



Digital Inheritance Path of Carving Decorations in Traditional Villages in Lanzhou

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Abstract. This paper selects the carving decorations in traditional villages in the Lanzhou area in the upper reaches of the Yellow River as the research object. Through integrating the cultural resources of those carving decorations along the Yellow River in this area, we have adopted UE4, mini-programs and other cutting-edge digital technology tools to study the digital transmission path of the carving decorations. In this way, we have revitalized the dormant carving decorations in this area with the “digital display” and “digital media” strategies. This study is aimed at the cross-disciplinary innovation of digital technology and carving decoration art, the exploration of the preservation of traditional architectural art heritage in Lanzhou, and the study of the communication value of the architectural decoration art of traditional villages.

Keywords: Traditional Villages in Lanzhou · Carving Decorations · Vr Museums · Mini-Programs

1 Introduction

As a critical geological plate for cultural heritage, the Lanzhou area in the upper reaches of the Yellow River has been profoundly influenced by the Yellow River culture in many aspects, including natural, historical, economic, social, and cultural.

The Yellow River flows through a number of traditional villages in the region, which not only focus on the harmony of many nationalities coping with nature, society and themselves, but also represents an essential source of nurturing the roots of Chinese civilization. The carving decorations of the traditional villages in this region reflect the cultural genes of the symbiosis of agriculture and animal husbandry in the upper reaches of the Yellow River, the historical process, evolutionary path and dynamic mechanism of the integration of cultural resources, acting as an important material carrier for our understanding of the Yellow River culture. Therefore, studying the digital inheritance path of architectural carving heritage can supplement the “living historical materials” of architectural decoration art in the region, digitize the “cultural memory,” and investigate the historical evolution of village architectural culture development in central Gansu. Besides, under the premise of ensuring cultural rigor, using digital technology to revive the vitality of traditional culture is close to the aesthetic interests of the public. It can attract young people to take the initiative to understand and disseminate the excellent

traditional culture, enrich the dissemination form of carving decorations in this region, and help rural revitalization.

2 The Art Exhibition Surface of Carving Decorations

Lanzhou, located in the hinterland of central Gansu, is down the ages reputed as a critical trade center in the northwest. As the saying goes, “its river separates China from foreign countries due to its crucial location; and the territorial security in the Hexi Corridor area always depends on the messages from Jincheng” [8]. The area has long been inhabited by Han, Hui, Tibetan, Salar and other ethnic groups. Combined with the list of “Chinese Traditional Villages” announced by the Expert Committee on the Protection and Development of Traditional Villages in China, the traditional villages in Lanzhou include Hekou Village in Hekou Township, Xigu District, Lanzhou City, Liancheng Village in Liancheng Township, Yongdeng County, Chenghe Village in Qingcheng Township, Yuzhong County, and Yongfeng Village in Jinya Township, Yuzhong County. The architecture of these traditional villages is all relatively complete and preserved, with rich and diverse types, as shown in Table 1.

The region’s multi-ethnic fusion of traditional villages, blend and collision of various cultures also endows the architectural carving style with its “diversity.” This diversity of style in the decorative materials, techniques, expression of the subject matter, has a distinctive Central Gansu’s vernacular style, reflecting the rustic, generous, simple residential architecture in the northwest. Moreover, due to the frequent economic exchanges between the ancient ferry of Yellow River, it also greatly promotes the inclusion of local

Table 1. Architectural Types of Traditional Villages in the Lanzhou Area

Traditional Villages	Building type
Hekou Village in Hekou Township	Towers and walls Hold the bridge Bell and Drum Towers Zhang Gongci Courtyard Memorial Gateway
Liancheng Village in Liancheng Township	Former site of Lu Tusi Yamen XuanZhen view Lei Tan
Chenghe Village in Qingcheng Township	Qingcheng Temple Qingcheng Academy Gao’s ancestral hall Luo family courtyard
Yongfeng Village in Jinya Township	Jinzaο ancestral temple Jinjia house Jinjia brick carving front wall courtyard

Table 2. Types of Carving Decorations in Traditional Villages in the Lanzhou Area

