

Appendix C - LD1300 - Loop

Concept

Link to video

LD1300 is a musical instrument made from repurposed materials that were discarded by their original owners. It is an electroacoustic instrument that, to produce sounds, it utilizes the audio feedback loop. It is designed to be easily reproduced and reimagine since it only requires common speakers at home, an amplifier, and two piezo sensors. It can be a little difficult to learn how to play this device, but the interface, which requires the player to move the sensors from one speaker to another, adds immersive interactivity.



Motivation

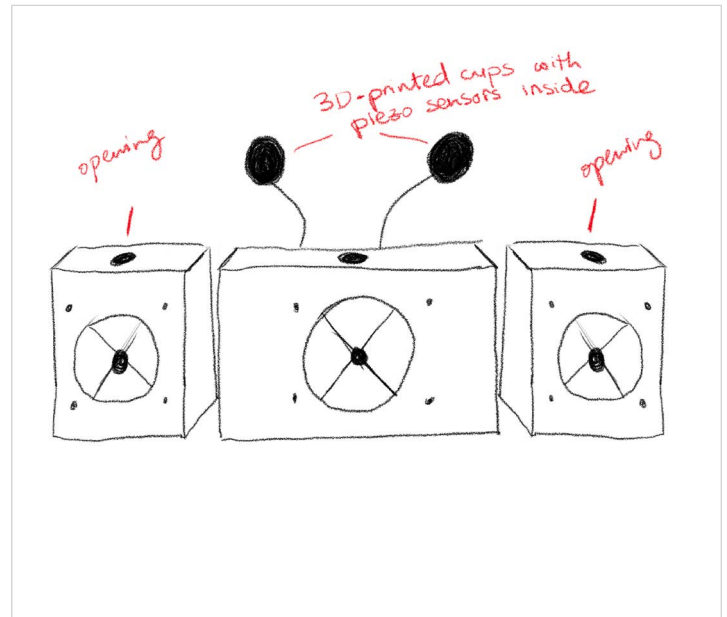
I wanted to create a device that is easily tinkered with at home with minimal complexity. One of the most common items I found discarded at waste centers, was old home theatres that no longer support modern technology like bluetooth or wifi. While these devices still work perfectly, their owners preferred to invest in newer models than to upgrade their existing one. So, for the third instrument, I decided to create something that inspires people to repurpose their home theatres when they decide that they no longer offer them a sufficient functionality.

Activation

I am aiming for the activation to occur through demonstrating to the audience the ease and accessibility of LD1300. I believe that if a person in the audience has the parts, they have a good chance of trying this at home after its exhibition. The design and layout of LD1300 can be determined by the makers depending on the available resources and their preferences. Using feedback loop for musical purposes is not new, artists like Lesley Flanigan have been building instruments that use feedback loop to create beautiful sounds during live shows. (see video sample)

Design

Most aspects of the LD1300 were discovered by coincidence through experiments that aim to expand my knowledge in audio instruments and input/output interactions. So, the design of the LD1300 was not much different. I was using some of the existing speakers to run some experiments on what kind of sounds I can produce using a piezo and speaker. After discovering the effects of the feedback loop, I decided to use the existing speaker cabinets because of their acoustic qualities and visual familiarity that is common in most homes. However, the focus of the design became to create an immersive interaction that goes beyond the tap of a drum pad or click of a button. For the LD1300 I wanted to create something that can exist in front of the audience, familiar in its aesthetics, unique in its interaction and sound production. While in the beginning I planned to build six speakers with different resonance qualities, placed in a half circle in front of the player. However, after completing three of the six, I decided to stick to three cabinets for now since it communicates the concept sufficiently. To house the two piezos, I experimented with two options, one that is 3D printed and the other made of wood. Since the 3D printed option offered less weight and less time to produce, I decided to go with that option.



Materials used

The LD1300 requires minimal resources and skills to replicate or redesign. It utilizes relatively easy technology and electrical components that are commonly found at home. To make the LD1300, I used medium-density fibreboard (MDF), which is a type of wood commonly used for speaker cabinets because of its vibration dampening qualities and durability. Although MDF does not offer the same reusability as plywood or other types of wood, it is still widely available in discarded resources, which makes it a viable option to use while making repurposed devices. Also, in addition to the MDF wood, I used an already-built cabinet for an old subwoofer, which I decided to repurpose for this instrument.

Reused Electronics



Speakers

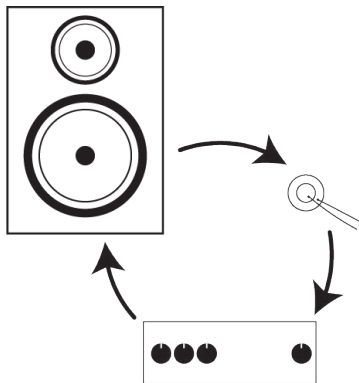
In total, the LD1300 uses four speakers with different sizes and qualities. I used two subwoofers, which produce low-frequency audio signal and vibrations, and two higher-frequency speakers which produce a higher pitch.



Amplifier

I repurposed an old guitar amplifier with a single channel. The amplifier gives the player the control of bass, treble and gain, similar to the controls for an electric guitar. Coupled with the amplifier, I added a signal splitter to create a multi-channel audio output.

Feedback Loop



An audio feedback loop occurs when a sound loops between an audio input (piezo) and an audio output (speaker). The signal received by the piezo is amplified and sent back to the speaker, which is then again received by the piezo and amplified again. The frequency of the loop is affected by several factors like the resonance and distance between the components. Usually, feedback loop is avoided because of its squeaking loud sound, however, LD1300 demonstrates how feedback can be controlled and used as music.

Results

First Iteration

The first iteration of this device was completed and shared with the advisors. As I mentioned before, this iteration included only three speakers, which feedback suggests is enough. However, I will continue testing and experimenting with additional ideas in order to take this to the next step. Some of the feedback received was to create connectors that connect the speakers and stop them from moving while the players are interacting with them. Also, feedback suggests some instructions that can help the players get an idea of the interactivity and the type of sounds they can produce. I am in the process of creating a video reel for all of Liberated Debris instruments. The video will show the interactivity and some of the making process.



Going Forward

Going forward I intend to explore more functionalities that could be added to the instrument and resourced from repurposed materials. For example, adding smaller and more flat speakers can add an interesting audio effect. Also, I am exploring how the shape and size of the instrument can be adjusted to be smaller and accessible.