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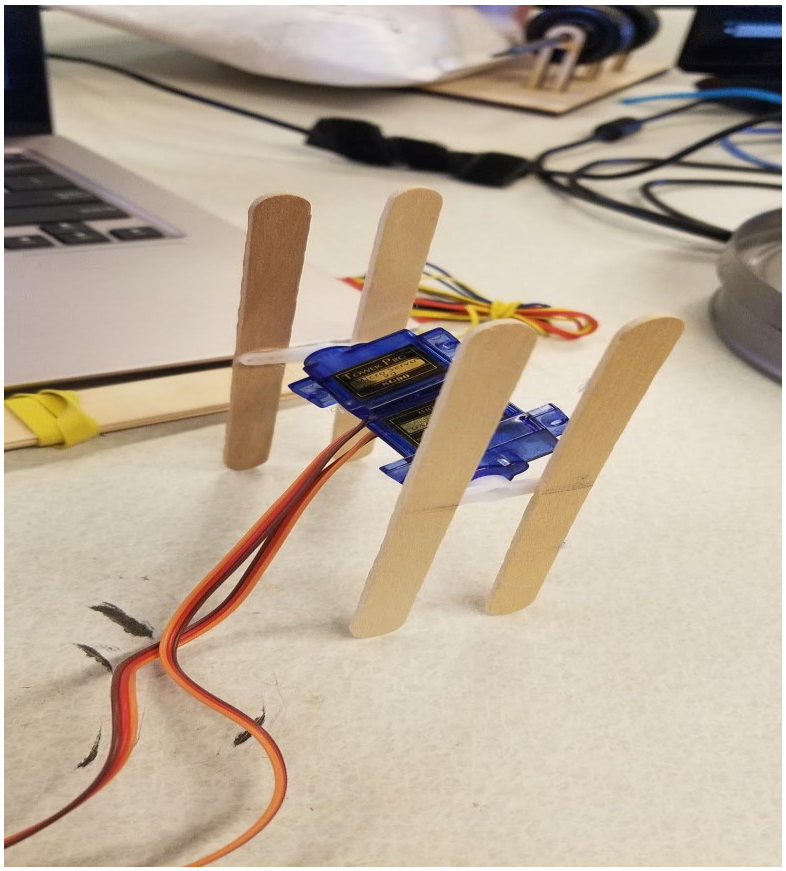
Arduino Robot Report

Introduction - Original Intent

My original idea was a machine to have a four legged vibrating machine, where two legs would go up while the other two went down, and vice versa until the “Point B” was reached. This mechanism can be seen in the first two iterations.

The materials planned were two motors, some popsicle sticks, glue, and rubber bands for traction.

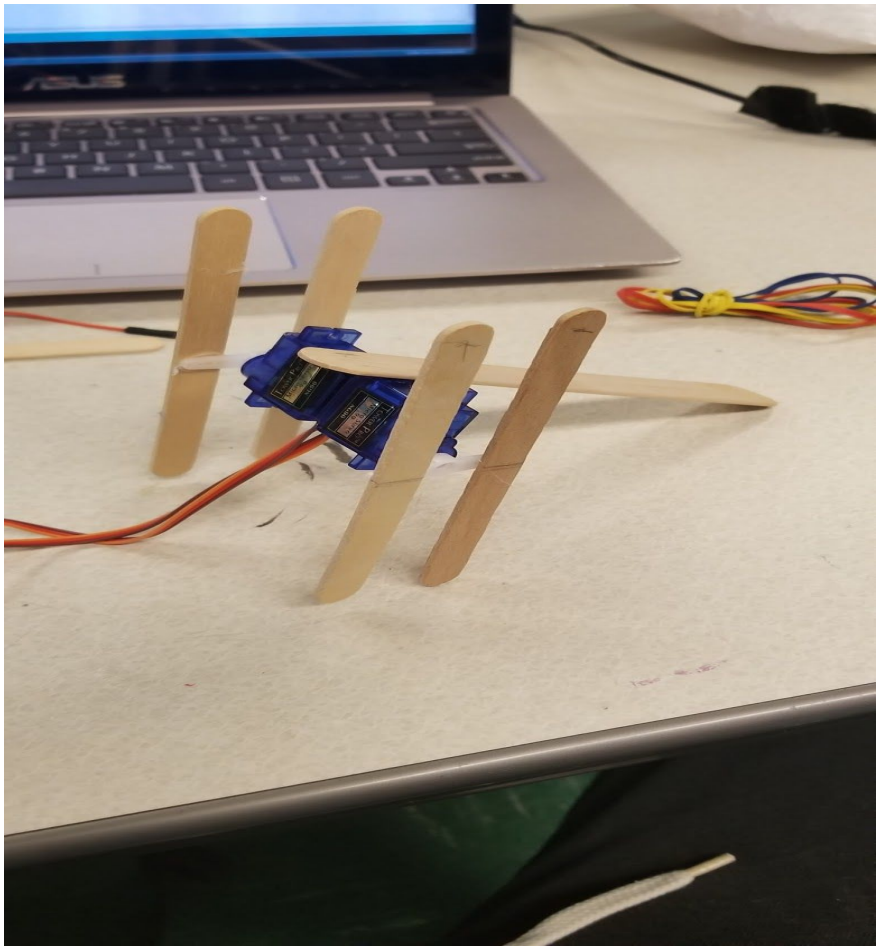
Prototype 1



The first iteration failed to work. One of the initial barriers I came across was that 0 degrees were not exactly the same on each motor, since you could remove and replace the head of the motor. Furthermore, vibrating the motors did not cause it to

move much, and often times it would fall over. Therefore, my next iteration needed to add a counter balance, like a tail.

