tactile and sensory is an effective way of interaction.

2) The general computing platform.

With the development of computer technology, computer technology has become very common. There are many types of high-end consoles and desktops to cheap laptops. Adding a wireless network to a VR system better meets the requirements of mobile to mobile.

3) The combination of different scenes.

Virtual reality is the extraction of elements and representation of real environments through actual methods of the actual environment. In fact, the world cannot fully recover, therefore, the effective integration of the real world and the virtual world is of great value and AR is one of them. As an important virtual reality field, it is necessary not only to inherit the original features of AR, but also to improve the characteristics of virtual reality and the impact of real scenes. In some applications, there are great advantages in virtual reality.

4) Scene related.

Data metrics are considered large-scale, an important feature of variable applications. The scale of virtual reality data is the ratio of the number of nodes and objects in a virtual reality distributed system. In addition, there is a scale value for simulating and rendering scene geometry. For large-scale data, research is also needed on a huge computing platform.

5) Integration of environmental information.

Traditional vertical positioning systems typically use geometric data and needs to consider the environmental information such as terrain and atmosphere to simplify the simulation of the natural environment. In order to reflect the environmental impact more deeply, the expression processes of the different types of geography, atmosphere, ocean and space must be different.

6) Standardization of the agreement.

Network protocols are an integral part of research and applications when building virtual reality distributed systems. Since existing international standards are based on private network environments and pre-allocated transmission media network resources, the development of variables based on the public network standards will be further developed (Wen T, Zhang Z, Qiu M, et al. 2017).

7) The integration model of domain names.

The virtual reality design assigned to each node in the software system is based on specific application requirements. Due to the development of virtual models and system modeling, subsystems need to be quickly adjusted based on changes in the application. Therefore, in order to meet the rapid adaptation and reduce the application development and maintenance workload, it is necessary to learn the virtual nodes of the software system designed and developed by the technology.

2.3 The Virtual Reality Content and Development Environment

2.3.1 The Virtual Reality Technology Content

There are many types of digital content that VR needs to process. According to the different processing stages, it can be divided into four aspects: acquisition, understanding, modeling and presentation (Wei C Z, Xing F U, 2010).

1) Get

In general, there are two ways to acquire the geometric features of virtual reality. One is optical and the other is stereo. Among the first methods of acquisition, the time-of-flight method is more common. It is also common to use complex methods based on electromagnetism, electromagnetism and special optics. The correct movement of the medium-sized devices sharing a wide range of signal systems has been completed in the past few days. With the application of the body sensor, not only the length of the sensor is reached but also the requirements of the digital camera. This is based on images taken with no motion and a small number of sensor modes. The schematic diagram of obtaining information is as follows:

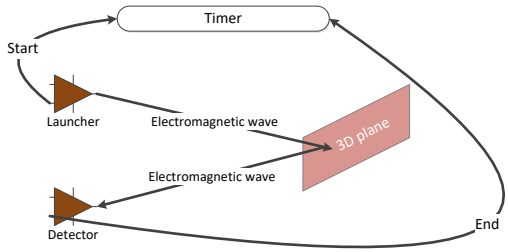

Figure 3. The Schematic Diagram of VR Acquisition Information.

Surface features are primarily derived from different lighting and viewing conditions, such as 4D cameras from the Massachusetts Institute of Technology and Columbia University. When the captured object is captured, the light is separated so that the captured object is not disturbed by the light. The main challenge and hotspot of modern research is to obtain the characteristics of the dynamic object surface and translucent objects.

2) Analysis

The video contains most of the human data. The analysis and use of the meaning of images and video is an important application issue. Current research mainly includes visual computing models, feature extraction integration, and related feature associations. These intermediate levels and high functionality are very important. However, semantic contrast still exists in modern research. Speech analysis and recognition technology is an application in which a machine can convert a language into corresponding text and instructions. When using text analytics to distinguish between words and search functions, there are significant requirements for the translation of questions and answers. A versatile high-quality natural language processing system remains a long-term goal.

