The space between noise and music: research into the art of sound

Jinjiang Zhang[1], David Schafer[2] and Paijit Ingsiriwat[3]

[1] Graduate Student, Master of Fine Arts in Design, Rangsit University, zjjzjk825227@gmail.com

[2] Lecturer, Master of Fine Arts in Design, College of Design, Rangsit University, david@studiomake.com

[3] Lecturer, Master of Fine Arts in Design, College of Design, Rangsit University, paijit948@gmail.com

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ABSTRACT

Hearing and vision are indispensable ways for human beings to understand society. However, with the rapid development of science and technology and the continuous improvement of people's spiritual needs, single-dimensional cognition has been unable to meet people's need to a certain extent. Therefore, the linkage between the senses has become a new development trend. With the advent of the age of picture reading, visual perception becomes an inevitable trend, while the rapid development of modern multimedia and the popularization of a variety of new media provide sufficient conditions and foundations for graphical visualization of music. In such a social drive, music visual visualization can try different forms of application.

As the deepening of the new champions league epidemic, both in isolation and home office requirements we need to stay at home for a long period of time, life and work in the same environment, plus there is no proper regulating mode, can make the mood affected by certain, so how to use sound art ascend space atmosphere improve people's mood is a crucial that occupy the home, The author's suggestion to this problem is to improve the sense of space atmosphere by designing a speaker that can see the beating rhythm of music to help people feel a different atmosphere at home, so as to improve the dull mood.

Keywords: Noise, Sound, Space, Visual music

1. Introduction

Music is an invisible art of sound as well as visual art. They know how to process information that we can't see or feel, and both have their own ways of processing art. However, visual recording of music had been invented long ago, and attempts to construct sensory organ resonances consistent with auditory experience have been made continuously through visual techniques. Modern science confirms that prominent sounds automatically activate the visual cortex. Vision and hearing can be integrated across channels. People explore "seeing" music in space and movement, concentrating on the design and creation of "music visualization". Visualizing music is a complicated and difficult task. The key resides in how to establish a connection between two independent and mature forms and give the audience a feeling of harmonious integration of "auditory" and "visual".

2. Objectives of the study

1. How to combine "hearing" and "vision" with sound visualization to effectively improve the sense of space atmosphere.

2. Make a speaker that can not only hear the music but also see the rhythm of music.

Literature Review

Creation of indoor space atmosphere is the multiple needs of people for indoor space, including physiology and psychology, material and spirit. Creating a good indoor space atmosphere can bring different visual and psychological feelings to people.

2.1 User needs research

The concept of "Music Visualization": the study of music visualization can be traced back hundreds of years or even longer in the West, but no clear academic boundaries and definitions have been formed. This view is explored in the Oxford platform for art practice research article Forms and transgressions regarding "Music020Visualization" : "Music visualization has a strong artistic quality. But it is also an intellectual and academic study. The fuzzy research boundary makes it difficult to define, but also forms various possibilities." The ambiguity of the concept of "music visualization" is explained by the fact that it requires cross-practice in many fields. It is an important part of music and performance, and also promotes the expression of visual art in the abstract concept of "time and space". Technically, it has to be combined with engineering and digital technology, as well as the study of aesthetics. Music visualization in different fields need to be studied independently and eventually combined to promote development and continuous revision. A more operational definition of "music visualisation" lies in "re-examining its objectives and the development of research models". Therefore, we need to study the development process of the two arms in a long time and complex correlation, so as to clarify the concept of "music Visualization" from shallow to deep.

2.1.1 What is sound? What is the shape of sound?

Invisible things, invisible things, always bring people more imagination and interest.

In real life, sound waves are mostly transmitted through the medium of air, which can be viewed or felt. But their vibrations press the air around them, creating invisible waves and "shapes" in air molecules, and leaving traces through other materials as they vibrate.

