



Research and practice of Interactive Design of Intangible Cultural Heritage based on Intelligent Design

Jinxia Zhou*

¹Lecturer, School of animation and digital arts, Communication University of China Nanjing, Nanjing, 211172, China.

* **Corresponding Author:** gyral@163.com

Citation: Zhou, J. (2025). Research and practice of Interactive Design of Intangible Cultural Heritage based on Intelligent Design. *Mediterranean Archaeology and Archaeometry*, 25(2), 81-85.

ARTICLE INFO

Received: 08 July 2024

Accepted: 22 July 2024

ABSTRACT

In the context of the protection and inheritance of intangible cultural heritage (intangible cultural heritage), intelligent design technology provides a new path for the interactive design of intangible cultural heritage. This study deeply explores the combination of intangible cultural heritage and intelligent design, and proposes the application strategy of intelligent design in intangible cultural heritage interaction design. Through digital reproduction of historical scenes, intelligent interactive experience design, creative integration of intelligent design and intelligent assisted inheritance education, this study aims to promote the inheritance and development of intangible cultural heritage, bring users more in-depth and vivid intangible cultural heritage experience, and promote the wide dissemination and innovative development of intangible cultural heritage.

Keywords: intelligent design; intangible cultural heritage; interactive design of intangible cultural heritage

With the rapid development of science and technology and the advent of the digital era, the protection and inheritance of intangible cultural heritage (referred to as "intangible cultural heritage") are facing unprecedented opportunities and challenges. As an important carrier of the long history and splendid culture of the Chinese nation, the inheritance and promotion of the intangible cultural heritage is of great significance to strengthening cultural confidence and promoting exchanges and mutual learning among civilizations. In recent years, the policy level has paid more attention to the protection of intangible cultural heritage. The 14th Five-Year Plan for the Protection of Intangible Cultural Heritage clearly proposes to "protect, inherit and carry forward the intangible cultural heritage", which provides a clear direction for the protection and development of intangible cultural heritage. Intelligent design, as an emerging scientific and technological means, provides new ideas and methods for the research and practice of intangible cultural heritage interaction design. Through the use of artificial intelligence, virtual reality, augmented reality and other advanced technologies, an immersive intangible cultural heritage experience space can be created, so that visitors can intuitively and vividly feel the charm of intangible cultural heritage. This study aims to explore the theory and practice of intangible cultural heritage interaction design based on intelligent design, in order to contribute new strength to the protection and inheritance of intangible cultural heritage.

I. OVERVIEW OF INTANGIBLE CULTURAL HERITAGE AND INTELLIGENT DESIGN

(一) Definition, classification and characteristics of the intangible cultural heritage

As an important part of human culture, an intangible cultural heritage (intangible cultural heritage) covers oral tradition, performing arts, social practice, knowledge of nature and the universe (such as traditional medicine, astronomy), traditional handicrafts and other aspects. These intangible cultural heritage projects not only reflect the unique cultural practices of various communities, groups and individuals, but also reflect the embodiment of the history, emotion, temperament and cohesion of various ethnic groups. Intangible cultural heritage is characterized by the characteristics of vitality, geography, nationality, diversity and inheritance. They are the spiritual wealth of living existence. They are people-oriented and inherited through oral teaching, teaching by words and deeds. However, due to the rapid development of modern society and the impact of globalization, the intangible cultural heritage is faced with many challenges, such as the aging of inheritors, the simplification of inheritance mode, and the deterioration of inheritance environment. Therefore, with the help of intelligent design and other modern technology means, the protection, inheritance and innovation of intangible cultural heritage is an important way to maintain human cultural diversity and promote cultural exchange and integration. Through intelligent design, the charm of the intangible

cultural heritage can be better explored and displayed, so that more people can understand and appreciate the intangible cultural heritage, so as to promote the inheritance and development of the intangible cultural heritage^[1].