3) Model

The geometry construction technology and the popularity of the mature data-driven 3D model editing the creation of the human costume images, and the creation of the indoor 3D scenes have led to more research in different fields.

By developing multi-core processors and GPGPUs, an automatic simulation based on physics will become a larger and more detailed real-time simulation, which has become an important direction for virtual technology research.

4) Demo

With the increase of 3d information, the rendering of a large amount of real-time data has become an important field of research. The external storage model, parallel rendering, organization and processing of the GPU computing becomes the research object. The mapping of hardware platforms, especially the two very large and complex realistic effects scenes and multi-content fusion is still a research issue.

Furthermore, AR means that users integrate virtual objects into the real environment and improve user awareness. Compared with virtual reality, virtual reality does not deviate from the real world, and its interaction is more natural. In fact, the real physical world is combined with the virtual world to form a new visual environment that interacts in real time. This is called Mixed Reality (MR).

2.3.2 The Virtual Reality Technology Development Environment

Virtual reality is a comprehensive and comprehensive technology that includes three phases of technology: human and computer interaction technology, detection technology, and artificial intelligence. Using computers, you can create realistic 3D vision, hearing, smell, and exchange information as participants. Related devices will naturally talk to the virtual world. As the user moves, the computer can immediately perform complex calculations to return accurate three-dimensional images and create a sense of presence. This technology combines the latest developments in computer graphics, computer simulation, real-world and network parallel processing. This is a high-tech analog system made with computer technology and main development technologies such as VRML, XML, X3D, JAVA3D. At present, the virtual reality development environment is roughly divided into the following three types:

(1) The underlying graphics development interface + high-level programming language.

At present, the underlying graphics development interface (that is, the software interface of graphics hardware) has OpenGL DirectX, etc., and OpenGL is a high-performance 3D graphics standard and runs in multiple operating systems.

(2) Secondary development based on commercial CAD/CAM software.

Existing commercial CAD software, such as Solid works Pro/EUG, mostly provides powerful structural design functions and secondary development interfaces. "This solution leverages the powerful 3D graphics simulation capabilities of mature systems to implement virtual functions, and advanced programming. The language is extended by the secondary development interface of the CAD/CAM system (such as database read/write, network transmission, human-computer interaction, etc.), which greatly reduces the development workload, shortens the system development cycle, and reduces the cost and hardware requirements. There are low and developed systems that integrate with existing CAD/CAM/LAPP systems.

(3) Virtual development based on virtual reality software with independent functions.

Virtual reality professional software helps users complete the establishment of the real-time interactive virtual environment, model visualization, virtual environment roaming and other functions.

2.4 The Current Situation of the Folk Culture Development and its Difficulties in Visual Communication

In today's society, folk culture is a cultural phenomenon in cultural, economics, and social fields, and the value of the influence is expanding. It is a social intangible asset, and gradually becomes a new economic growth point in the development of the entire national economy. China has a vast territory and rich folk culture. However, it is not optimistic from the inheritance of the development of folk culture. Some places have paid too much attention to the economic benefits of folk culture and neglected the inheritance, resulting in the loss or extinction of many folk cultures. Nowadays, the trend of the times is changing, and the development model of the traditional folk culture has not adapted to the times. Folklore culture has been used for a small amount of dissemination. The mode of communication is mostly offline. The use of newspapers, leaflets and other print media for publicity, single and one-way, has led to great limitations in the development of folk culture. This kind of communication lacks communication and interaction with readers. At the same time, the information contained can only attract the attention of some readers, and it is difficult to attract the interest of the many more people. This is a deficiency in the way of paper-based print media, and there is occasionally between the audience and information. As a result, the offline media has a narrow influence on information transmission, and the effect is limited. At the same time, this one-way promotion lacks communication with readers and is not easy for modern people to understand. Therefore, folk culture should expand its thinking and adapt to the needs of the times. At present, with the rapid development of Internet technology, with the help of powerful network functions, local government agencies have made a lot of effort in using the Internet to promote local folk culture and have achieved certain results. However, most of the online folk culture is aimed at economic propaganda and has insufficient effect on the inheritance of folk culture (Yibo Zhao ,2019).

