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CART 360 - Prototype

GitHub: https://github.com/jessfillippelli/CART360

Part one

In the text that was assigned, the reason behind prototyping is to understand, to test and improve, to communicate and to advocate. **To understand,** is to recognize what problems you will be tackling and what is the best way to go about it. Firstly, I figured out what I wanted to do, which was something with fairy lights because I love the look of them in a dim lit room. At this stage I am sketching out my idea on what I want my object to look like. If I was in a team I would talk with my team, but I am alone, so I discussed my ideas with my teachers. I had the freedom to think through what I wanted to do, which was something with light and messages. I ended up with a problem than I thought was not even a problem. I wanted to make my project in a box form with a glass window, the light would be inside the box that shows the message. With the help of the feedback I got, it would be best to step away from the hardness of an object and stick with something soft. The object will be more meaningful soft. People will have a better connection to a pillow than a box. **To test and improve**, at this stage I will have a good understanding of what my object will be. So, I can focus my attention to specific aspects of the project. After talking it out and finding which materials will be best for my project I am able to start laying out how I want the lights to look like and find some code to get the effects I want. I was able to test different layouts for the EL wire and different code, sensors and materials that fit the needs of the project. These prototypes are fast and disposable, which is what happens when I found out the EL wire I started to use was not going to work with the project. I had to scrap the EL wire idea and try something else, now I am using Neopixel. **To communicate:** having this prototype I can communicate what I mean when I want the light to pulse, to wave like ocean waves and how I want sound to activate the wave. With the prototype I was able to get feedback and improve the project. **To advocate:** this part of prototyping is to gain support for design or direction. In my case I got the okay from the teachers to go ahead with my project.

Part Two

With prototyping there is fidelity levels: low fidelity, mid fidelity and high fidelity. These fidelity levels are to test different stages of design for the prototype. Every prototype starts with low fidelity and works its way up to high fidelity. Low fidelity means that you start by designing on paper, by creating sketches, make wireframes, a storyboard, mood board and since I am working with circuits I can draw the circuits on paper and then transfer them to the breadboard to test if it works. At this point, I am testing ideas, for example The EL wire worked for one interaction, but then it did not work for another. So, I had to find something that worked for both interactions. With mid fidelity the prototype is starting to take shape and you are implementing your ideas in physical form. At this

point, I created what my pillow will look like by using fabrics and a hot glue gun. I am also working on what I need to buy for the project, like sensors and lights. High fidelity is the finished product. I am not there yet. But what I am hoping to have is a well-built object, that the circuit is in good condition and does not move around in the pillow and that it will not fall apart.

Part Three - SENSORS

The first sensor I would like to use is the Photocell. This sensor is controlled by light. So, since my project is using light, I thought it might be a nice little add, only I might know this feature. I'm thinking I would like this sensor to activate the fade in and out. Instead of shining a light on it, it would work when your hand is touching the sensor. So, it is when the variable is below the threshold that means no light is shining, its dark. But I've been going back and forth with the idea that a push button will replace the photocell. The button will be more dependent than the photocell because every room brightness is different from the next, so the photocell is not going to work well.

The next sensor I would like to use is the sound detector sensor. This sensor will activate another light show. This light show is supposed to look like an ocean wave. On my project I'm hoping I can have five lines of lights and the wave would start from the left side to the right side than loop over and over. The reason behind why I want a sound detector sensor to activate the ocean wave is because on my proposal I mentioned that a person can get this object for themselves in order for them to help themselves feel better. With the sound detection, a user can tell the object to help them by talking to the object, and the wave should start with their voice or the clap of their hands.

The last sensor I would like to use is the pressure pad sensor. This sensor is for the object and the user to know it is being touched and for the user to know it works; because when you touch the pad, the object will turn on and when you touch the pad again it will turn off. This sensor is like an on and off switch. I would like to have the pressure pad sensor on - what I'm calling it - the pillow ear. It is on one of the corners of the pillow, probably on the top of the pillow, the side that faces up. I've run into the same problem as the photocell. Where I am not using the pressure pad to its full capabilities, and when a push button is more reliable because the Neopixel was conflicting with this sensor.

Part 4- Has initial intention changed?

The intended meaning of the project has not changed, but the way that the project was going to look at the proposal stage verse now has changed. At first, the project was going to be a message board, and the light would showcase words and now it just represents lines of light in different patterns. Now I also want to give it the ugly doll effect. At first, I planned on my object being a hard object and not a full pillow. It was going to be a frame with a pillow for the back. While working on the prototype, I've added the element of making an on and off switch with a sensor or button. I spend most of my

time trying to figure out how the pressure pad sensor works and to get the photocell work. Because I thought it would be better for my project to have a sensor than a simple button. I thought the project had to be more complex than a bottom. At first, all I planned was a fade and a wave now there is a sunrise affect and an on and off state.

