Application Analysis of Computer Augmented Reality (AR) Technology in Landscape Design of Rural Revitalization

You Lv*
Nanjing Audit University Jinshen College, Jiangsu Nanjing, China, 210000

*Corresponding author e-mail: youayou0126@163.com

Abstract. Since the beginning of the new century, the emergence of new technologies like bamboo shoots after a spring rain, they have a strong potential in the future landscape design application in this field. These hardware and technology are widely used in the research of intelligent building, intelligent residence and virtual landscape. Augmented reality (AR) technology projects virtual information into the real world, realizing the real-time superposition of real environment and virtual objects simultaneously. The purpose of this paper is to explore whether it is possible to expand and improve the spatial environment of landscape design through augmented reality (AR) technology, so as to improve the quality of landscape design, and the different applications of augmented reality (AR) technology and virtual reality (VR) technology in landscape design. Based on the rural development and the rapid development of information technology as the research background, adopt the method of historical research and preliminary experiment, selected the domestic a place as a visual programming examples, summed up in the process of rural revitalization of traditional landscape visual planning may exist in the design of the main problems, and on this basis, introduces how to use including biological feedback information collection, geographic information collaboration platform, such as augmented reality technology to the current landscape visual design process optimization and simulation test. The research results of this paper show that the new technology has a certain effect on improving the existing visual planning and design methods, and the specific application of AR technology in various fields also makes the future development trend of AR more clear.

Keywords: Computer Augmented Reality, Rural Revitalization, Landscape Design, Virtual Information Projection

1. Introduction
With the development of villages and towns in China becoming more and more urbanized, the structural function of rural landscape and rural sustainability are gradually weakening. The goal of the rural revitalization strategy is to give priority to the development of agriculture and rural areas. In the process of combining urban and rural areas, rural development should be the main part, and urbanization should be the auxiliary part to plan and design the rural landscape. In terms of the current development of China, various regions are actively promoting the revitalization strategy of towns and villages, which is also an important poverty alleviation strategy project in China. The phenomenon of rural construction and urbanization is becoming more and more serious in the process of rural construction. The cookie-cutter rural development mode has made rural areas lose their original characteristics. The traditional culture and original ecological landscape in rural areas have become more and more difficult to see and have suffered a devastating blow. Therefore, only through scientific and reasonable way to make the rural landscape planning more characteristic, can promote the better development of rural.

Existing research results at home and abroad show that the theme and core problem of landscape design are the use and value mining of visual resources [1]. Foreign studies started earlier, and foreign landscape design research institutions have regarded the aesthetic value of landscape resources as one of the core basic knowledge since their establishment [2]. The design process of the national forest landscape planning of the U.S. forest service, centered on the aesthetics of visual resources, is highly scientific and systematic, playing a landmark role in landscape planning and forest management in the United States [3]. However, due to the subjectivity and obscurity of aesthetic experience, how to describe aesthetic experience in a scientific and objective way has always been the difficulty of aesthetic value evaluation [4]. The research on landscape design in China started with the international upsurge, and to a large extent was also influenced by the research results in the United States [5]. Since 2017, our country put forward the strategy of revitalization of the domestic scholars began to landscape design of the model is in line with the model of development in China, points out the visual problems existing in the planning and design methods of abroad, and deserve the place of Chinese landscape architecture planning and learning, and on this basis, combined with China's medium and long-term development plan for further, discusses the existing traditional landscape visual resource management planning a series of problems [6-7].

Before the rural-revitalization strategy, in China's rural development work, work planning and landscape design were not taken seriously, and the results achieved in this work were not ideal [8]. Nowadays, in the context of national revitalization of rural areas, more attention should be paid to landscape planning and design [9]. At the same time, the concept of planning and landscape design is constantly innovated, and the model connotation based on modern visual technology is integrated to ensure the beauty of rural landscape, so that it has a higher degree of appreciation and can add a touch of color to the local area [10]. The research in this paper will simply study the planning and design of rural landscape in the context of the revitalization strategy of towns and villages, and put forward Suggestions on how to better integrate computer augmented reality with landscape design, in the hope of making some positive explorations on the planning and design of rural landscape in China [11-12].

