

## Application of Augmented Reality Technology in Daily Ceramics

--Take Jingdezhen freehand blue-and-white as an example

Xiong Ying

Jiangxi Science and Technology Normal University, Nanchang, China

cocapesi@126.com

**Keywords:** Freehand blue-and-white, Traditional culture, Daily ceramics, Ar technology

**Abstract:** Jingdezhen daily-use ceramics have fallen into the pattern in the process of ceramic industry reform, affecting their position in the industry. The return to local culture and the development trend of emphasizing traditional culture have brought a new pattern to the daily ceramic industry in Jingdezhen. Jingdezhen's freehand blue and white is the outstanding of traditional blue and white. It has many development opportunities similar to modern ceramic art. It not only integrates Chinese traditional cultural connotation and excellent painting patterns, but also meets the needs of the modern aesthetic market. As digital technology is widely used in Jingdezhen Among daily ceramics, the study of digital images and three-dimensional models of traditional freehand patterns in three-dimensional ceramics based on AR technology will bring new ideas to the development of daily ceramics in Jingdezhen.

### 1. Introduction

As a world-famous porcelain capital, Jingdezhen has a thousand-year history of porcelain that has established its ceramic art level and value in an important position in the world. However, in recent years, the traditional ceramic industry in Jiangxi has shown a trend of lagging behind. The survey data of the Jiangxi Provincial Light Industry Bureau shows that Jiangxi's ceramic industry was still ranked first in the country in the early 1990s[1-2], but in 2004 it fell to the sixth place in the country[3]. After recovering growth in recent years, by 2007 Jingdezhen was positioned as a production base for daily-use ceramics, forming an industrial pattern with daily-use ceramics and artistic ceramics as the mainstay, construction and sanitary ceramics, industrial ceramics, electronic ceramics and special ceramics[4]. With the acceleration of the digitalization of cultural resources, Jiangxi, as a strong province of Chinese ceramics, should make full use of the artistic elements of local ceramics-the characteristics of freehand blue and white, combined with virtual images of AR technology and three-dimensional tracking technology, in order to establish a strong local Jingdezhen The daily-use ceramics brand strives to increase the competitiveness and popularization rate of daily-use ceramics in the shortest possible time, so that its sales and status in the current era are invincible.

### 2. The Status of Freehand Blue and White in Daily Ceramics in Jingdezhen

Jingdezhen freehand blue and white porcelain painting is a very successful artistic ceramic element. It integrates the manual skills of Chinese painting, uses porcelain as paper, and draws blue pictures on it. The technique has the beauty of Chinese ink and wash, and the subject matter is rich. It inherits the excellent traditions of China. culture. Freehand blue and white is the only one of Jingdezhen's blue and white. Painting on daily-use ceramic products is a popular art form. From the early traditional freehand blue-and-white technique of folk artists spread to the application of modern daily-use ceramic art, it is a reference to Jingdezhen daily-use ceramics. A new leap in development, it has distinctive national and regional characteristics, and has injected lasting tension into the artistic expression level and field of Jingdezhen daily-use ceramics. Mr. Nobuya Kato, professor of ceramics at the Aichi University of Arts in Japan, commented: "Jingdezhen modern

folk Blue and white art has opened up a new path for Chinese ceramic art, and it is indispensable and can withstand the test of history.”

## **2.1 The Traditional Freehand Blue and White Painting Style of Jingdezhen Promotes the Artisticization of the Daily Ceramic Market**

With the prosperous national power, people's aesthetics and lifestyles have changed with the improvement of consumption levels, and changes in consumption concepts and product use environments. In the future development of the daily-use ceramics market, daily-use ceramics are not only daily lives. Supplies are also regarded as an important part of life home decoration. The standard applique technique makes the characteristics of Jingdezhen's daily-use ceramics unclear. The unified daily-use ceramics cannot meet the consumers' demand for modern ceramics. As pointed out in the report of the 19th National Congress of the Communist Party of China, “the main contradiction in my country's society has been transformed into a growing number of people. The contradiction between the need for a better life for growth and unbalanced and inadequate development.” Today, with the rapid development of design, the public's consumption concept of daily-use ceramics has been upgraded from pragmatism to unique design feelings. The design elements and design styles of daily-use ceramics have become the core competition in the daily-use ceramics market.

