Research on Scene Fusion and Interaction Method Based on Virtual Reality Technology

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Abstract. The construction of a virtual interactive model based on VR technology breaks through the single mode of traditional virtual reality helmets, through optical attitude sensing, immersive cave virtual reality, multi-person network collaboration, 9D interactive media applications, and mobile terminal interaction. The organic integration and application of technologies have improved the user's interactive experience, and the inheritance and development of local folk culture and the continuous research on intangible cultural heritage can be a useful exploration. However, the development cost of the entire design is relatively high, and there is no unified construction standard and policy support for such projects in China, especially the lack of effective support from the network application platform, which makes it difficult to implement online, and the reproducibility is low.

1. Introduction of virtual reality technology
From 1995 to 2015, virtual reality technology equipment was constantly trying to land in the consumer market. During this period, many devices appeared. In 2001, Olympus launched the Eye-Trek head-mounted display; in 2012, Sony launched the HMZ-T1 3D head-mounted display with a 45° viewing angle; from 2014 to 2015, Google launched the head-mounted display. Samsung, Baofeng Technology and other companies have also launched their own virtual reality technology products. Although these products may not have caused much response, they are the virtual reality technology after 2016. The mature period has laid a deep foundation. The reason why 2016 became the first year of virtual reality technology has a lot to do with the integrity of its product industry ecosystem and its acceptance by its consumer market. Virtual reality technology is not a new concept. In the past thirty years, various experiments and products of virtual reality technology have emerged in endlessly[1]. Until the technology matured in 2016, the first batch of companies that launched civilian virtual reality technology products-Oculus, HTC and Sony, they launched virtual reality technology glasses for ordinary consumers[2]. The market for ordinary consumers has been opened up, and virtual reality technology has been more conveniently applied to more industry markets. From the above development of virtual reality, it can be seen that the basic tools we usually use to experience virtual reality are sensors and head-mounted displays. Head-mounted displays, also known as head-mounted displays, are based on the phenomenon of binocular parallax[3]. The angle of this difference is the angle between the two straight lines of the distance between the two eyes and the object, which constitutes a measurement of the distance to the object. At the same time, virtual reality technology uses more accurate spatial motion perception capabilities and a more powerful data processing computing platform to track user actions, and uses new optical lens equipment on the helmet to make the virtual reality space a complete surround experience In front of the person. The experiencer will
feel that he is in a brand new environment, no matter how he exercises, the helmet will move with the experiencer, while seamlessly generating corresponding images and feedback[4]. Virtual reality technology is not just an isolated technology, but integrates numerous electronic information technologies and sensors for application. Compared with previous electronic devices, virtual reality technology devices can more directly and conveniently perceive and interact with experiencers[5-6].

Virtual reality technology has three characteristics, including three parts: conception, immersion, and interactivity. The interpretation of the word "conception" in the "National Language Dictionary" is: "The thoughts pre-stored in the heart refer to the secret plan for the implementation of things." According to this interpretation, one of the characteristics of virtual reality technology is that the conception is the virtual representation of the environment and things that the designer wants, which contains ideas that match the designer, and can be used to achieve some desired goals. In order to study problems and solve models, we always build models to carry out some experiments. The more important and non-replicable problems, the more we need to use this method. The model can give us a more intuitive result, and we can adjust and formulate a more appropriate plan. For example, the doctor completes a virtual operation through a virtual operating room environment, with a virtual human body and tactile feedback, achieving the effect of surgical training. The same applies to the interior design industry: the designer simulates the real room environment through design virtual technology, and then shows it to the designed party and obtains recognition, thus achieving the purpose of real construction. In addition, the concept of virtual reality technology can also express fantasy scenes and things.

