

# All-round robots inherited from intangible cultural heritage -- taking Guizhou's "Thousand-Household Miao Village" as an example

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## Abstract

**This study aims to deeply explore the application and impact of the intangible cultural heritage all-purpose robot and its supporting APP in rural tourism. Through case analysis, theoretical discussion and data statistical analysis, it is expected that the smooth implementation of this project can bring significant economic benefits to rural residents. Increase revenue while promoting and inheriting intangible cultural heritage, improving tourists' travel experience, and thereby enhancing the reputation of the local tourism industry. This study will provide useful reference and reference for the innovative development of rural tourism.**

## Keywords

**Intangible cultural heritage all-purpose robot, APP, Rural tourism, Economic income increase, Cultural inheritance.**

## 1. Introduction

With the rapid development of science and technology, robotics technology has gradually penetrated into various fields, bringing great convenience to people's lives. In the field of rural tourism, the intangible cultural heritage all-round robot and its APP, as an innovative application method, are not only expected to bring new growth points to the rural economy, but also have important value in the inheritance and popularization of intangible cultural heritage. This study will deeply explore the application and impact of the intangible cultural heritage all-round robot and its APP in rural tourism, in order to provide useful reference and reference for the innovative development of rural tourism.

## 2. Research Background

In recent years, the protection and inheritance of intangible cultural heritage has become one of the hot topics of social concern. We must do a solid job in the systematic protection of intangible cultural heritage, better meet the people's growing spiritual and cultural needs, and promote cultural self-confidence and self-reliance. Ethnic minority villages have become an important part of China's tourism industry with their profound cultural heritage and unique geographical location. More importantly, many intangible cultural heritages (hereinafter referred to as intangible cultural heritage) were born in ethnic minority villages. If we can reasonably carry out high-quality development of ethnic minority villages and use scientific and technological intelligence, it will not only drive the development of the local economy, but also pass on the intangible cultural heritage, help rural revitalization, and further enhance our country's cultural soft power, enhance the cohesion of the Chinese nation and the influence of Chinese culture, and promote Chinese culture to better go global.

At present, many ethnic minority villages have basically become 4A-level or above scenic tourist areas. The combination of quaint traditional architecture and modernization allows tourists to feel the charm of Chinese culture that has spanned thousands of years. Take Qianhu Miao Village in Guizhou as an example. This ethnic minority village, where almost all Miao people live, still retains the unique local Miao culture. In 2007, Xijiang Qianhu Miao Village was selected as one of the 15 "Chinese Scenic Villages". In August 2012, Xijiang Qianhu Miao Village was selected into the fifth batch of national cultural industry demonstration bases. In July 2017, Xijiang Qianhu Miao Village was selected into the list of units to be recognized as "China's Excellent International Rural Tourism Destinations". Qianhu Miao Village has become one of the must-see attractions for tourists to Guizhou, but while becoming famous, the problems of Qianhu Miao Village have also been exposed. First, the museum's publicity model is single. In today's digital age where the Internet and new media are prevalent, almost all exhibition halls in Qianhu Miao Village are single "exhibits + text introductions", lacking immersive interactive experience, which is easy for tourists to forget; secondly, the handicraft production efficiency of Qianhu Miao Village is low, and the skills are seriously lost. In the context of the digital economy, more people choose to use mobile phones to buy handicrafts. At present, Qianhu Miao Village still uses traditional sales methods. Tourists can only go to scenic spots to buy handicrafts with Miao style, which has prevented the excellent intangible cultural heritage of the Miao people from being truly spread. If we can use digital technologies such as big data, artificial intelligence, and the Internet to innovate publicity and production methods, perhaps the national culture of Qianhu Miao Village can be diversified.

### 3. Research objectives and main contents

#### 3.1. Research objectives

- ① Implement the idea of the intangible cultural heritage all-round robot and design related finished products;
- ② To test the feasibility of using the intangible cultural heritage all-round robot in the promotion of the intangible cultural heritage of ethnic minorities in Qianhu Miao Village, Guizhou;
- ③ Explore how to integrate environmental protection concepts into the design of intangible cultural heritage all-round robots;
- ④ This paper explores the methods of combining big data with the development of intangible cultural heritage in Qianhu Miao Village, Guizhou, so as to solve some problems encountered by Qianhu Miao Village in cultural inheritance and development, and promote the development of local culture and economy.

