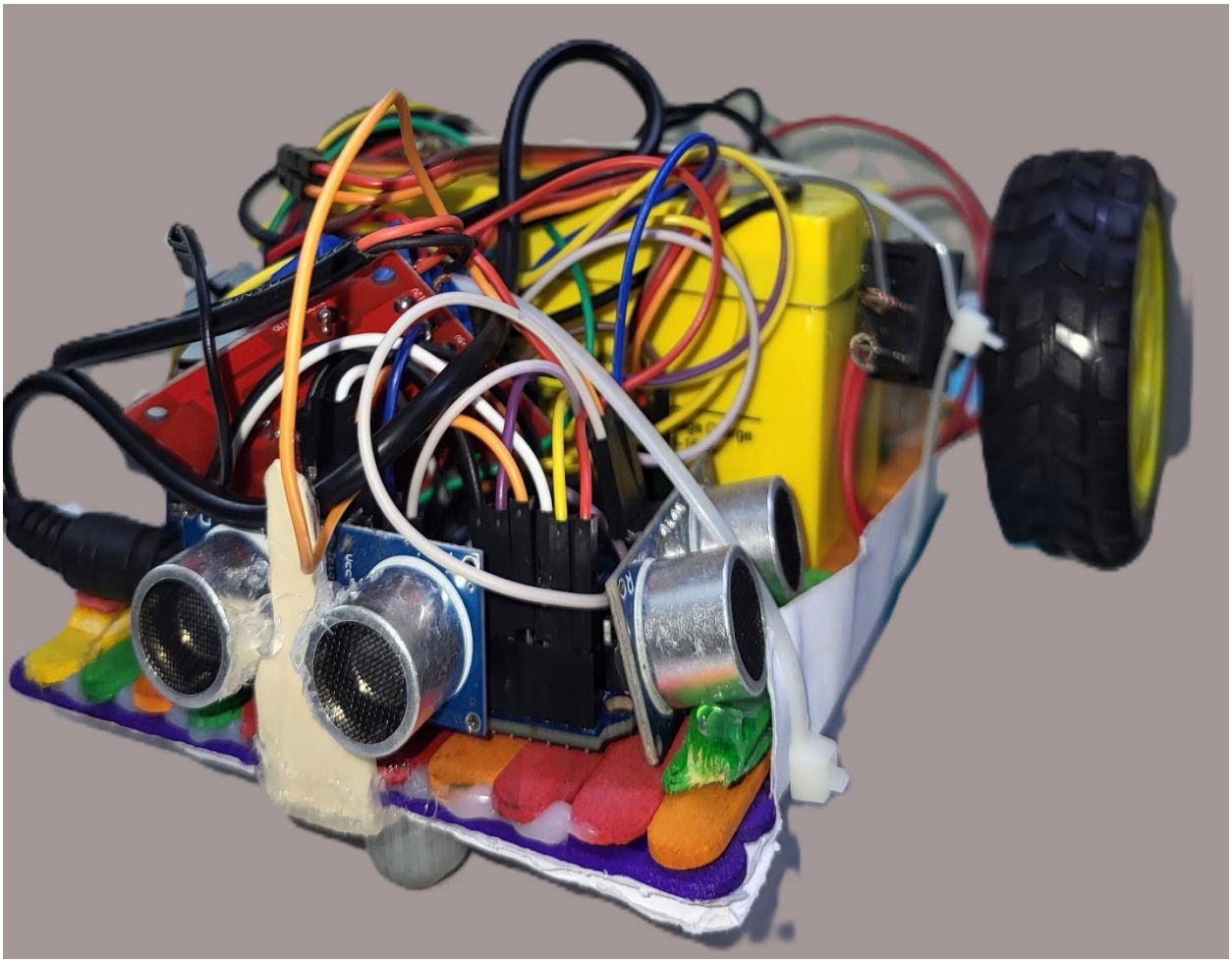
Arduino | Maze Solving Robot

Welcome, This is my team Lexus and our first robot "Lexus v1.0".

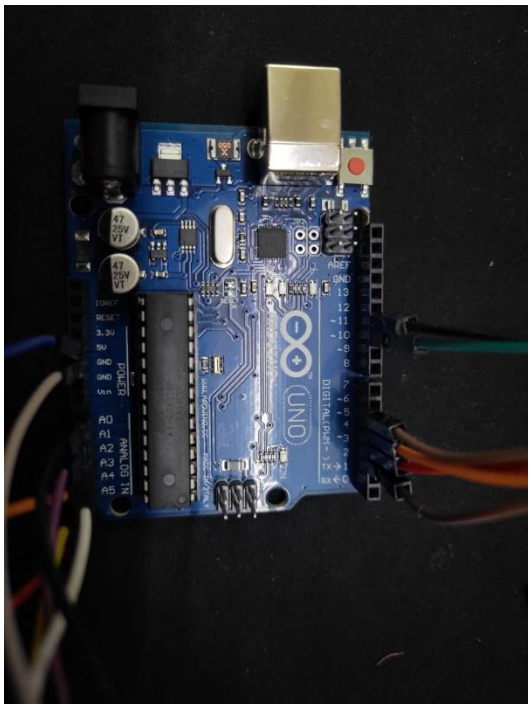
This Robot was designed to solve a simple Maze.

