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Retraction

Retracted: Machinery Changes and Challenges of Architecture and Landscape Design in the Virtual Reality Perspective

Journal of Robotics

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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[1] H. Jin and N. Zhang, "Machinery Changes and Challenges of Architecture and Landscape Design in the Virtual Reality Perspective," *Journal of Robotics*, vol. 2023, Article ID 1430551, 9 pages, 2023.

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Research Article

Machinery Changes and Challenges of Architecture and Landscape Design in the Virtual Reality Perspective

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With the in-depth study of architectural planning in China, more and more designers and developers are aware of the superiority of the use of technological robots to improve the speed and quality of construction, weakening past experience and based on real-world research through modern technology. However, the application of this method in the predesign work is not mature. To be specific, designers may lack expertise due to the overly detailed division of labor. In addition, the developer's blind pursuit of profitability leads to inaccurate market positioning and forecasting. At the same time, the lack of effective communication between designers and developers, architects and owners makes the predesign work ineffective and does not provide reasonable and accurate guidance for the building design. Therefore, the predesign work requires the designer to analyze and select the site reasonably. In addition, it is necessary to conduct in-depth research on the target customers. At the same time, it is necessary to accurately position and predict the dynamic market, and then to have a thorough understanding of the norms and regulations. As a result, the predesign work enables the design to be analyzed in the context of the actual situation. Then, according to the data and information from various aspects, effective planning and argumentation are carried out, and corresponding decisions are made to provide guidance for the design. Overall, predesign is a process of rational planning of the design process. In fact, in the process of landscape design innovation, it is necessary to fully consider the requirements of the intelligent era. Therefore, multimedia and advanced robotics can continuously enhance the interaction and experience of urban landscape to make it integrate into the intelligent system of the future city. In other words, multimedia technology can enhance the new image of the city in an intelligent, digital, and humanized interactive experience. Especially in the landscape design process, the advent of computers has enabled landscape designers to use relevant design software to design their own works, thus giving them unlimited design possibilities. Virtual reality technology, as a form of computer technology, provides designers with a new creative experience in the design phase of a landscape project. To be specific, this technology allows designers to freely grasp the design space and scientifically compare the differences between design options to make the design more reasonable and complete. Therefore, this paper analyzes the differences in the general environment and concepts of 3D software virtual reality technology, starting from the characteristics of the application of 3D technology as an entry point. At the same time, this study uses the similarities and differences in technology to discover the vital role of using virtual reality technology to reconstruct the space and the impact of robots on modern architecture.

1. Introduction

Landscape is a very broad concept that first began in geography. To be specific, landscape is a general term for a surface phenomenon or type of unit, such as urban landscape, grassland landscape, and forest landscape, and has the meaning of landscape, scenery, or view [1]. As a result, a discipline such as landscape design is closely related to its concept. In a nutshell, the profession is used to address the environmental modification actions taken by humans to adapt to various natural living conditions [2]. The development of landscape design has also gone through a long historical process [3]. During this time, the clarity and scientific nature of the concept has evolved with the times and has been

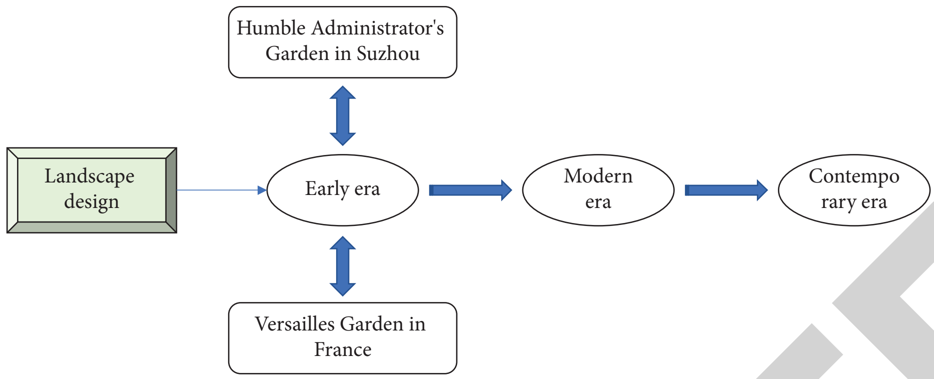

Figure 1: Development of landscape design.