From the porcelain paintings of Jingdezhen, it is not difficult to see that painting is one of the important means to sublimate the practicality of ceramics. On the one hand, the application of ceramic painting to daily-use ceramics is not restricted by the shape of the utensils, on the other hand, it is more artistic in aesthetics. However, because they are painted on ceramics, there are differences in the techniques and expressions of pen materials. Therefore, there are many types of daily ceramic paintings in Jingdezhen. Jingdezhen's traditional freehand blue and white has a long history and is a wonderful flower in my country's excellent traditional culture. It uses a glazed surface as a base, combines different porcelain shapes and uses different decorative techniques. It has specific oriental attributes in terms of painting materials, painting themes and expressions. His painting art style has the abstract beauty of Chinese ink and wash, drawing on the freehand blue and white painting characteristics of less ink and more white, with more painting levels, showing a specific style. The artistic characteristics of the freehand blue and white painting style of Jingdezhen are expressed in the shape of the utensils. Whether it is the practical functional modeling of traditional daily-use ceramics or the “expressive modeling”, “abstract modeling”, “conceptual modeling” of modern ceramics, it can be perfectly combined. Transform aesthetics into a fusion of diversified tools and paintings. Looking for the artistic characteristics of freehand blue and white in the form of daily-use ceramics in Jingdezhen not only satisfies the aesthetics of consumers, but also embodies the combination of practicality and appreciation; it also speeds up the art of daily-use ceramics in Jingdezhen.

## **2.2 The Traditional Freehand Blue and White Painting Art Style of Jingdezhen is Suitable for the Individualization of Daily-Use Ceramics Market Demand.**

With the continuous advancement of technology, people experience the joy of new technology while being shackled by modern technology. People begin to pursue the nature brought by historical civilization and the return to hand-made creation, and pay more attention to individual needs. The natural and simple style expressed by the pure handwork of the traditional freehand blue and white porcelain painting is suitable for the current people's return to the simple and natural psychology, and the form is vivid, breaking the homogeneity of daily-use ceramics, and liberating the trend of daily-use ceramics. Personality development.

## **2.3 Jingdezhen's Traditional Freehand Blue and White Painting Content Meets the Nationalization of the Daily-Use Ceramics Market.**

The study and understanding of traditional blue and white not only has the function of inheriting culture, but also has important historical and educational significance. By interpreting traditional blue patterns, we can understand Chinese history and cultural traditions. Blue and white porcelain

developed and changed during the change and rise and fall of dynasties, and the traditional blue patterns also changed and developed, reflecting the cultural civilization, public opinion, social form and historical culture of different times. We can understand the historical culture, political economy, spiritual pursuit and aesthetic appeal of the society at that time through the interpretation of traditional blue patterns in different periods. You can also learn about famous historical events, allusions and folk tales through traditional blue patterns. Take the famous “Ghost Valley Downhill” blue and white pot in the Yuan Dynasty as an example. “It is a historical story from the “Warring States Policy”. During the appreciation, teachers can introduce blue and white porcelain jars to the students through more interesting storytelling. This will not only stimulate students' interest in blue and white porcelain, but also Allow them to understand historical allusions about the Warring States period. Chinese traditional blue patterns generally apply the thinking mode of “implication” and “seeking for completeness”. For example, the common pattern of “plum, orchid, bamboo and chrysanthemum” on blue and white porcelain vases not only allows students to copy and create utensils, but also learn traditional Chinese art. Culture, “Plum, orchid, bamboo and chrysanthemum” is painted on the vase, which has the meaning of “four seasons peace”, and also implies the upright and tenacious cultural tradition of traditional Chinese intellectuals. For another example, on many festive utensils during the Spring Festival, the patterns often drawn on the fruit box and fruit plate are mostly the Chinese people’s favorite symbolism in pattern design, such as “Happy Brows” (two magpies standing on plum blossoms), Shuangxilinmen (two conjoined characters for happiness), Zubaopingan (a cluster of bamboo), Wufulinmen (five bats surround each other). These graphics have mostly auspicious meanings and clever ideas. With the study of these patterns, you can Let students understand Chinese traditional customs and culture from multiple perspectives.

