Application of Processing Programming in Interactive Installation Art——Take "What else" as an example

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Abstract. With the advancement of science and technology and the enhancement of human aesthetic experience, the fusion of technology and art has driven interactive installation art, an artistic expression with strong modern technology and information age characteristics, and has achieved unprecedented development. Processing is an open source programming language and development platform suitable for graphic and animation design. Through the study of processing, we have a more intuitive understanding of the creation of interactive art. Taking "what else" as an example, this paper studies the application value of Processing programming in interactive installation art, and discusses the influence of using code tools to innovate and develop art, integrating science and technology into art creation, aiming at providing new expression ideas for future installation art.

1. Processing Programming

Processing is a free program development platform, using an open source programming language, created specifically for electronic interaction design and digital media art. Processing is not only an excellent visual programming language and development environment, but also one of the outstanding cases implemented using open source technology. It is an extension of the Java language and supports many existing Java language architectures, but is much simpler in syntax and has many humanized designs. People do not need too advanced programming skills to create stunning visual expressions and interactive media works. Processing can also combine hardware such as Arduino microcontrollers to create interactive systems that return to the interpersonal real world.

The users of Processing are those who are interested in the interdisciplinary performance between science and art. Digital artists and designers often use these software, Photoshop, Illustrator, and Flash for creative work. Often, unknowingly, the standard production tools dominated by large companies limit the possibilities of creativity and expression. However, if you have a certain programming language ability, you can try to write a program that runs it for the realization of the idea, so that the content of the work is not only art, but the form of programming and the creative process is also an art. Processing programming language is based on JAVA language, so it can be easily used on Windows, Linux, MAC OS X and other operating systems. Processing integrates an efficient OpenGL three-dimensional graphics engine internally, so that program developers can easily call graphics interfaces and make full use of computer hardware graphics rendering functions for graphic visual design. It is relatively simple to write programs for graphic drawing, animation production, and interaction design. It can easily achieve interaction with common input devices such as mouse and keyboard, and is easy to learn and master.
2. Interactive installation art
Interactive installation art is a kind of emerging artistic expression means in the new media category. It is an art that is built on the basis of certain computer software and hardware as a platform for interaction between humans and computers or between different people. The hardware installation media-based interactive art breaks through the static aesthetics of traditional art. Artists and viewers can personally experience and touch the work, greatly improving the interactivity. Effective communication between people and installations conveys the interaction between technology and emotion, and promotes the relationship between art and the public. Interactive installation art presents different artistic effects according to different information conveyed by people. Especially through the participation of people, it becomes a part of the work, making art more accessible to the public, and the ideas and expressions expressed by artists can be more deeply rooted in the hearts of the people. It can be said that interactive installation art is the materialized expression of the artist's emotions, and the effect of interaction is the core of measuring interactive installation works.

Due to the involvement of interactive multimedia technology, although the connotation of the device has not changed, its extended performance has changed. The upgrade of installation art to interactive installation has greatly enriched the effect of installation art. Therefore, from the perspective of interactive multimedia technology, its interaction modes are divided into two categories, namely interface and immersive. Interface is the most common art form in exhibitions at home and abroad. It interacts with the works through the viewer's language, touch, gestures, or control actions such as joysticks and remote controls. Immersive interactive devices are mainly used in large-scale exhibitions such as museums and biennials. Relatively speaking, the exhibits have a large space, a strong user experience, immersiveness, and are not limited by the interface. Personal freedom is relatively important. Bigger.

3. Application value of Processing in interactive installation art
Interactive installation art is a unique art form, which can not only meet people's growing artistic needs, but also better meet people's practical needs for products, and can fully demonstrate the value and role of programming technology. Through the application of Processing programming technology in interactive installation art, it provides a technical carrier for the practical function, and further expands the value display of installation art works, and promotes the new period of installation art works to have higher artistic beauty and aesthetic value.

3.1. Rich interactive installation art design audiovisual experience
The application of Processing programming technology in installation art design, combined with light, electricity, information and sound elements according to design needs, promotes the gradual diversification of art forms and brings a unique audiovisual experience to the audience. The application of Processing programming technology gives the installation art design a strong vitality and vitality. People can really touch and feel the works, and feel the practicality of the installation art works. Similarly, there are some installation art works under interactive multimedia technology that cannot be touched, but with the help of Processing programming technology, people can immerse themselves and fully experience the beauty of installation art works. Installation art works break the space limitation, bringing colorful pictures to the audience, and making the work more vivid and vivid. In addition, the specific sound rendering stimulates the audience's imagination, produces unlimited reveries, and feels the unique charm of installation art design.

