Assignment One - THIS

CART 360 - Fall 2017

“The octopus stress reliever”
https://youtu.be/0fUWcmF4Lpw

Documentation for assignment one - THIS

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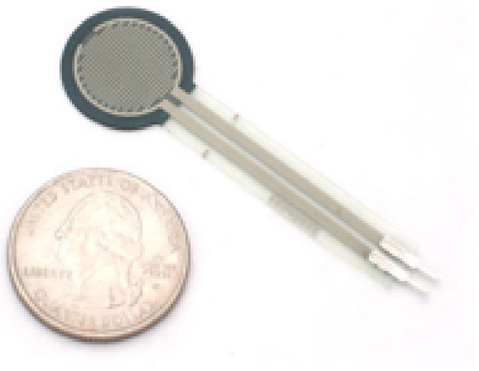
Sensor Research

Research on 3 analog sensors:

Pressure sensor (force sensitive sensor):



Specifications:

Resistance range: infinite (no pressure applied), 100k Ohms (light pressure), to 200 Ohms (max pressure).

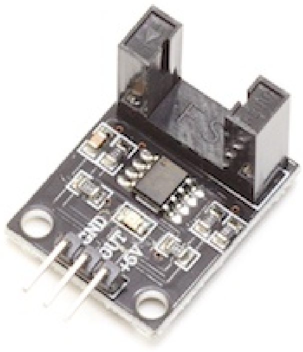
Force can range from 0 to 20 lbs when evenly applied over its surface.
Power: does not specify, uses less than 1 mAmp of current all depending on its usage of pullup/down resistors used/ supply voltage.

Pressure sensors are cool because they allow us to measure the change in voltage . these changes are read by the arduino, this makes effective use of tactile environments, they use pullup methods and do not require any special arduino libraries.

Photocell sensor:

Specifications: Resistance (light to dark) : ~1k Ohm to ~10K Ohm. Max voltage: 150V. Max power: 100 mW.
This sensors detects changes in the light present. This can be useful when interacting with the environment.

Photoelectric sensors:



Specifications: Runs on 5V, and you can power it right from your Arduino.

This is a neat sensor that allows us to detect motion at a distance. They usually only need optic and electronics in a single unit, requiring only power to provide an output based on their specifications and object detection criteria. They can detect a wide range of materials as well as being great for detecting range. Could be useful for identifying a person from afar!

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Design

Our concept:

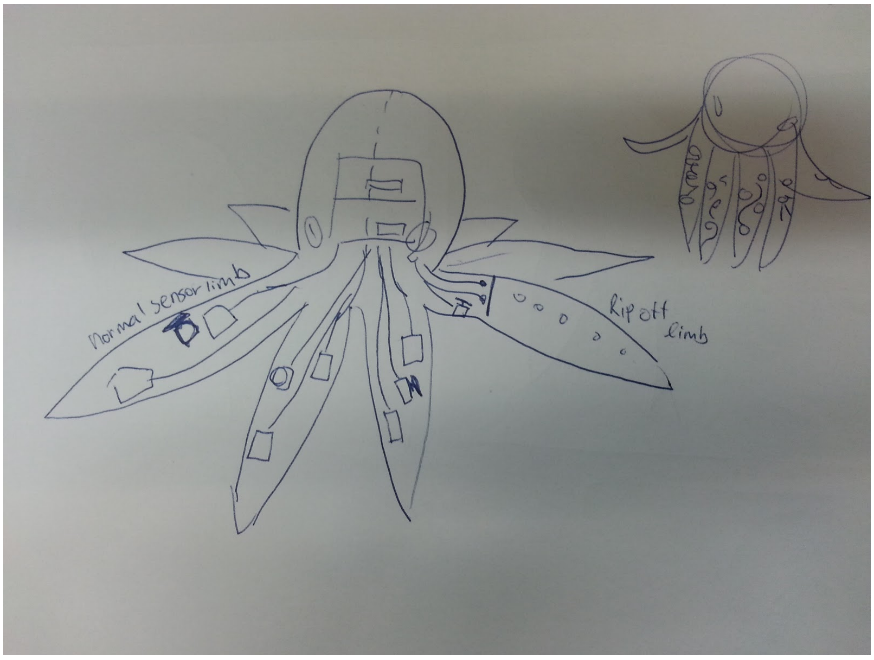
For this assignment we wanted to design something fun. We used the concept of of an octopus to really maximize how people would interact with our object. With eight limbs and a large size it means that many people can play with it at the time. The sensors and switches places in its limbs give the user the chance to play and experiment with what it can do. The sensors we used are analog sensors that utilise tactile input, so pressure sensors.