Figure 1.1 German physicist Friedrich Chladni

Friedrich Chladni was a German physicist and musician known as the father of acoustics

The main contributions are the discovery of Chladni's law and the calculation of the speed of sound in different media

In 1680 Robert Hooke, an English scientist, discovered that a piece of glass could be done to vibrate by sprinkling it with flour. Flour grains from regular and complex patterns. Later musician Friedrich Chladni suggested that the vibrations of the vowels could be visualized.

In our daily life, we avoid noise as much as possible. Noise is also identified as an unwelcome intruder in the teaching of traditional music. But in the futurist art of the 20th century, noise was prized. In 1913, Italian painter Luigi Russolo published his manifesto "The Art of Noise," which incorporated much noise of daily life, including explosions, sirens, murmurs and screams, into the music system.(Figure 1.1) it laid a foundation for the research and development of noise art.

Figure 1.1 Italian painter Luigi Russolo

2.1.2   What is sound visualization?

The conversion of sound to image is known as sound visualization. In exploring sound visualization, we can use synesthetic expressions as well as some experimental and programming skills. We generally discuss sound visualization, can be divided into sensible vibration visualization and sound wave visualization.

Synesthesia refers to the spontaneous induction of one sensory stimulus into another, often showing the relationship between sound and color.

2.2   Case study

2.2.1   Audio visualization device

The visual expressiveness of musical symbols can present the feeling in front of people in the way of symbol design in graphic design. Waveforms have been used in Windows Media Player for a long time to express the frequency and rhythm of music, but now there are more three-dimensional interfaces and expressions, such as 3D shapes and three-dimensional waveforms.

SONOS and Banbanbanban collaborated to create an audio visual installation using digital technology (Figure2.1), allowing us to intuitively experience the "shape" of sound and enjoy the wonderful visual experience brought by the optical sound.

Figure 2.1 Creative visual image installation,2018

The audience will be positioned in an enclosed "box" where the sound will be digitally converted into a moving image, which will be projected onto the walls. As the melody of the sound changes constantly, the moving image will also grasp the rhythm and follow the dance, just like the sound itself. The audience sits in the center, feeling the shock and immersion brought with stereo audio equipment and closed projection space, and fully experiencing the mystery and impact of "tangible sound" from visual, auditory and other body senses.

2.2.2   An early experiment linking music and vision -- Craney graphics

As early as the 18th century, the physicist Ernst Claddney experimented with the intertwining of sound and sound(Figure2.2), subtly linking sight and sound. He placed a metal board on top of the violin and sprinkled fine sand evenly over it. When he began to be played on the violin, the fine sand on the metal plate took on all kinds of changing patterns automatically as the music changed. And being dependent on the tune, depending on the frequency. There are different patterns. Ernst Claddeney's experiment objectively combines musical tones and frequencies on a physical level with visual geometric patterns. His experiment was opened a good research idea for future generations.
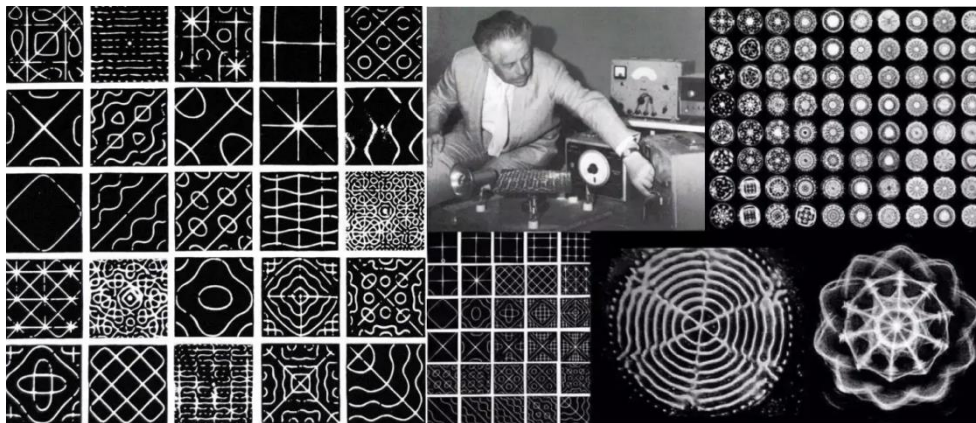
Figure 2.2 Craney graph experiment

The Craney board can be a square, rectangle, or circle, or even a violin or guitar, as long as it's embedded in the center. In Claddeney's case, he used a flat, rectangular metal plate with its center anchored to a sturdy base. Dust the board with a material, such as flour, sand or salt, to be observed the pattern. Next, pull the violin bow on the side of the board to encourage the board until it reaches resonance.

