Garden Landscape Design Based on Panoramic Intelligent Image Processing Technology

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Abstract. Virtual Reality (short for VR) information and the Internet is a comprehensive information technology that appeared at the end of the twentieth century. It integrates the latest development achievements of modern information technology such as computer graphics, multimedia technology, artificial intelligence, multisensors, computer networks, and parallel processing systems. Its real-time three-dimensional display ability, the use environment of human-computer interaction, and the immersive feeling it provides for people have changed the boring, blunt and negative interaction between people and computers in the past, and provided people with exploration and research. The macro world and the micro world have brought great convenience. The application of virtual reality information technology to the design of landscape architecture provides a powerful help for people to investigate the characteristics and activity laws of the objective world. It can allow designers to be inspired by the interaction with the multi-dimensional information environment, thereby enhancing the sensitivity and rational awareness, and then form innovative design ideas. At the same time, by using the interaction with the multi-dimensional information environment, it can improve the creativity of landscape architecture design. From a qualitative and quantitative comprehensive integration situation, the awareness of perceptual rationality is obtained, and then the design concept is deepened, thereby broadening the creative path. Although the application of virtual reality technology in landscape architecture design is still in the exploratory period, with the gradual maturity of technical means, it will have a greater impact on landscape architecture design.

Keywords: virtual reality technology · landscape architecture · garden design · application

1 Introduction

In the past few decades, the development of computer and digital technology has caused a series of impacts on contemporary landscape architecture science and architectural design. The essential changes in various fields such as social life style and human social composition have led to the further broadening of the connotation of modern garden architecture landscape design. Dr. Kongjian Yu from the School of Landscaping Engineering and Design of Peking University made a summary of the development of modern landscape architecture, and classified the development process of modern landscape

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architecture in three stages. We can analyze that the modern landscape architecture major has long been dominated by biological and ecological majors, and has developed into a relationship with other non-biological majors (such as civil engineering, architectural design, urban planning), philosophy, economic and social development history, literature and art, a comprehensive professional with professional integration.

However, people should be more aware of the shortcomings of the current landscape architecture design technology, such as: blindly focusing on modeling, decorative landscape architecture design has been found everywhere. In the artistic expression of the park, whether it is one-dimensional digital symbols, two-dimensional graphic images, or three-dimensional simulation sand table, renderings and other animation works are just a static form of media expression, which cannot truly vividly present the inherent form of the park landscape itself. The expansion space is getting bigger and bigger, urban and regional landscape and ecological construction planning, natural environment and cultural protection area planning and design, tourism and sightseeing activity planning, etc. will definitely become the focus of landscape architecture design and the directional transformation of analysis design. Therefore, we should enrich our own ideology and theory of landscape architecture and promote the continuous development of landscape architecture by absorbing the achievements of architecture and urban planning and design in other fields.

2 Application Characteristics of Virtual Reality Technology in Landscape Architecture Design

Everything is based on video, and on the basis of cloud technology, more new content, new interactions, and new experiences are born. There are real, interactive and three-dimensional, but also because it has created other incomparable and brand-new information interaction interfaces with traditional display methods on this basis: When experiencing the three-dimensional space, it adopts real-time editing of landscape elements and real-time adjustment of three-dimensional space. Technical means such as spatial scenarios and integration with system information provide a strong guarantee for the comparison and deliberation of plans and the performance of design ideas, design features and related information, which are highlighted in the following aspects:

2.1 The Performance of Design Ideas, Design Features and Related Information

2.1.1 Design Information Analysis is Scientific and Accurate

Since the VR operating system is composed of computer graphics, graphics information processing and model recognition, intelligent interface information technology, artificial intelligence technology, multi-sensor, language information processing and audio-visual information technology, computer network technology, parallel processing technology, and high-performance computer technology. The large-scale comprehensive and integrated environment composed of various main functions such as system information technology and subsystems with considerable scales at various levels is a highly integrated high-tech environment [1]. Its powerful application program interface can input relevant complex system models and analyze them, which can bring designers a more

overall and objective understanding. Various advanced optical imitation control systems, atmospheric analysis systems, geographic information systems (GIS), etc., it has introduced the analysis of creative information more scientific, realistic and accurate.

2.1.2 Dynamic Spatialization of Design Ideas

VR technology can not only make the expression of abstract ideas of landscape architects closer to the real world when designing space, but its more important potential is that it can break through some habitual attitudes caused by people's limitations in the way of expressing ideas. Design precepts, and then truly make space design landscape architects more likely to express the modern poetic image requirements in terms of technology [2]. Because the technological revolution of modern landscape architecture will lead human's sight from the appearance of the landscape architecture to the landscape architecture space, the design function of the landscape architecture space model becomes more critical. VR technology enables landscape architects to break away from the constraints of two-dimensional expression and the uncertainty of abstract ideas in space design, so that their design ideas can be freely developed in the actual three-dimensional space world. The overall structure of the innovative landscape garden space can be more sculptural and natural. We should believe that the progress of science and technology controls the form of expression, and the demand for environment and function also affects the form of expression, and the tools and media of design and expression can also promote the birth of a new landscape and urban form.

