Research on the New Development Direction of Visual Communication Based on VR Virtual Reality

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Abstract. Nowadays, with the development of science and technology, VR has become a very popular vocabulary. Moreover, VR technology has gradually penetrated into people's lives. Many games can be played through virtual reality technology. People can experience the fun of games and have a more vivid picture through VR technology. This paper introduces VR technology in detail, related concepts and technology. Especially, the application of VR technology has been improved, and this project has great development prospects.

Keywords: Operational Command, Development Prospect and Popularity of Virtual Reality Technology

1. VR technology and C4ISR system

We can sum up VR technology, it makes people feel immersive by simulating other scenes, hearing and vision. Virtual reality is essentially an operating system on computers. It is a three-dimensional graphics system generated by Grade 93. It can simulate the surrounding environment with a reference as the center, and participants can also interact with the surrounding environment. VR technology actually simulates and models in multidimensional information space, and can help people acquire knowledge and form new concepts. Immersion and interactivity are two basic characteristics of virtual reality system. Immersion means that participants feel surrounded by the virtual world and seem to be completely integrated into it. The five key components of virtual reality system are: virtual world, virtual reality software, computer, input and output devices. Virtual reality system is composed of many parts, but it is mainly composed of three major systems: non-immersive virtual reality system, immersive virtual reality system and enhanced virtual reality system. What is an immersive virtual reality system? Such systems rely on various hardware, such as helmets, stereo glasses and other virtual devices, to make the virtual environment more realistic and vivid. Increase the authenticity of the environment. At the same time, users can observe the real environment. Non-immersion virtual reality system is a desktop simulation system, which uses computer technology to simulate, taking the computer screen as the main body and using some external devices to manipulate the virtual world.
Virtual reality technology can bring very different experiences and feelings to users, and can make people interact with the environment better. Virtual communication has become a new means to solve practical problems. At present, VR technology has been widely used in some fields, such as aerospace, scientific computing, nuclear industry, and other industries. It must be said that virtual reality technology plays a very important role in these aspects. It has been well applied and practiced in the military field.

What is the command automation system? It can also be referred to as C4ISR system for short, which is a new system integrating command, control, communication, computer, intelligence, reconnaissance, and monitoring. This system has a great function, and can obtain information, make simple processing and make decisions. Especially in the army, they can command the management of the army and some military struggles. It consists of the following subsystems: intelligence subsystem, including radar, sonar, infrared and other detection equipment and various reconnaissance means, mainly for the detection and acquisition of various intelligence; Communication subsystem, including satellite communication, microwave communication, shortwave and ultrashort wave communication, etc., which mainly performs the tasks of providing intelligence, command transmission, internal communication, command communication to each combat unit, etc.; Reconnaissance and surveillance subsystem: complete the acquisition of enemy target status information; Electronic countermeasures subsystem: composed of electronic reconnaissance equipment, electronic jamming equipment, electronic anti-jamming equipment and electronic countermeasures command and control center; Command and control subsystem: it mainly provides functions such as comprehensive intelligence processing, auxiliary decision-making, operational command and graphic processing; Management subsystem: complete the daily management and maintenance of the system.

This system is mainly used in the following four aspects: firstly, it can collect intelligence, and this system can detect relevant information by collecting and protecting it. Collect intelligence in advance, as well as the relevant situation of the battlefield. This system can also carry out intelligence processing function. What is intelligence processing? Intelligence processing is to analyze and judge the acquired intelligence information, including target classification and identification, target threat judgment, enemy combat intention analysis, and provide complete and accurate battlefield situation for command posts at all levels; Operational command: according to intelligence information, organize and command the operational actions of troops, including the preparation and optimization of operational plans and the evaluation of results, etc., assist commanders in making operational decisions, and provide basis for military actions. Operational command and control is the core of C4ISR system; Communication function: to realize information transmission, command uploading and issuing, communication within the system, and contact between the system and combat troops [1].

2. Application of VR technology in C4ISR

Nowadays, with the development of science and technology, wars also adopt high-tech technology.
Nowadays, wars are a contest between science and technology. Not only that, but the future wars will be more inclined. Therefore, we can use various technologies or visual technology to award various information, as well as the enemy's troop status and the fighting situation between the two sides, to show them more vividly through virtual reality technology. This is more conducive to mastering the enemy's dynamics and training officers and men. The commanders can know the battlefield situation in an all-round and intuitive way, predict the dynamic development of the battlefield more accurately, and greatly improve the accuracy of command and decision-making. The key to realize these functions is to use virtual reality visual simulation technology. Combat command and control system is an important part of command automation system. Applying virtual reality technology to C4ISR system, especially in combat command and control subsystem, visualizing command and control process, battlefield change process, battlefield situation development, confrontation process of both sides, etc., can enhance the realism of the system, immersion and interactivity of combat commanders, and improve the practicability of command automation system.

