

The Sound Reactive Moving Boxes: towards an awareness of everyday sound through interactive rotating colored boxes

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ABSTRACT

The aim of this design is to experiment relationship between audio and physical movement, through rotating color projected 8 boxes that are assigned separate frequency range, for awareness of this movement and felt experience. I am creating physical audio interaction, a sound reactive boxes that response to user's audio input. This design activity is exploring potential way of interaction of the sound and physical movement relationships. This paper starts with an overview of relevant design. It then presents the development of the Sound Reactive Moving Boxes device as a demonstration of this physical audio interaction by integrating creative and feedback stages. I conclude with some initial insight into the sound-physical movement relationship established by observing how people interact with this device and suggest potential future work.

General Terms

Design, Experimentation

Keywords

Audio physical interaction, Everyday sound, Audio signal analysis

1. INTRODUCTION

The design is located at the intersection of sound input and physical movement as an expressive translation, through interactive technology. Ultimately this work intends to support greater awareness of everyday sound and felt experience as a means of directing attention for conscious listening. Julian Treasure defines listening as an activity of making meaning from sound. And he addresses that we are losing our listening due to developed recording technique and too much noisy world. I seek to explore a way to enhance our listening ability through the design and development of the Sound Reactive Moving Boxes. By interacting with this interactive device, people can actually see how sound is being translated.

Recent work has examined the use of interactive technologies to support joyful sound experience through developing musical sound converting device with mundane sound. (2012, Jun Fujiwara, Re: Sound Bottle). This Sound Bottle records multiple sounds and convert into interesting musical piece by slicing recorded audio clip and put into rhythmical composition. Initial findings from this work illustrate joyful relationship between mundane sound and musical expression. This finding points to the potential value of interactive technologies to support fun sound interactive experience. Other notable works using interactive technologies to influence subjective and kinaesthetic experiences

include the use of breath sensing to influence abstract dynamic video projection and sound (Khut, 2006).

While those works have fundamentally provided focus on sound converting to other interesting sound as primary consideration with designing interactive technologies, the Sound Reactive Moving Boxes will examine the potential of different form of sound converting and expression, which is physical movement. Physical movement response as representation of sound through this design. This paper initially discusses views on the background of the design. The second part of this paper discusses the development of the Sound Reactive Moving Boxes. And thirdly, I will provide initial insights into the relationships between sound making and physical reaction for awareness of sound and felt experience.

2. DESIGN- THE SOUND REACTIVE MOVING BOXES

In this section of the paper, I will discuss about technical aspect of the system.

2.1 Background of the design

The Sound Reactive Moving Boxes is an prototype designed and presented in the course called Experiential Media Design at Carnegie Mellon University, Interaction Design master degree program. The initial motivation behind the work was to address the opportunity interactive media design has for the way it shapes our listening behavior and to address this through the designing and making of a functioning prototype. I suggest this design work to be an opportunity to interactive technologies to explore relationship between audio and physical interaction, furthermore, make people encouraged to have deeper estates of listening consciousness. The Sound Reactive Moving Boxes was interactive design that sought to encourage reflection through sound awareness through physical movement and video projection.

2.2 Technical design and implementation

The Sound Reactive Moving Boxes take the form of 2 rows and 4 columns of boxes, which is 8 boxes in total. Each boxes are embedded with continuous rotation servo motor connected to Arduino. This Arduino is operated by sound input from microphone that is connected to MacBook Pro laptop that running Processing program to analyze audio signal. Once the sound data sent to Arduino, it operates each boxes according to sound frequency.(table 1). This decision was based on where the sound range lies on each frequency range.(From, Audio Frequency, Wikipedia). Sound volume change has an effect on the speed of

rotation, the lower volume, the lower speed rotation and the higher volume, the faster rotation speed. The Processing also convert sound into color that are mapped on the surfaces of each boxes. (The higher volume, color get more red)

