Interior Landscape Design and Research based on Virtual Reality Technology

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Abstract. Interior landscape design needs a comprehensive use of a variety of design theories and technical means, so that the aesthetic feeling and connotation of the works can be effectively reflected. However, the existing means and methods of interior landscape design have been difficult to meet the increasingly high expectations and needs of users. The development of virtual reality technology has brought new changes to interior landscape design, which is helpful to give full play to the auxiliary role of design. Based on this, this paper first analyses the application characteristics of virtual reality technology, then studies the application status and problems of virtual reality technology in interior design, and finally gives the modeling method of virtual reality technology in interior design.

Keywords: Interior Landscape Design, Virtual Reality Technology, Application

1. Introduction

Interior landscape design needs to use interior design theory, based on interior planning, and comprehensive use of a variety of technical means to make the works not only have visual beauty, but also coordinate with the interior environment. It is very important for interior landscape design to show all-round, real and even dynamic design works, so as to accurately show the design ideas of interior designers[1-2]. Most of the existing interior landscape design uses two-dimensional drawing, and most of the software is developed on the third-party platform[3-4]. The degree of automation in the three-dimensional modeling and data statistics is low, which fails to give full play to the role of auxiliary design. With the development of virtual simulation technology, Virtual Reality Technology (short for VRT in this paper) brings a new revolution to the field of interior design[5]. Through the simulation sample, it can put forward improvement suggestions for the design proposal, even the production procedure and the modified results can also be simulated, so as to reduce the construction period and cost, and improve the efficiency of interior design. Therefore, the research of interior landscape design based on VRT has important practical significance.

2. Application characteristics of VRT

2.1. Characteristics of VRT

VRT includes hardware equipment technology and virtual platform technology, that is, the input terminal represented by sensors, mouse and keyboard and the output terminal represented by image display, sound
and projection, so as to achieve high-level expression ability and complex software interaction[6]. The characteristics of VRT are shown in Figure 1 below. Immersion enables users to experience the virtual space environment in audio-visual aspects. Interaction is realized through the interaction of natural actions and virtual space in the virtual world. Imagination enables users to have a good design and conception of virtual space content.

![Figure 1. The characteristics of VRT](image)

2.2. Application of VRT in interior design

The important support of VRT for interior design is abstract concept modeling. Based on the support of computer logic computing processing ability, the interaction ability provided by VRT is brought into play, and more intuitive and understandable image or image demonstration is provided for users. With the development and maturity of VRT, VRT has been gradually applied in urban planning and design, architectural design and real estate industry. In addition, the core of VRT application in interior design lies in the creation of three-dimensional model. However, the modeling methods and requirements will be affected by the form of expression and the perspective of observation, which leads to the model cannot match the requirements perfectly. Therefore, in the virtual reality scene, we must pay full attention to the deficiencies of the model to ensure the user's interaction experience.

3. Application status and problems of VRT in interior design

3.1. Application of VRT in interior design

Interior design style is not only a reflection of regional history and culture, but also an important part of people's life connotation. Therefore, the interior space design should not only meet the needs of modern people, but also pay full attention to the design connotation and artistic display, so that the regional culture and value connotation can be fully reflected. As an important part of interior design, interior design decoration and space continuity need to be fully integrated with the extension of the building. The primary and secondary relationship, style consistency, material technology should be able to perfectly show the connotation of interior design. Through dynamic environment modeling, real-time three-dimensional space generation and display, intelligent human-computer interaction and large-scale distributed virtual reality and other technologies and means, the connotation of interior design can be more perfectly reflected. However, the current application of VRT in interior design is not deep enough, most of which are only superficial design. In order to fully integrate with regional culture and connotation, the role of VRT has not been brought into full play.

3.2. Problems in the application of VRT in interior design

VRT shows its great advantages in improving design efficiency, reducing cost and time in the application of interior design, and it has highly efficient dynamic adjustment ability, which makes users easy to ignore the functionality of VRT and only focus on its display, which limits the full release and play of its functions. The interior design based on VRT not only needs to fully display the design connotation and essence of the designer, but also needs to gradually stimulate and release the creativity and imagination of the designer by
adjusting the subjective feeling factors such as texture and color in the design process, so as to fully reflect its design level and experience, and create a work full of connotation for users.

4. Modeling method of VRT in interior design

4.1. Key applications of VRT in interior design
The key applications of VRT in interior design are as shown in Figure 2 below. Among them, the application core of VRT in interior design is environment modeling, while the stereoscopic display is based on the existing image generation technology, which is relatively easy to achieve. The interaction of VRT in interior design cannot be fully developed without the application of sensor technology. Through the perception and simulation of human behavior, the corresponding indoor environment is generated, which greatly enhances the user's perception ability of virtual environment. In addition, the system integration technology is an important guarantee to give full play to the functionality of VRT. Through the establishment of application scenarios combined with the use of objects, the creativity of interior design designers can be brought into full play.

![Figure 2. Key applications of VRT in interior design](image)

4.2. Modeling method of VRT in interior design
As a key step in the application of VRT in interior design, virtual reality modeling studies graphic data structure through the processing of geometry and shape. Generally speaking, the technical indicators of modeling and evaluation of VRT in interior design mainly include accuracy, display speed and ease of use. In order to improve the authenticity of interior design scene, it is necessary to give real texture to the interior scene. Based on diffuse map and transparent texture mapping technology, cross modeling can be carried out to restore the authenticity of the interior scene to the maximum extent. In addition, we need to further render the indoor scene, such as the rendering of indoor lights. We need to consider the authenticity of light and location, and choose and set reasonable texture.

4.3. Generation and combination of indoor scenes
The generation and combination of indoor scenes first requires the designer to make an overall plan and conception of the indoor model, so as to determine the configuration and overall layout of indoor objects, and through the three-dimensional scene construction tools, to compose the overall indoor environment. Secondly, based on the built overall indoor environment scene, add indoor components, such as furniture model and other items, to determine its location and layout in the indoor space. Through the independent modeling of indoor elements, the independence of each element module is guaranteed, which is not only conducive to the later modification and improvement, but also conducive to the overall layout of the new planning and adjustment, and improve the design of interaction and ease of use.
4.4. The interactivity of indoor scenes
In the interior landscape design based on VRT, the interior landscape scene should have strong selectivity, so that it can provide different landscape scenes for selection based on the user's personalized aesthetic needs, which requires strengthening the interaction with the user in the interior landscape design based on VRT. Through VRT, users can change the proportion relationship of the virtual world based on their needs. They can not only experience the indoor virtual landscape scene based on their own proportion, but also reduce the scene so that users can edit and reconstruct the scene, as shown in Figure 3 below. In short, through the interaction function of indoor scene, users can choose the indoor landscape matching and scene decoration independently, thus greatly improving the user's sensory experience.

Figure 3. Prototype construction process of visual angle of virtual reality

5. Conclusions
VRT has brought a new revolution to the field of interior landscape design. The interior landscape design based on VRT has improved the shortcomings of the existing interior landscape design, such as low automation, high cost and weak applicability, and can give full play to the role of VRT in the auxiliary interior landscape design. In this paper, aiming at the application of VRT in interior design and problems, the modeling method of VRT in interior design is improved, so as to optimize the generation and combination of interior scenes, and further enhance the interaction of interior landscape design scenes.

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