(二) Concept, principle and technical means of intelligent design

Intelligent design is a method to improve the level of design intelligence by applying modern information technology and artificial intelligence technology and simulating human thinking activities. It is based on the design knowledge, through the synergy of human-computer interaction, using the intelligent decision-making mechanism, enabling the computer to undertake more complex tasks in the design process. The technical means of intelligent design include information technology, artificial intelligence, virtual reality and augmented reality technology, and intelligent algorithms. These technologies provide powerful data support, computing power and interactive experience for intelligent design. Intelligent design not only focuses on the design results, but also emphasizes the intelligence of the design process, aiming to improve the efficiency and quality of the design, and provide more creativity and inspiration for designers. In the protection and dissemination of intangible cultural heritage, intelligent design can play an important role. Through innovative interactive ways, the public can better understand and experience the charm of intangible cultural heritage, and promote the inheritance and development of intangible cultural heritage.

(三) Joint point analysis of intangible cultural heritage and intelligent design

The combination of intangible cultural heritage and intelligent design has injected new vitality into the inheritance and innovation of traditional culture. This combination is mainly reflected in digital protection and display, intelligent assisted inheritance, innovative experience design, intelligent recommendation and personalized customization and other aspects. Through the application of virtual reality, augmented reality and other advanced technologies, intelligent design enables the intangible cultural heritage to be displayed to the public in a more vivid and intuitive way, and enhances the public's awareness and interest in traditional culture^[2]. At the same time, intelligent design tools provide a powerful assistance for non-genetic inheritance, so that traditional skills can be better preserved and inherited. In addition, intelligent design also brings innovative ways of experience, allowing users to immerse themselves in the virtual environment of intangible cultural heritage and feel the charm of traditional culture. Finally, intelligent design can provide personalized intangible cultural heritage recommendation and customized services according to users' interests and needs, so as to further improve user experience and satisfaction. This combination not only promotes the inheritance and development of intangible cultural heritage, but also injects new impetus into the innovation of traditional culture.

II. APPLICATION STRATEGY OF INTELLIGENT DESIGN IN INTANGIBLE CULTURAL HERITAGE INTERACTION DESIGN

(一) Digital reproduction of the historical scene, to guide users to come in person

In the interactive design of intangible cultural heritage, the digital reproduction historical scene can bring unprecedented experience to users, allowing users to seem to travel through time and space in the history and culture carried by the intangible cultural heritage projects.

On the one hand, accurate modeling and high reduction. Using high-precision 3D scanning and modeling technology, the historical environment and reconstruction of the intangible cultural heritage project are carefully captured and reconstructed. Both the eaves of the ancient buildings and the stone roads of the ancient streets should be accurately restored. For the tools, materials and finished products in the intangible cultural heritage skills, advanced scanning and modeling technologies are also adopted to ensure that every detail is clearly visible, so that users can deeply understand and appreciate it. The one thing is a multi-sensory immersive experience^[3]. Combined with virtual reality (VR) technology, for the user to create a multi-sensory immersive experience environment, the user can through the headset display and handle equipment, fully feel the virtual world of visual, hearing, touch, in the history of the digital scene, can join the ancient music, wind, water sound, and aroma, temperature, let the user as if in the real historical environment. On the one hand, interactive participation and deepening of experience. In the history of digital scene, design various interactive link, such as users can dialogue with virtual characters, participate in virtual activities, simulated intangible products, etc., these interactive link not only increased the user participation and sense, also can make the user more deeply understanding and experience the intangible culture, through intelligent identification and analysis of user behavior and feedback, the system can adjust the real-time interactive content and difficulty, in order to better meet the user's needs and interest.

