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1. WHY DO WE PROTOTYPE



WHY DO WE PROTOTYPE

Why do we prototype? This question would be the same asking ourself, “why should we take the easy way out instead of taking the long one?”. Part of the creation process is the errors and mistakes that you make. It is essential to have a clear idea of what you want to realize; otherwise, you won’t be able even to start prototyping. Without the trials and errors, our project can’t grow and become something more than the first idea we had in mind. Sometimes, mistakes and errors can lead to surprises or new ideas! Prototyping also let you the opportunity to know your strengths and weaknesses. Yes, we can schedule and organize our time to realize our project, but we can’t be sure of where we are going to have a problem. Maybe at first, we think our coding abilities are good enough to realize our project. Overestimating our capabilities can often be our worst mistake in the process. Testing our theories on a small scale can be more informative than we think. We can take into consideration where we are going to have issues and where we don’t have to worry. From this part, prototyping on the side let us know what can go wrong before it goes wrong. We will then be able to understand where we can go from our situation and maybe also improve our concept. At this stage, we are testing some ideas, try to figure out how we can make it come to life. From there, we will ask ourselves questions, and from those questions will come to new ideas. Those will let us a chance to push our concept further and make it more interesting. Furthermore, having a purpose in our mind and trying to explain it to someone else is not a good representation of our project. We all know that images speak louder than words, so taking the time to build a prototype will help

THIS = THEN = THAT

WHY DO WE PROTOTYPE

us communicate our ideas clearer. In this state of mind, we need to have the right level of fidelity. We first need to do preliminary prototypes to understand the motion and then build from there. By following this first part, we can slowly try to understand what type of material we need. Other decisions go on like that to come to a mid-fidelity prototype. This one needs, of course, to be functional, but it can still be a stage of questions. This would be the first iteration of your concept; this will show and needs to represent the research you did to come to this point. But if you have questions about, for example, the materials you should use, this is the moment you can ask people what could be the best alternative by showing your prototype. Also, if you build a prototype and you push it too far in the conceptualization, and you realize midway that it is not working, you will lose time and work in double. Prototyping a mid-fidelity prototype helps you, even though it takes a lot of time. This is the part of the process where you go back and forth, do trials and errors, and can also be frustrating. You first conceptualize a project that fits your knowledge but abilities, but you can come to realize that it is more complicated than you wanted. But without the prototyping part, you would never understand that and would probably never let the chance to your project to grow and be something more than just the first idea you had in the first place. Prototyping is only investing time on your own project, so you don't have to start again from scratch.

THIS = THEN = THAT



2. TECHNICAL EVALUATION OF THE SENSORS



If we go back to my proposal and my first idea for this project, I have three types of interactions: touch, movements, and voice. I started to look at some examples online, try to find documentation other than the ones seen in class to inform myself of what could be the best solutions for my ideas. Since I don't have any experience with sensors, I knew I needed to do some tests to figure it which one I should use. The touch sensor, I would say, was the easiest of the three to select. I chose the Ks0031 Keyestudio Capacitive Touch Sensor. The reason why my decision stopped on this one is that this first interaction is only to "wake up" the mechanism. I only need my prototype to understand that someone picks it up to start interacting with him. For my prototype, this choice was the smartest one to do, but after building my 3D model and looking for material, I realized that I should either change my sensor or change the material I had in mind for the flower pot. For the second interaction, which is the movements of the flower, I decided to go with an HS 5485HB servo motor. At the beginning of my research, I thought that I would use a basic DC motor. We used in class for various examples, and the motion in my project is pretty basic. I need a movement that will go up and down and rotate. Because it is simple movements, my choice stopped for the first solution I had. When it came to testing the motor, I quickly understood that I was not right about this specific motor. I had no real control over the movements, and the effect I wanted my flower to do was not quite right. I started looking to the slides of the motors and sensors presentation. I analyzed the different types I had at my disposition.