3 VIRTUAL REALITY TECHNOLOGIES IS INTEGRATED INTO THE VISUAL COMMUNICATION OF FOLK ART

IN the inheritance of non-legacy digital protection, in addition to the record keeping of the development history of folk culture, it is also necessary to record and reproduce the folk culture environment, and systematically protect the inheritance of the non-legacy. Human-computer interaction is a core of multimedia development. Human-computer interaction means that people can be in the virtual world of computers as well as in the real world. This requires a good combination of virtual reality technology and multimedia computer technology. According to the different types of visual communication of folk culture, the virtual experience design framework of the folk culture is divided into two aspects; one is folk culture VR the scene type experience design, including folk culture display scene, craft culture display scene and the other is folk culture. The VR interactive experience design includes the origin of the folk culture, the interaction of the development process, and the exchange experience with the characters in the folk culture. Both above frameworks require modeling and scene design.

3.1 Modelling

Modelling is divided into four parts: Spatial modeling, character modeling, tool modeling, and model integration.

3.1.1 Spatial Modeling

The spatial modelling content includes: The first step, the spatial modelling of the folk culture scenes, such as large environments where folk culture is located, modelling buildings, streets, and geographical environments, etc. The second step is to confirm the construction technology of the model according to the actual situation of the scene space and divide the spatial modelling into close-range and distant views. The distant scenes such as sky, plants, roads, etc. use 3D technology to establish a simple collection environment ball, cross three-dimensional surface film or Independent three-dimensional facet. The close-up such as yard, etc., using 3D technology for high-precision modelling. The third step, implementing the model, and the basic model of the environment ball or 3D patch in the 3D software Autodesk Maya. High-precision modelling requires the use of the texture mapping method to establish the mapping between texture space and scene space and the scene space and screen space. The process is as follows:

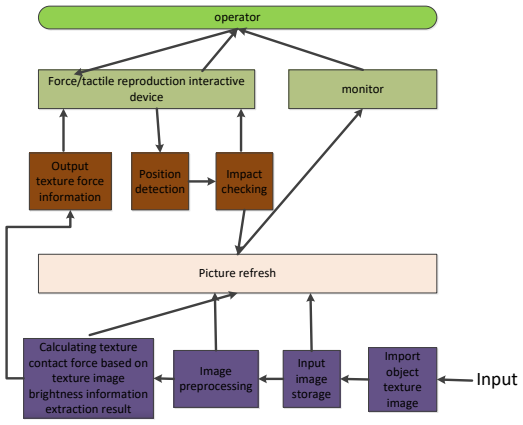

Figure 4. The Spatial Modelling Process.

Among them, the picture brightness information considers the brightness calculation and transparency

calculation, enriching the details of the texture. The brightness is calculated as follows:

$$I_1 = (1-s)I_d + sI_s \tag{1}$$

$$I_2 = (1-t)I_1 + tT(x,y,z) \tag{2}$$

$$I = V(x,y,z)[(1-a)I_2 + aI_a] \tag{3}$$

Transparency calculation:

$$V(x,y,z) = \begin{cases} 0 & ,when\ T(x,y,z) \geq V_1 + D \\ 1 - \dfrac{T(x,y,z) - V_1}{D} & ,when\ V_1 \leq T(x,y,z) < V_1 + D \\ 1 & ,others \end{cases} \tag{4}$$

$$V(x,y,z) = 1 - \frac{T(x,y,z) - V_1 - (V_2 - V_1)(1 - g(x,y,z))}{D} \tag{5}$$

where $g(x,y,z)$ is a scalar function, which takes a value of 1 at the projection center of the ellipsoid at the image plane, and a value of 0 at its projection boundary. Where V_1 and V_2 are the transparency at the center and boundary of the projection.

3.1.2 The Character Modeling

A simple workflow appears in Figure 5. First, based on the theoretical research, introduce the text patterns, and action files for scene files and text patterns. Each file contains multiple versions or operations for the simulation. Select the appropriate model in the new model database and tie the match to each model. A pattern is a multiple case, and different modes have different scenarios. The scene avoidance action and the action scene for selecting the avoidance path prepares for the second simulation experiment.

