MUSICAL STAIRS

Sensors, Body, & Motion Midterm Proposal

María Paula Calderón

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CONCEPT OVERVIEW

Musical Stairs amplifies the experience of taking the stairs in the Arts Center through spontaneous and collaborative music-creation.

The experience is spontaneous as there are no cues that hint at its existence; it is only when someone takes a step up or down the stairs that a sound will be produced and the experience begins.

Taking a slight twist from the previous versions of the piano stairs, this piece instead seeks to add spontaneity and excitement by playing a variety of seemingly random sounds (eg: kickdrum, clap, whistle, bark, etc.) following each step. Overall, this installation strives to make the experience of taking the stairs more enjoyable!

PROJECT GOALS

1. To encourage the collaboration between people by sound-making through movement.

2. To amplify the experience of walking up the stairs in the arts center.

3. To establish the stairs as a dynamic location for potential interaction between passersby.

TECHNICAL DETAILS

A sensor* will be placed under each step (as to avoid any people tripping on any of the materials). The sensor will be triggered every time someone takes a step. Once the sensor is triggered, the program will play a sound corresponding to that particular step through a loudspeaker placed at the bottom or top of the stairs. Either a Teensy or an Arduino connected to a power source will be used as the microcontroller that will facilitate this experience.

**A variety of sensors could be used for this experience. The ones I am planning on testing are an ultrasonic sensor (which measures the distance between itself and a surface in front of it), a sound detector (which gets triggered at the presence of sound), a tilt sensor (depending on where it is placed, it detects the vibration or tilting of a surface), or an Adafruit Cap1188 Touch Shield (which gets triggered according to different touch inputs). The final sensor I will use will be determined through trial and error. Testing each sensor will then lead me to identify the optimum one that will most effectively track people's steps.*

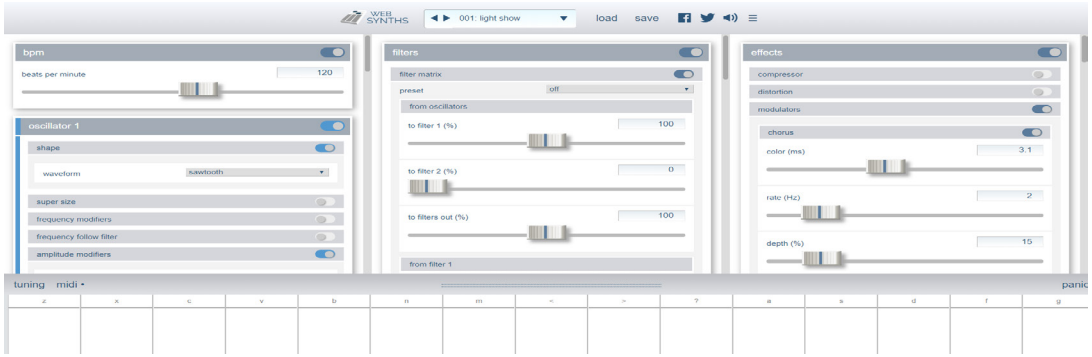
SOUND POSSIBILITIES

The final sounds that will be used will be determined after thorough user-testing, to ensure that the combination of sounds is both spontaneous but also enjoyable. The sound will be carefully decided, as it is the element that creates the magic of the piece. I also have to decide whether the sounds will be part of a musical scale or not. In the case of the latter, the sounds will still belong to the same theme, but will not necessarily follow a set musical scale.

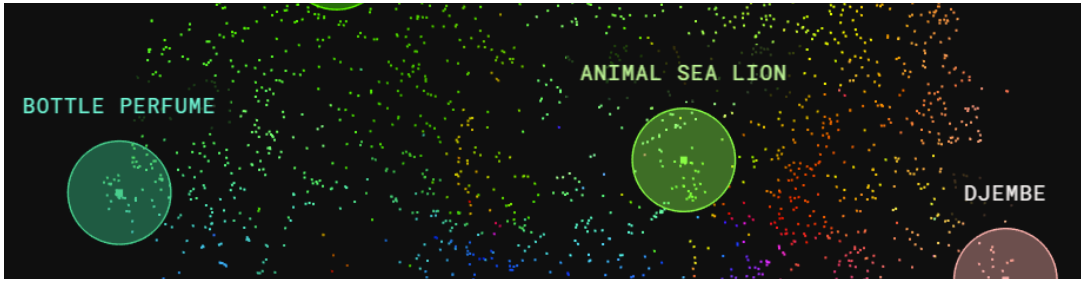
Some sound possibilities include:

Percussion instruments (bass drum, gong, timpani, chimes, etc.)

