Textile Interface Project

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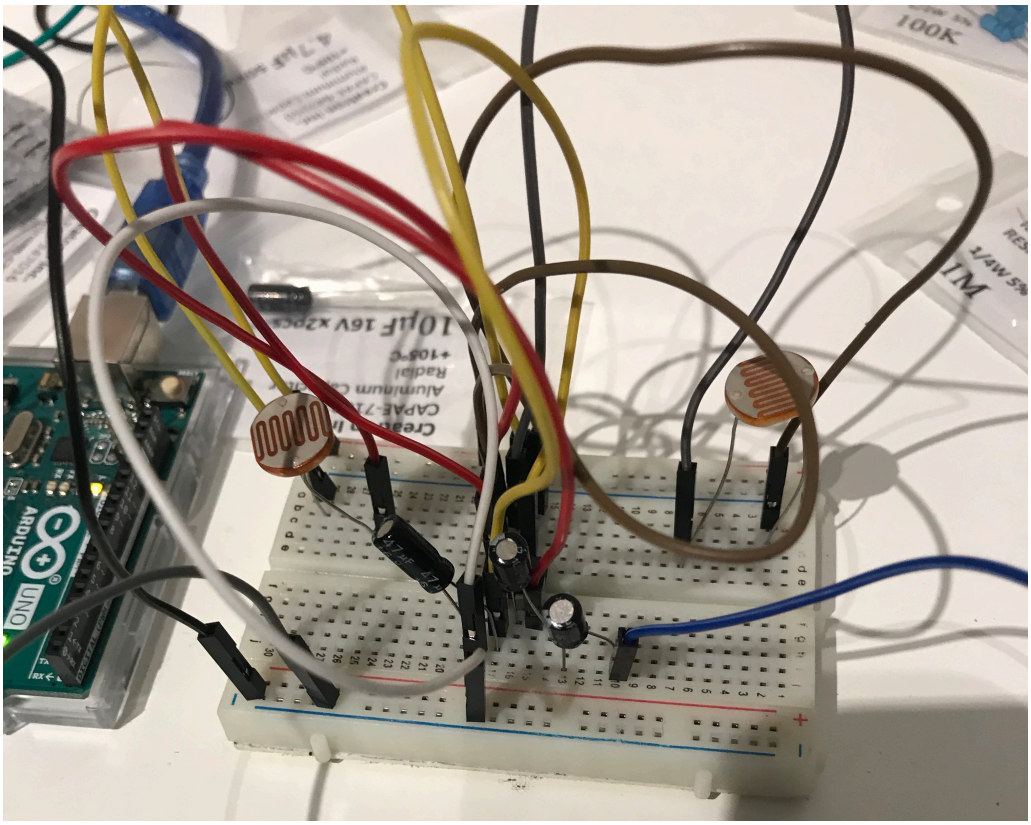
In class I became heavily inspired by the process of creating custom felt materials. Id never seen or done this kind of textile design and began thinking about the ways these kinds of materials can be used to create buttons and knobs to be pressed and reactive to the user. The idea of turning hard robust computer parts into squishy ridiculous looking fabrics was appealing to say the least, like allowing a toddler to do interior design. In another class we had discussed the inner workings of the theremin, which I had forgotten existed up till that point. It's a fairly simple technology, and I figured I would make my own using conductive thread and conductive fibres to create a similar effect and sound the theremin creates.

The Experimentation process

I had seen online people creating theremins with light sensors instead of an antenna with minimal to no programming, so i decided I would start by trying it out myself.



The circuitry took a bit of fiddling around and in the ned the photocell sensor theremin actually worked pretty poorly. I would assume it was a flaw in my prototyping. I got a bit of sound out of the speaker but not enough for me to feel satisfied with the results. I went back to finding an alternative.