### **3. Application of Ar in Jingdezhen Daily Ceramics**

#### **4. 1 Augmented Reality Technology**

Augmented Reality (AR) is a technology that calls the device camera to recognize images and objects in reality, calculates the position and angle of the photographic image in real time, and loads virtual digital resources on the image. We use augmented reality technology to generate three-dimensional information in real time. First, use three-dimensional software to build a ceramic model through image collection, and then use an excellent APP, which allows us to appreciate the shape, structure, components, patterns and superb skills of traditional Chinese ceramics in 360 degrees. , The organic combination of augmented reality technology and Jingdezhen freehand blue and white not only digitally protects the freehand blue and white patterns, but also through the virtual interaction of myths, legends, and different patterns of patterns, we can obtain novel experiences and generate strong interest. Listen to the historical story and artistic value of each ceramic relic, understand the material and spiritual connotations of traditional ceramics, so as to achieve the purpose of popularizing Chinese traditional ceramic culture. The three-dimensional display of simulation and reproduction and augmented reality technology in the form and form of daily ceramics The development of ceramic products has comprehensively improved the expressive power of daily ceramic products. The dynamic technology of virtual ceramic products can provide an intuitive display of ceramic products that is conducive to comprehensive observation and comprehensive comparison, and improve the pre-sales service of ceramic products. To make up for the shortcomings of the traditional daily-use ceramic product marketing model and system is of great significance for improving the comprehensive competitiveness of Jingdezhen daily-use ceramic products and coping with the current industry crisis in the ceramic industry.

#### **4.1 The Technical Route of Ar Applied to Jingdezhen Daily Ceramic Products**

AR technology should have three specific characteristics: three-dimensional registration, virtual and real integration, and real-time interaction. Therefore, the technical route applied in daily-use

ceramics mainly involves three aspects: one is to use advanced two-dimensional and three-dimensional scanning, digital photography, three-dimensional modeling and image processing technologies to establish related digital models and provide accurate digital materials. , So as to realize the high-precision acquisition and preservation of the structure and texture of the cultural relics graphics 49 ART RESEARCH. The second is to use AR key technology to achieve the extraction and calculation of key image features, target feature matching, ID tracking and registration, and realizing the fusion of virtual and real. The third is to use AR display technology to realize intelligent interaction in the display of daily ceramic products.

1)Use high-precision digital cameras or planar scanners to digitize traditional freehand blue and white patterns to generate two-dimensional images, and then apply image processing technology to process and analyze these images. Image collection is to collect a target image with the help of photography and camera equipment, and obtain the key features of the image through calculation. After pre-collection and pre-processing, the image collected by the camera device of the user's mobile device is converted into point cloud data to reduce noise and dimension, realize feature extraction, enhancement and geometric reconstruction, and generate the target image. The target image and the database template image are analyzed and matched to complete the image recognition process (as shown in Figure 1). For the needs to be carried out in three-dimensional space, the currently commonly used methods mainly use three-dimensional color scanners and data acquisition based on multi-angle photos. According to the actual ceramics, use three-dimensional modeling software to build a three-dimensional model of celadon, as shown in Figure 2. As shown, the model file and texture map are finally exported.

