

# Research and practice of digital media interaction design in the field of museum exhibition

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**Abstract:** Museums have diverse ethnic culture and special cultural relics environment. However, due to the difference of visitors' cultural awareness and the professional existence of cultural relics background information, quite a number of visitors, especially children, have a strange sense of cultural relics and cultural background. This paper describes the interactive design of digital media art used in museum exhibition, analyzes the impact of interaction design on museum exhibition, discusses the application value of digital media interaction design in the field of museum exhibition, and starts from the aspects of multimedia projection technology, multi-touch interaction technology, ultra-high definition giant screen projection technology, virtual reality technology, etc. To explore the application ways of multi-digital media interaction design in museum exhibitions, and enhance the interactive and narrative of museum exhibitions.

**Key words:** digital media; Interaction design; Museum exhibition

## Introduction

In the digital age, the application and promotion of digital media technology has brought new opportunities to the transformation of museum exhibition mode, while the traditional museum exhibition mode has been difficult to meet the needs of the audience. In order to give full play to the value function of museums, museums should make innovative use of museum exhibition methods, adopt advanced interactive design means, stimulate the audience's multiple senses, activate cultural relics, and present historical and cultural information in an all-round way.

## 1. Overview of interactive design in museum exhibitions

A museum is a microcosm of regional and urban culture. People can quickly understand the history of the city through visiting the museum. In the new era, in order to let the audience in the limited venues, real and intuitive contact with history and culture, access to massive cultural information, the museum needs to pay attention to the actual experience of visitors, adopt more advanced exhibition means, stimulate the audience's touch, hearing and vision. At present, digital media technology and museum exhibition are developing towards integration, and many digital media technologies are applied in the field of exhibition and presentation. The concept of interaction design emerged in the 1980s. It is a discipline that focuses on interactive experience and designing artificial behavior systems. In terms of design goals, interaction design focuses on improving user experience, requiring relevant personnel to adhere to the people-oriented concept and improve the usability of design. In the field of museum exhibition and presentation, through the application of interaction design, relevant personnel can combine the interactive relationship between people and the exhibition environment, people and exhibits, introduce digital interactive devices, so that the audience can role-play and touch operation to achieve the goal of interactive and experiential visit. In the interactive design process, relevant personnel can deeply analyze the audience's behavior logic, introduce novel experience forms, and match with gorgeous visual presentation methods, which can not only give full play to the museum's display function, but also enhance the audience's interest, experience and participation.

## 2. The application value of digital media interaction design in the field of museum exhibition furnishings

### 2.1 Improving the comprehensiveness of collection display

In the exhibition work, cultural relics information is presented in an all-round way through the use of three-dimensional models and rotating display, so as to facilitate the audience to enjoy the exhibits or cultural relics from different angles. For the previously invisible cultural relics, the museum can also use virtual reality technology to show the external and internal structure of the objects. At the same time, with the help of AI restoration technology, damaged cultural relics can also be virtually restored, showing the content as a whole and bringing good visual feelings to the audience. For example, Nanjing Museum's digital interactive project "Three Friends Plum Vase" (see Figure 1) uses three-dimensional models to reshape cultural relics, and adds interactive buttons, visitors can change and rotate the Angle, a comprehensive view of the porcelain, through the interactive buttons to obtain information about the decoration on the porcelain, to get a diversified visual experience.



**FIG. 1 “MingHongwu · Yamlihong Three Friends Plum Vase” digital interactive project Nanjing Museum**

### 2.2 Enhance the audience’s interaction and participation

Compared with traditional media presentation methods, interactive design based on digital media has stronger participation and interaction. It creates an interactive relationship between people and exhibits, and enables visitors to get more information with the help of digital equipment. For example, according to the needs of visitors and the characteristics of cultural relics exhibition, the comprehensive use of voice recognition, image recognition, motion capture and other technologies to promote the audience to establish a human-computer interaction relationship, so that they can enter the era of the exhibits, feel the culture and history, and improve the effectiveness of exhibition design. In the traditional museum exhibition, the audience can only obtain the cultural relic information from the visual, through the use of digital media technology, the museum can give visitors tactile and auditory information, to bring a variety of sensory experience. With the help of audio-optical technology, museums can create virtual worlds and Spaces and create virtual scenes, so that visitors can enjoy the immersive three-dimensional viewing experience. At the same time, based on the support of digital media technology, the museum can add a series of digital equipment to support the audience to ride the mobile seat, coupled with surround sound and three-dimensional virtual situation, the audience’s multiple senses will receive the stimulus response, and get the sense of immersion and authenticity experience.

### 2.3 Improving the display effect of details

In the museum exhibition, through the use of digital media technology, museums can systematically collect and organize cultural relic information, and create digital cultural relic models with the help of professional information. In the cultural relics exhibition, the audience can manipulate, rotate and enlarge a digital cultural relic by touch, see a certain part of the cultural relic in detail, and clearly understand the cultural relic pattern and texture. For some special cultural relics, they can be digitally restored, so that the audience can deeply observe the details and connotations of the cultural relics, and appreciate the engraving and seal details of the exhibits. For example, painting and calligraphy cultural relics, through the use of digital media technology, the museum can scan and restore the painting and calligraphy works in high definition according to the 1:1 ratio, alleviate the contradiction between the exhibition of cultural relics and the protection of cultural relics, and improve the display effect of details.

