

Lively Lineage of Daur Traditional Dwellings Based on AR Technology

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Abstract:

As a new technology rising in recent years, AR technology has been widely used in other fields. Based on the characteristics of AR technology, this paper discusses how to integrate the architectural characteristics, structural characteristics and cultural connotation of Daur traditional dwellings with AR technology, and analyzes the role of AR technology in the inheritance and protection of traditional culture.

Keywords:

AR Technology, Daur Traditional Dwellings, Wooden Frame Structure, Lively Linkage

1. Introduction

AR technology is gradually integrating into people's life, such as national defense application and Alipay activity page. At the same time, it has played a great role in the protection of tourism and traditional culture. Having been widely used in major tourist attractions, AR technology has laid an important foundation for digital smart tourism. The purpose of this study is to integrate the cultural value of Daur traditional dwellings with and AR technology, making AR technology as the carrier of national culture communication, letting more experiencers get comprehensive cultural experience, promoting the national culture and tourism industry, and publicizing the unique customs of Daur.

2. Characteristics of the Daur Traditional Dwellings

Daur is one of the ethnic minorities in the north. The Daghur people live in the Greater Xing'an Mountains where there are rich timber resources all the year round, so the Daur traditional dwellings are dominated by wooden structures. Although the modern Daur residents retain the original layout, the main structure has been replaced by masonry, cement and steel. In addition, the original grass roof has also been replaced by the modern color steel roof, which lacks the original national characteristics, but some houses still retain the characteristics of having a large chimney beside, as well as the structure of the west window and the Weizikang inside the house.

2.1. Architectural Features

In terms of housing structure, the Daur traditional dwellings are similar to Chinese traditional wooden frame structure, namely, structure made of four beams and eight columns. The layout of the courtyard is similar to the three-section compound where there is a main room on the central axis, and two wing rooms or high footed warehouse on the east and west. There is a large chimney on the east and west sides of the main room about one meter apart. The neck of the chimney is of a small conical shape, higher than the roof. From the appearance of the house in the unit of room, it is an earthen house covered with a ridged grass. Viewed from the side, it is in the shape of “Jie”. There is one room between the four pillars and most Daur houses have two or three rooms, but a very small number of houses have five rooms. If there are two rooms, the bedroom is on the west side, and the kitchen is on the east side; if there are three rooms, the east and west rooms are bedrooms, and the kitchen is in the middle, and so on. The east and west rooms are equipped with large kang (also known as Weizikang) connected to the south, west and back. The west room is for the respected owner, where there are south windows and west windows. The opening of the windows is large to ensure sufficient lighting, which is one of the remarkable characteristics of Daur traditional dwellings. The whole house has about nine to ten windows. The east and west rooms are partitioned by the partition wall and the middle kitchen which opens windows from the south and the north respectively. The windows in the south are symmetrically distributed on both sides of the door. Some kitchens have four stoves at the four corners, and some have two stoves in the north.

2.2. Wooden Frame Structure

With rich wood in Greater Xing'an Mountains, most of the Daur traditional dwellings are made of air-dried pine, followed by birch and then poplar. The wooden frame structure is made of four beams, eight columns and five pillars. The roof is a five-purlin and five-pull beam-column structure system which is similar to the structural support characteristics of the yurt. The number of pillars is determined by the number of rooms, that is, six pillars for two rooms, eight pillars for three rooms, twelve pillars for five rooms, and so on. Each two pillars support a girder which is divided into single girder and double girder, one layer of girder for less than three beams, two layers of girder for less than five beams and three layers of girder for more than five beams; three girders in two rooms, four girders in three rooms, six girders in five rooms and two more girders in three rooms. Small uprights are built on the female beam: ten small uprights for two rooms, fifteen small uprights for three rooms, and twenty five small uprights for five rooms. After that, the rafters are built on the coffin beam and the main beam, with a distance of about one foot.

The pillars are buried two or three feet deep. The roots of the pillars are scorched by fire and wrapped in birch bark. Meanwhile, pour perilla oil into the bottom of the pit to better prevent the columns from corrosion which affects the bearing capacity.

2.3. Decoration Features

The Daur decorative patterns are diverse, which are used in many places in traditional dwellings, such as panes, partitions, kang edges, “T”-shaped wooden structural supports on the façade and wooden furniture. The patterns of the Daur panes are diverse and varied, such as grids, bars, diamond-shaped flowers, etc. composed of lattice bars. However, most people use mullioned windows composed of

simple and generous parallel vertical lines and flat mullioned windows composed of horizontal lines.

There are rich decorative patterns on the wood partition board and lintel of the four screens of the partition door. In addition to the Cordyceps in Manchu, the deformed Chinese characters “Fu, Lu, Shou, Xi”, Babao and Ruyi are the most common. The door leaf is divided into upper and lower parts, where the upper part is mostly pane structure. The panes are often connected by carved four treasures of the study or eight immortals, such as gourd, palm-leaf fan, lotus and bamboo board. The most common technique for the slab under the door leaf is *basse-taille*, that is, carve the vase full of flowers and grass in four seasons. The flower cluster is full and beautiful and the branches and leaves are dense and clear, which is quite the floral pattern style of Tang Dynasty. There are also patterns such as two mandarin ducks were tumbling merrily about in the water, magpies climbing branches, dragon and phoenix bringing prosperity, running horse and tiger dashing down the mountain. The wood board along the elevation of the kang is often decorated with painting or *basse-taille* related to hunting life.