#### 3.2. Main content

Relying on the relevant intangible cultural heritage content included in Guizhou Qianhu Miao Village, we developed the intangible cultural heritage all-round robot and the online APP it relies on. This part is divided into three steps:

- (1) We distributed 300 questionnaires to understand the current problems faced by Qianhu Miao Village in Guizhou, people's familiarity with this ethnic minority intangible cultural heritage, and their demand for related intangible cultural heritage handicrafts, and conducted relevant data analysis and summary.
- (2) Start the research and development of the intangible cultural heritage all-round robot. Based on the previous survey results and the relevant conclusions drawn from the data analysis, determine the data resources for the intangible cultural heritage cultural introduction and teaching-related functions of the intangible cultural heritage all-round robot. Use robot cloud service technology, perception, computer vision and other related technologies for intelligent

robot manufacturing to develop and test the intangible cultural heritage all-round robot and find out the most environmentally friendly new energy as the power source of the robot through multiple experiments.

(3) Carry out online control and monitoring of the intangible cultural heritage all-round robot and develop a multi-functional APP for the online handicraft mall. Relying on computer technologies such as Python algorithm and C language, the background control and monitoring functions of the APP are realized.

The functions of the intangible cultural heritage all-round robot mainly include the following aspects:

a.Video playback function: there will be a display screen on the top of the robot's head, which is used to play explanation videos about relevant intangible cultural heritage and handicraft production.

b.Multi-mode autonomous selection , using python algorithm and other technologies to realize the robot's multi-mode system and achieve free selection between modes.

c.The operation function inputs the code into the robot system through programming and other technologies to form operation instructions, so that the robot can independently complete the production of intangible cultural heritage handicrafts.

d.Intelligent recognition function : when the robot detects the presence of tourists, it automatically selects the teaching mode in the multi-mode to provide tutorials on intangible cultural heritage and handicraft production. When there are no tourists, it automatically selects the production mode to produce handicrafts.

e.The cloud data transmission function and remote control function , through the relevant application of Internet technology, enable the robot to realize the function of transmitting data from the cloud to the APP. When the robot fails, the data can be fed back to the programmer in time, and the background APP provides remote operation to control the robot.

The entire operation process is as follows: the programmer remotely controls the robot - the robot operates (detects the presence of the organism and starts to select the operating mode) - tourists learn about the relevant culture and handicraft production knowledge (teaching mode) - the robot makes handicrafts (production mode) - the production data is transmitted back to the background APP - the APP online mall displays the existing number of handicrafts - users conduct relevant online transactions, purchase handicrafts, and form a closed transaction loop.

## 4. Innovations and Project Features

### 4.1. Innovation

#### 4.1.1. Innovation of research technology

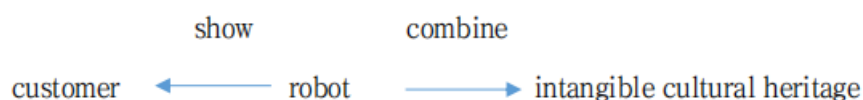


Figure 1: Technological innovation flow chart

First, by integrating intangible cultural heritage into robots, the robots can display handicrafts, enriching the exhibition scenes and methods, giving visitors a better experience and a sense of freshness. Starting from the cost, technology, and characteristics of robot operation, the

intangible cultural heritage is perfectly combined with robots, and successful cases at home and abroad are sorted out to provide suggestions for our research direction.

Secondly, the superiority of robotics technology is applied to the protection of intangible cultural heritage, achieving innovation and sustainability in the protection of intangible cultural heritage.

#### 4.1.2. Innovation in research content

This project studies the development trends in the future, how to combine the protection of intangible cultural heritage and rural revitalization to make them complement each other . The widespread application of intelligent robots will become a trend of future development. Proper integration of robots into intangible cultural heritage will greatly promote the development of both.

#### 4.1.3. Innovation in research methods

This project adopts a combination of multiple methods in research methods . The research method is novel and unique, that is, it is based on literature research method, supplemented by questionnaire survey method, and focused on case study method, to explore how to use robots to promote the protection of intangible cultural heritage and rural revitalization, and innovate production methods.

