

Application of VR Technology in the Protection of Minority Buildings

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Abstract: VR technology is a comprehensive and strong architectural design expression method. With the development of digital technology building information model, it provides a broad platform for the application of cultural relics building restoration design. Based on practical examples, this paper studies the application of virtual reality technology in the field of minority building protection. Aiming at the subjective and objective problems of the application of virtual reality technology in the field of minority building protection, this paper tries to explore the methods of applying virtual reality technology in the field of minority building protection. The design method and concept of building model have a great impact. With the real application of digitalization of building software technology, the rapid development and continuous improvement of building simulation information, the application of virtual reality technology in life will become more and more extensive. Although there are still some factors that restrict the development of technology in the field of heritage protection, the development of technology in this field is very meaningful and has extremely broad application prospects.

1. Introduction

VR technology, computer network technology and multimedia technology are called three major computer technologies, which have good prospects for development. It plays an important role in improving people's life style and promoting people's life progress. It is widely used in the field of architecture, and its role is relatively large [1]. The virtual environment is mainly simulated by professional equipment, thus forming a virtual experience for users. The application of VR technology has brought enormous social and economic benefits to the world. In the field of minority building protection, virtual reality system, as a unique technical means, can effectively construct a virtual world and reappear the disappeared human cultural heritage in front of us [2]. Traditional engineering management methods are becoming less and less suitable for the current actual project management, and there are many drawbacks in the storm. And virtual reality technology is a comprehensive and integrated high-tech, which can be used in project management [3]. From the perspective of thinking, VR technology is a kind of reproduction of photographic art. It is the production idea of the director's overall command, and it is also a manifestation of overall art.

At present, the existence and protection value of historical buildings have been recognized and recognized by all aspects of society. The main value of a historical building is that it carries humanistic historical information obtained from the birth of the building and the entire existence process. VR has become a hot topic, and the advent of VR picture book has also received attention and follow-up. The visualized content restoration and novel reading experience have made it a good response in the market [4]. Let the experienceer appear to be immersive and able to observe and experience things in three dimensions without any restrictions. The key technology of virtual reality technology lies in the synthesis of various digital technologies. It is precisely because of the combination of various digital technologies, the better the visual effect for the experienceer [5]. In the past, people can only be inspired by the results of quantitative calculation to deepen their understanding of things, and it is possible for people to get perception and rational understanding from the integrated environment of qualitative and quantitative so as to deepen concepts and germinate new ideas [6]. The technology content is relatively high, and the requirement for R&D is relatively high, which makes the virtual environment can simulate the construction

more truthfully, so as to better promote the improvement and development of the construction.

2. Methodology

The three-dimensional virtual interaction system is a computer generated virtual environment that stimulates many kinds of senses. It is an advanced human-computer interaction system. According to the definition, virtual reality consists of two parts, one is the virtual world environment created, the other is the participants. The core of virtual reality is to emphasize the interaction between them. In the past, feasibility study can be done through investigation and analysis and statistical data, but it is difficult to guarantee the correctness of project design [7]. Virtual reality technology has brought new vitality to the industry. The most typical of automatic modeling techniques is the three-dimensional modeling of actual objects using a 3D scanner. It can quickly and easily convert real-world stereoscopic color object information into digital signals that can be directly processed by computers without the need for complex and time-consuming modeling work. What is presented on different visual displays is the image and textual information produced by the visual effects of the incompleteness seen by our two eyes. In turn, it gives a layered realism of images, which can form the effect of multiple superposition of images and integrated imaging.

A finite element model of a building sap 2000 was established by field measurement of beam-column arrangement and component section dimensions (as shown in Figure 1 below). Among them, the beam unit is used to simulate the column and beam of the structure, and the plate unit is used to simulate the floor and the floor. In order to simulate the structural performance more accurately, the bending stiffness of some beams is released at the column-beam joint to realize the characteristics of semi-rigid connection and semi-articulated connection. The boundary conditions at the bottom of each column are hinge joints to stimulate the actual boundary conditions of the actual structure.

