Realizing "communication" and "reflection" based on the comprehensive characteristics of interactive installation art——Taking the work "Telepathy" as an example

Fan Zhaoxuan

School of International Journalism and Communication, Beijing Foreign Studies University, Beijing, China
17710459508@163.com

Abstract: *Interactive installation art is a new form of artistic expression with strong comprehensive artistic characteristics. With the progress of science and technology and the updating of art concepts, science and technology can be combined with art to empower art communication and bring audiences a new art experience. Taking the work "Telepathy" as an example, the article describes the comprehensive characteristics of interactive installation art, including design art, physical knowledge, programming language and so on. It utilizes special functional materials such as magnetic fluid to exert its plasticity, and presents a variety of changing forms under the action of magnetic field. Therefore, based on the comprehensive nature of interactive installation art, this paper further explores the medium power of interactive installation art to realize the communication between "people" and "things", "people" and "people", and to reflect on the social interaction between the target personnel relationship of "you", "me" and "him" at present.*

Keywords: *Interactive installation art; Comprehensiveness; Media; Magnetic fluid; Communication and Reflection*

1. Introduction

With the development of the times and the advancement of science and technology, various disciplines continue to merge. Interactive installations have become an emerging carrier of art display. They belong to a new branch of new media art and are dedicated to bring multi-sensory touch and interaction to the audience when they appreciate the experience. In recent years, interactive installation art has moved experimental forms of interpretation toward marketization and popularization, and has been applied in public spaces such as museums, shopping malls, and children's playgrounds. The reason is that the production of interactive installation art requires the intervention of the audience. This is the key point that is different from traditional installation art. The intervention of the audience makes the installation carrier "alive", allowing contact and communication to occur in a space where people and objects coexist; in this entertainment-like experience. It is the initiation of perception between "participants" and "device", but it is actually the spiritual communication between "audience" and "artist" [1].

2. The "comprehensive" characteristics of interactive installation art

2.1. Comprehensiveness of interactive installation art

Interactive installation art is an interdisciplinary and comprehensive art form. Its comprehensiveness is mainly reflected in the richness of material materials and the diversification of display methods. According to the collection of previous cases, it usually includes art design, computer graphics technology, and programming language, media hardware materials, physics knowledge, music, etc. Interactive installation art is not restricted by the constraints of traditional art. It comprehensively uses painting, sculpture, photography and other forms of expression, combined with communication, aesthetics, information science, psychology, physics, chemistry, software engineering and other disciplines, making interactive installation art more popular. The presentation methods are diverse and

rich [2]. Therefore, artists need to master multiple interdisciplinary knowledge in order to create uniquely attractive interactive works, giving the audience a new experience, and thereby enhancing the realm and height of art.

In the history of the development of new media, the Academy of Media Arts in Cologne, Germany, there are three concepts of synthesis: synthesizing old and new media; synthesizing widely differing forms of artistic practice; and strengthening cooperation between artists, technicians, and scientists. The article argues that these three key concepts are the essence of "synthesis" in interactive installation art, and vividly illustrate the core grasp of interactive installation art in the future development process.

2.2. "Use stones from another mountain to polish one's jade": "Comprehensive" empowers art communication

Throughout history, artists have created a variety of installations from which materials, communication methods and deeper connotations can be analyzed. These classic creations symbolize the collision between traditional art and current fashion. Traditional artists are good at characteristic research, while new media artists need to master information from multiple disciplines. Every new discovery, new technology, and new creation can be used for interactive installations. Art provides creative elements [3]. The article believes that comprehensiveness has become the basic characteristic of interactive installation art, so what kind of energy will comprehensiveness bring to art? After summarizing many cases, "comprehensiveness" has become an effective way for artists to convey their intentions.

Every year, the International New Media Art Interactive Experience Exhibition attracts visitors from all over the world. Among them, researchers from Harvard University created the world's first soft, self-propelled robot and named it as "Octobot"--"Little Octopus", as shown in Figure 1. This pneumatic robot breaks through the limitations of existing robot materials and draws on the soft characteristics of the octopus to shorten the distance between man and machine. The "Octobot" is a self-driven technical device that does not require external stimulation or control. Without batteries and circuit boards, it can still interact with the viewer, making the viewer a part of the artistic presentation. "Octobot" not only achieves a harmonious picture of human-computer interaction, but also establishes a connection between viewers and artists, allowing them to communicate and think in virtual space, becoming an effective carrier for art communication. This interactive device includes technology, physics, art and nature, so "comprehensiveness" has become an important factor in art communication.

