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A Private Customized VR Tourism Service System Based on Flow Theory and Panoramic Technology in the Post Epidemic Era

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Abstract: *The COVID-19 pandemic has had a serious impact on the global tourism industry, but as vaccines are being rolled out, the tourism market will gradually recover. In this era, the development of VR technology has brought infinite possibilities to the tourism industry. Based on Flow theory and panoramic technology, this paper designs a private custom VR tourism service system to provide tourists with a more perfect tourism experience. The system analyzes the personal needs of tourists, provides personalized tourism routes, and uses panoramic technology to achieve a realistic display of the tourist destination, in order to achieve the best tourism experience. After completing the system design, this paper provides a detailed functional description and technical implementation plan, in order to provide an advanced and personalized solution for the tourism industry.*

Keywords: *Flow Theory; Panoramic Technology; Private Customization; VR Tourism Service System*

1. Introduction

The COVID-19 has had a serious impact on the global tourism industry, and almost all the global tourism markets have been closed. In recent years, with the maturity and application of virtual reality technology, VR tourism has gradually emerged in the tourism field. VR tourism can present tourist attractions in a more realistic way, providing a comprehensive experience without considering time and space limitations. In this era, VR tourism can become the latest support for the tourism industry, providing certain assistance for the recovery of the tourism industry[1-3].

However, most of the current VR tourism services are fixed routes provided to the public, so they are not flexible and personalized enough. Therefore, based on Flow theory and panoramic technology, this article proposes a private customized VR tourism service system to better meet the individual needs of each tourist and provide a more perfect tourism experience[4-6].

The main content of this article includes: first, introducing the relevant theoretical foundations, including Flow theory and panoramic technology. Then elaborate on the design and analysis of a private customized VR tourism service system. Finally, provide a detailed explanation of the implementation method and functions of the system.

2. Comparison between VR tourism system and traditional tourism

The real experience of tourism is an important comparative factor between VR tourism system and traditional tourism. Virtual reality technology enables VR tourism systems to provide realistic audio-visual effects, making users feel as if they are in the real world. By wearing VR helmets, users can experience the beauty of scenic spots and the excitement of activities in a virtual environment. However, although VR tourism systems can provide an immersive experience, they still cannot completely replace the on-site experience of traditional tourism. The true feelings brought by traditional tourism are obtained through personal experience and sensory stimulation, and cannot be fully restored through virtual technology. The unique charm of traditional tourism lies in the practical experience of entering scenic spots, personally touching cultural heritage, and tasting local cuisine[7].

The interactivity and sociality of tourism experiences are also a comparative factor between VR

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tourism systems and traditional tourism. Virtual reality technology has brought interactive and social functions to VR tourism systems, allowing users to communicate and interact with other people in different places, and share their travel experience. In addition, virtual reality technology can also simulate interactions with virtual tour guides or other virtual characters, increasing the fun and interest of tourism. However, although the VR tourism system provides these interactive and social functions, it still cannot replace the real interpersonal interactions and social opportunities in traditional tourism. In traditional tourism, people can communicate with local residents, make new friends, and experience different cultures and customs together, which is something that VR tourism systems cannot provide[8].

The cost and convenience of tourism are also important comparative factors between VR tourism system and traditional tourism. Compared to traditional tourism, virtual tourism systems can save a lot of time and money. Users do not need to travel long distances, nor do they need to pay high transportation and accommodation costs. In addition, users can freely choose the scenic spots and activities they want to visit according to their preferences and needs, achieving a personalized and customized travel experience. However, the convenience of virtual tourism systems also brings certain limitations. Virtual tourism cannot provide authentic experiences and firsthand experiences from traditional tourism, as well as deep exchanges with local culture and scenery. In addition, virtual tourism cannot completely replace the sense of adventure and the joy of exploring the unknown in traditional tourism[9].

In summary, the VR tourism system and traditional tourism each have their own advantages and limitations. Virtual reality technology has brought a new way of experience to tourism, but it still cannot completely replace the real feelings, interactivity, and sociality of traditional tourism. In the future, it is possible to explore ways to combine virtual tourism with traditional tourism to provide a richer and more diverse tourism experience.

3. Project Overview

The design of this system will bring great convenience to users, allowing them to enjoy the ultimate personalized travel experience while staying at home to fight the epidemic. While bringing convenience to people, the development of the project will also drive the transformation and sustainable development of the VR tourism industry. The future of personalized customized VR tourism is broad, and the journey is winding. The personalized needs of users, the development of mobile internet, and the development of software and hardware such as electronic information technology have brought rare opportunities to the VR tourism industry. However, how to achieve this depends on the efforts, hard work, and innovation of the manufacturing industry, industry, users, and teams.

