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Electronics Workbench

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INDRODUCTION :

Arduino on the chasy of three wheel car. There are two function of this robot one is to avoid obstacles and second one is to follow a black line both mode are controlled by a button.

Line following :

Line following means it follow a black tape of 1.5 inch .

Obstackle Avoidance :

Obstacke Avoidace it will avoid any obstacle which will in its way it will avoid straight that path and will follow the path where there is no any obstacle.

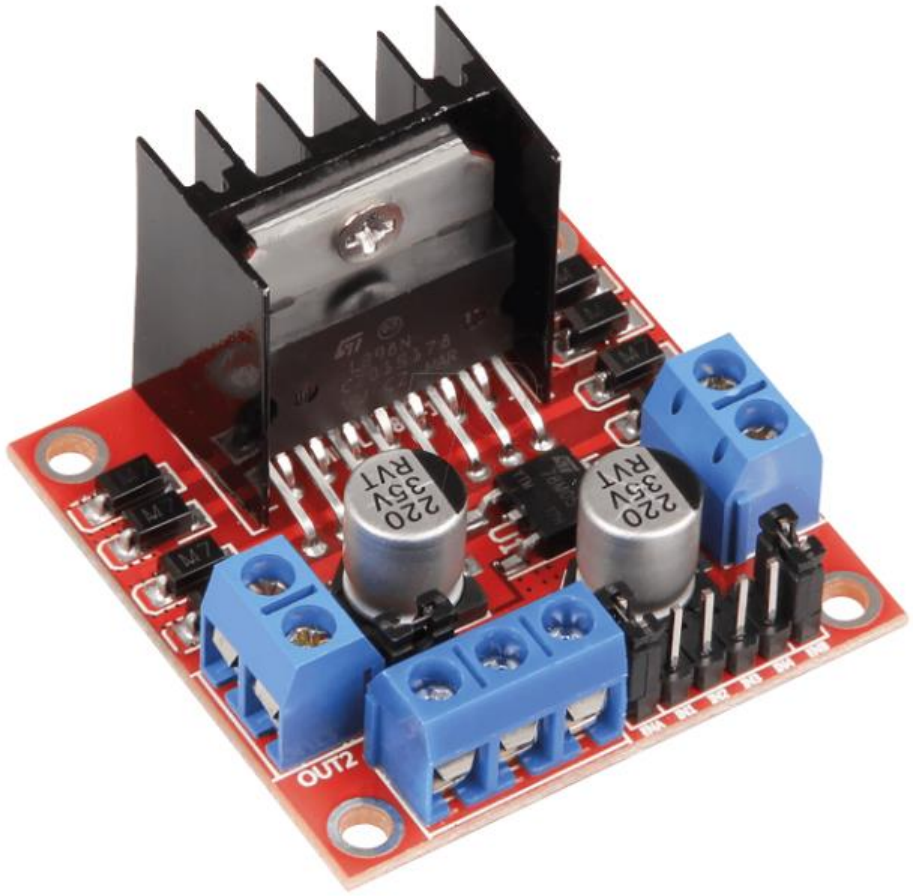
Components Used :

Arduino UNO:

It is a microcontroller which has a lot of specifications. It contains a reset button, digital pins, analog pins, power socket and a USB port. “Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.” [1]