Resource: Official website of Harvard University research team

Figure 1: "Octobot" created by Harvard University researchers

Ernesto Neto is a contemporary visual artist who specializes in filling exhibition spaces with biomorphic sculptures made of soft, flexible materials. The choice of these materials distinguishes them from traditional art materials, either amorphous forms made of foam polystyrene particles, spices, or translucent glass, crafting them into minimalist sculptural forms that transcend abstraction. The viewer watches the changes, touches the materials, and walks and thinks in the space created.In 2018, he created sculptures of forms that resemble gnarled trees in Zurich's Central Station, as shown in Figure 2. The material of choice for this installation is hand-woven cotton thread, which extends from the roof to the ground, and the viewer is interspersed in the space created by Ernesto Neto, realizing a dialogue and communication with each other.

Resource: HYPEBESAT website

*Figure 2: Gaia Mother Tree created by Ernesto Neto*

Through the analysis of multiple cases, it was found that "comprehensiveness" has become the connecting medium between artists and viewers, which realizes the presentation and transmission of the artist's creative intentions. At the same time, when the viewers accept the artist's intentions, they also show their personal understanding of the artistic concept [4]. Based on the fact that "comprehensiveness" is the necessary foundation for interactive devices to achieve "interaction", the creator took "comprehensiveness" as the creative condition to create an interactive installation art - "Telepathy", trying to establish a connection between people's souls, communication and reflection.

3. Based on the comprehensiveness in interactive installation art, create spiritual interactive installations

The birth of interactive installation art has made art more sociological. Art is no longer static, and the audience is no longer as an outsider. A good work can reflect and solve the hot issues of the current society. In modern society, social interaction has become a confusion for many people. How do we return to simplicity? How do we move from being separated by a screen to seeing each other in person? How do we communicate and reflect spiritually?

Facing the social problems, the creators create interactive installation art in the name of "telepathy" and on the basis of "comprehensiveness" in an attempt to open the audience's mind, and use the installation as a medium to build a bridge of communication between the creators and the audience. Enjoy the convenience brought by science and technology to the public and realize the modern communication art model！[5]

3.1. Comprehensive embodiment of "Telepathy" - design art, physics, programming
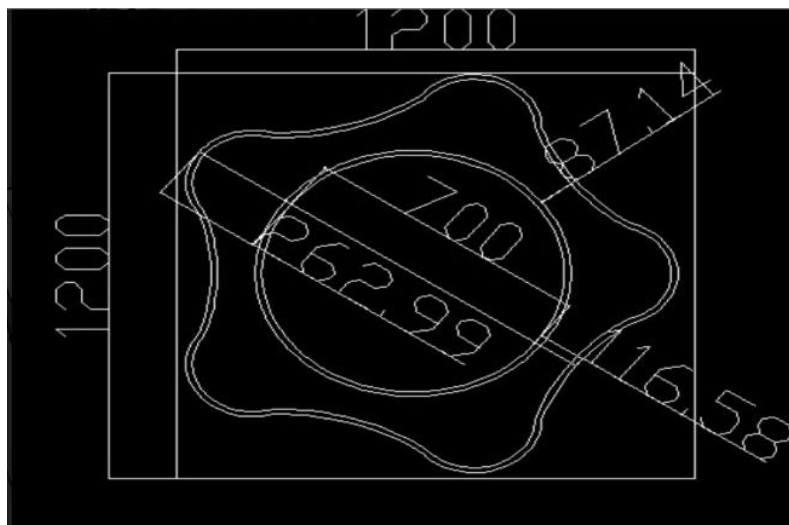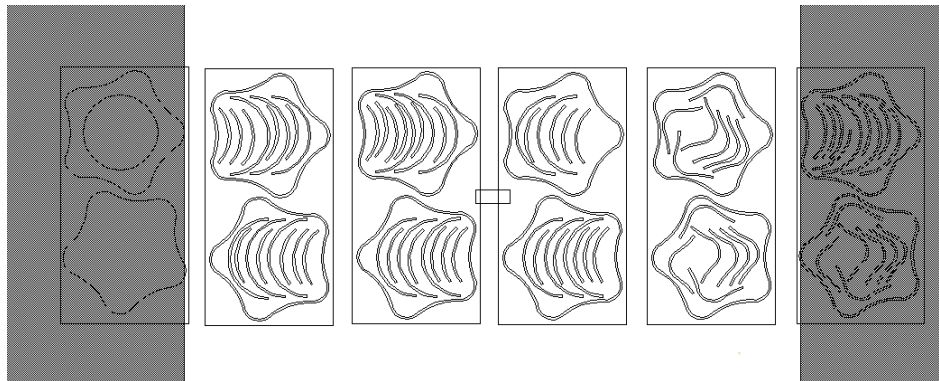

