Design and Implementation of Shaanxi Intangible Cultural Heritage Platform

Shiqiu Fu* and Shuangming Wang

ShaanXi Technical College of Finance & Economics, Xianyang, China
*fsq@scy.cn

Abstract. Develop a Shaanxi wheat straw painting intangible cultural heritage platform with the IdeaVR engine. The platform adopts 3DMAX, 3D scanning, a virtual engine, and other technical means. The platform explores the realization method of the virtual inheritance platform around key links such as demand analysis, architecture design, digital resource database establishment, UI interaction design, technology implementation, release, and operation. The platform aims to build a resource-rich and interactive virtual platform, and promote the development of intangible culture and skills.

Keywords: IdeaVR Engine, Wheat Straw Painting, Platform.

1   Introduction

VR technology has a wide range of applications in intangible cultural heritage (hereinafter referred to as "ICH"), and VR technology can be seen in virtual exhibition halls, ICH publicity, and other aspects. VR technology can present ICH in a variety of colors and can record the production process and technical process of ICH so that users can better understand and protect ICH through real-time interaction and an interactive experience. [1] Taking the design and implementation of the Shaanxi wheat straw painting ICH virtual platform as an example, this paper combines ICH traditional culture with VR technology to build an ICH craft VR platform. The platform allows users to better understand, protect, and pass on ICH.

Shaanxi is a major historical and cultural province in China, with intangible cultural heritages such as straw paintings, clay sculptures, paper cuttings, and social fires. Cultural relics, canonical books, traditional performances, folk activities, rituals, festivals, traditional handicraft skills, etc., are of high research and conservation value. Among them, 65 items such as straw paintings, clay sculptures, woodblock prints, embroideries, social fires, and paper cuttings have been selected for the protection of ICH at the national, provincial, and municipal levels, and 60 people have been identified as representative inheritors at the national, provincial, and municipal levels.

At present, the protection of ICH in Shaanxi still needs further improvement. Although local governments at all levels, civil society groups, and universities in Shaanxi have attached great importance to the inheritance and development of ICH, and have achieved the protection and inheritance of various types of ICH by carrying out various

types of ICH activities, building ICH venues and bases, cultivating new generations of inheritors, etc., the protection and inheritance of ICH are still in need of further improvement. However, the way of passing on the real ICH skills still relies on the traditional master-apprentice system of oral transmission, which is far from the way of learning of modern young people, and is not conducive to the passing on and development of ICH skills in the new era [2].

Straw painting is an art form and craft made from straw. The craft originated in ancient China in the central region and is a purely handmade folk art. Straw paintings are made from the stalks of wheat, and are finely crafted into works of art while maintaining the natural colors of the stalks. It is a kind of art that includes painting, paper-cutting, printmaking, and various folk handicrafts. [3] From the perspective of digital inheritance and conservation of ICH, the inheritance and development of Shaanxi Straw Painting ICH are studied by combining VR/ AR technology. Exploring the path and method of applying the IdeaVR engine technology to straw painting in Shaanxi not only broadens the research field of straw painting in Shaanxi and provides a new way of thinking for the inheritance of the ICH craft, but also makes the construction of the VR visualization platform conducive to the sustainable development of the ICH.

2   Information Acquisition and Processing

2.1   Information Acquisition

The main methods of data collection and acquisition are network research, book reading, field assessment, and other methods. Through reading much relevant literature on straw paintings, we obtained the relevant content of the production process of straw paintings and analyzed the production process of ICH straw paintings in detail. Summarize and sort out relevant data, use digital storage, and save the processed data in a format for filing.[4]

2.2   Information Processing

Pictures and videos are mainly obtained by shooting, network search, book scanning, and third parties. Keep high-definition pictures for easy identification. The production process of straw painting is in the form of dynamic animation, which is drawn using Photoshop. The whole production process is completed by hand. These processes can be displayed with dynamic pictures, played by PS frame by frame, and saved in GIF format. Image processing uses Flash or Adobe Premiere Pro to edit and adjust the video effect.

3 Design and Implementation of Platform

This paper takes Shaanxi straw painting ICH as an example to build a Shaanxi ICH information database and a Shaanxi ICH virtual platform. Let users immerse themselves in ICH skills and more intuitively and deeply understand the origin, inheritance, and development of ICH culture [5].

3.1 Design of Platform

Requirements Analysis. The construction of the Shaanxi straw painting ICH VR platform aims to enable users to experience the charm of Shaanxi straw painting ICH through VR technology through realistic situations and humanistic interaction. According to the user's demand for the ICH virtual platform and system function expectations, the system functions of the Shaanxi straw painting ICH virtual platform include mobile terminal support, virtual 3D display, etc.

