GLOBAL ACADEMIC RESEARCH INSTITUTE

COLOMBO, SRI LANKA

Author: Lijie Ren

Hongik Unversity, Seoul, Korea

RESEARCH ON THE APPLICATION OF SOUND DESIGN IN INTERACTIVE INSTALLATION ART IN PUBLIC ENVIRONMENT

Lijie Ren

Hongik University, Seoul, Korea

renlijie0921@gmail.com

ABSTRACT

Since its emergence, installation art has been characterized by high social significance, wide range of subjects and active use of new science and technology as a means of design. The site specificity, narrativeness and publicness of public installation art make it one of the important ways to show the concepts and characteristics of a region. In recent years, public installation art has gradually shown an interactive trend. While appreciating art, people pursue spiritual "closeness", "dialogue" and immersion, instead of merely staying on the visual effect. Sound is often regarded as a secondary element in design. However, as a matter of fact, as one of the five senses, sound is a very perceptual medium of communication that can provide personal special feelings and common emotional reactions. Compared with image, sound records an emotional background in a richer way, provides the atmosphere and state, creates imagination space for human perception, and lays a foundation for the realization of design narration. With the help of the narrative function of sound, the visual and touchable installation art can enrich the design experience in the dimension of auditory communication, also be easily received by the audience and interact with them. Sound design can not only provide ordinary participants with extraordinary immersion experience, but also increase the sense of participation of the people with visual impairment and improve the space narration construction of public installation art.

With acoustics, psychology, perceptual theory as its theoretical support, this paper analyzes the application of sound design in the art of public interactive installation through case studies; analyzes the commonalities, characteristics and design trends manifested by different regions, and studies how to achieve a better effect of interactive experience through design optimization.

Key words: sound, interaction, public environment, the art of interactive installation

INTRODUCTION

"Science and technology can change life" sounds like a cliche. However, since the 20th century, the rapid development of science and technology has not only promoted the urbanization of the whole world on a large scale, but also improved the daily life of human beings indeed. At the same time, it has brought tremendous changes to the spiritual life and artistic experience of human beings. Public art in a broad sense refers to all works with an artistic sense in public space. In the context of rapid economic and technological development, public art, as one of the spiritual carriers, has been also

expanding its own field at a considerable speed. With the support of science and technology, public art is not only confined to architecture, sculpture, landscape, painting and other aspects, but also has various expression forms of new media. As a hotbed for the development of science and technology and new media art, cities breed various new forms of public art. At the same time, public art communicates with the community and the public, affects the life of human beings in cities, and shapes the unique temperament and personality of each city.

The art of interactive installation in public art is also a part of the new media art. Its flexible forms of expression cover a wide range. Because it can bring a strong sense of immersion to and arouse the resonance of experiencers, it has a very strong influence in the art field today. In the era of digital media, interactive experience is the general trend. Nowadays, artworks begin to be judged by the audience's experience. Previous installation art mostly existed in the visual category of "seeing", while the combination of sound and installation art is the mutual promotion of hearing and vision. Expanding the creative performance field of installation art can enhance the perception level of experiencers more effectively. The art of interactive installation makes experiencers from the design ideas of "being given" by artists or designers to "dialoguing" with the works, and participating in the works to construct their own artistic experience with their own perception.

THE ART OF PUBLIC INTERACTIVE INSTALLATION

Literally, "sound", "interaction", "installation art", "public"----Here, the author tries to explain the definition of the art of public interactive installation ---A structural installation and a unique art form for the author to create a meaningful space scene in a public place by using a variety of carriers, generate feedback according to the behaviors of experiencers, and provide experiencers with immersion experience, so as to achieve interactive communication with the public, with sound as the design element, with computer graphics, human-computer interaction, information collection, processing, computation and other media technologies as tools.

The past and present of the art of public interactive installation

As early as in ancient Greece, European countries had the tradition of setting up commemorative sculptures on the open city squares, which could be regarded as the earliest consciousness of public art. The real public art sprang up in the West in the 1960s. After World War II, in the reflective mood of the social problems such as the rising anti-war sentiment in Western society caused by war and the deterioration of environment caused by high industrialization, the Western art circles began to question the previous art forms at the same time of the revival. With the post-modern cultural trend of thought in Western society in this period, the public art with modern flavor began to develop formally.