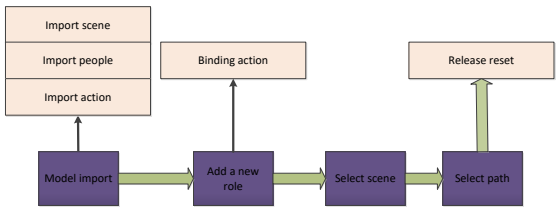

Figure 5. The Simple Workflow of the Character Modelling.

3.1.3 The Modeling Tools

A two-dimensional matrix is used in a computer to represent an image, in pixels, with one dot corresponding to one pixel (Wen T, Zhang Z, Qiu M ,2017). Generally, the lower left corner of the plane is taken as the origin, and the coordinates (u, v) of each pixel are the number of columns and the number of rows of the pixel in the image, respectively. Therefore, in order to facilitate the computer processing, it is necessary to convert the image plane coordinates in units of physical dimensions into representations in pixels. The two representation conversions can be expressed by the equation, where $(0,0)$ is the coordinate of point 0 in the coordinate system uv, and x 、 y_d 、 d is the width and height (in physical dimensions) of each pixel.

$$\begin{pmatrix} u \\ v \\ 1 \end{pmatrix} = \begin{pmatrix} \frac{1}{d_x} & 0 & u_0 \\ 0 & \frac{1}{d_y} & v_0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} x_c \\ y_c \\ 1 \end{pmatrix} \tag{6}$$

The relationship between the camera coordinate system and the world coordinate system is as follows:

$$\begin{pmatrix} X_c \\ Y_c \\ Z_c \\ 1 \end{pmatrix} = \begin{pmatrix} R & T \\ 0 & 1 \end{pmatrix} \begin{pmatrix} X_w \\ Y_w \\ Z_w \\ 1 \end{pmatrix} = M \begin{pmatrix} X_w \\ Y_w \\ Z_w \\ 1 \end{pmatrix} \tag{7}$$

The relationship between the camera coordinate system and the image plane coordinate system in the homogeneous coordinates can be expressed by the perspective projection formula of the following formula.

$$Z_c \begin{pmatrix} x_c \\ y_c \\ 1 \end{pmatrix} = \begin{pmatrix} \mathrm{f} & 0 & 0 & 0 \\ 0 & \mathrm{f} & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} X_c \\ Y_c \\ Z_c \\ 1 \end{pmatrix} \tag{8}$$

The above three equations can be used to obtain the relationship between the plane coordinate system and the world coordinate system, as shown in the following equation:

$$Z_c \begin{pmatrix} u \\ v \\ 1 \end{pmatrix} = \begin{pmatrix} \frac{1}{d_x} & 0 & u_0 \\ 0 & \frac{1}{d_y} & v_0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} \mathrm{f} & 0 & 0 & 0 \\ 0 & \mathrm{f} & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} R & T \\ 0 & 1 \end{pmatrix} \begin{pmatrix} X_w \\ Y_w \\ Z_w \\ 1 \end{pmatrix}$$

$$= \begin{pmatrix} \frac{f}{d_x} & 0 & u_0 & 0 \\ 0 & \frac{f}{d_y} & v_0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} R & T \\ 0 & 1 \end{pmatrix} \begin{pmatrix} X_w \\ Y_w \\ Z_w \\ 1 \end{pmatrix}$$

$$= K \begin{pmatrix} R & T \\ 0 & 1 \end{pmatrix} \begin{pmatrix} X_w \\ Y_w \\ Z_w \\ 1 \end{pmatrix} = P \begin{pmatrix} X_w \\ Y_w \\ Z_w \\ 1 \end{pmatrix} \quad (9)$$

In the formula, the matrix P is called the projection matrix; the matrix K is only related to the camera internal parameters ($0,0,...,x,y_f,d,d,u,v$ respectively corresponding to the camera focal length, the lens aspect ratio, the image center coordinate). Vectors T and R are by the camera. They are called off-camera parameters relative to the position and orientation of the world coordinate system. If the internal and external parameters of the camera are known, according to the formula, the image plane coordinates of any point in the three-dimensional space can be determined, and vice versa.

