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Original Paper

Research on the Intervention of Interaction Design in Digital Media Exhibition Design

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Abstract

With the rapid advancement of information technology and the increasing prominence of mass consumer culture, exhibition design is undergoing a profound transformation. Traditional static exhibition models are no longer sufficient to meet contemporary audience expectations, leading to the rise of new media-driven interactive exhibition formats. Interaction design plays a pivotal role in bridging the gap between audiences and exhibits by facilitating multi-sensory, multi-layered, and immersive experiences. This study examines the evolution of exhibition viewing in the digital media era and establishes design principles that enhance interactivity. Through an analysis of case studies from the past three years, the paper explores the core components of interaction design in exhibitions: interaction object design, interaction behavior design, and interaction feedback design. This research identifies emerging innovations and technological advancements that shape the future of exhibition design. The findings offer unique cross-disciplinary insights and propose a forward-looking perspective on the integration of AI, multi-sensory engagement, and adaptive interactivity in future exhibition environments.

Keywords

Interaction Design, New Media Exhibition, multi-sensory Experience, Human-Computer Interaction, AI-driven Interactivity

1. Evolution of Exhibition Viewing in New Media Design

1.1 From Passive Reception to Active Engagement

Traditional exhibition models rely on unidirectional information dissemination, where audiences passively absorb exhibit content with minimal engagement. In contrast, new media exhibition design integrates interactive technologies that transform passive viewing into dynamic, participatory experiences. Audiences are encouraged to explore exhibit information, provide feedback, and form

meaningful connections with the content, fostering an immersive interaction.One notable example is “The Van Gogh Experience” (2022), a traveling digital exhibition that uses large-scale projections and interactive floors to immerse audiences in Van Gogh’s works. The 40-minute looped presentation relies on state-of-the-art video mapping technology, and is coupled with projections on the floor ,visitors can walk through digital paintings, interact with animated brush, to create the impression of being enveloped in the art.

