

# Application of the Interactive Art of New Media Installation in Concert Stage Performance

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**Abstract:** “New media installation art” is the product of the combination of new media art and installation art, while interactive art originates from the integration and development of installation art and sound art in the context of new media. The interactive installation art can restore the performance scene of the music stage to the audience from the visual and auditory aspects through the sound interactive installation. In this context, this study analyzes the application of technology and the creation of stage scenes in the installation of interactive art in the music stage performance, and makes use of the installation of interactive devices to make the audience have a sense of substitution and experience the cultural ideas conveyed by the works.

**Keywords:** New Media; Interactive Art; Stage Performance

New media interactive installation art appears in the era of rapid development of science and technology. It uses computer technology to collect, edit and process information, and uses installed display scenes for certain artistic interaction. It is an art form developed on the basis of installation art. The interactive device can be used in the music stage to strengthen the transmission ability of music emotion by means of picture background and action, so that people can complete the interaction without touching. In addition, the interactive art of installation also adds the concept of time on the basis of traditional three-dimensional, and makes use of the deformation, stretching and dispersion of time to make the audience focus on the sound and movement in the music stage.

## 1. Expression Concept of Interactive Art in Concert Stage Performance

### 1.1 Human-device Interaction

Interaction is the primary design factor in the music interactive device. The interaction in the interactive device has two meanings: the interaction between people and devices and the interaction between devices and the environment. The interaction between people and devices emphasizes the manipulation of the music interaction device by people and the music performance. The interaction between the device and the environment has a higher demand for interactivity. It requires that the music produced by people operating the music device should interact with the environment, and integrate people, devices, music, etc. in the environment to form a complete interactive network.

### 1.2 Fun of Operation

Whether the music interactive device is set in the experiment or in the public environment, there should be interesting interaction between people and the device. The traditional instrument playing mode is interesting in itself, but in the simplified music device, in order to enhance the interest, we need to further design the instrument playing through different manipulation methods, which brings more interest to the operation of the music interactive device. In the experimental interactive device, the interest is expressed in the sound, light, electricity and even virtual reality technology related to modern technology, and has the novelty of exploring the unknown when operating the music interactive device; Among the functional public music devices, the interest is more in the diversified manipulation of the music devices, with a free sense of exploration in the operation.

### ***1.3 Harmony between Structure and Layout***

The music interactive device itself belongs to a kind of art, but it cannot build an aesthetic space alone like sculptures and other works. The music interactive device needs to connect with the environmental content to build a complete visual aesthetic space. For example, music interactive devices can be fully integrated into the environment and become a part of the environment; Or we can use the trees, rockeries, pools and other contents in the environment to build appropriate functional landscapes and expand the existing space of music interactive devices; Music devices can also be used to transform the environmental visual contrast, form specific landscape conflicts, and make the space contrast and change. These three types of environmental structure layout can be comprehensively used in actual layout settings.

## **2. Application and Development of Interactive Art in Performance**

### ***2.1 Application of Interactive Art in Performance***

The development of technology and the performance exchange of international drama have brought the combination mode of art form and technology to the performance. The stage background and space are set through the multimedia form, and the performance is assisted to form a stage performance form similar to the conversion of film perspective.

Falling Dream, a children's play performed by the Dutch theatre group Het Filiaal Theatermakers, accurately explains the integration of "new media technology interaction" and drama art in interactive drama. The director transforms the stage into a shooting scene, uses a work table and four cameras to shoot through projection, green screen matting and other technologies, and puts the actor's performance on the stage in the form of film on the screen. The director Monique Corvers creates diversified sound effects to reduce the monotony of space and expand the audience's imagination of performance. During the whole performance, the audience not only enjoyed the works of traditional stage forms, but also enjoyed them as film works or drama works, and the live music performance on the stage can also be enjoyed as concerts. The audience can compare the "objective world" of the main character's stage space with the "inner world" of the video space during watching. This way of comparison is exactly the details of the creative performance of Falling Dream using new media technology.

### ***2.2 Development of Interactive Art in the New Era***

In the new media interactive art exhibition, many exhibitors found that they could easily participate in these art exhibitions and interact with works of art. The way to participate in the interaction is usually very simple. You can dial the phone number displayed in the screen to interact, or watch the image generated by the change of light, sound and other environmental factors of the artwork. For example, in 2015, the Shanghai Academy of Drama exhibited the dance beauty work "Love Letter" in Beijing. Viewers can scan with mobile devices such as mobile phones, and then watch the "performance" segment in the stage model [1].