Our products and services, combined with the current VR tourism industry, not only provide basic VR tourism functions, but also add the design function of personal customized VR tourism services. Unlike current rental and experiential services, our services will be more suitable for the personalized needs of individual users. We can customize personal exclusive products to create unique, warm, and creative products, such as schools where the elderly went to school when they were young Places that go to the countryside and other places that have special significance are presented to users in VR format, allowing these users to experience the joy of tourism without leaving their homes, achieving their wishes, and allowing online users to truly experience the advantages of private customized VR tourism. There are no similar products in the VR tourism industry, and the emergence of this product will definitely drive the development and transformation of related industries.

4. Theoretical basis

4.1 Flow Theory

The Flow theory is a psychological theory proposed by psychologist Mihaly Csikszentmihalyi in the 1970s, aiming to explain the focused and engaged state of humans in specific activities[10]. This theory suggests that under certain conditions, when an individual's skills match the challenge, they will enter a psychological state called 'mobility'. In this state, individuals experience experiences concentration, disappearance of time, and full of fun[11]. The Flow theory has been widely applied in personal life, work, learning, entertainment, and other fields, and has had a positive impact on improving happiness, improving work efficiency, and promoting organizational innovation. The core concept of Flow theory refers to a highly focused and focused state of mind flow experienced by individuals in specific activities. The flow state is described as a fully engaged experience in which people feel time disappearing, self-

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awareness weakening, and an ideal match between task requirements and their own skills. This concept was developed by psychologist Mihari Chikson Mihai, who believed that flow state not only brings positive emotional experiences, but also promotes individual growth and satisfaction[12]. In order to achieve flow state, several key elements must exist simultaneously. Firstly, the level of challenge of the task should match the individual's skill level. If the task is too simple, individuals may feel bored; If the task is too difficult, individuals may feel anxious and stressed. Secondly, individuals should be able to concentrate and have a clear understanding of their goals and actions when carrying out tasks. In addition, feedback also plays an important role in the flow state as it provides information about task completion and helps individuals adjust their behavior. The Flow theory is closely related to psychology. It involves concepts and theories from multiple fields of psychology, including cognition, emotion, and motivation. For example, the flow state is closely related to happiness and satisfaction in positive psychology. In addition, the Flow theory is also related to the Motivation theory, as individuals often experience an increase in intrinsic motivation rather than being driven by external rewards in their flow state[13].

4.2 Panoramic technology

Panoramic technology is a technology based on panoramic images, which shows a complete scene by splicing multiple images together. With the development of technology, panoramic technology has become a bridge between the real world and the virtual world, providing users with a more immersive experience. This article aims to introduce the basic principles, application fields, development history, and current status of panoramic technology, so that readers can have a comprehensive understanding of panoramic technology. The rise of panoramic technology not only has extensive applications in fields such as photography, tourism, and real estate, but also plays an important role in the development of technologies such as virtual reality and augmented reality. Through the elaboration of this article, readers will be able to gain a deeper understanding of the essence of panoramic technology and have a grasp of its potential future development trends. Panoramic technology is a technique that can present the entire scene in its entirety to the audience. It creates a seamless and comprehensive image by stitching multiple images together, allowing the audience to experience an immersive visual experience. Panoramic technology is widely used in fields such as virtual reality, tourism, real estate, and cultural heritage protection. In panoramic technology, the main principle used is to capture images in panoramic shooting mode through special cameras or camera devices. These devices typically have special lenses and sensors that can capture a wider field of view[14]. The collected images will undergo a series of processing and stitching algorithms to seamlessly splice multiple images together to form a panoramic image. Viewers can view panoramic images by using VR glasses, tablet computers, smart phones and other devices to obtain immersive visual experience. The application fields of panoramic technology are very extensive. In the field of virtual reality, panoramic technology can provide users with realistic virtual environments, allowing them to feel the presence of real scenes. In the field of tourism, panoramic technology can enable tourists to feel the local beauty and cultural atmosphere in advance before they actually arrive at the destination by taking and displaying panoramic images. In the real estate industry, developers can use panoramic technology to display the interior and surrounding environment of a house, allowing potential buyers to have a more intuitive understanding of the situation of the house. In addition, panoramic technology can also be applied in fields such as cultural heritage protection, education and training. Panoramic technology has made significant progress since its inception[15]. With the continuous improvement of photography equipment and computer processing capabilities, the shooting and processing process of panoramic technology has become more efficient and accurate. At the same time, panoramic technology is constantly innovating and developing, such as adding features such as interactivity and real-time splicing, further improving the user experience. In summary, panoramic technology, as a technology that can provide an immersive visual experience, is widely used in fields such as virtual reality, tourism, real estate, and cultural heritage protection. With the continuous progress of technology, panoramic technology will demonstrate its enormous potential in more fields.