When the plate is excited, some areas vibrate, while others do not. More specifically, you can see standing waves along the nodal line of the plate. Sand from the standing wave amplitude is the most important thing. The abdomen of the wave moves towards the nodal line of the standing wave with the smallest amplitude, forming a Craney pattern.

Depending on the way in which flexible you are, you can "play" the Craney board by using different nodes and stimulating the board with a bow at different abdomens. Distinctive shapes will change depending on the tone.

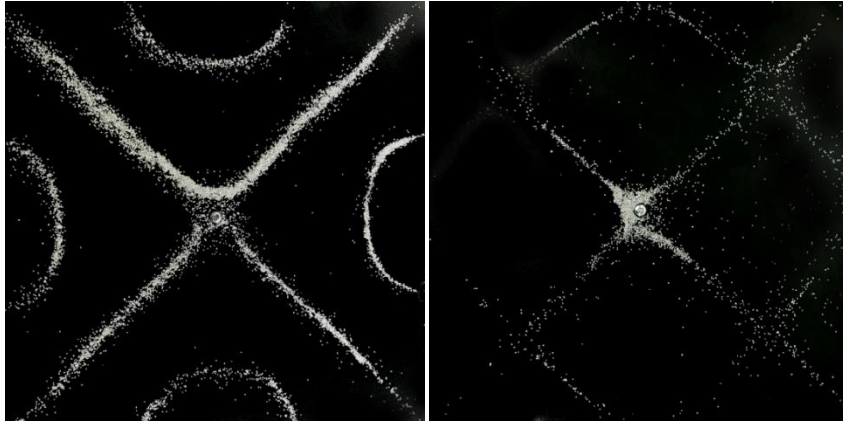Many of the graphics are very interesting(Figure2.3):

Figure 2.3 Two Krani figures on the same board in different modes

Although we can't see the sound directly, we can see that the shape of sound is different at different frequencies by using sand and other media.By studying sound changes, waveforms, wavelengths, speed and other properties, we can better understand how to manipulate and reproduce sound, as well as consider the physical effects of sound in design(Figure2.4).
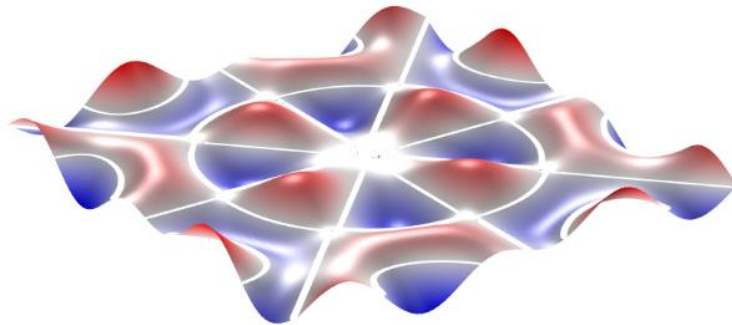

Figure 2.4 Example of a Craney plate model

Through the Craney graph experiment, we can understand that the fluctuation degree of different positions on the plane is not the same when the same plane vibrates at the same frequency. If this fluctuation can be expressed in the visible form of the naked eye, we can intuitively see the sound.

