Obstacle Avoidance Car

Introduction:

It is a robot car that goes in a straight line until it detects an obstacle in its path. When this car detects an obstacle, one of the wheels stops rotating but the other one keeps on rotating, which allows it to change its course. It uses a proximity sensor to detect the obstacle; a motor driver to drive two dc motors which rotate the wheels of the car.

This one is for people who are more comfortable using an Arduino and have worked on it before. It's a group project for at least two people and at least one of you should be somewhat comfortable working with electronics.

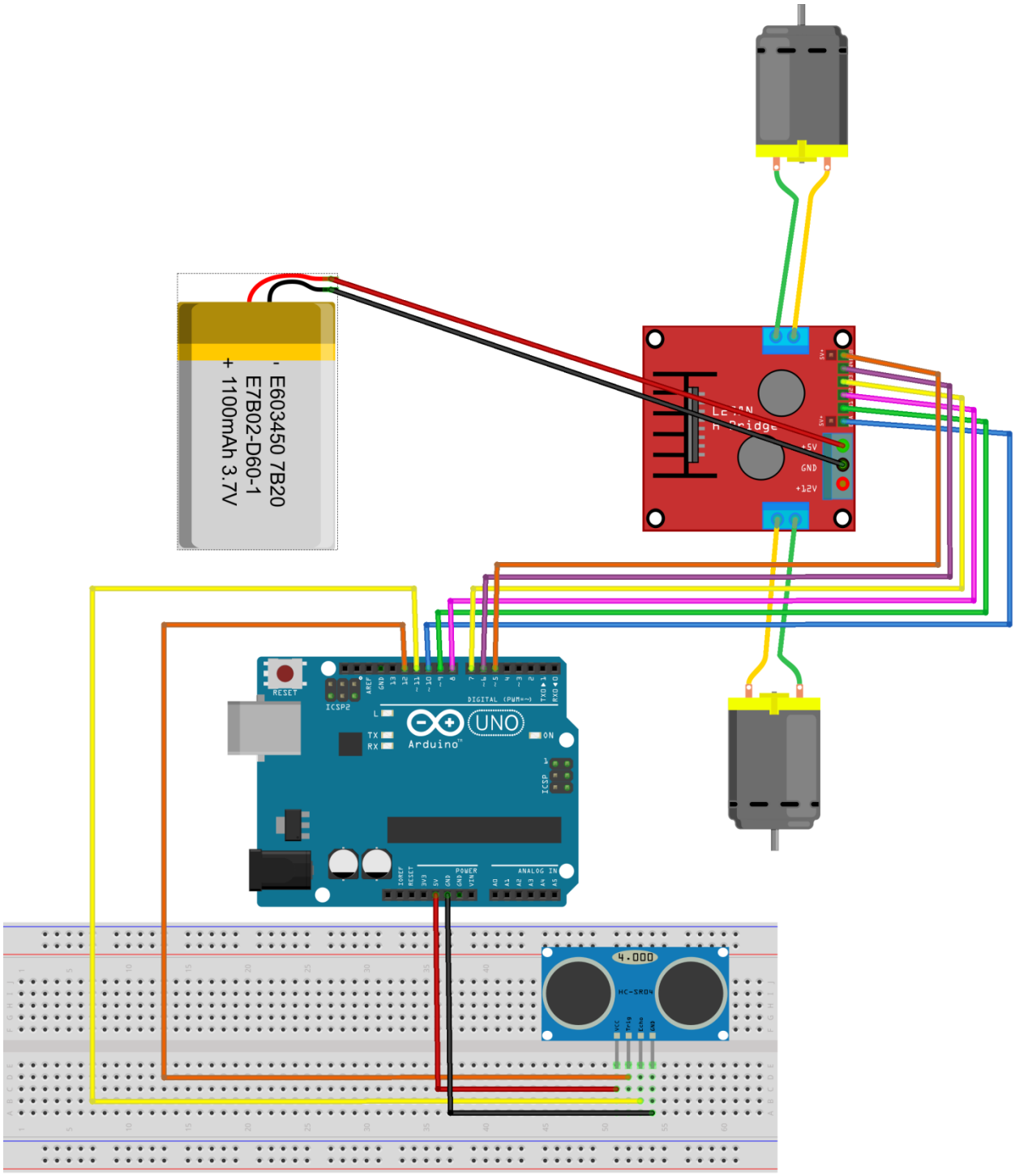
Circuit:

All of the circuitry is supposed to be mounted on top of the chassis of the car. You need the following components for this project:

List of components:

1. Arduino uno
2. Breadboard
3. Jumper wires
4. Ultrasonic sensor (proximity)
5. Motor driver (L298 H bridge)
6. Battery 7.5V
7. Chassis with motors

Here is the schematic that you need to follow to make the circuit:



Steps to follow:

- Make sure you have Arduino IDE installed

- Connect Arduino to your laptop, verify and upload example code of blink to see if your arduino uno is working. (refer to intro to arduino and electronics.pdf in arduino night folder). Here's how the wires are connected:

Power:

- Red wire is the voltage. Ultrasonic sensor is powered by Arduino's 5V pin but the H bridge draws out more current, so it is connected to the battery.
- Black wire is the Gnd or ground, ultrasonic's Gnd is ending at Arduino's Gnd but the H bridge's Gnd is connected to the –ve potential of the battery.

Ultrasonic pins:

- Ultrasonic or proximity sensor has two control pins. Trig is connected to arduino's output pin number 12 of arduino. Arduino sends ultrasonic waves using this pin.
- Echo is connected to arduino's input pin number 11. Arduino receives signal from this pin when ultrasonic waves are returned to the sensor.

H bridge pins:

- In1 and in2 tells the motor driver the direction of rotation for the motor 1. Both of these shouldn't be set to high at once. These are connected to Arduino's pin 9 and pin 8 respectively.
- In3 and in4 are connected to arduino at pin 7 and pin6 respectively. Both can't be set to high at one time as they are meant to tell the direction of rotation of the motor by setting different values.
- enA controls the speed/motion of the motor1. It is connected at pin number 10 of arduino.
- enB controles the speed/motion of motor2. It is connected at pin number 5 of arduino.

Code:

Code is provided in the subfolder named "obstacle_avoidance_car". It is a commented code and you should be able to figure out the functionalities of enA, enB, in1, in2, in3, in4, trig and echo pins from the explanation in the previous section.

- void up() function is called when the car is supposed to go in the straight direction.
- void down() function is called when the car is supposed to go in the reverse direction of the up() function.
- void right() is called to turn the car in the right direction whenever there's an obstacle in the way.
- void left() is defined but never called in the void loop() section of the code, meaning left() has not been used even once in the existing code. You can change that and do something with it.
- if(cm>15) is set to check the distance of the car and the obstacle and whenever it's not the case (car gets too close to an obstacle), else part of the code is activated.

There are multiple things that you can change in the code to make the car function better than it already does. You should try out different things and let us know how it goes.