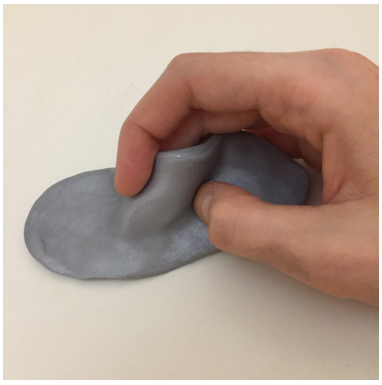
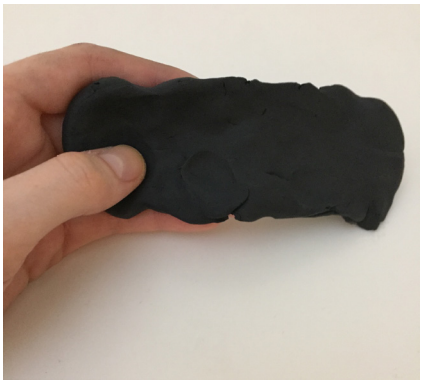
Final Documentation

Materials Testing

Clay



Testing materiality of 'FIMO Effect' modelling clay. The clay was rigid, hard to manipulate, but had a nice sheen.



The 'Plastimodál' modelling clay was hard to manipulate. but was easier to pull apart than the 'FIMO.' The clay however stained fingers.

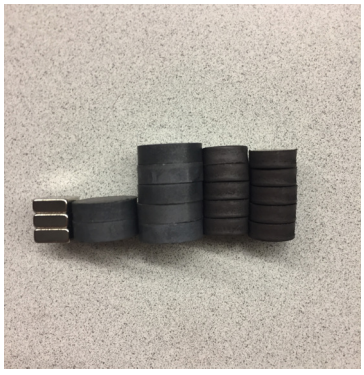
The 'Model Magic' modelling material was lightweight, easy to manipulate. Did not stain and stayed moist and moldable for longer.

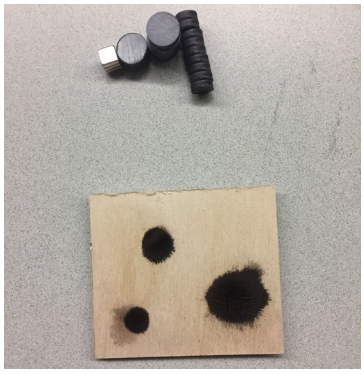
This testing of materiality led me to want to create a conductive modelling clay that had the texture of the 'Model Magic' with the color of the 'Plastimodál.' However, I had to make sure that the black clay would not stain hands the way the 'Plastimodál' had done. The conductive clay recipe I used was based on the Squishy Circuits recipe. I added equal parts red, green, and blue food dye to create a dark-colosred clay.

I had also wanted to make the clay magnetic, so I experiemented with rolling iron filings into the clay. I thought this might make the clay more conductive, however after testing with the multimeter I found that there was no difference in resistance, no matter how much more iron filings I added.

However adding the filings did make the clay attracted to magnets, and had the suprising benefit of turning the dark purple conductive clay into the nice black color that I had wanted.

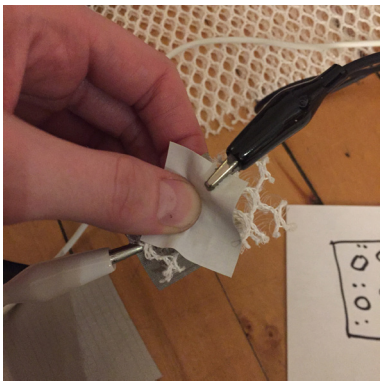
Magnets





I conducted tests on three different types of small magnets. These magnets were intended to attract the magnetic and conductive clay, in order to make the clay stay close to the board. The strength of the magnets was tested by using iron fillings and seeing which magnet attracted the most. Based on this experiment, the most powerful magnet is the small metallic square magnets. The weakest magnets were the larger circular magnets.