Types of Carving	Architectural Components	Pattern Category
Wood Carving	square-column purlins columns balustrade cartouche corbel arch windows doors	Animals: phoenix, crane Plants: pine and cypress, flowers and plants, melon and fruit, pine, bamboo, plum blossoms, orchid and chrysanthemum plum blossoms, orchid Artifacts: The Eight Treasures of the Tao, The Eight Treasures of the Buddha Geometric pattern: hexagonal, octagonal, round, fretwork Character pattern: fortune, prosperity, longevity, happiness
Brick Carving	corbel arch architrave shoe-shaped foundation cartouche Chui Hua eaves tile drip the main ridge front wall	Scenery: sun, moon, mountains, rivers Plants: pine and bamboo, flowers and plants Animals: phoenix, crane, magpie, dragon Geometric pattern: fretwork
Stone Carving	plinth stone balustrade step pedestal bearing stone	Animals: phoenix, crane, magpie, dragon, lion Plant: Weeping Lotus, Scroll Grass, Cymbidium, Pomegranate Artifacts: The Eight Treasures of the Buddha

architectural styles. The appearance and manufacturing technology of the carving decorations here not only have traces of typical buildings in Shanxi and the Central Shaanxi Plain, but also have the characteristics of carving decorations in Linxia Hui and Gannan Tibetan areas of Gansu, jointly constructing the rich original color of architectural carvings in this area.

The carving decorations in Lanzhou are mainly carved in wood, supplemented by stone and brick carvings, all of which create rich decorative shapes and patterns through pictograph, ideograph, hypocaustasis and analogy. The themes of the carvings are mainly reflected in several aspects, such as loyalty, filial piety, praying for good fortune, and praising life. In particular, there are more animals, plants, objects, geometric patterns, characters and landscapes, which convey people's aspirations and pursuit of good fortune and affluence, as shown in Table 2.

3 Digital “Spatial Migration” of Carving Decorations in Traditional Villages

Following the digital trend, the architectural memory field has also shifted from physical material to virtual existence, and people are more inclined to store and construct memories in the virtual space of the Internet [1]. The digital inheritance path of architectural carving heritage is a digital inheritance method with the help of network technology, mobile technology, and virtual reality as representative technologies. First of all, through these technologies, the real and complete information of pictures, texts, audios and videos of architectural sculpture and cultural heritage are recorded. Secondly, the data will be converted into algorithmic operations that can be recognized by computers, and then the digital resources will be organized and encoded by using programming technology. Eventually, through the Internet, computers, mobile phones and other terminals, all kinds of architectural carving information is transmitted to the public.

3.1 The Process of Digital Inheritance

Digital preservation, display and dissemination are three milestones in the digital inheritance of carving decorations. Digital preservation of cultural heritage lays a solid content base for subsequent display and dissemination. We show the architectural carving heritage in an efficient, fast and universal medium. With the technological empowerment of Internet technology, people rely more and more on communication media to preserve and transmit their memories, and the logic of technology profoundly affects the form of production of cultural memory. The expansion of the scope of communication, in turn, promotes the preservation of cultural heritage and increases public awareness of it, ultimately forming a virtuous circle. Therefore, the effective realization of digital recording and preservation, reconstruction and restoration, virtual display and dissemination, and the development and utilization of cultural and creative products requires the adoption of integration, overlap, intersection, and coordination in the application of digital technologies.

3.2 Significance of Digital Inheritance

As a piece of historical evidence in Lanzhou, the traditional village is an important reminiscent image of the region’s history. For one thing, when discussed from the perspective of spatio-temporal association, the image of memory needs a specific space to be materialized. For another, memory not only reconstructs the past but also virtually compiles the present and future experiences. Therefore, the digital inheritance of carving decorations of traditional villages in Lanzhou is a multi-channel reconstruction of digital production and creation of new memories, i.e., the PC platform of “VR Carving Decoration Museum” and the mobile terminal platform of “Lanzhou Traditional Village Pocket Carving Museum” both together accomplish complementary reconstruction of memory images. The integration of the two digital paths forms effective inter-evidence with the existing paper documents, physical materials, local records and other materials. By realizing the exhibition of three-dimensional samples of carving decorations, virtual

experience of the physical skills of the inheritors, and the text database of historical and cultural changes, we digitally reproduce the history of inheritance, production techniques, decorative materials, and the current situation of the typical samples of carving decorations in the traditional villages of the region. This combined and integrated digital inheritance path design is important for the study of the origin, development, inheritance, and innovation of the architectural decoration art of traditional villages along the upper reaches of the Yellow River in Lanzhou.

4 Digital Reproduction of Traditional Carving Decorations

Using the 3D simulation model development platform and the virtual interactive design platform as the digital base for the memory reconstruction of the carving decorations, the living heritage of the “Internet + digital museum” on the PC side is realized.

4.1 Virtual Traditional Village

This interactive form allows viewers to gain a new cognition of carving decorations in the virtual field, immerses people in the virtual traditional village, enhances the creative and personalized cognitive experience [10]. Since it makes the cultural inheritance of carving decorations not confined to time and space, it enhances the audience’s enthusiasm to participate, thus forming a deep understanding of the cultural characteristics, integration forms, historical origins and inheritance history of carving decorations in Lanzhou. Therefore, the virtual museum is used to develop a thematic multi-directional extended narrative that connects various elements such as the protection of the ancient village culture, the inheritance and transformation of the ancient village culture, realizing the digital record of the proximate clues of the changes of the traditional village carvings, as shown in Fig. 1.