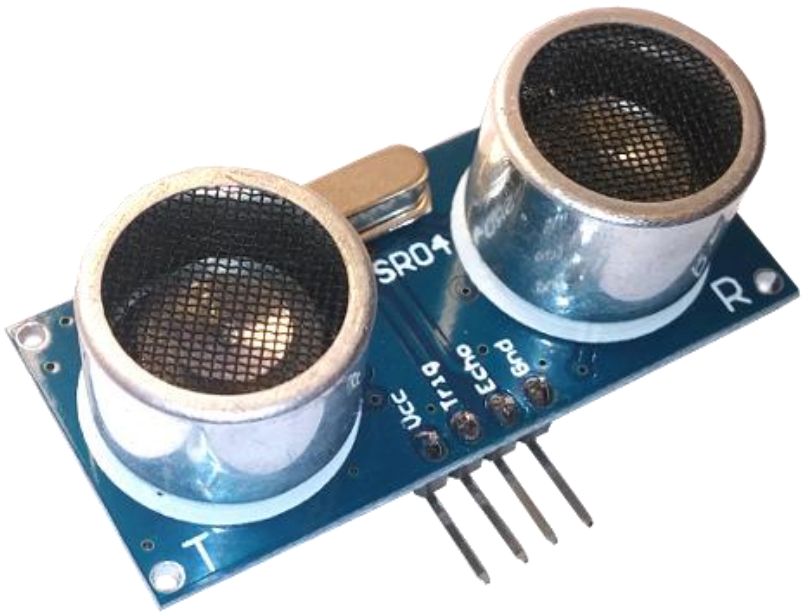
L298 DC Motor driver:

This motor driver connect the Arduino with the wheels of the car. We use this because Arduino does not have enough power to rotate motor properly .we can also control the speed of motors.



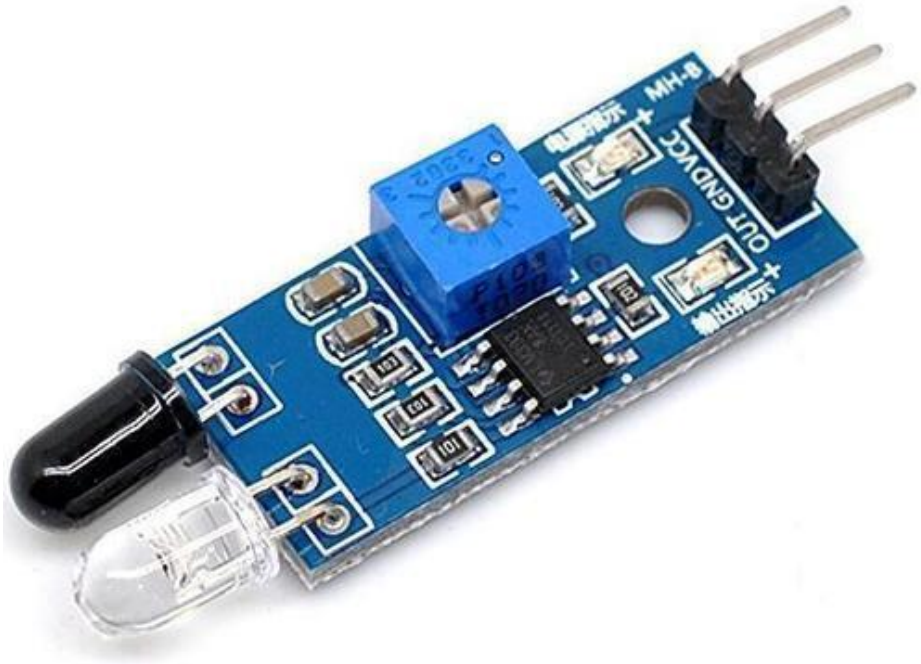
Ultrasonic Sensor HC SR04:

Ultra Sonic Sensor it use to detect any obstacle in the path it sends a ultra sonic wave and if there is any obstacle in the way wave will come back to receiver and by the distance formula we can find the distance of obstacle from the sensor .