I considered a stepper at first, but it was a little bit too powerful for the motions I needed to execute, and also I required fluid and delicate movements. This is why I stopped my choice on the servo motor for a reason for the range of motion. To make my flower blossom and close, I need to stop the movement at a specific angle. After doing some tests, the servo motor range of motion was perfect for it. I was able to make it close and open at a different angle. This way, I can realize different effects, just like a dance. I will also be able to make maybe two levels of petals that will be able to close and open and rotate at different angles. For the last interaction, I chose an LM386 Arduino Compatible Sound Sensor. During the class with the guest speaker, we played around with the different types of sensors. I thought that the one I chose at first, the Ks0035 keystudio Analog Sound Sensor was the one used in class. After many unsuccessful tests, I realized that it was not the right one. I needed a sound sensor that I was able to change the sensitivity of it. Otherwise, I was not able to get the right effect. The sound sensor was not detecting all the sounds I wanted it to do. Overall, after doing this first stage of prototyping, I still have a lot to discover, in my opinion. Just like the title of this project says it, there is always amelioration and new ideas possible. But based on the three sensors I chose, my main goal for the final part is to use these three ones still, but do the most that I can with it.



3. THE EVOLUTION OF THE PROTOTYPE



When I started this project, I wanted to create a tool that would help people to relax during their study sessions or just when they feel anxious. Before prototyping and doing actual coding to make this physical iteration comes to life, I thought that my ideas were pretty simple and that it will respond to my initial thought. After doing some research, looking at videos, and doing some tests, I have to realize that my project is probably going to end up more like a “toy,” I would say. Yes, it will be able to help people, but more to relax and think to something else than really developing new ways to change their habits. Furthermore, I wanted to use speech commands, but I think I will let this component on the side for now. During the creation of my prototype, I decided that this aspect was maybe not necessary. It was more fun to use speech recognition than useful and meaningful. I decided to replace this with a “show of LEDs.” Sometimes, listening to a song is an excellent way to calm down. With this in mind, I thought that displaying colors and making them changing to the beat would be more meaningful with the goal of my project. Also, since I won't use the speech recognition part, I am going to replace the voice input with the touch inputs. I thought that interacting with a machine was not respecting my concept. If you want to relax, you don't want to have to talk or need to focus to make things work. Also, my project was turning into sort of a google home type of project. Being always listening is not what I call something relaxing. Overall, yes, my initial project intention changed. The mechanical components and my errors made me also change my initial purposes of how the flower should move etc. While doing the implementation, I realized that my project was maybe a little too serious. I want it to be a bit more fun because sometimes relaxing is also having a good time!

