



Hutong Impression: A Multimedia Display and Interaction System for Beijing Hutong Culture

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Abstract. With the deepening of multimedia application art design research, various computer-based media can be utilized as tools to design interactive works in response to the current crisis in the transmission of traditional culture. This paper uses art design software and the Unity engine to design and implement a multimedia display and interactive system with the theme of Beijing traditional hutong culture. Through forms such as text and images, videos, interactive pictures, and virtual tours, the system guides users to explore the history, architecture, culture, and daily life scenes of the hutongs. Users can browse and learn about the culture related to Beijing hutongs and deepen their understanding of hutong culture through 3D scene exploration.

Keywords: Multimedia Application Design, Beijing Hutong Culture, Interaction Design

1 Introduction

Currently, due to the impacts of urbanization and industrialization, traditional culture is at risk of erosion and forgetting. In recent years, with the development of multimedia technologies and interactive design, increasing attention has been paid to the integration of digital technologies with traditional culture. A survey conducted by Diaz Mendoza et al. (2023) revealed that 70% of publications employed technological means to assist in cultural preservation, with the most commonly used technology being 3D digital technology [1]. At the same time, the Unity engine has gained popularity due to its ability to easily implement interactivity and create visually rich content. For instance, Garcia et al. (2022) used the Unity engine to develop an online model viewer showcasing 3D models of various cultural relics, demonstrating the engine's capability to realistically restore traditional cultural content [2].

In this context, this paper presents the development of an interactive multimedia display system focused on the theme of Beijing traditional hutong culture, aimed at introducing the history, architecture, snack culture, and community life embodied in the hutongs. The display system firstly uses Adobe Photoshop for graphic design, and at

the same time uses Cinema 4D to produce 3D models. Finally, the Unity engine is employed to integrate the 2D and 3D materials and develop the program, providing users with an enhanced immersive experience.

2 System Content and Scenario Design

2.1 Content Design

The display system designed in this paper is named ‘Hutong Impression’, and its core idea is to introduce Beijing hutong culture through different forms, especially in the context of the challenges of hutong culture in the process of urbanization [3], to remind people to pay more attention to the traditional culture around them. With the change of time, Beijing has developed into an international and modern city, but at the same time, Beijing is also a city with a profound history. For most people, Beijing traditional hutong culture has only a relatively vague impression. Based on this vague impression, this paper uses a reasonable interactive form to give users a deeper understanding of Beijing hutong culture.

As shown in Figure 1, the display system designed in this paper is divided into two major modules, namely, the cultural popularization module and the scene tour module, which allow users to choose different interaction methods to understand the Beijing hutong culture according to their own needs. The cultural science module is mainly divided into three parts: historical origin of Beijing hutong culture, structure layout and humanities and customs. Users can choose to enter any part in the homepage, and learn about the content of each part in detail by reading the text, watching the video, and clicking the interactive cards. The scene tour module uses 3D digital technology to display Beijing hutong culture in an immersive way. Users can learn about the life scenes of the old Beijing hutongs in the 20th century as well as Beijing snack culture in this module.

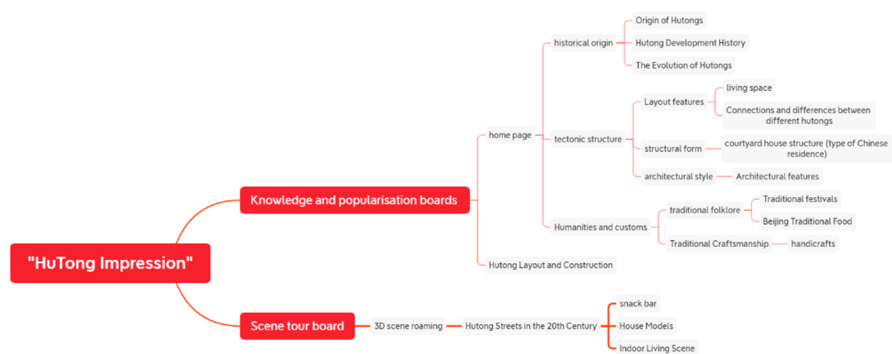


Fig. 1. The content framework of system

2.2 User Interface Design

In terms of art design, this paper takes 1920*1080 pixels as the interface design size to ensure that it can be compatible on multiple devices. During the design process, this paper refers to real-life hutongs and the public's impression of hutongs, which is dominated by green bricks and grey tiles, so that the interface and scene conform to people's impression as much as possible, and this approach not only meets the user's expectations, but also enhances the user experience through the attractiveness of the visual design [4].

As shown in the homepage presented in Figure 2, the interface design of this paper, the main tone as well as the font of the homepage are chosen to be grey, which is extracted from the wall color of the old hutongs in Beijing and then improved. The grey tone can well restore the vicissitudes of the old hutongs and the sense of historical weight, and at the same time, it is also in line with the overall design of the low-key introverted style. At the same time, there is a little bit of red in the screen of each interface, which comes from the red door of the courtyard of some rich families, symbolizing the joy and vitality of the hutong life, and adding a touch of bright color to the whole interface.



