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Research Article

The Planning and Design Research of the Rural Architectural Landscape of Southern Anhui Province by Virtual Reality Technology

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Abstract:

At present, virtual reality technology has been widely used in the planning and design of architectural landscapes, and its core content is to use virtual reality technology to carry out relevant planning and design. To improve the planning and design level of rural buildings in southern Anhui, and to verify the role of virtual reality technology in the planning and design of rural buildings in southern Anhui, this paper analyzes the basic features of virtual reality technology, discusses the superiority of virtual reality technology in the planning and design of rural buildings in southern Anhui, and takes advantage of the strong immersion and interaction effect that this technology can bring to the users to simulate and experiment the real rural landscape of southern Anhui, so that the users do not need to be physically present to carry out the simulation and experiment. With the advantage that this technology can bring users a strong sense of immersion and interactive effect, it simulates and experiments with the rural landscape of southern Anhui, so that users can feel the overall situation without personal participation, and thus carries out a preliminary exploration of the planning and design of rural buildings in the southern Anhui region.

1. Introduction

With the social and economic development, people pay more and more attention to the material standard of living and spiritual civilization construction. The requirements for architectural engineering have gone beyond basic livability, and there is a higher pursuit of architectural appearance and comfort, the architectural landscape planning and design industry is in urgent need of breakthroughs [1].

To address this industry need, the reference of new technologies becomes inevitable. Among them, virtual reality technology is a new type of comprehensive information technology that has been used in education, medicine, psychology, scientific research, entertainment, and engineering training in many fields, and its core technology principle is shown in figure 1. It can establish a multi-dimensional network space containing various information, realize building visualization design, inject vitality into the development of the construction industry, and realize the review and analysis of the content of architectural planning and design more realistically and comprehensively. Since virtual reality technology has realized its application in many fields, including architecture, this paper will further study its application in the architectural landscape design of rural villages in southern Anhui. Southern Anhui countryside is a complete system integrating ecology, production, and life, with beautiful countryside scenery and long-lasting vernacular culture.

Therefore, in the planning and design of the architectural landscape of the southern Anhui countryside, it is necessary to inherit the southern Anhui vernacular culture and maintain the ecology of the southern Anhui countryside, as shown in figure 2.

Virtual reality technology can use high-performance computer hardware and software and a virtual environment to generate models, through immersive three-dimensional model construction, to complete the architectural landscape design while preserving the ecology of the southern Anhui countryside. On this basis, the architectural landscape planning and design system of rural areas in southern Anhui based on virtual reality technology is constructed through example analysis [2].