## 3. Digital media interactive design in the museum exhibition of the application of methods

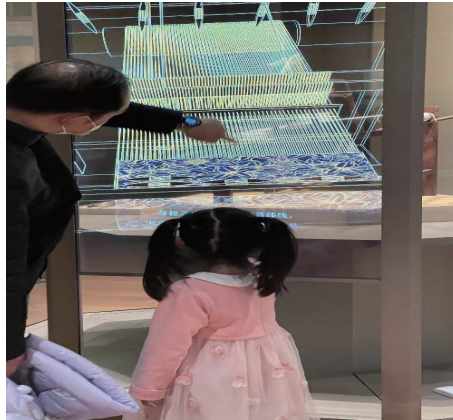
### 3.1 Multimedia projection technology exhibition

Under normal circumstances, multimedia projection technology needs the support of multiple channels and multiple projectors. Only by fully configuring the projector system to ensure the image resolution and size can we effectively restore the cultural relic images and bring visitors a shocking experience. The museum has a rich variety of historical and cultural heritage, limited by the environment and space restrictions, it is difficult to use the traditional way of display, to show the audience the full picture of cultural relics, it is not easy for them to understand the connotation, resulting in poor visiting experience. In Guangxi Museum of Nationalities, in addition to static exhibits, the exhibition hall is also equipped with modern sound and photoelectric technology to connect national culture with science and technology, and bring dynamic viewing experience to the audience. Through the use of multimedia projection system, the museum combines typical graphics and text introduction, and projects the landscape of “Zuojiang Huashan Rock Painting” on the picture to attract audiences of different ages.

### 3.2 Multi-touch interactive technology exhibition

In museums, multi-touch interactive systems are usually composed of touch displays, screen devices and touchpads. Visitors can perform sliding, clicking and touching operations to achieve accurate control functions. In the traditional exhibition mode, museums usually use graphic typesetting style to present cultural relics information beside cultural relics, and the information content is limited. Through the use of digital interaction design, the staff can systematically store the cultural relics information, so that the audience can understand the cultural relics information in detail through the touch screen and sliding screen, which can not only improve the efficiency of viewing, but

also leave a deep impression on the audience. For example, Suzhou Museum's transparent interactive screen "Su Embroidery Loom", each touch point can trigger a detailed text to introduce the use of the structure, coupled with the transparent screen can allow the audience to observe from different angles, this intelligent and interactive way of exhibition, to a great extent, mobilize the audience's initiative to watch.



**FIG. 2 "Su Embroidery Loom Transparent Screen Interactive Display Project" Suzhou Museum**

### 3.3 Ultra high-definition giant screen projection technology exhibition

The museum has the functions of protection, collection and exhibition. In the process of exhibition, in order to avoid the damage of cultural relics, museums usually place important cultural relics in exhibition cases. Although they can play the role of protecting cultural relics, they cannot enable visitors to appreciate cultural relics in detail and intuitively. Especially some cultural relics that are too small or too large, the audience can only look down and up to watch, it is difficult to understand the whole cultural relics in an all-round way. Based on the support of ultra-high-definition digital display and giant screen projection system, the museum can not only present a broader vision and diversified content, bring people a stronger visual impact, but also solve the problem of insufficient display space. In the Shanghai World Expo exhibition, the pavilion used the giant screen projection equipment to completely present the Riverside Scene during the Qingming Festival, integrating the cultural relics exhibition with digital media technology organically, so that people can enjoy the tiny face of the city in the picture and understand the cultural charm of the Qianlong flourishing era.

### 3.4 Virtual Reality technology exhibition

Virtual reality technology is an auxiliary technology based on virtual reality equipment. By using virtual reality technology, museums can restore cultural relics and provide virtual reality experience equipment to visitors, so that they can fully immerse themselves in cultural relics and get a real viewing experience. On this basis, the museum can also use augmented reality technology to connect the virtual world with the real world information, better present the virtual information, and bring the audience a closer experience to reality. In the Museum of Modern Art in Montreal, Canada, the designer uses virtual reality technology to recreate the life world around the work "Penetration". Visitors wearing electronic devices can enjoy watching the insects, plants and light spots around them, generating a sense of action activities and virtual space interaction.

## 4. Conclusion

To sum up, in the new era, digital media technology has entered the public's vision. How to make full use of digital media interaction design and innovate museum exhibition display forms has become an important issue for the sustainable development of museums. With the support of digital media technology, by adopting high-tech equipment such as virtual image, interactive cinema, touch screen and audio-visual technology, museums can create dynamic exhibition environment, present natural landscape, cultural landscape, material and intangible cultural elements in an intuitive and imaginary way, enhance the narrative effect of exhibition, and establish interactive relationship between exhibits and people. Enrich the audience's visiting experience and enhance the viewing value of the exhibition.

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Jiangsu Zhe Social Science general project "Research on Museum Digital Cultural and Creative Design Based on Interactive Experience" project number: 2022SJYB0656

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