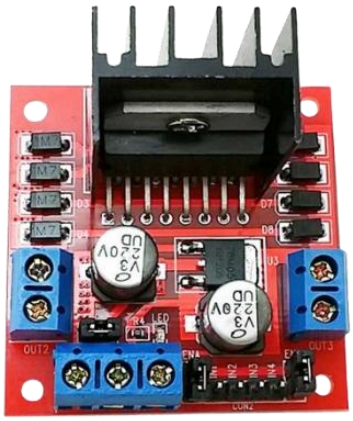


Step 1: Parts

Parts List:

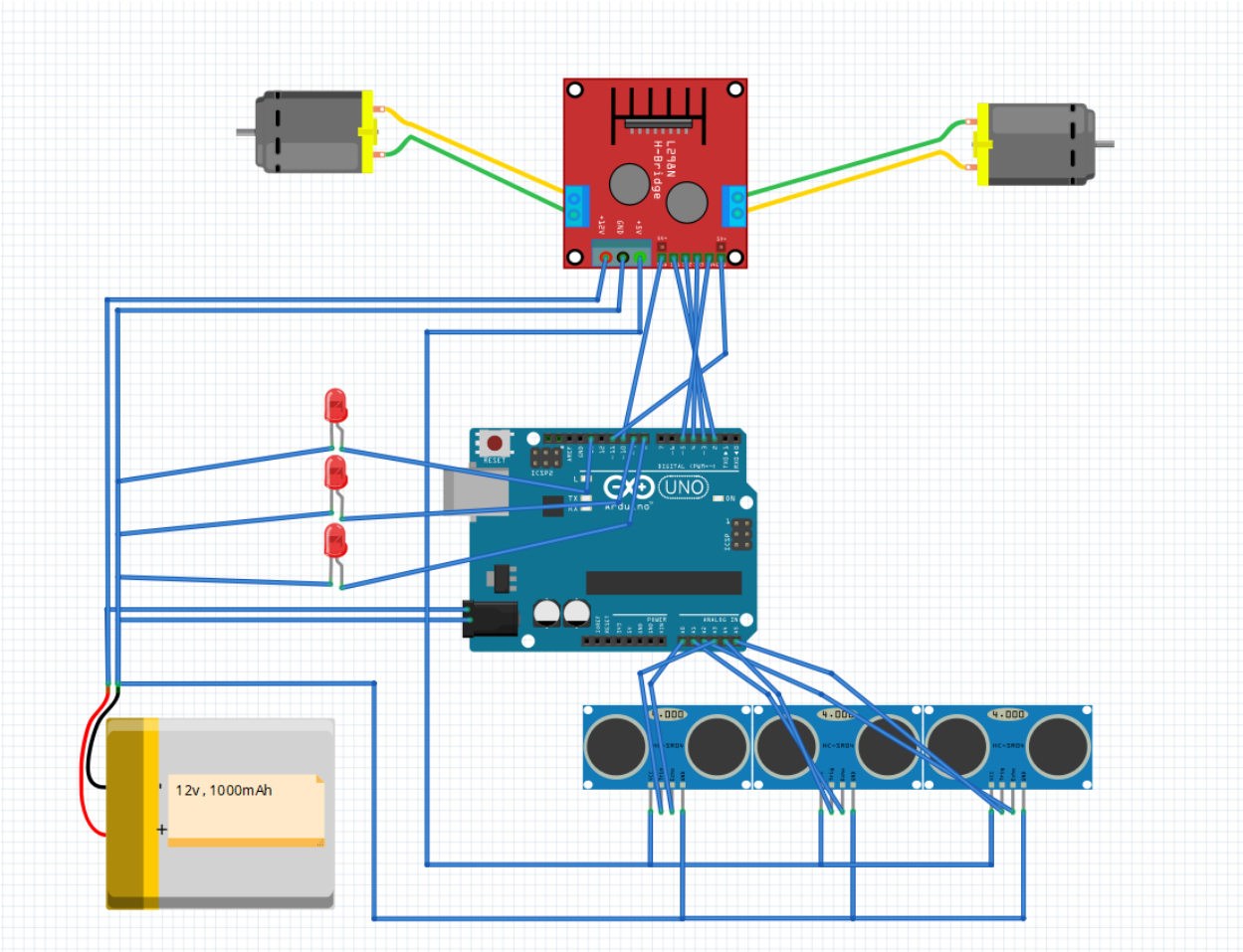
1. Arduino UNO
2. 12v DC motors (x2)
3. Wheels (x2)
4. Motor Driver (L298N)
5. Distance Sensor (Ultra Sonic)
6. Wires (Jumper wires 1-pin male-male)
7. 12v Battery (1300 mAh)
8. Switch