constantly supplemented and improved. As shown in Figure 1, the history of landscape design is divided into early, modern, and contemporary. The most representative of early Chinese and Western landscape design are the Versailles Garden in France as well as the Humble Administrator's Garden in Suzhou during the Ming Dynasty in China. In other words, both the Western emphasis on the orderliness of layout and the pursuit of rigorous geometric composition style, as well as the landscape mood of the Chinese classical gardens, reflect the values of early landscape designers [4]. Modern landscape design and its development, in addition to the change of form, also include a huge change in design thinking and traditional concepts [5]. Furthermore, modern landscape design and its development are fundamentally due to the advent of industrialization, which led to a double impact on nature and human mind and body [6]. As such, it is a spatial planning that originates from nature and is designed to meet the needs of people. Modern landscape architects consider landscape design to be a comprehensive discipline. As a result, the discipline is primarily oriented toward the construction of outdoor environments [7]. It combines art, science, culture, and engineering and is a highly applied professional discipline. In fact, the main research direction of the discipline is to design the environment for human outdoor living.

With the development of human society, landscape has long ceased to be the task of landscape architects in today's social life, especially for today's diversified market economy [8]. In this context, the diversified economy requires the involvement of a number of other stakeholders. In fact, this includes relevant government departments, developers, investors, as well as the general audience [9]. As a result, today's landscape design needs to meet conditions that are no longer as homogeneous as before, considering the diversity of its audience. In the new world economic and environmental conditions, new design tools are being applied to landscape planning [10]. To be specific, it is possible to navigate through the various contradictions and interests, making the design form visible. Then, the design process becomes reversible and the design approach becomes multifunctional: digital technology [11]. In the age of technology, the use of more technological robotics for landscape analysis and multidimensional landscape design is the trend in landscape design.

Architectural design preplanning is a clear design basis based on scientific and practical research, analysis, discussion, and experimentation on the basis of the master plan [12]. As a result, architectural design preplanning is not only the first stage of a building project design but also an important guide and component of the project quality at the later stage of the project, as well as the series of impacts and benefits that will be formed after the project is completed [13]. As illustrated in Figure 2, with the development of the times, architectural design has evolved from the traditional study of proportional division, morphological composition, and spatial distribution to a systematic study of the impact of architecture on human life, social development, ecological environment, economic development, as well as other elements [14]. This requires the designer to no longer create a single artistic creation but to consider all aspects of the design process comprehensively. Therefore, preplanning of architectural design becomes particularly important [15]. In fact, it is quite important for the designer to strengthen the coordination within the design team and to conduct a comprehensive study of the predesign planning together with the investment and construction departments [16]. Furthermore, this will allow for balanced economic, social, and ecological benefits of the project and avoid inconsistencies in the design and construction process as well as after the project is completed. In the preconstruction phase, the results of different studies of architectural design planning determine the outcome of different building projects [17]. As a result, it has a distinctive individual character on the way the building is used, the environmental impact, the economic development, and even the cultural formation of the building area. In short, designers should give full play to their personal subjectivity in the preliminary stage of architectural design and conduct in-depth research on the actual state of the architectural project [18]. In addition, after a thorough and multifaceted analysis of the research results, the results are determined on the basis of building science using modern computer science simulation and modeling. Also, the results are then cross-referenced with other disciplines to arrive at design conclusions. This ensures that the design is logically rigorous, theoretically complete, and objectively sound, and that the project will proceed smoothly [19].

