

TWINKLE

Final Documentation

I would like to preface this documentation with the sobering fact that I was not able to properly finish the project. I grossly underestimated the amount of time it would take to hand sew all of the components, leaving me not enough time to properly test and implement my code.

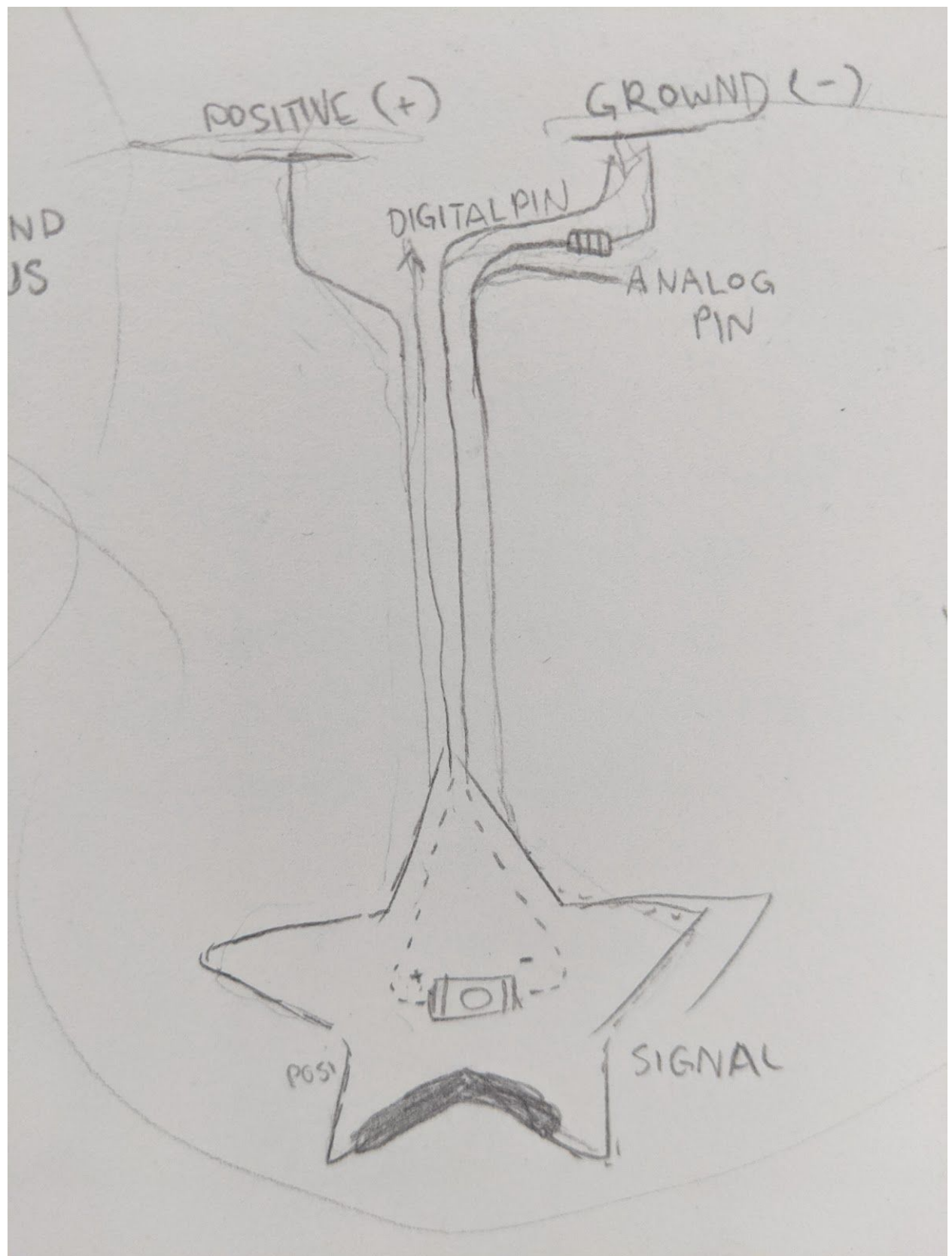
I kept putting this project off as it was something terrifying and new, all things I had not done before (working with handmade sensors, sewing, motors, etc) and by the time I fought against this anxiety that continually stopped me in my tracks, it was too late.

