

# **TWINKLE**

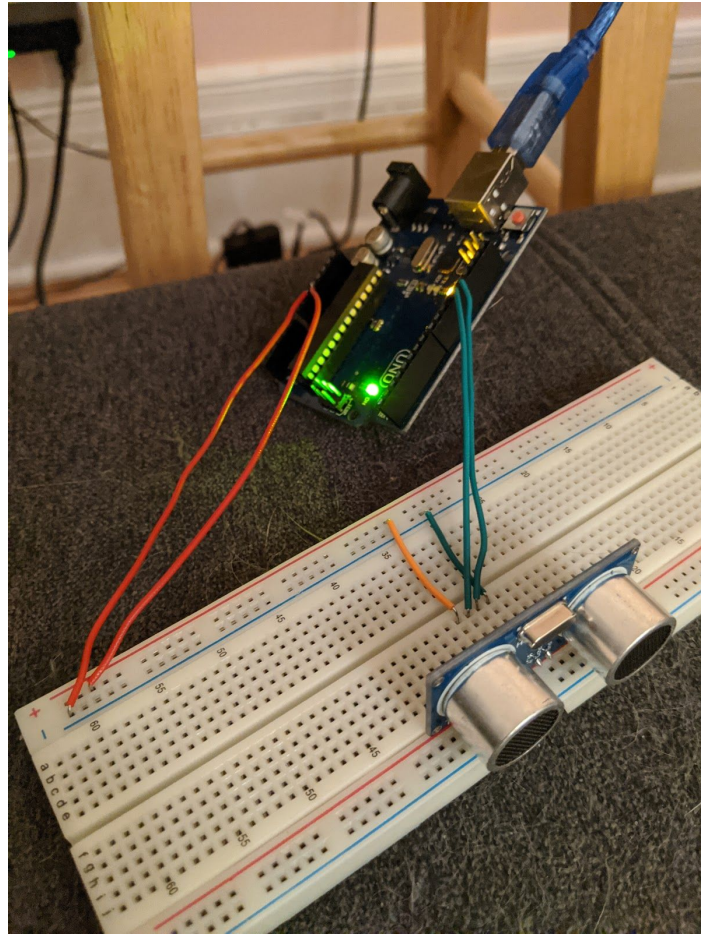
## **Prototype Report**

This prototype report may come across as underwritten, mostly as a result of lack of time to properly work and iterate due to my job and other classwork. I will be spending a lot of time on the morning of Friday, November 8 implementing new functions, and hopefully getting some to work. I apologize for the bare nature of this report and intend to update it with the missing sections once I get more work done.

## **UNDERSTAND**

Writing down a to-do list is only part of the battle, and unfortunately, the most vague. Without much time to work, understanding the mechanics and parts I am working with is still currently where I am at, and therefore, will be the lengthiest part of this report. This also coincides with the technical affordances of each part, as understanding the technical aspects is part of prototyping.

Testing the HC-SR04 Ultrasonic Sensor was the first, and easiest step. The sensor itself worked perfectly, and testing it with an Arduino program to serial print the amount of distance between it and movement proved itself well. My cat lent herself to the effort, sitting right in front of the sensor as a steadfast support.

