Cassandra Rousseau, Zi Di Zhu, Hummam Houara

Project link

Prototype —

Everywhere = Nowhere = Now

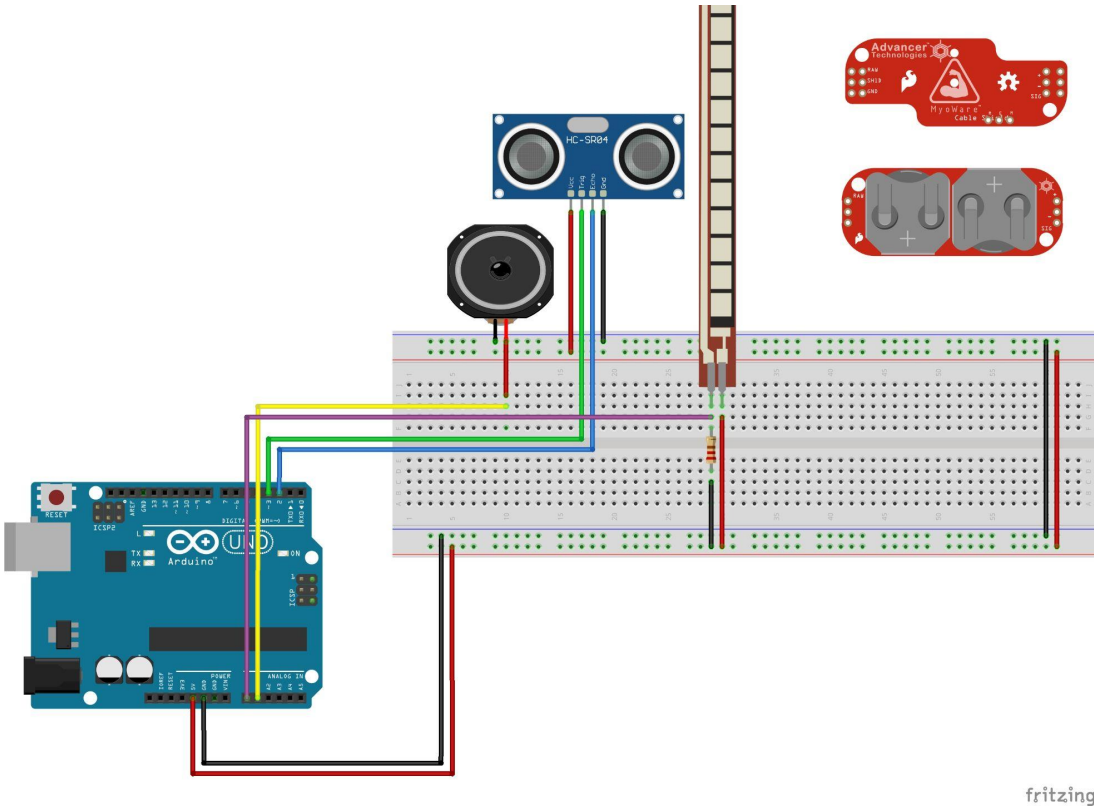
Vibe Check Music Controller

CART 360: Tangible Media & Physical Computing

Elio Bidinost

November 5, 2021

Diagram



Simple Guide to the Current Features:

- When it turns on, it will start playing an ascending sequence of notes.
- Move hand (or object) perpendicular to the ultrasonic distance sensor to change the chord of notes. Different distances gives different chords
- Place hand very close to the distance sensor (less than 5cm) to change the beat pattern
- Bend the flex sensor to make the tempo slower

Parts:

A1: Speakers:
Loops a sequence of notes. We have a few arrays of different notes (different chords), and different patterns for the notes to be played.

A0: Flex sensor:
Outputs an int between 0-180.
The base duration of a note is 120 millis, but the more this sensor is flexed, the longer the duration of the note is.

2,3: Ultrasonic Distance sensor:
Outputs the distance between the sensor and an object.
The distance is mapped to different chords of notes: The further the distance, the higher pitches are.
If the distance <5cm, it changes the beat pattern.