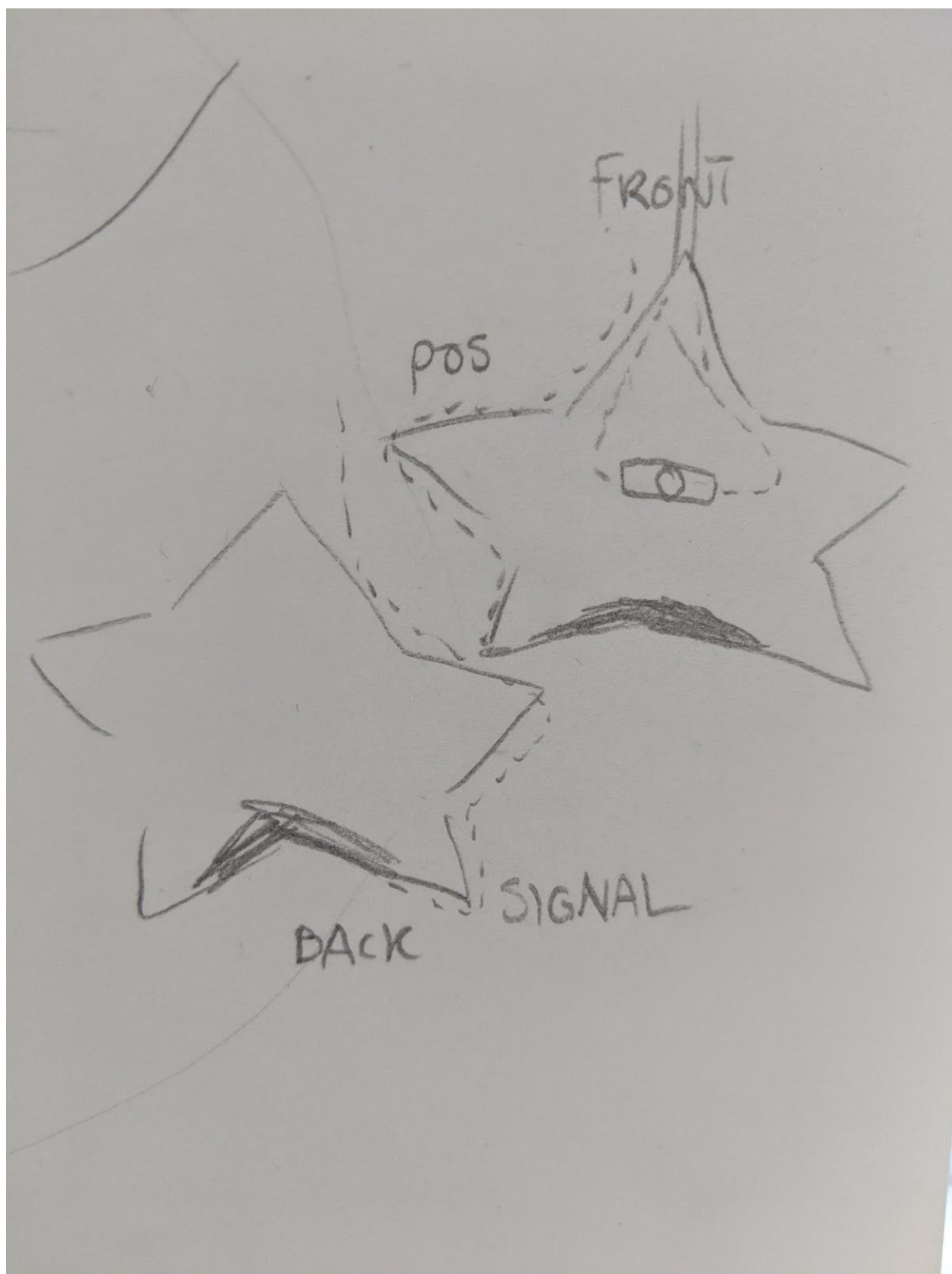
However, what I did get done is still something I am proud of. I have never done any of these things, so creating fabric circuits that properly work, as well as the hand made pressure sensors, is something I am fairly proud of. Towards the end of the project, I did work a lot more with physicality, and if I had done so sooner, perhaps things would have been more complete.

Unfortunately, with this project being unfinished, it nowhere near encompasses the proposed interaction strategy, although it did feel nice to be able to materially touch the star and watch it light up. Halfway through, I considered removing the motor to save time and have the distance sensor be used to instead have the stars blink invitingly until approached. That is what is so far implemented in my code.