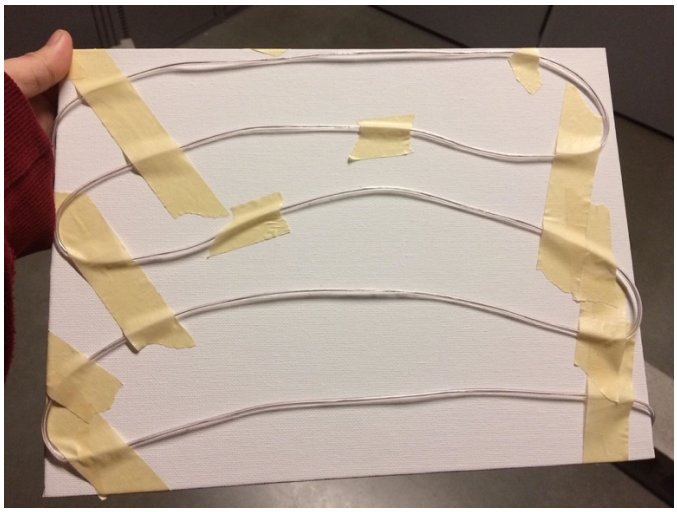
Part 5 - Process

Week of Sunday, October, 13th to Thursday, October 17th

I gathered all the materials that I thought I needed for the prototype, like EL wire, because I want to moled the lights in a waveform and I was told the EL wire was the best. I also got a board and glass from a frame because at this point I'm thinking I'm going to do the project on a hard surface. I also got two different kinds of feathers because I wanted a hard surface as a border and the back was going to be a pillow.

Friday, October 18

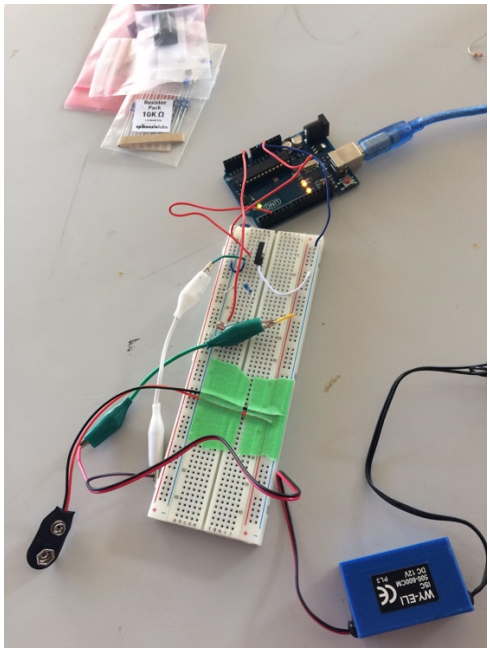
I took an art canvas to use as a placeholder for the pillow. The canvas was there so I can see how I wanted the EL wire to be placed on the pillow. I mole the wire into what looks like waves. I also found a tutorial on YouTube that gets the EL wire to fade in and out, but I need help to make the circuit. The EL wire needed 12V and the Arduino can only take 5V, so I needed MOSFET.

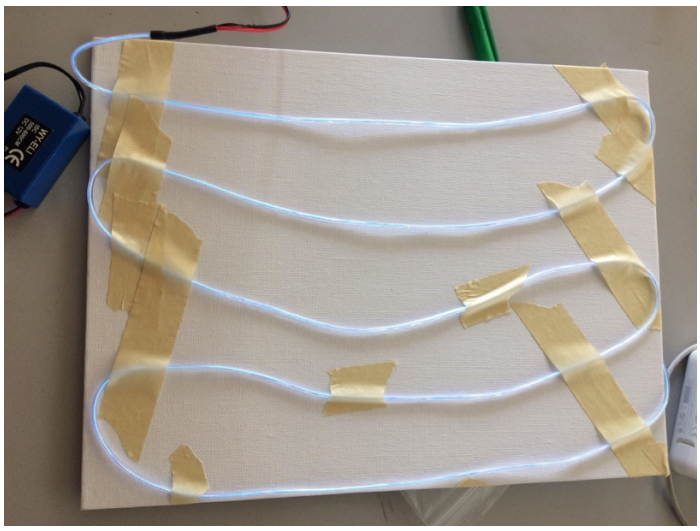


Monday, October 21

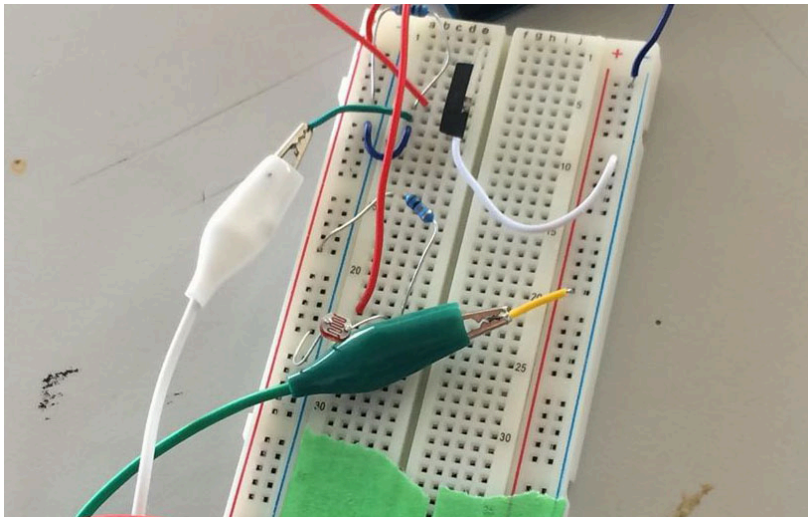
During this day, I got help with the MOSFET circuit and was able to set up the EL wire to the Arduino and I also started implementing the sensors. What I worked on is watching the fade in and fade out work hooked up.