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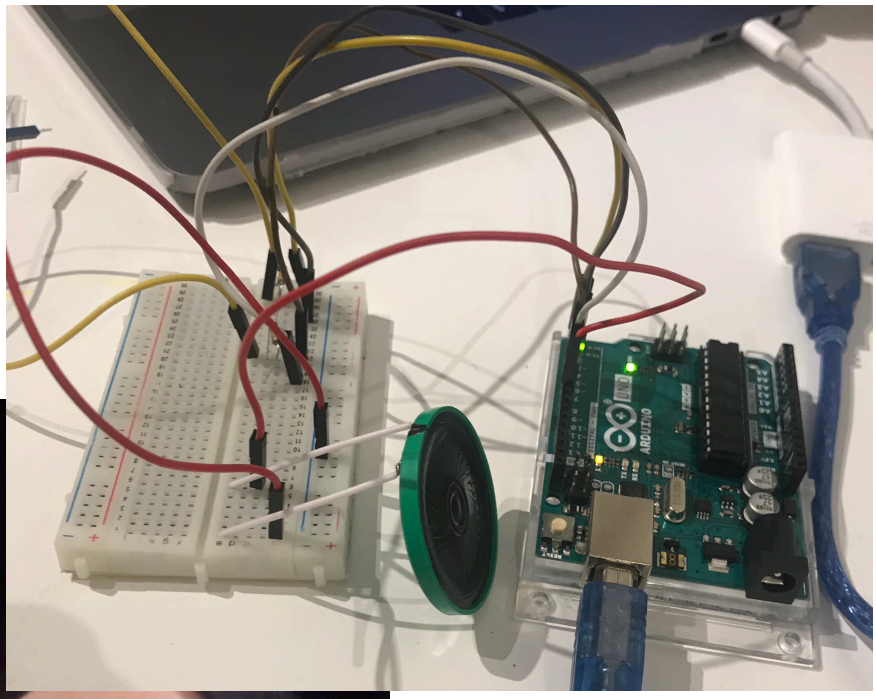
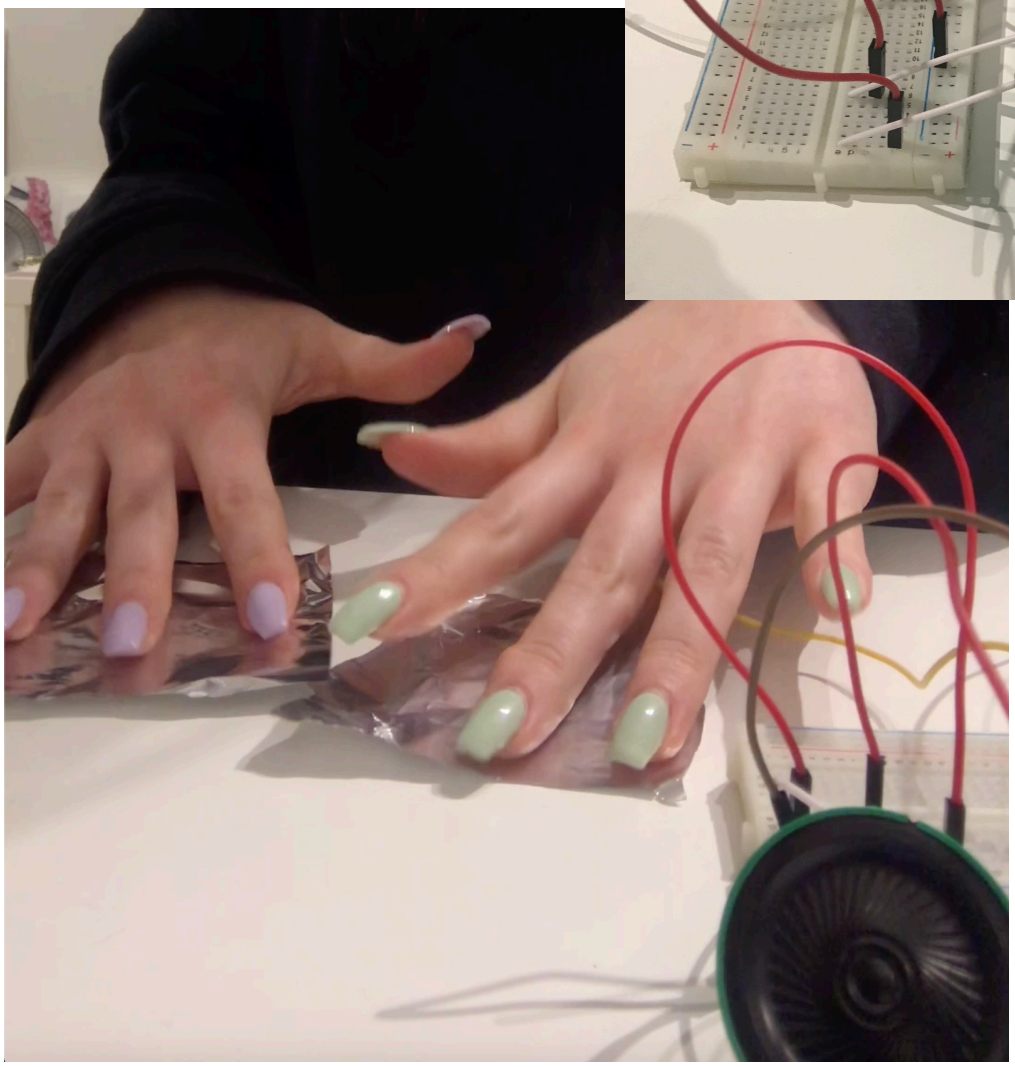
On the Arduino website they actually provided a small example of a capacitive sensor using tinfoil that could be created with only a few pin connections and a bit of code using the tone command to project sound. It gave me the exact kind of sound and reaction I was looking for. After that i started texting the theremin with other materials such as the conductive thread, fibers, other various metals, and also tested to see its limitations with other materials blocking the connections.