Today, as the most important part of public artworks, the public's needs and lifestyle directly affect the way that the works are presented. Certainly, the development of science and technology art has changed the characteristics of traditional public art and broadened the field of traditional public art. In recent years, with the development of human-computer interaction technology and the change of artistic viewpoint, new media art has gradually become the focus of attention in the art circles with its special artistic language form. The art of interactive installation is one of the most dynamic artistic forms in the art which

uses new media technology, and it is an emerging artistic form. It is full of the energy of new media technology and art, and has a very unique audience participation, flexibility and autonomy. In recent years, as one of the expression forms of public art, the art of interactive installation has been very active, with many excellent works having emerged. However, the research on its definition, value and creative methods is still not perfect.

The characteristics of the art of public interactive installation

The art of interactive installation in public environment was born for the public. The original intention of public interactive installation art works was not only to decorate the urban environment, but also to show the cultural concept of the environment, to lead the trend of development and to enhance public aesthetic awareness. Historical events, humanistic sentiments, ecological environment and so on are common elements and themes of public interactive installation works. Excellent works can guide people, inspire people, and increase the people's sense of belonging to, identity with and pride of their own cities and countries.

The art of public interactive installation is not only to "express" the designer's views and feelings, but also to "listen" to the user's feedback of experience. Influenced by the concept of interaction, public installation artworks give first priority to the analysis of the user's basic situation, thinking mode and behavior mode in the whole process from the initial conception to the final stage of presentation. The completion of the works cannot represent the completion of the design task. The works can be called the complete interactive installation works only when they communicate with the public and breathe in harmony with experiencers. In the following, the author will, from the following perspectives,

analyze several characteristics that should be paid attention to when interactive installation works are designed and produced in the public environment.

（1） Publicness

As mentioned by Hannah Arendt in The Human Condition, "Anything that comes into contact with or enters into the stable relationship of human life immediately has a nature of being a state of human existence. That's why no matter what human beings do, they are always existing in a situation". Human beings create situations for themselves. These situations are always rooted in the environment of human growth and integrated into human life. It is impossible for the former to break away from the latter. So when an artist starts his/her creation, his/her creation and works bear both individuality and publicness.

Publicness can also be explained by such words as "generality" and "universal meaning", which is expressed in art as a characteristic of universal meaning precipitated in history. Public installation art is not the art that designers admire themselves. It is the most convenient way of communication between the public and art. It needs to consider the public aesthetics, the artistry of works and the local culture at the same time. In the process of creation, the relationship between personal style, public demand and public acceptance should be well coordinated. As a result, the creation of public artworks is more difficult than that of art galleries. In a word, publicness is the core of public art, and the works of minority people who are separated from society can never be called qualified public artworks.

（2） Site-Specificity

Notes on Sculpture: Part II written by Robert Morris in 1966 is usually regarded as a key expression of the principle of Site-Specificity at an earlier time: Artworks should be "separated from the relationship

of works, so as to have a relationship with space, light and the viewer's horizon". To understand the site Specificity of public installation art, we can first understand the field in the site of works. The term "Field" comes from the field theory. This theory is one of the main theories of social psychology studied by Kurt Koffka, a German American psychologist. It is a conceptual model of human behavior. He believes that every action of human beings is affected by the site of the action, which not only refers to the physical environment, but also includes the behavior of others and many factors associated with it. Koffka referred to what an observer perceives when facing an environment as "the psychological field", and the realistic environment that brings perception to observes as "the physical field". Different people have different impressions of the same environment and different perceptions of the psychological field. On the other hand, the physical field of the environment will also have an impact on the psychological field of human beings, which shows that the psychological activities of human beings in the environment are often the result of the interaction between the physical and the psychological fields. Only when people's experience and perception in the environment are realized, can a dialogue between people and public art be reached and a new relationship can be established accordingly. Installation artworks in a public context can be regarded as an ensemble of "psychological field" and "physical field" from conception to completion and display of the works.