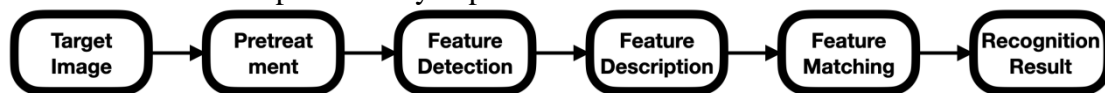


Fig.1 Image Recognition Process

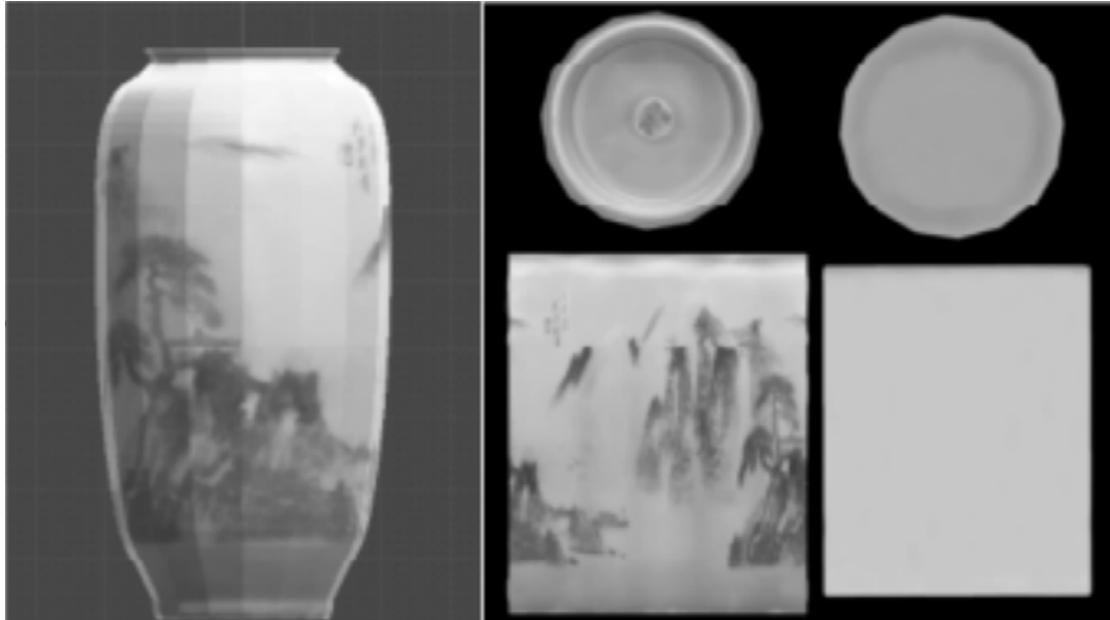


Fig.2 Ceramic Product Model

2)To achieve the perfect integration of the virtual model and the real environment, it is necessary to track the position information of the camera and the real environment in real time, and then superimpose the virtual model into the real scene through dynamic 3D display technology to realize 3D registration. Three-dimensional registration based on the recognition map, that is, the recognition map is placed in the real scene in advance, and the principle is to reconstruct the pose change matrix from the predefined marker coordinates to the current scene marker coordinates to complete the tracking and registration of virtual information (the system workflow is shown in the figure ). The form of the marker is shown in Figure 3. The system's identification methods for

markers are mainly based on image matching and marker recognition based on coding features. The form of the marker is shown in the figure. The system uses edge detection algorithms, threshold segmentation and other technologies to detect the position information of the recognition map and finally superimpose the virtual model in the real environment. Figure 4 shows the fusion effect of the virtual and real superposition of the position relationship between the celadon 3D model and the recognition map.