* The myoware is to be added later
* The parts will be placed on a glove

Potential features to add/ alternative designs:

Here are some features that are not in this prototype, but could be tested:

- Have a “record” function that records everything that has been played.
- Use buttons to allow the user to customize their own beat pattern.
- Adding the myoware sensor that controls the oscillation of the note’s frequency
- Multiple microcontrollers on a wireless network
- Include Mozzi Library to have different “textures” of sounds

A Written Response which addresses and relates the implicit concerns of *Why Do We Prototype?* & *Fidelity Levels* to the development process of your Physical Prototype

Multiple aspects in our project relates to the prototype making process and its fidelity levels. The methods mentionned in *Prototyping for Physical and Digital Products* by Kathryn McElroy aligns with our design process. Prototyping is the best way to improve the project for the users. By testing multiple ideas, we can get the best result for what we intended. In our project, we tried to create parts and interactive meachanisms that are close to the intended final product. We separated the process into multiple layers: researching and sketching, testing the materials, combining the materials and creating the final prototype. Our team agreed to start with the glove as our main prototype using at least two features requiring sensors. Our low fidelity was creating sketches of our intended project with the requiring sensors and searching information about these sensors. We started by creating sketches of what we intended to create as a wearable textile. We

made deep research about the characteristics of different sensors and how to use them. We also ask some advices from people working in the fashion industry and doing some researches about which fabric might be the best to use in the project. ,Our second step was to test the sensors that we found closer to our intentions and create a working circuit for each. The mid-fidelity in this prototype was the testing codes for each sensor. We tested each sensor with their own circuit and code virtually with the browser-based app Tinkercad. The first sound attempt was basic coded input. We used some Arduino code examples as references depending on the sensor we try to build a code. Once we where able to create a working virtual circuit, we transferred the code onto the Arduino IDE. We wanted to ensure that the sensors are appropriate to produce sounds and if the connection between the sensors and the buzzers was doable. Each circuit got their own physical circuit. During the mid-fidelity stage, we tried first to use polyester as a material to create the wearable textile. However, using polyester was not a success; it was harder for us to sew this fabric due to our poor experience in using sewing machines. We used instead a more rigid fabric. Our high fidelity prototype was the fully coded interactivity of the wearable textile. After some adjustments in both the codes and the circuits, we started to build the code and a physical circuit combining the sensors together and adding the Mozzi sound library. Prototyping was useful for us to make some improvements in our models, fix some technical issues and to test if our intentions work in practice.

Has your Project's initial intention or supposed meaning changed over the course of researching and implementing the Physical Prototype? If YES or NO – Explain why?

The project's initial intention and meaning changed throughout researching and implementing the physical prototype for various reasons. The given feedback for our proposal after our presentation changed a lot the path we wanted to take. We had to change the interface and its characteristics to make our project more challenging and interactive. We still kept the idea of creating music through bodies but in a different manner. We started by researching multiple possible sensors for our project, and what we got in our Arduino kit can fit the idea of creating music through bodies. Our preferences were the sensors based on pressure, motion and muscle contractions. We removed the idea of using temperature and heart rate sensors due to being too passive components for our project's intention. The chosen components are the Myoware, flex sensors, force-sensing resistors and ultrasonic sensors. We wanted to add more components to our project, but we had to reduce our scale due to their total cost. We tried to contact FASA to apply for a grant,, but we never had an answer from them. The second idea was to create a wearable computing glove and a high sock containing sensors on or within them. Each wearable textile has its own Arduino, holding its sound library. We removed the idea of using the Ableton software due to being a too direct approach to what we intended to do. A loop of computer-generated sounds will vary depending on the pressure, movement axis, and muscle contractions. The purpose was to allow a new way of composing music without using a traditional approach.. To push the project further, we want to install a Kinect connected to its own Arduino and sound library that detects the user's location in the environment. The melody will change according to the user's place in the room. We removed this idea because we thought it might be a too direct approach to what we intended to do due to its integrated camera already reading RGB colours, body types and facial features. Another idea was to create a carpet that detects the X and Y position of the user. The computer-generated melody varies depending on

the user’s position. The carpet will have its own Arduino and sound library. This idea was removed due to other ideas proposed by the teacher and the amount of time required to do the project. After proposing our second idea, other ideas arise to add or modify our project to make it more interesting. At first, we thought th the same user wore the glove and the socker, putting every feature on the same user might be overwhelming. So it was decided to separate the glove and the sock on different users. We wondered how to maintain the components of the wearable textiles; we thought of either soldering or sewing the components. We were suggested to sew the pieces with conductive threads and use an Adafruit Flora. To make our sound library more varied and interesting, the teacher suggested creating the Mozard microcontroller and using the Mozzi library. The last suggestion was to connect both the glove and the sock by radio frequencies and make them interact and communicate; the wearable textiles react and get influenced by each other's movements and pressure. After suggestions from people working and studying in the fashion industry and some research, we decided to use Polyester to create wearable textiles. However, while trying to sew the glove for the prototype, we noticed it would be too hard to create it with this fabric due to the poor experience of our team in sewing.