Analysis and research on image technology of virtual reality conference system

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Keywords: Virtual Reality Technology; Sensor Experiment Platform; Quest3D

Abstract: With the development of Virtual Reality technology, computer graphics technology and network technology, it is possible to realize the function of virtual conference in different places. Virtual Reality technology is one of the new technologies which have been developed rapidly in recent years. Image processing in virtual reality has become one of the main subjects in computer science. This paper combines the excellent outstanding achievements in related fields, pays attention to project practice, and on this basis, proposes a conference system solution based on virtual reality technology, and uses video compression, Quest3D and CSY2 and other related technologies as supporting means. Finally, this paper realizes the optimization of image and graphics based on the network technology.

1. Introduction

Traditional Virtual Reality (VR) technology require sensors to perform simulations, including the use of thermocouples and Houle devices to asynchronously transmit data. In recent years, with the continuous development of China's economy and society, there is a growing demand for meeting synchronization activities in different places. The traditional meeting is limited by the funds, time and place, which cannot meet the requirements of the current meeting, especially the off-site meeting brings great inconvenience to many people who cannot come to the meeting. Virtual Reality Remote meeting system can solve this kind of problems. Virtual Reality conference system has the characteristics of intuitiveness and validity, and is the most effective alternative to the traditional conference. At present, with the development of information technology, the technology and cost of virtual conference system have made breakthroughs in both software and hardware. Products such as Tencent Holdings's Qq and Wechat are developing similar VR conferencing technology. The United States is the birthplace of virtual reality technology research, and virtual reality technology can be traced back to the 1940s. Its initial research applications have focused on the U. S. military's simulation training of pilots and astronauts. At present, the research of Virtual Reality Conference System in the United States mainly focuses on transmission efficiency, transmission stability, transmission cost control and so on. Generally speaking, because of its own technological advantages, the United States is in the leading position in the international research results in this field. The research of Virtual Reality Technology has been listed as one of the long-term technical development in Europe and Japan, and the research and planning of Virtual Reality conference system is also one of its key development areas.

2. Overall design scheme

The main points of image and video technology for virtual conference system are mainly focused on the functions of sharing image data and video information among users, mainly including desktop sharing, real-time video display, and electronic whiteboard functions. The functional structure of the specific implementation scenario is shown in figure 1.