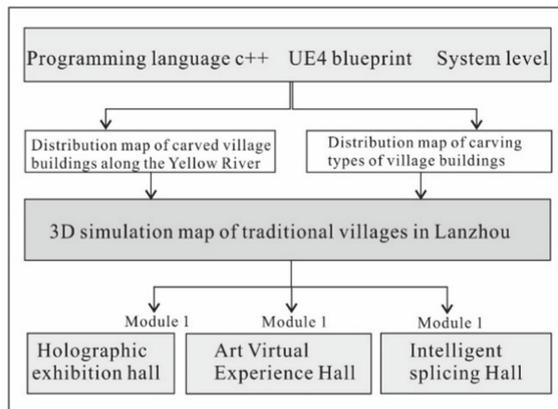


Fig. 1. VR Carving Decoration Digital Museum Framework



Fig. 2. Level Interactive Display Interface of Rum-shaped Bearing Stone

4.2 Case Performance

Take the typical residential building component of Hekou Village in Hekou Township, Lanzhou. For example, the rum-shaped bearing stone is a functional product of the traditional residential door component, and the stone component is decorated according to the function. The local drum-shaped bearing stone mainly consists of three parts: the base, the support, and the drum-holding stone [3]. The two sides, the front and the top of the drum are decorated with carvings, and the carving technique is borrowed from the carving and painting techniques of the Linxia brick carving. The patterns on both sides of the drum face are mostly based on the spinning lotus, which expresses the blossoming of flowers, longevity and good fortune. The front is decorated with sunflower and animal head carvings, similar to those in the Central Shaanxi Plain, but the carvings are simpler and more unadorned. The upper part of the drum stone is lined with lion-shaped beast figures, and the overall shape is well integrated, with clear priorities, symmetrical and balanced, ancient and generous. In the interactive display interface of this VR carving decoration museum, through the four panels of the simulation model, sample switching, structure characteristics, and pattern interpretation, and by clicking different function buttons to enter the relevant function area, you can further understand the cultural information and preservation status of the rum-shaped bearing stone in the region, as shown in Fig. 2.

In the process of virtual interaction design for the construction of the rum-shaped bearing stone carving, the technical route and blueprint planning of the following interaction functions were completed in accordance with the index requirements of human-computer interaction design:

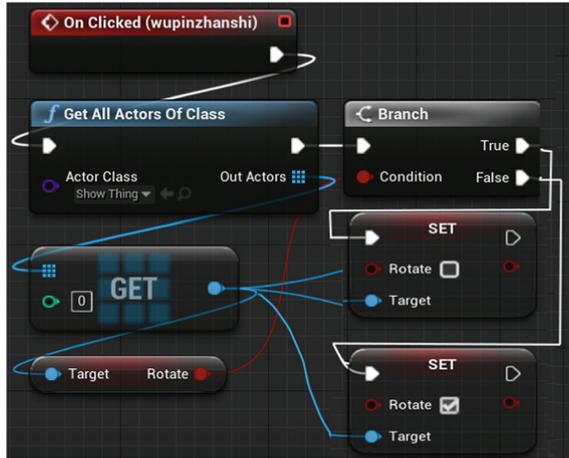


Fig. 3. 3D model interactive display blueprint

4.2.1 Rotate Display

The mouse wheel can be input to adjust the length of the spring arm, so as to realize the function of zooming in or out of 3D model. The mouse X and Y axes can be set to control the Rum-shaped Bearing Stone 3D model for rotating display, so as to fully understand the structural information of the Rum-shaped Bearing Stone components, as shown in Fig. 3.

4.2.2 Pattern Information

Event function for changing the materials of the Rum-shaped Bearing Stone was designed to allow the material interface array to complete material replacement circularly. In addition, the function of model rotation to display the material was designed to understand the various types of pattern information, as shown in Fig. 4.

4.2.3 Information UI Panel

The Rum-shaped Bearing Stone model information and the information UI panel were created. This allows you to enter the historical deduction, manufacturing process and other sub-levels to view the relevant cultural heritage, production process and other information once you click on the button of the Rum-shaped Bearing Stone 3D model.

Thus, with the addition of digital technology, the VR carving decoration museum is systematically designed to correlate the various database modules of carvings and compare the data to form a complete virtual presentation of carving decorations [9]. It realizes the digital simulation reproduction of carving decorations, reflects the cultural transmission and presentation of carving decorations in the region, explores the vitality of traditional architectural carving culture, and thus enriches the national history and vernacular sentiment.