Overall Design. In order to improve the interaction between modules, the coupling between modules is reduced. Shaanxi straw painting ICH virtual platform uses C/S architecture, server development platform uses Apache and MySQL, and client development platform uses IdeaVR engine. This design method has good scalability, which is conducive to the expansion and maintenance of later functions, and can quickly integrate other functions [6]. The overall design of the Shaanxi straw painting ICH virtual platform is shown in Fig. 1, including the data layer, service layer, and customer layer. The data layer is mainly the digital data of Shaanxi straw paintings in the form of text, pictures, digital images, etc. The service layer is completed through the IdeaVR engine's 3D model import, scene building, attribute setting, blueprint design, and script writing. Its function is to display straw paintings using 3D panels, object attribute parameters, etc. The display devices are mobile phones, VR devices, computer terminals, etc. The functions of the customer layer are third-person roaming, automatic pathfinding, product display, interactive communication, etc.
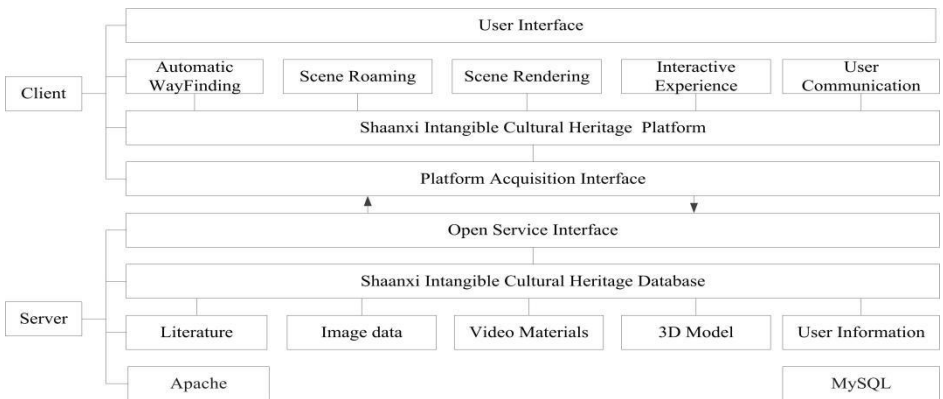

Fig. 1. Overall design of the platform.

Development process. There are four steps to developing the client of the Shaanxi straw painting intangible cultural heritage platform: first, obtain the data related to straw painting; second, deal with the relevant data of straw paintings; third, import the data of straw paintings into the IdeaVR engine to achieve the corresponding display and interaction functions; and finally, IdeaVR runs the test and distributes the output of the Shaanxi straw painting intangible cultural heritage virtual inheritance platform. The process is shown in Fig. 2 [7].
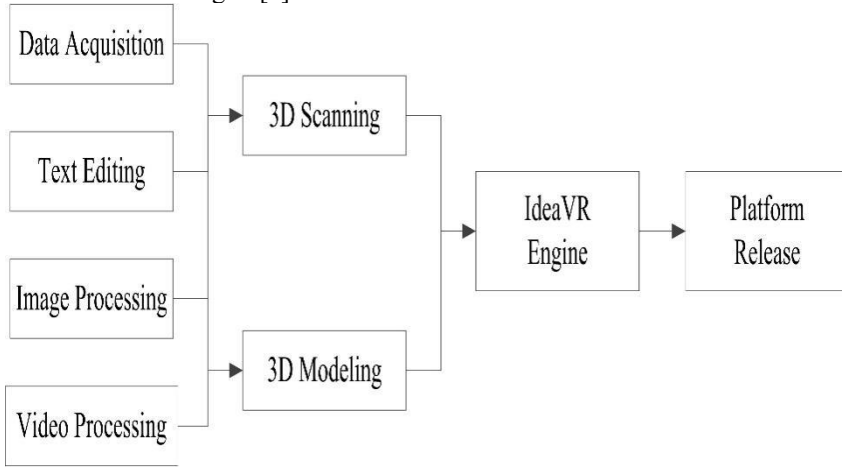

Fig. 2. Client development process.

3.2   Implementation of Platform

Virtual scene construction. Virtual scene construction. According to some existing high-quality Shaanxi wheat straw paintings, 3D scanners are used to scan the real objects, and 3D data are obtained, refined, and restored to obtain the 3D models involved in the ICH platform of Shaanxi wheat straw paintings that are exactly the same as the real objects. You can also use 3DMax and other software to draw maps based on real image materials.

