
“THIS = THEN = THAT”

ARTIFACT

Professor: Elio Bidinost & Sabine Rosenberg

Course: CART 360

Student: Liu WenYue (40098425)

Date: December 4th, 2019

Github repository URL: <https://github.com/Liu-WenYue/cart360-2019>

Research

Mozzi Library

After exploring different types of sound output options for Arduino, I decided to use the audio synthesis library for Arduino - Mozzi library [1]. I looked through the demo recordings available on the Mozzi library's official website and I did some research on how to deal with five inputs using the Mozzi library. I found a tutorial on Instructables done by Dorahan, the author used the Mozzi library to work with five potentiometers [2]. He used the Knob_LightLevel_x2_FMsynth example code as the basis of his code. And I studied his code and implemented it in my project. Instead of having five touch inputs produce different sounds, I had two of them to be the controller of the other two touch pins. So it creates more variation to the sound outputs as the users can change the frequency of the sound.

Embroidered Fabric Speaker

As I am working with the fabric sensors for this project, I wanted to make a fabric speaker in order to have a unified project that is mainly made of fabrics. After discussing with my professor and done some research online [3], I found that the stiffness of the material, the thickness of the conductive thread, the tightness of the arrangement, the dimension of the finished speaker, and the strength of the magnet are the factors that affect the volume of the sound output. With these in mind, I did a test using a relatively stiff fabric, three pieces of the strong magnet, and I made the arrangement as tight as possible. However, the end product produces an incredible low sound output. I have to go very close to the speaker to capture the sound. So I decided to go with the traditional speaker for this project.

Material of the Plushie's Body

After seeing the News of a lady making memory bears using the old clothes of people's lost ones [4]. I also thought of using old clothes as the body material of the plushie. In this project, I used an old cloth of mine. The plushie is not only taking in the pattern of the cloth, but it also brings in the memories of this old cloth. Be the memory of location, people, or matters. It makes the plushie more sustainable and connected to the users.

Making Progress



Figure 1. Materials for the pressure sensor

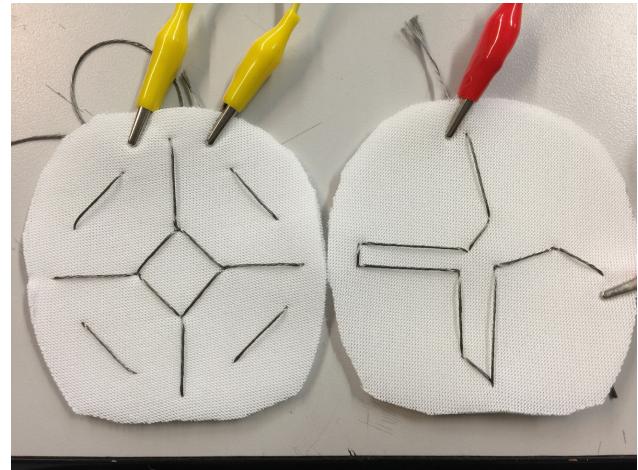


Figure 2. Updated the arrangement

I have increased the overall size of the plushie to make this project more feasible. Moreover, I have added more conductive thread on my pressure sensor to increase the availability of the touch sensors.