With the continuous development of the times, art and technology are also constantly merging and changing, but the "rebirth" of technology and content brought by imagination will not change. Excellent multimedia interactive art works from all over the world came to China for touring, which inspired many Chinese artists to create interactive works. For example, the children's play "Dad's Time Machine" directed by Ma Liang in Shanghai, and "Parallel Universe Love Deduction" directed by Wang Chong in Beijing are excellent interactive art works. From this perspective, China's interactive art works, whether they are about stories, innovative technology or actors, are constantly developing.

## **3. Concrete Application of Interactive Art in Concert Stage**

### ***3.1 Application of Scientific and Technological Techniques***

MAX/MSP technology is a core technology of the control port in the multimedia stage. It mainly focuses on the creation of electronic music and the development of programming language for music visualization. MAX/MSP technology uses programming means to simply connect different functions and transform them into a visual mode, so that musicians who have not been exposed to data programming can also create complex new media installation interactive art works, which is welcomed

by many composers and performers. These devices can use MAX/MSP technology to modify the frequency, repetition degree and cycle mode of sound, convert the sound wave into corresponding digital signal through digital technology, modify the sound effect in real time by parameter adjustment, and use code control output to achieve the desired music effect.

In Chinese stage performance works with multimedia interactive devices, the MAX/MSP technology on the computer can be used for pre-data editing. The object command is transmitted to the multimedia interactive sensing device in the stage. The computer collects the actors' action information using the point-to-point mode, and collects the actions that should be exchanged on the stage. When a specific action is recorded in the formal performance, it will be used as a conversion switch to trigger the subsequent conversion procedure, change the screen of the holographic screen and play the preset sound effect, so as to use the actor's performance, dance and other actions to trigger the preset instructions to achieve the purpose of stage program exchange [2].

The multimedia system captures the action of performers through the Xbox infrared motion capture camera Kinect developed by Microsoft. "Kinect" is a combination of kinesics and connection. Kinect is usually connected by three cameras, including infrared emission camera, infrared receiving camera and ordinary RGB camera with a resolution of 640x480. Kinect system also has a microphone and steering gear. Kinect only judges the transformation of bone points, and does not recognize the rotation data made by the human body. In the MAX/MSP software, `iit.freeconnect.grab`, `iit.openni`, `do.kinect` and other plug-ins are commonly used to grab the bone points, and image analysis is used to set the bone points of the plane contour of the human body. These three plug-ins can be used according to the needs of different stage performances. After the plug-in obtains the bone point data, it transmits the position of the bone point at each time point in the music to MAX/MSP through the OSC signal, so as to complete the trigger condition setting of stage sound effect and screen background picture, as shown in Figure 1.

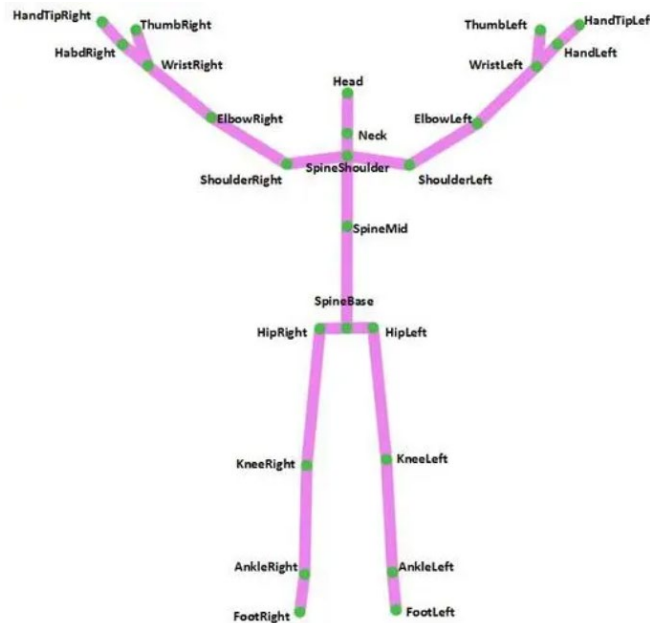


Figure 1: Kient Bone Point Settings

### 3.2 Setting of Stage Scene

The setting of the stage scene is conducive to the expression of the works' emotion, and will introduce the audience into the artistic world created by musicians. For example, the performance of "Rainbow, Cliff, Twilight" starts from an ordinary box, which is like an old octave box in memory and stops at the center of the stage. The performer opened the cover of the box in silence. As the rope on the shuttle rod was gradually pulled out, the stage sound effect and light and shadow were also constantly changing. During performance, the music box, as an interactive device, triggers the sound effect and light changes in the stage through continuous wire drawing, and forms a polyphonic relationship with the voice in the music and the actions of the performers. As an irreversible instrument performance switch, the spool echoes the central idea of this work, and has the meaning that what has passed away will never come back. The extraction of twine can be used as the concretization of the past sounds,