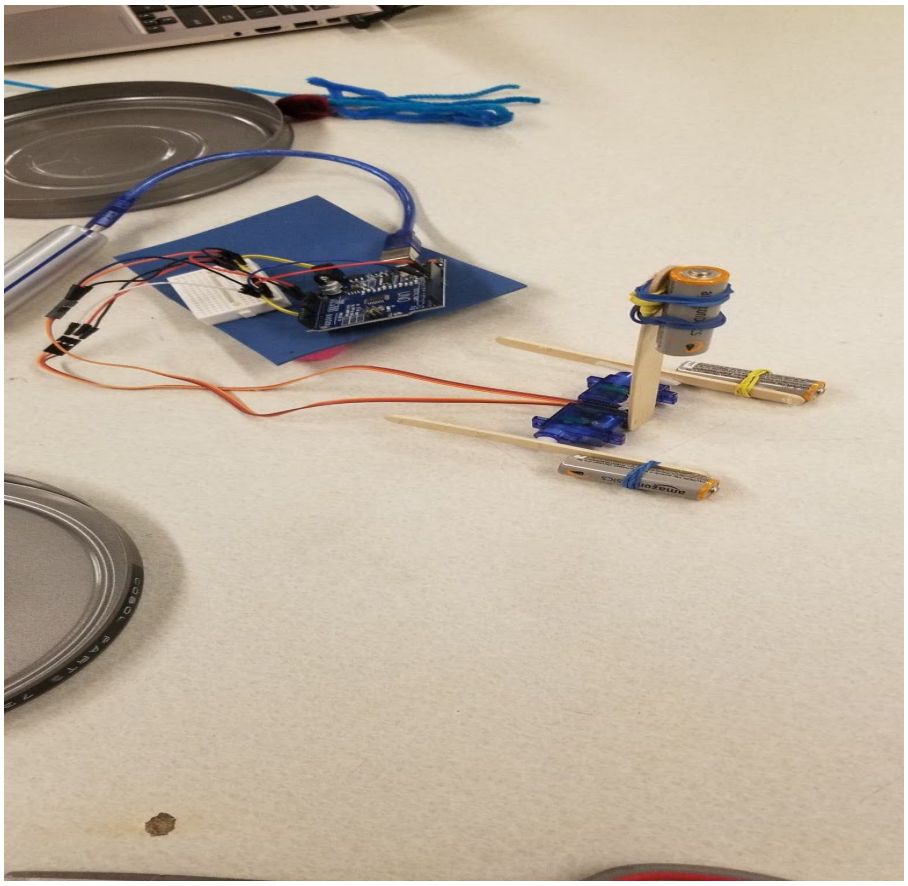
Prototype 2



The second iteration added a tail to the robot. This did help a little, but it became quite obvious that the design would not be functional as intended. The weight of the tail seemed to be too much, and, if it did move at all, it would move in the direction of the tail or in a circle. This is not the point of a tail. I also added the +/- on the popsicle sticks in order to ensure I did not confuse how the motors were orientated, as was a problem in the first prototype.

Video for Prototype 2:
https://drive.google.com/file/d/1I6b3FvzOuyDp-KwkzG1cfRMsZQk7dsts/view?usp=sharing

Final Design



Once I began tinkering with Prototype 2, one of the ideas I began to try was to add weight and traction to the tail with batteries and rubber bands, in an effort to get the robot to push against it. This led to a beautiful discovery: the tail acted like a catapult, violently flinging the robot forward. I decided to let this discovery drive me, and began designing to capture this movement consistently. I flipped the robot on its side, so its legs were now sleds. I added batteries on them to ensure that the catapult to be pulled back without pushing the robot back with it, thereby undoing any

forward progress. Finally, I designed a simple sled to place the arduino on, in an effort to detach it from my machine and to not damage the hardware as my robot trekked forward.

Video for Final Design:
https://drive.google.com/file/d/10jp54TKXrwV73dio567S_Bxujdaj6RwY/view?usp=sharing

Conclusion

In both intents, the result was not what was expected. The final result of the second prototype led to a catapult structure, while the final design of the catapult structure turned into a variant of a worm. I believe planning more in-depth, as well as studying the mechanics of motion better, would have led to a more intentional design. This has been a learning experience to both mechanics, frictions, robot design, and planning.