The Soft Sensors

acts as a button that augments the other sensor, creates choppy feedback and ticking as well as slows down the tone.

Closer you are higher the tone, different positions and angles on the sensor create different feedback.

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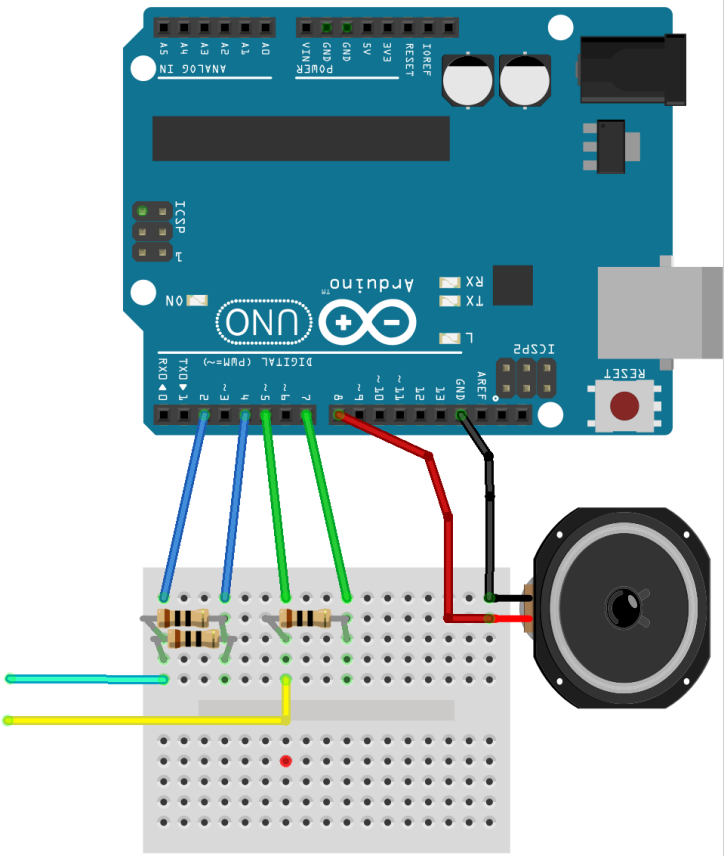
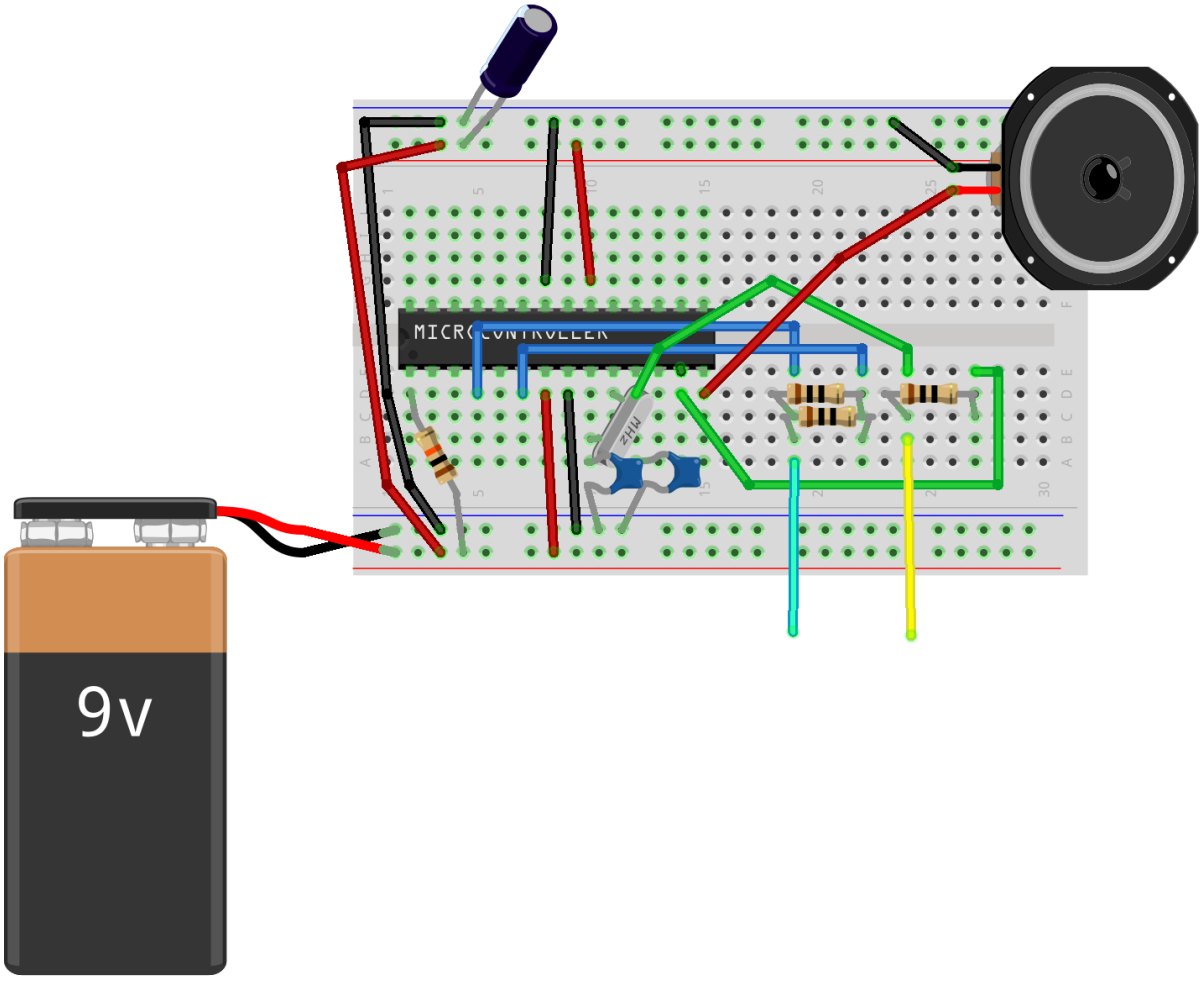
Breadboard Schematics



