ISSN: 2688-9323

Research on the Application of Immersive Virtual Technology in Zigong Salt Industry History Museum

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Abstract

With the development of science and technology, virtual technology has gradually occupied a place in life, traditional museum exhibition and visit no longer attract tourists, and panoramic virtual exhibition in the museum tour is becoming more and more important, making digital museum more effective space. At present, the web panorama virtual tour mode adopted by many virtual museums is no longer able to meet the diversified needs of the public, and the interactive and immersive virtual tour is more popular among the public. Based on immersion experience of virtual technology, analyzed the present situation of Zigong salt history museum, virtual Zigong salt history museum development put forward about the overall design scheme, and discussed based on immersion experience of virtual technology in the application of Zigong salt history museum, illuminates the virtual museum into the necessity of immersive experience in the exhibition, and the new trend of developing the virtual museum in the future.

Keywords

Immersive experience; Virtual technology; Zigong salt industry history museum.

1. Introduction

With the rapid development of virtual technology, the traditional museum's dominant position has been replaced with the virtual museum, a virtual museum is developed on the basis of traditional museum, application in the field of virtual museum in our country is one of the most panoramic virtual roaming exhibition, via the web or mobile terminal to realize the real virtual roaming, touring route selection, voice annotations and video playback function, but the pure voice, explanation and the text introduced has far cannot satisfy the needs of visitors, feel a sense of how to improve the viewers and the experience, has become an important direction of the virtual museum development research. Immersive virtual museum not only broke through the limit of time and space, has adhered to the "people-oriented" concept, completely from the perspective of visitors, not only will the museum's exhibition content in the form of 3 d three-dimensional all-round, make visitors by means of immersion for virtual device, also can through the device to interact with the exhibition, provide visitors with visual, hearing, touch, immersive experience, real virtual museum of human-computer interaction.

The applied research of Zigong salt history museum based on immersive virtual technology can not only enable visitors to visit the salt history and culture thousands of miles away without leaving home, but also develop a new display method for cultural communication, which plays a significant role in promoting the development of local cultural industry. Virtual museum protects salt historical sites and cultural relics to a certain extent and solves the contradiction between the protection and development of material cultural heritage.

ISSN: 2688-9323

2. Virtual Technology

2.1. VR Technology

Virtual Reality (VR) is a new digital technology developed as a comprehensive computer graphics technology, multimedia technology, network technology, human-computer interaction technology, sensor technology, three-dimensional display technology and simulation technology. VR techniques are commonly used to as damaged or lost the digital present cultural heritage, through the information collection, computer integrated technology to simulate the virtual scene, visitors can through the keyboard, mouse operation, VR dressing equipment, body movements, voice control and other ways to interact with virtual environment and virtual cultural relic, let the visitors are no longer limited by space distance, instead, the visitors involved gain immersive. Virtual tour technology includes 3d modeling virtual reality technology based on graphics, 360-degree visualization technology based on images and hybrid virtual technology.

2.2. AR Technology

Augmented Reality (Augmented Reality, AR) is a kind of information the real world and virtual world information "seamless" integration of new technology, using computer technology to the real world to experience the real information in the form of simulation stack into the same image or space, at the same time show the real world and virtual scene information. In augmented reality shows that way, the entity of cultural relics in information acquisition and modeling rendering, make the cultural relics is three-dimensional, multi-angle display on the screen of PC/mobile terminal, visitors with VR equipment can not only observe the museum environment and full details of the exhibition of cultural relics, also can reduce the distance between the exhibition and display, the AR model of cultural relics show effect, is a static entity museum display.

2.3. Immersive Experience

In the 1970s, Chic Szentmihalyi put forward the theory of immersion, which refers to people's full attention to a certain situation when they are doing daily activities. In order to make visitors feel immersive and involved, virtual museums must establish an effective interaction between visitors and the environment and objects, so as to make visitors resonate and provide visitors with a high sense of participation and emotional feedback.