On the other hand, it is personalized recommendation and guidance. Big data and artificial intelligence technology are used to analyze users' interests and preferences, and recommend intangible cultural heritage content and interactive experience that meet users' their needs. For example, for users who like traditional music, they can recommend relevant music performance and musical instrument production experience; for users who like handicrafts, we can recommend relevant handicraft production and appreciation experience. Through intelligent recommendation and guidance, the system can guide users to further understand and experience the intangible cultural heritage, and improve user satisfaction and loyalty. Moreover, it is a combination of education and inheritance^[4]. In the historical scene of digital reproduction, educational elements of intangible cultural heritage are added, such as introducing the historical origin, cultural connotation and technical characteristics of intangible cultural heritage projects, and allowing users to learn and inherit the intangible cultural heritage through the experience of teaching and entertainment. At the same time, non-genetic inheritors or experts can be invited to conduct online guidance and teaching in the virtual environment, so that users can interact and communicate with the inheritors, so as to promote the inheritance and development of intangible cultural heritage. Intelligent technology is used to reproduce the historical scene of the intangible

cultural heritage projects, so that users can personally feel the charm of the traditional culture, and enhance their sense of identity to the intangible cultural heritage.

(二) Intelligent interactive experience design to promote user active participation

Intelligent interactive experience design not only provides users with immersive cultural experience, but also greatly promotes the active participation of users through innovative interactive ways, thus deepening users' cognition and interest in intangible cultural heritage.

One is the virtual fitting and simulation production. Using augmented reality (AR) or virtual reality (VR) technology, users can virtually try on traditional costumes or simulate making intangible heritage crafts. For example, in the virtual environment, users can choose different traditional clothes to try on and view the effect in real time; or through the simulation production tools, personally experience the production process of intangible heritage crafts, from material selection to processing to the finished product display, every step seems to be present. Second, interactive games and challenges. Interesting and challenging interactive games are designed to allow users to learn and experience intangible cultural heritage in entertainment. These games can be developed around intangible cultural heritage skills, historical stories or cultural customs by completing tasks, solving puzzles or competitive activities. Meanwhile, rich information and knowledge incorporated into the game also enable users to deepen their understanding of intangible cultural heritage unconsciously. Third, intelligent question and answer and real-time feedback. Develop an intelligent question-answering system to provide users with real-time answers and guidance. When users encounter problems, they can input questions through voice or text, and the system will provide accurate answers and suggestions according to the content of the questions. This immediate feedback mechanism can not only solve users' doubts, but also enhance the interaction between users and the system. Fourth, community communication and interaction. To build an online community to encourage the communication and interaction between users. In the community, users can share their intangible cultural heritage experience, experience and creative results, or participate in discussions, ask questions and answer questions from other users. This community atmosphere can not only enhance the sense of belonging and cohesion of users, but also promote the dissemination and popularization of intangible cultural heritage.

Through intelligent interactive experience design, not only can bring users more rich, interesting and in-depth intangible cultural experience, also can stimulate user participation enthusiasm, improve the user interactive experience, this design way not only contributes to the intangible heritage and development, also can inject new vitality for the cultural industry and creativity.

(三) Creative integration of intelligent design to create a unique intangible cultural heritage experience

In promoting the modern inheritance and innovation of intangible cultural heritage (intangible cultural heritage), it is committed to deeply integrating modern design concepts with intelligent technology, and carrying out unique and creative transformation of traditional intangible cultural heritage elements, so as to create a series of fascinating intangible cultural heritage experiences.