  DOI: 10.25236/isrme.2019.137

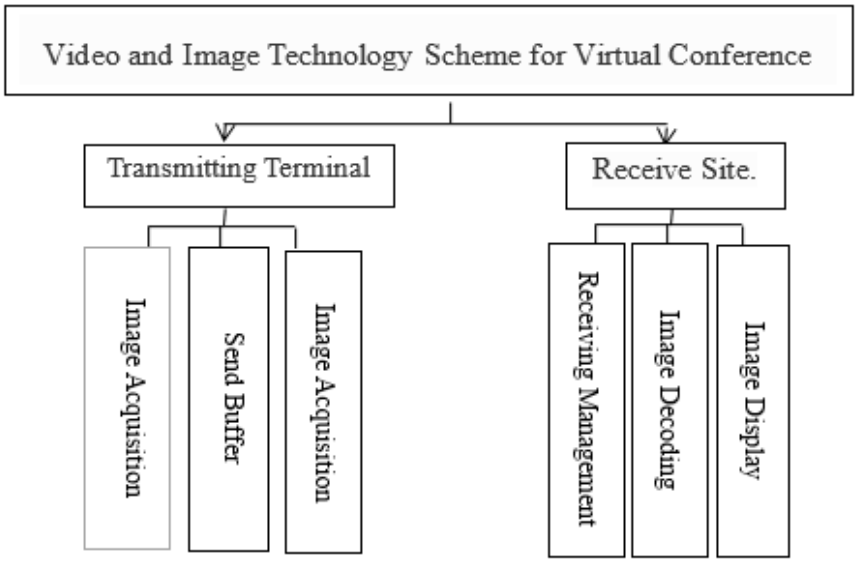

Fig. 1 Implementation Scheme of Image Processing in Virtual Conference System

2.1. Transmitter

Image acquisition module: This module is mainly for the necessary acquisition of image and video information, including two parts of specific data information, one part of the desktop can be shared system information, including Personnel Image Information and mapping information. This kind of data will be relatively large, the frequency of applications in video is low. The other part of the image information includes the image information of the camera and the participants. The information transmission volume of this part is not large and the frequency is generally high. The two kinds of information and data are acquired in different ways, which requires different application modules to intercept them and complete the corresponding acquisition work.

At present, when extracting the feature information of low frequency image, we usually adopt the mode of single FPGA + DSP. This part of function module has simple structure, but it requires high real-time performance the system with large amount of information processing cannot meet the requirements of the target. Therefore, in the multi-point virtual video conference, we will upgrade the single DSP structure to dual or even multi-DSP structure to optimize the load capacity of the original system. At present, TMS series chips made by Ti Company are widely used in China. The chips are fabricated at 90 nm, run at a million operations per second, and contain an SR10 communication module. Dual-DSP or even multi-DSP processing systems need to solve the communication and control problems between the chips. The system module is shown in figure 2.

Image compression module: The size of the image for the necessary compression. Send Management Module: The module is mainly composed of two parts, one is data send module, the other is send control module. The sending control module must establish a TCP connection and decide how much IP is used to transmit and send the data. In the virtual conference sending management module, we must consider the problem that the conference process can be interrupted by the high priority node at any time in the multi-point state, especially in the multi-point hierarchical authority mode. Therefore, the structure design based on hierarchical priority management is the core of sending management module. Figure 3 shows the sending module management system based on hierarchical priority management.