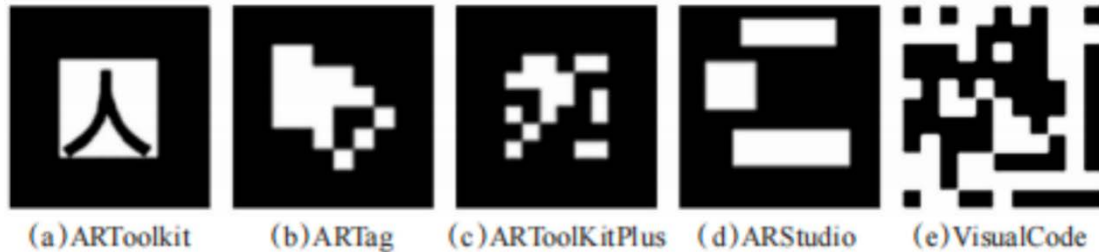


Fig.3 Markers

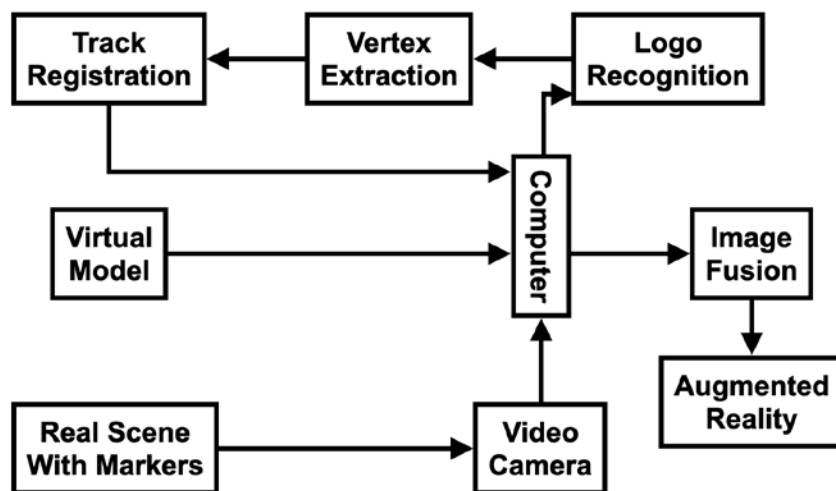


Fig.4 Marker-Based Tracking and Registration Work Flow



Fig.5 Superposition of Virtual and Real

3)Interacting with virtual objects in a real environment is the core function of the entire augmented reality content. Augmented reality technology is different from virtual reality technology. Users don't need to wear other devices, they can change their viewing angles, and can interact with

natural gestures. This is also an important manifestation of the advantages of augmented reality. Through the fingertip positioning algorithm, the position of the fingertip is accurately detected, and the effective area of the interaction between the fingertip and the virtual object is obtained, and the corresponding feedback is made by judging whether it is a single-point touch or a multi-point touch. The implementation process of the algorithm is shown in Figure 5, and the effect diagram of the implementation is shown in Figure 6.

