Establishment of Environmental Art Design System Based on Computer Virtual Reality Technology

Li Liu*
Hubei University of Technology, China, 341000
*E-mail: 1260609582@qq.com

Abstract. Multiple modern scientific and technological means are changing people's lives unconsciously. The emergence of computer technology and virtual reality (VR) technology has broken through the inherent traditional mode, endowing higher practical value to the environmental design scheme and its applications. In this paper, the VR technology and its practical application in environmental art design are expounded, and the far-reaching influence of VR technology on the actual design process is explored to provide a reference for broadening the environmental art design concept.

Keywords: Virtual Reality Technology, Environmental Art Design, Applied Research

1. Introduction
Currently, at the same time, various kinds of multimedia technology emerge, bringing new development momentum for the actual work[1-3]. How to improve the level of modern environmental art design has become a common concern of experts and scholars in this field. It is proposed that virtual reality (VR) technology should be combined with environmental art design to strengthen the efficiency and economy of environmental art design[4-6]. In the process of practical design with VR technology, the technical features of multi perception, interaction, and imagination of VR technology can make up for the insufficiency of traditional environmental art design.

2. Overview of VR technology

2.1. Analysis of VR technology
VR technology is essentially a collection of a series of advanced technologies, including multimedia technology, computer network technology and simulation technology, etc. relying on these kinds of technologies to create a more realistic three-dimensional virtual environment, under the support of hardware equipment, to achieve the creation of multi-dimensional information space, so as to present a very intuitive and image for specific industry fields Virtual environment of body.
Figure 1. VR technology implementation process

Different virtual scenes need to be realized by different technical means. In general, the vast majority of VR technology applications need to be equipped with information input modules of VR system, and with the specific operation of multimedia technology and information collection module. In addition, the most important thing is that the operation of the mutual inductance module of virtual technology, with this module, makes the interaction between human and environment. Finally, the VR scheme is presented to the audience through multimedia technology, computer information technology, and other means.

2.2. The application of VR technology in the establishment of the environment space model

The establishment of space model in environmental art design: first, the designer should make a complete set of space model design scheme, and complete the plan drawing of three-dimensional space through AutoCAD software; subsequently, the completed three-dimensional space plan is imported into SketchUp software for direct adjustment to perform insertion, copy and other editing operations and create the basic framework of the 3D model; then simplify the engineering files after modeling, and import them into 3D software such as 3dsmax and lumion to create the object materials and lights, and adjust them according to the final rendering effect; finally, according to different environmental art settings According to the design requirements, the physical objects in the space are adjusted in size and material to complete the optimization of the whole environmental art design. After the establishment of the environment space model, it is necessary to export the corresponding pictures, animations, and executable files, and show the final design effect to the customer. The process of building an environment space model using VR technology is shown in Figure 2.

Figure 2. Flow chart of environment space model establishment

3. Exploration of the practical application of VR technology in environmental art design

3.1. Purpose and connotation value of environmental art design

On the whole, in the field of architectural design and environmental design in China, we need to use various advanced technologies to highlight its connotative value. The purpose is to present a very valuable design scheme with the most economical cost. In the process of practice, we need to take all feasible means of the breakthrough industry development bottleneck.

From an objective point of view, in the process of applying VR technology to environmental art design, there will be some practical problems, but there is no fault. This is also determined by the characteristics of this technology, which will make environmental technology design present an
unrealistic side. Nevertheless, the application of VR technology to environmental art design still has strong technical support Because under its function.

3.2. The relationship between VR technology and environmental art design
VR technology needs to break the limitation of space or even time. With the support of this technology, the environmental design can span to any physical environment that can be touched by an idea. With the help of the artistic concept of the sky and the sky, further adjust the contents of the environmental design scheme, so that it has high artistic value or practical value. In essence, VR technology and environmental art design There are many professional relations between them. Because they are all related to the establishment of a specific environment, environmental design highlights the advantages and characteristics of VR technology, so the effect of integrating the two is more prominent. Specifically, an environmental art design project is a large-scale engineering design of integrated display type, i.e., using the dynamic atmosphere created by high-tech scenes to stimulate people's various experiences to have a more intuitive and specific understanding of the concept of environmental design.