2.1.3 Systematization of Design Information

During development, using the data interaction condition, the landscape garden model in VR equipment and some digital media resources, including images, sounds, pictures, floor plans [3], three-dimensional modeling and 3D animations, are used for resource interaction, so that the particular picture can carry all critical data, including plan, section, related structure description, design information to be scrutinized, etc. In this way, designers and readers can obtain relevant design materials for in-depth observation and exploration.

2.2 Authenticity and Innovation in the Performance Process

2.2.1 The Sense of Presence Expressed by Landscape Architecture

The immersive virtual reality makes the audience feel like they are in the virtual world, using the airplane model to get a bird's-eye view of the landscape garden shape and examining the relationship between the landscape garden and the surrounding environment, using a full-scale normal field of view, it provides an observation and understanding of the entire landscape garden spatial structure. The real-time roaming in the entire landscape garden may not only help the audience to see the details nearby and feel the interior space on the spot, but also wear big data gloves to observe the building materials on the surface of the landscape garden, so that the audience can achieve an immersive experience.

2.2.2 Interactivity of Landscape Architecture Experience

Through the interactive research and application of natural technology in virtual environment by using virtual reality interactive interface technology, virtual reality technology makes the spatial experience in landscape architecture more interactive, and the spirit of flexible place can be reflected as much as possible. The realism of the environment is also improved [4]. In virtual reality, people can decide by themselves the path of browsing, the viewing angle of observation, the viewpoint of observation, and the time to rest, edit the content of landscape architecture; in key links, they can link relevant information as required to obtain more information. Virtual reality gives designers and players greater freedom.

2.2.3 Creativity of Perceptual Activities

The fundamental purpose of virtual reality technology is not only to simulate models in multi-dimensional information space, but also to emphasize the three-dimensional representation of images in three-dimensional space [5]. The virtual reality operating system has a variety of powerful interfaces, and supports a variety of perception programs and hardware. The dynamic observation and multimedia experience in the space design of virtual reality landscape architecture will further produce a sensory response to the body, thereby inspiring designers to form a new space concept in the brain. This is the key for designers to use the virtual reality system for design and production.

3 Application of VR in Various Process of Landscape Design

3.1 Feasibility Analysis

In order to fully grasp the conditions considered by landscape architecture, it is necessary to systematically analyze the objectives, facts, concepts, needs and other factors in the project in terms of function, form, economy and time, so as to clearly summarize the whole design process. Potentials, limitations, and issues that must be explored. Therefore, landscape architects must clearly characterize some conditions and potentials and use the VR system for simulation and preliminary exploration. This stage is a rough preliminary exploration of the physical relationship, which is connected with the design conditions to form an overall understanding, which can be used as a follow-up design [6]. For progress and communication with others, it can use GIS to simulate the natural conditions of the base, analyze the current conditions of roads, trees, rivers, etc. Within the base, it can conduct multi-angle and multi-directional observation and research on the slope and terrain trends of the base, so as to clearly know that the base can be used for different purposes. Restrictions: Provide basic needs for indoor and outdoor space creation through the simulation of sunlight and wind direction in the environment. In addition, it can enter the interior of the landscape garden to observe and evaluate the direction and quality of the landscape in the base, and according to the comprehensive consideration of the aforementioned factors, the Bases are divided into different attributes required by the plan. These works provide systematic scientific judgments for the formation of design concepts [7]. The core stage of the design process is decision

making, and what is important in the design thinking process is coherent thinking. The computer virtual reality system is used for communication, evaluation and performance at the beginning of the development project design, which is conducive to the connection of thinking at all stages of design and the continuous advancement of creativity.

3.2 Conceptual Design

The beginning of landscape architecture design is often an abstract idea, but not necessarily a concrete thing. The main effort of a landscape architect is to innovate, develop and express graphic techniques. However, this abstract idea is often unable to be verified and played because of the backward expression [8]. In this process, the manifestations of things are always at a distance from their noumenons. In the traditional method, to analyze how the elements of landscape architecture are organically combined, it is often necessary to rely on the improvement of mapping technology as a means to understand, discover and display this spatial structure, and it needs to be at two different levels both conceptually and expressively. The use of virtual reality system to carry out product design is to use the artistic expressive power of machines to connect design drawing skills with composition expression technology, so that people have more opportunities to exert design composition skills and expression skills more autonomously, and the development of product design can be achieved. Not to be constrained by the development of relatively low-level structures and expressions [9]. It brings fresh vitality to the innovation and development of modeling forms, and also opens up new ideas. It can also relatively easily apply scientific principles in other fields to the creation of landscape garden modeling.

