

# Research on Chinese traditional culture development art innovation design and development system

Ling Zhang<sup>1, a</sup>, Yongdi Liu<sup>2, \*</sup>

<sup>1</sup>Party School of Laiwu District, Jinnan City, Shandong Province, China

<sup>2</sup>Laiwu Technician College, Shandong, China

\*Corresponding author Email: 835252319@qq.com, <sup>a</sup>sxzl66@163.cm

**Abstract.** Seeking the integration and innovation of traditional culture and modern technology, through the digital innovation and design research of traditional Chinese culture, the traditional Chinese ancient painting art and contemporary digital technology will go from parallel to active intersection and construct a new era from traditional Chinese culture: expressive form and symbol novelty. While realizing the creative concept design of contemporary Chinese traditional culture, the establishment of an infrared interactive projection system has been completed, and innovations have been made to meet the interactive projection requirements of traditional Chinese traditional culture for complicated technologies such as separation of pen touch points from background images and target tracking of pen touch points, with the breakthrough. They combined interactive projection technology with traditional Chinese culture for re-creation and re-expression, breaking through the inertial cognition of traditional Chinese culture with vision as the main body, emphasizing the correlation between hearing and traditional Chinese culture, and realizing conceptual innovation by designers and architectural designers. Technical personnel cooperate and communicate across borders and finally complete the multi-sensory new experience of digital art expression, providing a new way for digital innovation of traditional art.

**Keywords:** Artistic innovation; traditional culture; design and development.

## 1. Introduction

Chinese traditional culture has a long history and contains various cultural wealth, reflecting various cultural achievements of the Chinese nation's humanistic characteristics and folk customs. To develop today's traditional Chinese culture, it is necessary to adapt to the new situation, target new needs, and use new technologies. Only the new can develop[1]. As the application of digital media art integrating Internet technology and virtual reality technology gradually matures, digital media art can be used to "activate" excellent traditional culture, give it new vitality, promote the continuous development and innovation of China's excellent traditional national culture, and make the Chinese nation splendid. Treasures continue to shine in the new era.

## 2. The application of Chinese traditional culture in modern art design innovation

### 2.1. Practical application of traditional elements of Chinese regional characteristics

There are many regional traditional elements in China. Different regions have their regional history and ancient buildings. Each building has its imprint. The common patterns with auspicious meanings, such as cranes and auspicious clouds, are well-known. The ancient elements of interest have entirely derailed from the modern trend, but now they are gradually appearing in a variety of consumer goods[2]. Clothing, cosmetics, packaging, food, etc., have joined the cross-border integration trend. China's rich regional and characteristic traditional culture is a constant source of creativity. Artistic innovation will also allow consumers to understand the meaning behind the graphics from the clothing so that the traditional Chinese culture with regional characteristics can be carried forward and spread[3].

## 2.2. Use the form of artistic innovation to interpret the culture with Chinese characteristics better

China has five thousand years of excellent traditional culture. Art and culture have been integrated into the heart through the earnest teachings of elders since childhood and passed down from generation to generation. Today, the accumulation of art and culture is produced by viewing the Forbidden City, the top of the five major palaces in the world, the Terracotta Warriors and Horses, the eight wonders of the world, and the Dunhuang frescoes, a world cultural heritage, are always comparable to other countries[4]. Therefore, to make a natural national trend product, we should combine Chinese cultural characteristics with our brand characteristics and attitude towards fashion to create works comparable to these sages[5]. See Figure 1.