3.2. Enrich the content of interactive installation art works
The application of interactive multimedia technology in installation art design, through the narrative expression method, establishes an emotional bond between the creator and the audience, conveys the creator's work creation idea, and exposes life perception to the audience. At the same time, it can also express the function of installation art design works in narrative form, helping people to deeply feel and understand the artistic connotation. Processing programming technology renders an artistic atmosphere
and enhances the perception and experience of creators. The audience is brought into the creator space to create a situation with their own ideas. The practical value is self-evident. Human expression has its own limitations. Expression is only a process, and the part without expression may be more abundant. Interaction is not the ultimate goal. The ultimate goal pursued by interactive installation artists is to realize an artistic appeal or express an artistic concept through human-computer interaction. A new artistic language is used to create different interpretation methods. The form of expression is second. The most important thing is the concept and content of expression, so that people are more courageous in expressing their own value while paying attention to society.

3.3. Increase audience engagement
Interactive art today is a comprehensive system that combines computer technology. The "dialogue" between the audience and the machine is two-way and cyclical, forming a system of information exchange. Processing can be an important part of this system. It can process input data, analyze data, and output data. This process is actually a complete process of interactive works. In the past, when viewers appreciated works of art, they thought mainly from a one-way perspective, often hurriedly browsing, and could not have its connotation. The application of interactive programming technology encourages the audience to participate, stimulate the audience's interest through the interactive function, give full play to the audience's subjective initiative, make them feel the connotation and value of the installation art design, and shorten the distance between the work and the audience.

4. "What else" installation art design based on processing

4.1. Implementation of key technologies
The specific idea of realizing interaction is to use computer software (video images and sound), interactive programming software (processing platform) and external hardware (projector, external numeric keyboard, touch buttons, etc.) to achieve interaction with the audience through programming. The specific principle is that the physical sensing captures the touched buttons, and the system draws the corresponding graphics and plays the corresponding audio after recognition.

Install the Java environment. Processing is a revolutionary and forward-looking emerging computer language. Its concept is to introduce programming language in the context of electronic art and introduce the concept of electronic art to programmers. It is an extension of the Java language and supports many existing Java language architectures, but it is much simpler in syntax and has many thoughtful and user-friendly designs. Processing applications are very rich, and they all comply with open source regulations. This design has greatly increased the interaction and learning efficiency of the entire community.

Reference the Minim library. Minim is an audio library that uses the JavaSound API, Tritonus, and Javazoom's MP3SPI. It provides processing developers with an easy-to-use audio library. Put the mp3 format audio file required by the project in the data file to achieve processing in response to external input and control audio playback.
Human beings have changed the original state of the ocean. Marine garbage, oil pollution, and overfishing have damaged marine ecosystems. Pollution caused by harmful substances entering the marine environment will damage biological resources, endanger human health, prevent fishing and other human activities at sea, and damage the quality of seawater and the environment. "What else" is based on the concept of marine protection. The title is a pun. "What else" literally means "what is left", and in Chinese it is a homonym for "what is left in the sea". The work uses processing programming, combined with music interaction and interactive graphics drawing, and touches seven keys: do, ri, mi, fa, sol, la, and xi to reproduce the scene before and after the destruction of the ocean.

Establish information collection methods. This interactive device uses keyboard event processing to collect information. In the process of interacting with works, people make direct contact with the work. The easy way to handle keyboard keys is to use the keyPressed global variable in the draw function to determine whether a key is pressed, and then use the global variable key to get the current press. Press the key. The value of key is the key corresponding to the character in the ascii code table. The upstream serial port uses the processing program to visually analyze the color values of the painting, so that the viewer can have a more intuitive understanding of the proportion and brightness of the three RGB colors in the displayed graphics.

```java
void keyPressed(){
    if(key == '1'){
        draw1 = true;
        do.rewind();
        do.play();
    }
}
```

The form of the work. The size of the exhibits must be implemented before the exhibition, the packaging and transportation methods of the exhibits, the fixing methods of the exhibition racks, the placement methods, the size of the space required for the display, the scenery and lighting, etc. These details need to be considered before displaying the work in order to achieve the best visual presentation of the interactive device. The graphic drawing adopts the fade disappearing effect to make the transition smooth and avoid leaving the audience with a stiff feeling. In the creation of "What else", the original static elements are integrated into the dynamic elements, and the visual changes of the pictures are used to make the display effects richer and layered.

```java
import ddf.minim.*;
import ddf.minim.analysis.*;
import ddf.minim.effects.*;
import ddf.minim.signals.*;
import ddf.minim.spi.*;
import ddf.minim.ugens.*;

Minim minim;
AudioPlayer do;

void setup() {
    size(1600, 900);
    noStroke();
    minim = new Minim(this);
    do = minim.loadFile("do.mp3")
}
```