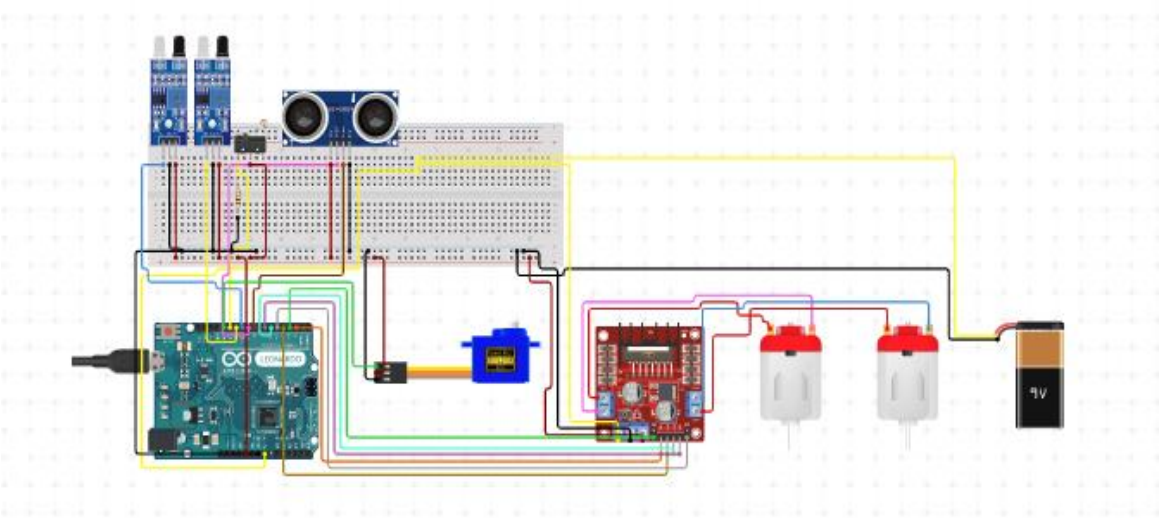
Infrared Sensor :

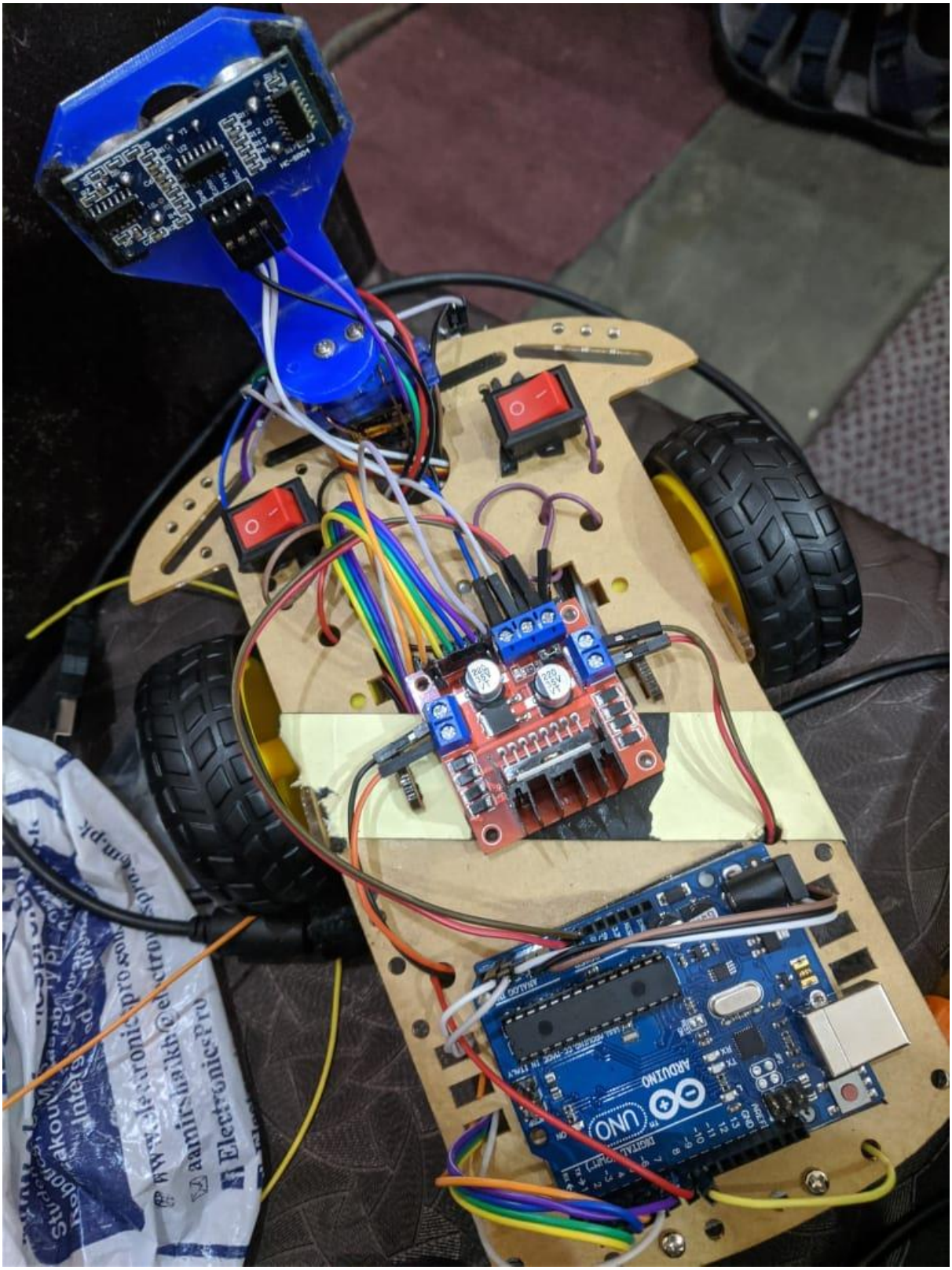
We use infra red sensor to detect the color of the path .Sensor has infrared sender and reciever part .It gives 0 when there is not detection of infrared and 1 when infrared reflect back to the receiver .Tape color is back so sensor gives 0 and when the floor comes it gives 1 because of bright surface.