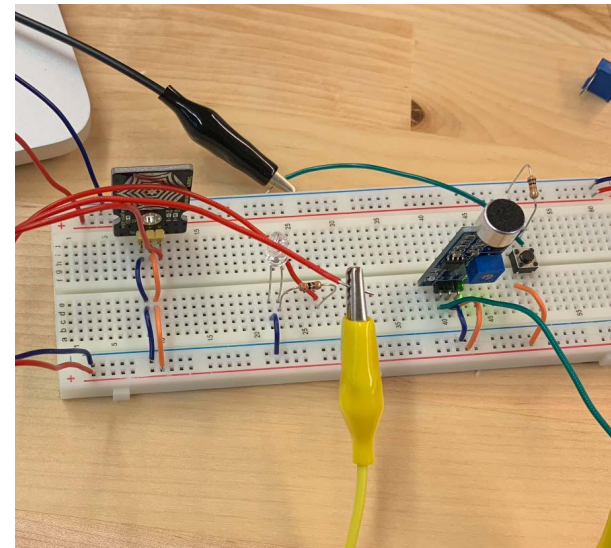
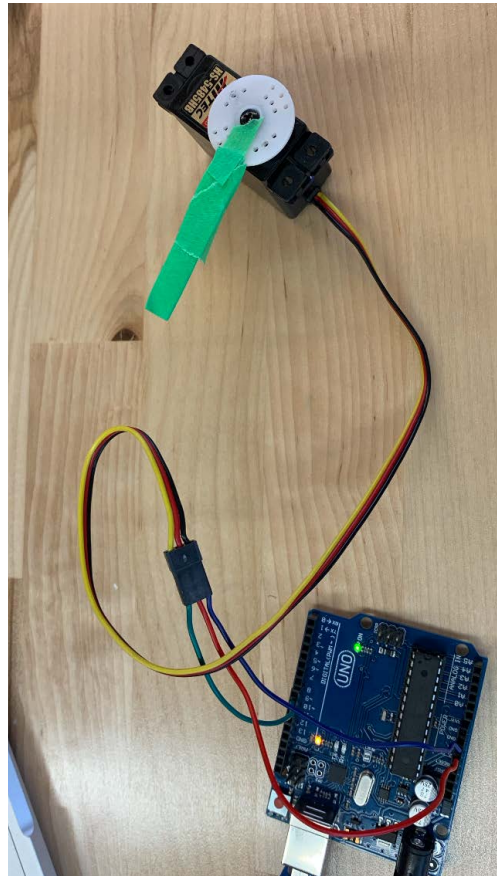
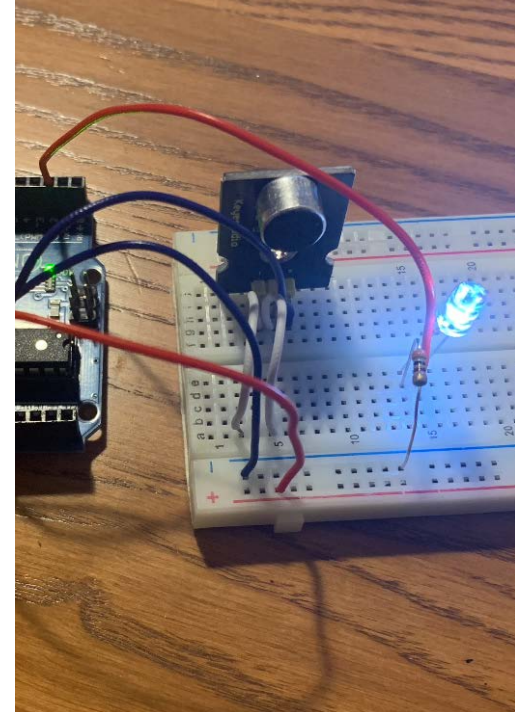
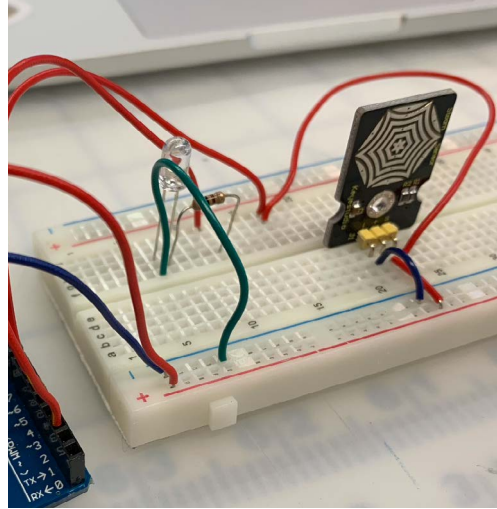


4. THE DIFFERENT STAGES OF IMPLEMENTATION



4.1 THE SENSORS

I started with testing the three different parts individually on my breadboard. I wanted to make sure that I understood everything before I put everything together. I used an LED to see if the code for my touch and sound sensor were working. Once that was done, I did some tests with the servo motor, looking at different angles to determine which one would be the best. Once everything was clear in my head, I put everything on my breadboard and tested the whole thing. For the prototype, I only did the basic logic to understand how it would work. Then, I would be able to implement the code for more interactions and motions for the flower to do.





