

Remote-Controlled Delivery Robot (RECODRO)

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Abstract

Do you experience hunger or thirst but haven't had the desire to get up to do anything about it? A bout of laziness tends to overtake us all at some point, so our group decided to base our project on this idea. We wished to devise a delivery system that would bring food directly to the individual through the use of a controller. Thus, we came up with our project idea, a wireless remote-controlled delivery robot called RECODRO. We came up with a three-wheeled vehicle design consisting of two rear wheels capable of independent motion, as well as one in the front capable of full rotation. The vehicle is operated via a Bluetooth app controller and loaded beforehand with snacks and drinks of one's choosing, so that the next time they wish for a satisfied stomach, all they have to do is connect the app to the delivery robot and drive it right over to themselves. We spent our time experimenting with different vehicle designs and materials, as well as plenty of modeling and troubleshooting. We found that our final design was capable of complex maneuverability, withstanding the loading of the delivery item, and navigating over varying terrains. When your cravings hit, know that RECODRO will be there with the solution.

Introduction

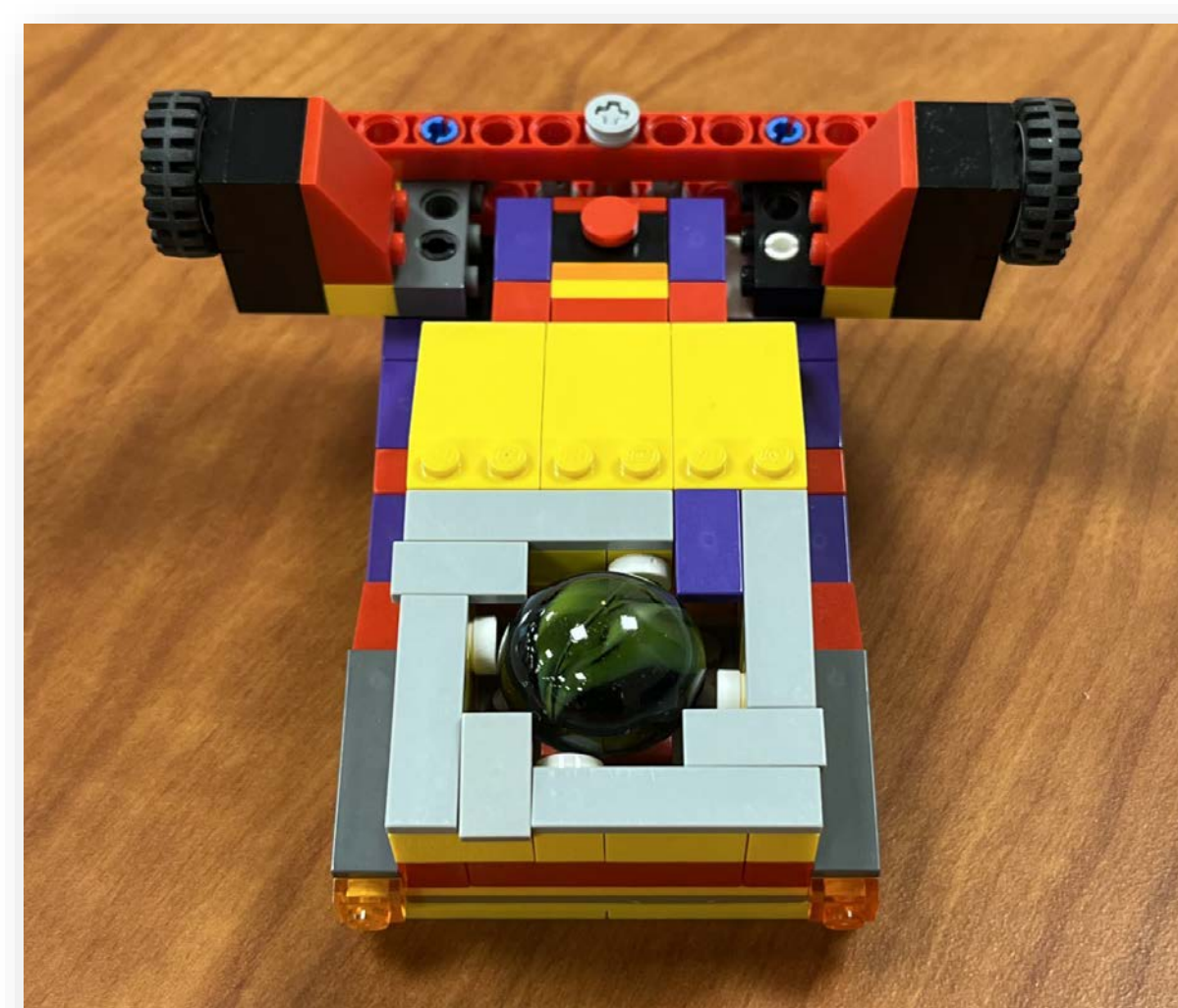
Give a warm welcome to your new delivery robot, RECODRO! RECODRO is capable of delivering supplied snacks and drinks, such as a banana, bag of chips, or can of soda to your location. All you need to do is make sure the loading container is loaded and situated on top of RECODRO, then pick up the controller and drive him right over.