（3）Narrativeness

Installation artworks in the public context, narration takes place in the space created by the works. The installation works designed by the artists themselves, even the surrounding environment of the site selected for the works, can jointly create a situation, and create the first scene of feeling, making stories come into being

here. This space is dynamic. The installation media materials, such as shape, material, lighting and sound, set up a stage for stories. On this stage, virtual space, material space and internal space intertwine and interact with each other, waiting for the audience (protagonist) to perform on it. Once the "narration" comes into play, the installation works will appear charming, vivid and natural. In order to create a narrative atmosphere for excellent installation works, artists should carefully study how to depict stories, express space, and shape time in artworks.

（4）Interactivity

According to Professor Roy Ascott, the pioneer of new media art, the most distinctive characteristics of new media art are connectivity and interactivity, which are most fully reflected in contemporary interactive installation works. This artistic form relies on the development of science and technology to provide more possibilities for the presentation of creativity and enables both creators and experiencers to experience a new realm. It breaks through the relationship between the author and the audience in the traditional art form, regards the visitor as an indispensable part of the works and emphasizes the enthusiasm, activeness and initiative of the audience. It requires the visitor to participate in the works and form a new viewing behavior by the means of audience perception guidance. Participants can also gain more hierarchical feelings through their own body movements and complete their works amidst interaction. This participatory mechanism promotes the integrity of conceptual expression.

As the matter of fact, the concept of interaction is very broad. The interaction between individuals and individuals, individuals and groups, groups and groups, individuals and works, works and works can all be called interaction. Interactive installations also have many forms. They mainly communicate with

experiencers by means of sound, electricity and light. They give feedback to the experiencers' body language. Therefore, the modeling can be static or dynamic, and can be touchable or untouchable. With the help of these media materials, human beings break through shackles of the real world and try to achieve richer emotional exchanges and more immersive virtual experience.

FEATURES AND FACTORS OF SOUND

Sound is one of the earliest physical phenomena studied by human beings. Until the end of the 19th century, only human ears were used to receive sound waves. As one of the frontier disciplines, acoustics has a long history and is still very active now.

Sound, an independent medium and one of five physical senses, provides us much information that visual sense fails to provide. The time when we hear the sound is shorter than the time we see something since sound can pass information in a very fast manner. Sound exists in the domain of time and goes beyond space while visual sense exists in the domain of space and goes beyond time. Sound is in an advantageous position in space because installation art is a kind of art that creates space. No matter which direction the user is facing towards, user can always hear the sound. Different sources of sound and varying sound volume can be adopted to help artists to create layering space.

In regard to the impact of sound art on public interaction installation art, it provides information and feedback for users, in turn users can participate in the two-way communication with installation work via receiving, cognizing and acting towards acoustical signal. The sound art applied in interaction installation art can be divided into phonetic element and non-phonetic element, the latter of which is widely used in public interaction installation art. In other words, non-phonetic elements are mainly used for auditory information expression. Non-phonetic elements can be further divided into natural sound and artificial sound, and artificial sound can be classified into music, noise, industrial sound, living sound and so forth. The countless sound elements can be analyzed from the acoustic perspective once applied.

The three factors of sound, i.e. pitch, loudness and timbre, have a mutually corresponding relationship with the three factors in physical acoustics, i.e. dominant frequency, amplitude and audio spectrum.

(1)   Pitch and frequency

Pitch refers to the sharpness of sound, which depends on the frequency of the vibration of sound source. The faster the vibration of an object, the greater the frequency, the higher the pitch, and vice versa(fig.1). The unit of frequency is Hertz, abbreviated as Hz. Only the regular waveform of sound can be felt by human beings, that is, only when the frequency of sound lasts for a certain period of time, can the pitches be felt by human beings. Discrete pitches can hardly provide much information. In installation artworks, too many meaningless discrete pitches should be avoided. However, human beings are sensitive to the change of pitch and can easily tell the difference of pitches between two sounds. Therefore, intermittent pitch changes can be used to transmit information over a period of time.