Below is how the circuit looks connected with the MOSFET and the Photocell sensor together. The image next to the circuit is the working EL wire.



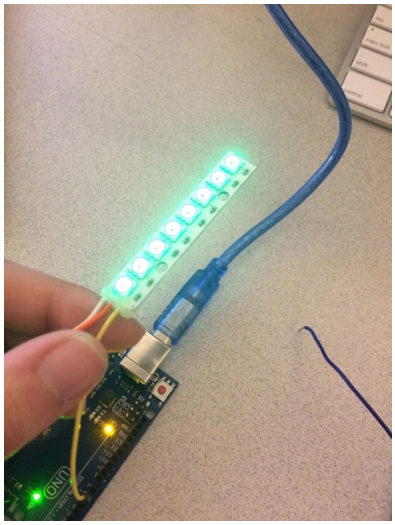
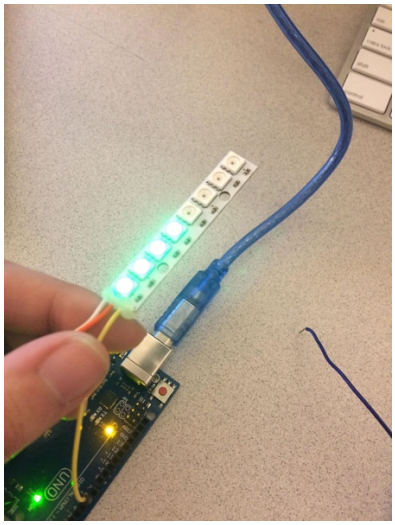
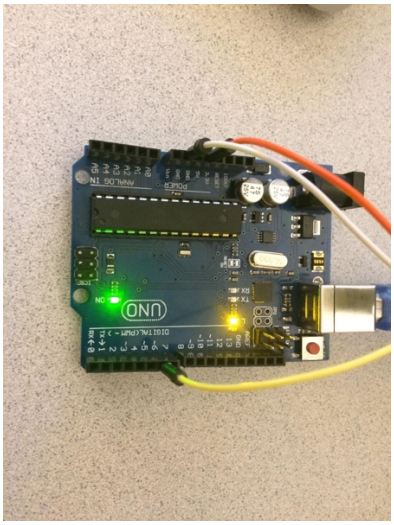


Below are the images where started implementing the sensors, I used the photocell that came with our kit to see if it worked with the EL wire. Everything was going well, I got the pulse affect that I wanted to represent a calm atmosphere. This atmosphere is for when users what to help themselves to feel motivated or calm. In the end they are helping themselves with this object.



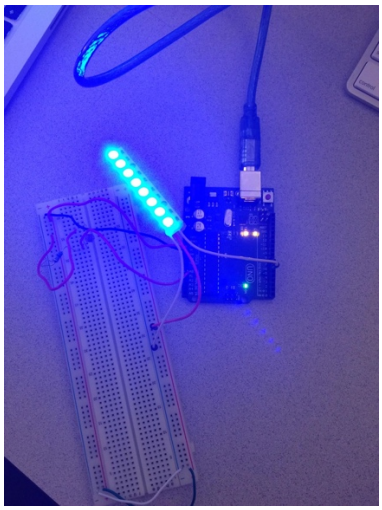
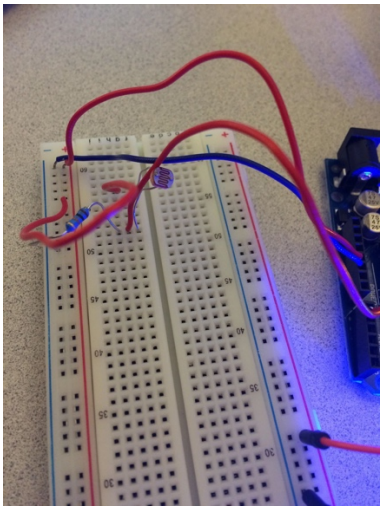
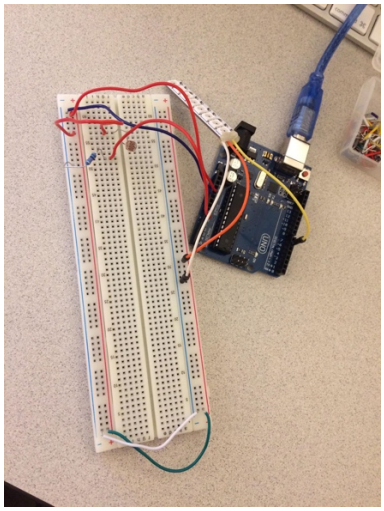
The part where it fell apart for me is when I found out I could not use the EL wire to make a wave effect. I wanted the wave to start at one end and go to the end than restart from the beginning and loop. But with the EL wire, that's not possible, unless you cut it but I won't have enough outputs. I should have done more research, when I found out that the EL wire can be twisted into shapes, I was hooked on it because I saw in my head the waves. I just thought that it would be able to work how I liked. Now the plan is to use Neopixel. With Neopixel, I can get the back and forth wave I want. I than got my hands on a small sample of Neopixel to test if I like the wave effect, and I do.