3.1.4 Model Integration

Models are a prerequisite for complex modeling systems. Different development environments and technical methods may result in incompatible system models. Therefore, developing a standardized development model interface is necessary for a standardized development model. Therefore, heterogeneous modes and integrated functional modules developed by different blocks are started when needed. Due to related research, the model interface constructed in this paper is based on individual interfaces and logic in the information field, which ensures the independent operation and reliability of the model. The model interface written in a high-level programming language uses a simple typical form of the following three functions.

The three functions described above manage the functions of the system preparation, simulation, and stop, respectively.

The pin parameter is in the form of a data set, and the data structure here is compatible with the system. The models described in the commercial software has no special limits but at least two model files need to generate a DL to complete the model initialization and another step model.

Table 1. A Simple Canonical Three-part Function.

Initialization function	Void XXX_Init (YSIMPARAMBUF *pSimParam, void *pParam, void * pInput, void *pOutput, void *pInsert, void *pUser) //Complete model parameter settings;
Model step function	Void XXX_Sim (YSIMPARAMBUF *pSimParam, void *pParam, void * pInput, void *pOutput, void *pInsert, void *pUser) //complete model calculation;
End function	Void XXX_End (YSIMPARAMBUF *pSimParam, void *pParam,void * pInput,void *pOutput, void *pInsert , void *pUser) //complete model resource release;

3.2 The Scene Design

The scene design is divided into the folk culture display scene design and interactive display design . In the environmental art design, the virtual reality technology effectively displays the meaning of its artistic work, and through the digital environment to transmit relevant information content through the virtual environment, thus completing the process of receiving the information/cognitive information and feedback information. Moreover, the virtual environment created by using the virtual reality technology is relatively more realistic and characteristic. The virtual reality technology constructs a three-dimensional digital model by using computer graphics, and the virtual reality scene is also embedded therein, so that the user's vision can be effectively mobilized, by hearing and touch, and lets them feel the real interactive experience. If the user touches the virtual item in the virtual space, he/she will feel the weight of the item, and when the user touches the virtual item in the virtual space, the weight of the item will be felt, and when the user takes the item, the item will move with the hand, giving the user a very real feeling.

3.2.1 The Display Scene Design uses the Two-dimensional Texture Image Processing Technology

Texture mapping is an important technology to enhance the realism of virtual scenes. Texture synthesis technology that improves texture seams and aliasing problems in texture mapping has been one of the research hotspots in the field of computer graphics, computer vision and image processing since its introduction. In this paper, the two-dimensional texture synthesis technology based on the sample image is studied. Based on the analysis of the advantages and disadvantages of various algorithms, some new ideas are proposed, and the algorithm is improved. In addition, this paper also applies the

texture synthesis strategy. The image compression technology has been studied, including the design of the compression framework and the implementation of the image compression algorithm based on the texture synthesis technology. This paper first introduces the basic concepts of the texture and texture synthesis, the development and application of the texture synthesis technology, and then introduces the sample-based two-dimensional texture synthesis technology in detail. This is represented by the Ashikhmin algorithm, the Wang Tiles collage algorithm and the hybrid texture synthesis method. The advantages and disadvantages of the point matching algorithm, the block splicing algorithm and the hybrid optimization synthesis algorithm and their improvement strategies are analyzed and discussed. Then, this paper proposes an improved hybrid texture synthesis method based on the pyramid structure. The hybrid texture algorithm is improved by the image pyramid, Ashikhmin search strategy and the sample texture pre-calculation. The texture synthesis is greatly accelerated under the premise of ensuring the quality of synthesis.

3.2.2 The Interaction Design

The interactive design uses a three-dimensional spatial model to combine the scene with the digital person to form a virtual display space.