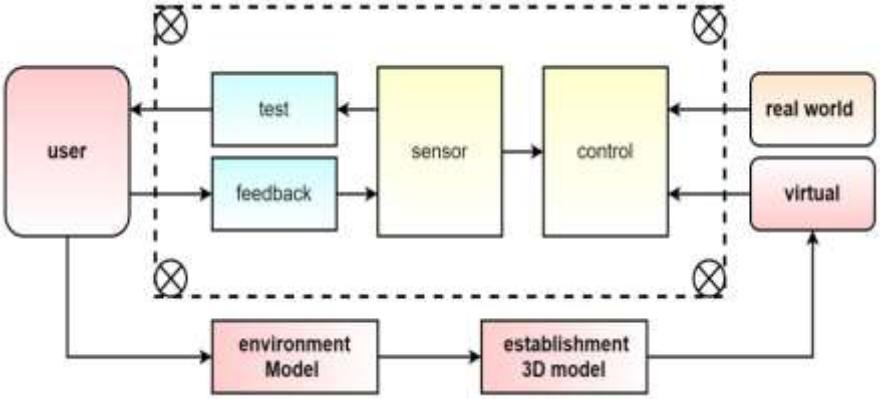

Figure 1. *Core technology principle*

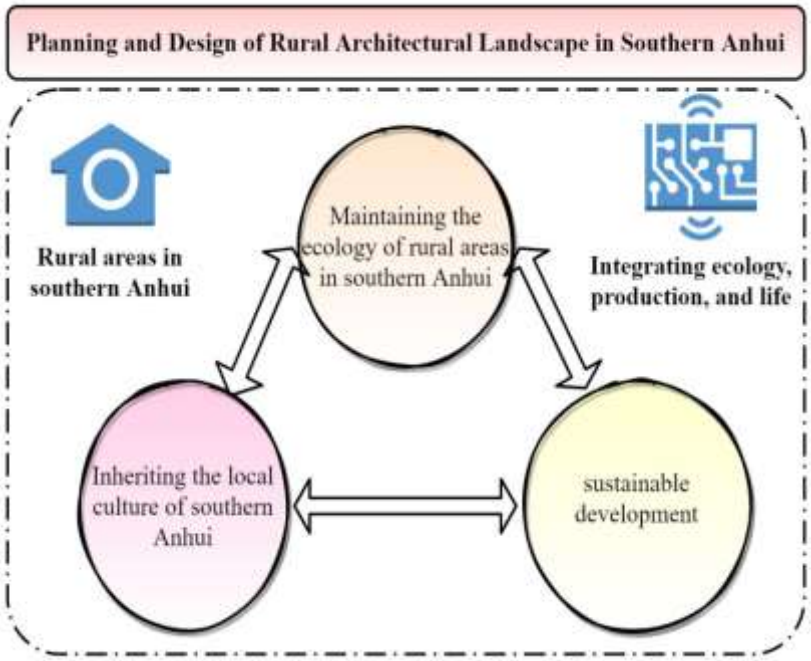

Figure 2. *Requirements for architectural based*

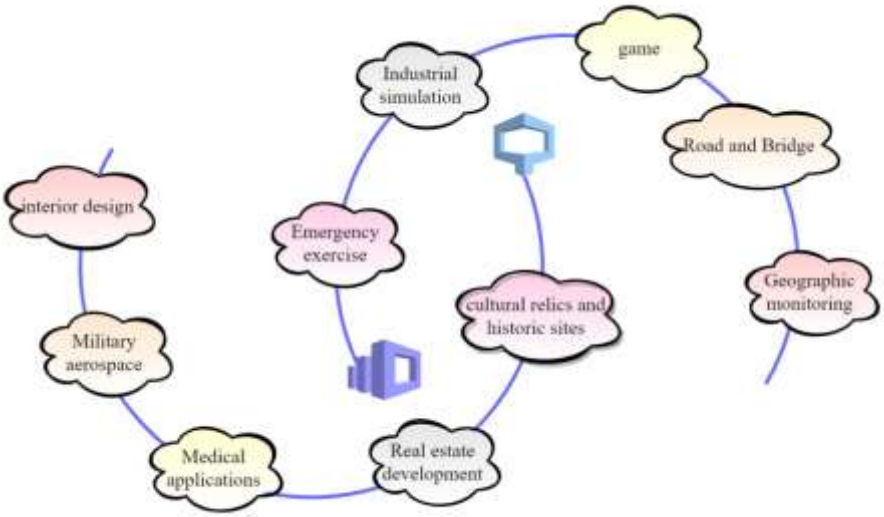

Figure 3*. Areas of application of virtual reality technology*

2. Virtual Reality Technology

2.1 Basic characteristics of virtual reality technology

The main feature of virtual reality technology is to use computers to simulate a virtual scene so that the user can enter the scene to experience it by manipulating the equipment, and at the same time, the user can also use the corresponding equipment to interact with the scene, to achieve the immersive effect [3]. This effect of virtual reality technology determines that it can be used in various fields, as shown in figure 3.

The three main characteristics of virtual reality technology are listed in table 1. The autonomy among the three main characteristics of virtual reality technology is specifically represented by autonomous conceptualization, which means that virtual reality technology represents a very rich imagination [4]. This creative thinking coincides with the planning and design of architectural landscapes. In the virtual world constructed by the computer, this technology combines the actual situation of rural villages in southern Anhui Province to generate appropriate simulation models of architectural landscapes and inspired by a wide range of innovative planning and design examples, it can break the fixed planning and design mode so that innovative imagination and virtual reality collide in a rural architectural landscape in southern Anhui Province to obtain different Planning and design. Designers as well as users may think of more situations of architectural landscape planning and design, thus generating more profound ideas and associations. Virtual reality technology in architectural landscape planning and design is even more to play this characteristic to the fullest, combining the human cerebral cortex activity with the computer, bringing infinite possibilities to architectural landscape planning and design [5]. The most intuitive manifestation of this is in an architectural garden, where users can touch indoor furniture such as cabinets, tables, chairs, and sofas with their hands, and can see the exact scale of the furniture and its material.

Table 1. *Characteristics of virtual reality technology and application directions*

Characteristics	Application Direction
Autonomy	Simulation Environment
Interactivity	Sensing Devices
Multi-sensory capabilities	Environmental Sensing

2.2 Advantages of the application of Virtual reality technology

The traditional rural architectural landscape design in the southern Anhui region is usually carried out by plane or three-dimensional drawing. The professional drawings of architectural landscape design given in this way contain a large number of proprietary expressions, which are obscure and difficult to understand for both owners and managers, which leads to the fact that owners and managers cannot judge whether the design is in line with their requirements, and are unable to give effective feedback on time, which in turn affects the modification in the later stage, and is a major problem in architectural landscape planning and design [6]. At the same time, this drawing method can not provide a comprehensive and objective display of the information of the whole building, and it can only singularly convey the information of certain attributes of the building, such as the proportion, size, and position of doors and windows. However, with the support of virtual reality technology, the process of architectural landscape planning and design can remove the clutter and keep the essence, while retaining the basic information of the traditional drawing method to display the overall model of the building through the three-dimensional form and utilizing the observation of the building model, the visit to the interior of the building, and the transformation of different perspectives, the unique architectural landscape of the rural villages in southern Anhui Province will be shown in its entirety, such as the Xidi traditional houses, the eaves on the walls and the windows on the windows. The eaves on the wall and the eaves on the windows, the harmonious proportion between the local natural landscape and the buildings in Wuyuan, etc., better demonstrate the coordinated relationship between the architectural landscape and the surrounding environment [7]. In addition, the application of virtual reality technology can also help landscape users who do not understand architectural knowledge other than designers to judge the whole building more simply and intuitively, and it plays the role of assisting decision-making in deciding whether the architectural landscape meets the requirements and where it needs to be modified, as shown in figure 4.