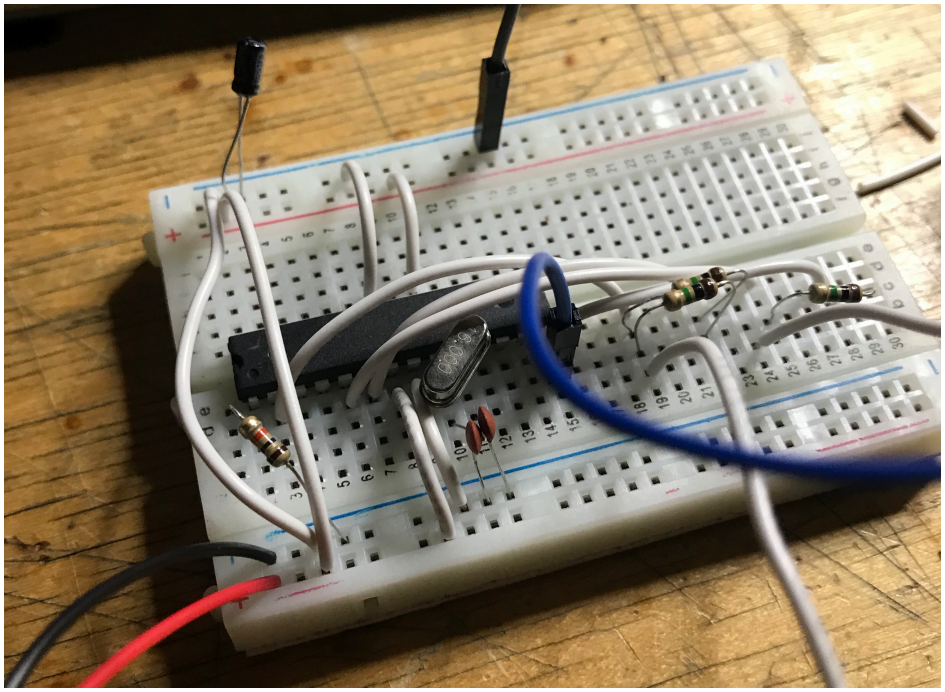


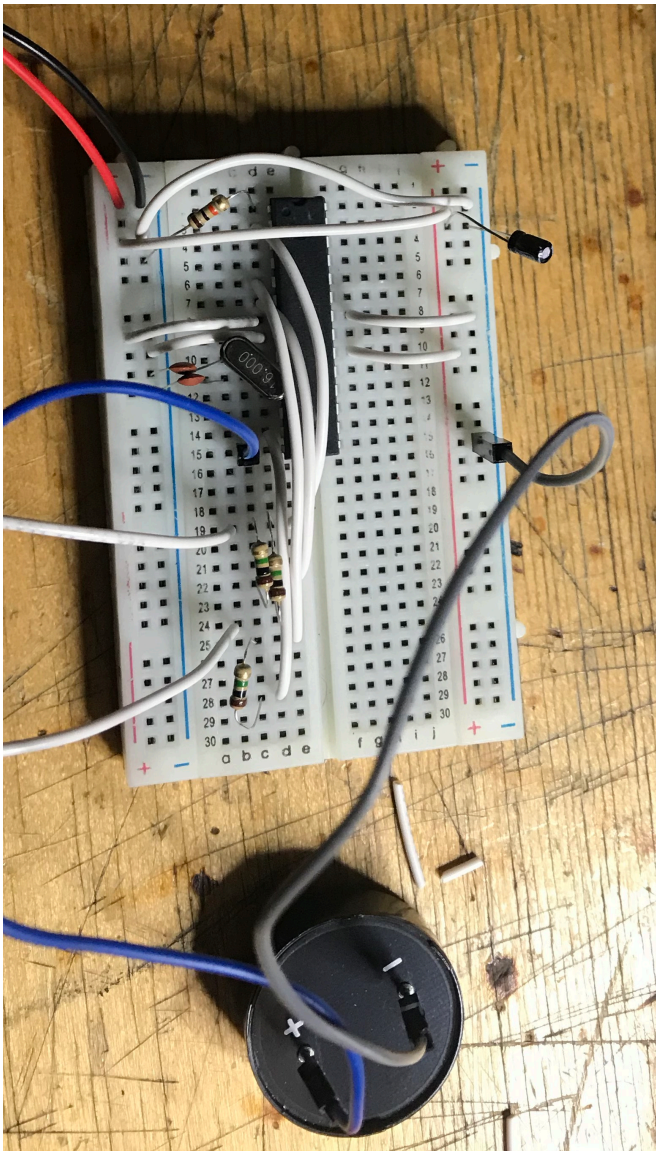
Parts	
ATmega328	2
16 Mhz Crystal	1
10Ω Resistor	4 - 6
10kΩ Resistor	1
10pF Capacitor	2
10µF Capacitor	1
Speaker	1 - 2
9v Battery	1
Arduino Uno	1
Conductive thread and wires	