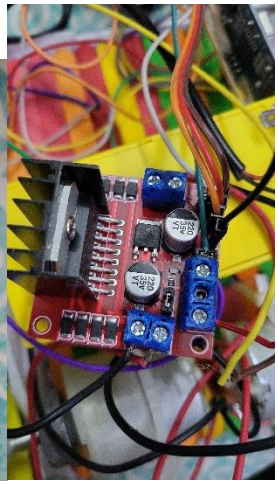





4.000
Y1
HC-SR04
Vcc
Trig
Echo
GND
T
J1
R

Step 2: Building/Wiring





Sensors

Lets talk about "The Ultrasonic sensor"

An Ultrasonic sensor is simple radar that measures the distance of an object by using sound waves.

Ultrasonic Sensor connections:

1. GND: connect this to the Ground.
2. VCC: connect to the power source 5 voltages.(**Alert! if you connect it to more than 5v it will be damaged**)
3. Echo: connect this to any pin on the Arduino. (match it to the code)
4. TRIG: connect this to any pin on the Arduino. (match it to the code)

Motor Driver

The **L298N** H-bridge: it controls the speed and direction of two DC motors. it can be used with motors that have a voltage of between 5 and 35V DC.

1. DC motor 1 “+” > connect this the motor #1
2. DC motor 1 “-” > connect this the motor #1
3. 12v jumper > keep this connected to enable the 5v regulator.
4. Power Source > Connect your battery positive here
5. GND > connect this the battery negative
6. 5v output (if 12v jumper in place) > connect the sensors here
7. DC motor 1 enable jumper > Remove the jumper and connect it to the Arduino this is used to control the speed of motor 1 (match it to the code).
8. IN1 Direction Control > connect it to the Arduino this is used to control the direction of motor 1 (match it to the code).
9. IN2 Direction Control > connect it to the Arduino this is used to control the direction of motor 1 (match it to the code).
10. IN3 Direction Control > connect it to the Arduino this is used to control the direction of motor 2 (match it to the code).

11. IN4 Direction Control > connect it to the Arduino this is used to control the direction of motor 2 (match it to the code).
12. DC motor 2 enable jumper > Remove the jumper and connect it to the Arduino this is used to control the speed of motor 2 (match it to the code).
13. DC motor 2 “+” > connect this the motor #2
14. DC motor 2 “-” > connect this the motor #2

Battery

I used 12v Battery with 1300 mAh.

Note:

Remember to connect all grounds to a common Ground to the battery negative.

Step 3: Coding

Code flow:

1. **defining the pins**
2. **defining output and input pins**
3. **check sensors' readings**
4. **use sensors' reading to define walls**
5. **check first route (if it was left then follow the left wall, if it's right follow the right wall)**
6. **Use PID to avoid hitting the walls and to control motors' speed**

project.ino

```
#include <NewPing.h>

#define TRIGGER_PINL  A3  // Arduino pin tied to trigger pin on ping sensor.
#define ECHO_PINL     A0  // Arduino pin tied to echo pin on ping sensor.

#define MAX_DISTANCE 100 // Maximum distance we want to ping for (in centimeters). Maximum sensor distance is rated at 400-500cm.

#define TRIGGER_PINF  A4  // Arduino pin tied to trigger pin on ping sensor.
#define ECHO_PINF     A1  // Arduino pin tied to echo pin on ping sensor.

#define TRIGGER_PINR  A5  // Arduino pin tied to trigger pin on ping sensor.
#define ECHO_PINR     A2  // Arduino pin tied to echo pin on ping sensor.




int dir;


#define STOP 0
#define FORWARD 1
#define BACKWARD 2
#define LEFT 3
#define RIGHT 4



float P = 0.7 ;
float D = 0.5 ;
float I = 0.4 ;
float oldErrorP ;
float totalError ;
int offset = 5 ;

```

1- first_turn = false ;

2- rightWallFollow = false ;

3- leftWallFollow = false ;

first_turn = true ;

rightWallFollow = true ;

leftWallFollow = false ;

if you want it to follow the left wall:

first_turn = true ;

rightWallFollow = false ;

leftWallFollow = true ;