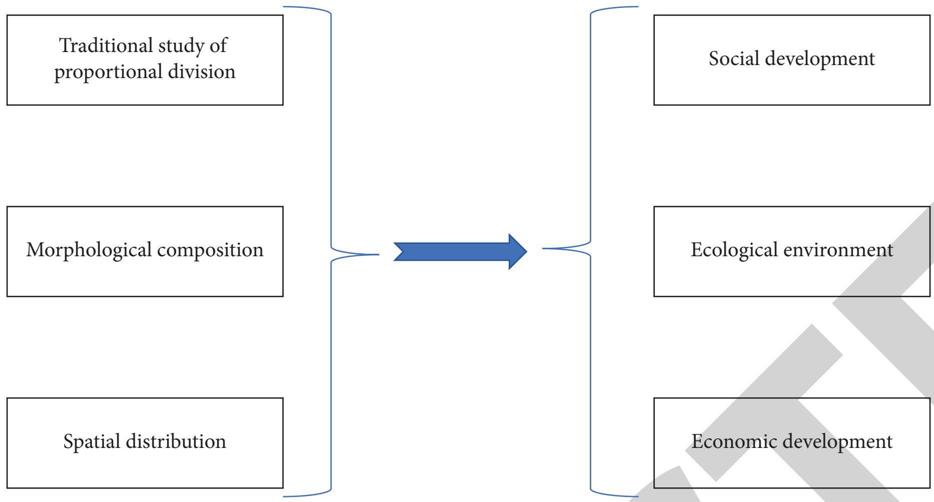

Figure 2: Change of architectural design.

In recent years, with the advent of digital intelligence, a new technological revolution has provided people with tools and methods to understand and transform the world. In the context of the invention and development of Internet of Things technology, advanced multimedia technology has gradually replaced traditional media, which is also an inevitable trend of social development. The rise of multimedia technology has provided unlimited creative power and space for architecture and landscape design. As a matter of fact, art is the source of ideas for landscape design, and designers can obtain diversified design intentions and design inspirations from various art forms. Among them, multimedia technology can present a different art form from traditional media art. Therefore, it can be seen that multimedia technology plays a huge role in promoting innovation for landscape innovative design.

Virtual reality technology is a system that uses robotic systems to simulate and create digital information, virtual world. Specifically, it incorporates robots graphics, computer simulation, artificial intelligence, human-computer interface, multimedia, network technology, and other technologies [20]. Through various high-performance computer hardware and software and advanced virtual reality input and output devices, this technology can bring a virtualized information environment to users. To date, virtual reality technology has been widely used in the military, education, architecture, civil engineering, and entertainment industries. In the architectural design process, graphics and images are also gaining importance and can play a very important role in communication between clients, designers, various engineering technicians, and users [21]. The introduction of virtual reality technology can successfully solve the problems of abstraction and professionalism of traditional two-dimensional drawings, as well as the unfamiliarity of clients with drawings and the increasing difficulties of communication between designers and clients [22]. In short, the robots' architectural design based on virtual reality technology is a process of planning the space again in the virtual space and modifying the information in the virtualized digital information. In addition, it can be improved in layers directly during the design process, thus making the design more and more perfect [23]. Virtual reality technology is now increasingly used in architectural design. For example, the multispatial presentation of building information models, the remote design, demonstration as well as circulation of building plans via the Internet, the simulation of disaster prevention techniques for buildings, and the simulation of the feasibility of restoring historical buildings. As a result, many people realize that the combination of virtual reality technology and architectural design will be an advanced research in the field of architectural design in the future [24]. The ability to invest in more robots and large machines is a prerequisite for an architectural design. Advanced machinery and equipment can be a better representation of the design and can provide more ideas for the design.

The changes that digital technology has brought to design are revolutionary. It is no less significant than the industrial revolution, the invention of movable type and the telephone. In some respects, digital technology has gone far beyond the changes listed above [25]. In fact, the current changes brought about by digitalization are only the beginning of the information revolution [26]. In the future, this technology will continue to have a radical effect on social, political, and cultural communication worldwide. As such, it has enormous potential to be exploited [27]. The pioneering of this technology has given designers previously unimagined priorities. To be specific, advanced scientific technologies have allowed them to eliminate the need for complicated processes, redundant tools, and repetitive creative techniques [28]. This has greatly enhanced the enthusiasm of designers. For instance, the digital model as well as the digital building is shown in Figure 3. It would be difficult to complete such a building without large mechanical equipment.

Virtual reality technology is a combination of multimedia, computers, artificial intelligence, and so on a variety of recent high-tech disciplines. Virtual reality technology

Figure 3: Digital model and digital building.

