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Exploration of Gesture Interaction Design for Jiajiang Nianhua

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Abstract: *In the contemporary technologically driven era, individuals employ diverse methods for accessing information. Gesture interaction plays a pivotal role in enhancing immersive experiences. Jiajiang Nianhua art, recognized as a national-level intangible cultural heritage, serves as a custodian of traditional culture and seamlessly integrates with modern tactile technology. Commencing with the imperative to safeguard Jiajiang Nianhua and providing an overview of research on gesture interaction, this study delves into its historical evolution, distinctive features, and technological aspects. The investigation scrutinizes a transmission model that synergistically combines tactile interaction with Jiajiang Nianhua, proposing specialized design strategies.*

Keywords: *Jiajiang Nianhua, Gesture Interaction, Interaction Design, Intangible Cultural Heritage*

1. Introduction

This article endeavors to investigate the design and implementation of gesture interaction devices for Jiajiang Nianhua. Through an in-depth exploration of Jiajiang Nianhua's historical backdrop, artistic nuances, and cultural connotations, the objective is to comprehensively comprehend the essence of Jiajiang Nianhua while preserving its distinctive artistic style in interactive device design. Harnessing the capabilities of contemporary technology, the article strives to amalgamate traditional art with innovative technology, unveiling gesture interaction devices that are not only visually captivating but also interactive.

2. Research Status

With the enactment of the "Law of the People's Republic of China on the Protection of Intangible Cultural Heritage" in 2003 [1], the objectives of preserving and promoting the exceptional traditional culture of the Chinese nation, advancing socialist spiritual civilization, and reinforcing the protection and conservation of intangible cultural heritage were explicitly delineated. Jiajiang Nianhua, designated as a national-level intangible cultural heritage, encapsulates abundant historical information and cultural memories, portraying the traditional way of life, religious beliefs, and values of the Jiajiang region. However, in the face of contemporary developments and technological advancements, conventional textual descriptions and image records prove inadequate to meet the dissemination demands of Jiajiang Nianhua[2]. Through a comprehensive examination of pertinent literature, it has come to light that several successful instances have incorporated gesture interaction technology within the realm of intangible cultural heritage. For instance, the "Interactive Exhibition Design of Hunan Jingzhou Carved Flower Honeyed Snacks" [3] meticulously compiles the background narrative, production processes, and cultural significances of "Hunan Jingzhou Carved Flower Honeyed Snacks," intertwining them with interactive modalities to dynamically showcase the culinary artistry. This approach not only sparks heightened interest but also propels the inheritance and dissemination of this intangible cultural heritage endeavor. Similarly, the "Innovation Design Practice of Digital Products for Intangible Cultural Heritage" [4] adeptly facilitates an understanding of the historical culture and human emotions associated with Qinhuai lanterns through digital artistic representation and interactive device design, thereby positively impacting the preservation of lantern craftsmanship. Additionally, platforms like "teamLab" and "MANA" offer myriad examples of tactile interaction. Leveraging touch, projection, and various other interactive methods, these platforms create diverse avenues for communication. Concurrently, certain gesture interaction devices, utilizing sensor recognition technologies such as switch, VR Headset, etc., cater to entertainment and fitness functionalities.

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While gesture interaction technology has found widespread application in domains such as virtual reality experiences, interactive installation art, and gesture interaction games, its utilization in the preservation and dissemination of intangible cultural heritage remains relatively limited. Consequently, this article endeavors to delve further into the potential of gesture interaction technology in safeguarding and perpetuating Jiajiang Nianhua. The objective is to intricately integrate it with Jiajiang Nianhua, thereby exploring more innovative and interactive methodologies and tools for display. This integration aims to infuse fresh vitality and momentum into the heritage and evolution of Jiajiang Nianhua. Such investigative efforts will not only augment the dissemination efficacy of Jiajiang Nianhua but also yield valuable insights for the inheritance and evolution of traditional culture in contemporary society

3. Jiajiang Nianhua

On Mount Emei, the moon hangs halfway in the autumn sky, casting its reflection upon the serene waters of the Qingyi River. This watercourse is named the Qingyi River. On both banks, verdant mountains stand in opposing harmony, and a stream of crystal-clear water courses through the center. The urban settlement in this locale is known as Jiajiang. It is within this region that Jiajiang Nianhua flourishes, nurtured by the advantageous techniques of papermaking and engraving distinctive to Jiajiang. Drawing inspiration from folk traditions, Jiajiang Nianhua employs exaggerated imagery, well-composed scenes, and lively facial expressions to epitomize a romantic and artistic style."

3.1 Characteristics of Jiajiang Nianhua

Jiajiang Nianhua has garnered widespread acclaim for its distinctive artistic features, with its allure primarily evident in composition, color, lines, and character portrayal [5]. Concerning composition, Jiajiang Nianhua adopts a dispersed flat layout, cleverly accentuating symmetry and balance while appropriately highlighting main characters, yielding a harmonious and balanced visual effect [6]. Regarding color usage, Jiajiang Nianhua favors warm tones as the primary palette, complemented by cool colors. Through skillful integration of light and dark contrasts and the interplay of warm and cool hues, it achieves a distinctive "color space blending" effect, presenting a visually rich and harmonious display [7].