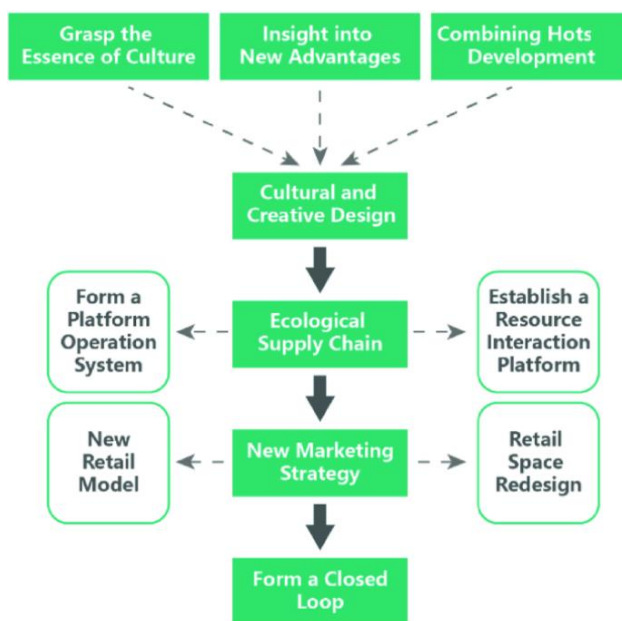


Fig.1 Cultural innovation design and development system

## 3. Design innovative cultural concepts

The cultural concept of design innovation includes five aspects: innovative idea, innovative spirit, innovative consciousness, value orientation, and behavior mode. First of all, we must establish a scientific and innovative concept. This is the essential support for the industry to achieve innovation and development. Secondly, we must cultivate a robust, innovative spirit and sense of innovation. Among them, promoting the spirit of innovation is to encourage employees to break the shackles from the depths of their minds and be brave in innovation. If we further analyze, we will find that only with a strong sense of innovation can we completely emancipate our minds, release our vitality, and make forward with innovative actions. Therefore, innovation consciousness should be a more comprehensive innovation quality, a long-term professional sensitivity, and habit. A crucial part of innovative awareness is thinking. Thinking is an introspective innovation factor, which is procedural and systematic, flexible and individual, and varies from person to person. Internally, innovative thinking is related to the innovative subject's cognitive factors, knowledge background, habits, personality, and motivation.

## 4. Research on innovative design and development system of Chinese traditional culture

Throughout the existing digital creations using Chinese traditional cultural symbols, most of them are applications in animation films, visual communication, etc. The author explored the innovative

digital design of Chinese traditional culture, starting from interactive installations. The interactive installation works of the development art innovation design and development system were created and exhibited at the "Contemporary Chinese Ancient Painting Design Exhibition" in Beijing International Design Week, China, a new exploration of contemporary digital Chinese traditional culture. In the digital innovation of Chinese traditional culture, the development art innovation design and development system uses interactive projection technology to recreate and express Chinese traditional culture, breaking through the inertial cognition of traditional Chinese culture with vision as the main body, emphasizing multi-sensory and traditional Chinese The relevance of culture, combined with the law of reality and reality of traditional Chinese painting theory, creates an imaginary and boundless symbolic imaginary artistic conception with the symbolization process of ancient Chinese painting, and combines contemporary digital technology as a physical object carrier to build a three-dimensional ancient Chinese painting narrative situation space. See Figure 2.

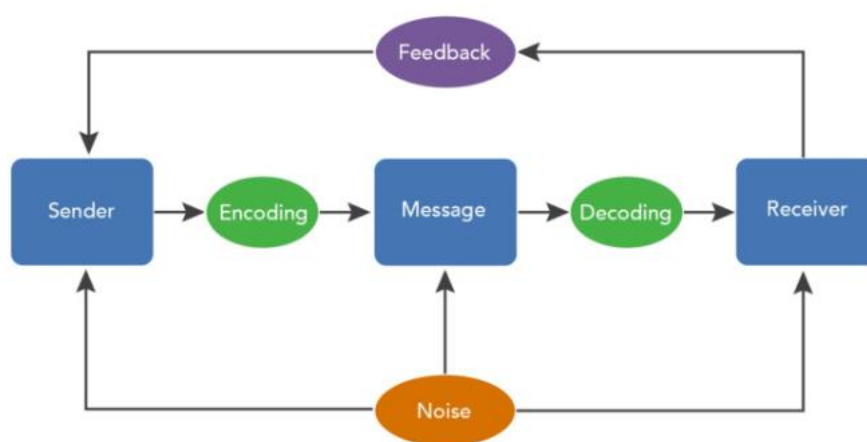


Fig.2 The application of Chinese traditional culture in modern art design innovation