2. Method

2.1 Core Concepts
(1) Computer augmented reality (AR)

Computer augmented reality can also be referred to as AR technology, which is the connection entrance between virtual and reality. Different from the virtual world immersion advocated by traditional devices, AR focuses on the connection between virtual and reality in order to achieve more shocking augmented reality experience.

The definition of computer augmented reality (AR) is very broad, and there are many kinds of technologies. At present, the mainstream AR refers to the recognition of 2d, 3d, GPS, somatosensory, facial and other recognition objects through device recognition. Virtual information is superimposed on a position based on the recognition object and displayed on the screen of the device, which can interact with virtual information in real time. In summary, it is recognition, combination of virtual and real, and real-time interaction.

Computer augmented reality (AR) is to use the real scene of the "enhanced" shows that by using the virtual object technology, compared with virtual reality, realistic strong, modeling, the advantages of small amount of work in landscape design, can be used in the real world existing real plant varieties, architectural form, clear and intuitively show the effect of the final design at the same time, the virtual information can also be displayed at the same time, the real world with multiple synthesis of computer graphics, the two complement each other, information, improve the quality of the landscape design quality. Through the application of augmented reality (AR) technology, landscape designers can use more natural human-computer interaction means to control the form of works, to shape a more immersive artistic environment and dreams that cannot be realized in reality, and to give new meaning to the process of creation.

(2) Rural landscape theory

The definition of rural landscape is uncertain and can be understood in different fields. Because rural appearance has different definitions, the concept of rural landscape has multiple meanings. Japanese scholars and relevant experts believe that the rural landscape is basically based on "agriculture" as the basic color of the whole countryside, and fully integrated natural soil conditions for production and living in rural land. The combination of "agricultural production landscape" and "farmer living landscape" forms a composite landscape of rural landscape.

From the perspective of planning, spatially related landscape is a combination of rural population settlements, including rural settlements, productive landscape and natural ecological landscape, which is an important subject of rural landscape research. Therefore, through the discussion of the rural landscape above, it can be considered that the natural landscape and the corresponding agricultural base are obtained on the basis of the rural landscape. Rural landscape, also known as rural settlement landscape, is the collection of landscape agricultural production, unique rural landscape and rural architecture landscape, and the pastoral landscape formed by the corresponding culture and cultural rural landscape.

2.2 New Schemes Brought by VR Technology to Rural Landscape Design

The development of VR technology has brought tremendous technological progress to the research of landscape architecture, geographic information and other disciplines, especially the following
important breakthroughs have been made in the related fields of landscape visual planning:

Through the real-time collection process of real scene dynamic physiological information led by VR technology, the method of exploring cognitive process through indirect methods such as photo scoring, cognitive map and questionnaire interview was introduced, making it possible to collect real scene real experience information of people in real time.

Through the collection of eeg signals from visual perceivers of the environment, the eeg activity of subjects in buildings, open Spaces, green plants and other environments with different characteristics can be captured and observed in real time.

Through real-time camera image, mobile device display screen, Google smart glasses, etc., the superimposed image of real 3d dynamic space and virtual 3d entity can be directly seen.

Through the technology of augmented reality, the designer can observe the visual relationship between the design scheme and the surrounding environment from different perspectives by moving the viewpoint in the real three-dimensional space, and simulate the completion effect of the real scene simulation scheme.

3. Rural Landscape Planning and Design in the Context of Rural Revitalization Strategy

Landscape planning and design with the theme of beautiful countryside. In the planning of rural landscape planning should not blindly pursue economic benefits, should pay attention to the reasonable protection of existing rural resources. The new resource connotation makes the rural landscape integrate into the natural and human ecology, and designs the rural landscape with more connotation and more modern flavor.

Improve the landscape structure. In the process of planning and designing the rural landscape, the basic elements of the rural landscape can be classified to connect different aspects of the rural landscape to form a complete landscape system. In the process of planning and designing the rural landscape, it is necessary to strengthen the relatively weak part of the landscape to make it more stable.

