Research on the Space Interaction Design Strategy of Shanghai Red Cultural Stadium under the Background of Intelligent Communication

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Abstract— With the development of modern science and technology, more and more cultural venues and museums have opened up digital, intelligent, and information development. In the context of current intelligent communication, the interactive space design of cultural venues plays a vital role in the spread of Shanghai's red culture. However, the design of red cultural venues is affected by factors such as the hysteresis of technology application, the limitation of communication effects and the homogeneity of exhibition methods, and has not given full play to its unique significance and role. In order to meet the development of the era of intelligent communication and meet the needs of the new generation of audiences in the red culture, the spatial interaction design strategy of Shanghai Red Culture venues should be innovative in terms of upgrading intelligent technology, deepening intelligent communication, optimizing user experience, and digging into the spiritual core.

Keywords— Intelligent communication; Red culture; Venue construction; Interaction design.

I. INTRODUCTION

As the birthplace of the Communist Party of China, Shanghai is not only the birthplace of the Chinese revolution, but also the root of China's red culture. In the process of launching the "red culture" brand in Shanghai, as the spiritual home of Shanghai's red gene, the red cultural venues, its spatial interaction design strategy is particularly critical. In the context of intelligent communication with the continuous popularization of 5G base stations and the expansion of VR technology to offline locations, the construction of Shanghai red cultural venues is important for making good use of Shanghai red cultural resources, inheriting red cultural genes, telling red cultural stories, and polishing red cultural landmarks. A good experience of red culture plays a vital role. This article attempts to start from the development background and user needs of Shanghai red cultural venues, analyze the current red cultural venues to be solved urgently, and combine the influence and role of intelligent communication on the construction of cultural venues, and finally put forward the spatial interaction design of Shanghai red cultural venues Innovation strategy.

II. THE DEVELOPMENT BACKGROUND OF SHANGHAI'S RED CULTURAL VENUES

1. The resources and advantages of Shanghai Red Culture

Red culture is a unique spiritual and cultural phenomenon in China. Its material manifestations include red cultural relics, red historical buildings and venues, and revolutionary war sites. As the birthplace of the Communist Party of China, Shanghai can be called the starting point of China's red culture. According to research, "Shanghai has more than 1,000 red cultural venues and sites"[1], such as the site of the First Congress of the Communist Party of China and the editorial office of "New Youth" The former site, the former site of the central organ of the Chinese Socialist Youth League, and the former residence of Song Qingling. As the birthplace of the red culture, Shanghai not only has abundant red resources, but also because of its unique geographical location and economic status, the revolutionary culture and the Shanghai style culture can develop together. It has both historical and contemporary characteristics and advantages.

2. New media development enhances the effect of red culture communication

The advent of the new media era has made the red culture in the history books "live". Through the promotion of new media and short video platforms such as Weibo, WeChat, and TikTok, the dissemination of Shanghai's red culture presents a comprehensive, comprehensive Three-dimensional, rich features. In the era of traditional media, the dissemination of red culture relies more on linear dissemination, and the efficiency is generally low. The development of the Internet has broadened the dissemination path of red culture, so that the popularization of red culture is no longer restricted by region. From social communication, big data communication to the current intelligent communication, red culture not only exists in paper books, but is also active in screens, fingertips and algorithms, radiating new vitality.

3. Research on intelligent interactive technology in the field of space design of cultural venues

After entering the 21st century, with the rapid development of digital technology, artificial intelligence technology and virtual reality technology have become more mature, and intelligent interactive technology has entered the field of space design. Scholars at home and abroad have conducted various studies and explorations on the spatial interaction design of cultural venues. Interaction design expert Terry Winograd once described interaction design as "the design of human

communication and interactive space"[2], and believed that interaction design is the communication and interaction between people, things and things, and people and things. At present, interaction design has broken through the plane interaction between people and things, and opened up an interactive way that focuses on immersive experience. Li Wei and He Yongjun pointed out in *The Construction of Digital Technology for Contemporary Display Design*, "Digital technology can break through the constraints of the material world and design expression barriers, and effectively enhance the visualization of information." [3] In the era of intelligent media Today, in order to achieve the purpose of benign interaction between users and red culture, the display method of red cultural venues will inevitably develop in the direction of digital interaction, in order to better inject vitality into red culture.