3.3 Theme Idea

In a sense, the powerful function of virtual reality technology in multi-dimensional space modeling has brought a huge leap in landscape design, especially the theme conception stage of landscape design. In addition to bringing the abstract thinking of landscape art closer to reality, the main possibility of virtual reality technology can break the traditional design commands caused by the expressive boundaries of past thinking, and then in order to express a more refined image, the theme of the gardener is more clearly defined [10]. Landscape architecture and spatial design can be constructed with more freedom of sculpting. We believe that technological progress will control the form of expression, environmental and functional requirements will also affect the form of expression, and the tools and media of design expression will also generate new landscape theme ideas. Through accurate descriptions and real-time generation of landscape scenes, we can exaggerate and stimulate our senses and creative thinking, morphing the features and shapes of landscape structures. This can be translated into another scheme in real time, while observing different environments in the observation sequence of the same observation point [11].

3.4 Scheme Optimization

With the development of the design, it can use the virtual reality system to conduct technical reviews with the owner, in order to identify any contradictions between the

different construction service systems and structural design in the process of communication, check the proposed scheme from the aesthetic point of view to meet the basic function. The requirements can fully meet the user's requirements. In the past, the traditional computer-aided design actually used the computer to draw or express the effect of the design, but it only created a new way of expression, which greatly reduced the labor intensity of drawing [12]. However, today's computer technology has been used as a very feasible technical means to review landscape architecture design. Especially with the development of virtual reality technology, the traditional landscape architecture design procedures have been changed, and the barriers between landscape architecture, structures and facilities will be removed, so that the feasibility and economic benefits of the judgment principle are unified, avoid future field modifications in the early run-in.

4 Application Scope of VR Technology in Landscape Architecture Design

For landscape architecture design, virtual reality technology can provide a powerful help for creating and experiencing orthogonal environment space, stroll freely in the park and enjoy different scenery.

4.1 Feel the Landscape Garden Space During Exercise

In the past, landscape architects used some perspective sketches of paintings, photographic series of pictures, animation simulations and videos to complete the analysis of air perception. This was also an attempt at gardening when the information technology was still relatively backward at that time. Therefore, it was limited and ran counter to the actual spatial perception. Because the above-mentioned means all rely on visual effects (and hearing), while the actual spatial perception is the result of the combined effects of visual field, hearing and touch. The advent of virtual reality technology has also prompted people to perceive space more and more realistically. In the VR system, users can choose the route of travel, watch the angle of view change; walk, stop, look around, or look up at the sky [13]. The change of visual picture is also the beginning of people's perception of new space, from bright to dark, from cold to hot, from noisy to quiet, and the touch of the ground under the feet have an impact on the user's ability to accumulate space experience [14].

4.2 Simulation of Various Motion Modes

There are various ways for people to experience landscape garden space. Humans can experience the spatial image of landscape gardens by walking, taking ladders, or flying. The virtual reality system simulates various space motion methods, such as flying, turning, and driving. In the virtual reality environment, the user can choose the sports mode independently, and set the corresponding observation elevation and movement speed, as well as other corresponding technical parameters. With VR technology, it is possible to set the appropriate viewing elevation and movement rate and its movement path. For example, it can walk freely in the landscape garden, or walk through the outer space of

the landscape garden at an hourly speed, observe the change of sight from the ascending stairs, and overlook the entire landscape garden from a high altitude. These are exactly how the landscape architecture will be felt in the future, and it is an important basis for the study of people's feelings in landscape architecture [15]. The VRML language in VR technology is used to import the landscape architecture space into the network, and through a harmonious human-computer interaction technology environment, a wider range of public can interact and evaluate the design scheme in an open environment. It realizes the process of directly participating and revising the opinions of the public, so that they can understand the designer's ideas more quickly, so that the same method can be viewed with different purposes and different focuses, and finally the information is fed back to the designer, so as to maximize his work and meet the requirements of the public to a certain extent.

5 Conclusion

This article specifically discusses the application characteristics of VR technology in landscape architecture design, the role of each stage of design and the scope of application in the design process. Landscape architects are placed in a virtual environment to make design ideas more comprehensive, real, intuitive and convenient with great analysis, evaluation, discovery of problems, and timely revisions. This will greatly shorten the design innovation cycle and improve design quality. In terms of design communication, the visual, auditory, tactile and other multi-sensory perceptual simulation information provided by the virtual environment makes up for the shortcomings of previous design media in communication, improves the enthusiasm of all parties involved, and promotes more effective integration of resources.

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