Fig.1. Pitch and frequency
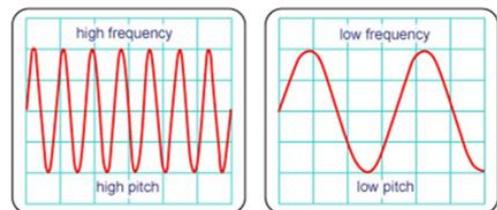
(Pic from Period Science Term)

(2) Loudness and amplitude

It refers to the size of the sound that the audience feels subjectively, also known as volume, which is related to the magnitude of the sound source and the proximity of the sounding object(fig.2). The greater the vibration amplitude of the sound source, the greater the loudness. On the contrary, the smaller the amplitude, the smaller the loudness. The closer you are to the sounding object, the louder the sound you can hear(fig.3). On the contrary, the farther, the lower. The use of stereo or surround sound can effectively map spatial dimension information. According to this characteristic of sound, adjusting and setting the loudness is just like injecting soul into the space created by the installation works, which can make it more vivid and real. In the design of installation works, we should not judge everything by experience. It should be adjust and test the size of the used sound according to the design theme and design site, so as to achieve the most appropriate effect.

Fig.2. Loudness and amplitude

A loud sound – large amplitude

A soft (quiet) sound – small amplitude
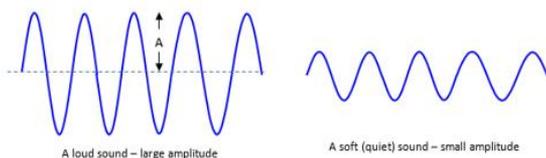
(pic from school Physics)
Fig.3. Loudness and distance
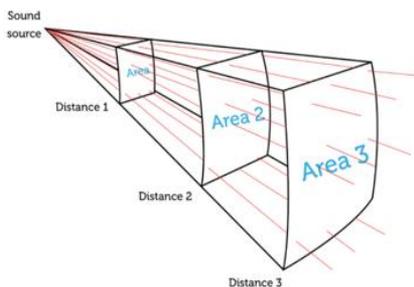
(pic from Physical Stack Exchange)

(3) Timbre and sound spectrum

Timbre refers to the different characteristics manifested by different sound frequencies in waveforms. Sound spectrum(fig.4) can indicate which frequencies of sinusoidal waves a signal is composed of, and can also show the size, phase and other information of sinusoidal waves at different frequencies. Sound spectrum is one of the factors that determine the timbre. It refers to the intensity of harmonics and overtones at different frequencies in relation to the basic frequency. The most clearly sound produced by the fundamental frequency of sound waveform is referred to as fundamental tone, and the sound produced by the tiny vibration of each harmonic is referred to as overtone. The sound at a single frequency is referred to as pure tone, and the sound with a harmonic is referred to as compound tone. Each fundamental tone has overtone with an inherent frequency and different loudness, which can distinguish other sounds with the same loudness and pitch. The proportion of each harmonic of sound waveform and the size of its attenuation with the time determine the timbre characteristics of various sound sources.

Timbre is a very important characteristic of sound. Different materials and structures of the sounding object would result in different timbres, which can provide numerous materials to meet the narrative requirements of installation design works. At the same time, timbre is also the most frequently used element of sound, because even discrete timbre can be easily distinguished by human beings, just as human beings can identify the instruments used by listening to discrete fragments.

Fig.4. A Sound Spectrum
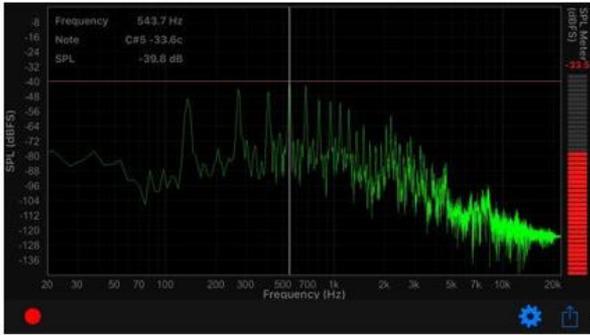
Sound Design in Interactive Installation Art in Public Environment

As a matter of fact, 70% of the information that human obtains from the outside world is via visual sense while about 15%~20% is via auditory sense, thus the auditory sense is the most important way for human to obtain information in addition to visual sense.