These pressure sensors are placed in the limb and respond to different thresholds of pressures, so the harder you push the faster it will rumble! This concept is meant to harm this poor octopus, you can even rip off its limbs making the socket rumble!

The original concept involved adafruit and playback of sound whenever the sensors would be pressed. We had planned to make it go off accordingly with the same concepts as the little servo motors. We did not get to finish this so we removed it entirely.

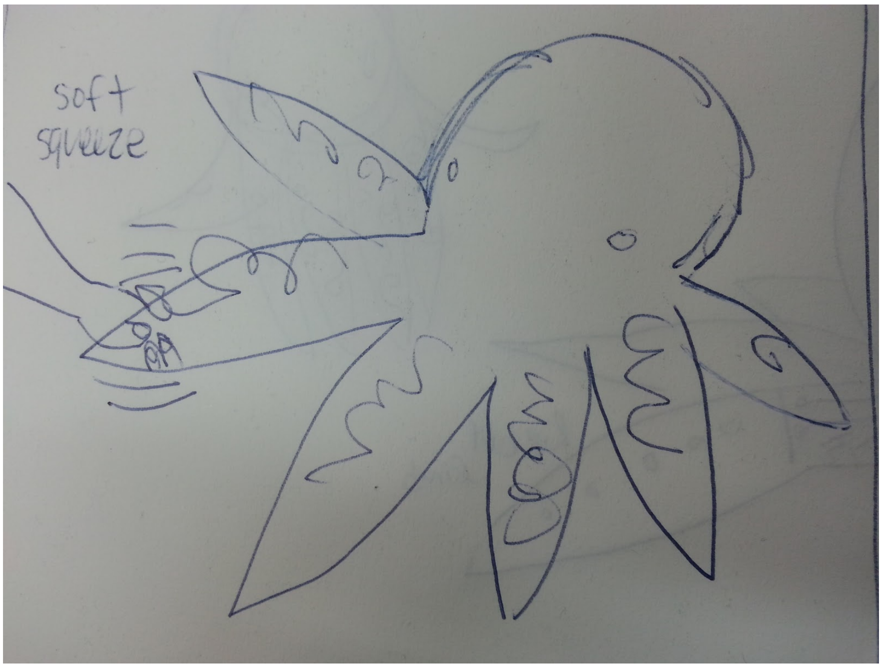
Sadly the servo motors did not rotate or rumble as strongly as we had hoped they would, therefore the reaction isn't intense and does not move the limbs as expected, they still move and rotate via the sensors signal.

Storyboard:

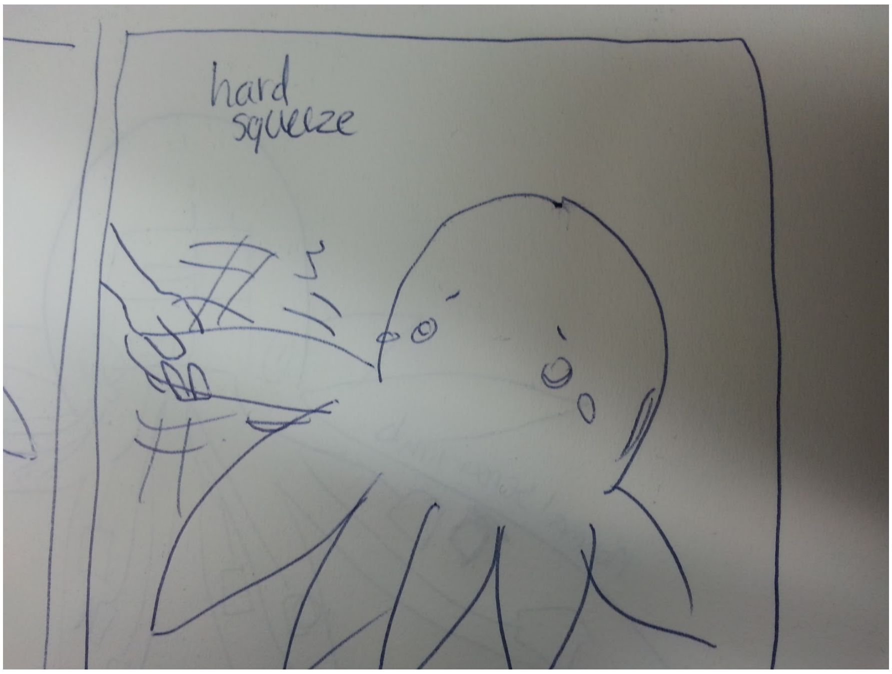


We have an 8 legged octopus with 4 limbs dedicated to reading pressure.
2 for detachable limbs and the other 2 are decorative. This octopus has laser sensors so it can detect a human approaching and can make noise in response!