2.4. VR Devices

To realize the immersive experience of virtual museum, we must rely on VR equipment. Virtual museum sound can enhance realism to the visitors in the virtual environment touch, hand gestures and other body movements can be achieved through VR wear equipment communication and interaction, in use process, visitors through the equipment issue instructions, these movements through related instrument, such as computers, collection processing, matching the data results, and the corresponding signal to the system, to make the right feedback, visitors to complete the whole process of human-computer interaction [4]. At present, the VR system can realize immersive experience the most representative is the low VR, the low VR is the user to interact with the aid of a wearable VR headsets, user totally immersed in the visual effect of helmet display, high advantage is virtual environment experience, defect is visual environment block with reality, on behalf of the product is Facebook Oculus.

ISSN: 2688-9323

3. Research Status of Virtual Museums at Home and Abroad

3.1. Virtual Museum

Virtual museum is to build a museum is an important part of modernization, it is based on virtual reality technology and augmented reality technology, based on entity museum, all kinds of cultural relics in the information extracted, with sound, images, text of dynamic digital information to replace the traditional static display of cultural relics, and around the world via the Internet information technology [6]. Virtual museums use virtual technology to construct famous historical and cultural activity scenes, to add interest to the display of intangible cultural heritage, which is easier to be accepted by the public than the traditional visiting mode. Meanwhile, virtual experience expands the depth and breadth of cultural heritage communication. The features of virtual museums are as follows (Table 1)

Table 1. Comparison between virtual museums and field museums

	Virtual Museum	**Field museum**
Exhibition platform	network	The scene
visitors	The global Internet users	Surrounding area and some tourists
Visit the way	Virtual experience is realized through network, multimedia and virtual wearable devices	With the aid of vehicles to the site for real scene, on-site visit
The interactive way	With the help of virtual wearable devices, human-computer interaction such as vision and sound effects can be realized	People interact directly with cultural relics and people
Time	All the time, no time limit	Subject to climatic, seasonal, open hours and other conditions at the destination
Space	No boundaries, zero distance, large amount of information	Subject to limited distance, environment and other conditions, limited information
Visit the cost	Low cost (no other cost except network, computer and VR equipment)	High cost (transportation, catering, accommodation, tickets)
Social benefits	Rapidly improve the social influence and cultural communication of museums and cultures	The scope of social influence is limited
Economic benefits	Promoting the change of economic growth mode is conducive to optimizing industrial structure	Relieve employment pressure and enhance regional comprehensive competitiveness
Sustainable development	No consumption, no damage to museum resources, conducive to the protection of cultural relics	There was a certain amount of consumption and destruction of the museum

ISSN: 2688-9323

①Break the time and space limit

Virtual museum is based on the Internet for exhibition and communication. In terms of time, visitors can choose to enter the virtual museum system for sightseeing at any time, while the traditional museum visit is subject to the restrictions of the destination's climate, season, opening time and other conditions. In terms of space, physical museums are easily restricted by the conditions of space and distance, so that all exhibits cannot be exhibited, while virtual museums can accommodate and exhibit all exhibits after digitizing cultural relics.

②Strong sense of virtual museum experience

Virtual museum with the characteristics of the technology of virtual reality, augmented reality, with the aid of virtual dressing equipment, implement and cultural relics, the interaction between the virtual system can real-time feedback for visitors, can let visitors experience the field museum and panoramic virtual roaming is unable to provide the experience of feeling, and interactive entertainment feeling, provide immersive visit.

③Virtual museums are rich in exhibitions

Virtual museum USES information technology and modeling technology to store physical cultural relics in the digital form on the virtual museum platform. The number of cultural relics is far greater than the number of cultural relics that can be visited by physical museums. Visitors can visit and understand cultural relics of interest anytime and anywhere. Visitors can not only have a panoramic tour of the museum and obtain detailed information of cultural relics, but also interact with cultural relics through sound, video and other forms.