Various Materials

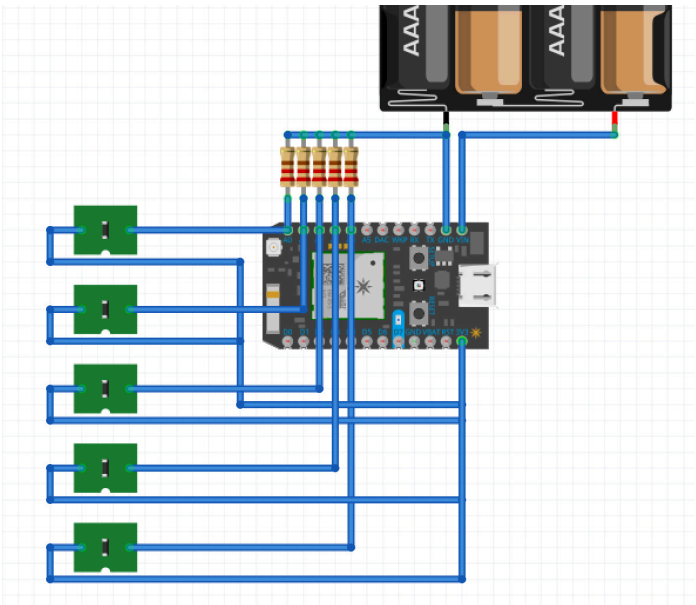


For some time, I tried to incorporate this plastic threaded material into my project. I thought it could provide a nice layer between the conductive clay and the board the clay would be on. However, despite multiple attempts, I was unable to get a current to travel through/past the material. I even tried to embed the plastic with conductive clay, but the switch still did not work. So this was a path that I abandoned for my final project.

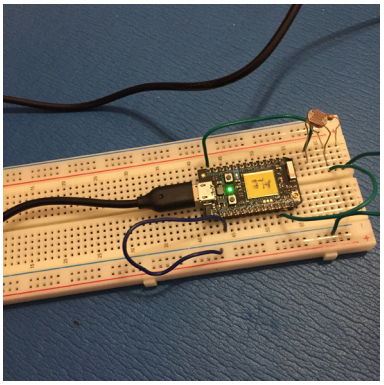
Prototyping

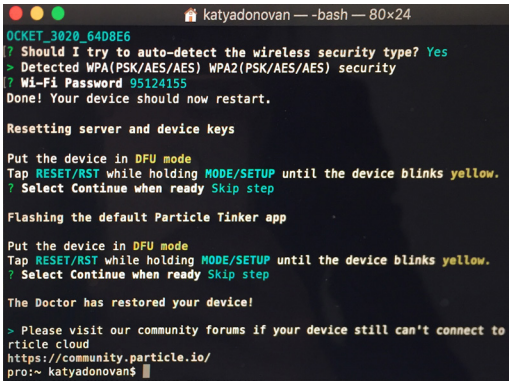
Circuit Drawing

The drawing on the right shows the final circuit drawing for the project. The green variable resistors are substitutes for the five points on the board where the conductive clay would touch.



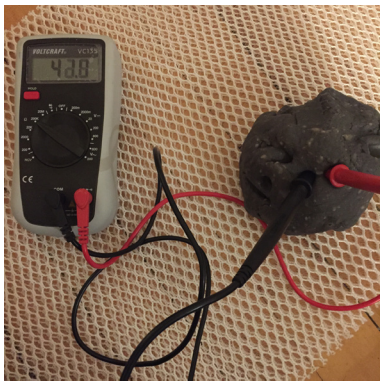
Photon to Router Setup

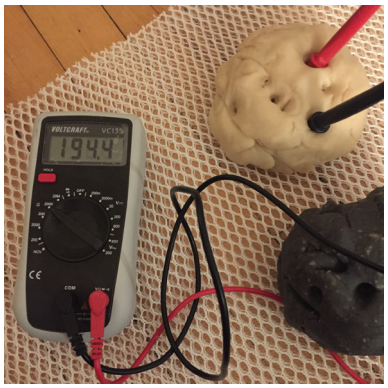


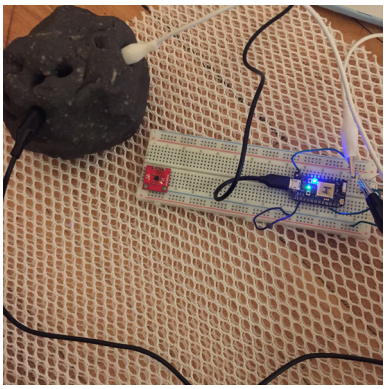


To test the code, I created a simple circuit linking a photocell with one of the analog pins of the Particle Photon. Both Elio and Isabelle Charette helped me set up the Photon so that it connected to my own mini router and not to the cloud by default. For my future tests I was able to replace the photocell with the conductive clays.