Figure 1. Minim library

4.2. Creative process

Creative ideast. Due to human activities, marine garbage, oil pollution, and overfishing have damaged marine ecosystems. Pollution caused by harmful substances entering the marine environment will damage biological resources, endanger human health, prevent fishing and other human activities at sea, and damage the quality of seawater and the environment. "What else" is based on the concept of marine protection. The title is a pun. "What else" literally means "what is left", and in Chinese it is a homonym for "what is left in the sea". The work uses processing programming, combined with music interaction and interactive graphics drawing, and touches seven keys: do, ri, mi, fa, sol, la, and xi to reproduce the scene before and after the destruction of the ocean.

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```java
void keyPressed(){
    if(key == '1'){
        draw1 = true;
        do.rewind();
        do.play();
    }
}
```

Figure 2. Press the keyboard to get music playing

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float pressedTime;
boolean isDraw = false;
color a;
color b = color(0);
color c;
float f;
int delayTime = 2000;
void setup(){
  size(1600, 900);}
void draw(){
  background(0);
  if(millis() - pressedTime > delayTime){
    isDraw = false;}
if(isDraw){
  a = color(#fd6b00);
  f = map(millis() - pressedTime, pressedTime + delayTime, 0, 1);
  c = lerpColor(a, b, f);
  fill(c);
  ellipseMode(CORNER);
  ellipse(10, 10, 20, 20);}
void keyPressed(){
  if(key == 'a'){
    pressedTime = millis();
isDraw = true;}}}

Work assembly connection and operation. After ensuring that the computer is assembled and that the files can run normally, connect the projection device and turn on the audio. Finally, decorate and decorate the hardware of the interactive device with a paper box and color stickers. The exposed wires are blocked with a note paper with a note and printed A work promotion poster and an instruction sheet. The experiencer presses the keys of do, ri, mi, fa, sol, la, and xi respectively. By touching different buttons, different circles of marine life will be displayed on the screen. The entire screen is a floating effect, and the experiencer can freely Playing music means that the sea was originally a wonderful melody. Subsequently, the circle connection of marine life was broken and gradually dispersed until it disappeared, which means that as the marine pollution became more and more serious, the living organisms that depended on the ocean lost their lives due to pollution. When the experiencer played
again, a full screen of rubbish appeared, meaning that the ocean is now scarred and overwhelmed. One less piece of garbage and one more piece of ocean blue. Don't let the ocean fill up with garbage, so as to appeal to people's awareness of protecting the ocean.

![Image of works assembly connection and operation]

Figure 5. Works assembly connection and operation

4.3. Outlook

The idea of this work is to show the audience more intuitively through the interactive installation the original colorful marine world and the shock of the marine life lost due to pollution. It has a certain degree of appreciation for interactive fun and scientific popularization. Science popularization has economic, educational, cultural, social and scientific functions, and it plays an important role in promoting social and economic development. The addition of interactive programming technology makes "What else" is different from the traditional propaganda works, allowing the audience to participate, generating certain communication and interaction, letting the audience understand the status of marine pollution, and calling on people to protect the consciousness of the ocean. This installation can be displayed in marine-related exhibition halls, such as aquariums, aquariums, and marine parks. It will combine endangered marine life with a combination of culture and modern business to let more people know about these creatures. To understand marine protection is more conducive to the consciousness of marine protection taking root in people's hearts.

5. Summary

With the development of the integration of science, technology and art, multi-media interactive design in installation art is increasing. The immersive and emotional experience in interactive installation art not only enriches the form of art display, but also enhances the communication and interaction between the entire installation art and the audience. The value of Processing programming in installation art fully meets the display demands of modern digital art exhibition methods, and meets the sensory needs of audiences at various levels when participating in interactive experiences. Advances in science and technology will also drive interactive installation art in Deep development in various fields and multi-dimensional levels. The new generation of artists and designers should not just stay at the level of commercial software applications. More people should try and master the creation of programming code.
techniques. In China, where the creative industry is rapidly developing, we have reason to believe that more people will use code tools to innovate and develop art and design, integrate technology into artistic creation, and broaden the path of artistic development. This will also become an important direction for the development of art in the new era.

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