III. TECHNOLOGY APPLICATION OF INTELLIGENT COMMUNICATION IN SPACE INTERACTION DESIGN

The introduction of intelligent interactive design into the construction of the red stadium can convey the information and connotation of revolutionary culture in a more visual and humane way. The traditional exhibition methods of venues are mostly based on the internal and external structure of the building, and display the content itself through two-dimensional humanistic environmental information. In recent years, various concepts based on Internet digital applications have emerged one after another. Big data, cloud computing, virtual reality and other technologies have expanded the space for the intelligent interactive design of red cultural venues. At present, the intelligent technology applications of spatial interaction design in cultural venues mainly include virtual reality technology, human-computer interaction technology and artificial intelligence technology.

1. The use of virtual reality technology in cultural exhibition halls

The virtual reality technology of the pavilion is designed for the perception system and behavior system of the visitors. The virtual reality equipment is used to stimulate the senses of sight, hearing and touch to realize the interactive behavior of the user and the virtual environment. The head-mounted display uses an optical system to amplify the image of the miniature display screen, and is paired with stereo headphones to provide users with immersive sound effects and achieve a strong immersive effect; the exoskeleton mechanical glove Dexmo can help users synchronize their hands in the display Actions to enhance the user's sense of experience in the virtual environment.

2. The use of human-computer interaction technology in cultural pavilions

Human-computer interaction display is an important field in virtual reality applications. The interactive methods mainly include: "immersive digital interactive display, enhanced digital interactive display, and physical interactive virtual display"[4]. Immersive digital interactive display is divided into two interactive modes: full immersion and semi-

immersion: the full immersion uses a head-mounted display to comprehensively utilize the multiple senses of the human body, enabling visitors to have a comprehensive interactive experience of the pavilion environment; Semi-immersive does not create a virtual environment, but uses Kinect motion sensing equipment to help visitors interact with exhibits through the screen. Augmented digital interactive display is to project three-dimensional virtual images of exhibits and scenes in the real environment through augmented reality technology. Different from the immersive virtual reality interactive display method, in the augmented reality interactive display, visitors can view the three-dimensional images of the exhibits with the naked eye without using any wearable equipment. The mutual complement of virtual reality and augmented reality technology can better enhance the interactive display effect of cultural pavilions. The physical interactive virtual display method is to design the appearance of the interactive device into the physical shape of the exhibit, and realize the interactive experience through the manipulation of the physical interactive device by the visitors. This display method enables users to more intuitively understand the physical information of the exhibits.

3. The use of artificial intelligence technology in cultural pavilions

Artificial intelligence technology and computer Internet technology are combined to jointly complete the online digital interactive design of the cultural pavilion. Online digital interactive design mainly includes two forms: three-dimensional virtual space display and web embedded three-dimensional display. Three-dimensional virtual space display uses three-dimensional software to create virtual space and display three-dimensional objects. This space display form can simulate the spatial structure and perspective transformation in reality, and has a high degree of simulation, interactivity and immersion. Visitors can freely visit in the virtual interactive space and experience the same exhibition environment as the cultural pavilion. Web page embedded 3D display uses 3D technology to embed the visitor into the web page, and visitors can rotate the viewing angle, enlarge the shape of the exhibits, and understand the details of the exhibits through the operation of the web page.

IV. PROBLEMS THAT NEED TO BE SOLVED IN THE SPATIAL INTERACTION OF RED CULTURAL VENUES

1. Red cultural venues have mostly static content and poor interactive design

The development of intelligent technology has made the interactive design of cultural venues move from ideal to reality. A batch of emerging cultural exhibition spaces with immersive interactive experience have been born. However, due to the unique weight and spirituality of red culture, most red cultures design of the venue remains at the stage of ordinary exhibition display and simple human-computer interaction. Traditional display methods are dull in design, lacking in experience, and are seriously out of touch with the intelligent age; at the same time, the space interaction technology of a large number of red cultural venues is limited

to the interior of the venue, and it fails to effectively connect with the smart phone terminal, and it can neither vividly display the red culture national spirit contained in it is also difficult to attract young visitors of "Generation E". Therefore, the red cultural venues urgently need to develop more modern, vivid and diversified human-computer interaction methods.