5. Design analysis

5.1 User Requirements Analysis

5.1.1 Changes in tourism demand during the pandemic era

With the outbreak of the epidemic and global travel restrictions, people's travel needs have undergone significant changes. Many people are concerned about long-distance travel and choose to avoid public transportation and crowded tourist attractions. Therefore, they are more inclined to seek safer and more

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private ways of traveling.

5.1.2 The importance of private customized tourism services

In this context, private customized tourism services have become particularly important. Private customized tourism services can provide targeted travel plans based on personal preferences and needs, ensuring the safety and satisfaction of travel. The emergence of VR technology provides new possibilities for private customized tourism.

5.1.3 Advantages of private customized tourism services

The characteristic of VR tourism system is the application of virtual reality technology. Virtual reality technology enables users to experience various tourism scenarios firsthand by simulating real environments and scenarios. Unlike traditional tourism, VR tourism systems can be customized according to individual needs, allowing users to choose tourism destinations, attractions, and activities based on their preferences and interests. This personalized and customized travel experience provides users with greater satisfaction and engagement. In addition, the VR tourism system breaks the limitations of time and space, allowing users to experience travel anytime and anywhere. Whether at home, in the office, or elsewhere, users can enter a virtual travel world and explore various attractions and landscapes through VR devices and internet connections. This travel experience without time and space limitations provides convenience and opportunities for those who are unable to travel to distant places in person or are limited by time and economy. In addition, the VR tourism system provides a rich and diverse selection of attractions and activities. Users can choose to travel to any country, city, or scenic spot without being limited by actual travel. They can visit multiple places on the same day and experience different cultures and customs. The VR tourism system can also provide various activities, such as hiking, diving, skiing, etc., allowing users to enjoy adventure and excitement in the virtual world. In summary, the VR tourism system provides personalized customization, unlimited time and space, and rich and diverse tourism experiences through the application of virtual reality technology. These characteristics make VR tourism systems an attractive and innovative way of traveling.

5.2 System objectives

This system aims to provide tourists with a more perfect travel experience. Guided by Flow theory, we aim to provide more personalized and diverse virtual reality tourism experiences for each tourist based on their different needs. Use panoramic technology to present a realistic representation of the tourist destination.

5.3 System structure

The private customized VR tourism service system consists of two main system structures: one is the tourist side, and the other is the server side. Among them, the tourist terminal is a system that runs locally on the client and provides services directly, mainly including: client front-end interface (see Figure 1 for details), 360-degree video playing window (see Figure 2 and Figure 3 for details) and other modules; The server side is the server program running in the background, mainly including: customer information management module, 360-degree video generation and storage module, etc.

Figure 1: Client Frontend Interface.

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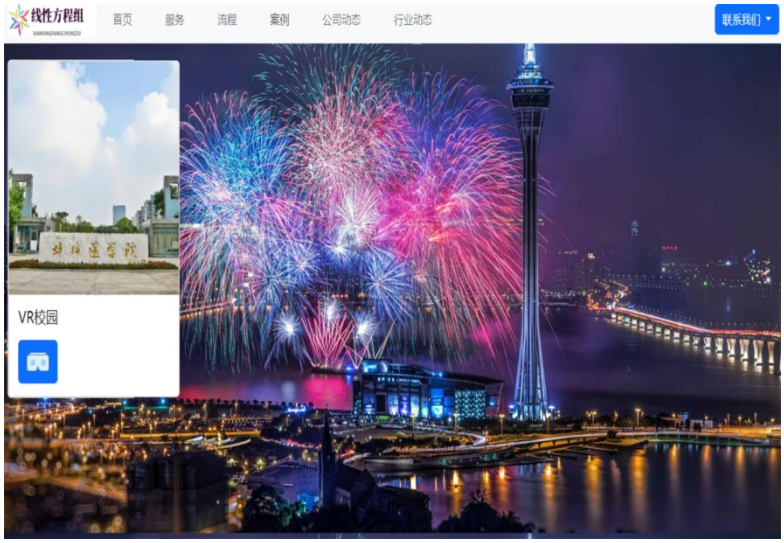

Figure 2: 360-degree video playing window.