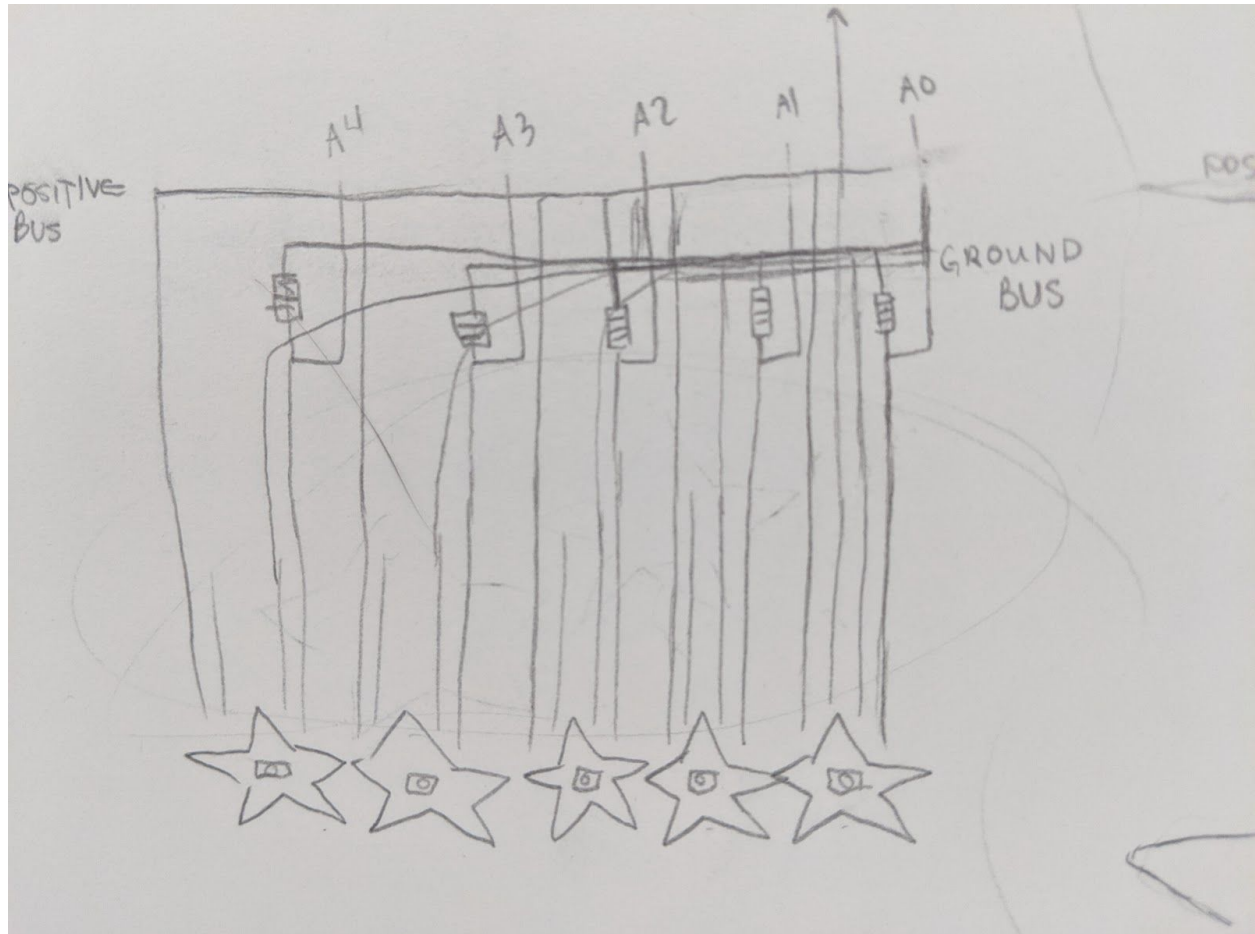
SCHEMATIC

I will start with the schematic. Coming up with a circuit diagram was arguably one of the harder parts, as I underestimate the amount of wires that will end up being used! Initially, I considered merging the ground signal wire with the ground wire of the LED, but then realized the signal wire would need to split through a resistor, half going to ground and the other half going to the appropriate signal pin (A0). This would mean I had four conductive threads coming out of each star.



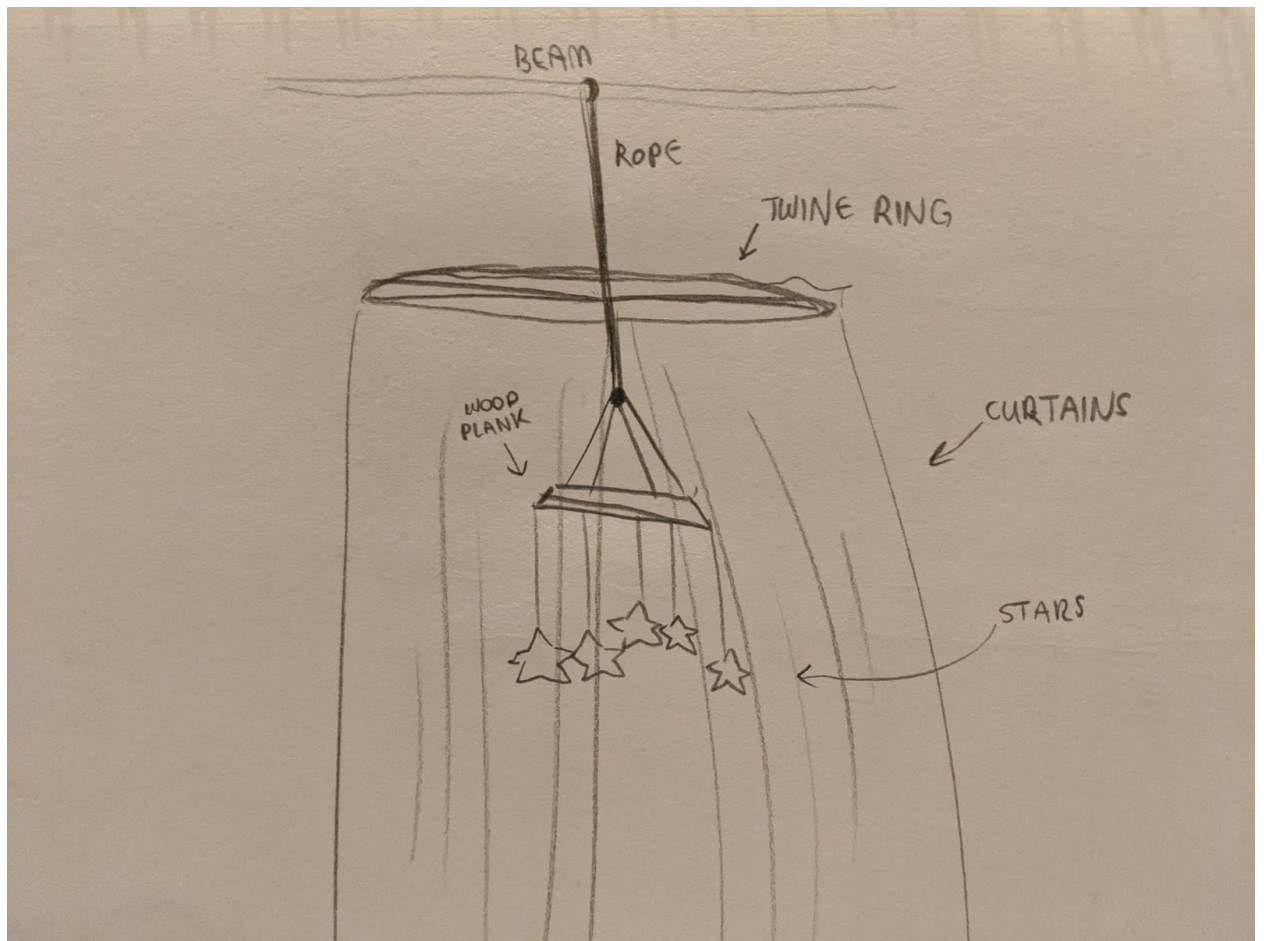


This led to concerns, of course, about the accident of crossed wires. I had done a lot of research into using conductive thread and soft circuits and was intending on passing beads through the wires, allowing them to be insulated and also aesthetically pleasing to the eye and adding to the mystique of the aesthetic. I would then pass these threads through a small wooden platform I intended to stick the Arduino and breadboard to, keeping them separate and wrapping them around wires so they can then connect to their respective pin.



By using the breadboard for a common ground as well as general positive charge for the home made pressure sensor, I would significantly reduce the amount of clutter as it got near the Arduino. I would also have cut a hole just big enough for the Ultrasonic rangefinder's two 'eyes', allowing it to peek down but keeping everything else up on the platform. This platform would have been suspended/attached to the tent's poles with a thicker, non conductive material. This platform, initially, would be this clean so that the motor, stationed a bit higher in the tent, could pull it up with ease without any of the wires bending or accidentally brushing to send a short circuit.