④Virtual museums have the characteristics of sustainable development

Virtual museum has the advantages of convenience, wide range and fast transmission speed, and is widely used in the fields of education, teaching, historical research and cultural communication. Virtual museums solve the contradiction between cultural heritage research, dissemination and protection. Visitors can fundamentally prevent the consumption of cultural relics by conducting research and tour through digital cultural relics, which is conducive to the protection of cultural relics.

3.2. Research Status at Home and Abroad

With the rapid development of the global economy, consumers' demand for cultural products increases, and the research on the virtual exhibition of museums also rises gradually. UNESCO put forward the 'Memory of the World' project in 1992 and promoted the digitization of cultural heritage sites around the World. In February 1995, the Museum Places of Education Permit Program (MESL), sponsored by the Getty Institute, was officially launched. Its mission is to "define the conditions under which digital museum images and information can be shared on campus networks for educational use". The Museum of Modern Art (MoMA) in New York and the TATE in London in the United States are the two museums that adopted Internet technology in the early construction of foreign art museums. They are also the art museums with the highest degree of digital exhibition development and the strongest sense of academic history. The "Virtual Temple of Egypt" exhibition project jointly completed by the United States and Canada also constructed the Temple of Egypt through 3D modeling virtual reality technology for visitors to visit and interact, which greatly enhanced the visitors' experience.

Cultural resources digitization construction in China began from 1996 to start the national digital library project, then entered the digital era and the era of experience economy, the domestic scholars generally agree that, from the Angle of virtualization, digitization of cultural heritage protection, development and dissemination of research is a kind of trend, but most of the research is still in the rendering of the model, the optimization of platform and system efficiency, etc., while ignoring the "convenient", "comfort", "practical" and "efficiency" and other aspects of the construction. Panoramic view, for example, the national Palace Museum

ISSN: 2688-9323

"Forbidden City" and "virtual the old Summer Palace " virtual exhibition system, Dunhuang academy "digital Dunhuang" virtual exhibition system, such as "Hunan museum" virtual museum, all is the use of virtual technology is used to model the building and cultural heritage, then through the network to show to the visitors in front.

It can be seen that the construction of virtual museum is the only way for the traditional museum to develop into a modern one. In addition to realizing the experience of visiting remotely and at any time, it is also necessary to consider how to improve the user experience and enhance the immersive experience of visitors from the perspective of visitors.

4. General Design of Virtual Exhibition Hall of Zigong Salt History Museum

4.1. Status Quo of Zigong Salt History Museum

Zigong Salt Industry History Museum was built in 1959. It is located in the south of Sichuan Province. It covers an area of about 3,000 square meters. Is one of the earliest established professional museum of history in our country, is China and even the whole world only salt history museum, the main collection, research, display, which is mainly composed of well salt, protection of cultural relics, history of Chinese salt industry is outstanding in China's existing nearly 2000 museums, has been awarded as national excellent De Xian Ji museum, national advanced collective, wenbo system in 2017 by formal assessment for the national museum. The cultural relics in the collection mainly include 3879 pieces (sets) of cultural relics that reflect the contracts, account books, production tools and equipment for well salt drilling, halogen extraction, halogen transportation and salt production. Due to the remoteness and isolation of the region, the dissemination and promotion of Zigong salt culture is greatly restricted, and the tourist reception of more than 80 scenic spots in Sichuan province is in a weak position.

The field visits and exhibitions of Zigong Salt History Museum are of strong historical, scientific and professional nature. For ordinary visitors, the salt history relics seem monotonous and antiquated, just like archaeology, lacking in participation and entertainment. Website's existing 360 ° panoramic navigation system is to take a panoramic view of the synthesis of real roaming technology, combined with some text, voice annotations and video broadcast show in the form of multimedia in PC and mobile terminal for the media to the public exhibition, visitors through the choice of the mouse and keyboard for scenario and switch, operating, and scene experience lack of interactive interface, the whole virtual scene of lack of experience, not active visitors choose to accept certain information, but let the visitors in the form of "indoctrination" mandatory accept information of system does not conform to the current mainstream experience to visit the exhibition, This is also the common deficiency of most virtual museums in China. Therefore, the design and construction of virtual museum should tend to be more personalized and humanized, attaches great importance to the visitor's diverse demand, visitors will be operating habits, interest, psychological characteristics such as included in the design of virtual museum, provide visitors with image, vivid, immersive viewing experience, fully mobilize enthusiasm and initiative of visitor's visit at the same time, also make the spreading of Zigong salt culture and break the limit of time and space, also be conducive to the protection of the culture of Zigong salt culture and heritage. (figure2)

