Electric Kalimba

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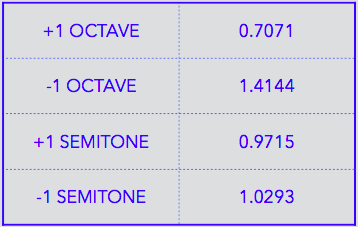
Garnet Hertz

Term project for an industrial design course focusing on Critical Design at Emily Carr University. An arduino based, handmade, analogue instrument, designed with kalimba-like playability paired with a piano-like note arrangement. Built in piezo microphones bring sound into an arduino guitar pedal that allows various effects, 6 available effects to choose from with effect parameter knobs. Made to bring both instruments into a modern context as one under the umbrella of Ludic design. A stream of design that creates objects aimed at promoting the user to get engaged in the exploration of the possibilities of the products coming out of ludic design. These are playful explorations.

The project first stemmed from an interest in trying to recreate the functionalities of a Wurlitzer electric piano which uses a series of keys, pistons, mallets, reeds, and electromagnetic pickups to generate tones. After figuring all this out I found that this would be a very tedious task to just recreate one note due to cost and technical feasibility. I moved onto a slightly more simple path, but one that still was based on the vibrations of metal being amplified, the kalimba. A very simple instrument that employs the use of tuned metal bars attached to a piece of wood for amplification. It is generally played using one’s thumbs, hence the other name the kalimba has earned, the thumb piano. With this name in mind I decided to recreate a kalimba at a much larger scale, and to arrange the keys in the same manner as they are on a piano (natural notes on the bottom level, sharps/flats on the top). Instead of employing electromagnetic pickups, which are expensive, I chose to use some piezo pick-ups, a much more cost effective solution. The piezo pick-ups also allow for any sort of vibration to be picked up and amplified, ranging from the keys being plucked and a tap on the body of the instrument all the way to a hard stomp on the floor to someone yelling near the mic.

The next step that the amplified vibrations would go through is that they would be sent into an arduino guitar effects pedal. This is meant to put various distortion effects on any audio coming in, as well as an ability to cycle through 6 preset effects, and a few knobs to adjust effect parameters. After many attempts and countless hours spent on this I was still not able to get this portion of the project to work once it was all soldered down onto the arduino shield. All inforformation about the arduino guitar pedal, including the schematic for the shield, parts list, and arduino code can be found on this instructables tutorial: <http://www.instructables.com/id/Arduino-Guitar-Pedal/>

In order to make the dibond housing for the instrument an illustrator file path must be generated. It is attached in this folder. The black lines indicate a straight cut all the way through the material, grey areas indicate a portion with the top half shaved off, and pink lines indicate a “v” cut through the material which allows for easy and precise folding. If you do not have access to a CNC milling machine this housing can be 3D printed (also attached in this folder).

Once the desired housing has been made you can then make the body. The way I did this was by getting a long sheet of mahogany (with a width of at least 300mm) and cutting it down to size and stacking layers and glueing them in between. I included a hollow chamber in the middle to help with resonance, this is optional. The keys I made out of strips of steel strapping cut down to size. I found a table that helped with tuning. Once a single strip has been tuned the length of it can be multiplied by the following values to achieve different octaves and semitones 

Each key is held down using screws, the hole that is on each key is more of an elongated circle, this allows the user to fine-tune each note individually as desired.

Thanks for a great class, Garnet! Have a great summer.