Once I realized I was nowhere near done, I decided against acquiring a tent only to not be able to use it and amended my initial design for it.

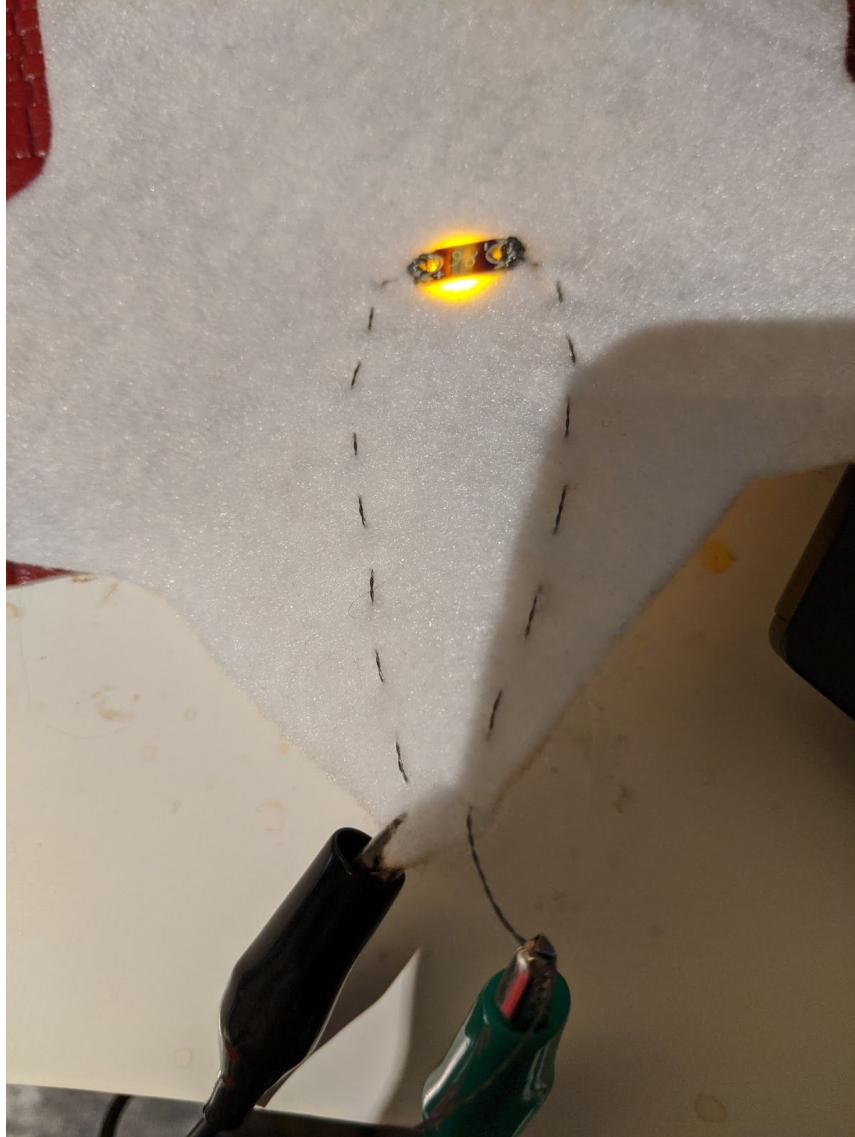


I was unable to have time to consider power, but without a motor, a simple 5V portable battery or less would suffice. Too much power would heat up the thread and possibly set it ablaze and ruin the Lilypad LED component.

PROGRESS



These shapes were cut from a construction paper stencil and paired for later sewing.



Then, I sewed on the Lilypad LED. Figuring out how to get used to the rhythm of hand sewing, as well as pulling the conductive thread through the hoop over and over again to strengthen the connection, was gratifying. While it took a long time to sew, and I continuously pricked my fingers, it was an interesting and new experience.



After sewing the fabric pressure sensor, half to each side of the star, and tested it, I was glad to know the values were being properly read. I wanted to stuff the stars, so I added fake snow, which greatly decreased the sensitivity, which is something to test with and tweak accordingly in code.