Online Design of Architectural Landscape

With the development of the times, the network has also become an important auxiliary tool for architectural landscape planning and design, providing conditions for online design and real-time transmission of architectural landscape

planning and design. That is, the network enables virtual reality technology to be more effectively integrated into architectural landscape design in the rural areas of southern Anhui Province [8]. In the traditional network environment, the virtual reality technology uses the network to publish its design plan, which makes the practicability of the online landscape architecture model more deeply embodied, as shown in figure 5. Designers use virtual reality technology to build a corresponding architectural landscape model, after which they can use the electronic technology of the Internet to quickly send their work to the building's contractor, the contractor's decision makers can see the architectural landscape model designed by the architect online, and can also make judgments on the cooperation between the building and the landscape as well as the building itself. Virtual reality technology allows the feasibility and integrity of the building to be described in more detail, thus enhancing the usefulness of the web [9]. The network also serves the function of reproducing and presenting the building as well as aiding decision-making in the process of building modeling. At the same time, virtual reality technology allows users to navigate through virtual reality architectural landscape scenes in two different perspectives, first person and third person, and the technology of human-computer interface calling is applied to architectural landscape planning and design. The so-called human-computer interface call technology refers to the production of the architectural landscape roaming animation for testing and packaging, generating executable files for digital browsing. The optimization of the software interface of human-computer interface calling technology refers to the reasonable design and management of the interface, and generally divides the session effect in the human-computer interface interaction technology into three stages: the initial design stage, the form evaluation stage, and the final evaluation stage. Through these three steps, a good human-computer interface can be established by utilizing virtual reality technology [10]. In a sense, the software interface of the human-computer interface calling technology is more important than the hardware devices and working environment. This paper uses virtual reality technology to construct a corresponding architectural landscape model, after which the model can be transmitted to the building contractor in real time with the help of network transmission channels, so that the decision-makers of the contractor can see the architectural landscape model designed by the architect online, and also make judgments on the cooperation between the building and the landscape as well as on the building itself, to make the feasibility and completeness of the building be described in detail, thus completing the planning and design of the building landscape in real-time online. The feasibility and integrity of the building can be described in detail so that the planning and design of the building landscape can be completed online in real-time [9]. In the process of architectural modeling, virtual reality technology also plays a role in presenting the building online as well as aiding decision-making by navigating through the virtual reality architectural landscape scene from two different perspectives, one-person and third-person, and applying the technology of human-computer interface calling to architectural landscape planning and design. The so-called human-computer interface calling technology refers to testing and packaging the produced architectural landscape roaming animation to generate executable files for digital browsing. The optimization of the software interface of human-computer interface calling technology refers to the reasonable design and management of the interface, and generally divides the session effect in the human-computer interface interaction technology into three stages: the initial design stage, the form evaluation stage, and the final evaluation stage. Through these three steps, a good human-computer interface can be established by utilizing virtual reality technology [11]. In a sense, the software interface of human-computer interface calling technology is more important than the hardware devices and working environment.

Conducting multi-option analysis and comparison

Architectural landscape planning and design usually go through several design schemes, and then through the comparison of developers and contractors before they are finally put into practice. If we want to target a certain area, such as the rural area of southern Anhui, we also need to combine the cultural characteristics of the rural areas of southern Anhui, the special environment, and human habits to develop multiple comparison programs, which is a very complicated process [12]. The application of virtual reality technology can effectively solve the problem of comparing multiple programs. Its main principle lies in the fact that designers can make corresponding architectural models according to their conception when they carry out the design, and in the virtual 3D architectural model, they can choose different modes according to the specific conditions, and compare the architectural landscape garden planning and design programs in the rural areas of southern Anhui Province from multiple

perspectives, which is shown in the following table 2, which allows for a more detailed and meticulous comparison of the different architectural programs. It is more likely to highlight the advantages of the project and help the construction unit to make a more objective decision.

Accurate data analysis

Virtual reality technology can be uploaded to the field visit measurement data to the virtual reality software, scanning and reading in the computer to restore the architectural landscape has specific information, such a method can be from the outside to the inside of the rural architectural landscape of southern Anhui Province of the detailed analysis of the information so that the architects better grasp the specifics of the rural architecture of southern Anhui Province to better find out the shortcomings of which, to ensure that the design work of the systematization, completeness, and accuracy, shown in figure 6. In addition to this, through computerized data analysis, virtual reality technology can not only help in the planning of villages in southern Anhui but also help people perceive the architecture on multiple levels, thus showing greater value when reconstructing the complex [13]. For example, the Afang Palace, the Daming Palace, the Yuanmingyuan, the Garden of Ten Thousand Gardens, the Buddhas of Bamiyan, and the tombs of the Turkish Haliknasomosoras, the above human architectural heritage is difficult to recreate glory at present due to the interplay of various objective and subjective reasons, but virtual reality technology can restore the existing dilapidated buildings through computers and image processing, to bring these destroyed buildings back to the human world.

Analysis of the virtual reality technology

In this paper, virtual technology is applied to architectural landscape planning and design in the rural areas of southern Anhui Province, and its advantages such as scheme comparison, data analysis, and information visualization greatly reduce the difficulty of architectural landscape planning and design work, and the online planning and design can also show the designers' design results to customers in real-time [14]. Moreover, the advantages of virtual reality technology such as information visualization and accurate data analysis also allow designers to better understand the subtleties of architectural landscape planning and design in the rural areas of southern Anhui Province, and better demonstrate the unified architectural form, orderly architectural composition pattern, and harmonious architectural scale proportion in the rural areas of southern Anhui Province. The application of virtual reality technology to the real rural architectural landscape design in southern Anhui goes through three stages, as shown in figure 7.