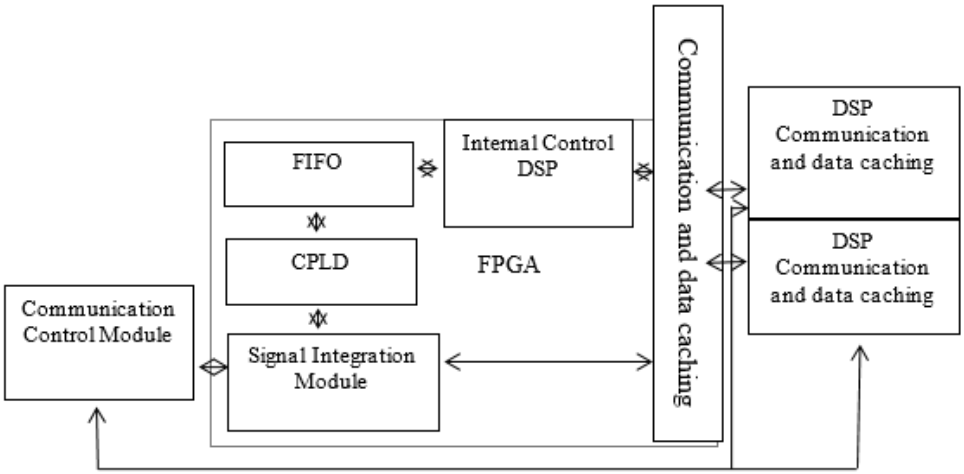

Fig. 2 Image Acquisition System Module

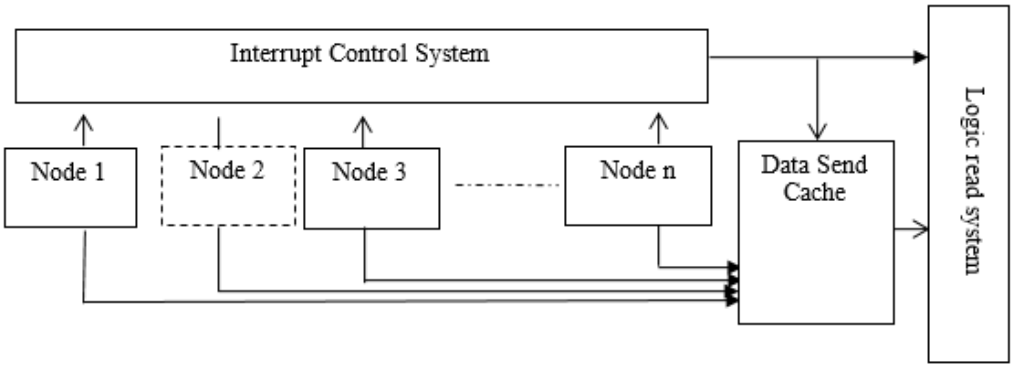

Fig. 3 Sending Module Management System Based on Hierarchical Priority Control

2.2. Receiving End

Receiver Management Module: The receiver management module consists of the packet analysis and the data receiving control module. The receiver module must establish the necessary connection with the sender to initialize the information. The data analysis module processes the received data through the packet processing mode, from which the relevant data of the packet is resolved, and then the data is cached as necessary.

Video Stream caching module: This module provides the real-time image transmission function of the whole system and acts as a buffer. It can store the image data in a specific register to make the necessary adjustments to the real-time performance of the system by controlling the data read.

Image Decompression Module: After receiving the image information, you can use the image decompression module to decompress the image stream, get the corresponding real-time data, and then convert it into the system's mapping file, and finally submit it to the image processing module for display.

Image Display Module: Image display module can display in different states according to user's requirements, including virtual screen presentation, electronic whiteboard data sharing and other functions.

3. Platform Design and implementation

3.1. 3D model building

3D model building is mainly used to achieve the virtual meeting platform, generally through

sensors and data processing of real world things for virtual display. The display equipment used in this paper is CSY2 sensor equipment. Temperature sensing devices, image adaptation sensing devices, and temperature sensing devices and the like can process images and graphics accordingly, and match different backgrounds according to the relevant content of the meeting. The sensor automatically picks up the images and material, and then builds the necessary infrastructure to create the virtual scene through Quest3D.Figure 4 shows the construction system for the three-dimensional model.

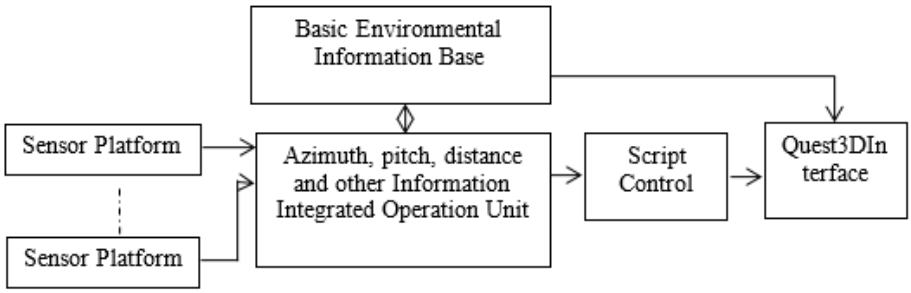

Fig. 4 construction system of the three-dimensional model

3.2. Model optimization

There are a large number of 3D models in the application of virtual scenes. In the process of building the model, if the model angle is not accurately located, it will increase the difficulty of rendering the three-dimensional model of the system the platform must develop a degree of balance to improve the integrity of the model.

3.2.1. Modeling data materialization.

The appearance of the sensor module is measured and the shape of the sensor equipment is recorded. The model can be copied.