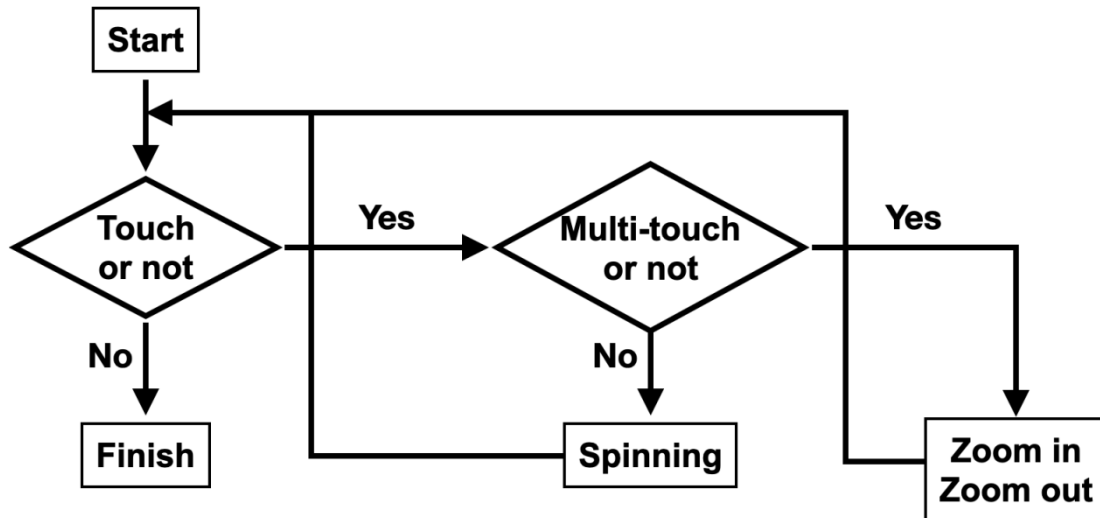


Fig.6 Algorithm Implementation Process

The current application of augmented reality technology in the spread of ceramic products for daily use is mainly combined with mobile terminals such as smart phones, using a client/server (C/S) model. The mobile client-based work flow should be as simple as possible, with high requirements for visibility and operability. The client operation of the augmented reality system should be as simple as possible and respond in a timely manner, which requires strong background technical support. The server side uses cloud storage service technology, network communication technology, tracking registration technology, virtual scene drawing and rendering technology, human-computer interaction technology, display technology, etc. The functions to be realized include: recognition and tracking of target images after acquisition, three-dimensional registration, superimposition of virtual scenes and reality, terminal equipment to achieve virtual and real fusion, and real-time human-computer interaction, etc.

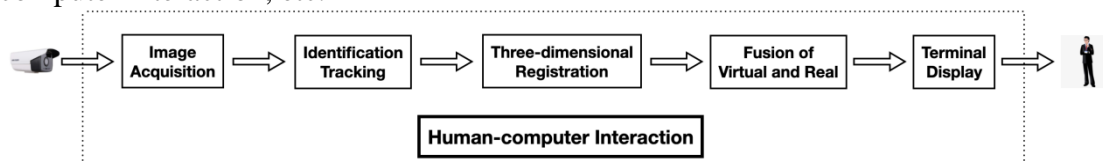


Fig.7 The Technical Process of the Application of Technology in Jingdezhen Daily Ceramic Products

## 5. Conclusion

The traditional freehand blue and white porcelain painting of Jingdezhen represents the essence of Chinese painting and contains excellent traditional Chinese culture. Its unique national charm allows daily-use ceramics to inherit the ceramic culture of the broad spirit and become competitive in the market competition. Inheriting the characteristics of the traditional freehand blue and white of Jingdezhen's daily-use ceramics through AR technology, we study the characteristics of Jingdezhen freehand blue and white, combining the characteristics of modern cultural and artistic development and the technological trend of AR virtual interaction, and digitally transform the color, shape, craft and art of blue and white. The language and national cultural characteristics have been expanded in multiple directions, and Jingdezhen daily-use ceramics will be developed into a new modern daily-use blue and white art brand with modern artistic connotation and modern aesthetic

connotation. The combination of augmented reality technology and art culture is the inheritance and inheritance of traditional art and culture. Development not only expands the communication channels of ceramic art and culture, but also promotes the development of science and technology. This kind of innovation is more meaningful for the purpose of popularizing science and culture.

### **Acknowledgment**

The Humanities and Social Science Research Project YS19111 of Colleges and Universities in Jiangxi Province in 2019(2019XJYB003)

### **References**

- [1] Zhan Shurong. "On the application of ceramic tile rapid firing technology in daily-use ceramics." *Foshan Ceramics* 018.008(2008):14-16.
- [2] Yang Li. "Research on the application of digital technology in the design of daily-use ceramics." *Art Science and Technology* 26.5(2013):1.
- [3] Chen Siying. Research on the application of digital technology in the design of daily ceramics. Diss. Shandong University.
- [4] Yuan Chao, and Yu Yong. "The application of virtual reality technology in the design of daily-use ceramics." *China Science and Technology Expo* 17(2010):1.