Resource: Photographed by the Author Fan

Figure 3: Structural diagram of the work "Telepathy"

The Figure 3 is photographed by the author called "Telepathy" and is shaped like a five-petaled flower, which symbolizes the blooming flowers deep in the human heart. The "five petals" symbolize the human five senses, which receive information from the outside world and transmit it to the depths of the heart; there are grooves inside the petals, which contain "magnetic fluid". When the induction device is turned on, the magnet device at the bottom of the petals will respond to the viewer's reaction. The magnetic force changes due to the distance and sound level, so that the "magnetic fluid" forms an unknown changing form, which belongs to the audience's personal symbol.

3.1.1. Design Art

From past cases, it can be concluded that unique appearance design is extremely important, which can make people's eyes brighter. The shape has a sense of intimacy and will make the audience take the initiative to get close, touch and interact. In the design process, the creator has always adhered to the viewpoint of "expressing the meaning of the work and touching the hearts of the viewers". At the same time, he has also mastered relevant information in psychology, trying to achieve a truly meaningful interaction between the work and the audience. Therefore, the creator combines the actual conditions of the venue, lighting, viewers, etc. to create a "Telepathy" appearance, making it closer to life and easier to enter the public's field of vision.

The shape of "Telepathy" is a regular pentagon, like the shape of petals. Its total length is 1.2M, the inner circular diameter is 70cm, and the total height is 25cm, as shown in Figure 3. The material of "Telepathy" is wood, and the surface is covered with spray paint. It uses chrome-plated spray paint to form a stainless steel mirror paint surface. Under the illumination of the venue lights, it shines slightly, symbolizing the sparks of collision between people. The thickness of the wooden boards is 18MM and 9MM, the bottom board is 9MM, and the rest are 18MM. As shown in Figure 4, choosing a thinner board at the bottom will reduce the obstruction to the magnetic field. "Wood mixed with stainless steel" is a way to attract the audience. At the same time, wood can be curved and is easy to polish, and the welding seams can be smooth, which is more in line with people's characteristics. In today's society, it is difficult for people to understand with each other, which becomes an obstacle to social interaction. "Telepathy" first attracts the audience with its shiny appearance. When touching it, the audience gets an unexpected surprise and discovers that it is made of wood. This is an important reason why the creator chose wooden boards.

Resource: Photographed by the Author Fan

Figure 4: Structural plane figure of the work "Telepathy"

Under the action of the magnetic field, the magnetic fluid becomes round, streamlined, thorn-shaped, or spiral-shaped, presenting artistically changing forms, giving the audience a visual touch and leaving space for the audience's imagination. "Magnetic Fluid" is black and constantly changing in liquid form, which symbolizes the emotions flowing in people's hearts. Facing different audiences, it will show different emotional forms. It is the connection and interaction between the device and the audience, as well as the relationship between the creator and the viewer. Effective communication between people is essential for building strong relationships. The matching of black "magnetic fluid" and silver "appearance" not only brings a sense of mystery to the audience, but also reflects the sense of technology that technology brings to art.

Design art is an indispensable part of interactive installation art. Feeling the creative process from the appearance design will touch the hearts of the viewers more. It shows the charm of art, the charm of new media art, and the charm of interactive installation art.

Faced with various current social problems, the audience may not be able to find the answers. The

creator hopes that when viewers see the "Telepathy" appearance design, it can become a communication object for the viewers and bring them closer to each other [6]. Therefore, the author believes that designing the appearance is the first step to the success of an art installation. Simple shapes are not simple, but often have inner meanings.