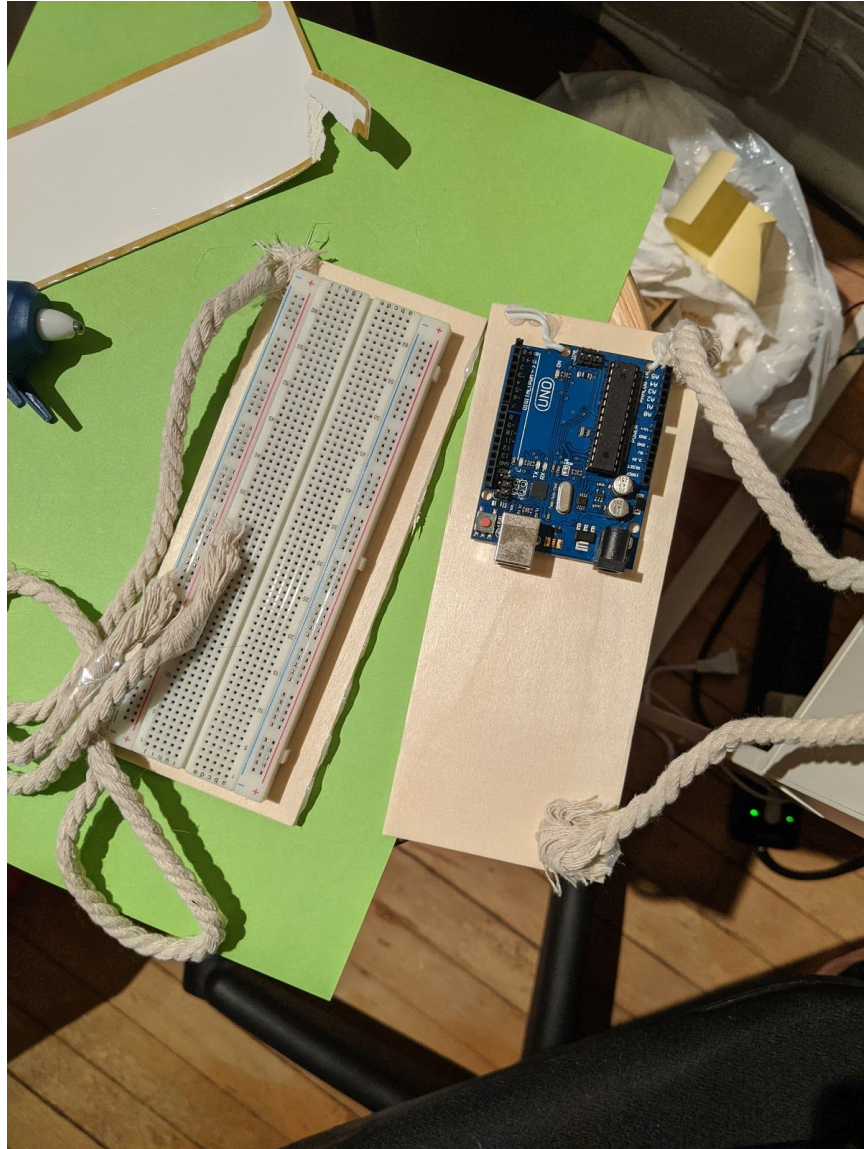


The front of the stuffed and hand stitched together star. I indicated which side was positive and negative for the LED, as I wanted to remember this.