3.3. Influence of the practical application of VR technology on environmental art design
In practice, it is found that the practical application of VR technology on environmental art design because it can not only make up for the shortcomings of the traditional, but also effectively avoid potential problems in actual operation, such as the coordination between human and environment, and the design of dynamic environment. Also, with the support of VR technology, we can avoid the cost waste of repeated design in the past. Only by using computer technology and multimedia technology to create VR space, we can realize the overall environmental design structure. Therefore, the practical application of VR technology improves the economic and social benefits of entity project establishment to a certain extent.

Before assumption l samples are labeled as \( \mathcal{E} = (x_1, x_2, \ldots, x_l) \), corresponding label \( \eta = \{y_1, y_2, \ldots, y_l\} \).

The importance of each feature dimension in the classification problem is different. The environmental art design data can overcome the shortcoming that the environmental art design data treat each feature dimension equally to some extent. Its definition is as follows:

Sample \( x_i \) and \( x_j \) the environmental art design data between is defined as

\[
d_i(x_i, x_j) = \sqrt{(x_i - x_j)^T A(x_i - x_j)}, \tag{1}
\]

\( x_i \in \mathbb{R}^d, A \in \mathbb{R}^{d \times d} \) is a symmetric semi positive definite matrix.

According to the properties of positive semidefinite matrix, \( A \) Decomposable into \( A = L^T L \), the above formula is:

\[
d_i(x_i, x_j) = \sqrt{(x_i - x_j)^T A(x_i - x_j)}
= \sqrt{(x_i - x_j)^T L^T L(x_i - x_j)} \tag{2}
= \sqrt{(Lx_i - Lx_j)^T (Lx_i - Lx_j)}.
\]

It is equivalent to the matrix as a mapping, and transforming the environmental art design data of the original space into the environmental art design data of the new space.

The application of VR technology can effectively avoid potential problems in the environmental design scheme. In view of the special technical requirements, it is often necessary to integrate multi-disciplinary knowledge system to complete the content of the design scheme. If there is a
technical omission, the whole environmental art design scheme may be overturned. From the specific situation, in the VR system. In general, VR system can be divided into two main parts: foreground simulation presentation and background technology processing. Under the support of computer hardware and software, the simulation system model can be set up [8]. In fact, VR system itself is a system Through the orderly operation of the simulation system platform, the integration of column technology makes each module play its maximum role, to implement the VR in a specific situation. In this way, the application of VR technology combines the advantages of the simulation system system to avoid the problem of previous design efficiency.

4. Conclusion
The essential function in the application of the environmental art design is mainly reflected in its interactivity, which is different from implementing a single large-scale integrated display project. In the human-computer interactive virtual environment, the interaction and exchange with the central system can be experienced through some simulation function modules of the system to present the high-tech fusion efficiency of such interactive 3D virtual environment model. In this way, any problems in the environmental art design scheme can be easily reflected by the virtual scene, which can help technical designers adjust or improve the design scheme, avoid problems in the practical environmental establishment process, and prevent the waste of resources to some extent.

References
[1] Wang, Q. H. , Li, J. R. , Wu, B. L. , & Zhang, X. M. . (2010). Live parametric design modifications in cad-linked virtual environment. The International Journal of Advanced Manufacturing Technology, 50(9-12), 859-869.
[2] Zhu, L. . (2013). Application and design of virtual reality technology in railway maintenance training. International Journal of Technology Management(4), 42-44.
[3] Vorlaender, M. , & Stienen, J. . (2015). Virtual acoustic environments for soundscape research and urban planning. The Journal of the Acoustical Society of America, 138(3), 1748-1748.
[4] Gervasi, O. , & Ranon, R. . (2010). Guest editors' foreword to the second issue on virtual reality in scientific application. virtual reality, 14(2), 153-154.
[5] Antonio Laganà, & Gervasi, O. . (2010). A priori molecular virtual reality on egee grid. International Journal of Quantum Chemistry, 110(2), 446-453.
[6] Halik, U. , & Maciej Smaczyński. (2018). Geovisualisation of relief in a virtual reality system on the basis of low-level aerial imagery. Pure and Applied Geophysics, 175(9), 3209-3221.