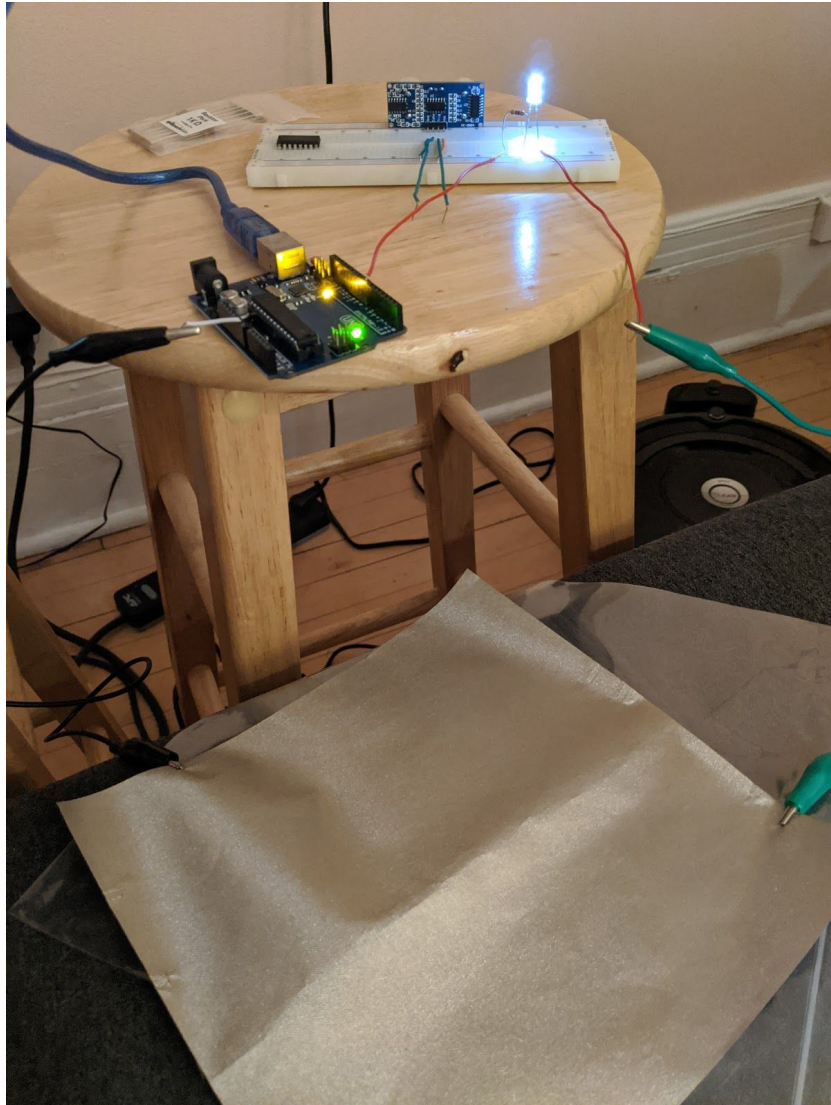


I discovered a crucial issue when preparing to wire my stepper motor and dual H-Bridge. I had completely forgotten we had a 9V power supply in our electronics kit, and therefore didn't work on the motor beforehand. This was definitely a lesson in getting more sleep. Of course, I already knew the sensor worked, but it would have been nice to implement motor functions before the morning of the prototype presentation.

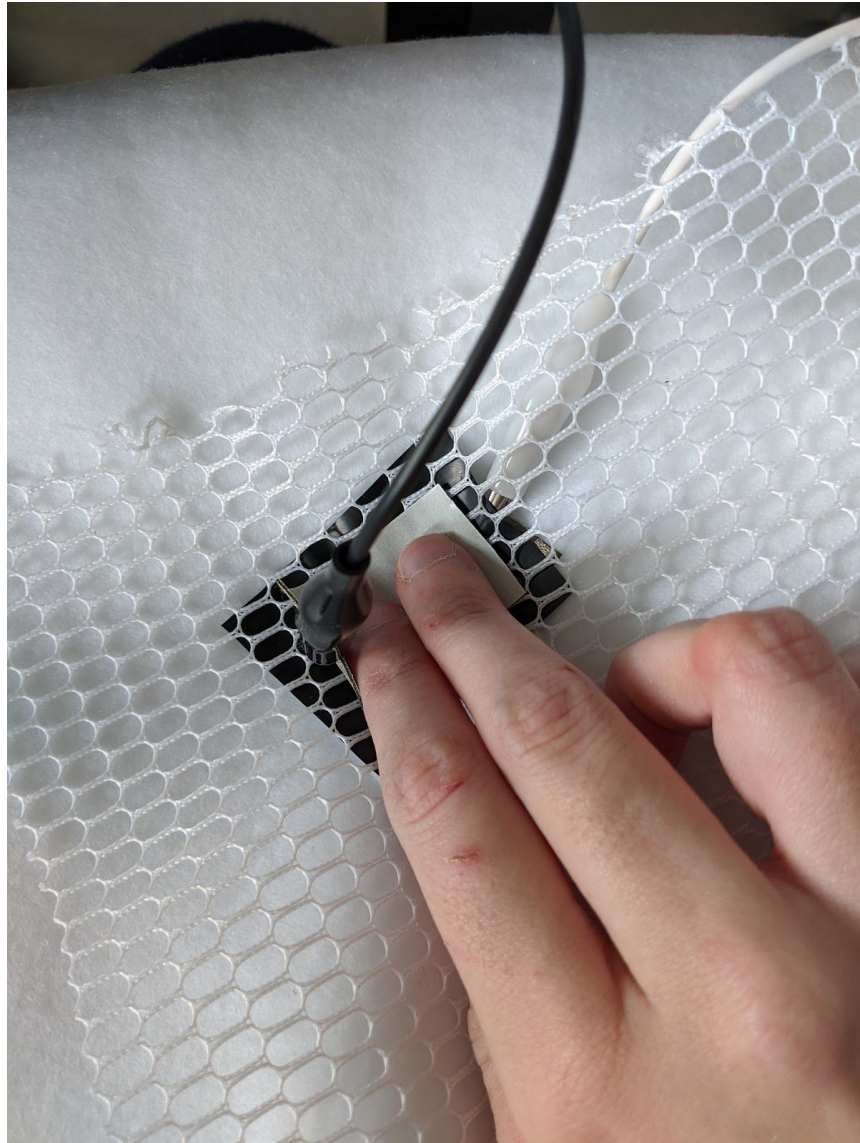
The morning of November 8, I began to implement the stepper motor. I understood that it required less volts, but more amperage, something the 9V AC/DC power supply did not provide adequately, and was therefore heating up the 3.3 V power regulator and dual H-bridge to an uncomfortable degree. I will have to buy a better power source, which will also remove my need for the power regulator, OR buy a new

stepper motor, sacrificing step accuracy for a lighter power usage. I think I will buy the new stepper motor, which will also likely be lighter, and easier to support in the tent's infrastructure.

