Clifford the Big Red Rover 2.0

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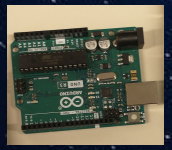
Abstract

Our mission is to build a rover that will be able to navigate and survive all types of terrain. Our rover will test the capabilities of our team through designing, programming, and teamwork. The plan for our rover is to test tread designs to determine the best designs for certain terrain. These tests will allow us to be better equipped for most obstacles. With the rover being built out of only 3D print, we found new ways to go about designing and testing certain filaments. One filament we used for our legs is dissolvable filament or Ultimaker PVA which allowed no extra work to rid of supports especially in areas where it is especially difficult.

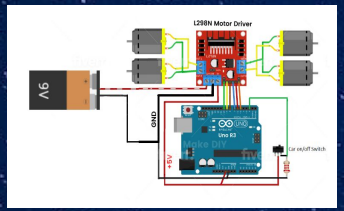
Materials

-Arduino Uno Rev3
-1298N Motor Drive
-DC Barrel Jack Wires for Arduino
-Solderable Breadboard
-12v Voltage Regulator
-9v Batteries
-Pack of XT60 Wire Adapters
-DC Motors 12v



Electrical and Programming

Our programming and our electrical diagrams are very simple as we did not have enough experience or time to go more in depth. Our main focus was to get it move and to get more comfortable with working on electrical systems.



Sensor Research

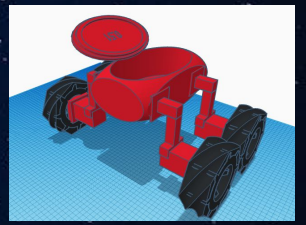
We wanted to look more into sensors and the differences between two available types. We researched the affordable types found on Arduino so the research we have collected may not relate to every type of IR or Ultrasonic sensor.

	Ability to handle High winds	Ability to handle intense heat	Wide Beam Width (15 cm wide)	Affordability (under $20)	Withstand power between 3V-5V
IR Proximity Sensors	✓	✗	✗	✓	✓
Ultrasonic Sensors	✗	✓	✓	✓	✓

Sources: Adarsh1, S., Kaleemuddin1, S. M., Bose1, D., & Ramachandran2, K. I. (2016, September 1). *IOPscience*. IOP Conference Series: Materials Science and Engineering. Retrieved April 12, 2023, from https://iopscience.iop.org/article/10.1088/1757-899X/149/1/012141
Wiliams, D. (2020, July 23). *Is Infrared Heat lost through Air Movement?* Advice Centre. Retrieved April 12, 2023, from https://www.infraredheatersdirect.co.uk/news/is-infrared-heat-lost-through-air-movement/#:~:text=Infrared%20radiation%20can't%20be,draught%20coming%20into%20our%20hom

Design Overview

The design of our rover is very simple. We decide four wheels and a basic body. Our legs are bolted to the body of our rover and our lid has hinges for more accessibility. Our wheels have special bolts that allow us to interchange them easier between the rocky terrain wheels and sand wheels.
Most of the rover is made of PLA with uses of a PVA called Ultimaker which allowed the supports to dissolve in water making it more time efficient.



Conclusion

Though we did not complete our mission this time, we gained a better understanding of a lot mechanics and skills that go into this project. We also learned valuable skills relating to teamwork and time organization. Next time we will complete our mission.

Acknowledgement

We want to thank our great advisor Joey Mathews, the STEM Center work studies, and the Space Grant Staff who offered amazing support and advise.