Figure 3: Example of 360-degree video.

5.4 System Process

The system workflow of the VR tourism system can be divided into the following steps:

(1) User entry: Users access the VR tourism management system to gain an understanding of relevant information.

(2) Familiarization with company workflow: Users can familiarize themselves with the workflow of the company through the provided information in the system, facilitating smoother communication in subsequent interactions.

(3) Selection of relevant cases: Users can choose relevant successful cases based on their own needs, experiencing the quality of the company's products and clarifying their own requirements.

(4) Viewing company updates: The system provides the latest updates about the company, keeping users informed of recent developments.

(5) Accessing contact information: Users can obtain contact details to reach out to the company for services and collaboration.

(6) Communication and sharing: After experiencing the provided services, users can share their feedback with other users and provide valuable suggestions to help us improve.

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In summary, the workflow of the VR tourism management system includes user login, user entry, selection of relevant cases, viewing company updates, and communication and sharing. Through these steps, immersive virtual tourism experiences are provided to users.

6. Technical Implementation Plan

6.1 Panoramic Video Production

(1) On-site shooting: Different equipment combinations, primarily using the Insta360 One X2 panoramic camera and relevant tripods, are selected to capture scenes on location according to the requirements.

(2) Image processing: Capturing panoramic images is a crucial step in VR panoramic production. By capturing scenes with a panoramic camera, attention should be paid to the shooting angle and visual quality. The captured images are then processed using software such as Photoshop (PS) to create panoramas.

(3) Video processing: The required videos are obtained from the school's official website. Using software like Premiere Pro (PR), the videos are edited, classified, and saved.

(4) AI video production: Two AI videos were produced for this project, one using the digital human synthesis tool in 720yun and the other using Tencent Zhijing platform.

(5) Backend production: The finalized panoramic images and required videos are uploaded to the 720yun VR panoramic and metaverse creation platform. Various roaming functions such as editing opening effects, linking hotspots, and setting initial perspectives are added. AI video explanations are also integrated into some panoramic images to enhance the viewing experience.

(6) Online publishing: The completed panoramic tour projects are published on the website. Links, QR codes, offline packages, and mini-program versions are generated for external dissemination.

(7) Offline downloading: The projects completed on the 720yun platform are downloaded offline and backed up for storage.

(8) Website integration: The finished panoramic tours are imported into a personalized VR tourism service system. This system connects the panoramic videos to users' VR devices, allowing them to watch and experience the tours using VR headsets and gloves. Users can choose different destinations and scenic spots, change perspectives, and navigate by moving their heads and hands in virtual reality.

6.2 VR glasses and glove production

VR glasses and gloves are important equipment for tourists to participate in VR tourism, so reasonable production plans need to be considered during design to ensure stability and high-quality customer experience. The core components of these devices include optical components, screens, three-axis acceleration sensors, gyroscopes, electronic compasses, and tactile feedback modules. The design of VR glasses needs to be based on the characteristics of human eyes, providing a comfortable visual experience. The focus of glove design is to ensure the flexibility of the hands. It is recommended to use flexible materials to make gloves, while adding tactile feedback modules to enhance the sense of participation of tourists.

6.3 Server side implementation

The VR tourism management system is primarily implemented through interactive webpages using technologies such as VUE and Node.js. To make it accessible on the internet, the project is first packaged using Visual Studio Code and then compressed. A lightweight cloud server, such as HECS (Cloud YAO Cloud Server), is chosen for hosting the corresponding webpages. In this case, CentOS is selected as the system image to facilitate the installation of third-party website management software, with Baota panel being used as an example.

After the necessary preparations mentioned above, the following steps can be taken: access the Huawei Cloud official website's console interface, locate remote connection settings, and navigate to the Baota panel page. Choose the Linux version installation option and copy the installation script code. Next, access the remote connection interface of the cloud server and paste the copied script code. Upon

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successful installation, click the management URL provided and enter the account and password displayed by the cloud server to access the visual management interface of the server. In this interface, click "Add Website" and input the purchased domain name in the URL field. After successfully adding the website, access the corresponding website folder, upload the compressed project, unzip it, and delete the compressed package. Finally, perform domain name resolution, and the VR tourism management system will be accessible through the internet.