The images below are when I tested a sample of Neopixel that I got, to get the wave effect. The Neopixel is just plugged into the Arduino with some code.

Tuesday, October 23rd

Today I played with the Neopixel to see if I can get the fade in and out. I also hooked up the photocell to control the fade.

Thursday, October 24th

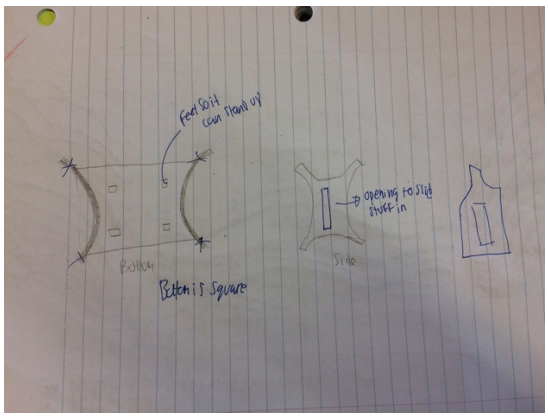
I started looking up Neopixel and which one would be best for me. I picked the 60 LED pack in cool white. I also had to think about the sensors a little bit more. I had to think about how my object is being known that it is being touched. Maybe a pressure sensor and the LED lights will turn on and then you do your first command, which will be to have the fade in and fade out. However, to get this effect, I've decided to use a sound sensor because as I said in my proposal, having this object is like saying a user wants to help themselves. So, all they have to do is talk into the mic and the wave will start.

I then had to think even more on what I want my object to look like. So, I got the advice to use a shoelace to represent the way I want to have the lights look like. As well to use a pillowcase, and to draw on it how I want the object to look. I was able to talk through how to put the circuit onto the object and how to hold it in place. I will have a semi hard surface that the circuit will be on and I can slide it into the pillow. I will make loops that will hold the LEDs in place, maybe the loops will be Velcro.

I was having trouble grasping my head around the aspect of light and what light can do for you and how it can make you feel. I looked up the word "calming" in to Google images to make sure that what I was thinking about calmness was right and I would get water and waves and the color blue. Which is what I consider calming so I was on the right track. When I did a little more research, I found out that with light the "more saturated hues can have amplifying effects on emotions, while muted colors can dampen emotions"[1]. So, with this it makes me feel like by having light it is a good aspect to help with someone's emotions when they are stressed. From the same article it talked about color and it said that to my surprise that red (and not blue) helps improve mental health because "red light in the evening helps increase the secretion of melatonin which leads to better sleep at night"[2]. I thought blue would be the better color because a wave is blue, so I was sticking with the theme of water and water is blue. So, at this point, I'm turning towards the color red now.

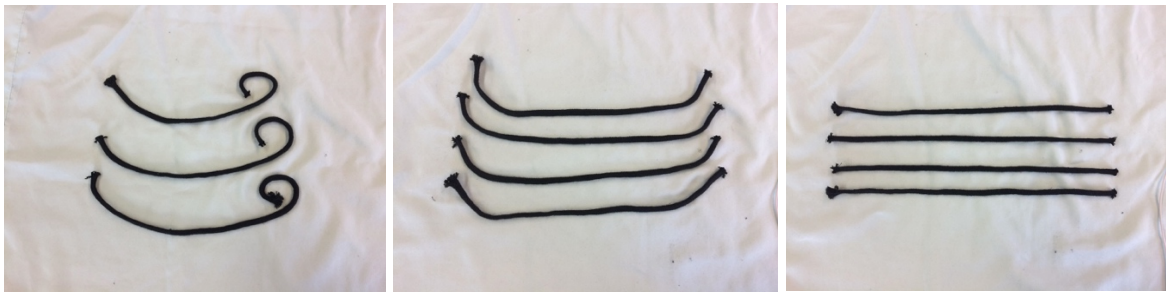
Friday, October 24th

Today I made my first attempt of building how I want my pillow to look like. I hot glued the pieces together instead of sewing them. I first started with sketches and I gathered some scrap fabric to build with.