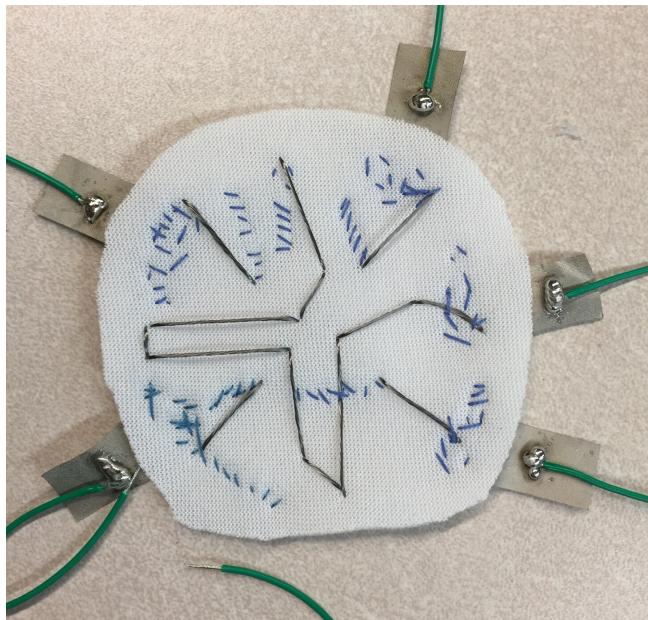


Figure 3. Lower part of the pressure sensor

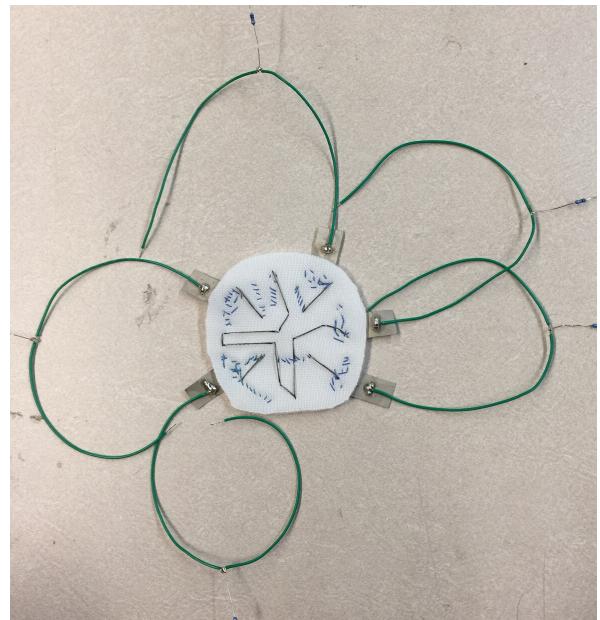


Figure 4. Wires and resistors soldered

I arranged the wires in a radial manner, so it will be easier for me to bend and clean up them.

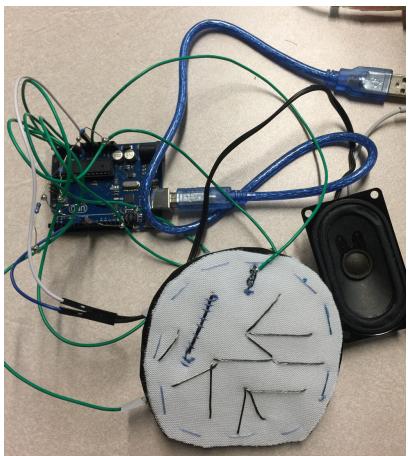


Figure 5. Connection test



Figure 6. Making embroidered fabric speaker



Figure 7. Materials for the plushie

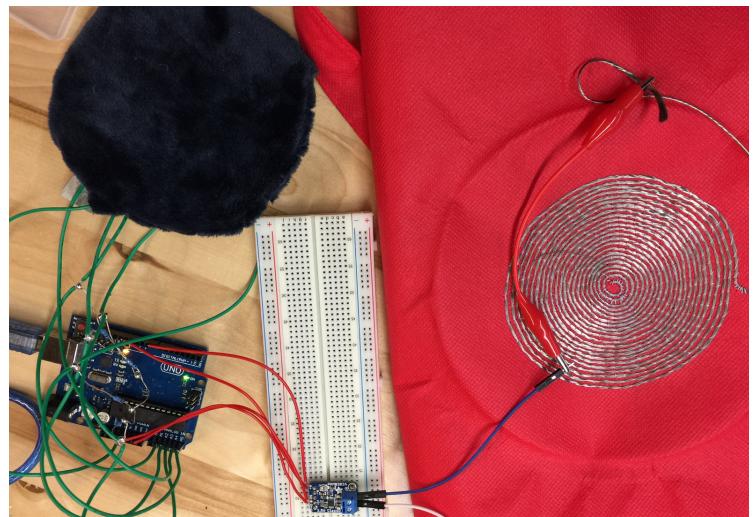


Figure 8. Connection test with the fabric speaker

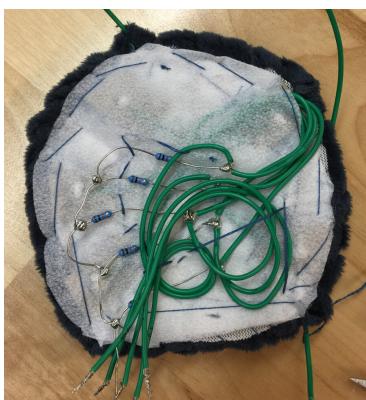
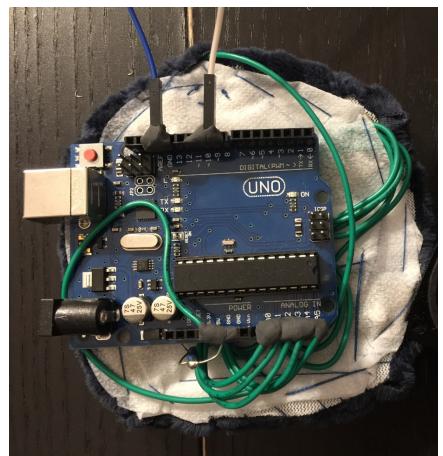
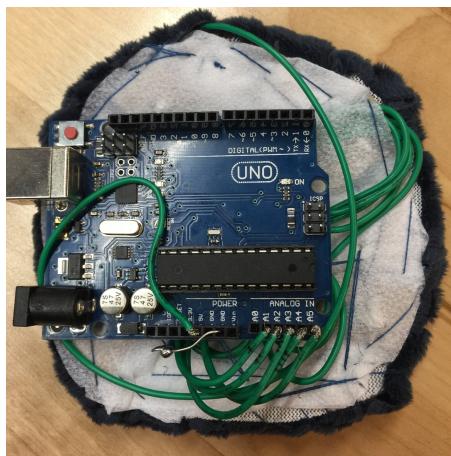


Figure 9. Adding insulating layers,
cleaning up the wires,
fixing wires using kneaded eraser.