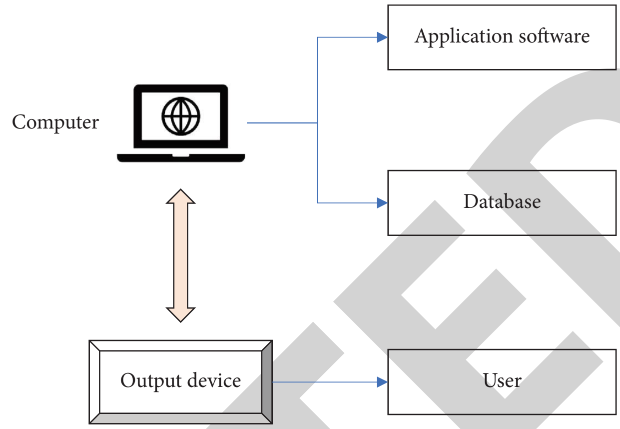

Figure 4: Composition of virtual reality technology.

constructs a form of image interaction for users that can reflect changes in physical objects and virtual three-dimensional space in real time [29]. Therefore, this technology has a variety of sensory experience and can have a very realistic feeling, so that the experience can directly and quickly understand and experience the role of virtual objects changing in the environment, as if in a real world, so that people can have a sense of immersion in the experience [30]. This paper presents a study on the application of virtual reality technology in the predesign stage of architecture, based on the ideas of design planning, predesign stage of architecture, predesign stage of architecture and operation, and the possibility of virtual reality technology to solve the abovementioned problems. In the predesign phase, any design activity requires the cooperation of designers and people from other fields. The real-time and interactive nature of virtual reality technology in the predesign stage can effectively integrate designers with marketing, management, as well as the operations while the design is being transformed from a concept to a finished product.

2. Virtual Reality Technology

2.1. Composition of Virtual Reality Technology. Virtual reality is a comprehensive technology that integrates computer graphics, sensor technology, interaction technology, and network technology. The most basic requirement for virtual reality technology is to be able to realize real-time interaction with users. As a result, a basic virtual reality system mainly consists of a computer, input and output devices, application software, and database, as shown in Figure 4.

The computer is the host of the virtual reality world and is the core of the whole virtual world. As a result, the computer is mainly responsible for the generation of the virtual reality world and the processing of information about the user's interaction with the virtual world. Depending on the complexity of the virtual world, the performance requirements of the computer vary. When generating complex and large-scale scenes, the amount of computation required is enormous, which requires a high level of computing performance.

Furthermore, input and output devices are the medium of interaction between the computer and the user. The input device is the interface through which the user sends commands to the virtual world. As a result, its function is to accept commands from the user and convert the user's actions into information data for input into the computer. Depending on the requirements and purposes of use, input devices include not only the mouse and keyboard but also spatial tracking locators, data gloves, and data suits (Figure 5).

A database is a repository of all relevant information in the virtual world, such as geometric and physical models of the virtual reality environment and captured user actions. In a virtual reality world scenario, a large amount of information needs to be stored for use, and this requires a database to manage this information. The software application in the virtual reality system is the key to the realization of the virtual environment. It is specifically responsible for the creation of models in virtual scenes, for ensuring the fluidity of direct interaction between people and the virtual environment, and for the synthesis of sound and spatial orientation.

2.2. System Architecture of the Virtual Environment. A virtual reality environment is an environment that exists inside a computer and requires special equipment to experience it, generated by a computer through the construction of geometric and physical models. In order to be called a virtual reality environment, it must have the ability to interact with the user in real time and the user must have absolute autonomy. The structural composition of the virtual environment is presented in Figure 6.

Virtual reality is a discipline where technology and art merge. In order to realize the value of virtual reality technology, it must be supported by hardware technology and equipment for immersion and interaction. Without the support of related equipment, the value of virtual reality technology cannot be realized. As a collection of multiple technologies, virtual reality requires the use of multiple devices, including computers, stereo displays, user sensory trackers, human motion trackers, feedback devices, and voice input/output devices. Interactivity is the most fundamental and important function of a virtual reality system. In order to achieve human-computer interaction, special human-computer interaction interfaces and devices must be used. It enables both the user to send information to the computer and the computer to send real-time information back to the user. The internal magnetic field transmitter of a low-frequency magnetic field sensing device generates a low-frequency magnetic field. The transmitter is composed of three orthogonal antennas and there is also an orthogonal