Nature has not only created a variety of sounds, but also created human ears to listen to sounds. As an important sensory channel, human auditory system has unique physiological characteristics and has the functions of receiving, selecting, analyzing and judging loudness, pitch and timbre. The lowest sound intensity that can be heard by human ear is about 10-6W/m2 (sound pressure20μPa). At 1000Hz, the corresponding vibration displacement of air particles is about 10pm（=10-11m）, which is only one tenth of the diameter of air molecules. The mystery of human ears is evident. Human ears can hear sounds of 20 Hz - - - 20000 Hz, and are most sensitive to sounds between 1000 Hz - - - 3000 Hz. It is sadly to admit that people widely believed that the auditory sense is of secondary importance, as a result, it remains in a very subordinate position in design.

As mentioned previously, sound, light and electricity are major media materials used in installation art works.

Nevertheless, study on sound elements in the domain of installation art is still in the original stage. It is quite common for artists to adopt a piece of music so as to make the installation art work more appealing or use the sound as a prompt to ask users to have a look. There are also some works in which sound elements are used as the major element. In an installation work released recently, the artist creates a black space which enhances users' auditory sense while significantly weakens their other sensory senses. In the black space, users are allowed to enjoy the music or audio materials provided by the artist no matter they are lying or seated（fig.5）. This kind of installation art work, as an exhibition art, certainly has its brilliant points, which however is not advisable in public installation art. Such design pattern disconnects sound from other media materials, and it is the same mistake as neglecting sound while focusing on visual elements only.

Fig.5. Sound experience display

(pic from Lynn Pook)

In addition to these physiological features, sound possesses some interesting advantages in terms of human psychology and even the cognitive domain of acoustical signal.

（1） The detection speed of acoustical signal is faster than that of visual signal.

With regard to the acoustical signal and visual signal released at the same time, the acoustical signal is always received before the visual signal. Visual information accounts for most information that human receives every day, thus human is more sensitive towards the stimulation of visual signal. Utilizing visual signal to guide acoustical signal can improve the accuracy of the information that user receives.

（2） Human is sensitive towards changes of sound as time goes by.

Sound is a time-related information carrier and passes information via constant changes as time goes by. If the parameters of an acoustical signal remain unchanged for a long time, then human will soon have auditory adaptation, be less attentive toward this signal. If a sound varies as time goes by, human will be very sensitive towards the sound.

（3） The omni-directional feature of acoustical signal can be used to guide user to focus on details via visual sense.

Acoustical signal can be utilized to help visual sense to capture information, human get used to further reading and analyzing from visual perspective after hearing acoustical signal.

（4） The collaboration of visual and acoustical information provides human much stronger sense of real experience.

In the context of the booming development of new media art, all kinds of media materials emerge like the mushrooms and provide users all-around information support. The next aim for most designs is to provide immersive experience for users. Visual and acoustical sense, as the first and second information source for human respectively, supplement each other, their collaboration can bring users much stronger sense of real experience that can be compared to real world.

（5） Sound has cultural and regional feature.

The cognition of human of different nationalities in different areas towards acoustical signal varies because of diverse historic and growth environments. Everyone has his most special sound he remember, and he and the people around him can be touched or recall some sound together. Artists can create public or individual space for installation art work by using the cultural and regional feature of sound.

（6） Sound is emotional and can pass different emotions.

Sound is a very pure element and influences human's emotions via subconsciousness like color. For instance, light value and high hue contrast is clear and bright, which can be used to express lively and cheerful emotions. Medium value and high hue contrast is similar to smooth and soft rhyme, which is suitable for relaxing and comfortable atmosphere.

（7） Sense of rhythm can be used for more efficient narration

Sound of different rhythm and diverse melody can express different emotions and feelings. There is a saying that "music has no boundary". Unrestricted by language and visual signal, sound is one of the arts that are the most accessible to human mind. Applying sound elements appropriately can significantly improve the narration feature of the work. Along with the economic and cultural development, government and the society are working hard to make the visually disabled to live as average person does. Equipping installation art in public environment with sound element enables the visually disabled to experience

together, which also improves the public character of public interaction installation art.