We will have limbs that are detachable and will relay a message back to the board making a servo located it the socket rumble. Noise can also be outputted



When the user presses softly on the tentacle, the octopus limbs will rumble softly.



A hard squeeze will make the octopus panic, making it rumble faster

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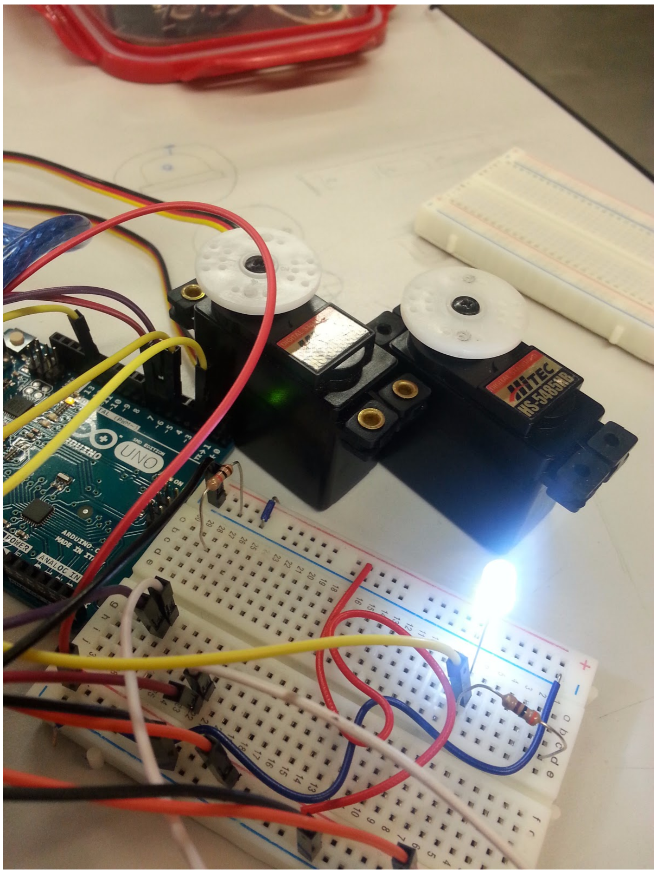
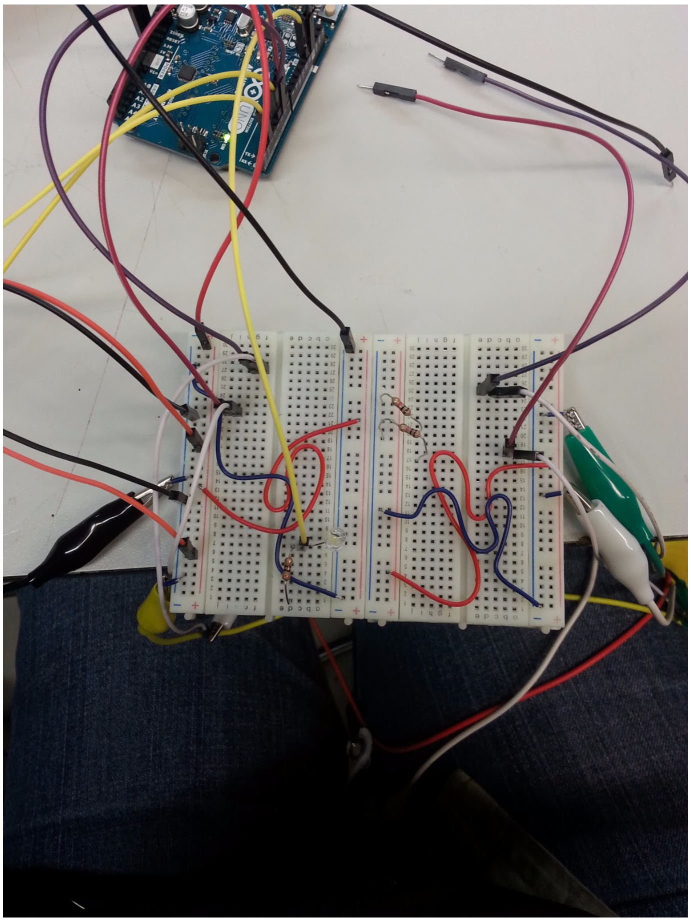
Implement