The display design based on the virtual reality technology is a new topic of multimedia audio-visual design with the development of the virtual reality technology and the related computer application technology. It uses computer virtual reality technology and integrates multimedia technologies such as image, sound, animation and video and creates a new type of information multimedia display with 3I (interactive Interactivity, immersive Immersion, and conceptual Imagination) features.

Designers use their computer-specific software (VRML, Virtools, Cult3D, VRPlatform, Quick Time VR, etc.) to generate 3D real-world environments, and object information, etc. to generate digital avatars, and integrate multimedia information such as images, sounds, animations, etc. by digital media. As a carrier to spread to the people, through visual, auditory and even tactile sensations, the people are immersed in things in the virtual reality space of the computer simulation. It is a real-time interactive 3D graphic interface, which generates a more harmonious information display method with human-computer interaction ability that is similar to the objective environment and beyond the objective time and space, can be immersed and controlled according to the designer's concept. There are two main types of implementations of existing virtual reality display designs, namely image-based VR based on image rendering and Geometry-based VR based on 3D modeling. In terms of design and production, the former is based on the design of real-life photos, and the latter is based on the design of 3D models.

4 THE SYSTEM IMPLEMENTATION

4.1 The Parameter Settings

In order to develop an interactive interface, not only the user's user interface but also the location of the user interface and the size of the interface must be considered. When the interface containing the same information is too large, the user must always turn the position of the head, shoulders or body to get everything. When the user imagines the interface, they usually put themselves in a state of tension, causing head fatigue. The size of the smart interface helps to improve the comfort of the user experience. In a better horizontal field (both eyes), the eyeball size is between 55 and 55 turns between 30 and 30 fields of view, with the vertical being the best between the eyes. The eyeball is between 65-50 and 55-5 and is clearly visible. Therefore, in order to develop a virtual reality interface, it is necessary to control the size of the same content as much as possible so that the vertical direction is changed from 55 to 55 to 65 to 50. In the horizontal direction, the content of the important information is organized.

The line of sight is the distance between the screen and the operator's eyes. Distance directly affects the speed and accuracy of knowledge. In a virtual environment, if the distance is too close, the eyelash muscles will contract, making the reading difficult. If the distance is too large, the 3D feeling does not exist. Therefore, the distance between the viewpoint and the viewpoint is at least 0.5 m, and the most convenient area is 1.5 - 3 m.

When designing interfaces, the information must be optimized from the perspective of content and quantity. The organizational structure between the data is equally important. Before using these applications, users only need to understand the entire project and understand what services these applications can provide and what they can do to get them. The intelligent information architecture makes it easier for users to understand and start working, allowing them to use it more naturally and smoothly.

4.2 The Design

The development of the virtual reality technology has made an important contribution to the construction of the virtual visual expression. Immersive experiences are more convincing than full advertising. The autonomous interaction based on the visual representation of the virtual reality is completely different from the traditional passive representation. The development of new technologies has brought us new ways of thinking.

Virtual vision refers to the virtual representation of scenes and environments using computer technology. Virtualization is an environment based on virtual reality technology, computer network technology, virtualization and digitization. It can also be diverged

through the Internet, allowing distant viewers to see exciting pop art.

According to the actual roaming needs of users, the main functions provided by the system include view options, interaction mode, roaming mode, scene selection and task introduction.

Table 2. The Virtual Visual Communication System Function Profile.

Viewpoint control	Best: Move the viewpoint to the most appropriate viewing position when the panorama is switched. Reset: The set command button moves the viewing angle of the panoramic image to the initial optimal position. Rotation: 360 degree viewing by moving the viewing angle of the panoramic image with mouse clicks. Full screen: Click the full screen button to view the panoramic image in full screen. Auto: The function of automatic rotation viewing and manual rotation viewing through command buttons.
Interworking	Mouse: Use the computer's mouse as the input main device to complete the panoramic image viewing and interactive roaming functions. Keyboard: Use the computer's keyboard as an input auxiliary device to complete panoramic image viewing and interactive roaming.
Scene switching	Map navigation: switch to the corresponding panoramic scene view through the hotspot setting connection Hotspot connection: Complete scene switching through maps and hotspot settings in 3D scenes. Fast channel: Set the fast channel through two images to complete the scene switching.
introduction	Introduction to the work: A brief introduction to the whole work, so that the viewer has an overall understanding of the work. Scenario introduction: Introduce the panoramic node that is being viewed during roaming to learn the basic information of the scenario.