Figure 1. Sound Reactive Moving Boxes Arrangement

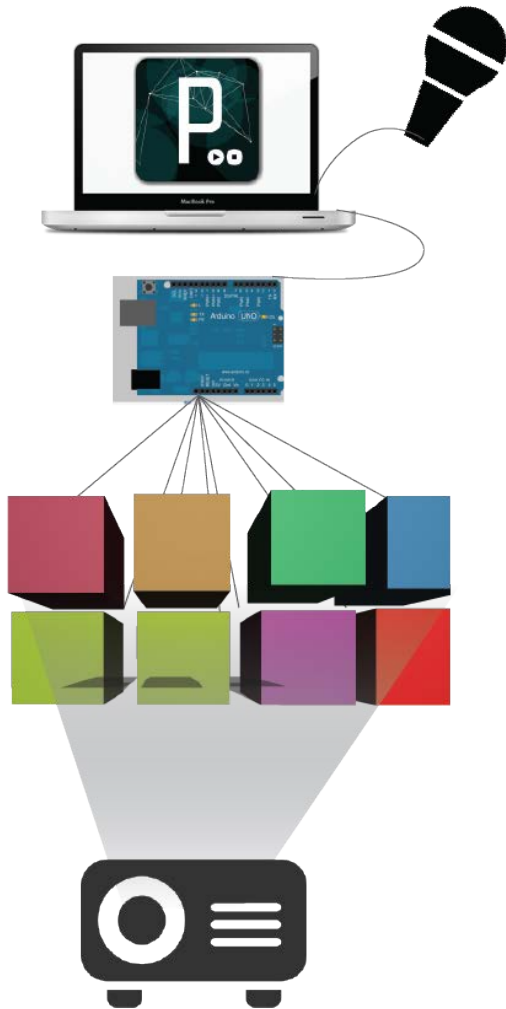


Table 2. Frequency assigned to each boxes

Frequency	Box row	Box column	Oct ave	Description
50 ~ 512	1	1	2 nd to 5 th	Rhythm frequencies
513 ~ 1024	1	2	6 th	Defines human speech intelligibility, gives a horn-like or tinny quality to sound.
1025 ~ 1526	1	3	6 th	
1527 ~ 2048	1	4	7 th	
2049 ~ 3050	2	1	8 th	Gives presence to speech, where labial and fricative sounds lie.
3051 ~ 3550	2	2	8 th	
3551 ~ 4500	2	3	8 th	
4501 ~ 8192	2	4	9 th	

Figure 2. Picture of Sound Reactive Moving Boxes



2.3 Reflection on interaction

The designing of the Sound Reactive Moving Boxes enabled the confrontation with all of the usual issues present when a design concept is translate into a functional device. These included the physical form, electronics and signal processing, and the physical movement and visual representation. There were many possible variations of this interaction. If there are multiple microphone, boxes can move according to direction of audio input, then boxes can create wavy movement.

This device provided some interesting informal insights into the nature of the sound making with the Sound Reactive Moving Boxes. Each tone of sound was perceived as a physical post-action include which box is moving, speed of rotation and color of each boxes. I could see people are trying to rotate specific boxes by making certain range of sound. They enjoyed their sound as physical and visual representation. I was satisfied that this sound and movement relationship was compelling enough to explore in finer detail with specific context of use.

3. DISCUSSION OF FINDINGS

Participants who engaged with this device, they explored sound frequency and volume for expressive purposes. This insight illustrate the potential for expression with simple sound making to expressive purposes as having creative potential, for example, during concert. Music is also good medium for this physical expressive translation. In further analysis, I will look at whether this audio-physical interaction has relationship to sound awareness and potentially mindful listening activities. This towards joyful experience in response to the sound/ physical movement reaction. I will analyze these insight further to determine any relationship to conscious listening.

4. CONCLUSION AND FUTURE WORK

These initial findings will be analyzed further to determine an understanding between the patterns of sound and creative physical object movement. I submit that the Sound Reactive Moving Boxes has demonstrated its potential for another way of analyzing sound and will pursue this in future work. The Sound Reactive Moving Boxes' initial development as a piece of prototype interactive device with very basic function. Type of moving object will be developed further, so it can be extended to other context of use such as concert hall, or lobby. Furthermore, this initial development should be evaluated with participants to see if their felt experience will lead them to be conscious listener. And how they would feel from this experience.

5. REFERENCES

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