

BLOG ENTRY 3 - DESIGN & RESEARCH 1

Introduction

In my last blog, I discussed several projects I was interested in working on. I have now finalized my decision and decided to focus on audio reactive visuals. I also decided to add another interesting feature to this project, interactive sound.

As previously mentioned, the visual element of this project would morph (in size, shape and colour) according to the user's interaction. The colour variations will be based on the Camelot wheel, which is a visual tool commonly used by DJs to help with harmonic mixing. This interactive medium would be made through the software called Touchdesigner.

The setup would also be centered around a surround sound configuration (preferably a 5.1 system). Just like the visuals, the audio would be based on user interaction. The speakers would recreate reflective environments (echo, delays and reverb). This would be done with the help of Max/MSP and Ableton.

Additionally, I also thought of triggering the sounds based on the harmonics of the input. So, an audio reaction would be played based on each harmonic frequency of the user. This last step is a bit complex to plan due to various properties so I may not include this in the project.

Q) What intention is being pursued?

The project aims to recreate an immersive and interactive audiovisual environment for the user. The user's voice acts as the input which triggers the spatialized soundscape in coordination with a sonic visualizer.

The installation may intrigue the user and in turn spark a curiosity for the world of sound in general.

***Q) What tasks can and will the implemented project fulfill?
Which goals will primarily be achieved through this?***

The tasks to be included in the project are as follows:

- Real-time capture and processing of audio signal
- Detection of sound characteristics and real-time visualisation of data
- Spatial processed audio of user's voice played through a surround sound system
- Coordinated playback of visuals and audio

I would also like to further explore and understand the relationship between:

- Sound spatialization and surround sound
- Interactive Audio
- Visual representation of sonification

***Q) How will the endeavor be implemented (Identify steps =
Identify subtasks)***

The implementation is to be done in two parts: one part focuses on visuals and the other would be centered around sound. These are the steps that I was able to identify:

1) Audio Capture and Processing

- Acquiring hardware and software to carry out project
- Building an automated system for real time audio processing using Max/MSP
- Adding spatial localization and other effects
- Integrating the system into a surround sound/ambisonic format
- Testing signals with realtime audio
- Callibrating playback with speakers
- Testing latency and sync between visual and sound
- Finetune movement patterns and visual responses

2) Real Time Data Visualisation

- Build an OSC receiver channel
- Creating a 3D/2D coordinate system for interactive visuals
- Constructing visualization modes: waveform, particle cloud and spatial path tracing
- Binding visual parameters to audio features
- Design UI control/calibration view
- Testing latency and sync between visual and sound
- Finetune movement patterns and visual responses

Q) What information and framework conditions are necessary for implementing the subtasks?

1) Audio Processing Requirements

- High-quality microphone and speakers (hardware)
- Max/MSP and Ableton Live (software)
- Low-latency drivers (ASIO/CoreAudio)
- 6–12 output audio interface
- Speaker layout and position to accommodate panning
- Ensure Max can handle multi-channel audio in Ableton
- CPU headroom for Ambisonic encoding/decoding

2) Visual Processing Requirements

- TouchDesigner (software)
- A display screen and projector (hardware)
- GPU capable of real-time 3D rendering
- Stable network connection to Ableton/Max
- OSC port mapping and naming consistency
- Frame-rate \geq 45–60 fps to match sonic motion

Q) What prior work / knowledge can be built upon?

- Existing Max/MSP knowledge (audio routing, signal processing)
- Gain staging and mixing
- Panning and positioning of sound in surround sound format
- Ambisonics and surround sound plugin workflows
- Prior Ableton Live routing experience
- TouchDesigner for generative visuals

Q) Understanding of various methods, Where are additional resources needed? i.e., (literature) research, hardware and software requirements.

I have researched about most of these concepts on the internet. I am learning more about the various processes, potential errors and ways to troubleshoot them

We will learn more about sonification, surround sound and interactive design in the next semester which I believe would be very resourceful and essential topics to be aware of while executing a project like this.

Video References

- [Audio Reactive 3D Point Clouds in TouchDesigner - TouchDesigner Tutorial 133](#)
- [TouchDesigner Tutorial: Create Audio-Reactive Visuals \(Beginner Friendly\)](#)
- [How to create an Atmos bed in Ableton Live: The Envelop Hack](#)
- [3D Sound in Max for Live \[Ambisonics\]](#)