2.2.3 audio-visual installation multimedia work is "Node 5:5"

Japanese artist black chuan is a multimedia audio-visual device works "Node 5:5"(Figure2.5) also built an amazing some of the hair on space, in a screams filled the room, a red rays penetrate the space quickly, ruby general color impact to a black screen, above the patterns of the erosion of the white, more scattered laser began, Constantly changing form.
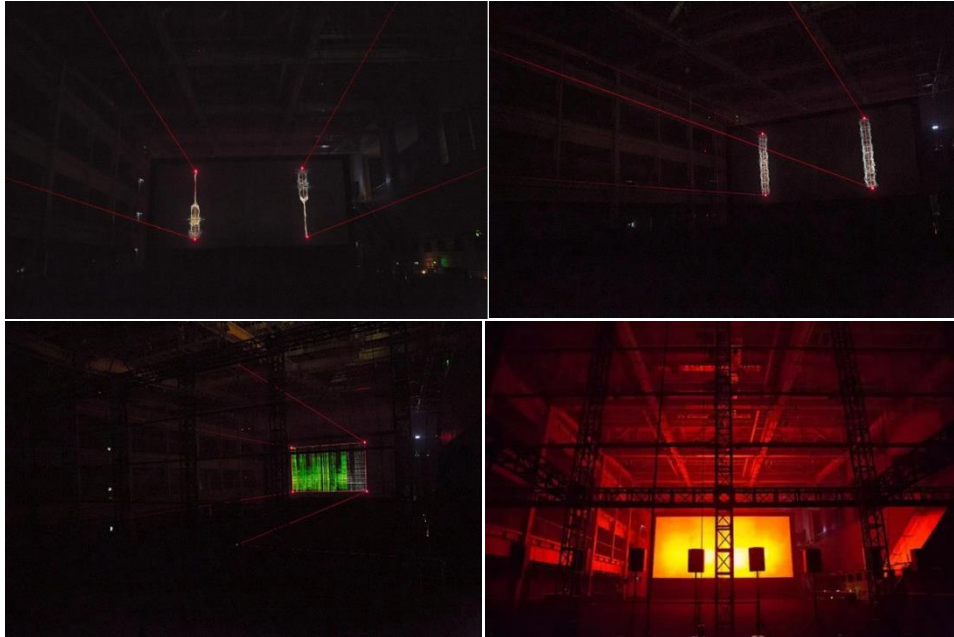
Figure 2.5 Installation photo | node 5:5 | ACT/ACC | Gwangju | 2016

The room sounds like a snake. The air is filled with danger, and the experiment seems to transport the viewer to another country. The whole space is surrounded by laser tracks and projection images, including dynamic laser casting, video projection, wave formation, by controlling different lasers, each one is independent of each other, the white pattern on the screen is the projection pattern, changes with the internal changes.

Whether he transforms waterfall recordings into white noise or combines field recordings with computer digital remixes, he creates a quiet space around us that is almost spiritual, with an inherent explosive power of natural law.

Through the combination of sound and picture through the listening device, people can have different feelings in the same space, and it is likewise through the use of sound visualization technology to change the atmosphere of the space, so that people can have different feelings.

Research the needs of users, users in the long time work at home or isolation of mood changes, through reading and data collection, finds the feeling of the user's need and space atmosphere. In order to understand the problems that users encounter when staying at home for long periods of time, social media can also help to gather opinions and suggestions, and suggest that the same atmosphere of space can only lead to boring, lazy and depressed performance.

Investigate and observe date

20 people were asked by questionnaire survey. This question is about the need to improve the atmosphere of space, do you think it is necessary to live in the environment of the active atmosphere. Through sorting out the data, it is found that staying indoors alone for a long time will have an effect on people's mood, which leads

to laziness, depression and unwillingness to do anything. In the living environment, lively atmosphere is needed. This proves that vision and hearing are essential sensory experience to enhance the sense of space atmosphere and improve negative emotions. The changeable elements in the space will give people different feelings.