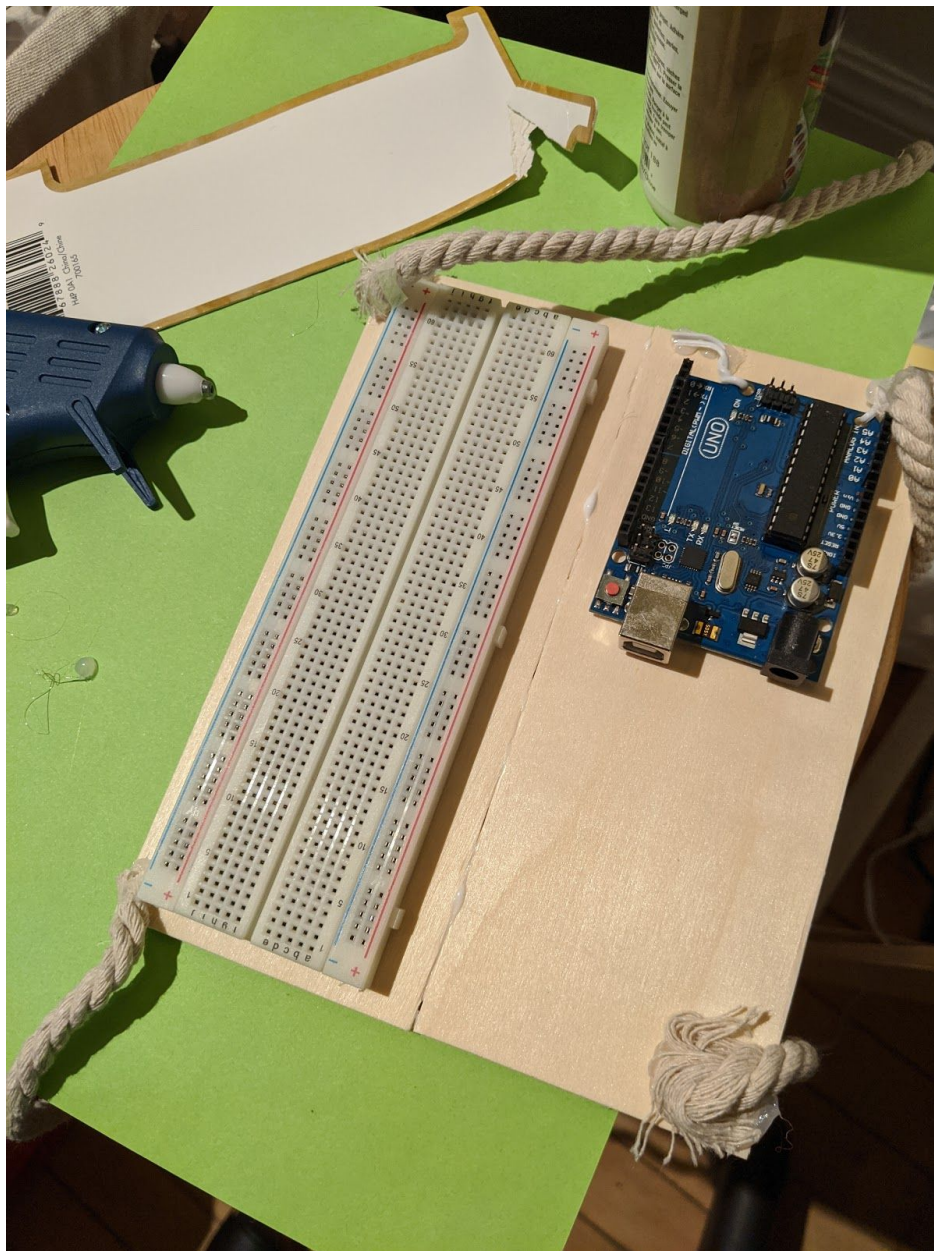


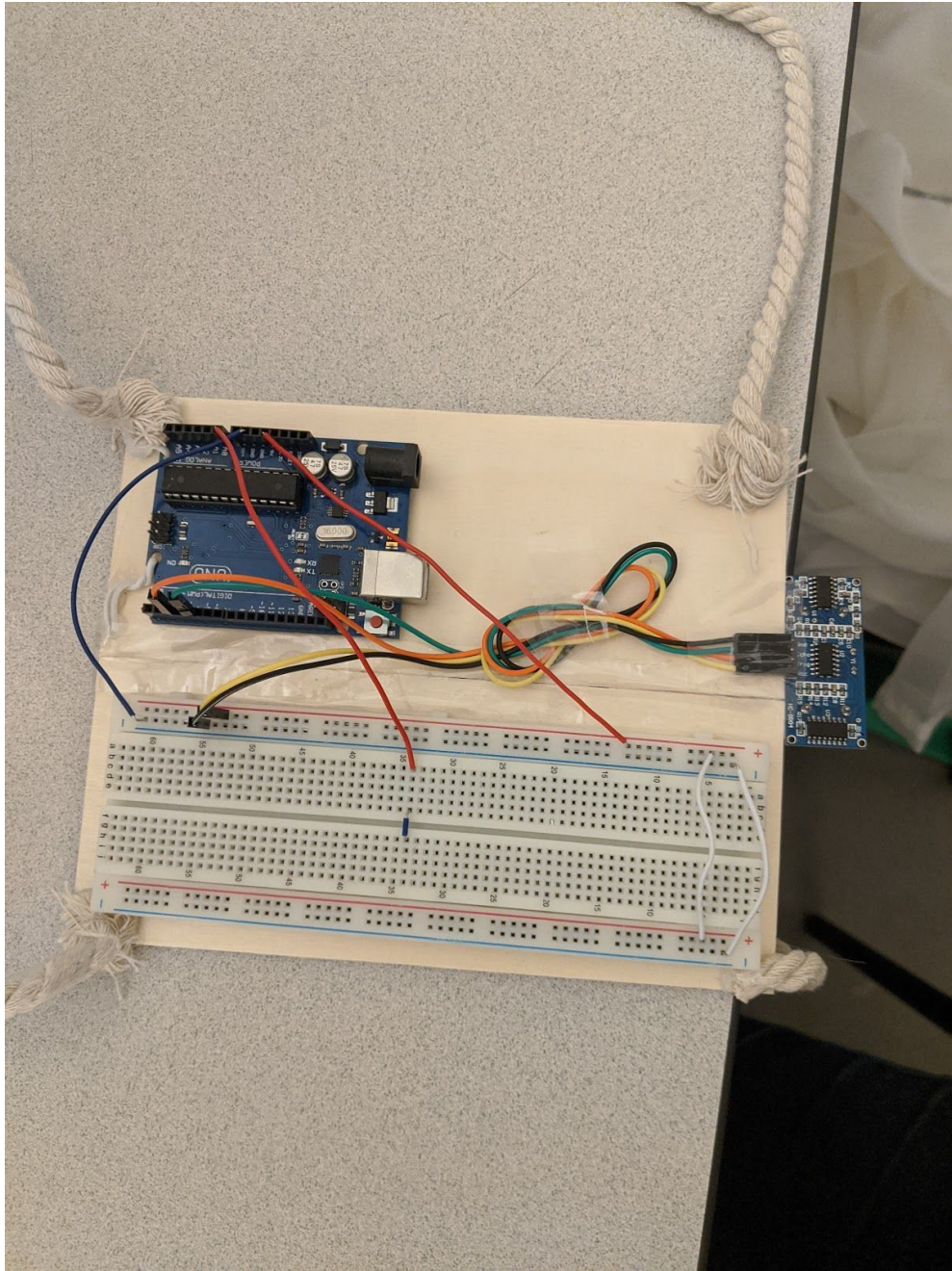
The back of the star. The LED stitching, as well as the other side of the button, are present here.

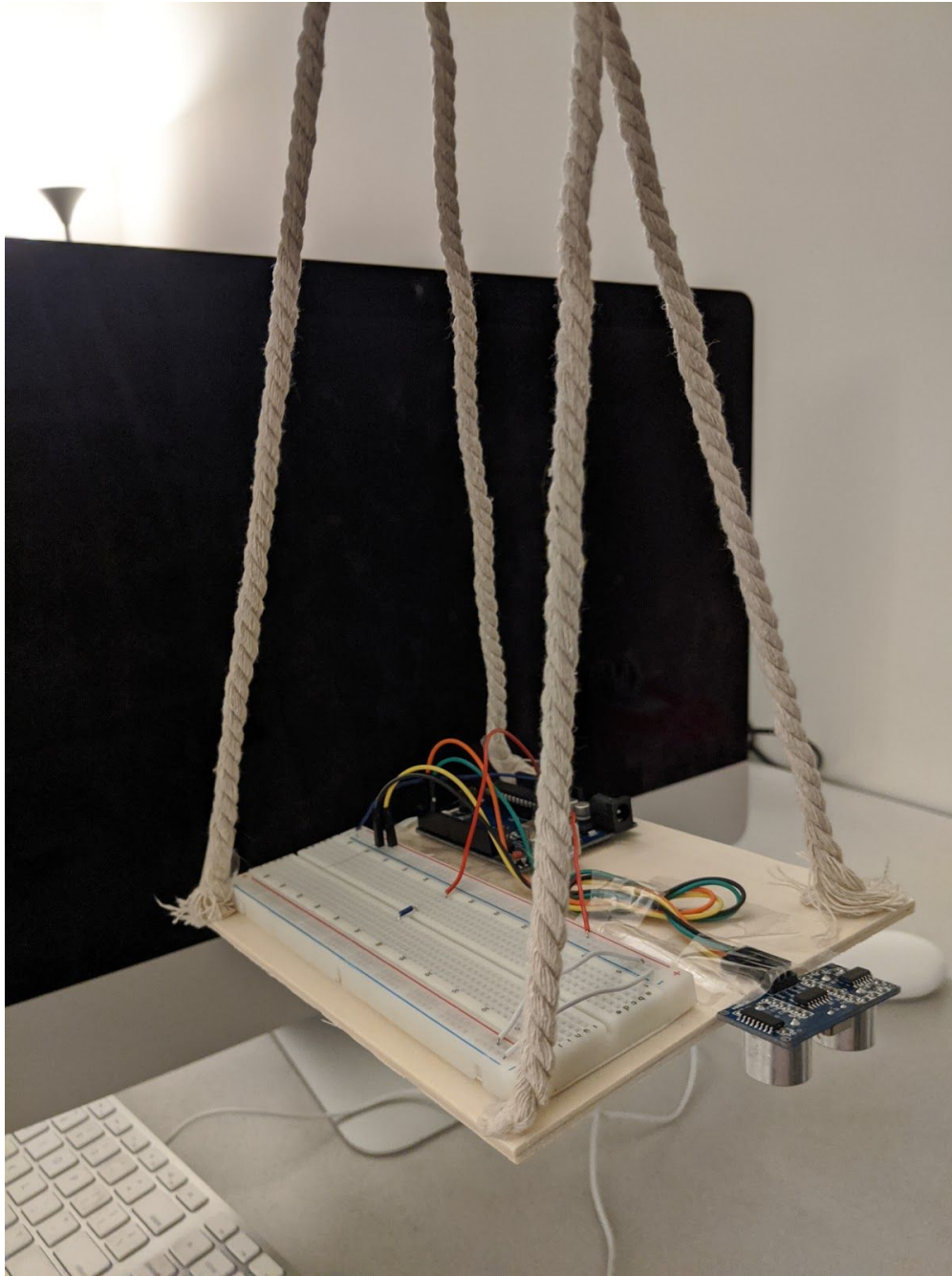
After the stars were complete, focusing on the main suspended board was next.