CASE STUDY

(1) Touched Echo

There is a 500-meter-long terrace which is called "Terrace of Europe" in Brühlsche Terrasse. Standing there, it's a bird view over River Elbe and the old town across the river. On handrails, there are some humble sticking marks showing an outline of a figure covering ears with elbow on handrail and a serial of numbers, 13.2.1945(fig.6). When imitating this posture, an experiencer will be haunted by the ghosts from the war decades ago.

Fig.6. Terrace and Sticking Marks

Bone conduction(fig.7), a method conducting sound is applied to this installation. The conduction pathway is "sound wave, cranium, bony labyrinth, lymph fluid in internal ear, organum spirale, acoustic nerve, and acoustic center at cerebral cortex. The principles of bone conduction can be explained with a simple example. When we cover ears with hands, we can clearly hear our own whisper in a voice no matter how low it is. With bone conduction, sound will not be spread in air so people who do not touch the handrail can hear nothing. In this unusual way, German artist, Markus Kison represented the horrible atmosphere caused in Bombing of Dresden on February 13th 1945. The name of this installation is named as Touched Echo. Markus

explained people who touch the installation will become involuntary participants. All these participants will cover their ears and bend their body, looking like escaping from the air attack, explosion and terror howl. The harder their palms press, the clearer the sound will be.

Fig.7. Bone conduction

The collision between the sound of air attacks and explosions heard when covering ears and the beautiful scenery through the bleak handrail makes people feel absurdly unreal. The terror against wars is common among people. This immersive experience created and produced by stripping a space from the real environment is brought by the sentimental narratives of sound.

The sounds of air attacks, explosions and heart-wrenching howl are all noise. However, noise can also be taken as a major sound element to create excellent works by different themes.

The artist was invited to create a special work of Osnabrück for 2009 European Media Art Festival in Osnabrück(fig.8). Same as Touched Echo, the mark shows the date of the first air attack in Osnabrück during the World War II, 20.6.1940(fig.9). Located in a bridge in Osnabrück downtown, the installation is towards the direction of air attack.

Fig.8. Touched Echo Osnabrück (2009)

Fig.9. Sticking Marks of Touched Echo Osnabrück (2009)

History is a process everyone can take part in. Real events can be used as the material for installation arts. Even without experiencing the event, experiencers may also call for the objection against war from their heart through the silent mourning for victims in this installation.
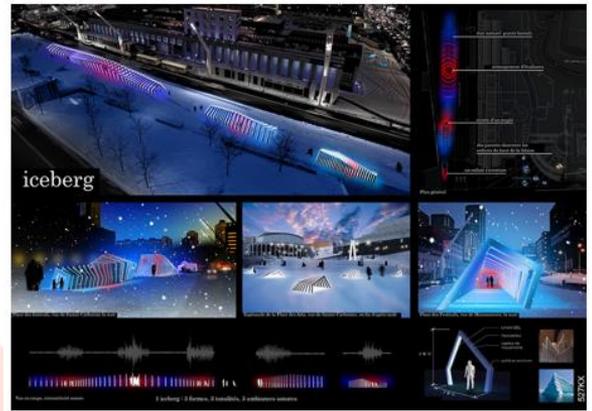
(2) Iceberg

Iceberg, an interactive public installation with architecture, light, and sound as major design elements is created by a design group, ATOMIC3. This installation was exhibited in Quartier des spectacles, Montreal, Canada.

As its name shows, from north to south, the work is composed of four huge illuminating arched installations in triangle shapes with unique sound emitting. A tunnel is formed under the arched installations, attracting experiencers feel the birth and melting of icebergs from the waters in the Arctic Pole to the southern coasts. When entering into the installation, the motion sensors inside will detect the experiencers to trigger the changes in lights and sound (fig.10).

Fig.10. Iceberg

The installations of icebergs in any shape and size may remind people about the glaciers floating and gradually melting in the water. After hundreds of years, icebergs may emit unique sound with time and environment changing. In the north, under the biggest iceberg, the movement of experiencers can trigger the light and sound on. When sea water flows into cracks, a huge sound similar to organ may occur. When floating further to the south, the icebergs melt intensely and get closer to the coastline with residents. Thus, the sound turns from meaningless to that like music. The installation is a small-size one which is only fitted for children(fig.11). It

warns the coming of global climate change and asks people to protect the environment.