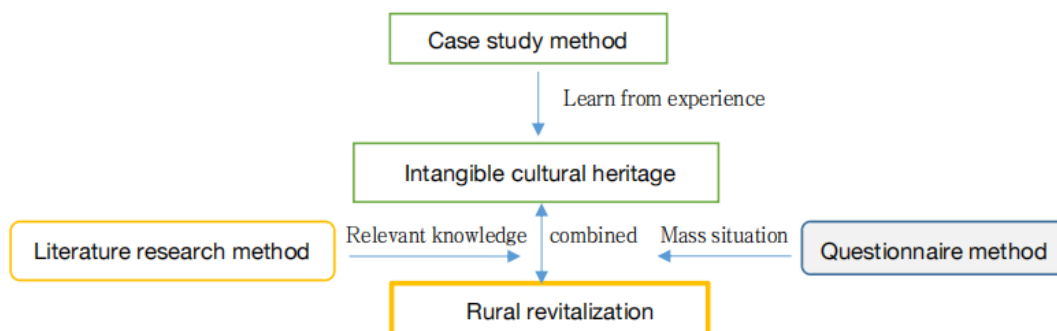


Figure 2: Method innovation flow chart

### 4.2. Project Features

Innovative study focusing on the theme of "how to combine modern technology with traditional intangible cultural heritage and promote rural revitalization while inheriting intangible cultural heritage". It explores the development space and influencing factors of the project strategy in specific implementation from a practical perspective. In addition, when using technology to assist, that is, using robots to penetrate the intangible cultural heritage market, it will use a combination of online questionnaires and field interviews to obtain preliminary data on whether multi-mode and multi-structure adjustments are needed, whether changes need to be made in terms of technology costs, and how to accurately transmit background data. This ensures the public recognition of the project and the feasibility of the project.

## 5. Technical route, problems to be solved and expected results

### 5.1. Technical route

The team develops technical software that supports the interconnection between the backend app and robot data.

① There is an LCD electronic display screen above the robot , which can play the teaching video of the handicrafts being made by the robot (with explanation text ). At the same time, the robot has teaching mode and production mode. Visitors can choose the teaching mode and choose

their favorite products. The electronic display screen will play the corresponding teaching video and help make handicrafts. On-site teaching, after the teaching mode ends, it can automatically switch to the production mode and start producing handicrafts according to the programming program . When in the production mode, the electronic display screen will stop playing the video to reduce power loss. The robot has high production efficiency and a high degree of autonomy, which can increase production, improve product quality and reduce manpower input .