Insights & Future Development

More Characteristic Features

Due to the time constraint of this project, there are some features that I was not able to implement in this project. These features are designed to make this plushie more personalized, in other words, to bring in more characteristic features. For future development, I would like to work on the following additional features. Firstly, I want to have the eyes of the plushie to be more expressive and interactive. Its eyes will be closed when the user is not interacting with the plushie, and the eyes will open when the user holds the plushie or touch its body. This will be done using the thermochromic ink or LED display. For the case of thermochromic ink, the eyes will be first sewed in the shape of closed eyes, and the thermochromic ink will cover the space for opened eyes. In this way, the eyes seem open only when the temperature is high enough. On the other hand, for the LED display option, it has to work with sensors like potentiometers or thermal sensors to track the existence of the human beings nearby. When it tracks people, the LED displays change to eye open from eye close, vice versa. Secondly, I also would like to add some interactions for the plushie's ears. There will be heartbeat sounds produced, and the blush on plushie's face will turn to red from pink when the users touch or press the plushie's ears. Moreover, for the hands of the plushie, it will trigger an LED blink when the users hold both of its hands for a period of time. It simulates the charging process, and the intention is to have the users charge themselves mentally. In the technical aspects, this interaction will be achieved with an analog thermal sensor. The LED blinks when there is enough thermal energy tracked by the sensor. Furthermore, I want to have the plushie to be able to stand on its own. The base of the plushie has to be bigger and flatter in order to hold its body. And sand will also be added to the bottom of its body to give it an even more stable base.

Body Material of the Plushie

The body material and the minor design can be varied according to the users' needs. Clothes are a collection of memories, people reminisce about their friends, places, and things using clothes. School uniforms, wedding dresses, first suit, and favorite pajamas. Using the fabrics that have special meanings to make the plushie will make the plushie more sustainable, and users will feel more connected with the plushie.

Overall Appearance and User Experience

In this artifact, there is a hole at the right-hand side of the plushie for the Arduino connection and power supply. In the future development, I will replace the hole with battery supply and have the finalized code uploaded onto the microcontroller.

Moreover, I feel putting the Arduino inside the plushie's body makes it very heavy, and it may cause the users to refuse to hold on to it for a long time. Furthermore, the speaker is currently hanging around the right bottom of the plushie which makes it very inconvenient for the users to hold the plushie. So I will build a box that incorporates the speaker and the wires in a meaningful way, and the users will be able to store the plushie inside the box when are not using it.

Diagrams

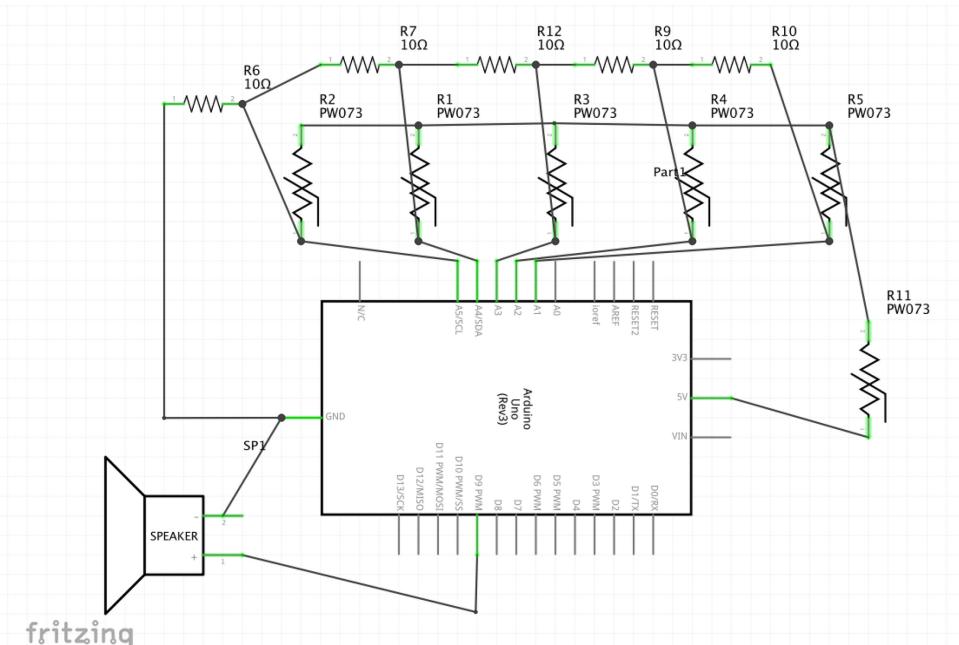


Figure 10. Circuit diagram



Figure 11. Finished artifact

Reference

- [1] <https://sensorium.github.io/Mozzi/>
- [2] <https://www.instructables.com/id/Using-Mozzi-Library-with-5-potentiometers/>
- [3] <https://www.instructables.com/id/Embroidered-Fabric-Speaker/>
- [4] <https://metro.co.uk/2019/11/20/woman-makes-beautiful-memory-bears-lost-loved-ones-old-clothes-11188203/>