Export the FBX file of the 3D model with the IdeaVR engine and build the virtual scene of Shaanxi straw painting according to user needs and platform design. The scene of the entire virtual platform adopts the classical architectural style of Han and Tang dynasties, so that users can visit the scene of Han and Tang dynasties and truly feel the charm of Shaanxi straw painting ICH in the process of interactive experience.

PC terminals, mobile terminals, and VR devices are common tools for immersive interaction. Immersive interaction requires not only two-dimensional interaction modes such as mouse and keyboard but also three-dimensional interaction modes such as trigger collision and handle trigger [8]. Text display, PPT and video playback, work appreciation, etc. are relevant contents of Shaanxi wheat straw painting intangible heritage virtual inheritance platform. Using IdeaVR's multimedia, plane controls, trigger areas, etc., you can achieve interactive effects such as Button, peripheral triggers, etc. The

interactive types involved in the Shaanxi wheat straw painting intangible heritage virtual inheritance platform are shown in Table 1.

Table 1. The interaction type of the platform.

Interactivity Type	Interactive Device	Interactive Function
UI interface	Buttons, etc	User login and visit method, virtual character selection.
Multi-media	Graphic, audio, video, etc	Various information, such as the history of wheat straw painting.
Flat controls	3D panels, 3D buttons, etc	Click on the image to bring up a 3D panel to display all kinds of information.
Trigger area	Handle, etc	Use the VR handle to pick up tools and experience crafting.
Pathfinding guidance	Route guidance, etc	Arrows guide the user in the direction of the tour.

The design of Shaanxi straw painting intangible cultural heritage platform not only allows virtual display but also allows users to learn intangible cultural heritage through text, pictures, videos, and other forms. Users can also learn the production process of straw painting through a VR interactive experience and the production skills of Shaanxi straw painting. The platform will pick up and use various tools in the production process of straw painting and create an interactive experience through the production skills so that users can use buttons to learn production skills in the form of space trigger.

The interactive experience of Shaanxi straw painting design is mainly the animation production and triggering of virtual characters. 3DMax software is used to create 3D character models, and tools are used to create animations of pattern designs. After exporting FBX files, they are imported into the IdeaVR engine, and the animation is played by means of the spatial trigger function of IdeaVR engine and VR handle.

3.3   Platform Release

Select Export in File, select the required system platform in the export window, set the export path and file name, and select Export Path to export and publish Shaanxi Wheat Straw Painting ICH Platform.

After the file is exported, click "EXE" to run the file, run and test the scene, UI interface, VR interaction effect, etc. of "Shaanxi Wheat Straw Painting ICH Platform", and carefully correct the existing problems.

4   Conclusion

According to the actual needs of Shaanxi intangible cultural heritage protection, this paper designs and implements the Shaanxi wheat straw painting intangible heritage platform. On the basis of functional analysis, it designs the platform architecture and

development process and analyzes the design essentials, key technologies, and presentation effects of Shaanxi wheat straw painting ICH platform from the aspects of three-dimensional model construction. With the continuous development of virtual reality and other technologies, the Shaanxi straw painting ICH platform will also be more widely used.

References

1. Sun Meili, Zeng Peifeng, and Chang Yong.: Design and implementation of a virtual simulation experimental system based on IdeaVR. [J] Journal of Liberal arts college (Natural Science Edition) 24 (1), 34-41 (2021).
2. Liu Weihong, Li Yusheng and Meng Jianbing.: The development process and strategy of a hydraulic virtual simulation experimental system based on IdeaVR technology. [J] Manufacturing Automation 42 (3), 36-39 (2020).
3. Zhang Yating, Guo Mingqiang and Huang Ying, et al.: Design and implementation of an intangible cultural heritage inheritance system based on WebGIS. [J] Geospatial Information19 (8), 103-105+6 (2021).
4. Wang Jianlei.: Design and implementation of Suzhou intangible cultural heritage inheritance platform based on IdeaVR engine [J] Modern Information Technology 23 (5), 6-11 (2021).
5. Pei Miaoran.: The development and promotion of wheat straw painting in Shaanxi intangible cultural heritage [J] Cultural Industry 12 (8), 21-23 (2021).
6. Tang Xiaoying, Qu Xuelan and Xie Danni.: Application and research on the design of Guangfu furniture "Paper Museum" based on AR technology [J] Packaging Engineering 39 (4), 115-122(2018).
7. Banfif, Brumana, R and Stanga, C.: Extended reality and informative models for the architectural heritage: from scan-to-BIM process to virtual and augmented reality [J] Virtual Archaeology Review 10(21), 14-30 (2019).
8. Liu X M.: Research on construction method of robot motion scene based on virtual reality interaction [J] Artificial Intelligence and Robotics Research 8(3), 166-182 (2019).