Virtual environment modeling coordinates

The modeling language used in virtual reality technology can be considered a tool for creating images, a simple textual language for describing interactive environments, a cross-platform language for publishing web pages and providing a more natural experience, and a language with real-time communication capabilities in computer networks [15]. The process of determining the coordinates of a 3D pixel is as follows: first, a point is constructed in 3D space, represented as the origin in the coordinate axes, and the transformed coordinates are the variable points, while the corresponding transformation matrix is as follows:

$$T = \begin{bmatrix} a & b & c & p \\ d & e & f & q \\ h & i & j & r \\ k & m & n & s \end{bmatrix} \quad (1)$$

Complex transformations are composed of base transformations, the order of transformation matrices cannot be inverted arbitrarily, and matrix multiplication violates the law of exchange, so special care should be taken when performing transformations. Proportional, symmetric, rotational, translational, and intersection are the most commonly used base transformations [16]. The most complex of these are symmetry transformations and rotation transformations, which can accomplish both planar symmetry transformations and multidimensional spatial transformations. They can transform two-dimensional, three-dimensional, and even more advanced point-to-point transformations so that virtual images can be transformed into graphics. According to the above Euclid's principle of motion, the relationship between three dimensions and two dimensions can be made clear, and in addition, it is possible to represent the coordinate points three dimensions as coordinates in three dimensions with the expression: in

$$X = [X_1, X_2, X_3]^T \quad (2)$$

where X means, for two points P and Q in the space with coordinates X and Y, and the vector space consists of P and Q, which can be expressed as:

$$\langle u \times v \rangle = u^T v = u_1 v_1 + u_2 v_2 + u_3 v_3 \quad (3)$$

The intersection product is shown below:

$$\langle u \times v \rangle = \begin{pmatrix} u_2v_3 - u_3v_2 \\ u_3v_1 - u_1v_3 \\ u_1v_2 - u_2v_1 \end{pmatrix} \quad (4)$$

In addition, the cross-product of the defined matrices is expressed in the following form:

$$uv = \langle u, v \rangle \quad \langle u \times v \rangle \quad (5)$$

Three-dimensional virtual image technology is a new and comprehensive information technology emerging in recent years, which promotes the application process of virtual reality technology in the landscape planning and design of rural architecture in southern Anhui Province.

Construction of Virtual Environment Modeling

Virtual reality technology in the planning and design of rural architectural landscapes in southern Anhui Province is a very important step is to establishing a simulation environment with a certain degree of fidelity, in establishment of the simulation environment, not only to have the appropriate difficulty but also to have the necessary three-dimensional picture, stereo sound, etc., as shown in table 3.

(1) Terrain modeling. In virtual modeling, terrain modeling is the most difficult part, in areas with gentle terrain, geometric planes are usually used because the amount of terrain variation is small, while in areas with more undulating terrain, such as hillsides and mounds, they can be modeled using grayscale images [17].

(2) Architectural modeling. The creation of the architectural model is very simple, one only needs to draw a red line according to the ratio of the actual area to the screen area and then extend it, through the calculation of the scaling coefficient, the outline of the architectural landscape can be constructed, followed by the addition and refinement of doors, windows, staircases, balconies, and other details. After completing the basic landscape modeling, factors such as physical materials and light are combined to make the whole space present a dynamic visual effect [18]. With the development of the times, especially the application of virtual technology, the requirements for the realism and real-time of the architectural landscape are getting higher and higher, which makes the architectural landscape design in the rural areas of southern Anhui Province present diverse morphological characteristics. To reduce the workload of the designers, when needed, the designers only need to calculate the spatial coordinates of the mapping by the computer system, and then present them instantly with the physical entities in the bitmap to obtain the same landscape modeling effect.

(3) Color modeling. To effectively enhance the realism of landscape lighting of rural architecture in southern Anhui Province, virtual reality technology does not directly use color fills when performing landscape lighting, but chooses techniques such as color fusion and softness to improve the accuracy of landscape lighting [19].

(4) Environmental modeling. Plant modeling is also a common modeling method in architectural landscape design in the rural area of southern Anhui Province, but it is a great problem when modeling how to model plants. Currently, many designers complete the modeling of plants and trees by using drawing software to add a mapping, while large plants are modeled by taking pictures from different angles, and this modeling method can greatly affect the authenticity of the model in practice, thus failing to resonate with users [11]. However, due to the scarcity of 3D plant models, the existing tree models do not match the characteristics of the trees in the Chinese region, and the tree models are not highly specialized and simulated. To solve this problem, virtual modeling of architectural landscapes usually presents trees in architectural landscapes by using pictures of trees from multiple angles at a distance and tree models at a close distance.

The above four models can be used to construct a perfect virtual model of the rural architectural landscape in southern Anhui Province from the aspects of buildings, roads, green areas, and other public facilities.

2.4. The rural architectural landscape planning and design system

A high-quality virtual reality system can not be separated from the cooperation of various technologies, this paper designed the framework of the rural architectural landscape planning and design system in southern Anhui Province, as shown in figure 8.

(1) User Layer: Users can enter the user's window through the viewport and transfer the window to the computer to let the computer perform the simulation of the garden landscape.

(2) Application layer: According to the instructions, the 3D landscape image of the village in southern Anhui is drawn.

(3) Display Layer: Show the generated landscape image of the village in Southern Anhui to the user.

System hardware design

The realization of the system requires a hardware carrier, and the hardware structure of the system designed in this paper mainly includes an input device, a main control device, and an output display device [20].

(1) Input device. The first thing to be carried out in the design of rural architectural landscapes in the southern Anhui region is the establishment of three-dimensional architectural landscapes, This process requires a large amount of data, so there must be a data and information collection device to complete. LIDAR achieves the detection of the ground by transmitting a laser to the ground, and then through the reflection of the laser, to obtain information on terrain and topography. The pulse distance measurement method works on the principle:

$$Y = \frac{1}{2} v \times t \quad (6)$$

In the formula: Y is the LiDAR detection distance to the ground; v is the transmittance of the laser, and t is the difference between these two periods of time. The sensor senses the information of the object under test and converts the information into a signal as shown in figure 9.

(2) The main controller is the most critical hard body, which transmits the collected relevant information to the main control device through the main control device to complete the three-dimensional modeling of the rural architectural landscape in the rural areas of southern Anhui Province.