3. Lively Lineage of Daur Traditional Dwellings with AR Technology

Augmented reality technology is a new direction of human-computer interaction technology which superimposes digital information such as virtual three-dimensional model animation, video, text, and pictures into the real scene in real time, and realizes natural interaction with real objects or users. AR technology has been combined with a lot of tourism resources and regional culture. In addition, it has achieved good protection and inheritance effect and realized the activation of traditional culture. For example, the small program of “playing in Forbidden City”, the AR detective game of “the mystery of the Song Dynasty City”, and the digital landscape of the Yuanmingyuan are all well publicized and protected. Therefore, the Daur traditional dwellings can also be protected by learning from the same technical means to achieve its own lively lineage.

3.1. Application of Technical Means

3.1.1. Smart Display Technology

First, the model is built by software such as Unity3D and then communicated by hand-held or intelligent mobile display, space display or head-on display. Mobile APP and AR glasses are the most common ones on the market, which can realize the interaction of various derivatives, and let people feel the construction process, history and culture and customs of traditional dwellings.

3.1.2. Registration Tracking Technology

This is also the focus of AR technology. First, 3D coordinates of virtual space and real space are registered to determine their relative position and orientation. Tracking technology is to establish a spatial coordinate system according to the user’s current perspective in the process of use, so that the virtual scene can be rendered to the accurate position in the real environment, and the two coordinates are perfectly integrated, making it possible to observe the details and structure of the model from multiple angles.

3.1.3. Virtual and Real Fusion Technology

The virtual content to be presented, including image, text, model, animation, etc., will be projected into the display area with the hardware equipment. During this process, the experiencer will see the superposition of virtual objects and real scenes in the display area at the same time, thus combining virtual with reality visually.

3.1.4. Human-computer Interaction Technology

The common ways are eye tracking, language recognition interaction, action gesture interaction and touch screen interaction, which can be realized by watching, speaking and touching. Touch screen interaction is the most common interaction mode at present.

3.2. Forms of Expression

3.2.1. AR Digital Map

Let people have a better understanding of the geographical location of the Daur traditional dwellings and the relationship with the surrounding buildings, make them intuitively feel the surrounding geographical environment factors and regional characteristics, make them understand the environment, architectural style, topography and representative buildings in advance, and increase their immersive experience.

3.2.2. AR Games

Make the experiencer carry out virtual construction and arrange interior furnishings through the form of mini games to strengthen their understanding of the architectural structure and characteristic furnishings of Daur traditional dwellings. In addition, attract the attention of adults and children and improve their interest in understanding traditional culture through the games. The AR games play the role of learning through play in inheriting culture.

3.2.3. AR Cultural And Creative Products

Extract the cultural elements and regional symbols of the Daur traditional dwellings, make bookmarks, pencil cases, folders, notebooks and other cultural and creative products, and place identifiable QR codes on the products. APP with AR technology enlivens the content of the plane and elements such as stories and explanations increase the interest of buyers. The AR technology does not only have the same basic functions as traditional packaging design, including conveying information, promoting sales, and increasing product value, but it can also reduce packaging costs and save physical materials. More importantly, it enhances the visual effect of commodity packaging, improves the user experience between consumers and packaging, improves the efficiency and interest of information acquisition, and expands the extension of packaging design in terms of product publicity and display.

4. Significance of Implanting AR Technology

4.1. Effectively Protect the Form of Daur Traditional Dwellings

The Daur traditional dwelling is mainly of wooden frame structure. After hundreds of years of hardship and the constant renewal of building materials, its original

appearance cannot be well preserved. However, the intervention of AR technology can effectively store and reproduce the architectural form, structure and characteristics of Daur traditional dwelling in digital form through virtual construction. Meanwhile, it can be stored in historical materials through the construction of AR technology or placed in local museums for protection and display, which can better retain its original appearance and distinctive interior furnishings, enhance the interactive experience of tourists, and better leave a deep impression in memory.

4.2 Increase the Spread of Regional Culture

AR technology can perfectly solve the conflict between cultural relic display and cultural protection. According to the real situation of cultural relic, including shape, size, specification and color, a virtual cultural relic with first-class appearance can be constructed in a virtual environment. AR technology can show people real objects and scenes in various forms, breaking the traditional static display form of cultural relics. Integrating augmented reality technology with virtual reality into cultural communication can better display cultural and creative products with regional characteristics and national unique life items to consumers, enhance the audience's audio-visual experience and enhance its display effect. AR technology gives cultural relics and cultural and creative products a powerful new media function of virtual and real integration, and interaction in diversified forms such as video and 3D animation, which brings unlimited possibilities to cultural relics display and cultural and creative products. On the one hand, in the face of a new generation of consumers seeking to stimulate their senses, the application of AR technology in this field has more effectively stimulated consumers' desire to buy, and on the other hand, it can effectively reduce the waste of materials.

5. Conclusions

AR technology plays a certain role in the activation of local culture, especially for the minority traditional culture which is being disappeared. For example, the AR technology implantation makes the traditional wooden frame structure of Daur traditional dwellings which are gradually fading out of people's sight well preserved and inherited, appear in modern life in various forms and shapes, and realize that traditional culture can live in the present.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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