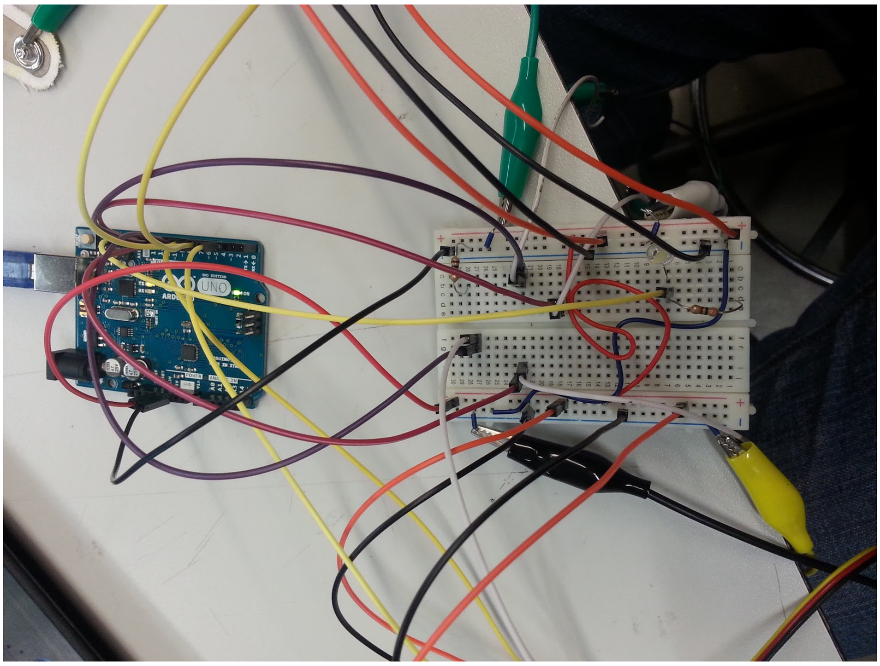
Leg ripping process:



This part of our limb rip process. You can see the temporary light turning on notifying us that the connection is broken meaning the limbs has been torn off.

