



Environmental Art Design System Based on 3D Virtual Reality Technology

Yan Yang^(✉)

Cheng College of University of Electronic Science and Technology of China, Chengdu 610000,
Sichuan, China
zhc010314@163.com

Abstract. The design rendering of the traditional environmental art design system has certain line problems, which does not exist in the environmental art design system based on 3D virtual reality technology. The processor of the environmental art design system based on 3D virtual reality technology is mainly single chip computer and supplemented by sensors and reservoirs, so the design data can be stored and adjusted, while the central processing unit of the system is the controller and operator, through which the environmental design data can be used to load the data and input into the design system. In addition, the server end port transforms the two-bit image information into three-dimensional virtual worry data, which can also improve the design effect of the environmental art design system. Compared with other design systems, the 3D virtual reality technology and the environmental art design system are the best combined.

Keywords: 3D Virtual Reality Technology · Design System · Single-Chip Computer

1 Introduction

Virtual reality technology is mainly integrated by a variety of technologies, in which 3D virtual reality technology is the subject of technology. Through 3D virtual reality technology, it can create a three-dimensional virtual world, so that both designers and customers can get a more real design experience [5]. At the same time, 3-dimensional virtual reality technology can observe things in 3-dimensional space, and designers can also use computer models to artistically process the design space and create a unique atmosphere of the design space [16]. Environmental art design system, as a platform that can show the designer's design level and aesthetic design design, is particularly favored by designers, and can make the effect of designer design more three-dimensional.

2 Hardware System Design

System The main controller of the hardware is a single-chip computer, which can effectively handle special environmental computing processes [7], and can even carry the

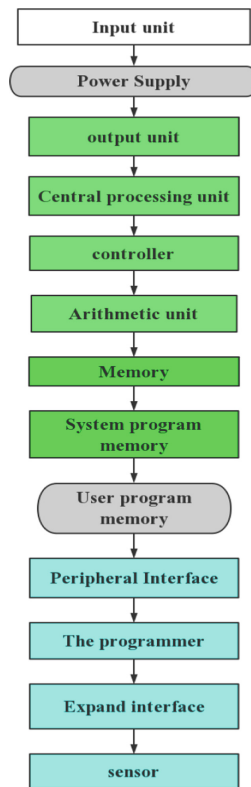


Fig. 1. Hardware composition diagram.

unit input and unit output of virtual reality technology. The design circuit framework diagram of the hardware is shown in Fig. 1.

According to the hardware composition diagram, it can be seen that the hardware of the design system mainly includes power supply, central processing unit, design equipment, input and\output interface [9], communication interface, and memory. The controller mainly uses the micro controller, the microcontroller is mainly the single chip machine, the single chip machine structure is very simple [15], but the programming function is powerful, you can constantly adjust the data according to the environment [2].

Data function modules are mainly designed for three types, plant location modules, topographic data modules, and building modules, and these three modules will work together to transmit and process the data [10]. In order to ensure that the security of the data in the process of transmission can be guarantee, it is necessary to use the SP12 multifunctional sensor, set the oscillator in the sensor [12], control the internal clock through a 2.5 kHz oscillator, and then control the data function through the 2 MHz oscillator. The sensor structure is shown in Fig. 2.

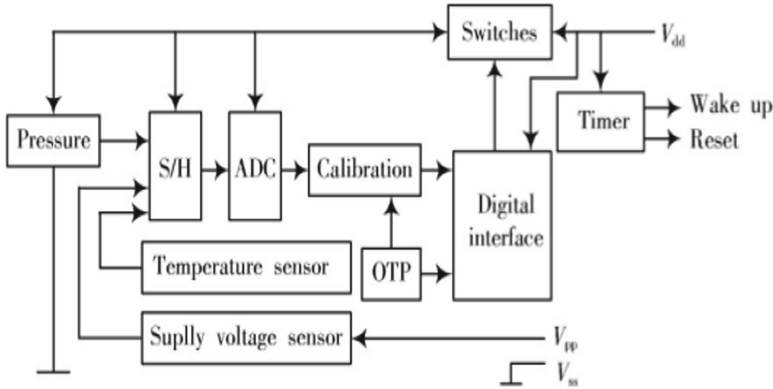


Fig. 2. Sensor structure.

