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Department of Computer Engineering (Music Engineering and Multimedia)

Audio Visual Synthesis Control with Body Motion

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Abstract

In the current project, we aimed to create the art model between technology, audio and visual by combining human motion in terms of an alternative physically control for audio and visual works through point cloud mapping. The objective of this project is the system can interact with human sensing such a hearing and seeing by the movement of them through the artwork. First, we detected the motion of humans by using Kinect as a sensor. Then, we used TouchDesigner program to generate visuals, gather the data of motion and send it through SuperCollider program with Open sound control (OSC) protocol to control the audio parameters. Overall, this project will give the user a new experience to interact with artworks.

Introduction

When we talk about art, we will think about photographing, painting, music and dancing. Then why don't we combine these things together? This project will let users interact with audio and visuals by their movement of the body. Visual and audio will be change up to the action of users. The visual and audio that users will interact with synthesis by TouchDesigner and SuperCollider respectively. This installation will create a new experience of art to control the visual and audio.

- **Interactive system with media art**
  Interactivity is not only computer and video signal presenting with each other, but it should be more referred to communication and respondence among viewers and works.
- **Point cloud mapping**
  A point cloud is created by scanning an area with a 3D Laser Scanner. This scan is then imported into post-processing software (unless desired accuracy is obtained in real-time)
- **Open sound control (OSC)**
  OSC is a protocol for communicating among computers, multimedia devices and sound synthesizers by using UDP/IP and Ethernet.
- **Dataset**
  When the system can capture the position of the organs then will bring that detection through mathematical and physics processes, create systems that are more responsive to human interaction, or add to the art of combining technology and mathematics.

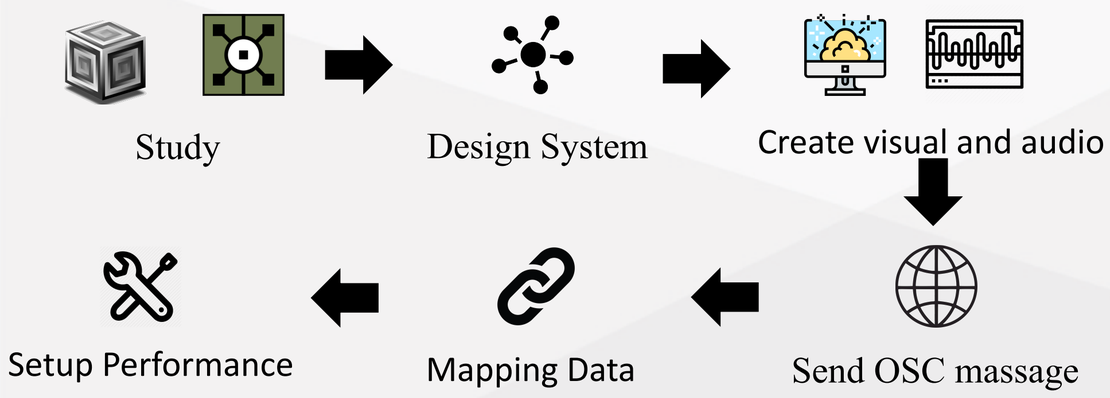
Methodology

- **Equipment**

  Software
  - Visual Design :TouchDesigner
  - Sound Design : SuperCollider

  Hardware
  - Microsoft Kinect, projector, two speakers and computer

- **Working process**



[**Figue1**: Working process diagram]

This interactive system was created by designing visuals in TouchDesigner and coding to synthesize the audio in SuperCollider. With Kinect, the motion and position will be used to control the visual parameters in TouchDesigner and audio parameters in SuperCollider which the motion data was sent by OSC protocol. The audio and visual will change up to the motion that control by users.

Results

There are two versions of system. Version 1 is real-time processing that a motion can control the visual and audio parameters and show the output simultaneously. In version 2, to be more artistic approaches, the system gathers the motion and position data then uses mathematical processes on these. The motion that the system can detect and implement to control audio and visual synthesize in version 1 and version 2 are as follow in table 1 and table 2, respectively.

Gesture	Visual control	Audio control
Left hand x-axis	Circle position	Tempo
Left hand y-axis	Circle position	Amplitude of sequencer sound
Right hand x-axis	Circle position	Note of pad sound
Right hand y-axis	Circle position	Sequencer note and pad sound amplitude
Velocity of left hand in x-axis	Circle velocity	Kick sound 1
Velocity of Right hand in x-axis	Circle velocity	Kick sound 2
Distance between two hand	Distance between circle	Brown noise amplitude

[**Table1**: Mapping design of version1]

Gesture	Visual control	Audio control
Average Position based on x, z-axis in 5 seconds	Color of main object and background	Number of harmonics.
Average Position based on x-axis in 3 seconds	Vibration of the main object	Frequency of LF noise
Average Position based on x, z-axis in 3 seconds	Rotate the sub object	Duration of background music
Distance between people	Twinkle of sub object	Amplitude of twinkle sound
Average height based on y-axis in 5 seconds	Strength of background	Reverb of background music

[**Table2**: Mapping design of version2]

Conclusion

This project gives the experience for users to interact with artworks of visual and audio. Users will have a new experience to interact with audio and visuals by moving, gesturing and positioning. Kinect can lose out of the detection because of the condition of brightness to people and interception environment. Audio and visual synthesis control with body motion could be the prototype for Thailand installation in the future

References

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