Table 2.6 The List the factors that are considered important to improve the atmosphere of the space

Item	Number
Music	18
The light	20
Interactive	6
Intuitive feelings	4
Novel	10
Color	9
Decoration	8

Studies have proved that intuitively felt factors such as music and lighting can effectively improve the atmosphere of a space

As mentioned above, music, lighting and other frequently changing factors related to vision and hearing will be more intuitive for people to feel, while facilitating intuitive feeling can change the invariable dull indoor atmosphere, thus changing the mood of users. The design is based on the idea that speakers, as a universal player tool, can play music everywhere we see them, at home, on the street, in the mall, at school, even on our phones and computers. But traditional speakers can only play sound and music, and only interact with our auditory senses, not our visual senses. Nevertheless, how do you directly represent sound with a picture? This makes me think of the previous case. If the laser effect can be combined with music, we can see a laser show in the room when the music is played, which can effectively improve the sense of space atmosphere. First, we have to know how to match colors to make us have a better visual experience.(Figure2.7)
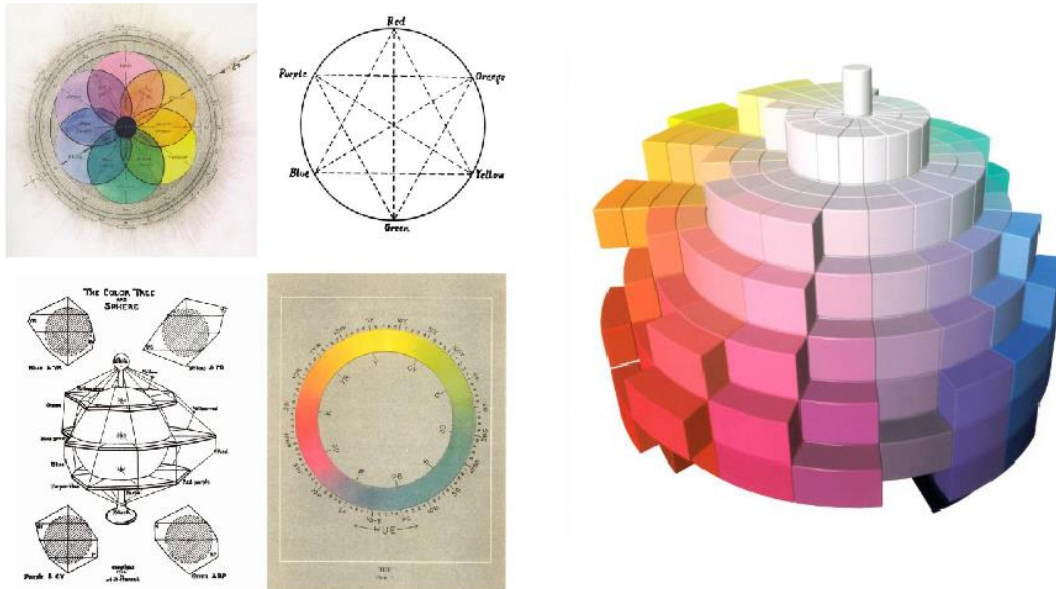
Figure 2.7 Hue rings and color stereoscopic 3D graphics

Different colour can make the person produces different feeling, also can affect people's mood, improve space atmosphere, but how to match the color is a very important thing, a single color can make us feel easy, while too much color can let a person dazzling, so I finally choose to use red, green, blue three colors to match.

3. Materials and methods

Materials used to make visual speakers: the main part is wood(Figures 3.1). Wood is a natural material with inherent compatibility, easy to change shape and splice. Most importantly, wood feels softer than metal, doesn't feel cold, and looks better.

Figure 3.1 Example of wood as a material used

In addition to wood, I choose to wrap black leather on the outside of the visual speaker. (Figures 3.2) The surface of leather material has natural lines, giving people a smooth and delicate feeling, and the touch is delicate. Black is very versatile, and the black product will not make people feel awkward no matter what environment it is enclosed in.