(3) The output program and display program output device is the effect feeling device required in the design of rural architectural landscape in southern Anhui, including stereo glasses, stereo headphones, and so on.

System Software Design

According to the impact of virtual reality technology on rural architectural landscape planning and design in southern Anhui Province to build the system framework, the design of specific software running program, as shown in figure 10.

3. Rural architectural landscape planning system

3.1 Practicality of rural architectural landscape planning and design system

The highest goal in architectural landscape design in the rural area of southern Anhui is to realize the best design effect of the architectural landscape scene. To realize this goal, the practical application of the architectural landscape planning and design system in the rural area of southern Anhui should be explored. Therefore, this paper first establishes a test bench, whose main parameters are shown in table 4 and table 5. Then, on this basis, the subjects were selected and the simulation system of architectural landscape design in rural areas of southern Anhui was tested to determine the practicality of the architectural landscape planning and design system in rural areas of southern Anhui.

3.2 Analysis of the effect of the use of landscape planning and design system

To further verify the applicability of the simulation system in the rural architectural landscape of southern Anhui, this project analyzes the feasibility of computer modeling of the architectural landscape in the rural areas of southern Anhui and combines the ability of virtual reality technology to fine-tune the surrounding environment to evaluate the effect of the use of the simulation system in architectural planning and design more realistically