2. Red cultural venues have insufficient new media operation capabilities and limited cultural dissemination

Compared with museums with a higher "existence" in social media, some red cultural venues are relatively lacking in the operation of new media platforms such as Weibo, WeChat official account, short video, etc., and the ability to popularize red cultural knowledge remains in the graphic era, online smart viewing methods such as digital museums, 360°VR panoramas, and real-world simulations have not been widely used. The awareness of intelligent communication is not strong, the update frequency is low, the content style is not unique enough, and the red culture is not Innovative display. In addition, the communication channels of the red culture are relatively outdated. The community communication and algorithm-recommended communication led by artificial intelligence technology have not been widely used in the publicity of the red culture.

3. Insufficient connection between red culture and city impression, lack of local cultural characteristics

The questionnaire survey results of the "*Research on the Interpretation of the Value of Shanghai's Red Cultural Heritage Based on 3D Visualization Technology*" showed that the national respondents' perception of Shanghai is mainly concentrated in the "China Financial Center", "Sino-foreign Economic and Trade Exchange Center", and "Shanghai Pai" "Cultural birthplace" and other modern city labels, and the respondents who recognized Shanghai as a "red cultural gathering place" "not more than 30%"[5], which is a big gap with the actual situation of Shanghai with more than 1,000 red cultural sites . The survey results show that the display methods of Shanghai's red cultural venues tend to be homogenized, the characteristics of the local red culture are insufficient, and the main line of the red cultural context is refined and concentrated. This shows that the current city impression of Shanghai and its own red cultural heritage cannot be organically connected.

V. THE INTERACTIVE DESIGN STRATEGY OF SHANGHAI RED CULTURAL VENUES BASED ON INTELLIGENT COMMUNICATION

In the context of the continuous promotion and popularization of intelligent communication technology, the spatial interaction design of Shanghai Red Cultural Stadium should also move towards the direction of intelligentization along the law of technological development.

1. Make full use of smart technology to strengthen terminal support

In recent years, intelligent interaction technology has begun to be used in exhibitions. However, the application of artificial intelligence technology to the spatial interaction design of red cultural venues is still at a relatively preliminary stage and needs to be further improved. First of all, an intelligent analysis system for red cultural resources information should be established, and artificial intelligence technology should be used to more accurately analyze visitors' preferences for red culture, so as to achieve one-to-one personalized services for different cultural venues for the visitors. Provide more suitable and exclusive information. Secondly, the establishment and popularization of massive data support systems makes the intelligent display of red cultural venues imminent. Artificial intelligence-based red cultural databases, information base stations, and cloud storage spaces are essential foundations for red cultural venues to survive digitally. As an international city, Shanghai is already at the forefront of China in terms of intelligent technology. Therefore, the intelligent construction of Shanghai's red cultural venues should also give full play to its technical advantages and take the lead in taking the lead in the key step of deep integration of red culture and intelligent technology. Finally, an intelligent screening system for red cultural resources is also indispensable. As a virtual world, Internet space inevitably has the characteristics of information flooding and difficult to distinguish between true and false. Through an intelligent information screening and evaluation system, false information in the network world can be effectively filtered, and the authenticity of the red culture is protected. Spread and build a clean cyberspace.

2. Give full play to the advantages of intelligent network communication and accelerate the process of online intelligent interaction of red culture

In the era of smart media, the red cultural information conveyed by traditional media such as newspapers, magazines, television, and movies can no longer meet the spiritual and cultural needs of the audience. The widely accepted emerging media such as Weibo, WeChat, and short video apps should assume the red culture. The important task of communication. The data analysis, personalized recommendation, immersive interaction and other communication features of the intelligent network can fully integrate the communication advantages of text, images, audio, and video, attract the attention of the audience, and stimulate new spiritual and cultural needs. In the past, the red culture spread by traditional media, after taking the express train of new media and intelligent network transmission, the visual scenes and special effects presented will be more vivid, which will not only help increase the charm of red culture, but also be effective Enhance the spread of red culture. In addition, intelligent networks should continue to strengthen the social attributes of the Internet, enhance emotional bonds, and reduce the barriers to the spread of red culture. Various red cultural venues can develop a common smart red cultural app software through artificial intelligence technology, so that red cultural scenic spots can be scattered to assembled, achieving the effect of connecting dots, and adding social elements such as likes, comments, sharing, and friends. Break the gap between geographic location and online and offline. In this way, it can not only

exert the huge information gathering ability of the intelligent network, but also enable the red culture to achieve an exponential growth effect in interpersonal communication, thereby expanding the coverage and radiation of the red culture.