Figure 3.2 The physical object after wrapping the leather

The choice of color: the speaker body is mainly black with leather itself, giving a high-level feeling, and the black product will not appear out of place no matter where it is placed. Leather exquisite feel and natural grain added natural adornment to sound box itself.(Figures 3.3)

Figure 3.3 Leather-wrapped speakers

4. Results

Once we've determined the color, we need to connect the speakers and lasers to the same circuit board so that they can work together and interact,I connected the speaker circuit board and the laser circuit board, so that the

speaker and the laser can work at the same time, and then the program input circuit board can see the most original lighting effect, and the laser can be changed according to different sounds.(Figure 4.1)

Figure 4.1 Visualize how the speaker works

A single laser is ugly and does not produce an immersion experience. By placing different materials in front of the laser, I made a further discovery. The surface of the gel is uneven. If I set the gel in front of the laser, the laser will diverge and the pattern will be more magical.(Figure 4.2)
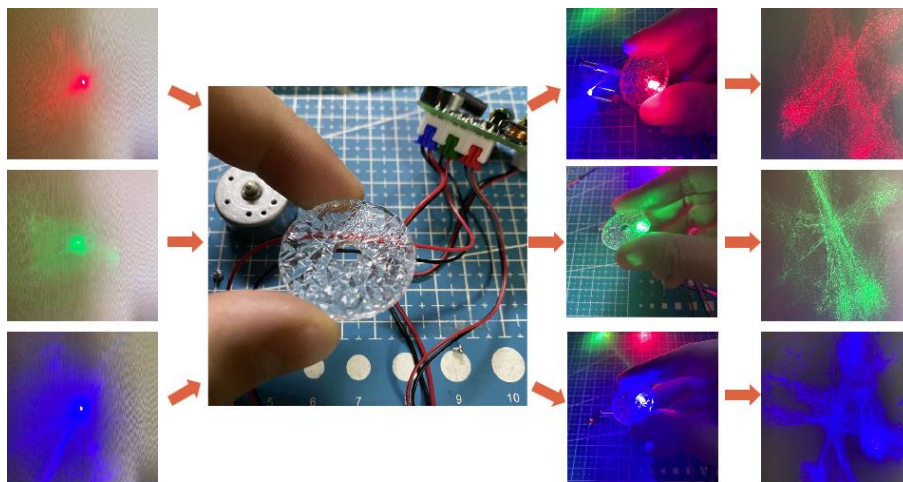
Figure 4.2 The effect of laser light diffusing through the gel

Placing the gel in front of the three colored lasers at the same time causes the three colored lasers to diverge and overlap, making the pattern even more magical. Let's take a look at the combination of sound and light.(Figure 4.3)
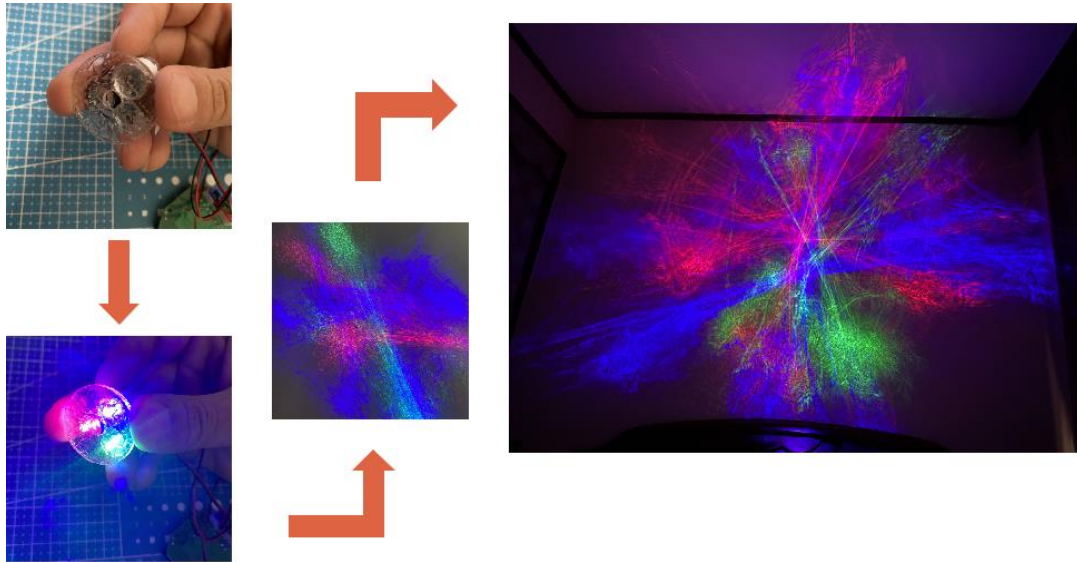
Figure 4.3 The effect of putting the gel on a laser of three colors