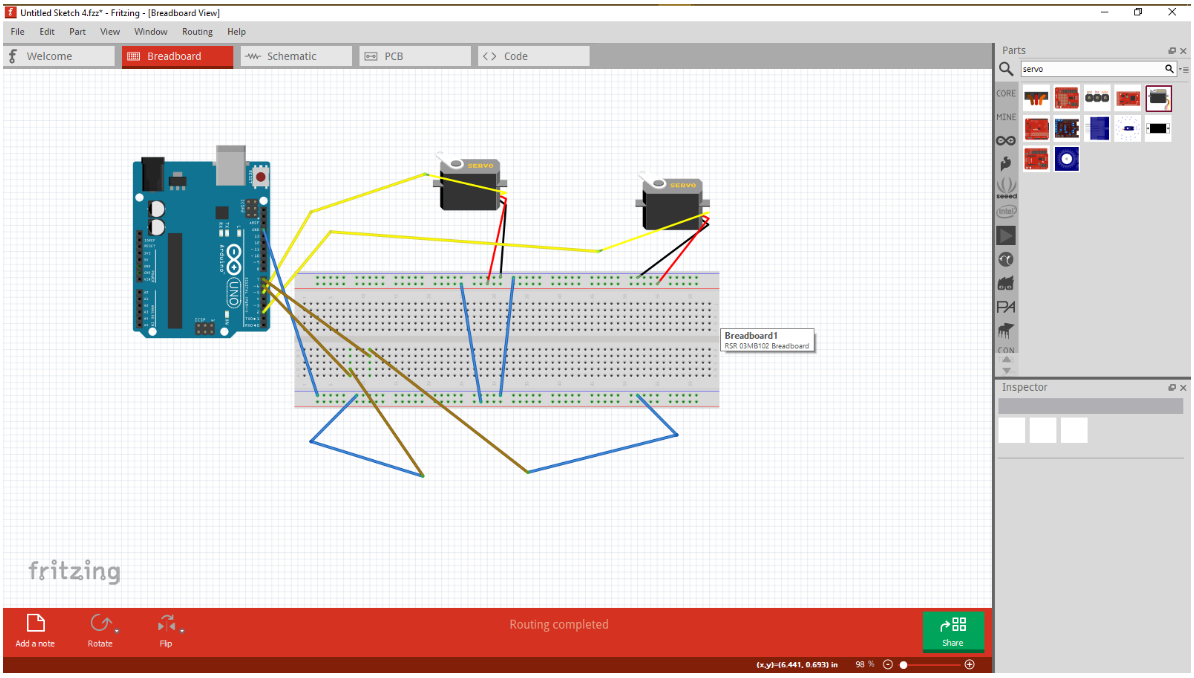


Power was divided in order to maximize the functions of the four servo motors. This was not enough and the battery pack that was attached short circuited, so this was removed.



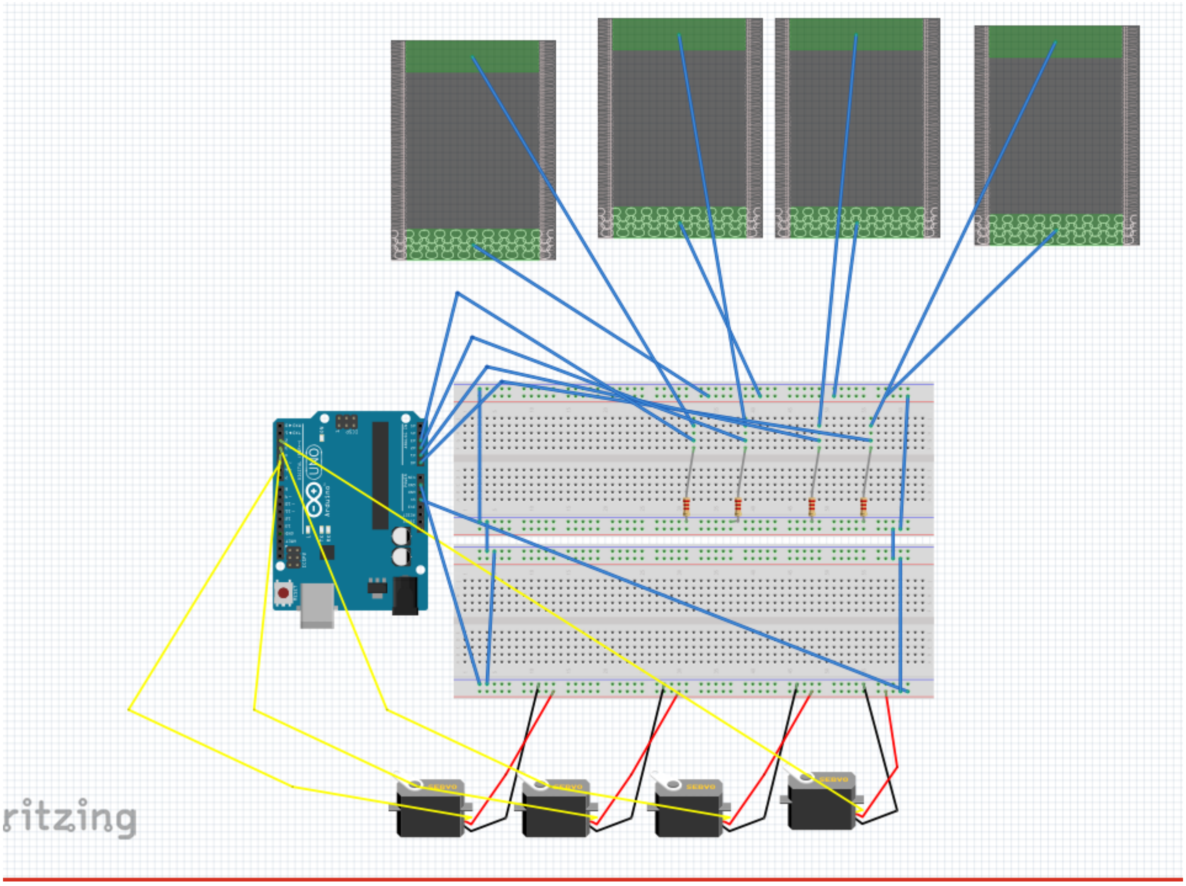
Everything was put back on one breadboard. Again there was an error with writing the servos because of a lack of voltage.