The model can be copied 1:1 according to the requirements to obtain the corresponding modeling data information, and the scale is changed through the mode of the photo shooting place, and finally the corresponding scene is adjusted, so that the final model can conform to the change of the meeting background. The modeling and simulation are shown in fig. 5

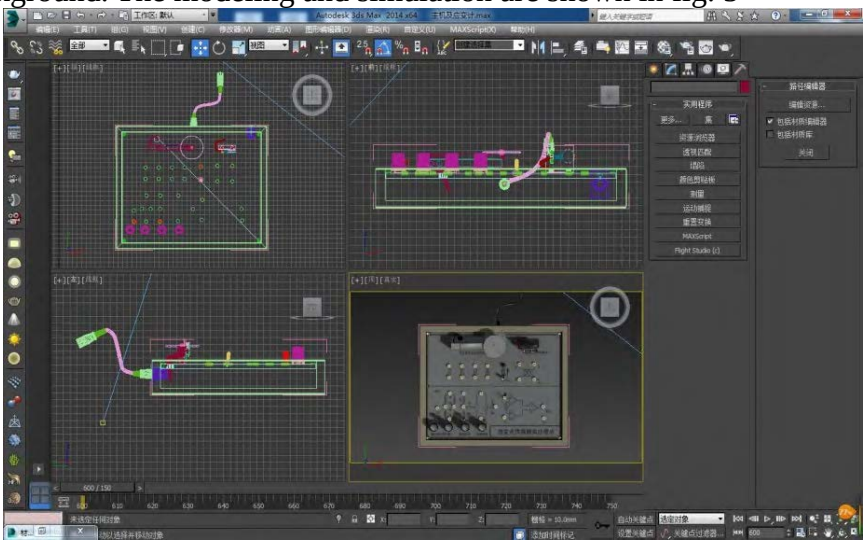

Fig. 5 modeling Simulation Diagram

3.2.2. Modeling surface refinement.

In the process of modeling, because the paths of the planes are different, it needs to be transformed into three-dimensional model by the corresponding software. In the process of

modeling, there will be more planes than necessary, and the planes will not be visible in the background of virtual conference system. The modules make necessary replacement to the bottom of the scene, making these modules show unpredictable positions, and then make necessary treatment to these surfaces to achieve a high degree of rendering, thus effectively reducing the difficulty of model construction.

3.2.3. Optimization of modeling software.

Quest3d software is usually used in the process of creating the model, which can optimize the system if necessary. For example, you can select "modifier" in the software toolbar the modifier makes the necessary edits to the grid in the secondary menu and optimizes the 3D image information in the menu. The pattern can be installed with a plug-in, such as using Polygon Crunc-her software. The code is as follows:

```
clearall %
figure
scrsz=get(0,’Screen Size’);
[left: bottom: width:
Height]
set (gcf: ’Position’: scrsz) ;
Va=0.2;
ab=0.4;
od=sqrt(3) /10;
T=(ab-od) /Va; t=0: 0.001: T;
oa=od+(Va.*t);
```

3.2.4. Texture mapping optimization.

In the running process of virtual conference system, if we design it in a complicated way, it will increase the difficulty of using the system. At the top of the experimental model, there are many functional modules that need to be processed. The top of the module is taken by a camera device. The images are beautified by PS. At the bottom of the sticker, a three-dimensional image can be processed Display the data through the circuit diagram model. The precision of the model is controlled, the image rendering is enhanced effectively, and the precision of the model and the rendering display rate are improved in the design of the 3D model. In the production of sticker materials, but also need to three-dimensional image rendering, so that the scene closer to life.

Fig. 6 texturing treatment

Using LOD to simplify the model in the scene. According to the object's distance and viewing angle, the necessary geometric model is built internally to complete the system rendering

4. Conclusion

On the basis of the basic technology of virtual reality, this paper designs the conference system based on virtual reality by using sensor technology and 3D modeling technology. In the process of design, the image processing and effect optimization are considered comprehensively. The platform can enhance the feasibility of the virtual conference system and improve the quality of the application of the system, which is of great significance to the planning and construction of the conference system.

Acknowledgements

Supported by Fundamental Research Funds for the Central Universities (GK201903113)

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