When we place the speaker flat, the laser pattern is projected onto the ceiling, and vertically onto the wall. The farther the distance, the bigger the pattern.(Figure 4.4)
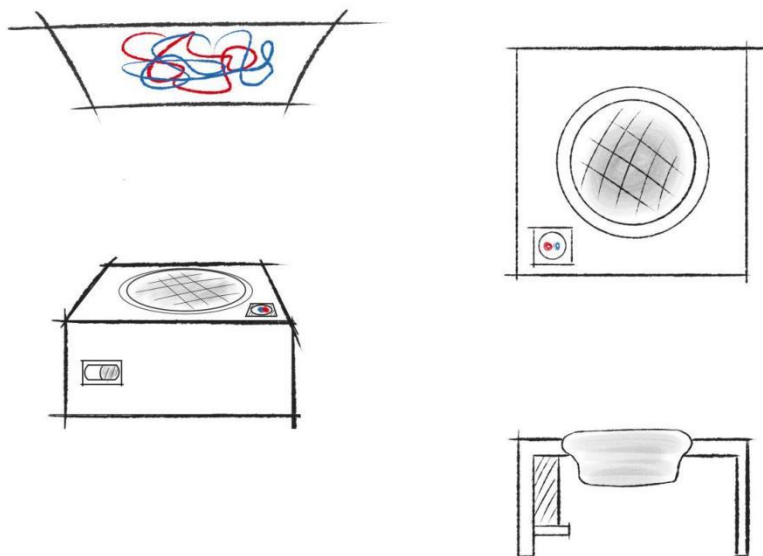

Figure 4.4 The sketch of Visual speaker

However, as a player, the quality of sound is crucial, and the shape and size of the player need to be able to effectively enhance the atmosphere of the space, but not too large and inconvenient to store. If too big, it will be bulky and inconvenient to move, while too small will reduce the sound quality and light pattern effect, so the overall size of the speaker is about half the size of a laptop.(Figure 4.5)
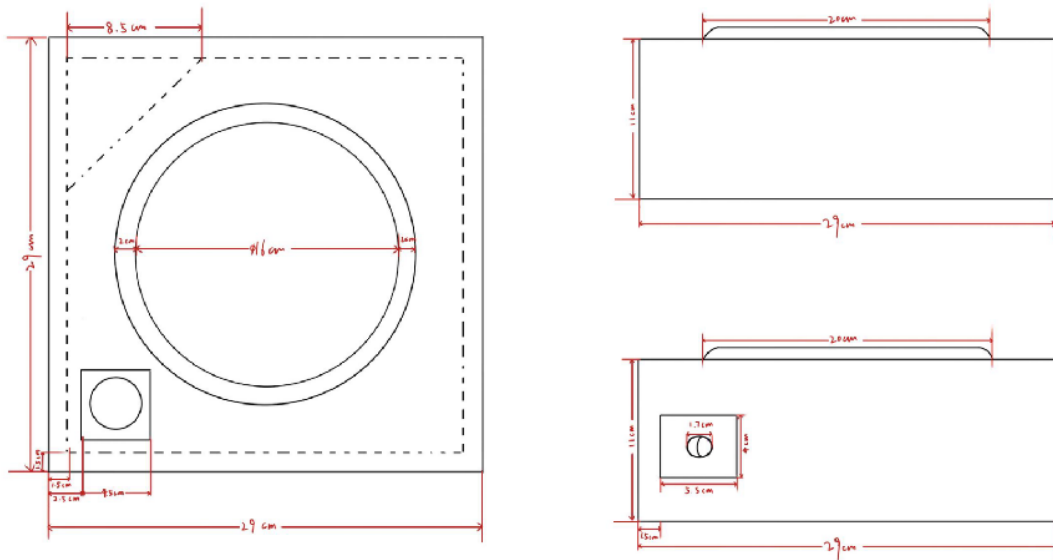
Figure 4.5 The sketch of Visual speaker size