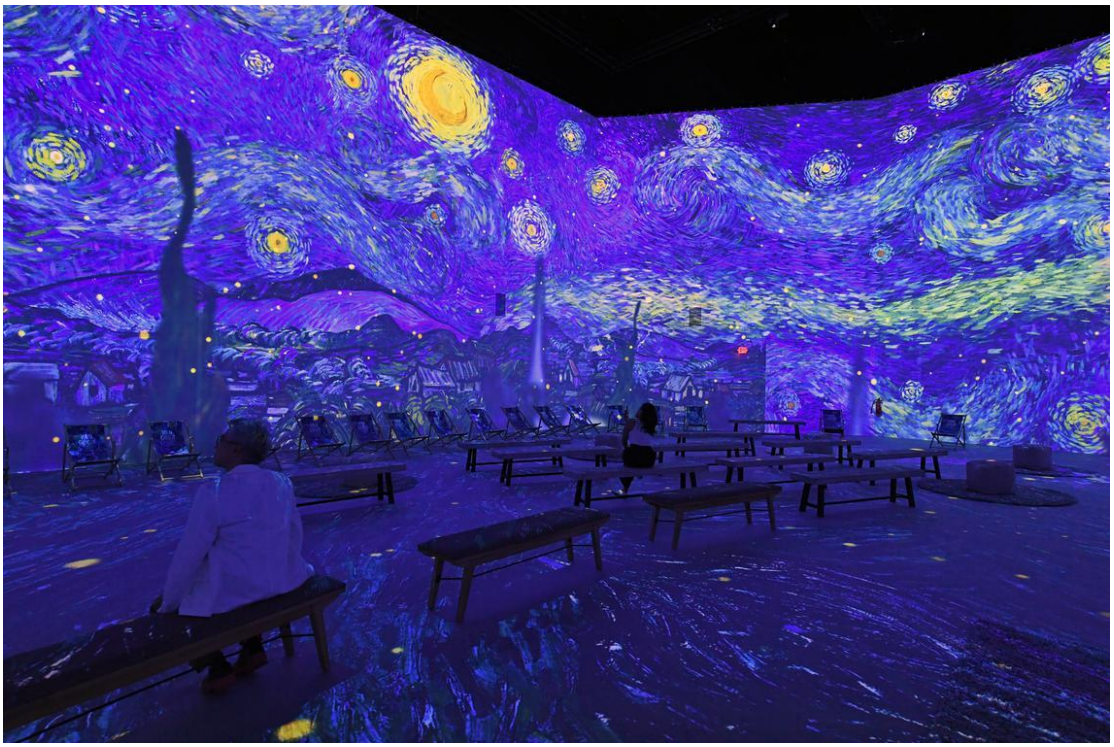

Figure 1. Van Gogh Exhibition: The Immersive Experience

1.2 From One-Way Communication to Reciprocal Interaction

Conventional exhibition formats prioritize content presentation over audience participation. New media exhibition design shifts the focus toward two-way or multi-directional communication, fostering a collaborative dialogue between audiences and curators. This participatory approach enhances user engagement and satisfaction.The “Relational Gestures” by Sougwen Chung at HOFA Gallery， 2023.Chinese-Canadian artist Sougwen Chung, recognized as a 2023 TIME100 AI honoree, presented works that explore human-AI collaboration. The exhibition showcased a blend of physical paintings, digital videos, augmented reality sculptures, and immersive media installations. Chung’s innovative practice involves partnering with AI-powered robots to create art, exemplifying the synergy between human creativity and machine learning.