#### 4.1. Extraction of Chinese traditional cultural symbols

Symbolic thinking is unique to human beings, and human spiritual culture and behavior are guided by symbolic thinking. As the cultural accumulation of China's thousand-year historical development, Chinese traditional culture carries the cognition and emotion of nature and is a symbolic form for creators and viewers to interpret and integrate into nature. The development process of traditional Chinese painting and Chinese painting, in a certain sense, is from human beings to understand and imitate nature, then add self-consciousness and emotion to interpret nature, and finally achieve the creative process of integrating the virtual and the real, and the unity of nature and man. The symbolic language of painting in ancient Chinese paintings is not only to restore the morphological characteristics of objects but also to express the creator's subjective state of mind by feeling nature, interpreting nature, and finally integrating into nature. In the interactive installation works of the development art innovation design and development system, the landscape and natural scenes are introduced into the first part with ancient Chinese painting symbols such as mountains, flowing water, fishing boats, and bamboo forests. In the process of understanding nature, in the second part of the sequence, the audience will use the hearing of the strings to blend with the sight of flying cranes, dragons, and swimming fish and carry out natural interpretations that bring personal emotions. Finally, using the ink pen as the traction, it transforms into a swimming fish playing in the blue and white porcelain and integrates into the natural situation to complete the third part of the porcelain plate swimming scales.

#### 4.2. Creativity of interactive methods

Different from traditional Chinese ancient painting and painting, the development art innovation design and development system is a dynamic multi-dimensional interactive work that presents the

traditional Chinese culture in a three-dimensional manner. Starting from the law of virtual and real, extracting symbols from ancient Chinese paintings to create a symbolic imaginary situation, combining different digital technology forms as a physical entity situation, and finally constructing a unique narrative situation of Chinese traditional culture. The digital creation team that develops the art innovation design and development system is composed of digital media technology professionals who solve infrared interactive projection technology, traditional painting creators who draw background materials of ancient Chinese paintings, and animators who complete creative interaction through modeling and Rendering. Cross-border cooperation. The overall interactive content of the development system of artistic innovation design and development is divided into three parts. The introduction of ink rhythm in the first part starts with the viewer holding a brush and drawing ink dots, followed by the animation of the ancient Chinese painting of waterfalls flying, the fishing boat drifting, and the ink lotus blooming, combined with the background music to bring the viewer into The artistic conception of ancient Chinese painting. When the viewer is holding the brush and clicks on the scroll, the infrared emission module quickly captures the movement of the brush and activates the preset animation of the calligraphy and ink lines. The second part is the fusion of strings and sounds. The viewer holds a brush to pluck the strings of an ancient Chinese painting, and the plucked places play qin music. The qin strings are transformed into ink-like water droplets, cranes, dragons, etc., to achieve audio-visual senses. Fusion interaction. When the viewer's brush is placed on the strings, the music of the strings and the interactive effect of the ancient Chinese painting corresponding to the music are triggered, realizing the resonance of the strings in the context. The third part is the scales of the porcelain plate. The blue and white patterns are reflected in the three porcelain plates in the form of interactive projection, and different patterns and colors change with the rhythm of ancient music. The viewer touches the porcelain plate lightly with a brush, and ink droplets are smeared at the contact point. In the third part, the viewer's interactive area is reduced from a full-scale scroll to 3 porcelain plates. Where the viewer's brush touches, ink scales that jump out of the water appear.

### **4.3. The creation of the narrative situation of Chinese traditional culture**

From the feature extraction of traditional Chinese painting symbols to the selection of interactive methods, digital technology is used as the carrier of Chinese ancient painting symbols, and finally, a three-dimensional ancient Chinese painting narrative situation space is constructed. The narrative situation space of ancient Chinese paintings is realized from three aspects, namely, the pattern replacement of walking and appreciation of the creation table, the dynamic fusion of audio-visual senses, and the construction of the creative narrative space of ancient Chinese paintings.

#### **4.3.1 Walk and appreciate the creation table**

The creative paper on Chinese traditional culture is carried out from the perspective of tiling the table. The creator's vivid charm and bone method are integrated into the tiled paper. Traditional Chinese traditional culture is mostly displayed in a single vertical static form. The one-way subjective communication of the ink painting creators determines the viewer's single and passive standing and appreciation angle. In the creative concept of developing the art innovation design and development system, the viewers can appreciate from the static horizontal angle to the vertical angle of the ancient Chinese painting creation table and realize the innovation of flexible, dynamic display and two-way interactive viewing.