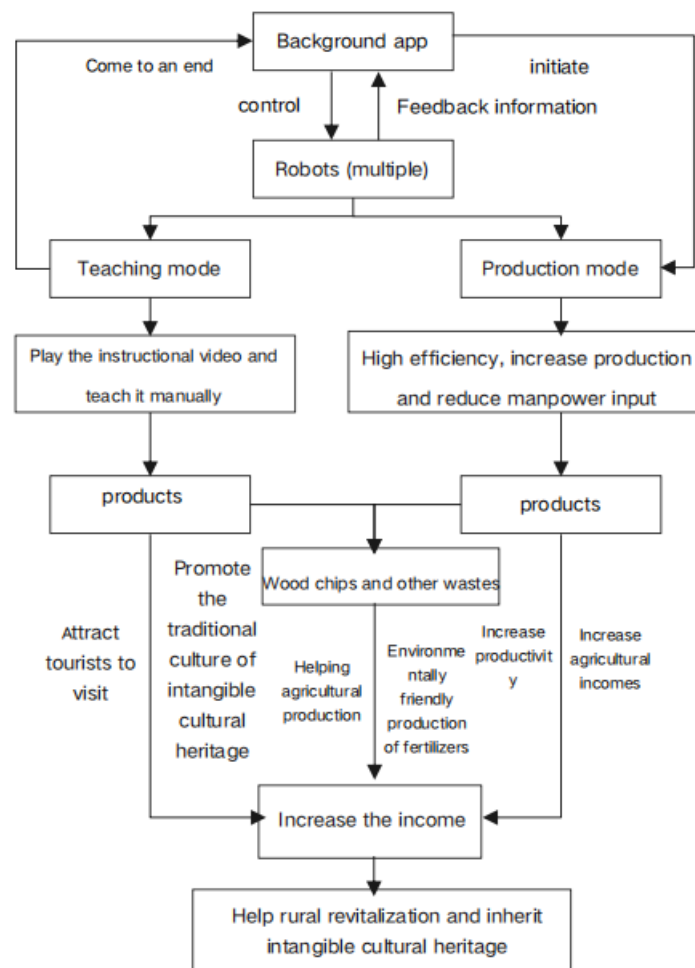


Figure 3: Non - heritage universal robot function flow chart

② Every time the robot produces a product , it will automatically transmit the data to the background app, and the background app will automatically update the database . As long as the demander downloads the app and selects "online ordering", they can directly place an order to purchase the handicrafts they like. Online purchases increase sales and solve the problem of villagers seeking companies to order products and difficulty in sales. At the same time, the use of artificial intelligence production methods greatly improves production efficiency . The inclusion of traditional intangible cultural heritage skills in the database can preserve and pass them on well. While inheriting intangible cultural heritage, this project helps rural revitalization, increases the income of local villagers, and uses robot production to solve a series of problems such as the loss of intangible cultural heritage skills.

③ During production, carved handicrafts will generate some sawdust and waste. After production is completed, the robot will automatically suck them into the storage bin for storage, and then the staff will take them out and put them into local agricultural production as fertilizer.

This is not only environmentally friendly and pollution-free, but also increases agricultural production income, improves resource utilization, and achieves sustainable green development.

Non-heritage universal robot and its app functions and processes:

## 5.2. Problems to be solved

① Protect and inherit China's intangible cultural heritage and traditional handicrafts, meet the people's entertainment needs for excellent traditional culture, solve the development problems of rural tourism after the epidemic, and use modern technology to inject new impetus into China's rural cultural tourism industry.

② Promote rural revitalization, solve the problem of insufficient driving force for rural development, promote the "sunset red" of rural tourism, develop local handicrafts and agriculture through tourism, increase local visibility in the market, and promote the innovative development of emerging rural enterprises.

③ Promote green and environmentally friendly development, alleviate the problem of rural agricultural fertilizer supply through waste utilization, reduce production costs, improve resource utilization, enhance product competitiveness, and promote green and sustainable development.

## 5.3. Expected results:

The smooth development of the intangible cultural heritage all-round robot and its app can support the subsequent software development and increase residents' income, expand production, and effectively increase rural residents' income by ten percentage points in one year. It can also purchase new machines and develop new technologies. In the process of encouraging tourists to make handicrafts, it promotes and inherits the intangible cultural heritage, improves the popularity of excellent traditional culture, and improves the enrichment and satisfaction of tourists' travel, thereby improving the reputation of the local tourism industry. If the intangible cultural heritage all-round robot and its app are put into use smoothly, the coverage rate of rural tourism areas in the country will reach 60% within five years of use, and the monthly income will be sufficient to support the maintenance and service expenses of the robot and its products. It is expected to successfully pay back within three years of use.

## 6. Analysis of existing foundation and conditions

The implementation of this project relies on the Guizhou government's emphasis on the protection of intangible cultural heritage, as well as the good local economic foundation and the number of tourists. Specifically, the existing foundation and conditions include the following aspects:

**Political conditions:** The "Implementation Opinions on Further Strengthening the Protection of Intangible Cultural Heritage" issued by the Guizhou government has laid a good political foundation for the implementation of the project. The opinions propose to improve the intangible cultural heritage protection and inheritance system and strengthen the protection of intangible cultural heritage intellectual property rights, providing policy guarantees for the implementation of the project.

**Economic conditions:** The Guizhou government not only set up special protection funds, but also strongly encouraged and guided financial institutions to strengthen financial services for intangible cultural heritage and participate in the protection and inheritance of intangible cultural heritage. At the same time, intangible cultural heritage-related industries can also enjoy tax incentives in Qianhu Miao Village. These economic measures provide financial support for the implementation of the project and reduce the economic risks of the project. In

addition, since the Qianhu Miao Village was renovated in 2008, the number of tourists has continued to grow, and tourism income has been considerable, providing a good economic foundation for the implementation of the project.