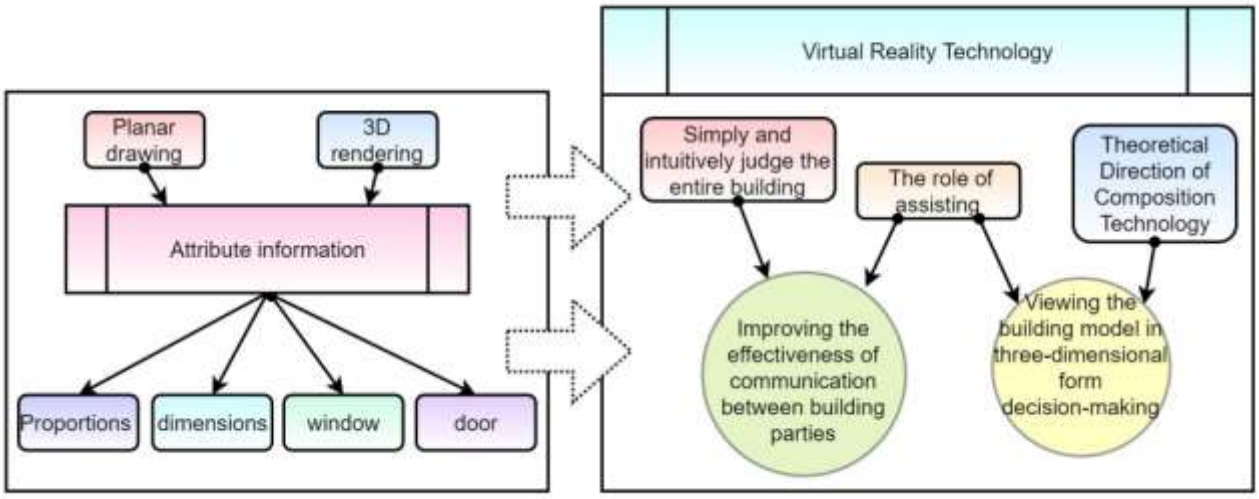

Figure 4. *Building landscape information visualization*

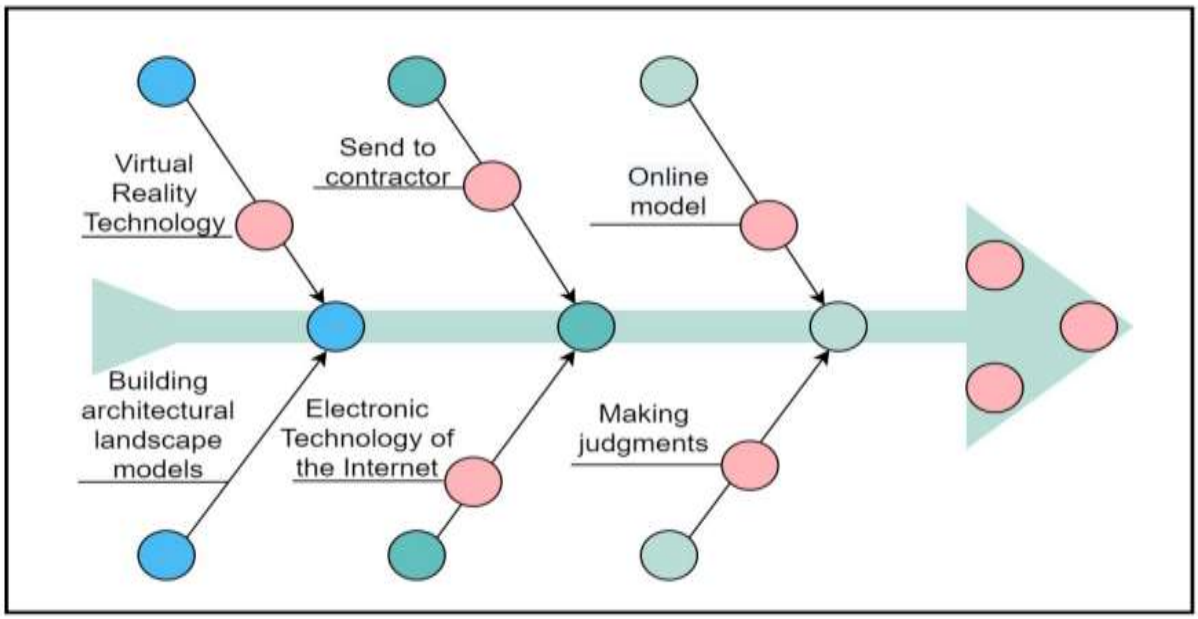

Figure 5. *Virtual reality technology online architecture landscape design*

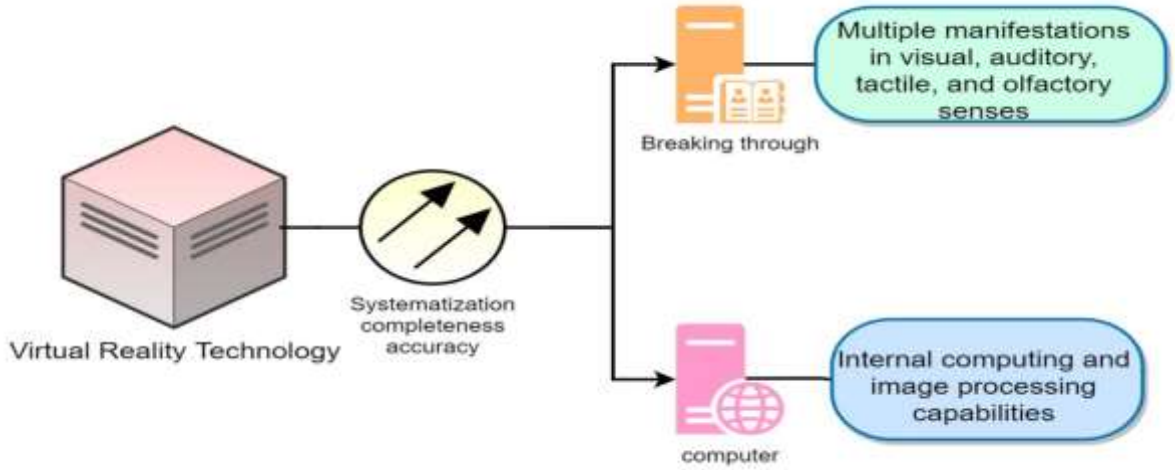

Figure 6. *Data analysis capability of virtual reality technology*

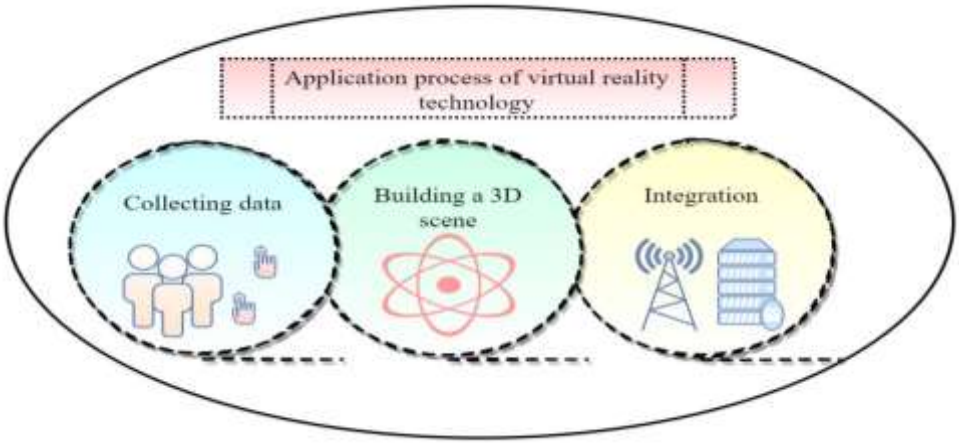

Figure 7. *Process of using virtual reality technology*

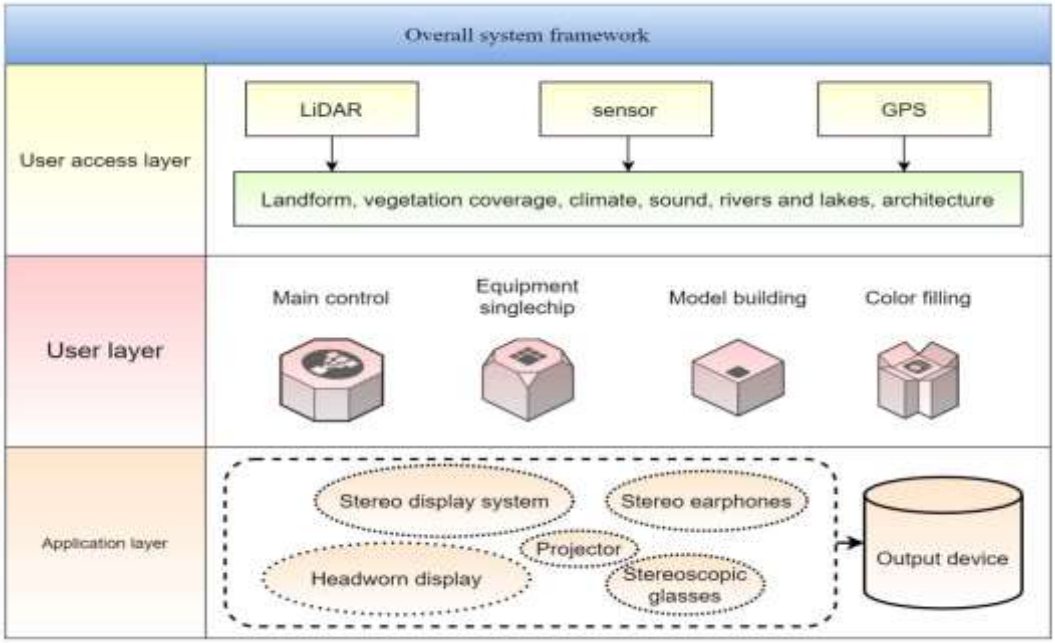

Figure 8. *The framework of rural architectural landscape planning and design system in southern Anhui Province*