2. Interactive Fusion Model Design

The highly immersive and three-dimensional interaction of VR technology makes the experiencer feel like being in various scenes. We take the cultural center project as the starting point, and through the construction and integration of multiple virtual reality equipment terminal applications, we achieve the purpose of allowing visitors to explore the ancient city, explore the city, and inherit culture without leaving home. The virtual cultural experience pavilion is composed of five themed interactive areas. Each area adopts different technology fusions to express and render around themes. The exhibition hall navigation area mainly adopts large screen + 3D somatosensory (Kinect) technology system integration to construct somatosensory virtual. The typical application of reality, the large-scale landscape and shadow area, mainly adopts the immersive cave virtual reality (Cave) technology system, including three-dimensional display, virtual reality peripheral network (VRPN: Virtual-Reality) Peripheral Network) standards and other technologies are implemented to build typical applications of immersive cave-based virtual reality; the game entertainment area mainly uses the virtual reality helmet technology of HTC Vive (a virtual reality head-mounted display jointly developed by HTC and Valve), and LAN interconnection Technology, to build a typical application of head-mounted virtual reality with network collaboration; dynamic scene tour area, mainly using 9D (perfectly integrates vision, hearing, smell, touch and movement) dynamic seat, VR helmet technology to build external drive A typical application of type (connecting to a computer to realize scene sharing); the character modeling interactive area mainly uses augmented reality (AR) technology, deploys applications on mobile terminals, and establishes a mechanism for intercommunication with the "3D printing studio". The virtual reality experience content is designed and built in an open form. The themes include: comprehensive guided tour of the cultural center, interactive viewing of ancient cultural legends and historical backgrounds, virtual experience of ancient cultural legends war stories, immersive tours of ancient cultural legends, ancient scenes, and character modeling of ancient cultural legends AR interactive. Each theme cooperates with the corresponding virtual reality environment to achieve a unique interactive experience through the integration of content, technology, and equipment. The navigation area is constructed by a virtual optical attitude sensing system, which integrates technologies such as optical sensing positioning and sensor interaction. Through the interactive large screen of the interactive navigation area, the overall layout is intuitively displayed to the visitors. As shown in Figure 1, we can see the rendering effect.
3. Application of interaction design

The 9D dynamic scene tour area is based on the 9D interactive media application technology system. 9D technology mainly refers to the construction of real scenes through sound, light, shadow, water, fog, smoke, and interaction (vision, hearing, smell, taste, touch), combined with gesture feedback control, VR scene construction, scene rendering optimization, animation interaction Control, virtual particle system and other technologies, through the preset 9D dynamic seat and virtual reality helmet feedback system, allow visitors to immerse in the experience and feel the scenery along the ancient city, and deepen the experience of the experience of the history and culture of the place. The experience scene is connected to a storyline, and the experiencer (the protagonist) leads the team to the ancient city to guard the home. The virtual reality helmet displays a variety of gorgeous roadside scenery along the way, and the dynamic 9D seat matches the rising and falling pitch feeling to avoid trees, birds, etc., which will give you the feeling of shaking and flying. The whole process is a fusion design and application of the preset 9D seat and virtual reality helmet interactive experience to achieve the purpose of displaying historical scenes.

2.5 Interactive design and application of mobile terminal augmented reality technology in the character modeling interactive area of the virtual cultural center

The character modeling interactive area is constructed based on the augmented reality interactive technology system, integrating augmented reality, image recognition, 3D model dynamic processing and other technologies, using the equipment in the venue, Or use your own smart device to scan AR interactive cards with 3D characters "Guarding the ancient city" as the content to show the experience local cultural features such as characters, customs, clothing, etc. Scan the color AR card through the tablet (or mobile phone), and display the corresponding 3D model of the character on the tablet (or mobile phone). For example, scanning the soldier card will display the 3D model of the soldier. Use the coloring tool to color and dress the model. After finishing the coloring and dressing within the specified time, you can receive the corresponding 3D printing model provided by the 3D printing studio. The AR identification card contains the characters in the legendary story of guarding the ancient city and the scenes along the main route: the protagonist, guarding soldiers, city officials, officials' cronies, foreign leaders, ancient city buildings, government offices, scenery along the road outside the city, etc.

4. Conclusion

Through the actual project of constructing a virtual cultural center, the article combines multiple virtual reality equipment terminals and sensor interaction technology, LAN interconnection technology, multi-channel splicing and fusion technology, interactive animation control technology, display and optical position tracking collaboration technology, panoramic video technology and scenes. The organic integration of rendering optimization technology is expected to achieve multi-channel, multi-dimensional, and multi-form interactive experience effects.
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