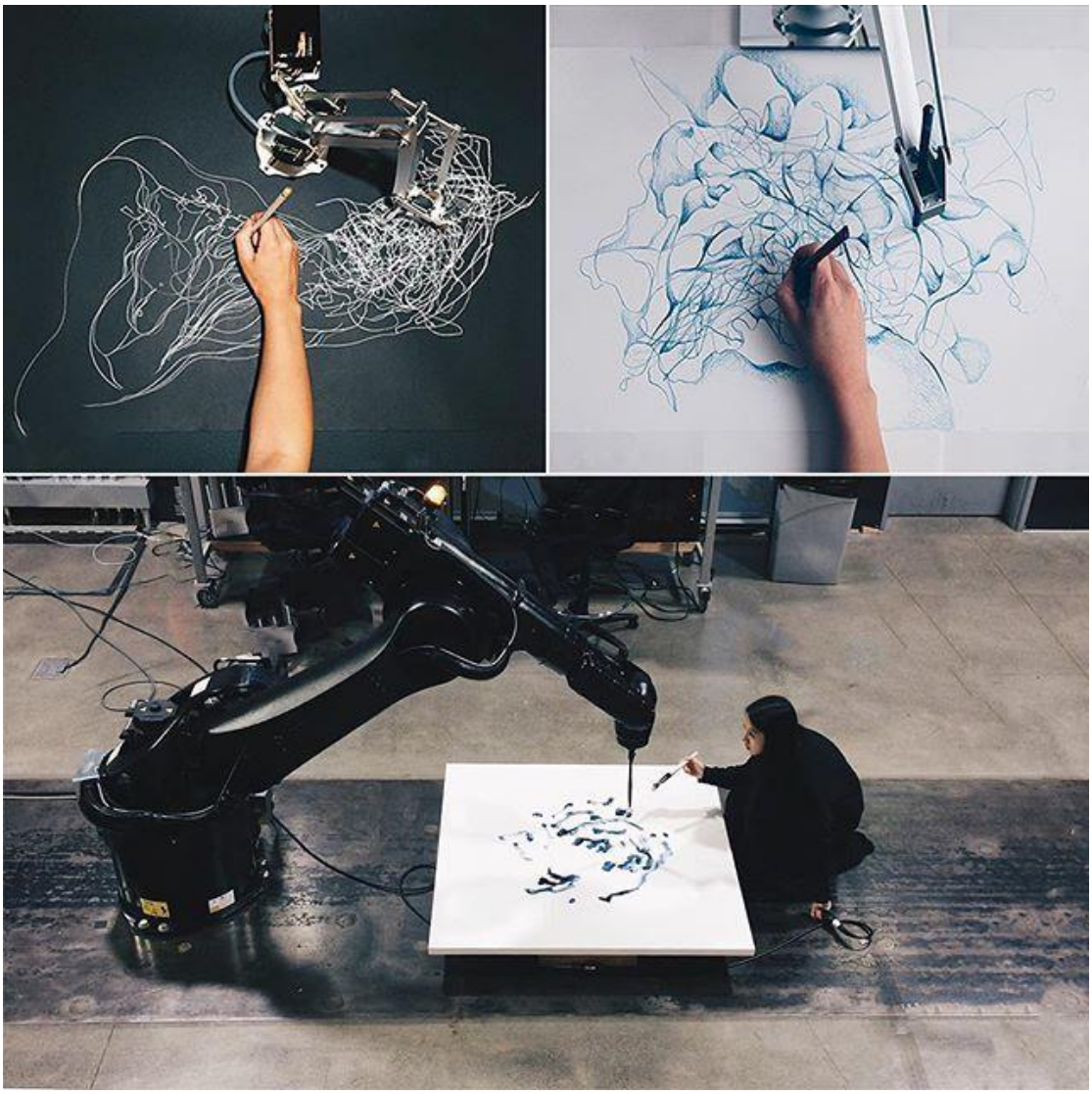

Figure 2. Sougwen Chung co-creates with Multi-robotics Through Biosensors

1.3 From Single-Sensory Input to Multi-Sensory Immersion

Traditional exhibitions predominantly rely on visual and textual narratives, limiting engagement and accessibility. New media exhibition design incorporates multi-sensory elements—sound, lighting, digital projections, and haptic feedback—to create a more immersive and memorable visitor experience. For example, The *2023 Ars Electronica Festival* in Austria showcased an interactive installation where visitors used VR headsets, scent-emitting machines, and responsive surfaces to experience data visualization through multiple senses. This case highlights the increasing importance of integrating touch, smell, and sound into exhibitions.This expansion of sensory inputs deepens audience involvement and enhances content comprehension.

2. Characteristics of New Media Exhibition Design

2.1 Spatial Expansion

New media exhibition design transcends static spatial constraints, enabling dynamic and adaptive exhibition environments. Through interactive installations and projection mapping, interactive installations have extended exhibitions beyond traditional venues. “The TeamLab Borderless” exhibition . The entire art space is essentially one large canvas featuring over 50 artworks, many of which flow and move freely between the various sections. Once inside the facility, there are no set walking routes nor clear cut entrances or exits. Like the artwork, visitors are encouraged to just go with the flow. Some artwork may look repeated to the uninitiated, but it is an expression of the borderless nature of the museum, in which artworks crossover or spill into and interact with one another.

Figure 3. Universe of Water Particles on a Rock where People Gather at Team Lab Borderless Exhibition

2.2 Intangible Exhibition Content

While traditional exhibitions emphasize tangible artifacts, new media exhibition design often revolves around abstract themes and conceptual storytelling. Compared to its sister exhibition teamLab Planets in Toyosu, which is space and universe themed, Borderless focuses on nature and the elements. As such, visitors can expect to see and interact with flowers, animals and element-inspired artwork. Additionally, the specially formulated scents in specific sections of the museum also ensure that the immersive experience goes beyond sight, touch and sound, but also includes smell.