Through the above introduction, we have a deeper understanding of virtual reality technology and visualization technology, and we also understand that simulation technology is beneficial to realize automatic combat command and control. At the same time, a desktop virtual reality simulation application system is established, which is suitable both in theory and in practice, for the following two reasons: First, the command and control decision-making system is to command, control and dispatch combat force confrontation, which is to form a plan. Instead of simulating the operation of specific weapons and equipment platforms, it does not rely on the platform hardware system of the combat unit object itself, but on the tactical technical performance and combat determination of the platform and the attack weapons carried; Second, the content of the system mainly shows the confrontation simulation of multi-weapon platform cooperative operation in the whole process of combat under the combat environment, rather than the specific operation of single instrument and equipment and combat weapon. Moreover, the emphasis of virtualization lies in the plan preparation and real-time command, which is mainly aimed at making participants visually "immersive". The contents of the virtual reality system can be summarized as follows.

2.1. Visualization of battlefield environment
Nowadays, maritime wars between countries are all three-dimensional wars, and various situations in the wars, including the number of warships on the sea and submarines in the water, are inseparable from virtual reality technology. Through virtual reality technology, we can use a large number of 3D data display technology, multimedia technology and other information acquired and processed by c4ISR intelligence, and combine multimedia with simulated reality technology to provide participants with real combat scenes. Let soldiers know more about battlefield situation, enemies and our targets in three-dimensional space, combat units such as surface and underwater ships, air planes, marine environment and meteorological conditions, distribution of troops, blockade of navigation channels, interference, etc [2].

2.2. Visualization of Force Configuration
There is a special 3D image simulator in the virtual battlefield constructed by using simulated reality technology. This simulator allows both sides to communicate and make automatic judgments according to the information of communication. The constructed virtual battlefield has also shown the cooperative combat confrontation movement process of various weapon simulators. The combat command simulation system needs many technologies, such as tactical technology of background weapon platform, support of war rules data, support of visual simulation database and so on. At the same time, it also needs background support to complete visualization content, and VR model classes, including static scene modeling, physical law modeling, motion law, communication modeling and geometric shape modeling. Physical-based modeling means that the established model includes not only appearance, LOD, degree of freedom, but also important physical attributes such as quality, and modeling can be realized by some modeling software [3].
The combat command system that can build virtual reality is actually a system that can realize intelligent decision-making. The participants of the system need to know all kinds of situations on the battlefield, as well as the conditions of various simulators and the changes of the virtual battlefield environment, and make correct judgments through these factors. Therefore, the system should have a rich knowledge base in order to make correct and rational decisions.

Usually, the real battlefield or the simulated battlefield situation is complicated and changeable, and many things may happen midway, such as air attack, ground rendezvous, air rendezvous, logistics supply, reinforcements, etc. Participants not only watch the happening process of these things, but also must establish and maintain the model method of this model in order to determine the value of potential important time periods. The distributed virtual simulation system of combat command and control simulates the battlefield confrontation situation from formulating combat tasks and objectives, setting the battlefield environment and generating combat plans, to making collaborative plans through model calculation and reasoning, and finally submitting the simulation results to the central command console for the system to conduct combat evaluation [4].

![Virtual reality equipment](image)

**Figure 2.** Virtual reality equipment.

Compared with the immersive virtual reality system such as flight simulator or driving simulator, the desktop virtual reality simulation application system is in the form of visual immersion, and the immersion feeling is relatively poor. This is the shortcoming of establishing the desktop virtual reality simulation application system by using the visual simulation technology. However, the computer can control the viewpoint of the image generated by the computer by matching and installing equipment for tracking the position and direction of the user's head, such as a graphic workstation and a simple head tracker, and the effect of looking out from the window can be produced. With the help of a trackball, a three-dimensional mouse or interactive gloves [5].

3. Conclusion

This paper mainly explains the function and principle of the combat command system based on simulated reality. By introducing it, everyone has a deeper understanding of the combat command system based on simulated reality. This paper introduces the functions of the system and makes relevant analysis on the system. This system has brought great convenience and benefits to soldiers. At the same time, in the process of continuous improvement and development, this system will have a huge development prospect in the future [6].

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