3.1.2. Physics knowledge

The most critical material in the "Telepathy" device is the physical liquid "magnetic fluid", as shown in Figure 5. Magnetic fluid stock solution is relatively new. It is made of nano-iron particles and organic solvents. It was once used in the medical field to transport drugs. Now it is used in many fields due to its diverse functions and is loved and paid attention to by many people.

Resource: Photographed by the Author Fan

Figure 5: Magnetic fluid original solution

The "Telepathy" device requires a large amount of magnetic fluid liquid. In order to present the ideal artistic effect, the creator chooses to prepare the magnetic fluid liquid by himself; the magnetic fluid liquid can be made by mixing toner and 100% pure vegetable oil, with a mixing ratio of 1:1. The demand for "magnetic fluid" is large, and the viscosity of the vegetable oil is not enough. The prepared magnetic fluid has a phenomenon of delamination of toner and vegetable oil in a short period of time. After that, the creator replaced the toner with iron oxide pigment, which has a higher iron content, and mixed it with engine oil, which has a strong magnetic field response. In the screening of iron oxide pigments, black has a more obvious magnetic field response than red, yellow, and blue, and it has the strongest response in experimental testing. Therefore, the darker the iron oxide pigment, the stronger its magnetism. For the selection of blending agents, the creator chose Magnetic Protective Oil 5W40, with a viscosity of 40, strong adhesion, and no delamination.

The morphological change of magnetic fluid requires the control of magnets. Ordinary magnets can control a small amount of magnetic fluid liquid, but cannot change the shape of a large volume of magnetic fluid. The creator chose 24v electromagnets with a suction force of 20kg. There are 16 electromagnets in total, which are respectively attached to the bottom and sides of the container. One electromagnet is 3w, 16 are 48w, use a 72w adapter to power the electromagnet, and connect it to household AC current. The program is connected to the electromagnet, and the program outputs a voltage of 3.3v. The voltage of the electromagnet is 24v. The normal operation of the electromagnet is realized through relay control.

New media art is experimental. To be novel and innovative, it requires cross-border learning. The "Telepathy" device uses physics and experiments to explore the artistic expression of magnetic fluid, combined with the control of electromagnets, to make the art installation more high-quality. Japanese artist Minako Takeno has been studying invisible forces - magnetism and gravity. She continues to conduct research in the areas where art and physics intersect, providing effective research methods and research areas for the future development direction of new media art.

3.1.3. Programming language

"Interaction" in interactive installation art is the key point that distinguishes it from traditional art installations, so who interacts with whom? The article believes that "in the space envisioned by the creator, establish interactive art between humans and machines using certain computer software and hardware as the platform, or between different people through computer software and hardware." In short, making the audience become a part of the work can be extended for communication between

audience and audience, audience and creator.

The creator's programming idea: When the device senses the presence of a person, the magnetic fluid will start to change subtly. The closer the audience is to the device, the more obvious the changes in the magnetic fluid will be. Depending on each person's pace and distance, the magnetic fluid will show a unique changing form. It is like human telepathy. When facing an effective communication partner, the human heart will undergo wonderful changes, and both parties will produce a magnetic field reaction. This change is unpredictable and cannot be judged, and the creator cannot control the changing form of the magnetic fluid [7]. Therefore, "Telepathy" interactive installation art is an art jointly created by the audience and the creator, and is non-replicable.

In order to realize the implementation of the whole idea, the creator has installed five ultrasonic sensors in "Telepathy" with a measuring range of 2m. When a person is detected, the sensing mode is turned on, and the micro-controller will control the direction pin port to be set to high level, and control the on and off of the electromagnet by controlling the closing of the relay. When the electromagnet is energized, the original magnetic fluid liquid will show various changing states; When the sensor senses that a person is approaching, the current of the electromagnet continues to increase, and the magnetic force continues to increase (the ultrasonic module detects the distance of the object in front through two devices, one receiving and one transmitting). The principle is: after sending the ultrasonic wave, start the timer. The object distance is calculated by the time difference between receiving the return signal and sending the signal. The micro-controller controls the closing of the relay by controlling the level change of the pin, thereby realizing the use of weak current to control the strong current of the electromagnet; when multiple people appear in the sensing area, for example : When someone appears in three of the five directions, the electromagnet will control the magnetic fluid to change clockwise; when no audience appears, the electromagnet is turned on in a cycle, changing every 5 seconds, and the magnetic fluid changes clockwise, symbolizing Time keeps passing by.