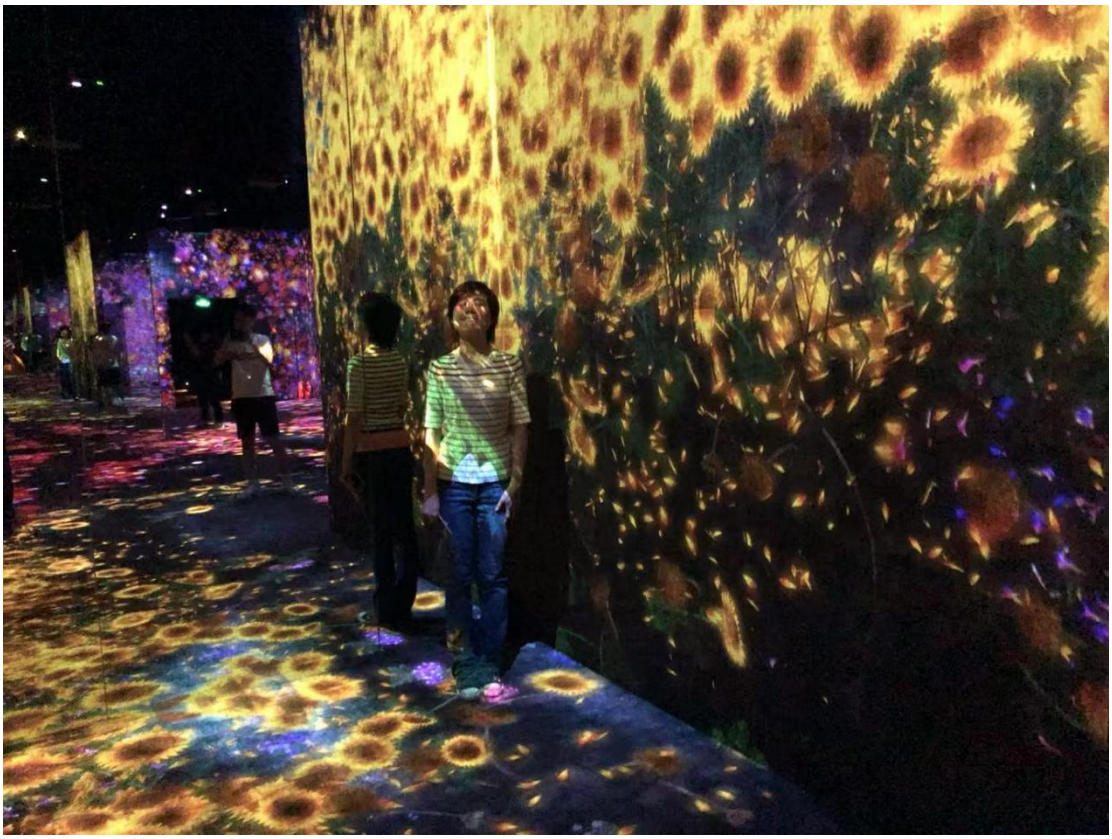

Figure 4. Author's selfie at TeamLab Borderless Exhibition

2.3 Interaction-Centric Design

A defining characteristic of new media exhibition design is its prioritization of human-centered interaction. The primary objective is to facilitate meaningful exchanges between audiences and exhibits, transforming exhibition spaces into interactive environments. Interaction is now central to exhibitions. “The new TeamLab Borderless 2024”.There is a tea house inspired by the traditional tea ceremony for visitors to drink tea, in which digital flowers bloom in cups of tea and scatter when no tea is present. This taste experience makes a visit a complete sensory experience, and further allows visitors to create their personal work of art.