Roaming has three main aspects of interactive technology. The first is the collection and production of panoramic images, the second is the editing of the roaming panoramic space, and the third is the development and production of the navigation interface.

The acquisition and creation of panoramic images is an important technology for implementing panoramic images for roaming. Editing a circular roaming space is also a critical roaming system. You can edit the panorama space during the roaming and organize a 3D panorama in a virtual walkthrough, and the viewer can see any scene. When a freely moving user views the panorama, the design and development of the panoramic screen can be ensured, so, you can simply see the 3D stereoscopic panorama and high-quality browser interface, as well as the virtual scenes that users like.

(1) Design of the main interface.

The design of the main interface is intuitive and simple, and easy to operate. In the design of the main interface, the overall is visually reproduced by three-dimensional modelling, and the label is marked with the hotspot. Interior scenes such as important places combined with panorama display, navigation map guidance, and text introduction, establishes a quick browsing channel shown in Table 3.

Table 3. The Design of the Main Interface.

Panoramic play window	Panoramic play window
Navigation map	Navigation map

The panoramic image playback window is an important component of the interface and is a necessary element for the 3D panoramic images and roaming. In this window, perform the effect of focusing on the stage of the virtual reality, (look above, look down, rotate left and right, zoom in/out), then press the link of the access point.

Navigation maps are required for users to explore in a virtual reality space that is not lost. The navigation map is connected by a white access point set by the card, and the viewer is a panoramic location, and can also quickly input a specific scene.

In the left and right scroll mode, you can roam and view the panorama in multiple flat 2d images. Each scene in the panorama mode can be quickly found or click on a 3-d screen for quick input.

The browsing maps are virtual roaming tools that play an important role in the virtual roaming system. In the whole manufacturing process of the virtual roaming, for the role of the environment, it is generally used to explore the 2D planar maps. However, the performance of the two-dimensional exploration map is too abstract, and the two-dimensional plane can be obtained from the three-dimensional virtual reality. The conversion of the Y program is artificial and to better alleviate this situation, simulations were performed using a 3D modeling technology model. You can navigate the map at any time while roaming. The final rendering of the main interface is shown in Figure 6.

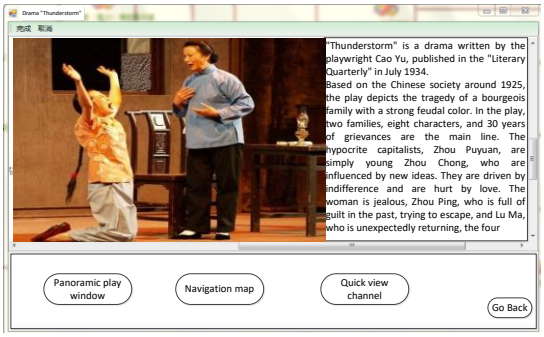

Figure 6. The Main Interface Rendering of the Final Design.

5 CONCLUSIONS

THE culture is the soul of the country. With the development and innovation of society, the role of the cultural soft power in the international contest is gradually increasing. In a variety of media, image communication, and as a unique carrier of art culture and information, there are incomparable characteristics of other forms of communication, and this feature provides an advantage for the modernity of the traditional culture. The traditional visual communication is to stay in the paper plane design, and the modern visual communication is based on three-dimensional space. The VR technology plays an important role in the people's modern life with a new communication perspective. The new concept of visual communication triggered by the VR technology is the revolution of visual communication driven by technology. The visual communication thinking of the VR technology itself needs people to accept and needs constant innovation. This paper discusses its application and practical significance in the field of cultural heritage-folk art. While analyzing and discussing it, it provides a reference for further exploration of the development and innovation of virtual reality display design.

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