Sensor and expansion interface are combined. Through the combination of sensor and expansion interface [6], the data can be input to the central processing module, and the data of the central processing module can be combined with the computer keyboard [1], so the user can also input the data through the keyboard [14], and complete the design. The memory design is mainly divided into system program storage and the user program storage. The daily work of both stores is to store the data, but the system program memory is responsible for the system data [8], while the user program storage is responsible for designing the data. In order to avoid the uneven heat dissipation of the computer due to the too long running time, the hard disk drive data interface also mainly uses the SATA interface, which can ensure the normal operation of the hard disk.

3 Software System Design

The server side and the client together constitute the system software design, while the two ports are connected by Internet. The server side port can provide the design data that the designer needs [3], and the client port can guarantee the communication between the designer and the customer. The overall architecture is shown in Fig. 3.

As can be seen from Fig. 3, the server side of the virtual reality environment art design system is based on the 3D virtual reality technology [13]. Data can be modified and transmitted, the communication process can also be controlled, and even the design data provided by the designer can be added or deleted. In order to expand the space of the system, and to make the system more flexible, it is necessary to change the two-dimensional graphics information to present a 3-dimensional virtual reality effect. However, if two-dimensional graphics are used to represent the homogeneous coordinates, and constantly change the coordinates, you can finally achieve the three-dimensional virtual reality effect [4].

4 Design Effect Comparison

Comparing the mountain design effect designed with Sketch UP design system and 3D virtual reality environmental art design system, Fig. 4 can be obtained.

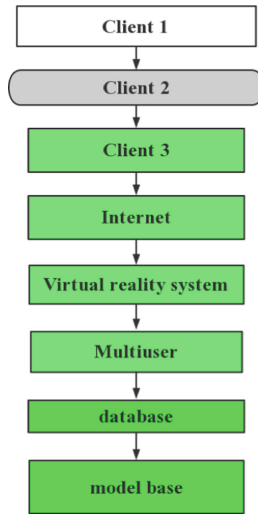


Fig. 3. Overall architecture diagram of the system software.

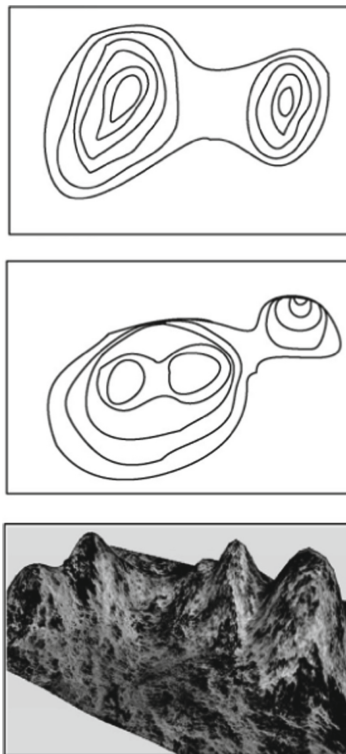


Fig. 4. Effect comparison of the three design systems.

As can be seen from the comparison of the Fig. 4, the environmental art design system of 3D virtual reality technology has the best effect, while the AutoCAD design system and the Sketch UP design system are more or less not accurate enough in the processing of the lines, which will affect the design effect to a certain extent. Therefore, 3D virtual reality technology is more suitable for application in environmental art design [11].

5 Software Function Design

The function of the traditional environmental art design system is not very prominent in the analysis of the environmental map data, especially when making the environmental model, the display of the data in the initial map is not clear enough, leading to the confusion of the environmental map. Adjusting the initial graph data to obtain the corresponding grid data, predict the value of uncertain points in the environmental art design, and weighted calculation through the known points, the calculation formula is:

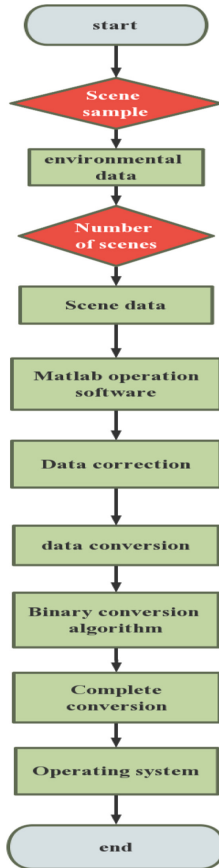


Fig. 5. Flow chart of the data transformation.