#### **4.3.2 Dynamic fusion of audio-visual senses**

The traditional Chinese culture of the past was satisfied by a single visual appreciation. In the era of rapid advancement of contemporary digital technology, viewers are no longer satisfied with one-way and single sensory interaction but pursue a new interactive experience brought by multi-sensory real-time interaction. Qin, chess, calligraphy, and painting have been essential artistic skills for scholars and scholars since ancient times. In the creation of the development art innovation design and development system, the sound of the qin and the serpent in the calligraphy and painting of the

qin, chess, and the two arts of ancient Chinese painting and painting are combined, and the hearing of the qin music is combined with the vision of the ink painting, so as to realize the dynamic fusion of the audience's audio-visual senses.

#### **4.3.3 Constructing the creative narrative space of Chinese traditional culture**

Narrative space refers to the experience space constructed through plots, clues, and scenes, and it is an experienced art originating from life. The continuous falling water particles form a spectacular waterfall scene in the oil tank. In this immersive scene, the viewer, as the subject of the experience, can change the flow of the water, and the touch of the limbs can become a rock that blocks the flow of water. In the development system of artistic innovation design and development, the immersive space created by digital interactive devices is used to convey the will of innovation and integration of contemporary Chinese ancient paintings, placing viewers in the works, establishing a narrative connection between multi-line time and multi-dimensional space, and through narrative, It creates an immersive and resonant Chinese ancient painting immersion experience space.

### **5. Innovative design system of Chinese traditional culture**

Flat ink digital painting and photography are produced or composited by computer, capturing images in the real world through photographic equipment. The multi-dimensional ink and wash performances, images, and installations will be presented through digital media together with the physical ink and wash works, or interactive installations will be realized through digital video editing software, digital programming, and interactive equipment. The development of artistic innovation design and development system is to use digital programming and interactive projection technology as the physical and technical carrier of the artistic conception of ink and wash symbols.

#### **5.1. Animated model rendering**

The Rendering of the ink animation model in work is divided into two parts: model movement and ink rendering. In the model movement part, the Maya software is used to model first, and the 3D model is completed by applying Nurbs curve, Nurbs-circle, and Loft loft; then imported into C4d software, add joints and IK for the fish, start the dynamics, and set the gravity of the force field to 0 cm; then outline the curve spline for the fish to swim, and add a spline constraint; finally, set the offset key in the spline constraint frame to make the fish swim. In the ink effect section, install the TurbulenceFD insert file for the C4d software, add the emitter TurbulenceFD for the fish, set the Fluid Emitter temperature value greater than 0; usually, 1, set the temperature in Rendering and the attachment to black, and then change the Simulation For the mechanical parameters in Simulation, the wind speed is 10 cm, and the wind direction and buoyancy are based on the swimming direction of the fish; after completing the general numerical settings, the link will be generated along with the swimming of the fish, and then the fish will be added with noise and ohmic waves. The gradient texture realizes the complete ink effect of the fish and finally exports the file. See Figure 3.