3. Enhance the spatial immersion of the red stadium and optimize the intelligent experience of users

The in-depth participation and perception of the red culture can help the audience better understand the historical content of the red culture and understand the revolutionary spirit during the interaction process. To cultivate the user stickiness of visitors to the red culture, it is necessary to strengthen the attractiveness of the interactive design of the red culture venues. First of all, you can start from the perspective of vision and hearing, use artificial intelligence technology, integrated visual effects, image processing, speech synthesis and other means to interpret the red cultural story, and dynamically present the originally static characters, cultural relics, and history. The immersion of the space directly hits the sensory experience of visitors, arouses users' interest in red culture, and adds rich emotion to the content of red culture. In addition, it is necessary to tap the potential psychological needs of visitors to the red cultural venues, and optimize the contextual experience of human-computer interaction through a variety of intelligent means, and to amplify users' curiosity for red culture. For example, the use of artificial intelligence technology to create virtual perspectives of characters, reproduce historical figures and historical facts, realize the "face-to-face communication" between visitors and historical figures of interest, and experience the magnificent waves of revolutionary history. In this way, it can not only meet the individual needs of visitors to the red cultural venues, but also enable visitors to understand revolutionary culture and understand the true meaning of patriotism through immersive experience.

4. Dig deep into the spiritual value of red culture, and accurately design targeted intelligent interaction methods

The red culture was born during the period of China's revolutionary war and socialist construction. It is the immortal spirit extracted from countless revolutionary martyrs and great people in modern China during the bullying of imperialist powers and the torment of semi-colonial and semi-feudal society. Culture permeates the core of the Chinese nation's spirit-patriotism, and inspires the Chinese people to step out of

the years of backwardness and humiliation, and pass through one difficulty after another, which has special spiritual significance for China. Therefore, the intelligent dissemination of red culture should not simply stay at the stage of technical assistance. Instead, it should focus on the spiritual core and use intelligent technology to design red cultural venues that integrate science and technology and ideology, so as to explore the era of red cultural spirit. characteristic. Artificial intelligence uses data analysis, keyword capture, information integration and other technical advantages to understand the emotional needs of the audience to the greatest extent, and better explore the deep meaning of the red culture, and finally realize the personalized value communication to the audience and let the red culture spiritual value of is better demonstrated in the intelligent age.

VI. SUMMARY

In the era of smart media, the integration of the red culture and the interactive design of venue space requires a commonality between spiritual and material aspects. How to make use of intelligent interactive methods to make Shanghai Red Culture leap over the years and make visitors relive the original touch is an important topic in the intelligent construction of Shanghai Red Culture venues.

REFERENCES

[1] Kong Liang, Gao Fujin: The Characteristics, Advantages and Research Review of Shanghai Red Cultural Resources, Shanghai Culture, Issue 10, 2020, page 15..
[2] Terry Winograd, Han Ke (translation): The Art of Software Design, Machinery Industry Press, published in 2001, page 71.
[3] Li Wei, He Yongjun: The Construction of Digital Technology for Contemporary Display Design, Art and Design, Issue 6, 2015, p. 214.
[4] Achintya·K·Bhowmik (Editor-in-Chief), Wen Xiuying, Dong Yiqing, Hu Bing (translated): Human-Computer Interaction Technology under Realistic Interactive Artificial Intelligence, China Machinery Industry Press, 2018, p. 125.
[5] Ren Wei, Chen Xianhong: Research on the Value Interpretation of Shanghai's Red Cultural Heritage Based on 3D Visualization Technology, Urban Architecture, Issue 17, 2020, p. 122.