Fig. 4. 3D model pattern switching blueprint

5 The “Digital Body” of Traditional Carving Decorations

On the strength of the development of digital technology, people increasingly rely on communication media to preserve and transmit memories, and the logic of technology profoundly affects the form of cultural memory production [5]. WeChat mini-programs have gradually turned into a new carrier for remaking traditional cultural memory. As a significant media product that survives on the WeChat platform with more than one billion daily active users, it plays an increasingly important role in the process of the digital shift of cultural production. Mini programs make full use of the social advantages of the WeChat platform to decode the cultural factor of architectural art and awaken young people’s enthusiasm for traditional culture. With the advantages of no installation, flexible search, portability and virtual socialization, the mini-programs show a unique representation different from other places of preserving memory, embedding cultural meaning perfectly in technical practice and becoming a new path for spreading cultural memory.

Therefore, the design of the mobile phone as the medium of communication, with the “Lanzhou Traditional Village Pocket Carving Museum” as the theme of the WeChat mini-programs, supplement, expand and innovate the carving heritage content and form an orderly connection with the PC platform of “VR carving decoration museum.” Not only does it break the boundary that a traditional museum audience must be present, but it also breaks the previous offline audience’s one-way access to static heritage information stereotypical visiting experience, as shown in Fig. 5.

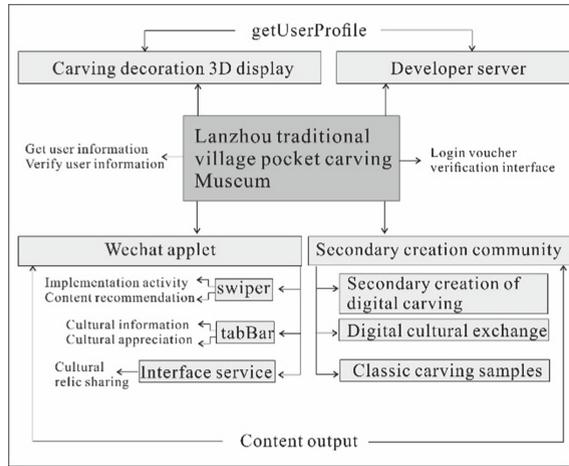


Fig. 5. The Development Framework of “Lanzhou Traditional Village Pocket Carving Museum” “mini program”

5.1 Content Design Based on Wechat Applet

The use of mini-programs can construct the carved cultural image and spread the value of the times, preserving the “form” and “soul” of architectural heritage. The “Lanzhou Traditional Village Pocket Carving Museum” mini-program, which integrates digitalization of carved cultural relics, new creative products, knowledge popularization and functional tours.

5.1.1 It Builds Digital Memories of Carvings with the Help of Digital Storage

Through holographic photos, 3D physical scanning, 3D modeling, digital painting and other technologies, we collect and organize the holographic data of the carving decorations of the traditional villages in the region, and use 360° VR panoramic technology according to the classification and technical difficulty requirements, so that the typical architectural components of the carved heritage turn into digital resources that can be moved and stored permanently. It exists in a mini-program as retrieved at any time. Besides, it also integrates into people’s daily media behavior, constructs the digital representation of cultural memory, and realizes the continuation of culture.

5.1.2 Based on Intelligent Development, Digital Expression is Broadened

Using big data technology, we can provide the audience with modules that match their interests, and the display of architectural and carved cultural heritage is not only limited to stereotypical displays, but also excavate the common contents of the architectural and carved heritage of the traditional villages in the region, and present them in a thematic form to better experience the background stories of the exhibits and the cultural symbiosis connotations therein. According to the path of visit and stopping data, digital commemorative stamps of the buildings are issued for the audience to save or share,

expanding the picture of memory and reproducing cultural meaning in dissemination [10]. In the process of broadening digital expression, it is necessary to consider factors such as emotion and temperature, design carving puzzle games, pay attention to combining the audience's aesthetics and thinking, enrich the interactivity and entertainment of the digital preservation platform, explore creative digital cultural texts, and provide a more intelligent mode of cultural memory.

6 Conclusions

The traditional village architecture in the Lanzhou region is the product of the inter-embedded pattern of Chinese ethnic groups in the geographic and spatial distribution, economic activities, and symbiotic intermingling of multi-ethnic cultures, which constantly influence, complement and infuse each other. It is a rich cultural gene of the traditional village architecture in the region. It is important to let the memory of the carving decorations that have been protected in the area be re-interconnected and interact with the people through the digital integration of the inheritance path, so as to realize the experience-based, scenario-based and intelligent communication, and help the added value of the traditional village architecture culture and the local economic development, thus realizing the international communication of Chinese architectural decoration culture.

Acknowledgements. Fund Project: Supported by the Fundamental Research Funds for the Central Universities (No: 31920210086).

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