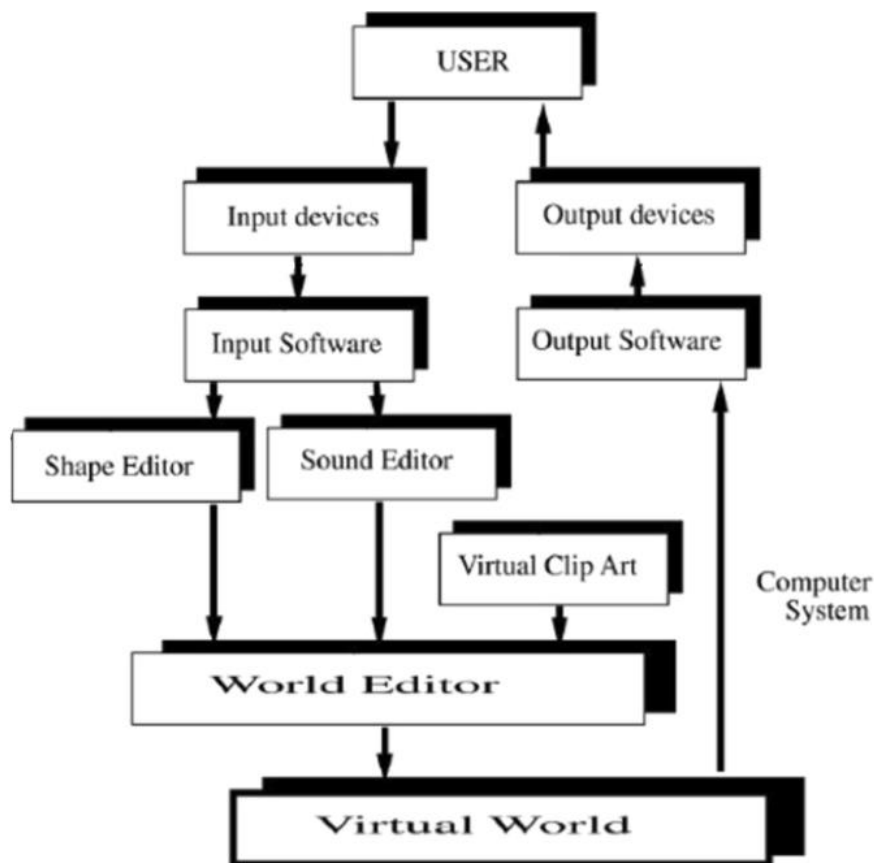


Fig.3 Art Design Computer System Modeling

## 5.2. Construction of Infrared Projection Architecture

The interactive projection system consists of 4 parts, including the projection imaging part, infrared signal acquisition part, sensor signal processing part, and auxiliary equipment parts such as connecting line and sound. The projection imaging part of the development art innovation design and development system selects a commonly used projector and connects the imaging projection equipment and the computer with a data cable so that the solid-color picture scroll tiled on the creation table displays the image in each part of the computer screen. The infrared signal acquisition part adopts the point-shaped infrared laser transmitter with high-cost performance. Fix multiple point emitters on one side of the ink creation table, leaving the same interval between adjacent emitters to form an infrared light surface. The sensor signal processing part is to remove the filter that can filter out infrared light from the purchased high-definition camera and paste the infrared filter. This ensures that the high frame rate camera can accurately capture when the brush tip touches the projection surface of the painting axis. Auxiliary equipment such as data line connection, audio equipment debugging, and scene layout, and finally develop the construction of a complete infrared interactive projection system for the artistic innovation design and development system.

## 5.3. System Technology Innovation and Breakthrough

### 5.3.1 Image processing of touch points and ink background

In the installation of the development system of artistic innovation design and development, simple background difference is used first. Because the projection background of ink and wash interaction changes, the binarization method is also used to remove some impurities in the background. Development Art Innovation Design and Development System The system adopts a Gaussian filter to realize the self-adaptive generation of a background image and then applies binarization for data result processing. The threshold value in the binarized data is affected by environmental changes, dark lighting, and other interference factors and needs to be determined through field debugging.

### 5.3.2 Target tracking of brush touch points

After the preliminary image binarization results are obtained, the target of the brush touching point is tracked and recorded. With reference to the edge operator and the preliminarily completed binarization results, the centroid point of the outline area of the brush touch point is calculated; the target tracking is realized by comparing the coordinate displacement of the centroid point in the new frame and the previous frame. After the calculation of the position of the centroid point is completed, by recording the motion displacement coordinates of the centroid point frame map, the change of the position of the centroid point of the image between the touch frames is represented in the coordinates, and the movement trend of the brush touch point is obtained, and finally, the target tracking of the touch point is realized.

## 6. Conclusion

Civilization is ahead of the trend, and civilization is the guide of the trend. Its meaning, its symbol, and its imprint come from inheritance, classical or modern, classic or traditional culture, never out of date. Only based on a deep understanding of traditional Chinese culture and modern trends can we find new creative elements by adding traditional Chinese culture to them so as to create better works. The digital media art design is a new art form in the development of multimedia technology. Chinese traditional culture provides new design ideas and creative inspiration for the creative design of digital media art.

## References

- [1] Zhang Wenyue. Analysis of the Application of Chinese Elements in Digital Media Design Art. *Popular Literature and Art*, Vol. 17(2021) No.09, p.121-122.
- [2] Zhang Yunqing, Hu Yan. Expression of Chinese Elements in Digital Media Design Art. *Media Forum*, Vol. 22(2020) No.19, p.162-163.
- [3] Wang Fei. Research on digital art design and practical application of Chinese elements. *China Packaging*, Vol. 16(2020) No.10, p.38-41.
- [4] Jin Helin. The fusion and innovation of traditional Chinese cultural elements and dynamic visual design. *Packaging Engineering*, Vol. 18(2020) No.12, p.83-86.
- [5] Zou Bo. Research on the communication strategy of traditional culture under the background of new media. *Media*, Vol. 20(2020) No.12, p.90-93.