Block Diagram :

First I give 7.4 volts to motor drive and then give the 5 volts from motor drive to all the componets which needs 5 volts to operate .




ARDUINO
UNO

Explanation of Code and Logic :

First I used 2 switches one for the overall power from battery and second is use to change the mode of robot I connect the second switch to the 5v supply and it connects it to Arduino dc port for the signal to change the mode to run which part of code (obstacle avoidance & line following).

Line Following :

For line following part, I used 2 IR sensors .So when left IR sensor detect the black tape it gives 0 so the right motor turn forward and when right IR sensor detect tape it gives 0 and the left motor turn forward. So the robot follow the tape in form of left right motion.

Obstacle Avoidance :

For obstacle avoidance part we used ultra sonic sensor which detect the obstacle and also give the distance from obstacle in centimeters. When the robot is in obstacle avoidance mode it first check for any avoidance in 30 cm distance if there is not any so it will move forward and when there is obstacle it stops and use servo motor to rotate 45 degree to both sides and check for obstacle by ultra sonic and gives the values to the left and and right distance variable and move left or right to the not obstacle side or where obstacle is far .it left and right by moving motors forward and other backward .and it all work in loop so it remain checking for any obstacle and moving forward.

Code for both modes Obstacle Avoidance and Line following :

The whole working code for robot is in this link ;
https://drive.google.com/file/d/1Qn17THRvS8cjFzdbOktWsjSyWzwQKYjo/view?usp=sharing

Conclution and working videos link :

All of the code is working perfectly .

Please check these links for working videos :

Line following :

https://drive.google.com/file/d/14WJWciNIRAUyWOoxd9LMnR8cZKkc35Q2/view?usp=sharing

Obstacle Avoidance :

https://drive.google.com/file/d/14Xjyrrm_t8blRb1WA8m_PzvUiHlGZBuA/view?usp=sharing

Citated Work :

[1] "What is Arduino?," [Online]. Available: https://www.arduino.cc/en/guide/introduction.