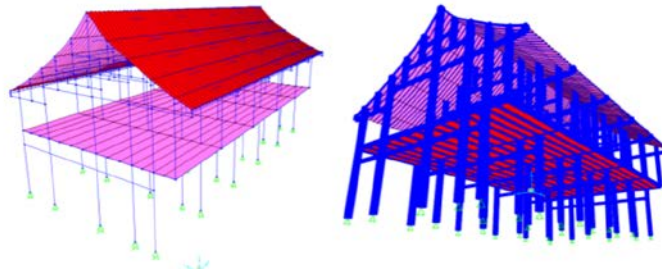


Fig.1. SAP 2000 finite element model of a building

For the restoration of heritage buildings, VR technology can be applied to various processes, from the original production of building models to the study of architectural design and structure. Its form of expression is often realized by boring numbers, and does not form an intuitive feeling. Therefore, in the actual screening process, the final design fails or is unreasonable due to personal errors. The consequences are also extremely serious. A successful 3D virtual interactive system will inevitably create an environment for the user to feel immersive. To achieve this effect, it is necessary to realistically display the displayed objects in the virtual reality system. Systematic modeling should be as perfect as possible, taking into account all aspects of actual factors, to ensure the closeness of virtual reality system and real reality. Image-based modeling technology can also be used in automatic modeling. Compared with 3D scanner, it is simple, labor-saving, low cost and fast, but the actual modeling effect is general. In the construction process, VR and AR technology are simulated and drawn according to the actual size of the site construction, which is very close to the actual operation, making the site construction and simulation effect map very consistent.

Figures 2 and 3 show two typical Chinese wood structures, with columns and linear skeletons. The wooden frame with laminated beams and columns shown in Figure 2 is mainly located in northern China. The timber skeleton of this structure consists of columns and beams that extend toward the ridge and become smaller and smaller. The vertical members supporting the ramen are

placed along the stepped shoulders of the skeleton.

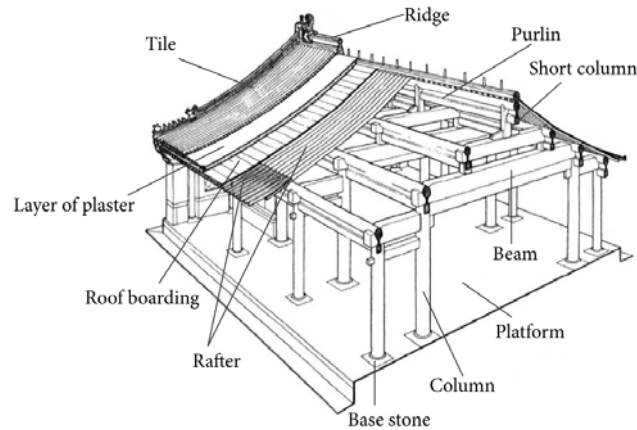


Fig.2. 3D view of laminated beam-column wood structure

Figure 3 is a commonly used timber frame with columns and ties in southern China. The main feature of this structure is that it is supported directly by columns. The crossing system of connecting columns is called transmission, which only has the function of cross connection.

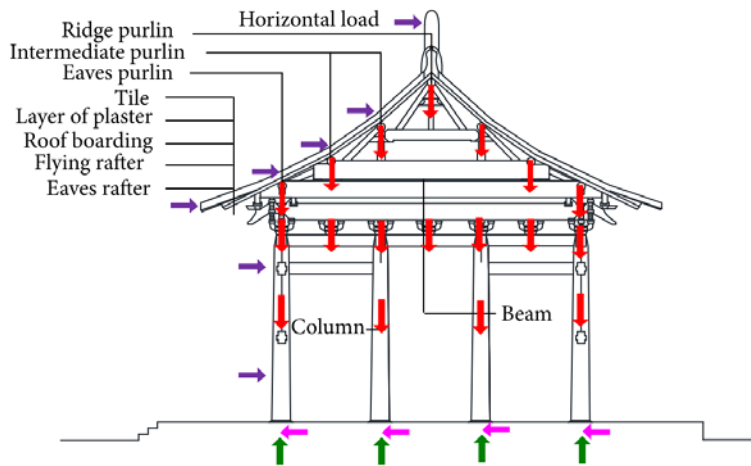


Fig.3. Wood frame section with laminated beams and columns

For the design of the surrounding environment of cultural relics, if you can create an immersive feeling, then the design method of this environment is more reasonable and comprehensive, and this feeling is exactly what VR technology needs to solve. ask questions. Since different buildings have different requirements for daylighting and other factors, these factors should be considered comprehensively in the process of designing the plan. Some building components in heritage buildings need to respond to the observer. When an observer interacts with an object, the object must react in an appropriate way, without neglecting the observer's actions. There are many factors, all of which are expressed as some parameters. In addition to the mathematical models mentioned above, some other mathematical models can be used to include stochastic process models and statistical tests, which can make the system dynamic and adaptive. In modeling, we try to simplify the complexity of the model as much as possible. For complex details, we use mapping to represent them. We also use some auxiliary software to reduce the number of models, and try our best to achieve the best performance with the least number of faces.