In the application of intelligent technology, it is not only limited to the immersive experience of virtual reality (VR) and augmented reality (AR), but also to further explore the various possibilities of artificial intelligence (AI) in the intangible cultural heritage. For example, AI algorithms can intelligently analyze users' behaviors and preferences, and provide users with customized intangible heritage experience recommendation. This personalized recommendation system can ensure that every user can obtain intangible heritage content closely related to their interests, so as to improve users' participation and satisfaction. In addition, AI also shows great potential in the creation and display of intangible cultural heritage content. Through machine learning technology, AI can learn and imitate the style and characteristics of traditional intangible cultural heritage skills, and create new works with traditional charm, which not only provides a new way for the inheritance of intangible cultural heritage, but also provides a rich source of inspiration for artists and designers. At the same time, intelligent technology can also optimize the process and services of intangible cultural heritage experience. For example, the Internet of Things (IoT) technology can monitor the on-site situation of intangible cultural heritage exhibitions or activities in real time, and adjust the content and way of display in time to ensure that users get the best viewing experience. In addition, the intelligent guide system can provide users with personalized navigation services according to their real-time location and interests, and help users to better understand and experience the intangible cultural heritage. In terms of creative integration, attention is paid to the combination of modern design concepts and intangible cultural elements to create works and products with both traditional charm and in line with the modern aesthetic trend. This integration is not only reflected in the display and inheritance of intangible cultural heritage skills, but also extends to the cross-border application of intangible cultural heritage elements. For example, intangible cultural heritage elements will be integrated into fashion design, home decoration and other fields to create new products with unique charm, so as to attract the attention and love of more young users. Through creative integration and intelligent design, the intangible cultural heritage is combined with modern technology to create an intangible cultural heritage experience with both traditional flavor and full of modern flavor. This unique experience can not only meet the diverse needs of users, but also promote the inheritance and development of the intangible cultural heritage.

(四) Intelligent assisted inheritance education to promote intangible cultural heritage inheritance

In the inheritance and development of intangible cultural heritage, education plays a vital role. However, the traditional way of inheritance is often limited by the time, space and the personal experience and ability of the inheritors. In order to overcome these limitations, we should actively explore the application of intelligent technology in non-genetic inheritance education, use digital tools and platforms to provide assistance for inheritors, and promote the extensive inheritance and in-depth development of intangible cultural heritage.

Intelligent technology provides a rich variety of digital resources for non-genetic inheritance education. Through hd camera, recording and digital scanning technology means, can be the intangible art production process, performance form and historical background content for digital records and preservation, the digital resources can not only convenient inheritance people consult and learning at any time, can also through the network platform to share to a wider audience, let more people understand and know the intangible culture. In addition, intelligent technology provides a personalized and interactive learning experience for non-genetic inheritance education. Virtual reality (VR), augmented reality (AR) and other technologies can simulate the production environment and performance scene of intangible cultural heritage skills, providing learners with immersive learning experience. At the same time, through intelligent algorithms and data analysis, personalized learning paths and feedback can also be provided according to learners' interests, abilities and needs, so as to help learners better master the intangible cultural heritage skills. In addition, intelligent technology also provides the possibility of distance learning for non-genetic inheritance education. Through online video teaching, remote tutoring and other methods, inheritors can teach intangible cultural heritage skills to a wider range of students without geographical restrictions, which not only expands the spread scope of intangible cultural heritage, but also provides more teaching opportunities and choices for inheritors.

In the process of intelligent assisted inheritance education, it also pays attention to the training and support of inheritors. By holding digital skills training, providing technical support and consulting services, we will help inheritors to master the use methods and skills of digital tools, and improve the digital literacy and ability of inheritors. At the same time, the inheritors are also encouraged to use intelligent technology to innovate and develop the intangible cultural heritage, so as to inject new vitality and creativity into the inheritance of the intangible cultural heritage.

三. EPILOGUE

With the continuous progress of intelligent design technology, the interactive design of intangible cultural heritage has shown unprecedented vitality and charm. The application strategy of intelligent design in intangible cultural heritage interaction design proposed in this study not only provides strong support for the inheritance and development of intangible cultural heritage, but also brings users a more colorful and deeply rooted intangible cultural heritage experience. In the future, it is expected that intelligent design technology can continue to inject new impetus into the protection and innovation of intangible cultural heritage, so that this precious cultural heritage will shine with new luster in modern society. At the same time, we call on more people to pay attention to and support the inheritance and development of intangible cultural heritage, and jointly protect the treasures of human civilization.