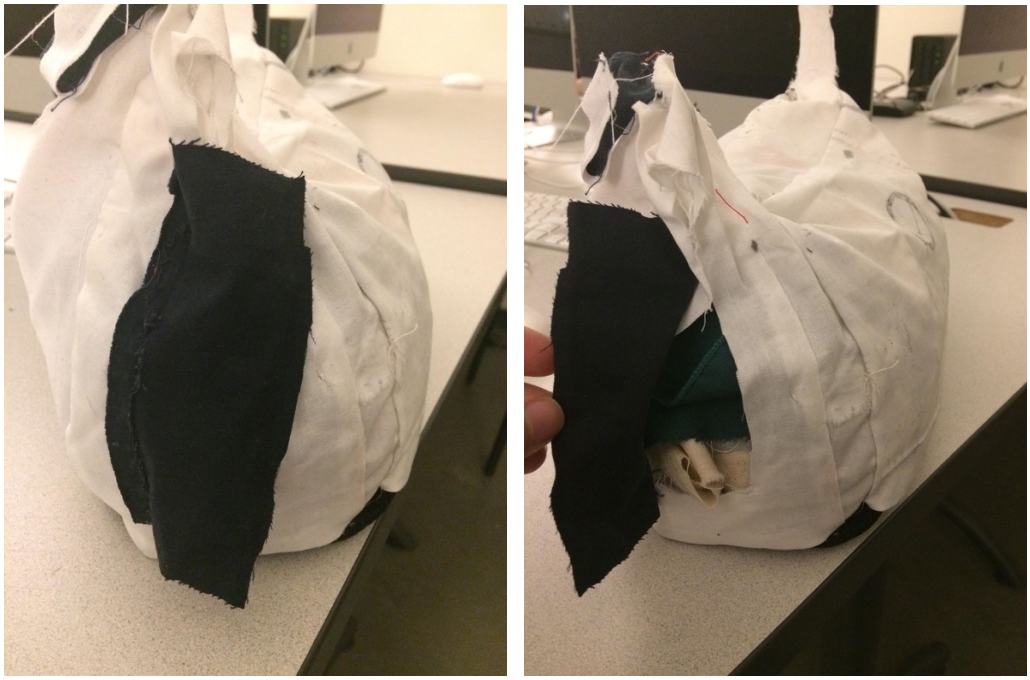
[1] "The Psychological Impact of Light and Color." *TCP Lighting*, 27 Dec. 2017, www.tcpi.com/psychological-impact-light-color/.
[2] "The Psychological Impact of Light and Color." *TCP Lighting*, 27 Dec. 2017, www.tcpi.com/psychological-impact-light-color/.

Before I started building, I took a shoelace and laid out three options I liked for the light placement.



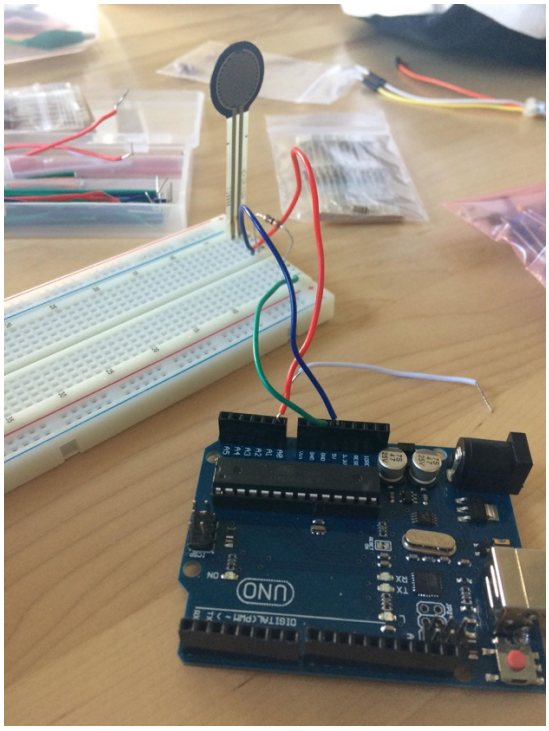
Below is what I came up with.

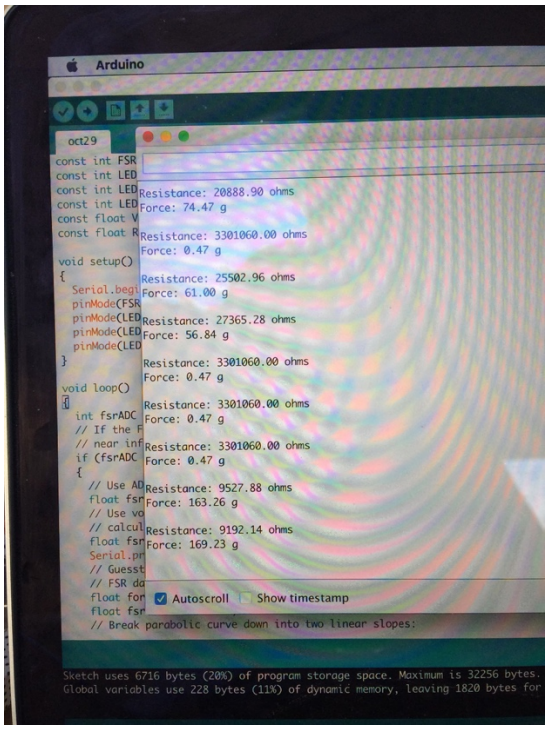
Below is an opening where I will slide the circuit and light in. The opening be attached with Velcro.