Online synthesizer sounds (obtained from websynths.com)



Sounds inspired by [Google's Infinite Drum Machine]



MATERIAL NEEDS + COSTS

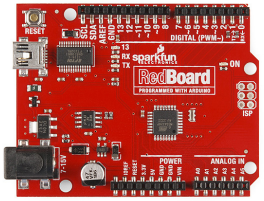
1 SparkFun RedBoard **($19.95)**
1 Teensy 3.2 **($19.95)**
1 Extension cord **($3.49)**
1 Arduino Speaker **($1.95)**
1 Zip tie bundle **($4.95)**

For each step on the staircase: (sensor number will vary according to the final one that will be used)
1 Ultrasonic sensor **($6.95)**
1 Sound detector **($10.95)**
1 Tilt sensor **($2.00)**
1 10K pullup resistor pack **($0.75)**
1 Adafruit Cap1188 Breakout **($15.10)**
1 Breadboarding wire bundle **($4.95)**

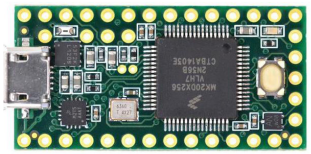
Approximate total cost*:
$54.24 + cost of final choice of sensor * 33 (number of steps)

*Since all of the components can be supplied by the Interactive Media Lab, the final cost is significantly lower.

SparkFun RedBoard

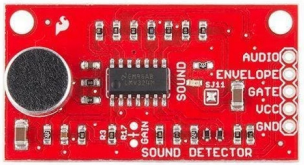


Teensy 3.2

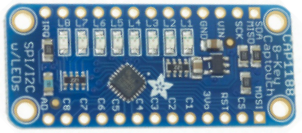


Ultrasonic sensor

Sound detector

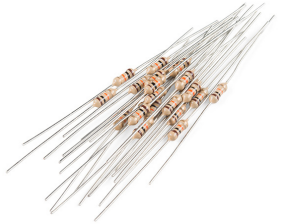


Adafruit Cap1188 Breakout



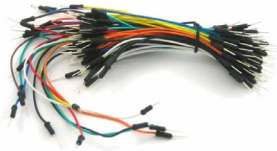
Tilt sensor

10k pullup resistor pack



Extension cord

Breadbording wire bundle



Arduino speakers

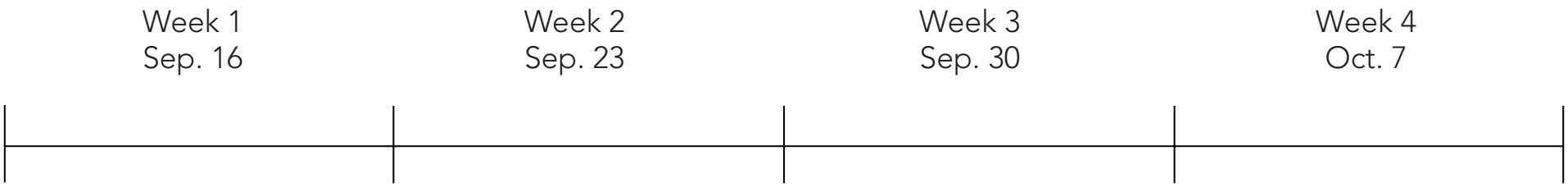
Zip tie bundle

SPACE/LOCATION NEEDS

The experience is meant to be installed in any of the sets of stairs in the Arts Center.

A power source and an extension cord will be needed.

PRODUCTION TIMELINE



- Proposal submitted.
- Start obtaining materials.
- Test sensors and identify optimum sensor to use.
- Choose potential set of sounds.

- First iteration + basic functionality done.
- Working prototype done: sensor can successfully identify steps and play sounds accordingly.

- Project almost completed.
- All sensors installed on staircase.
- Project ready for user testing.
- Based on user testing, final sound set determined.

- Piece completely installed and fully functioning.

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