The next was understanding the conductive fabric. I struggled slightly with the concept of using an open circuit and closing it by grounding via touch, especially once I figured out the conductive fabric was carrying the charge all the way through my alligator clips and not even stopping. This made my initial idea of having patches of conductive fabric under felt to touch impossible. Instead, I will have to implement the concept of the fabric touch button, which initially repelled me due to not understanding the nature of or where to acquire the non conductive material that is used between the conductive and outer shells of material. I did not spend enough time asking questions and looking for help, which I should have done, and maybe I would have realized my initial idea was impossible.



Thankfully, the fabric button became slightly easier to understand on the morning of the prototype presentation. By layering the conductive fabric, Velostat, and felt, I began to experiment with the potentiometer. The felt, regardless of the amount of holes punched through, proved to be too difficult for the button press, so I swapped it out for some netting.



## **TEST AND IMPROVE**

I do think that there is a lot of room for future testing and improvement where this project is involved. I am disappointed by the lack of progress, but do think that this leaves a lot of room to continue working and improving both by learning new skills and by asking more questions. The prototype is not yet at a place where it can communicate or advocate much.



My prototype is unfortunately at a low-fidelity stage, which should ideally be upgraded in the coming week or so. I have slightly more formed plans and some component circuits planned out and done. I will do my best to keep pushing my prototype into a much more defined direction. I do think that I was too overwhelmed by my workload and how to even begin to get an early start, but now realize that would have been a wise decision either way. This project has definitely pushed me out of my comfort zone, which has both positive and negative connotations. I think it is good to be challenged, but I do also think that more in-class time and studio time to learn and practice circuits and live coding, turning into studio time to work on our prototypes, would have streamlined the course and given someone like me with less out of class time the hours needed to practice and understand concepts.

I intended to have the basic concepts and circuits understood, and have crafted a rudimentary mobile to simulate the fabric plush stars rising and coming down by this time.

## **SENSORS AND EQUIPMENT**

The HC-SR04 Ultrasonic Sensor is an ideal sensor for detecting human presence. It sends out a sonic burst that bounces back when it hits something, which makes it great for detecting distance as well. That is what I will be ideally using it for- detecting if someone has entered the environment by checking the distance for a set amount of time. If it is within a certain threshold for a certain amount of time, it will activate the stepper motor.

The stepper motor is heavier than I expected. I will have to create a proper support that I can add into the tent for its weight (if I do not replace it), but I do think that will also integrate into hiding the electronic components and Arduino on a sort of hidden 'shelf' as well. I may be given the opportunity to 3D print a proper shelf and casing for

the motor and electronics. Regardless, the motor will be propped sideways for its step rotations, to allow the coil supporting the mobile of stars to slowly rise and fall with the motion of the motor. I will have to test how many revolutions I think would suffice for raising and lowering it, but I do want it to be subtle and not super dramatic, so maybe a few revolutions will be enough. The stepper motor takes 400 steps per revolution, therefore making the action smoother and slower, promoting relaxation and play.

Each star will be connected to the mobile via conductive thread, which I will be certain to glue or sew down into the mobile so that none of the wires are able to cross. The wire will travel up the mobile, sewn in place, and from there extend into electrical wires that will be firmly attached to the Arduino. I am still debating on the specific function of the stars themselves, as a constellation may be too complex to string along, but I do think lighting up the stars, or even a random star, through touch, would be a playful experience as opposed to a binary response (i.e. this star creates this pattern, which one would learn, as opposed to feeling in continuous wonder about the experience).

The stars themselves will be almost like large fabric conductive buttons. Since the user will be laying down, I will focus the most conductive fabric at the bottom and middle of the star, where the user is most likely to touch, layering it with the felt on top and the non-conductive material at the bottom, just like the buttons. When the user presses on the stars, that'll send a signal up the conductive thread which will act as a switch, turning on a random star's LED and turning off another one.

My project's intention and meaning haven't changed much- there was not enough time for the concept to truly take flight and evolve yet from a low-fidelity stage. I do think that the meaning and intention will only truly change when I fabricate the final environment for the piece- the tent itself that will house everything- as it will likely communicate a strong feeling.