In the handling of lines, Jiajiang Nianhua showcases exceptional artistic prowess. Precise black lines delineate character contours and prop details, while dynamic and flowing lines depict facial expressions, clothing textures, and various patterns, delicately portraying elements like beautiful women, dolls, and flowers. Bold lines are employed to feature door gods and scenes of labor, creating a striking visual contrast [8]. Concerning character portrayal, the figures in Jiajiang Nianhua are robust and vibrant, exuding an aura of auspicious celebration, reflecting a lively atmosphere. These characters display diverse postures, possess a strong sense of drama, and incorporate distinctive local characteristics of Sichuan, emanating a rich regional charm. The comprehensive embodiment of these artistic features positions Jiajiang Nianhua as a dazzling gem in Chinese folk art, with its unique artistic value and charm thoroughly discussed and demonstrated in the references cited above.

3.2 The Production Process and Essence of Craftsmanship in Jiajiang Nianhua

The production process of Jiajiang Nianhua involves the meticulous selection and application of diverse materials. A detailed material selection process encompasses considerations of raw materials, texture, specifications, thickness, color, and flexibility of the paper, ensuring the final product's aesthetic appeal and durability. In the utilization of traditional woodblock printing technology, the craftsmanship employed in Jiajiang Nianhua's production is truly commendable, demonstrating a remarkable precision in manual operation. The creation of a Nianhua typically relies on three to four, or even as many as eight to nine, wooden blocks, each assigned to a specific color. Through intricate overprinting techniques, it achieves a vibrant and colorful visual effect.

The selection and production of colors are of equal significance. To ensure the Nianhua's colors are both vivid and enduring, artisans often opt for fresh materials processed into high-quality pigments through meticulous grinding. The entire production process can be categorized into five key steps: material selection, woodblock carving, paper selection, pigment production, and overprinting.

Firstly, during the material selection stage, the selection of woodblocks, carving knives, and paper plays a crucial role. The choice of carving knives directly influences the details and portrayal of the Nianhua; factors such as the sharpness, shape, size, and thickness of the tools are critical in determining

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the carving effect. Following this is the woodblock carving process, which serves not only as a demonstration of technical skill but also as an expression of the artist's creativity. Craftsmen initially sketch the predetermined patterns on the woodblock and color them, proceeding to meticulous carving once the colors have dried slightly. The selection of paper is equally crucial, as different types of paper possess unique characteristics and serve distinct purposes, significantly impacting the overall texture and effect of the Nianhua. The production of pigments is derived from nature, with each pigment having distinct colors and characteristics. Accurately making and applying these pigments can infuse the Nianhua with lively and vibrant colors. In the final overprinting stage, precision and patience are put to the test. Craftsmen initiate the process by printing the detailed sections and subsequently progress through the layers of light and dark colors. The sequence and techniques in this stage must be carefully mastered by experienced producers to ensure the flawless presentation of every detail, thereby endowing Jiajiang Nianhua with its distinctive artistic charm.

4. Gesture Interaction

Gesture Interaction is an advanced form of human-computer interaction that surpasses traditional input devices such as keyboards and mice. It encompasses the capture and interpretation of sensory information, including body movements, postures, gestures, and sounds, facilitating interaction with computers or smart devices [9]. This mode of interaction utilizes various devices like sensors, cameras, and microphones, enabling users to communicate with technology in a more natural and intuitive manner [10].

The evolution of gesture interaction technology has significantly broadened the horizons of human-computer interaction. Users can control and operate devices through simple body movements or gestures, leading to a more immersive experience. This mode of interaction finds extensive application in fields such as virtual reality (VR), augmented reality (AR), smart homes, interactive art installations, and gaming entertainment [11] [12]. Particularly in the domain of virtual reality experiences, gesture interaction allows users to immerse themselves in virtual environments as if they were physically present. Equipped with virtual reality headsets and interactive controllers, users can engage in real-time interactions within three-dimensional virtual environments [13].

In the realm of interactive art installations, gesture interaction technology provides artists with innovative means of expression. By integrating sensors, projections, sound, and other technologies, artworks can respond to the movements and interactions of the audience, creating a unique artistic experience [14]. Some interactive art installations even integrate the audience's experiential journey as an integral part of the artwork, enhancing interactivity and the sense of participation in art. Gesture interaction games, by capturing players' real-time body movements, translate them into character control and operations within the game. This mode of interaction not only enhances the immersion and enjoyment of games but also introduces new challenges and experiential dimensions for players [15].