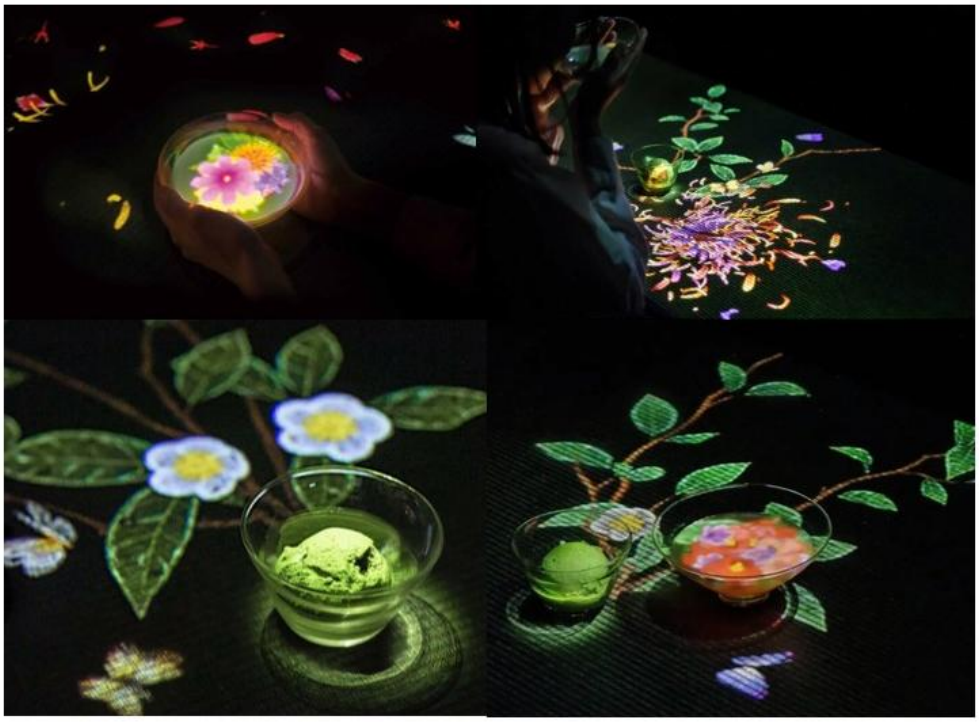

Figure 5. Interactive tea House Experience at TeamLab Borderless Exhibition

3. Principles of Interaction Design in New Media Exhibitions

3.1 Instinctive Interaction

Intuitive interaction design ensures that audiences engage with exhibits effortlessly. Natural interaction mechanisms, such as touchscreens and motion-sensing technologies, enable seamless information retrieval without imposing cognitive strain. These interaction methods mirror familiar real-world behaviors, enhancing accessibility and usability. For example, the use of multimedia touch screen in the new media display enables people to obtain information by touching their fingers, zooming, stretching, moving and other operations. These technologies enable people to obtain information about exhibits only through their daily behavior, increase the interactivity and interest of the cognitive process, reduce the cognitive burden of the interactive process, and enable the audience to smoothly obtain the exhibition experience in a natural and relaxed atmosphere.

3.2 Emotional Engagement

Interactive exhibition design should evoke emotional responses, fostering deeper audience connections. Emotional interaction design incorporates sensory stimuli, behavioral responses, and environmental ambiance to create immersive experiences. By engaging multiple cognitive and emotional faculties, exhibitions can create more profound and lasting impressions.From the perspective of design elements, emotional interaction design mainly has three types of elements: (1) sensory elements, which mainly include five types of elements: vision, hearing, touch, smell and taste; (2) behavioral elements, which mainly include language, sound, movement and other elements; (3) environmental elements, i.e., the

spatial environment in which people are located. Emotional interaction design requires that it interacts with people through different levels of design, which firstly triggers people's emotional response to the exhibits by interacting with their senses, secondly triggers people's perceptual experience of the exhibits by interacting with their behaviors, and lastly enables people to emotionally resonate with the exhibition through the display environment created for people.

4. Interaction Design Methodologies in New Media Exhibitions

4.1 Designing Interaction Objects

New media exhibition design encompasses three primary modes of interaction:

- Human-Space Interaction: Spatial design elements facilitate engagement, with digital installations extending the physical environment.

- Human-Computer Interaction: Digital interfaces enhance engagement, ensuring efficient information exchange.

- Interpersonal Interaction: Social interaction components, such as collaborative exhibits and multiplayer installations, enrich the visitor experience.

4.2 Designing Interactive Behaviors

Exhibition interactions can be classified based on input modalities:

- Gesture-Based Interaction: Systems like Microsoft Kinect allow audiences to control digital elements using body movements.

- Voice Interaction: Speech-controlled exhibits enable hands-free engagement.

- Brainwave-Driven Interaction: Experimental installations, such as the *Idea Stadium* exhibit, utilize neural feedback to create interactive experiences.

4.3 Designing Interactive Feedback Mechanisms

Interactive feedback enhances engagement through real-time responses:

- Sensory Feedback: Tactile, visual, and auditory feedback reinforce interactive experiences.

- Physical Feedback: Dynamic installations react to audience inputs, fostering tangible interaction.

5. Conclusion

New media exhibition design represents a significant evolution in audience engagement, transitioning from passive consumption to immersive interaction. This study has explored key principles and methodologies for designing interactive exhibitions, and their real-world applications. Emphasizing the importance of human-centered engagement.

The future research direction should be in the following aspects

- Exploring Brain-Computer Interaction (BCI) in exhibition environments.
- Investigating the psychological effects of immersive multi-sensory exhibitions.
- Developing AI-driven adaptive curation for personalized exhibition experiences.

As interaction design continues to evolve, future research must explore how AI, neural interfaces, and

cross-disciplinary methodologies can further enhance cultural storytelling and audience engagement in exhibitions.

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