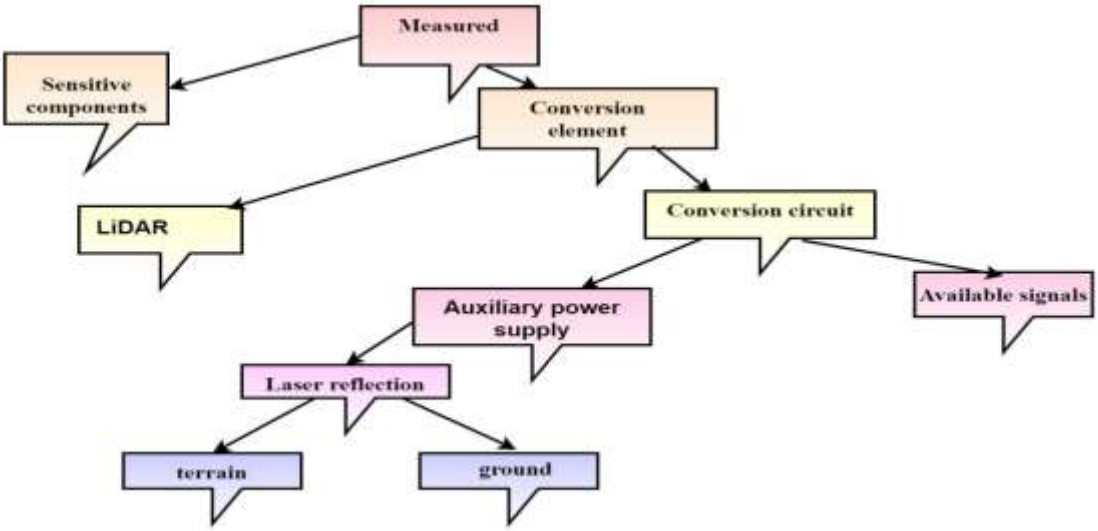

Figure 9. *Information conversion component*

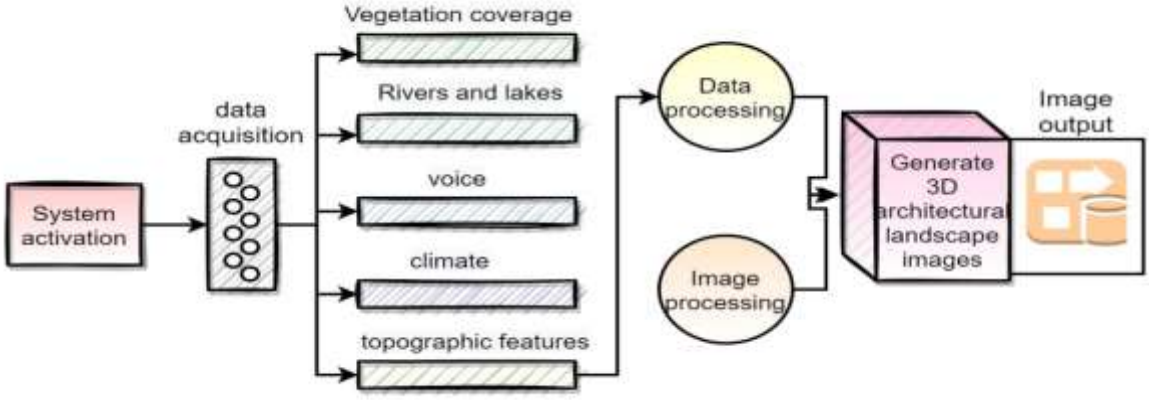

Figure 10. *Software running program*

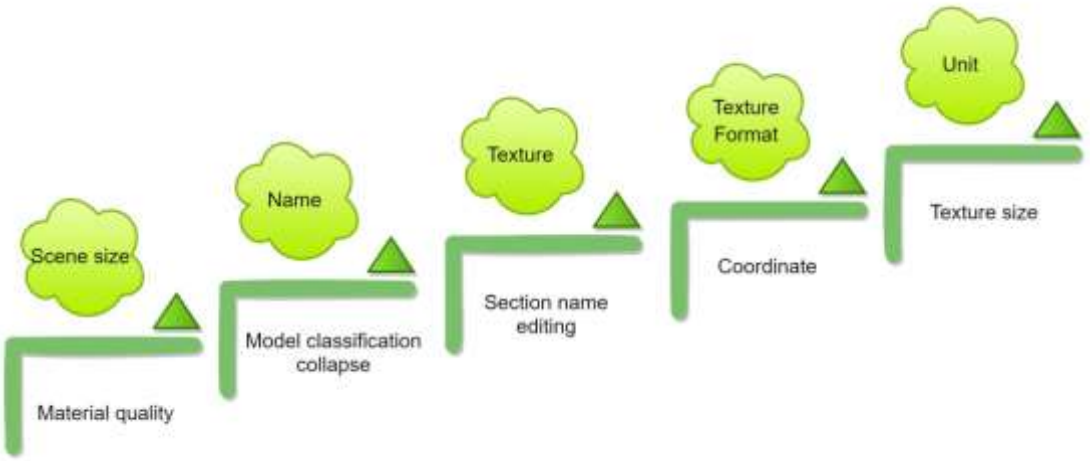

Figure 11. *system demand direction*

Table 2. *Comparison of architectural landscape planning and Design programs in the rural areas of Southern Anhui Province*