Objectives

- Create a robotic vehicle capable of delivering snacks.
- Have the vehicle able to traverse complex terrain, such as bumps or shaggy carpet.
- Have the robot be controlled via a Bluetooth app installed on the user's device to remotely control the robot.



Our first prototype



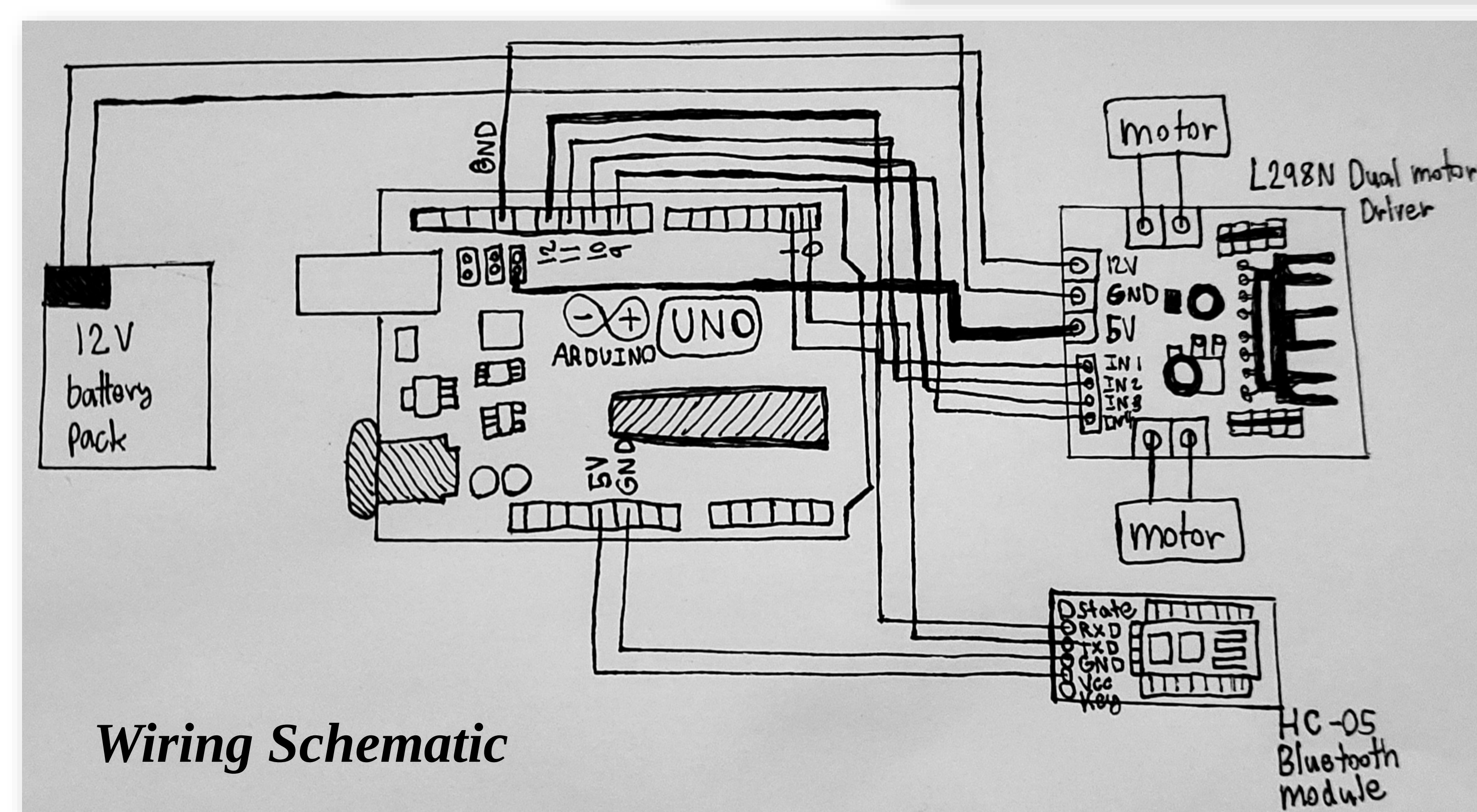
Methods

- The first step was to create a prototype on which to base the final version off of.
- There is no steering mechanism; instead, we used a roller to reduce the complexity of the vehicle.
- Used Arduino Uno R3, Dual Motor Driver (L298N), Bluetooth module (HC-05) and various other components.
- Alex was responsible for the coding, wiring and troubleshooting; Tyler and Andrew were responsible for the mechanics, design, testing, and aesthetics.
- The base was 3D printed and various other materials such as wood and tape were used for assembly.
- Testing included traversing various types of flooring and carpeting that would be seen in a typical indoor environment.
- Necessary adjustments were made, and the vehicle was able to overcome the obstacles set before it.
- The loading container sits atop the base and circuitry of the robot, and has the capacity for a large water bottle, or two soda cans (this is the maximum capacity, which is approximately 900 grams, or about 2 pounds).