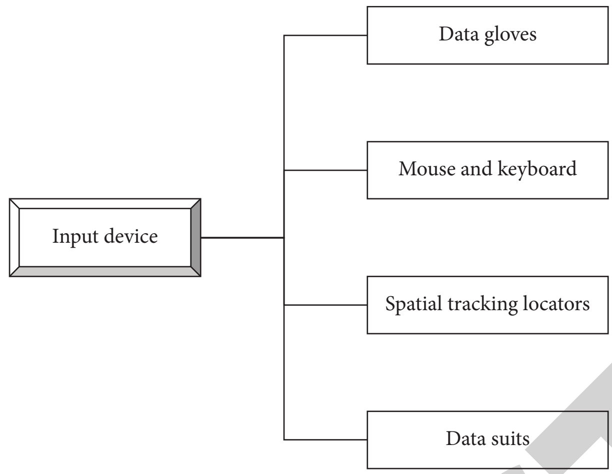

Figure 5: Various input devices.

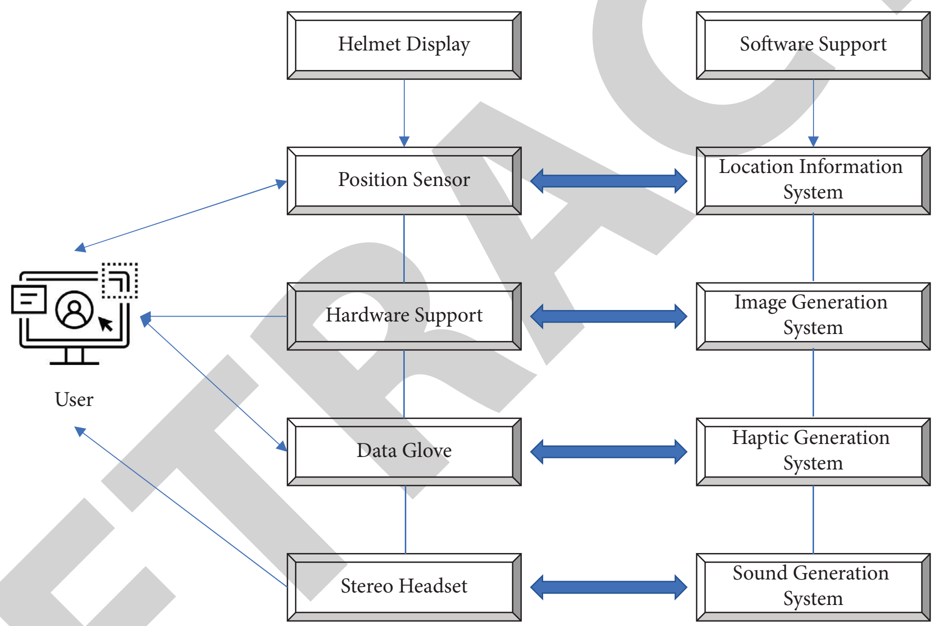

Figure 6: Structural composition of the virtual environment.

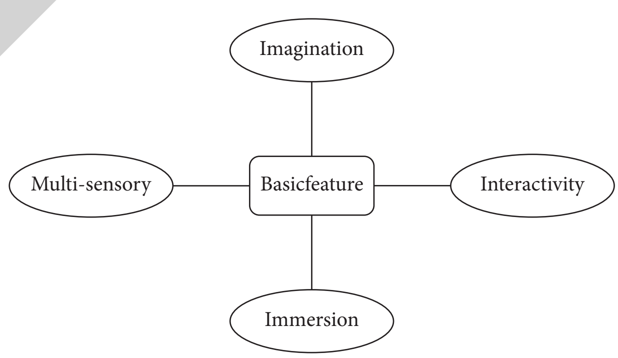

Figure 7: Basic features of virtual reality.

antenna in the receiver. The receiver is placed on top of the moving object under test, and based on the magnetic field obtained by the receiver, the location and relative direction of the moving object can be determined and the relevant data information can be transmitted to the computer device by means of a communication device. Thus, the computer

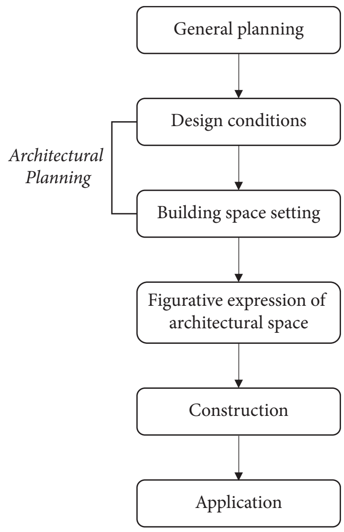

Figure 8: Diagram of the building project process.

equipment can monitor the area and the target direction of the moving object in this way.