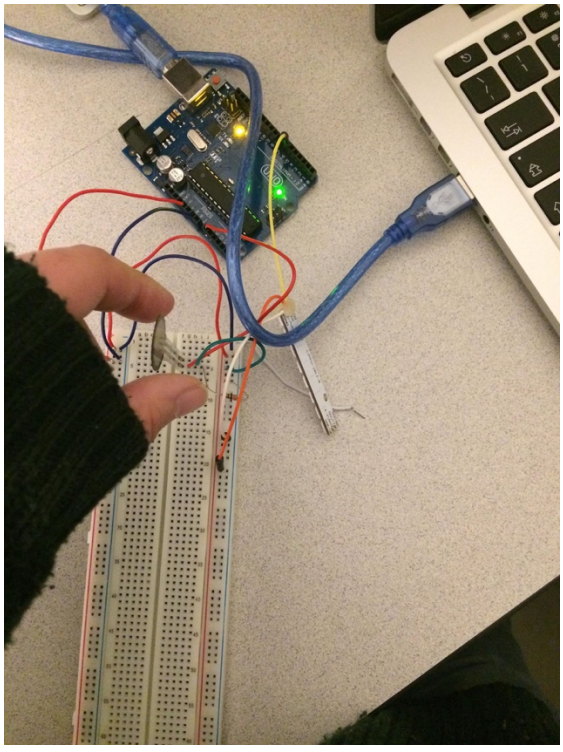
Tuesday, October 29th

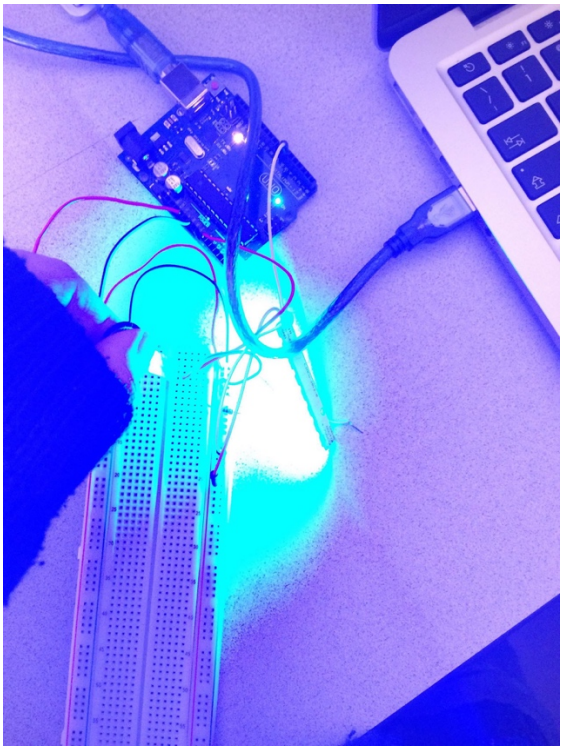
On this day, I tested the pressure sensor to see how it worked.





I then connected the Neopixel to the sensor.

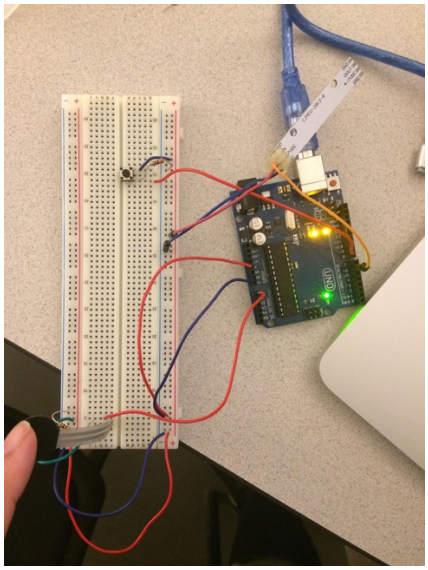




Having the Neopixel connected to the pressure sensor, it works but it doesn't switch on and off probably. It has something to do with the Plex.Clear. The light was not solid, it was flickering. It's like there's noise. It seems when you do not clear the pixels there is some voltage that makes it look that it is on when it is off.

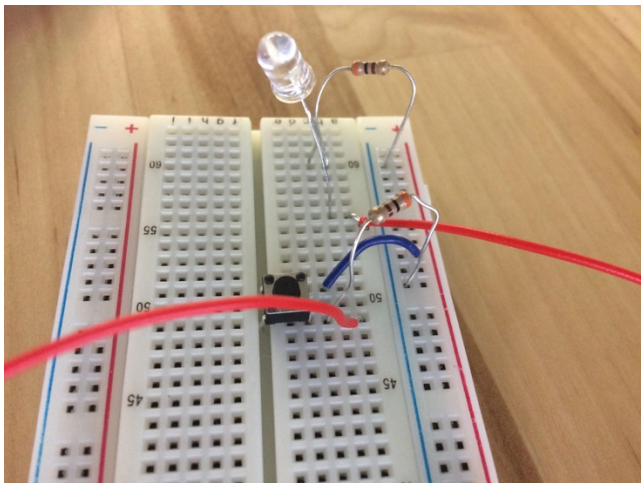
Wednesday, October 30th

Today the plan was to fix the flickering of the Neopixel. The sensor all by itself works but then connect it to the Neopixel, it is affecting the pressure sensor. That when you press it, the light turns on but does not turn off. The Neopixel is not responsive. A timer was created so every three seconds you can press the switch. But when testing the Neopixel with a button it works perfectly.