Fig. 2. Homepage and directory page

As shown in Figure 3, the interface of 'historical origins', in order to make the system more in line with the theme of 'Hutong Impression', in the selection of graphic elements for the interface design, this paper chooses things related to the hutongs and courtyards, such as the door piers, the door rings, the stone lions, and other familiar things in Beijing hutongs. In terms of the selection of graphic elements for the interface design, this paper chooses things related to hutongs and courtyards, such as door piers, door rings, stone lions, etc. People are more familiar with Beijing hutong elements, and they are distributed in the interface as function buttons, backgrounds, etc., which not only bring a sense of affection to the audience visually, but also make the whole content of the interface look richer. At the same time, in order to enhance the expressive power and tension of the interface, this paper adds a part of dynamic effects within the system, such as scrolls where there are scrolls unfolding animation, these simple dynamic effects, so that the interface is more vivid, so that the user in the browsing process will therefore feel more fun and surprise.



Fig. 3. The 'historical origins of hutongs' interface and video playback interface

2.3 Interaction Design

As shown in Figure 4, in the 'structure layout' module, there is an interactive illustration of a courtyard. The interactive points on the picture prompt the user to interact with it by glowing outside, and the user can interact with it and learn about the history of the hutongs by moving the mouse to the glowing area or clicking on the area. At the same time, users can click the video play button and the layout switch button on the right to open the video and switch between the introduction of the layout of the courtyard and the introduction of the architectural features of the courtyard, and the icon will have an enlarged effect when the mouse is moved over the icon to prompt the user to click on it.



Fig. 4. The 'structure layout' interface

3 Implementation of System Functions

3.1 Basic Interaction and 3D Scene Exploration Implementations

In this paper, this paper uses C# script to implement the basic operation functions of the system, such as button clicking, interface jumping, cyclic page turning, interface

jumping transition and other functions. In order to further enhance the user experience, this paper sets up a virtual scene of hutong for users to experience. At the same time, in order to integrate more cultural elements of Beijing into the scene to make the experience more authentic, as shown on the right side of Figure 5, the scene restores some of the old Beijing hutongs common snack bars, etc., in order to enable the user to experience Beijing's hutong culture in an immersive way. Users can tour the whole scene by keyboard and mouse or touch screen, and explore every corner of the hutongs accompanied by the background sound of the old Beijing hutongs. In this paper, there is also an automatic tour system, as shown by the green line in the scene on the left side of Figure 5, which is the automatic tour route. The system will automatically take the user to visit all the scenes of the whole hutong and finally return to the starting point.

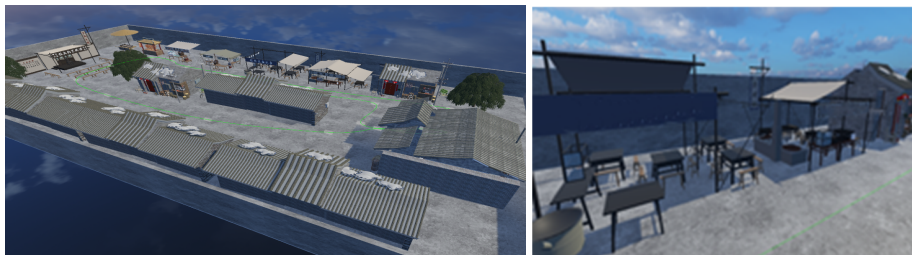


Fig. 5. 3D scene navigation route and snack stall models

3.2 3D Scene Interaction Implementation

As shown in Figure 6, in the ‘humanities’ module, this paper sets up a three-dimensional scene, users can interact with different items in the scene, such as clicking on the ‘sewing machine’, it will pop up the relevant introduction card, clicking on the two-eight kongs, it will pop up a GIF window. Clicking on ‘radio’ will allow users to choose what kind of yells to listen to. This interactive environment can effectively enhance users' understanding of and interest in the content [5], and attract more users to learn about the life of the people in old Beijing in the 1980s. life.

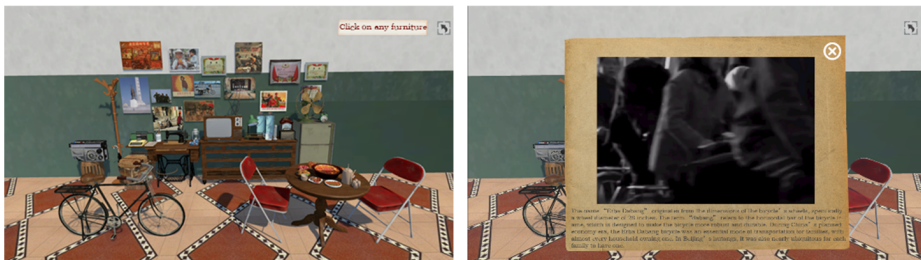


Fig. 6. Introduction to two-wheeled cart and the ‘humanities’ interface

4 Conclusion

This paper designs and develops a multimedia display and interactive system themed around Beijing hutong culture. Through excellent visual design and interactive design, the relatively vague concept of Beijing hutongs is made tangible, reminding the public to pay attention to traditional Chinese culture, including Beijing hutong culture. The combination of interface interaction and 3D scene exploration enhances the user experience, while the consistent artistic style and attention to detail further improve the user experience.

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