Fritzing diagram for the leg/limb detaching with sensor and servo motors.

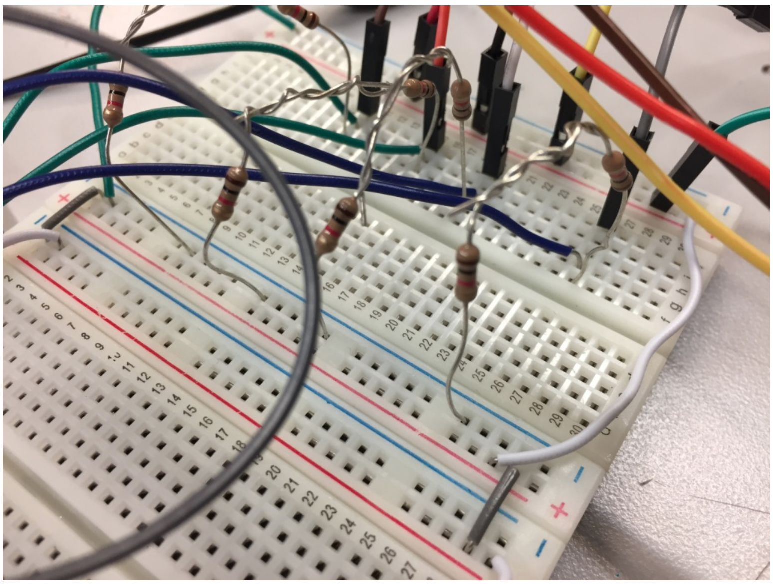


The sensors attached on the breadboard are shown here as two wire connecting on the outside(bottom of the schematic) these are connected onto a conductive piece of fabric which is placed on the limb that detaches from the body of the octopus. Therefore when the connection is lost the signal will be transmitted through the code and signify the servo motor to rotate accordingly. The servo motors are attached to the digital pins as well as the sensor detaching wires. We only used two connections as the code required power that could fry up the system if it had more servos and connection limbs. The arduino is connected to the computer during the process for current flow.

Fritzing diagram for leg responding to pressure on force sensitive sensors data process:



Four pressure sensors are attached to the breadboard and the arduino. Servos are attached to the digital pins on the arduino while the pressure sensors are attached to the analog pins. The sensors shown in the fritzing are just an example and not the same ones we made for the project; which consisted of conductive material with velostat sandwiched in between the two layers of conductive fabric. The resistors are actually two 1K ohms resistors interlocked together. See image below. The power is outputted from the arduino at 5V.