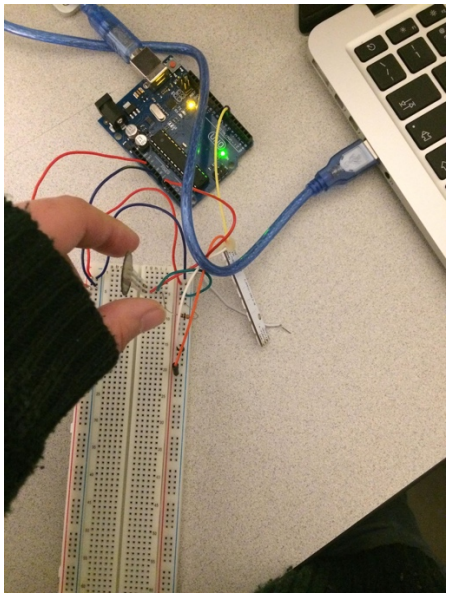


Thursday, October 31st

Today, I tested a LED light to see if the pressure sensor works with the LED and it does.



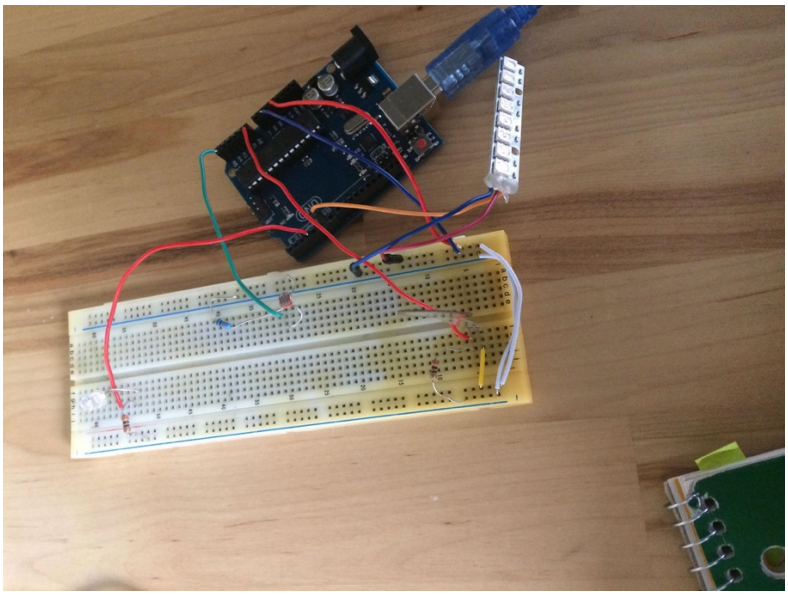
Then I tested the pressure sensor and it worked. So, there was probably a loose wire. I do not know why all of a sudden it worked. So, I figured since it works I would start combining my photocell sensor and the pressure sensor together with the Neopixel.



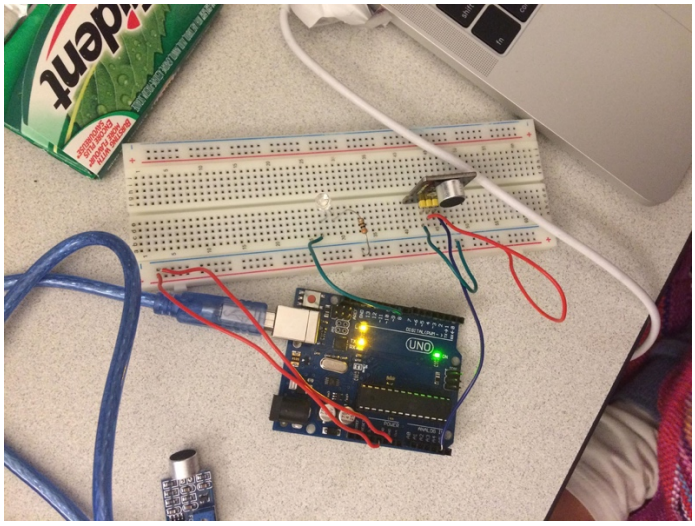
But now having these two aspects of the project on the same circuit, it is not working. The logic is right. The fade in and out doesn't work but the pressure sensor works.

Friday, November 1st

After some trouble shooting the Neopixel turns on with the pressure sensor, when the Photocell is activated it fades in and out once and then it turns off. It is acting like the pressure sensor was touched to turn off, but it was not.



I also started to work with the sound sensor.



The sound sensor works. I test the sound sensor with a LED. When you make a loud noise, like saying the word "on" the LED turns on.

Monday, November 4th

I did some research on the meaning of my project, when it comes to light. I looked into light therapy to see if it would back up what I thought about light. What I thought about the fade in and fade out and ocean waves and light in general will have a calming effect on a person and will help them feel better. The information I found was about a light box, "the box gives off bright light that mimics natural outdoor light". This can relate to the blue light because the sun bounces off the ocean and reflects blue. The article is probably talking about UVs rays, but I'm putting my own twist on it. It is said that light therapy can help with depression. The light box can "ease symptoms, increase your energy level, and help you feel better and yourself and life".[3] I also found an article that said that dawn simulators [sunsets], which is a sunset and sunrise are a form of light[4]. I was thinking of doing this effect instead of the fade. I also found another article that said the "whooshing noises [of the water] are the sounds of non-threats, which is why they work to calm people."[5] This information helps back up my thoughts of that ocean waves are calming.