The board was two thin wooden planks, one with the Arduino secured to it, and the other with the breadboard stuck on. At first, I tried sticking the two with hot glue, but the bond didn't last. I ended up using crafting glue, along with a lot of lines of tape to make sure the planks wouldn't bend at the crease and risk breaking them apart again. The ropes were hot glued to each corner, which would meet at their ends and act as a cradle for the main board.

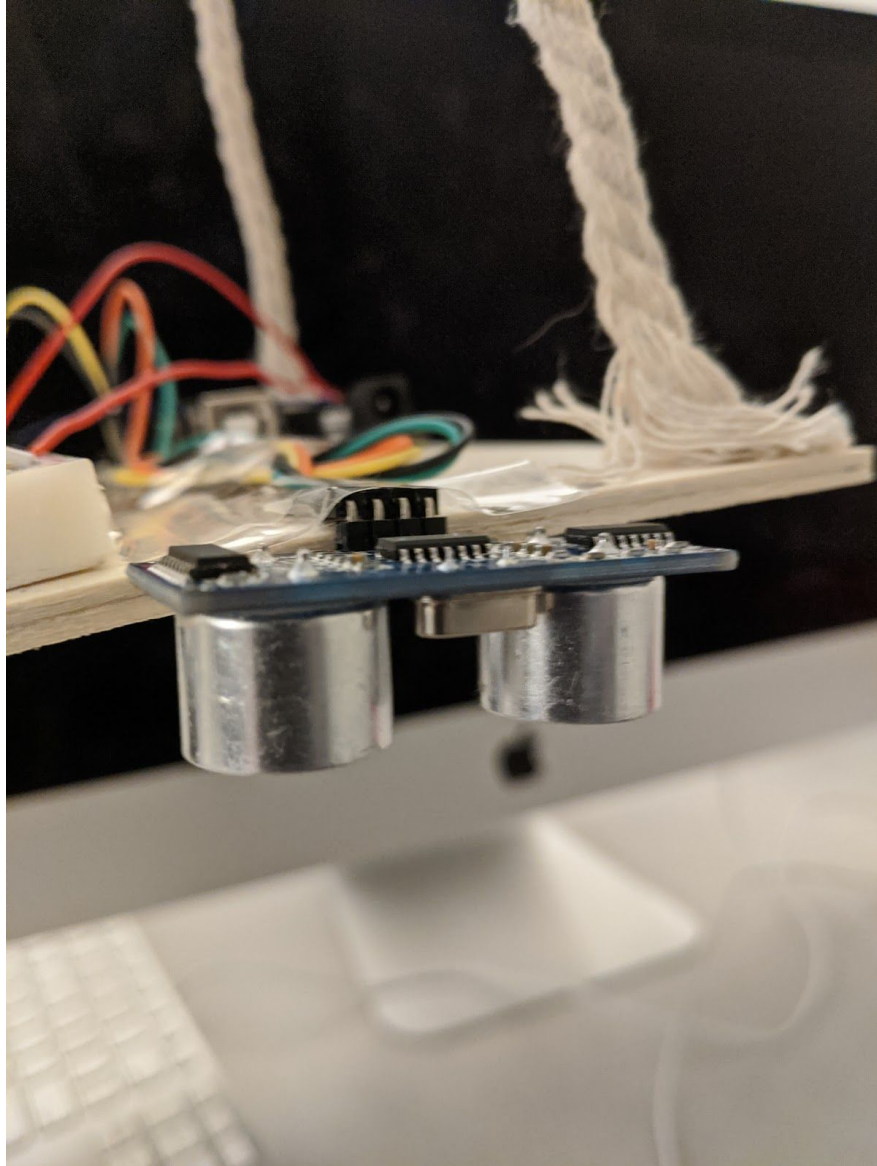






The wooden board, fortified and hanging.

I then worked on attaching the HC-SR04 Ultrasonic sensor to the board, along with the wires. Keeping the sensor hanging down would mean it could sense the distance, and therefore whether a person was underneath it, or not.