5. Integration of Gesture Interaction with Jiajiang Nianhua

Based on a comprehensive analysis of Jiajiang Nianhua and gesture interaction, the fusion of gesture interaction with Jiajiang Nianhua not only meets the demands of new communication but also deepens the interaction between users and Jiajiang Nianhua, providing a more enriching emotional experience. In the process of applying gesture interaction technology to Jiajiang Nianhua design, virtual reality technology is employed to simulate a real carving scene on the screen. This not only offers users an interactive interface to understand Jiajiang Nianhua culture and experience the production process but also utilizes sensors, cameras, and dynamic capture with image recognition to capture the hand movements, postures, and details of the carving master in real-time. This information is then transformed into computer-readable data, leading to the design of the Jiajiang Nianhua interactive device. When using the Jiajiang Nianhua gesture interaction device, the user stands at the position of the Jiajiang Nianhua gesture interaction sensor recognizer. Once the sensor detects a person, the device automatically starts, entering the initial interface. Through the recognition of specific hand movements, users can make selections like "Enter Options" or "Switch Options." In the initial interface, users can choose between "Jiajiang Nianhua Experience" or "Jiajiang Nianhua Learning." Opting for "Jiajiang Nianhua Experience" allows users to delve into the production process, while choosing "Jiajiang Nianhua Learning" enables browsing various Jiajiang Nianhua, gaining insights into their composition, colors, lines, stylistic features, and the stories they convey.

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In the "Jiajiang Nianhua Experience" segment, users first need to select the wooden board material for carving. Once the wood material is confirmed, users grasp the handle of the simulated carving knife to initiate the "Carving" phase. Sliding the handle in the air, the sensor reflects hand movements in real-time on the screen, completing the carving process. The vibrations of the handle simulate the real sensation of carving, and the depth, thickness, and shape of the carving path are determined by the force and direction of the hand holding the carving knife. Additionally, the device provides auxiliary graphics, allowing users to display carving outlines, reference patterns, or technique tips to assist in more accurate creation. After carving, users proceed to choose paper and paint. Through parameter settings and algorithm superposition, the device simulates the texture and coloring effects of different papers, making the carving experience more realistic. Finally, algorithmic adjustments enhance the visual effects, enriching the interactive experience for participants.

In the "Jiajiang Nianhua Learning" section, users can explore various Jiajiang Nianhua pieces, selecting their favorites through sliding gestures. After choosing a Nianhua piece, users can read related background stories, gaining in-depth knowledge of the composition, colors, lines, and style of Jiajiang Nianhua. Moreover, users can opt to participate in coloring games, creating unique Jiajiang Nianhua pieces.

This gesture interaction design greatly enhances the interaction and emotional experience between Jiajiang Nianhua and users, providing a more diverse and enriching way of participation, further promoting the dissemination and inheritance of Jiajiang Nianhua.

6. Exploration of Gesture Interaction Presentation Paths in Jiajiang Nianhua

In the in-depth exploration of Jiajiang Nianhua gesture interaction presentation, exciting possibilities emerge beyond integrating the production and cultural learning of Jiajiang Nianhua into gesture interaction. One such possibility is the integration of the rich stories of Jiajiang Nianhua with virtual reality technology, creating an immersive interactive experience. By wearing VR headsets, participants can feel as if they are in the world of Jiajiang Nianhua, experiencing the production scenes and stories behind the culture. They can interact in real-time with virtual characters from Jiajiang Nianhua and engage in the experience using devices such as controllers. Another innovative approach is the fusion of Jiajiang Nianhua art with installation art. By placing interactive installations in public spaces or exhibitions, audiences can interact with Nianhua through multi-sensory stimuli such as touch, sound, and light. They have the opportunity to change the colors and shapes of the Nianhua, trigger animation effects, and participate in artistic creation in a unique way. These innovative approaches provide new opportunities for the cultural heritage and preservation of Jiajiang Nianhua, allowing participants to discover, appreciate, and engage in the creative process in a distinctive manner. This not only injects new vitality but also opens up broader and more innovative development space for Jiajiang Nianhua artistic creation.

7. Conclusion

This paper, through a comprehensive analysis of the nuanced meanings embedded in Jiajiang Nianhua and the cutting-edge application of gesture interaction technology, compellingly illustrates the imperative of amalgamating tradition and innovation within the realm of Jiajiang Nianhua. The utilization of gesture interaction technology in Jiajiang Nianhua not only bears profound significance but also charts a novel course for the preservation of Jiajiang Nianhua in a more vibrant, interactive, and immersive fashion. The incorporation of this technology represents not just an innovative synthesis of traditional artistic forms but also a profound reconfiguration of the audience's experience. Through such integration, Jiajiang Nianhua can more effectively align itself with the demands of contemporary society, captivating the attention and engagement of a broader audience, especially the younger demographic. However, realizing this ambitious vision necessitates a deep dive into the historical heritage and cultural essence underpinning Jiajiang Nianhua, concurrently harnessing the potential of modern technology for innovative design. Within this process, the stability of the technology and the design of the user interface emerge as critical aspects demanding further exploration and experimentation. It is firmly asserted that through ongoing exploration, development, and research, gesture interaction technology will play a substantial role in the protection and inheritance of Jiajiang Nianhua, emerging as an exemplary fusion of traditional art and modern technology.

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