REFERENCES

- [1] Kan Fengyan, Liu Yanfang. Research on design Strategy of Laoshan Intangible Cultural Heritage Tourism APP [J]. Source of Creative Design, 2024, (03): 39-45.
- [2] Lu Yiming, Wang Kunqian, Jiang Zihan. Research on digital Technology of Intangible Cultural Heritage under Deffler Interactive Process Model [J]. Heilongjiang Science, 2024,15 (06): 162-164.
- [3] Xie Hui, Xie Hui. The fusion of intangible cultural heritage and interaction design [J]. New Chu Culture, 2024, (04): 88-90.
- [4] Fu Yanxiang, Xie Jieni, Li Zhixin. Research on the immersive interactive experience design of the digital platform for intangible Cultural Heritage [J]. Industrial Design, 2023, (05): 108-111.
- [5] Zhou Jie, Confucius Yi. HTML 5 small program design exploration of intangible cultural Heritage [J]. Hunan Packaging, 2023,38 (02): 62-66.
- [6] Wang Jing, Han Haiyan. User Experience Research on digital Communication of Intangible Cultural Heritage in Inner Mongolia [J]. Art and Design (Theory), 2022,2 (03): 97-99.
- [7] Ye Cong, Kuang Caiyuan, Yang Junge. Qinhuai lantern color culture and creative products interactive design and display application [J]. Screen printing, 2022, (03): 8-11.
- [8] Ye Cong, Kuang Caiyuan, Zhang Lin. Nanjing paper-cut intangible cultural heritage and derivative product interaction design [J]. Screen printing, 2022, (02): 10-13.
- [9] Li Yifan, Huang Jiayan. Feasibility study of the dissemination of intangible cultural heritage in universities and inheritance in museums —— The bamboo carving project of digital media works as an example [J]. Technology Communication, 2020,12 (24): 58-60.
- [10] Zhang Ting, Peng Li. Design and application research of intangible cultural Heritage APP based on user experience [J]. Packaging Engineering, 2020,41 (20): 182-187.
- [11] Hu Yi Na. Explore the restriction of the core of Suzhou embroidery culture to the interface elements of new media [J]. Popular Art, 2020, (19): 74-75.
- [12] Tang Jie.—— Take Xinhui Kwai Art as an example [J]. New Media Research, 2020,6 (18): 25-27.
- [13] Zhao Wei. Research on the application of virtual reality technology in the intangible Cultural Heritage project display [J]. Information and Computer (theoretical edition), 2020,32 (15): 42-44.
- [14] Huangyan. Practice and thinking of intangible cultural heritage "wood structure" mobile platform [J]. Art and Design (Theory), 2019,2 (12): 107-109.
- [15] Jun Mu Yi, Huang Tao. Animation realization of Nanjing "Qinhuai Lantern Festival" intangible cultural heritage [J]. Art and Design (Theory), 2018,2 (08): 91-92.
- [16] Liu Yan, Wang Tianyu, Wang Qian. Digital research of intangible cultural heritage —— Interactive experience design practice of guqin qin and reduced character spectrum [J]. Art Science and Technology, 2017,30 (12): 1-2 + 54.
- [17] Zhang Ting, Chen Guangxi, Huang Fan. Research on digital protection of Guangxi Zhuang bronze drum based on AR technology [J]. DESIGN In 2017, (12): 138-139.
- [18] Wang Tianyu, Liu Yan, Wang Qian. Digital research of intangible cultural heritage —— Interactive experience design practice of guqin qin and reduced character spectrum [J]. Art and Technology, 2016,29 (09): 3-4.
- [19] Li Nannan. Research on the interface interaction design of the intangible Cultural Heritage Protection APP in China [J]. House of Drama, 2015, (24): 265.
- [20] Tan Tiezhi, Dai Jingjing. Research on Digital Interaction Design and Innovative Communication of Shadow Play Culture [J]. Art Education, 2014, (03): 196-197.