Protecting sensitive areas of rural ecological environment. The eco-environmental system in the sensitive areas is also the most fragile. Any mistake may easily cause irreversible damage to the environment. Therefore, in the process of planning and designing rural landscape, the sensitive areas of ecological environment should be carefully protected, and relevant protection measures should be taken in the sensitive areas identified by the investigation of rural appearance and rural ecological environment.

Landscape planning and design based on rural culture. As a rural landscape, it can highlight the characteristics of the country and show the charm of the country. When designing and planning the rural landscape within the framework of revitalizing the countryside, it is necessary to establish rural culture, so as to integrate the landscape and culture and ensure that the landscape design is more attractive.

4. Discussion
4.1 Ecological Assessment

Generally speaking, the application of the traditional landscape design and planning method emphasizes the use of artificial force to transform the environment, which requires a lot of manpower and material resources, and may achieve a good effect in the short term, but in the long run, a lot of capital needs to be continuously invested to maintain. The main method of ecological engineering is to give full play to the initiative of the environment so that the landscape can achieve its own gain. In this paper, the village planning based on AR technology is evaluated in detail. The evaluation results are shown in figure 1 below.

![Figure 1. Ecological evaluation in rural landscape design](image)

By the evaluation results can be found in the graph, the ecological diversity performance can effectively to form a "habitat" this kind of environment that can grow on its own and mature, have a certain ability to resist the influence at the same time, in the built environment landscape and even if the destruction will be self-renewal and resurrection, this also means that landscape design scheme based on computer augmented reality technology can greatly reduce the corresponding manpower material resources, and can form the sustainable development of the landscape.

4.2 Sustainability Assessment

The landscape design under the background of rural revitalization is different from other ordinary scenic spots or home landscape design, which not only serves the rural tourism but also serves the national strategy. Therefore, in the process of designing with AR technology, tourist experience, farmers' income generation and rural image improvement must be taken as evaluation indicators. Moreover, the sustainability of rural landscape is the key to the sustainability of the whole ecosystem, the foundation of rural sustainable development, and the fundamental guarantee for the sustainable development of people's lives. The evaluation results of rural landscape sustainability in this study are shown in table 1 below.
Table 1. Assessment results of rural landscape sustainability

|                          | Traditional design | AR technology design |
|--------------------------|--------------------|----------------------|
|                          | Score | Number of evaluators | Satisfaction | Score | Number of evaluators | Satisfaction |
| Tourist experience evaluation | 6.5   | 89                  | 65%          | 7.9   | 93                  | 89%          |
| Farmers' income          | 5.8   | 85                  | 64%          | 8.6   | 89                  | 86%          |
| Rural image promotion    | 6.8   | 88                  | 69%          | 8.8   | 91                  | 84%          |
| Sustainability assessment| 5.7   | 79                  | 61%          | 9.1   | 87                  | 92%          |
| Overall evaluation       | 6.4   | 82                  | 63%          | 8.6   | 89                  | 90%          |

As can be seen from the survey data in the table, under the background of rural revitalization, people's satisfaction with rural landscape is getting higher and higher. It can be predicted that in the future rural landscape design, technology development is no longer a dream. Under the dual pressure of rapid population growth and earth environmental crisis, augmented reality (AR) can expand our living space and improve people's quality of life by displaying virtual space in real space through optics. At the same time, reduce the consumption and waste of resources in the future living space and urban construction. Maybe in the future, we can live in the city and enjoy the experience of seaside residence at any time, feeling the gentle sea breeze and bright sunshine. Sleep can feel in the forest, the wind at night listening to the sound of rain to enjoy their own unique mood to sleep. We can enjoy the life style of the ancient people, such as the garden in the woods or the shade in the mountains, without leaving home. Time and space can no longer form distance, this is the future.

5. Conclusion

Under the background of rural landscape planning and design needs to fully consider the countryside actual geographical environment and other factors, to create a more comfortable living environment for people, the country's combination of ecological landscape and urban planning, under the condition of guarantee rural local characteristics of original rural landscape of rich humanistic connotation, promote the development of China's rural construction is an indispensable part of in the process of rural construction. In the future research and application of technology innovation, attention must be paid to the maintenance of ecological development, protection of rural art and rural culture, active planning and design of rural landscape projects, improve rural landscape.

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