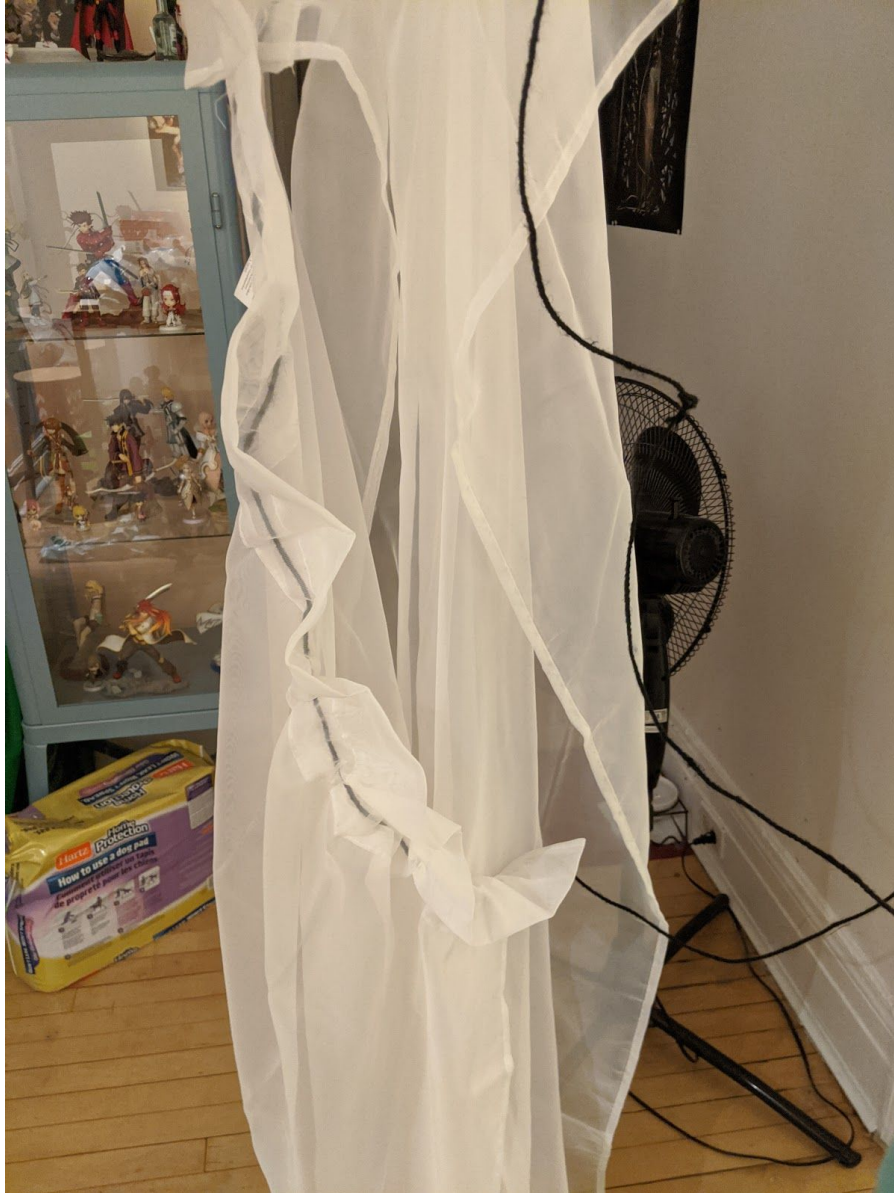


With this main part done, I then considered the stars again. The conductive thread, being uninsulated, could cause an issue if the wires crossed, and caused a short circuit.



Using plastic beads would insulate the wires, and also look aesthetically appealing. I chose deep glassy blues and beautiful bronze. However, this was also a time-consuming task that would take a significantly large amount of beads, so I was unable to cover the entire wire. I considered the closest parts would be the best, since the thread would be able to be stuck at the wooden support.





The initial twine setup with the curtain woven through it (which would replace the tent).

In the end, this project may have been too daunting for me to tackle too late. Being too afraid to implement anything held me back, and I was too overly careful and slow with the rest of the sewing. I had a bad experience prior where a project had immediately short circuited when I connected it, and nothing worked afterward, so I became overly anxious. While this project isn't complete, I am proud of the small steps I've so far taken to fight against that immobilizing fear. I do think I would eventually like to complete this project in my own time.

INSIGHTS AND FUTURE DEVELOPMENTS

I've learned many things over the course of this project, some of which I have already discussed but will outline here.

I was paralyzed by fear. I was caught up by my past failures which didn't allow me to see the future in a positive light. I was certain I would somehow short circuit the project or fail. I had never sewn, nor done anything with soft circuits, and felt extremely overwhelmed whenever I considered the project. I do think that it wasn't a lack of competency so much as it was a lack of trust that I could complete all of these tasks.

Hand sewing takes a very long time. I never properly considered the amount of time it would take for me to sew a single star, much less five. I massively underestimated this and had much less time to focus on other aspects.

Aside from basic functionality as intended in the proposal, I would like to consider and plan the aesthetics of the project more. I left it up for my future interpretation, not really considering the specificity I would need for a physical build. I did that with the rest of the project as well until it was too late. I have trouble being extremely specific and precise, which are aspects required for a proper circuit as well as schematic. I would hone in on every single aspect of my project and work it in more detail as a result. For the aesthetics, I do think I would like to spruce up the tent with many dark shades of blue, as well as transparent fabrics that would sparkle. Essentially, the more the tent would look mystical and inviting, the better.

I had decided against making a tent near the end of the project due to lack of time and how expensive tents were, instead wanting to create a wireframe ring that I could attach a curtain to that would hang around the user. The stars would hang down from the wooden planks.

I didn't consider that covering the stars in another layer of fabric might have been a good idea until the end. I would cover them with a thin, but shimmery yellow fabric that would complement the outside's deep blues.

Mostly, the things I would like to focus on save implementing the functionality and build would be detailwork, and how I could bring small details together to create a much more cohesive and inviting project.