Fig.11. Installation changed

Fig.12 Piano Stairs in subway station and shopping mall

(Pic from google)

In this public installation, the sound design creates a layering space, making experiencers have an immediate association. From the natural sound to artificial music, this work describes a story of iceberg melting. Moreover, the application of lights gives participants an experience with stronger reality.

(3)   Piano Stair

With the city development, congested traffic has become common in the middle- and large-scale cities all over the world and the general lack of exercise among people in cities also becomes a public problem. To help citizens lacking in exercise and relieve the visitor flow in escalators, governments want to encourage people walk by stairs.

As shown in pictures, to improve the behaviors of the public, many countries have launched this series of public installations. In metro stations and shopping malls with heavy crowds, the steps for walking are designed as piano keys in the long and boring footsteps. These steps are equipped with infrared induction system or pressure sensors. When walking on the stairs, people press a piano key when making a step, making the stairs emit light and music(fig.12). This installation greatly improves the utilization rate of stairs and relieves the traffic pressure while encourages many people to make more movement.

In fact, there have been more and more works focusing on and reflecting the living ecology. Humanity or ecology are hot themes in public installations. The piano stairs are designed with the public experiences in cities, increasing its publicness. Moreover, this simple design has characteristics of interactive installations, including public participation, interactive feedback, dynamic variation, and visual pattern. With appetency and attraction, this edutainment method can subtly convey the ideas for public benefits and motivate the ecological awareness.

(4)   Sound Fun

The pigeon whistling in the sky, the vendor's hawking nearby or in distance, bells of old bikes passing by in the old times… The sounds of the old Beijing disappearing in recent years reoccur in Dashilan of Qianmen, Beijing through a sound installation Sound Fun by the designer, Qin Siyuan.

In this work, the sound fragments occur randomly. Each fragment is like a small complete play. The sounds in four seasons are different, vividly depicting the culture of street vendors in old Beijing. The shouts of street vendors can be heard in spring, the shouts for smoothies selling be heard in summer, the pigeon whistling be heard in autumn, and the camel bells be heard in winter. However, all these sounds have changed. They appear in the public environment of Beijing Fun in Qianmen. Inbuilt in the benches for rest, the sounds

become a part of public art plan in Beijing Fun(Fig.13). In this installation, visitors can acquire an intangible comprehensive experience once upon entering the area. The indistinct sounds are extracted and designed as the abstract background sound(Fig.14). Played discontinuously in a limited volume, the sounds are not abrupt but make subtle changes to the space in the area. By controlling the sound continuity and space positioning between different tracks, the installation pulls audiences back to decades ago with misty sound and make them in a living theater of sounds hiding in the time.

Fig.13. *Sound Fun* in Beijing Fun

When talking about Sound Fun, Qin Siyuan said, "sound is one of the most humane presence through which we can explore our emotions and record the ages. In time, it's the past, the present and the future, composing the common memory of people."

Fig.14. Played discontinuously in a limited volume

（Pic from sina.com）

With sound as a medium, Sound Fun creates a living sound theater traversing space and time with the shouts of street vendors in the old Beijing as the major element with the percussion and natural sound as supplementary. This installation brings unique perceptive and sentimental experiences by representing the culture of street vendors with sounds in Dashilan, a 600-year long commercial district of Beijing.

The impact of sound design in interaction installation art is firstly reflected in the subject matter and work feature of interaction installation art. In most cases, interaction installation art exists as experimental art or technological art as it is still in its starting state, and it is always on exhibition in galleries, art museums, art galleries, exhibition centers and other official institutions. In addition, what interaction installation art shows is artistic concept and technology experience. At the very beginning, interaction installation art was merely artistic work and focused on personal emotion expression and technological experience. Along with the development of sound art, interaction installation art became applied design with practical social functions and could be adopted to solve practical problems. Even though that installation art became known to the public and the access to interact cannot be credited to the application of sound art, it is undeniable that sound art makes the content and nature of installation art different.