memories and other contents that cannot be specifically touched. Therefore, when the performer is entangled by the string of the past in the stage, the audience can trigger the sympathy, and recall their own memories by listening to the old voices on the stage. One-way extraction is the most suitable trigger design for this work [3].

The rotation speed of the spool corresponds to the action and music in the performance. The author takes the pitch and rhythm of the music and the brightness of the three lights as the adjustment objects. In the performance, the faster the speed of the central axis, the stronger the rhythm, the higher the pitch, and the brighter the light; the slower the spool rotates, the weaker the rhythm, the lower the pitch, and the darker the light. In order to achieve the expected performance objectives, it is necessary to set up sensors for motion capture, set up hardware for converting and storing information, collect wired resources for transmitting information, and maintain the normal operation of interactive devices. After the materials are prepared and assembled, the stage scene can be controlled. The following is the structure and material settings inside the music box.

The music box is mainly composed of five parts, including: 1. ChipKIT Uno32 open source hardware prototype platform; 2. 9V battery; 3. wireless network; 4. four fixed-distance magnets; 5. Hall-effect sensor. Hall-effect sensor is the core component of the music box, which uses electromagnetic effect to work, acts as a transducer in the music box works, and converts the magnetic field information in the music box into voltage for output. The specific structure of Hako's interior is shown in the figure 2.

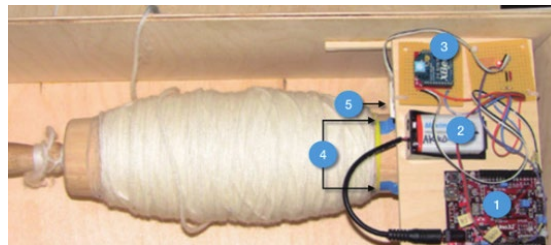


Figure 2: The five main parts inside the Hako music box

The Hall sensor sends the electromagnetic pulse signal to ChipKIT Uno32, converts it into a MIDI signal, and then transmits the obtained signal to the Max software in the computer through the network. In addition, the battery in the box can supply power to Uno32 when it is not connected to the external power line, which makes the music box unlimited in scope, so that the performer can pick up the music box and perform stage action in the performance, as shown in Figure 3.

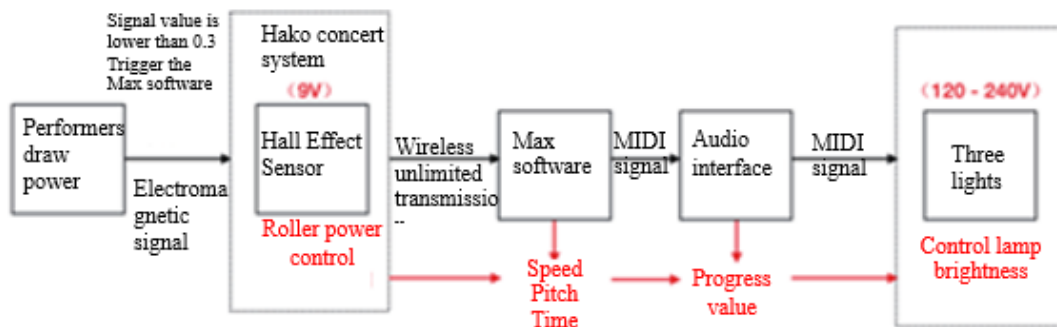


Figure 3: Schematic Diagram of System Operation

#### 4. Conclusion

Multimedia art creates a humanized artistic environment attitude that allows people to feel the author's feelings and thoughts in artistic works, and represents the artist's creation as a mediator and explorer in the network. Interactive music art has set up a comprehensive development model with art and technology as the core. During the interactive performance creation, concepts and technologies from different disciplines will be fused to different degrees. Through interactive technology as a link, it will promote the integrated art of hearing, vision and other senses acting together. The technology used in the interactive installation art is constantly innovating, and the audio-visual experience is also constantly improving, but the concepts conveyed are basically the same, mainly using the empathy of

human beings to enable the audience to obtain the delicate feelings in the works.

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