Among them, di is the weighted function, ui is the scene distance in the environmental art design system, while C is the number of environments. However, due to the difference in the scene distribution, the data $\sum_{i=1}^c ui$ will be affected to a certain extent, and transforming the data in the environmental art design system can effectively stabilize the system. The flow chart of the data conversion is shown in Fig. 5.

6 Conclusion

It is believed that the future three-dimensional virtual reality technology will get a wider range of applications in environmental art design, but at present, it is necessary to solve the problem of three-dimensional virtual reality technology in environmental art design, find the advantages of three-dimensional virtual reality technology, with three-dimensional virtual reality. The Advantages of Technology against Disadvantages in Traditional Art Design Forms. At present, environmental art design is no longer just operated on paper, designers began to use computer-aided tools to make the design work more perfect. As the most applicable technology in the environmental design, three-dimensional virtual reality technology is widely used by designers, providing the design quality of designers, and more truly reflects the realistic elements existing in it.

References

1. Chen Huiying. Explore the application of virtual reality technology in Environmental Art Design [J]. Building Materials and Decoration, 2018 (09): 105.
2. Guanyu Bian, Yanghong Li, Qicong Zhu. Implementation Strategy of Basic Course of Environmental Art Design under the Background of Informatization [J]. Design, 2019, 32 (23): 84–85.
3. Ling Qin. — takes the major of Environmental art Design as an example [J]. Sichuan Building Materials, 2017, 43 (07): 242–243.
4. Lixue You. Application of VR in Training of Art and Design [D]. Wenzhou University, 2017.
5. Lu Chen, Chuan Liu. The Application Strategy of Virtual Reality Technology in Environmental Art Design [J]. Journal of Jilin Radio and Television University, 2021 (03): 151–153.
6. Mona Huang, Xianfeng Li. Research on Modern Architecture Environment Design based on Virtual reality technology [J]. Tomorrow fashion, 2018 (05): 40+63.
7. Monroe Li, Qian Zhou. Practical Exploration of the Application of Virtual Reality Technology in Environmental Art Design [J]. Art Grand View, 2021 (08): 75–76+79.
8. Qishi Chen. Application Model and Effect Evaluation of VR Technology in Environmental Art Design Teaching [J]. Popular Literature and Art, 2017 (22): 189–190.
9. Teng Zhang, Jun Song. Exploring the Application Value of Virtual Reality Technology in Environmental Art Design [J]. Scientific and technological innovation and Application, 2020 (35): 32–33.
10. Wei Liu. Discussion on the Application Strategy of Virtual Reality Technology in Environmental Art Design [J]. Research on Urban Construction Theory Research (Electronic Edition), 2018(30):81. <https://doi.org/10.19569/j.cnki.cn119313/tu.201830067>.
11. Wenlian Li. How to Use Virtual Reality Technology to improve the execution of the professional training courses [J]. External Education in China, 2016 (30): 115.

12. Xiaocui Lu. The Requirements and Application of Virtual Reality Technology in Modern Environmental Art Design [J]. *Electronic World*, 2018(17):194+196. <https://doi.org/10.19353/j.cnki.dzsj.2018.17.106>.
13. Xuejiao Xiong. Application of Virtual Reality Technology in Environmental Art Design [J]. *Shanxi Youth*, 2017 (10): 178.
14. Yankai Yang. The Application of Virtual Reality Technology in Environmental Art Design [J]. *Fine Arts Education Research*, 2018 (02): 76.
15. Zhichao Zhang. Application of (VR) VR technology in the Project-based teaching practice of school-enterprise cooperation [J]. *Chinese and foreign entrepreneurs*, 2020 (14): 153.
16. Zhinian Dong. Art and technology coexistence of environmental design under the background of contemporary digital technology [J]. *Industrial Engineering Design*, 2021, 3(02):89–93+102. <https://doi.org/10.19798/j.cnki.2096-6946.2021.02.013>.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