CONCLUSION

Through theoretical research and case analysis, first of all, we can know what kind of works deserves to be called excellent works on the premise of facing the public in the subject matter of installation design with sound as the design element. They should be marked by

the coexistence of form and content, and the unity of function and aesthetics. They should possess a strong spiritual power and a tough soul, reflecting the internal relations and development status of society, economy and humanities, providing participants with complete narrative space, natural feelings and spiritual and physical interaction. The application of new media in the field of interaction has changed the concept of traditional artworks and brought more possibilities for the interpretation of excellent works. Different media means are bound to have direct or indirect impacts on artworks. Actively speaking, sound design acts on the artworks of interactive installation in the public environment, fully taking into account human nature, with a strong scientific and technological sense, and an obvious digital, interactive and immersive nature, showing the infinite charm of the combination of art and technology, redefining the relationship between experiencers and the public installation art. Experiencers are guided to think about the ideas the works want to express, and to think about the relationship between man and man, man and nature, man and environment, man and society, man and the world.

Passively speaking, sound design acts on public installation art, making the dialogue between works and experiencers more natural and real, producing more contingency and interest, and changing the current repeatability and absoluteness of some experiential designs. This trend of change makes the public gradually become a part of the design works, and change from experiencers to participants. And because the response to sound is a natural instinct bestowed upon human beings by Nature, the communication between participants and works is made more direct. Without any instructional guidance, participants can enjoy participating in art. The experience of

participating in art also indirectly improves public aesthetic consciousness.

Public art of interactive installation is not completely equivalent to public art. Generally speaking, it only has a short-term display function. Unlike other public artworks, it cannot be preserved for a long time. Art is constantly changing. The artistic ideas, concepts and aesthetics are different in different periods. Throughout history, with the development of society, social problems would inevitably emerge endlessly. Hotspots of public concern are constantly shifting and changing. This is the normal situation of the development of human society, which is unavoidable. With the rapid development of science and technology, new media materials are constantly being studied and invented and the devices which provide better experience for human beings are being updated at a very high speed. However, the history precipitated in sounds, and the culture, emotion and spirit contained in them would not fade easily. Therefore, under the action of sound design, as long as the sound elements of public installation artworks are changed and adjusted, brand-new emotional feelings can be brought on the premise of the retention of the concept of works and the maintenance of the common experience. An infrequent flow display can come into being.

But unfortunately, in terms of the works that have so far emerged, there are still few installation works which take sound design as the main element. In the practical application of sound elements, there is also a tendency that some design elements are separated and go their own way. In particular, the whole Asian circle is still in the exploratory stage, failing to show a clear picture. I hope that, in the future, more artists and designers will pay more attention to the "thickness" and "weight" of the sound element, and combine the sound design with the design of new media, so as to create more

excellent public installation works for human society.

REFERENCES

Austin, T. and Doust, R.(2007), New Media Design, Laurence King Publishing in association with Central Saint Martins College, UK.

Bandt, R.(2004) ,"Sounding Public Space, Sound Artists in the Public Domain", Georgia Institute of Technology, Vol.8, No.71 , pp. 183-203.

Carlyle, A. and Lane, C.(2013), On Listening, Uniformbooks, UK.

Dong,F. and Xu,Z.(2014), "Compound release of mood : Application of interactive multimedia technology in installation art", Design Research, Vol.4, No.3, pp.43-47.

Gabriel, Z.(1984), "Towards a Theory of Space in Narrative", Poetics Today, Vol.5, No.2, pp309-335.

Hendy, D. (2013), NOISE: A Human History of Sound &Listening, Profile Books Ltd, UK.

Habermas, J.(2017), Post Metaphysical Thinking II, Polity, Cambridge UK.

Li, S. (2011), "Research on Human-Computer Interactive Styles in Installation Art", Art and Design, Vol.8, No.82, pp.146-148.

Lu,Y.(2017), Acoustic Experience: The Study on Sound Consciousness and Auditory Aesthetics in Design, China Central Academy, Beijing, pp86-89.

http://www.markuskison.de/touched_echo.html

https://www.atomic3.ca/projet.php?id=2

https://news.artron.net/20181115/n1032969.html

www.google.com