Basically, I'm thinking about removing the fade in and fade out with the Photocell because, with the light in a room, or if it is not dark enough, it will not work like I want too. You can't depend on it.

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[3] "Light Therapy." *Mayo Clinic*, Mayo Foundation for Medical Education and Research, 8 Feb. 2017, www.mayoclinic.org/tests-procedures/light-therapy/about/pac-20384604.

[4] Borchard, Therese. "6 Types of Light Therapy for Seasonal Depression." *EverydayHealth.com*, Everyday Health, 29 Sept. 2016, www.everydayhealth.com/columns/therese-borchard-sanity-break/types-of-light-therapy-to-treat-seasonal-depression/.

[5] Borchard, Therese. "6 Types of Light Therapy for Seasonal Depression." *EverydayHealth.com*, Everyday Health, 29 Sept. 2016, www.everydayhealth.com/columns/therese-borchard-sanity-break/types-of-light-therapy-to-treat-seasonal-depression/.

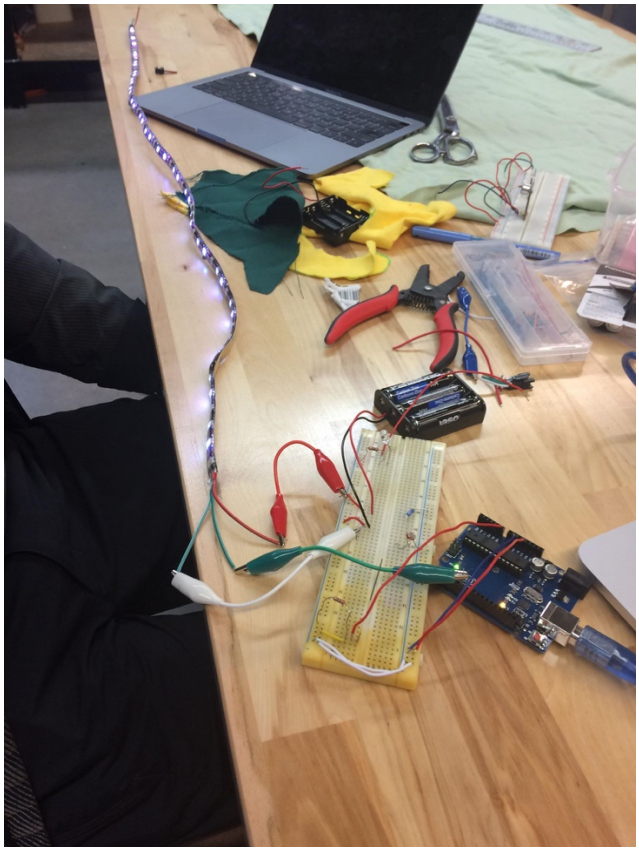
I'm thinking of having the pressure sensor or a button be the on and off switch and that aspect will activate the sunrise effect and the wave. Ex: click once it turns on, click a second time the sun rise starts click again, it turns off. I am not sure right now.

Tuesday, November 5th

More research

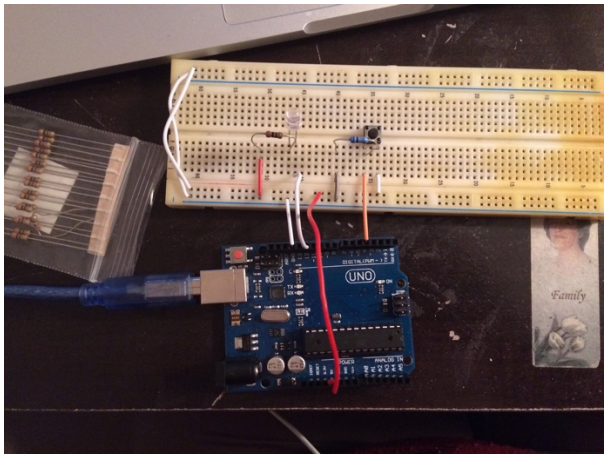
I always felt that the pulse effect was very calming and there is truth to that because a study form feeldoppel.com,[6] a company that makes a watch that helps humans feel a heartbeat. So, for my project the fade in and fade out will represent a pulse, which is a heartbeat.

I also tested out the light I bought that I am going to use for my project.



I've changed my on and off switch idea. I'll be using a button now. I'm using a LED to test it. I am using a function called buttonPushCounter to count the number of times the button has been pressed. For example, on click - light turn on, second click - interaction starts, 3rd click it turns off.

[6] "Listening to Your Partner's Heartbeat Has a Calming Effect." *Doppel*, feeldoppel.com/blogs/news/why-listening-to-your-partner-s-heartbeat-has-a-calming-effect.



Wednesday, November 6th

My interactions are all on one circuit. The button has six states, on and off, wave, sunrise fade and sound. The code is on GitHub.