Conductivity



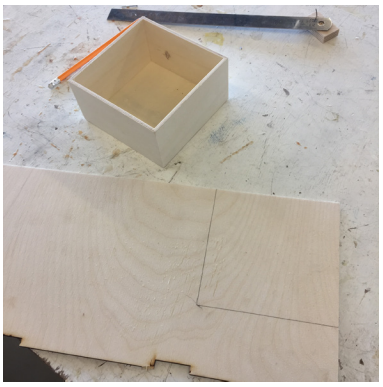


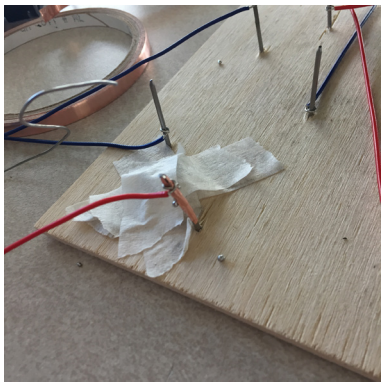


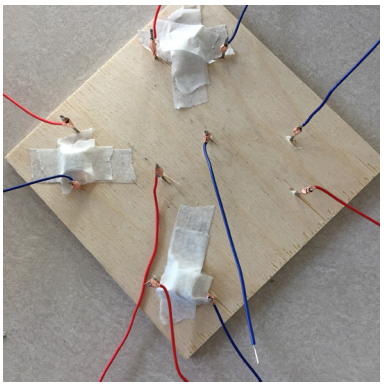
I created a conductive and a non-conductive type of modelling clay. Both clays were based on the recipes at Squishy Circuits. I tested the resistance of both materials to double-check that the conductive clay was conductive. The conductive clay (depicted above as the darker material) had a much lower resistance read on the multimeter, therefore showing it was much more conductive than the non-conductive clay. I replaced the photocell from the breadboard setup I had before with the conductive clay and was able to change the resistor values collected by the Photon by manipulating the clay.

Box Construction

The box was created with scrap wood at the Fabrication Lab. The box was cut using the horizontal bandsaw, glued together, and sanded down in the shop. There were 10 nails hammered into the lid of the box. It was important to the project that all the electronics were contained and obscured from the user.

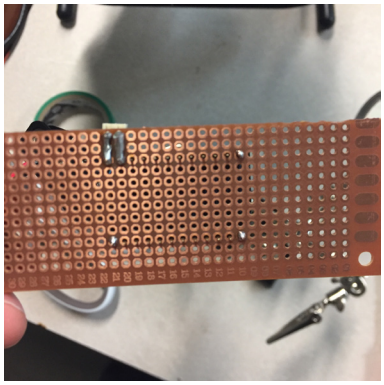


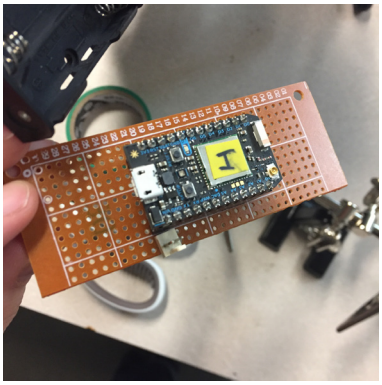


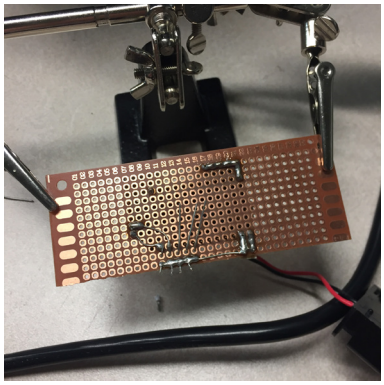


After failed attempts to solder wires onto the nails (I think this might have to do with what the nails were coated with) I decided to simply wrap the wires with copper tape. The tape served the double-function of making sure the nails would carry current to the wire and also making sure the wires were secure and would not fall out of place.

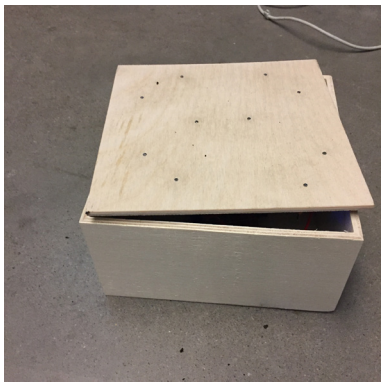
Circuit Building & Soldering

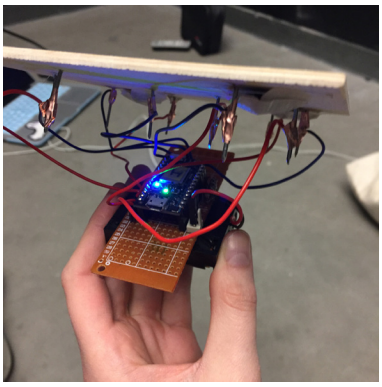






Final Result





In the above images, one can see the finished interface. The lid is taken off in the second photo to show the full soldered circuit, along with the attached battery pack. The lid was then glued on top so that it could be used and interacted with the conductive clay.