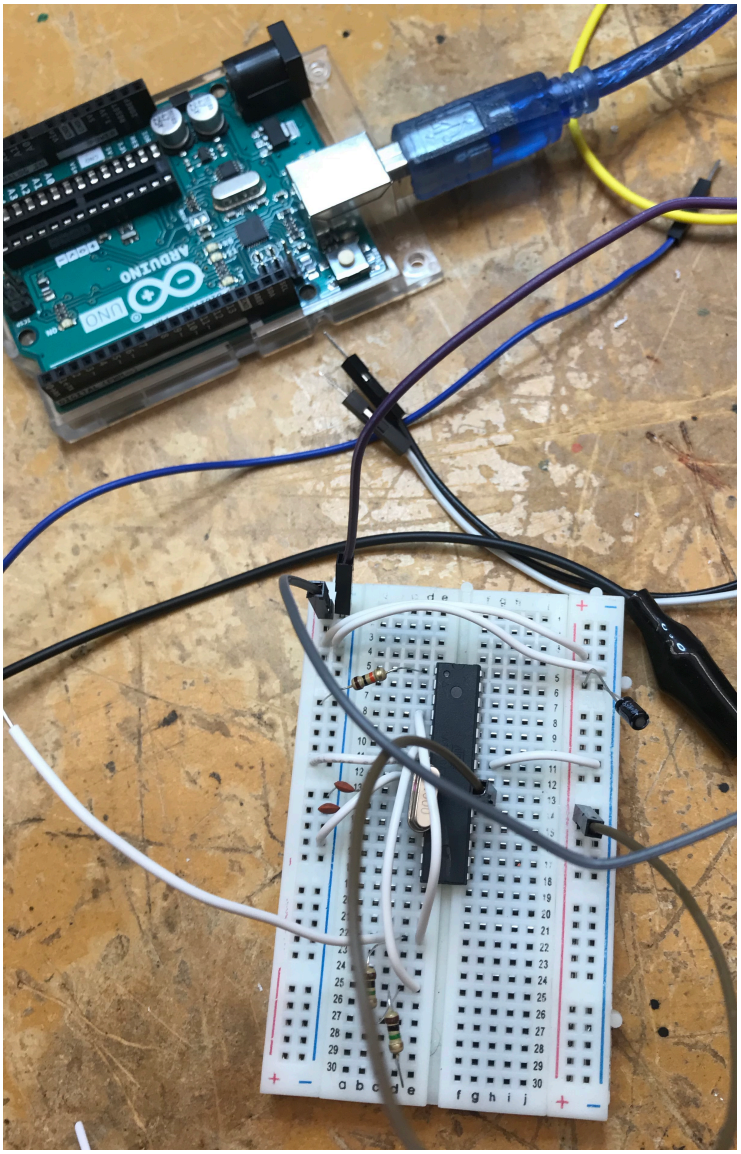
Link to Theremin Capacitive sensor code

https://github.com/Fiona-Stewart/Wearable-Tech/blob/master/Theremon_tinfoil_sensor.ino

Finalizing the circuit







Unfortunately I was unable to move from breadboard to PCB. My circuit and code hit some unexpected errors that I ended up spending hours trying to trouble shoot. I programmed an ATmega328 on my Arduino uno then removed it from the board to solder onto a board instead. It worked… sort of. Sound was coming out of the speaker but the sounds were delayed, and the sensors were computed with a delayed reaction. Not exactly what I wanted especially when the sound was crucial, and delayed sensors aren't exactly impressive. When I went to re program the chip my Arduino started getting errors that I could not fix for the life of me. The internet informed me that the errors could be a result of many different factors. Luckily the code was still on the chip, and seemed to work just fine when powered through my Arduino. I think what happened was the chip was using its internal 8Mhz crystal instead of the 16Mhz crystal I provided which was causing the timer to work slower.