2.3. Basic Feature of Virtual Reality Technology. Figure 7 shows the basic features of virtual reality. Interactivity is the main characteristic of virtual reality technology. Instead of passively watching and listening, users can control and even create things in the virtual world. At the same time, users can interact with other users and change the content of the virtual world through their own thinking and actions. In addition, with the help of computer hardware and software, such as head-mounted stereo displays, digital gloves, or digital suits, the user is fully immersed in the virtual simulation environment constructed by the computer. This can give the user a sense of immersive reality. In fact, the user's senses and perceptions are similar to those in the real world. As a result, it is quite difficult to distinguish between the feelings of a person immersed in a virtual environment as well as those in the real world.

People immersed in the virtual world can rely on their own perception and cognitive ability to obtain information in a comprehensive manner. In addition, people can use their own initiative to broaden their cognitive scope. Therefore, they can not only reproduce what already exists in the virtual world, but also use their own imagination to construct things that do not exist in the real world and seek new concepts and ideas. In addition, multisensory means that in addition to the visual and auditory experiences that virtual reality technology can provide, it can also provide tactile, olfactory, and force experiences, and even more so, it can provide taste experiences. It is envisioned that virtual reality technology could allow humans to experience all the effects of the experience. However, due to the lack of science and technology development, at this stage, virtual reality technology can only provide the public with a few basic sensory experiences, such as visual, auditory, and tactile senses, and its perceptual scope and accuracy are not comparable to the real world.

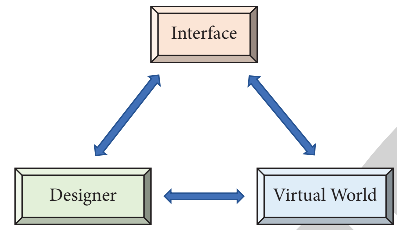

Figure 9: Digital landscape design generation process.

3. Architecture and Landscape Design

3.1. Architectural Planning. From the perspective of building science, a scientific and systematic building process should include building planning, through building design, mechanical equipment, construction, delivery of the building, and postuse feedback. Figure 8 shows a diagram of the building project process. Among these processes, the last three steps are usually familiar. As for the first two, in the domestic construction market, there is a significant portion of the public who cannot distinguish between the two and often confuse architectural planning with architectural design. The reason for this is that at present in China's construction industry, the preconstruction work is not systematic and complete, resulting in unclear and imperfect work in the interval from the project to the design of the construction project. Usually, the design of a building is guided by the design task book. If the design task book is not strictly controlled by the preliminary architectural planning, then the building designed by such task book will not achieve the expected design effect and will not bring the social and economic benefits of the building itself. At the same time, the later use of the building will not meet the needs of the target customers. From the point of view of effectiveness, architectural planning is classified as a discipline of architectural value management. A great plan not only guides the design effectively and accurately, but also has a great impact on the overall effect of the building.

3.2. Digital Landscape. Digital design and machine-based construction have brought new forms and structures never before seen in the history of human civilisation. At the same time, it has provided mankind with new design theories and technical tools. The use of digital technology has provided landscape architects with a richer creative space. In addition, digital technology offers more diverse possibilities for the implementation of landscape solutions. In other words, the development of this technology has greatly increased the efficiency of the implementation of landscape planning. The introduction of nanomaterial robotics in landscape planning allows for a more efficient, faster, comprehensive, and in-depth collection of information and data about the site than traditional methods. In the digital age, all robotic devices using nanomaterials will produce a data trail. This allows for purposeful and informed site planning. In fact, nanomaterial robots will be a powerful technical support for contemporary landscape design.

Today, the computer is integrated into the approach to landscape installation design as both, a tool and a medium. As the medium of landscape design has evolved from handwriting to drawing paper to computers, the advancement of robots of nanomaterials has also brought about a revolution in design methods, moving through stages of development from low to high. This logic is usually simulated by digital tools. The third stage is the closest to the real state of existence of the landscape. The formal self-logic is usually expressed as a self-organising system. Self-organising systems are a complex class of systems that are typically used in open environments and can change in response to changing external and internal environments. The system dynamically adapts itself to better meet design purposes by interactively transforming data about its own components. With the development of digital technology, more and more computer systems are becoming self-organising. At the same time, related research systems are becoming very active and are receiving a lot of attention from academia and industry. The digital landscape design generation process is illustrated in Figure 9.