7. Conclusion

In this study, we designed a private customized VR tourism service system based on Flow theory and panoramic technology. Through user demand analysis and technological application, we have successfully combined VR technology with personalized tourism services, providing users with a more diverse and immersive tourism experience. Although our system has achieved certain results in providing virtual tourism experiences, there are still some issues that need to be addressed. Firstly, the hardware equipment requirements of the system are high, which limits the popularity of users. Secondly, personalized recommendation algorithms still need to be improved to better meet users' preferences and needs. In addition, users' acceptance and adaptability to VR tourism also need further research and improvement. With the continuous progress of technology and the increasing demand for personalized experiences from users, private customized VR tourism service systems have broad development prospects. In the future, we can further optimize the performance and user experience of the system, reduce the cost of hardware devices, and promote the popularization of VR tourism. In addition, the application scope of the system can be expanded, such as applying it to fields such as education and cultural heritage protection, providing users with a more diverse virtual experience.

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References

[1] Hou M, Zhang M, Sun Y. Greening tourism with environmental wellness: importance of environmental engagement, green tourist intentions, and tourist' environmental stimulus[J]. Environ Sci Pollut Res Int. 2023 Jun 8:1–15.

[2] Elshaer IA, Algezawy M, Ghaleb MMS, Mohamed SA, Azazz AMS. The Impact of Social Loafing on Turnover Intention for Tourism Employees Post COVID-19: The Mediating Role of Mental Health[J]. Int J Environ Res Public Health. 2023 May 1; 20(9):5702.

[3] Tu R, Park SK, Ding Y. Travel intentions of travelers in the COVID-19 context: The moderation of fear of COVID-19[J]. Front Psychol. 2023 Mar 2; 14:1136465.

[4] Saneinia S, Zhou R, Gholizadeh A, Asmi F. Immersive Media-Based Tourism Emerging Challenge of VR Addiction Among Generation Z. Front Public Health[J].2022 Jul 1;10:833658. doi: 10.3389/fpubh.2022.833658. Erratum in: Front Public Health. 2022 Aug 24;10:1017242.

[5] Templin T, Popielarczyk D. The Use of Low-Cost Unmanned Aerial Vehicles in the Process of Building Models for Cultural Tourism, 3D Web and Augmented/Mixed Reality Applications[J]. Sensors (Basel). 2020 Sep 23; 20(19):5457.

[6] Fiocco AJ, Millett G, D'Amico D, Krieger L, Sivashankar Y, Lee SH, Lachman R. Virtual tourism for older adults living in residential care: A mixed-methods study[J]. PLoS One. 2021 May 20; 16(5): e0250761.

[7] Yin X, Han X, Jung T. Analysis of spatial perception and the influencing factors of attractions in Southwest China's ethnic minority areas: The case of Dali Bai Autonomous Prefecture[J]. PLoS One. 2023 Jun 13; 18(6):e0285141.

[8] Cheng R. Assessing and validating tourism business model in hospitality industry: role of blockchain platform [J]. Environ Sci Pollut Res Int. 2023 May; 30(23):63704-63715.

[9] Torabi ZA, Rezvani MR, Hall CM, Allam Z. On the post-pandemic travel boom: How capacity building and smart tourism technologies in rural areas can help - evidence from Iran[J]. Technol Forecast Soc Change. 2023 Aug;193:122633.

[10] Zhou J, Wu S, Wu X, Xia X. Cultural landscape perception of the Chinese traditional settlement: Based on tourists' online comments[J]. PLoS One. 2023 Apr 13;18(4):e0283335.

ISSN 2706-6827 Vol. 5, Issue 14: 23-30, DOI: 10.25236/IJFS.2023.051404

[11] Li Z, Yang M, Zhou X,Li H, Zhai F, Zhang Y. Research on the spatial correlation and formation mechanism between traditional villages and rural tourism[J]. Sci Rep. 2023 May 22; 13(1):8210.
[12] Liu J, Wang Y, Chang L. How do short videos influence users' tourism intention? A study of key factors [J]. Front Psychol. 2023 Jan 17;13:1036570.
[13] Heutte J, Fenouillet F, Martin-Krumm C, Gute G, Raes A, Gute D, Bachelet R, Csikszentmihalyi M. Optimal Experience in Adult Learning: Conception and Validation of the Flow in Education Scale (EduFlow-2)[J]. Front Psychol. 2021 Dec 30;12:828027.
[14] Deng Y, Han SY, Li J, Rong J, Fan W, Sun T. The design of tourism product CAD three-dimensional modeling system using VR technology[J].PLoS One. 2020 Dec 28;15(12):e0244205.
[15] Pang Y. Application of Image Mosaic Technology in Tai Chi Animation Creation[J]. Comput Intell Neurosci. 2022 Jan 13;2022:4775189.