Compare Drop Points	**Comparison Objects**
Same observation point	Different rural architectural landscapes in southern Anhui
Different observation points	The same rural architectural landscape in Southern Anhui
Localized Observation Points	Specific modification of a part of the architectural landscape of the southern Anhui countryside
Before and after observation point	The rural architectural landscape of Southern Anhui before and after modification

and effectively [21]. The specific evaluation content includes four aspects, each aspect has its corresponding evaluation index, combined with the analysis of the actual application of the content analysis system of the rural architectural landscape planning and design system in southern Anhui Province, the evaluation results are shown in table 6. As can be seen from the this table, in the preliminary work, the virtual reality technology in rural areas of southern Anhui Province has achieved very good results in the application of rural architectural landscape planning and design in southern Anhui Province, through the identification and connection of the virtual reality technology, it can be realized for the automatic presentation of the main format documents, especially for the pattern generation of documents in the landscape planning and design of rural architectural landscape planning in southern Anhui Province, so that the current use of the virtual reality technology in southern Anhui Province The use of virtual reality technology currently used in rural architectural landscape planning and design is very effective. In terms of evaluating the input process, the landscape planning and design of rural architecture in southern Anhui province using virtual reality technology can improve the visualization because it can present very realistic textures and can present detailed light and shadow effects [22]. Therefore, this paper proposes an assessment method based on virtual reality technology and applies it in practice, in addition to the fact that virtual reality technology can provide an immersive virtual environment. The model designed in this paper includes four virtual model constructions of terrain, architecture, color, and environment in terms of application mode and operational performance in the inspection stage, which meets the needs of rural architectural landscape planning and design in southern Anhui. In the application stage, due to the lack of corresponding correction work, the actual application of the virtual architecture landscape planning and design system in the rural areas of southern Anhui Province is poor.

3.3 Problems in the landscape planning and design

There are still many problems to be solved in the application of virtual reality technology in the landscape planning and design of rural architecture in southern Anhui Province, such as the cost of the hardware and software involved in the system is

still very high, so it is still to be further promoted and further reduced [23]. In addition, in virtual reality technology, the security and privacy of data, etc., still need to be strengthened. In this paper, the design of the rural architectural landscape planning and design system in southern Anhui Province based on virtual reality technology needs to increase attention in many aspects, as shown in figure 11. In the process of creating the virtual technical model of a rural architectural landscape, the basic contents included in the system are required to strictly comply with national standards, and the program management should be simple, clear, and standardized. In addition, when building the model, we also need to take into account the size and proportion of the model, generally in the production of architectural landscape models, the length unit used is millimeters, and combined with the actual situation, choose the appropriate proportion, to ensure that the built model of simulation and objectivity.

In addition, in the process of building the model, if computer-aided design drawings are used, then the model needs to be built based on computer-aided design drawings, and the use of computer-aided design drawings can better ensure the accuracy of the design drawings. Even if the auxiliary diagrams are not updated in time, the designer can use the data already in hand, such as videos and pictures, to model the model reasonably, so that the risk of the design can be minimized [24].

For the selection of modeling materials, certain expertise is necessary, for example, the courtyard wall in the rural architectural landscape of southern Anhui Province has a roof built of green tiles at the upper end, a wall plastered with white lime in the middle, and the foundation part of the wall made of green stone at the lower part, and the main function of the horse-head wall is its fireproofing function. Therefore, the choice of modeling materials is a good indicator, which plays a vital role in the refinement and optimization of the landscape design model of rural houses in the southern Anhui region.

4. Conclusion.

This paper firstly studies the basic situation of virtual reality technology and analyzes the application of virtual reality technology in rural architectural landscape planning and design in southern Anhui based on it, to solve the problems of low communication efficiency and poor display effect of traditional architectural landscape design. On this basis, a set of rural architectural landscape planning and design systems based on virtual reality is developed, and it is found that when virtual reality technology is applied to the architectural landscape planning and design of rural areas in southern Anhui Province, it has significant advantages in rendering the sense of reality, creating detailed light and shadow effects, etc., and it can intuitively show the composition mode and law of the rural architectural landscape portfolio composition in southern Anhui Province, and explore the external morphology of the presented Programming characteristics.

In conclusion, this paper argues that the use of virtual reality technology in rural architectural landscape planning and design in southern Anhui Province can help to assist the process of planning and design, promote effective communication with Party A and the late docking of the program with the design unit, and the further application of virtual reality technology in rural architectural landscape planning and design in southern Anhui Province has a reference significance. Planning and design is an important and used in different works [25,26].

Table 3. *Requirements for the construction of the virtual environment model*

Model building scenarios	**Model Building Requirements**	**Model Building Categories**

Table 4. *The hardware configuration of the experimental platform*

Hardware	**Parameters**
CPU	Quad Core Eight Threads
Solid State Drive Space	120 GB
Mechanical Hard Disk Space	2 TB
Graphics Card	NVIDIA Quadro K2200 Models

Table 5. *Experimental platform software configuration*

Software	**Parameters**
Drawing Software	Auto CAD
Modeling Software	SketchUp
Renderers	Enscape, Lumion

Table 6. *Evaluation of rural architectural landscape planning and design system in Southern Anhui Province*

Evaluation content	**Evaluation Indicators**	**Applications**
Preparation	Equipment Construction	Efficient
Data entry	Visual effect	Efficient
Model checking	Operational Performance	Efficient
Use	Implementation modification	Ineffective

Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
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