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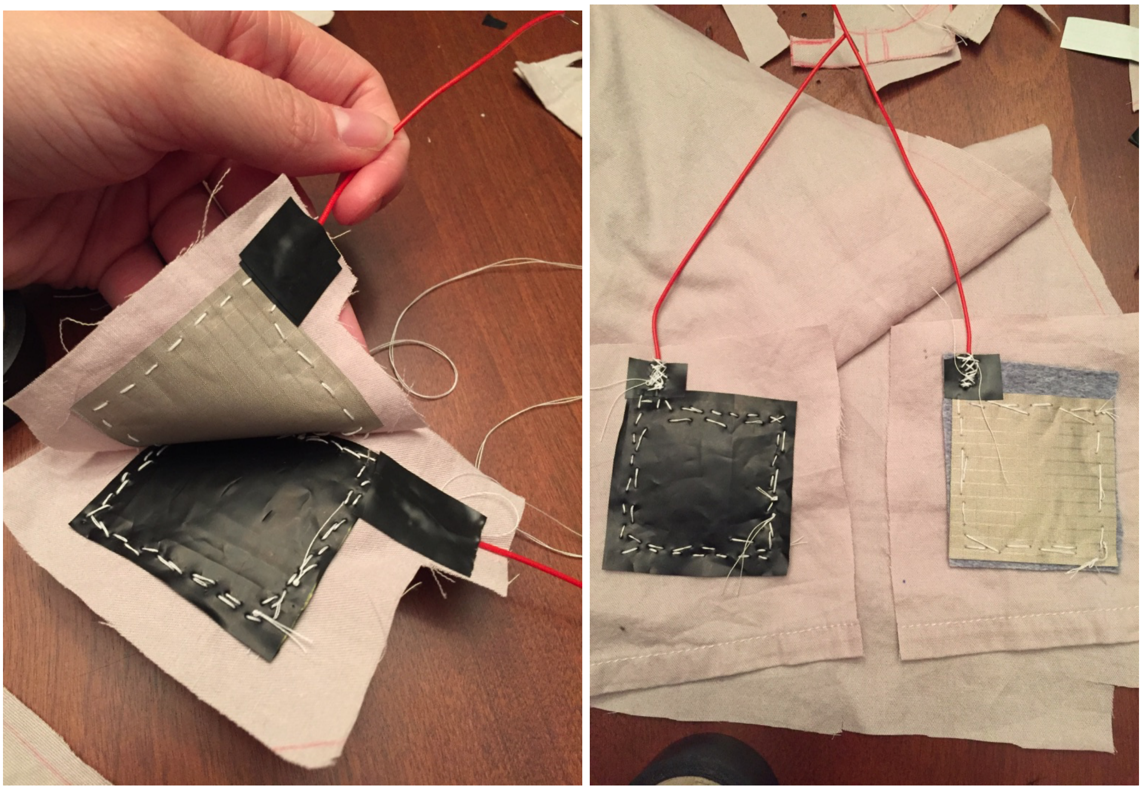
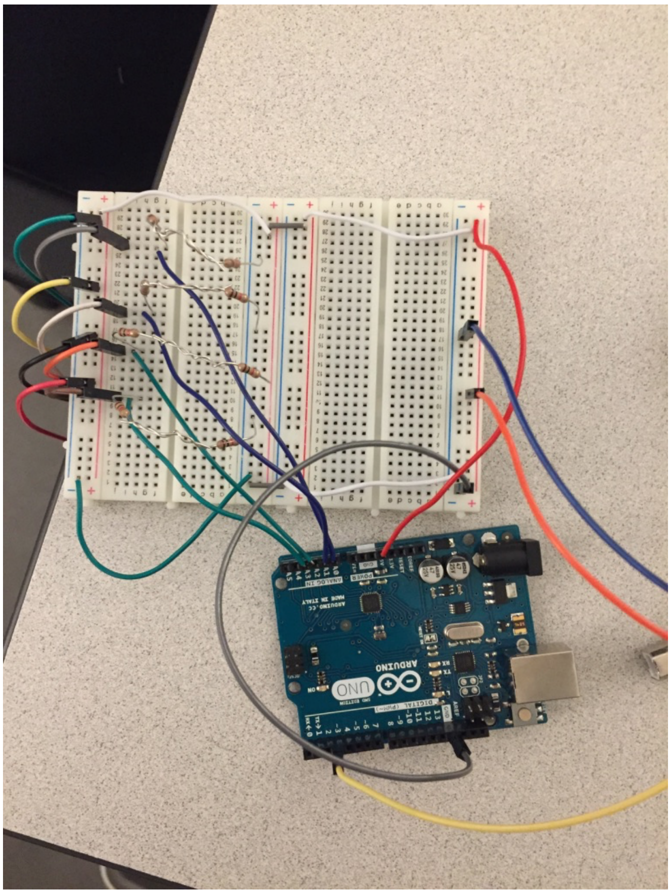
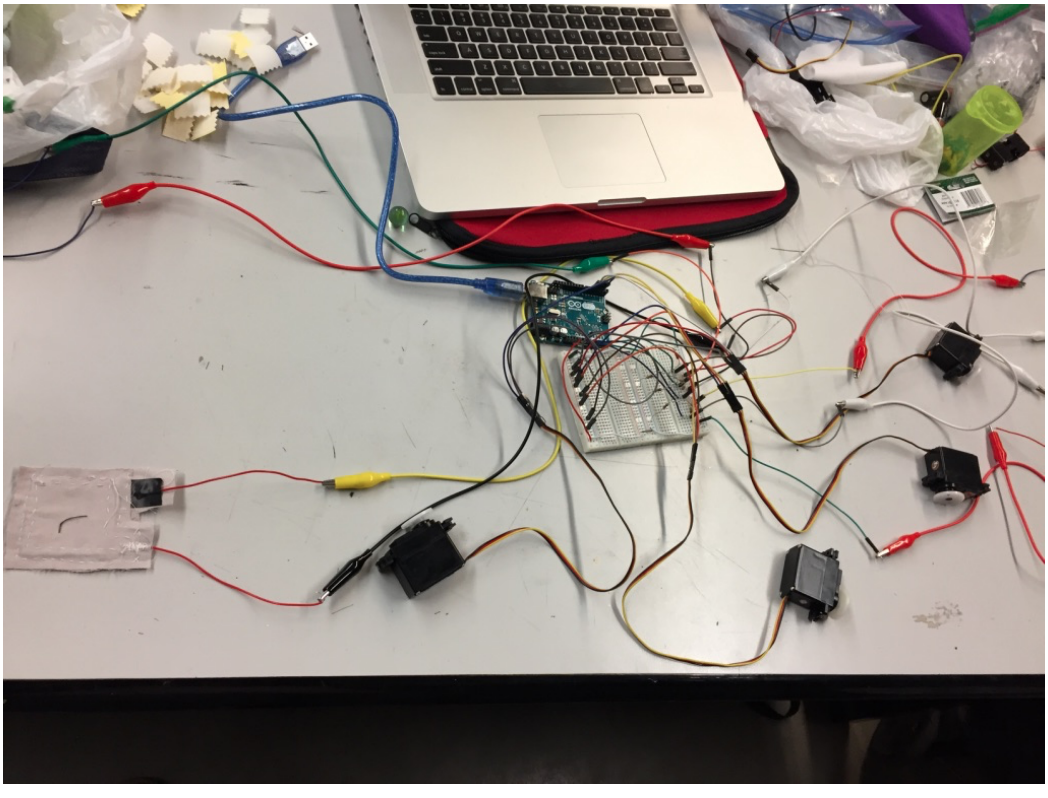
Building documentation:



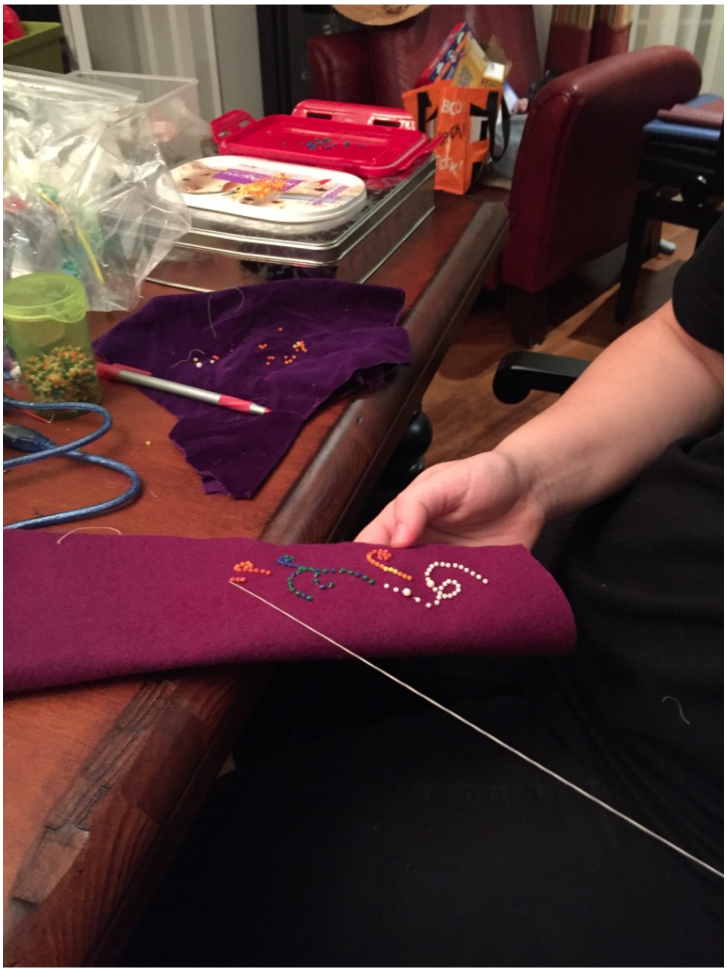
Building the pressure sensors.



circuit for the sensory limbs.



Layout of the four pressure sensors along with their corresponding servo motors.



Kathleen creating the textures and decorations on the limbs.

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Combination Process:

Our fabric legs being connected with the wires to the arduino Uno and the breadboards The two programs had their own Arduino Uno circuit board and breadboards as the detaching limbs required a lot of power due to its pullup functions.

Detachable limb/leg with conductive material placed in center of it.

Final product

Link to video:
https://youtu.be/0fUWcmF4Lpw