Three carpet samples (layered on top of each other) for testing & code snippet

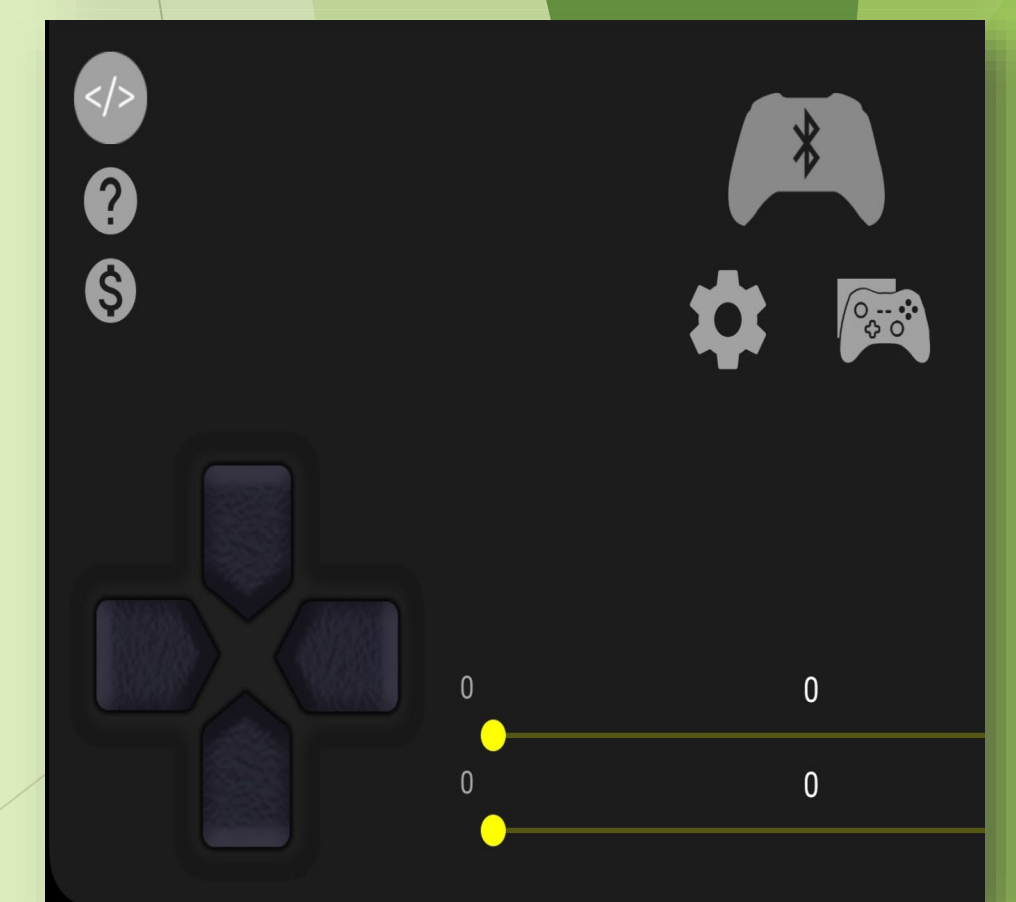
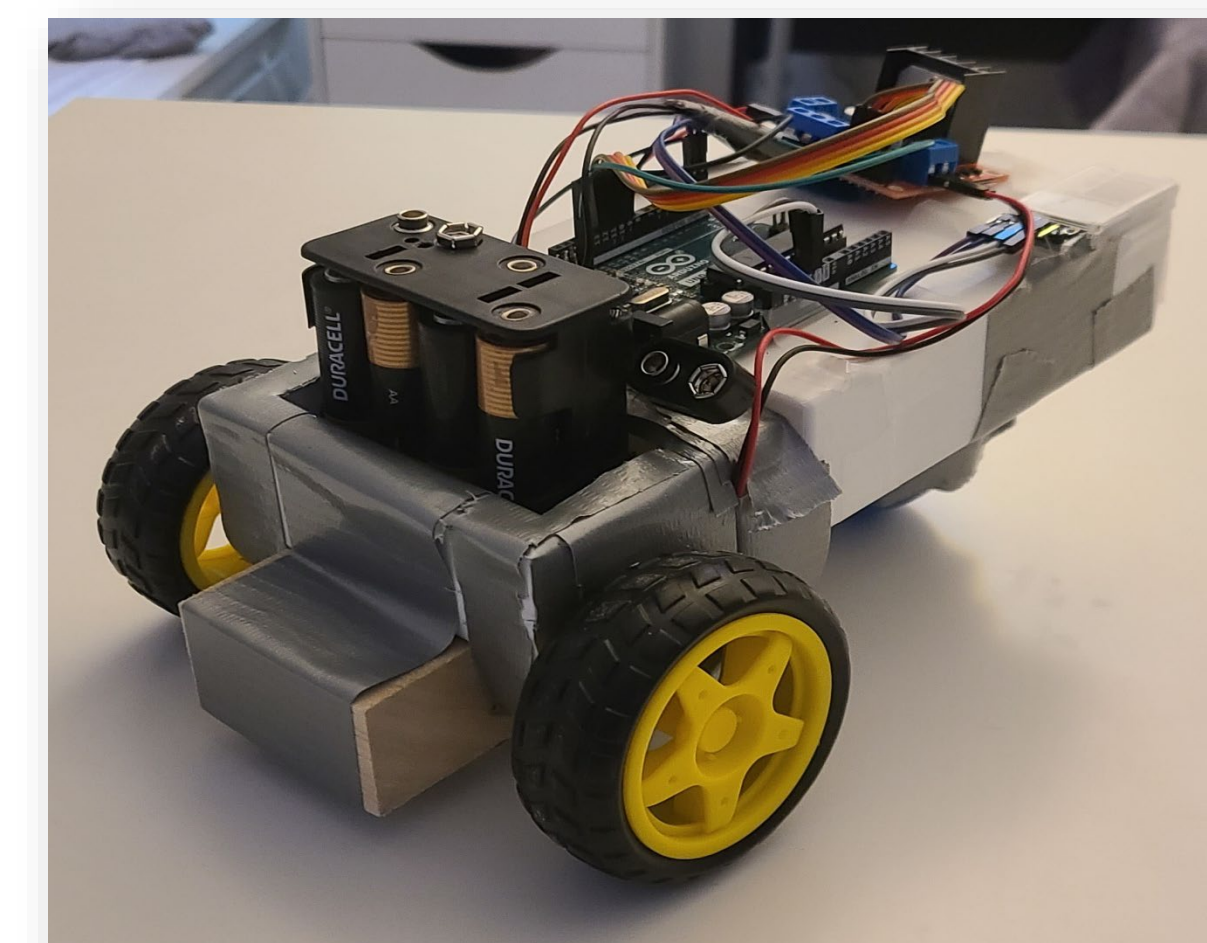
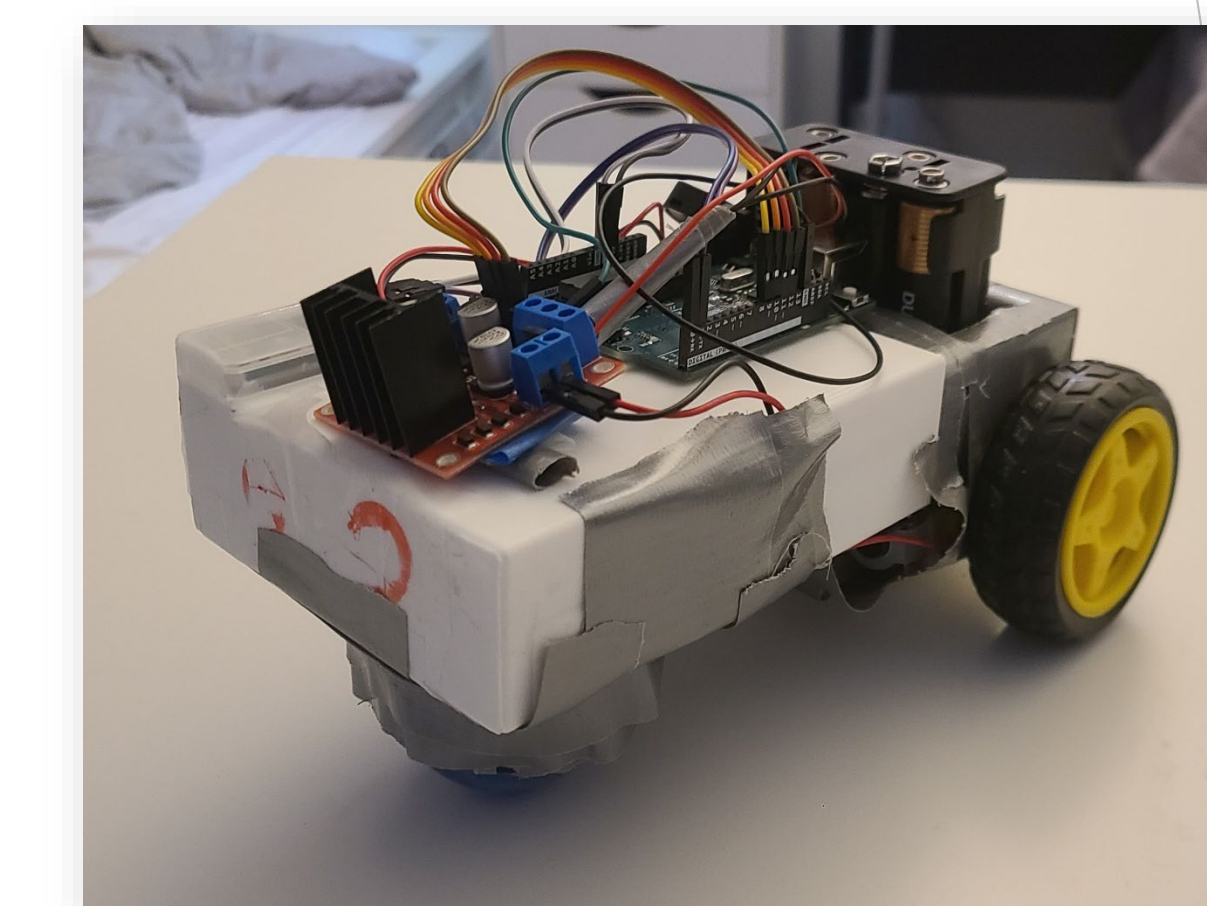
```
1 int a1 = 9;
2 int b1 = 10;
3 int a2 = 11;
4 int b2 = 12;
5 char val;
6
7 void setup()
8 {
9   pinMode(a1, OUTPUT);
10  pinMode(b1, OUTPUT);
11  pinMode(a2, OUTPUT);
12  pinMode(b2, OUTPUT);
13  Serial.begin(9600);
14 }
15
16 void loop()
17 {
18   while (Serial.available() > 0)
19   {
20     val = Serial.read();
21     Serial.println(val);
22   }
23   if (val == 'G') // Forward
24   {
25     digitalWrite(a1, HIGH);
26     digitalWrite(b1, LOW);
27     digitalWrite(a2, HIGH);
28     digitalWrite(b2, LOW);
29   }
}
```



Results

After plenty of tinkering with the circuitry, we finally were able to wire the system to allow a Bluetooth app to drive the rear two wheels. Through the app, the individual can control each wheel separately to allow steering of the vehicle. We tested various weighted snacks, from a light bag of chips to a full water bottle and found that RECODRO was able to support and deliver in each test. We also found that RECODRO had the capability of driving over all the various surfaces we tested on.

Final Version & the Bluetooth App



Conclusions

RECODRO successfully navigated treacherous household terrains, all while delivering various delicious snacks and drinks, without spillage or tipping over. We found that we spent approximately \$60.00 on the total project. The engineering behind even the simplest robotic system is no small feat.

Acknowledgements

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