Technical conditions: With the advent of the big data era, various scientific and intelligent technologies have gradually matured, providing technical support for the implementation of the project. For example, the first Shenzhen Cultural Expo used AI technology to produce hundreds of short videos, pushing news broadcasts and exhibits to the entire network, and replacing manual live broadcasts with novel "digital people". These technologies have broad prospects in the application of intangible cultural heritage all-round robots and their APPs.

However, there are still some challenges and limitations: First, Internet technology has not been fully integrated with Qianhu Miao Village. Compared with other popular scenic spots, this high-end digital technology has not been fully introduced to Qianhu Miao Village. These Internet companies are generally active in cities with developed digital economies such as Beijing, Shanghai, Guangzhou and Shenzhen, and rarely pay attention to scenic spots like Qianhu Miao Village that are famous but gradually unable to keep up with the development of the times; second, there is a lack of talent resources. In the design of cultural and creative products, we lack designers who not only understand the local culture and customs very well, but also have an innovative spirit and can produce exquisite products that reflect the Miao culture. These challenges and limitations need to be paid attention to and resolved during the implementation of the project.

## 7. Solutions and Strategies

In response to the above challenges and constraints, this project proposed the following solutions and strategies:

### 7.1. Strengthen the integration of Internet technology and Qianhu Miao Village

By making promotional videos of Qianhu Miao Village and other means, we can increase publicity efforts, show its potential, attract Internet companies to cooperate with Qianhu Miao Village, and jointly promote digital development. Specifically, we can cooperate with Internet companies to develop an exclusive APP or mini-program for Qianhu Miao Village, providing functions such as tourist navigation, scenic spot introduction, and intangible cultural heritage display. At the same time, we can use Internet technology to digitally transform Qianhu Miao Village and enhance tourists' travel experience.

### 7.2. Launch cultural and creative product design competition to attract talents

We will use Weibo, Xiaohongshu and other online platforms to hold a design competition for cultural and creative products in Qianhu Miao Village, and set up prizes or bonuses to attract painters and designers with different styles to participate. Through the form of competition, we can discover and cultivate a group of designer talents who understand the local culture and customs and have innovative spirits, while promoting the diversified development of local cultural and creative industries and providing tourists with more tourist souvenirs with Miao cultural characteristics.

### 7.3. Strengthen the inheritance and popularization of intangible cultural heritage

As an important carrier for displaying and inheriting intangible cultural heritage, the intangible cultural heritage all-round robot and its APP need to be fully utilized in the implementation of the project. Through the robot's display and interactive links, tourists can experience the charm of intangible cultural heritage firsthand. At the same time, the APP can be used to provide

intangible cultural heritage courses or lectures, so that tourists can learn intangible cultural heritage knowledge during their visit and increase the popularity of intangible cultural heritage.

#### **7.4. Improve tourists' travel experience**

In view of the current situation of increasing tourist demands, this project will focus on improving tourists' travel experience. By optimizing the design and functions of the robot, the interactivity and fun of tourists will be improved. At the same time, the APP will be used to provide personalized travel services, such as customized travel routes, recommended special food, etc., to meet the diverse needs of tourists.

### **8. Conclusion and Outlook**

This study systematically explores the application and impact of the intangible cultural heritage all-round robot and its APP in rural tourism. It is expected that the implementation of this project will bring new growth points to the rural economy, while effectively inheriting and popularizing the intangible cultural heritage. Looking to the future, with the continuous advancement of technology and the expansion of application scenarios, the intangible cultural heritage all-round robot and its APP are expected to play an important role in more fields and contribute to the inheritance of China's intangible cultural heritage.

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### **References**

- [1] Wang Wenzhang. Introduction to Intangible Cultural Heritage [M]. Beijing: Culture and Art Publishing House.2006.
- [2] Song Junhua. Protection and Inheritance of China's Intangible Cultural Heritage [J]. Journal of South-Central University for Nationalities.2008 (4).
- [3] Li Xiu-ping. (2020). "Puppet robot" helps non-genetic inheritance. Journal of Rural Youth, (8), 34-37.