3. Result Analysis and Discussion

The application of VR technology to the restoration design of cultural relics is of great significance to the study of architecture, the protection of cultural relics, the planning of the surrounding environment of buildings and the planning of tourism in the future. In the process of using virtual reality technology, through the simulation and change of the virtual environment, it

can better promote the construction unit to study and analyze the construction effect of the project. Building components in a virtual environment are diverse. It takes a lot of effort to build a model of a building component, so it is necessary to build a standard model library that can be reused. Authenticity and accuracy. The three-dimensional construction of cultural relics and their environment must be based on various surveying and mapping materials and historical archives. In order to ensure the authenticity of the virtual environment, users can not only visually see the virtual objects in the virtual environment, but also interact with them personally, which requires that the solid objects in the virtual environment are impermeable. The three-dimensional model database of the building is established to preserve various spatial relationships of the cultural relic building, and to realize a comprehensive, vivid and realistic display, which makes the cultural relics out of the geographical restrictions and realizes "sharing resources for all".

In virtual reality technology, it provides an intuitive feeling by displaying two-dimensional pictures in an integrated form, which is conducive to the reasonable modification of the landscape and the construction scheme of the building and the rational inspection of the overall layout. In the actual application process, the display of the model, the behavior of the motion model, and the conflict detection in the virtual environment with multiple moving objects are all operations with high frequency, which must be implemented efficiently. The virtual reality scene is decomposed into groups that can be rendered directly in physical memory, and then rendered in groups. This method is effective for both prefabricated and real-time animation. The fascination for building virtual reality is not only in real-time interactive 3D, but also on the basis of a new information exchange interface that is unmatched by other traditional expressions. If the model is created to produce a partial static architectural rendering, then all the details of the nearest observation should be carefully established. The application of VR technology can realize the pre-argument and virtual demonstration of the building based on the simulation of the architectural scene technology, and can realize the observation of the building effect from multiple angles on the basis of maximizing the professional participation.

Creating an effective model is a very complex task. The modeler must represent the geometric and behavioral models of the object as accurately as possible. The modeling technique should construct and develop a good model as easily as possible. When making a roaming animation in a virtual environment, the rotation path is most likely to cause rework. The reason is often that the rotation in the roaming animation is not thoroughly explored during production. The role of spatial building models becomes more and more important when space is recognized as the main body of architecture. VR technology can free architects from the constraints of two-dimensional expression and the uncertainty of Abstract thinking, so that their ideas can be generated in real time. Full development in the world. If an object is far away from the camera and is a rather complex object in the salient position of the scene, the remote object may not need much detail. In practical application, this technology can also simulate and check important structures in buildings, such as virtual failure experiments on important load-bearing beams in buildings, and obtain failure rules by studying their failure patterns. When moving and rendering three-dimensional objects, the more information related to each vertex and its three-dimensional coordinates processed by the computer. Therefore, it is necessary to optimize the three-dimensional modeling, which can speed up the display speed of the three-dimensional virtual interactive system and bring users a more smooth experience.

4. Conclusions

Firstly, this paper analyses the current situation of virtual reality technology, then puts forward the existing problems of the application of virtual reality technology in the field of minority building protection, and analyses the three-dimensional construction method of cultural relics building based on virtual interaction. Virtual reality technology provides us with an open, interactive, college and accurate management platform, breaking through the scope of traditional management methods, can make project management more time-saving, labor-saving and efficient. Virtual reality is a developing technology. Its purpose is to make information system meet human

needs as much as possible. Human-computer interaction is more humane, and users can interact with data more directly. Let the designer intuitively face the design object from different angles, study the relationship and proportion between each design element and space in the environment, and design a more perfect and more humanized work. Due to the real-time three-dimensional performance capability, the human-computer interactive operating environment and the immersive experience of virtual reality will become an ideal tool for architectural and planning aided design and display. At the same time, the system also realizes practical functions such as real-time distance measurement and navigation map, which provides a new means for the protection and research of architectural heritage.

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