ISSN: 2688-9323

Figure 1: The panorama of Zigong salt history museum

Figure 2: Zigong salt history museum 360 ° panoramic navigation interface

4.2. Overall Design of Virtual Zigong Salt History Museum

The virtual Zigong Salt History Museum consists of two parts: data and system. The data part mainly includes the architectural complex model constructed with Zigong Salt History Museum as the prototype, the cultural relics' models of well salt drilling, halogen production tools and equipment, the virtual role model controlled by visitors and the multimedia database. The system includes six parts: exhibition module, collection module, interactive tour module, popular science education module, and cultural relic inspection module and user center. The system structure of the virtual museum is shown in Figure 3.

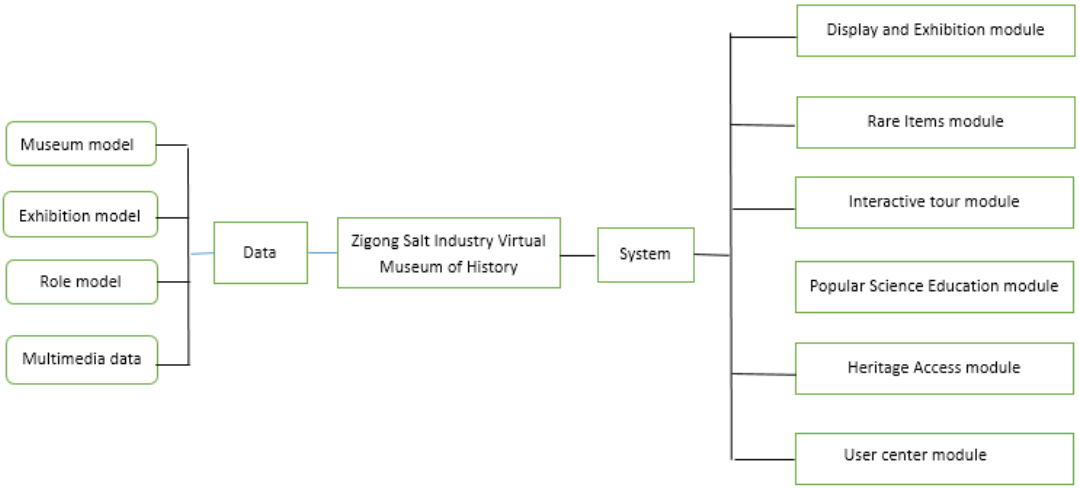

Figure 3: System structure of virtual Zigong Salt History Museum

5. Immersive Experience and Application of Zigong Salt Industry History Virtual Museum

Immersive virtual salt industry history of the museum construction mainly from the perspective of visitors to carry on the design, enhance the visitor's experience, optimize the

ISSN: 2688-9323

visitors use behavior process, at the same time to well salt extraction using virtual technology, production and use of tools of cultural relics in the image of narrative, in order to strengthen the deep understanding of visitors to the museum exhibition information. Visitors can truly observe, participate in and play in it, stimulate their interest in the tour and enhance their participation. Immersive experience into immersion perception system immersion and behavior of the system, perception system of immersion or from vision, hearing, touch, full experience, and activity system of the flow is generated by virtual technology of virtual environment and situation, need using interactive visitors by sending commands such as language, body immersion. The application of immersive experience to Zigong salt History virtual museum has the following characteristics:

①Active participation in the experience

Zigong salt history museum exhibition mainly well salt drilling, mining, transport, evaporation of production tools and equipment such as cultural relics, the construction of virtual museum should be the omni-directional arouse the curiosity of the visitors, only in this way can visitors during a visit to actively involved in the process, allowing visitors to more in-depth and comprehensive understanding and research of Zigong salt culture.