Virtual reality is a digital technology that generates a virtual simulation of a three-dimensional world through computer simulation, thus enabling the user to feel an immersive experience. This technology is widely used in all areas of design, providing an experimental environment that provides a realistic representation and emphasis of the real world. Compared to traditional design, experimental results are more realistic and experiential. In recent years, nanomaterials for robots virtual reality technology has been increasingly used in the field of landscape design. The impact of this technology on the development of landscape design is undoubtedly huge, as it provides an immersive experience and display of design solutions, which can effectively eliminate research errors and data mistakes in the design in a timely manner and improve the accuracy of academic research.

3.3. Virtual Scene Design. Design concept is usually the core point of concern for designers in the design process. Conceptualization is a language of thought, and even the most precise computer presentation cannot be conceptually clever, or the concept cannot be generated. However, the use of virtual reality technology can indirectly help designers to generate design concepts. The image display capability of virtual reality technology is by far the most realistic visual representation in terms of image presentation capabilities. Its most important feature is its interactivity. The designer can intuitively create a rough model of the building block directly in the virtual project site by controlling the joystick and analyzing the building massing and other information.

In the early stages of design, concept generation is always vague and uncertain. After all, many factors can influence the designer's concept generation. Once the designer enters the virtual site based on the project site state of affairs data, he or she can roam around the real site space in full view and analyze the site information as it emerges. At this time, the designer's mind is active and stimulated by a large amount of information to generate relevant branches of the design concept. Through the operation of the virtual site, these conceptual branches are transformed into computerized information and stored for later integration. The real-time, interactive nature of virtual reality technology makes it possible for designers to accurately grasp design ideas and store fleeting design concepts in a timely manner, as well as provide screening for subsequent architectural design concept generation to optimize design solutions.

3.4. Application of Advanced Machinery. Under the trend of mechanisation, landscape design innovation must be a combination of technology, networking, digital technology, and function and form. As such, mechanised technologies can transform landscape design from a traditional single visual appreciation function to a human-computer interaction experience. In other words, nanomaterials for robotics can contribute to the functional diversity, intelligence, and humanization of urban landscapes. At the same time, robotics can also enhance the artistic and scientific aspects of landscape design, and to a certain extent, the value of digital media art.

In addition, the innovative integration of nanomaterial robotics and urban landscape design plays a role in driving urban economic development and vigorously spreading urban culture, while at the same time playing a role in the protection of the urban ecological environment. Traditional urban landscape design generally uses stone, wood, metal, or composite materials, which can lead to the consumption of environmental resources. The intervention of nanomaterial robotics has diversified the material options for urban landscape design. Specifically, digital technologies such as digital lighting, laser projection, and energy-saving induction are applied to urban landscape design. These sustainable energy sources reduce the burden of environmental resource consumption to a certain extent and play a role in the protection of the urban ecology.

4. Conclusion

In the modern design industry, the use of virtual reality technology is becoming more and more widespread. However, the application of virtual architectural landscape roaming with interactivity is a new field with a very broad development prospect. Successful research on this topic will enable viewers to view projects remotely through a web-based platform, improving the chances of successful project negotiations and increasing the efficiency of use, while also reducing communication costs for designers and related personnel. In addition, the application of interactive virtual landscape technology is also very extensive, such as the tourism industry, architectural planning, and landscape teaching practice, have a broad development space. In this paper, the impact of virtual reality technology on landscape design is studied in detail, and the production of interactive virtual landscape scenery systems is studied in depth by combining the two. In addition, this study summarises the methods and approaches to improve the quality and efficiency of landscape design using existing virtual reality technology machines and advanced mechanisation technologies.

Due to the continuous advancement of modern technology, virtual reality and advanced mechanisation technologies are bound to make huge leaps in the coming years. The proliferation of virtual reality software in recent years is a proof of this. Many researchers have now introduced interactive virtual roaming technology and robotics with nanomaterials into the design field, which will gradually become the new technology of the future in everyday work.

Data Availability

The labeled data set used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

Acknowledgments

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