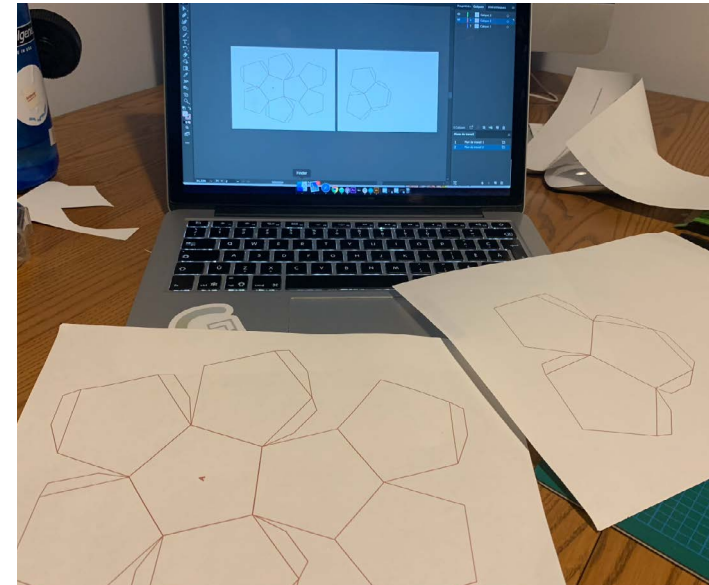
4.2 THE PETALS

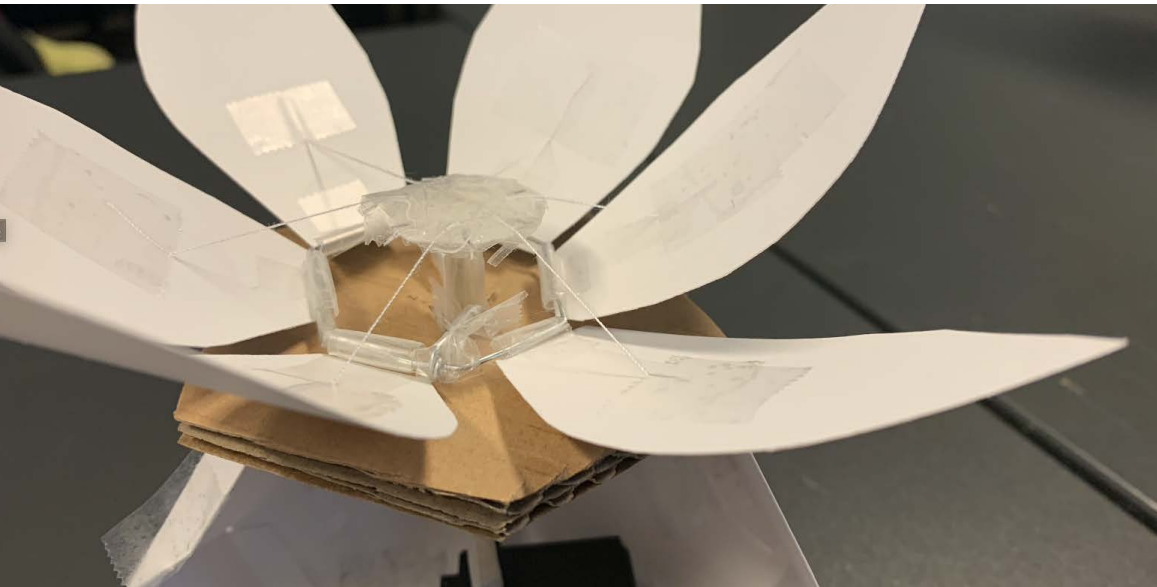
I first started with the cardboard prototype. This first iteration helped me to understand the basic motion I needed for my flower. I was able to manually make it blossom and close with the help of the stick at the bottom. Once that was done, and while I was building the second iteration, I realized I needed support to stabilize the petals, but also let them rotate. I made a metal hexagon where I added cut pieces of straws. I then attached the leaves to it and added strings to each one. I first thought that I would just put the strings in the cylinder in the middle of the flower. I then decided to attach them to support that would go up and down the cylinder. This let me have more control over the movement of the petals. After building the second iteration of my flower, I then decided to build a metal frame where I could, later on, add LED's and make it more resistant.



4.3 THE VASE

Based on my sketches for the proposal, I knew I wanted a little pot that would fit in the decor and not be too big. I did some research for references and inspirations, and I came up with these two images. What caught my eye was the angles and the shape that goes out of the standard vase shape. For the esthetic aspect, I also loved the minimalist aspect with a little twist. For the meaningful part, I feel like that size, and the round type of shape is more friendly, and you feel more attracted to hold it in your hand. Based on a template found on the internet, created my own to make sure I had the right size. It also makes it more easy in the future to change some details, make the hole bigger, etc.





4.4 THE PROTOTYPE

After figuring out the interactions and building the maquette, it was time to assemble the two parts. I realized that I needed some kind of support to hold the petal's frame. It needs to stay still while the cylinder that holds the strings moves up and down. I don't have it in the right size, but now I know I had to have this part for my final one. The battery will be at the bottom of the vase. While assembling everything, I made a note to myself that I need to take the right measurements so everything can fit together correctly. I also pushed the petal prototype a little bit further by adding textiles on it and hiding an LED inside. With this version, I learned from my mistakes and have a clearer idea of how to build the final one.