②Experience of emotional immersion

With the continuous development of virtual technology, the simple panoramic virtual tour experience has been far from meeting the needs of visitors, and will be replaced by immersive virtual museum exhibitions. Museum exhibition has the characteristics of scientific and professional, geared to the needs of people in addition to the professional researchers, and various social strata, so visitors centered immersive experience is becoming more and more important, when the design should consider many aspects at the same time visitor's senses and thirst for knowledge, and make the visitors in the virtual tour with VR equipment immersion from visual, auditory, not only can through body, touch interactions with the environment and cultural relics, such as immersive, immersion experience, and empathy with the virtual scene, continue to inspire visitors multi-sensory experience.

③Experience of multiple communication

Immersive experience based on virtual technology is mostly applied in public Spaces such as art galleries, music theaters, museums, etc., mainly in the form of multimedia, multi-channel and artificial intelligence. Implementation process is of the experience of the immersive virtual visitors wear VR devices into the virtual museum, the system provide visitors with visual, hearing, touch, taste, etc. Various sensory experience, artificial intelligence for visitors of all sorts of feelings and actions feedback make a match, the visitors by voice, facial expression, the line of sight, gestures and other body movements issued instructions, information system is a real-time feedback, repeat the above process to make visitors immersed in the virtual interaction, and finally realize the visitors and the real interactive exhibits.

6. Conclusion

Virtual museum's construction is the inevitable outcome of the development of the digital age, the characteristics of the virtual museum is to break the limitation of time and space, provide visitors tour service anytime and anywhere, and Zigong salt history of virtual museum design and construction must be from the perspective of visitors, adhered to the "people-oriented" concept, to meet a variety of needs of visitors, implement effective transfer of exhibition information, can we improve the curiosity of the visitors, to attract more visitors to understand Zigong salt culture, offers visitors from omni-directional sensory immersion enjoyment, thus, immersive virtual museum construction is bound to bring about a fashion trends.

ISSN: 2688-9323

Acknowledgements

The Project Supported by China Salt Culture Research Center of Sichuan University of Science &Engineering, a key research base of Humanities and Social Sciences of Sichuan Province (No. YWHY18-06).

The Project Supported by the Centre for Cyber Culture Studies (No. :WLWH18-27).

References

[1] Li min, Han feng. Overview of virtual reality technology [J]. Software guide, 2010, 9(06):142-144.

[2] Wang Runling. Research on the Design and Development of virtual Tourism Products based on individual Tourist Market [D]. Shandong Normal University, 2009.

[3] Zhang Aiyan, Wang Yan. Brief Analysis of Museum Display Design based on Immersion Theory [J]. Art & Technology, 2012, 31 (12):217.

[4] Li Yajuan, Wang Haifeng. Design and Implementation of Virtual Tourism System based on VR Technology [J]. Automation and Instrumentation, 2019(09):195-197+201.

[5] Pan Zhigeng, Yuan Qingshu, Chen Shengnan, Zhang Mingmin. Research and Progress of Digital Display and Interactive Technology of Cultural Heritage [J]. Journal of Zhejiang University (Science Edition), 2020(03).

[6] Zhang Qiulian, Li Han. Exploration of the application of 360-degree Panoramic Display in virtual Museums [J]. Journal of National Museum of China, 2011(9):154-56.

[7] Peng Dongmei, Pan Lusheng, Sun Shouqian. Digital Protection -- A New Approach to the protection of Intangible Cultural Heritage [J]. Chinese Calligraphy and Painting, 2006(4):193-195.

[8] Blackaby J, Sandore B. Building Integrated Museum Information Retrieval Systems: Practical Approaches to Data Organization and Access [J]. Archives & Museum Informatics, 1997, 11 (2): 117-146.

[9] Sun Dani. Theory and Construction of European and American Virtual Museums [J]. Fine Arts, 2020(06):20-26.