The actual size display of 1:1 is also made. The computer software was used to create a layout of the 1:1 model (Figures 4.6)

Figure 4.6 Three dimensional view

The material of wood provides a soft and comfortable feeling. The speakers can play any music you want to hear, whether it is fun music, rock music, piano music, through the bluetooth connection of mobile phone and computer, and the laser can be projected on any plane, wall or ceiling. When the music is playing, the laser changes with the rhythm of the music, forming a changing picture that echoes the rhythm of the music itself. Add action and bearing elements of the immutable interior space. Effectively increase the atmosphere of the space.

Figure 4.7 Visual speaker (laser off)

Figure 4.8 Visual speaker (turn on laser)

Music and painting are among the expression methods of art, with the same spiritual core, so they can infiltrate each other and transform through certain forms. The appreciation of music has timeliness, while painting can make people feel artistic emotion intuitively in an instant.

Generally speaking, music is auditory, transmitted through the ear, people feel emotional changes in the process of listening, so as to produce the enjoyment of music art. From movies to TV, and finally to the convenient mobile phone screen, the development of modern communication and communication technology makes people's reading on the screen seem to be playing an irreplaceable role. However, the fast-paced life style makes people unwilling to spend time listening to an emotional musical work. Instead, they directly present it visually without the need to listen, instantly convey the artistic emotion to their hearts, and get the information needed in a very short time, so as to achieve the purpose of appreciation and enjoyment. If music visualization can be realized, people's reception of inventive spirit will be more intuitive and efficient.

Figure 4.9 Visual speaker effect (playing music)

5. Discussion

4. Social development is an important driving force of music visualization research

With the continuous development of science and technology, people's thinking and spiritual realm also have higher requirements. In the past, the feeling generated by a single sense was too one‑dimensional and flat. However, experience transformed by the combination of all senses can broaden the cognitive mode by changing the angle and formation of people's understanding of the world. For example, artist Melissa McCracken, who suffers from synesthesia, was born with the ability to translate the sounds her ears hear into colorful, vivid colors. The world she saw differed from that of ordinary people, and that's why she became an excellent artist. If music visualization develops to the point where ordinary people can "see" music art, then people's cognitive patterns and understanding of the world will also change. In turn, the expansion of this knowledge model can be expected to result in the birth of new industries and the breakthrough development of existing industries. The progress of all walks of life in society leads people to pursue more and more precise goals of music visual visualization research. Thus promoting the further development of music visualization.

5. Emotional design for caring for deaf and dumb people

Responsive care for the disabled is an important symbol of social civilization. Deaf-mutes cannot hear and make sounds, which make their understanding of the world not comprehensive enough, and there is a lack of care for deaf-mutes in the society at present. But also because the deaf-mute people lack the sense of hearing, so for vision, touch, smell and other feelings more sensitive. If music can be visualized, if music can be converted into something that is visually visible, then it may be possible for deaf people to "see" sound and experience the beauty of music.

6. Music education for children

Art education can stimulate people's feelings of beauty and make them more sensitive to the cognition of external things. Simply by hearing the music teaching education effect is not obvious, if in the process of teaching, music can be transformed to a certain form of visual, music teaching with audio-visual way of mutual cooperation, we can imagine, it can let children produce more intuitive understanding and feelings, and have increased interest in music art teaching, cultivate their understanding of art from the Angle of multidimensional.

6. Conclusion

Unchanging space will make people feel boring, lazy and other negative emotions, so it is extremely important to improve the space atmosphere. The beige color of the wood material itself gives people a sympathetic vision, and the high-pitched speaker can play any music you want to enjoy. After turning on the laser, you can see the track of the light spot jumping on the wall following the rhythm of music, feeling the integration of hearing and vision. On the other hand, the blending of hearing and vision will effectively improve the space atmosphere, relieve people's pressure and improve their mood. Adding a lively atmosphere to a routine living and working environment and paying attention to your emotions can improve your mental health.

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