Programming is the biggest highlight of the interactive experience. It embodies the meaning and artistic concept of the work, becoming a communication channel between the creator and the audience, and a dialogue bridge between the audience and the audience's artistic concept. Programming is widely used in military simulation, virtual reality, artificial intelligence, advertising, daily life, etc., such as: interactive sensor music fountain, Qinhuai River night view square design, Jinan Quanlefang virtual fish pond system, etc.

To sum up, interactive installation art - "Telepathy" involves multiple disciplines and is highly comprehensive, including design art, physical knowledge, programming language, psychology, etc., which lays an important foundation for realizing the meaning and connotation of this work. The "Telepathy" installation establishes an interactive bridge between humans, machines, and humans, alludes to social issues in current society, and brings profound reflections to audiences and creators. This is also the sociological significance of interactive installation art.

3.2. Use objects as media to achieve communication and reflection

Resource: Photographed by the Author Fan

Figure 6: Work of "Telepathy"

As a new art, the creator breaks the traditional viewing mode. The audience can enter the creation

and feel the inner meaning conveyed by the creation, which improves the quality and efficiency of art communication. Any material carrier can become a communication media between people, and it can be discovered by artists to reconstruct and combine to form new communicate channels [8]. The audience is attracted by the virtual space created by the artist, which is full of questions and reflections, as shown in Figure 6. For example, "What material is this? What is it telling? How do we get closer to the truth?" etc. It brings new solutions to the public and inspires viewers and artists to explore and practice artistic concepts.

4. Conclusions

Interactive installation art is the product of the combination of art and technology, and is highly comprehensive and open. In various exhibitions in recent years, both virtual interaction and mechanical devices have involved research in physics, art, nature and science. Therefore, comprehensiveness has become the key to distinguishing it from traditional art. Breakthroughs and integration make interactive installation art have profound meaning and connotation. At the same time, it also satisfies the public's desire for art and allows more people to understand contemporary art.

"Telepathy" includes design art, physical knowledge, programming, etc. It shows the comprehensiveness and cross-border nature of interactive installation art, which is its own charm. In order to make the work no longer thin and more exploratory and stimulating, the concept of "communication and reflection" is injected to face the current social problems directly: the changes of magnetic fluid are used to present the viewer's psychology, trying to find new solutions in social problem. The highest state of art is to baptize people's souls. For creators, it is necessary to constantly discover problems from life, form a divergent conceptual context, establish communication bridges between humans and machines, and between humans, and explore issues together, interpreting the values of contemporary art. Therefore, the "Telepathy" interactive device realizes its media value, using material carriers as media to jointly explore "social" issues: Can a reasonable social solution be found in the current society? How to return to simplicity? Is it possible to switch from being separated by a screen to seeing each other face to face? How to carry out spiritual communication and reflection? The article believes that on the way closer to the truth, "Telepathy" realizes its sociological significance, empowers the spread of art, and lets everyone know that contemporary art has value and meaning that allows viewers to think deeply and discuss.

References

[1] Zhang Jidong.(2002).Dissolving and creating distance - Thoughts on installation art's attitude towards art and life .World Art, (03):62-63.

[2] Zhang Gan.(2002). Revisiting "Art and Language". World Art, (03):2-6.

[3] Ma Zhongxian.(2001). Installation Art and Modern Life. World Art, (03):43-44.

[4] Wang Duanting.(2014).Installation art that counters aesthetics and returns to aesthetics . Oriental Art, (07):124-125.

[5] Lin Lin.(2015).Approaching "Art Therapy". Shanghai Artist, (01):78-79.

[6] Guo Tanna, Wang Ning.(2013). A brief analysis of the application of interactive graphics programming language Processing. Wireless Internet Technology, (05):107.

[7] Qian Xuemin.(1998).Qian Xuesen's new insights on science and art. Democracy and Science, (03):3-9.

[8] Yu Jian.(2004).Qian Xuesen talks about art and performing arts technology. Performing Arts Equipment and Technology, (01):49-51.