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Obstacle Avoidance & Light Following Robot

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ABSTRACT

Obstacle avoidance & light following robot can be used for Industrial purpose & Military operation. The major components include an Arduino Uno R3, Servo motor, BO motor, L298N motor driver, LDR module, Ultrasonic HCSR-04 sensor & holder, Chassis body, Battery & battery holder. The system is controlled by the Arduino Uno R3 module which is an advance version of a microcontroller and a part of embedded system. In this work, we have designed a robot, which is compact, autonomous and fully functional. It is a proposed model which can be used in such an environment, which may be vulnerable and risky to human being. It has four types of functions. The functions are light following, obstacle detection and controlling from an android device through Bluetooth or Wi-Fi module& capture the video clips of that area. Obstacle avoider light follower robot detects the light (such as the light of flashlight) and follows light on travelling path. Also it can detect the obstacles while it is moving and make the passes by the obstacles. The robot has two light detection sensors which are prepared with LDRs and an infrared obstacle detecting sensor. The sensitivity of the light sensor can be set by using the trim pots.

***Keywords*:** *Robot Sensing System DC motors, Smart Phones, Motor Driver.*

1. INTRODUCTION:

In present time, robotics is one of the important fields in modern and technological world for the design, construction, operation and application of robot**.** Before 20th century this sector was not developed successfully. Today the research, design, building of new robots used in different domestic, commercial, military sectors are developing the applications of robotics day by day. A Robot, in general an electro-mechanical & computer programming using power and control machinery device that can perform takes automatically depending on sensors. This project is designed to build obstacle avoidance at the same time light following robotic vehicle using ultrasonic sensor for its movement & LDR module to decide the path to follow according to the light falls on it. An Arduino Uno R3 is used to achieve the desired operation. Ultrasonic sensor is used to detect any obstacle ahead of it and sends a command to the Arduino. LDR

is used such that the amount of light falling on it, from every direction will be calculated and then it will find out the direction from which the light with maximum intensity falls on it. Then it moves in that direction only. L298N motor driver is used to increase the current by which we can drive the DC motors.

2. DESIGN OF THE SYSTEM:

The entire circuit diagram has two major sections. One is Light following with the help of LDR module & another is Obstacle detection with the help of Ultrasonic sensor.

2.1 block diagram of the system

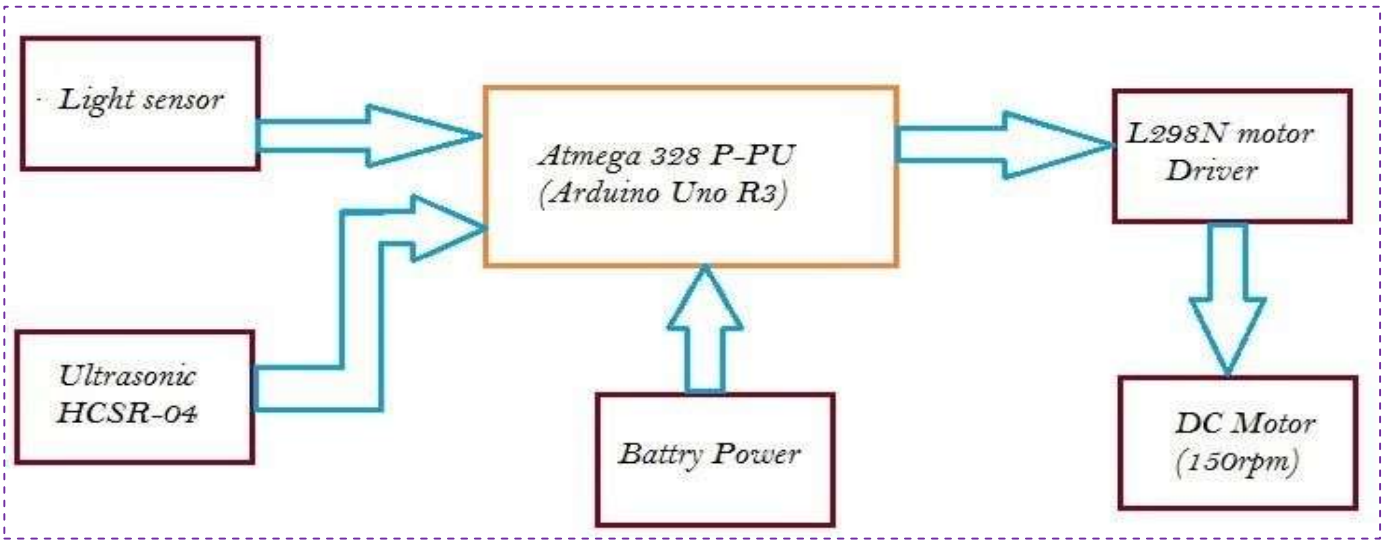


Figure 1: Block diagram of Obstacle Avoidance Based Light Following Robot

At first robot gets the power of 5v. Then after getting the light source the robot start to work. Where the LDR sensor get the highest intensity of light the robot will start to follow that path. When an Ultrasonic sensor gets any obstacle, it will stop the robot at that position and start to echo the pulses. The time of the triggering pin is measured the respected distance. Then the Ultrasonic sensor with the help of servo motor rotates 180 degree, the robot check its left and right path and the robot will travel to the long distance path. In the meantime stepper motor also generates the pulse and rotates the web camera with the help of light and the camera will capture photos and videos of that pulse and send the data to the user through Bluetooth or Wi–Fi.

3. CIRCUIT DESIGN AND OPERATION:

The heart of our module is Arduino Uno R3 is triggered by 3.7v, 1200 MAh battery socket. The microcontroller ATMEGA 328p-pu is programmed to control HCSR-04 (Ultrasonic module) & LDR module. As per program HCSR-04 module is connected to digital pin of Arduino for trig (7) & ECHO (8) & LDR module is connected to A0 , A1 (Analog pins) of Arduino. The output is sensed by the

Arduino and depending on the programming statues the specific digital data is sent to the motor driver module for different type of rotation using and control motor. Additionally the rotation of servo motor is digital pin of is Arduino controlled by the HCSR-04 depending on the obstacle detection. By condition of this sensor & program in Arduino controls the rotation & movement of the robot.

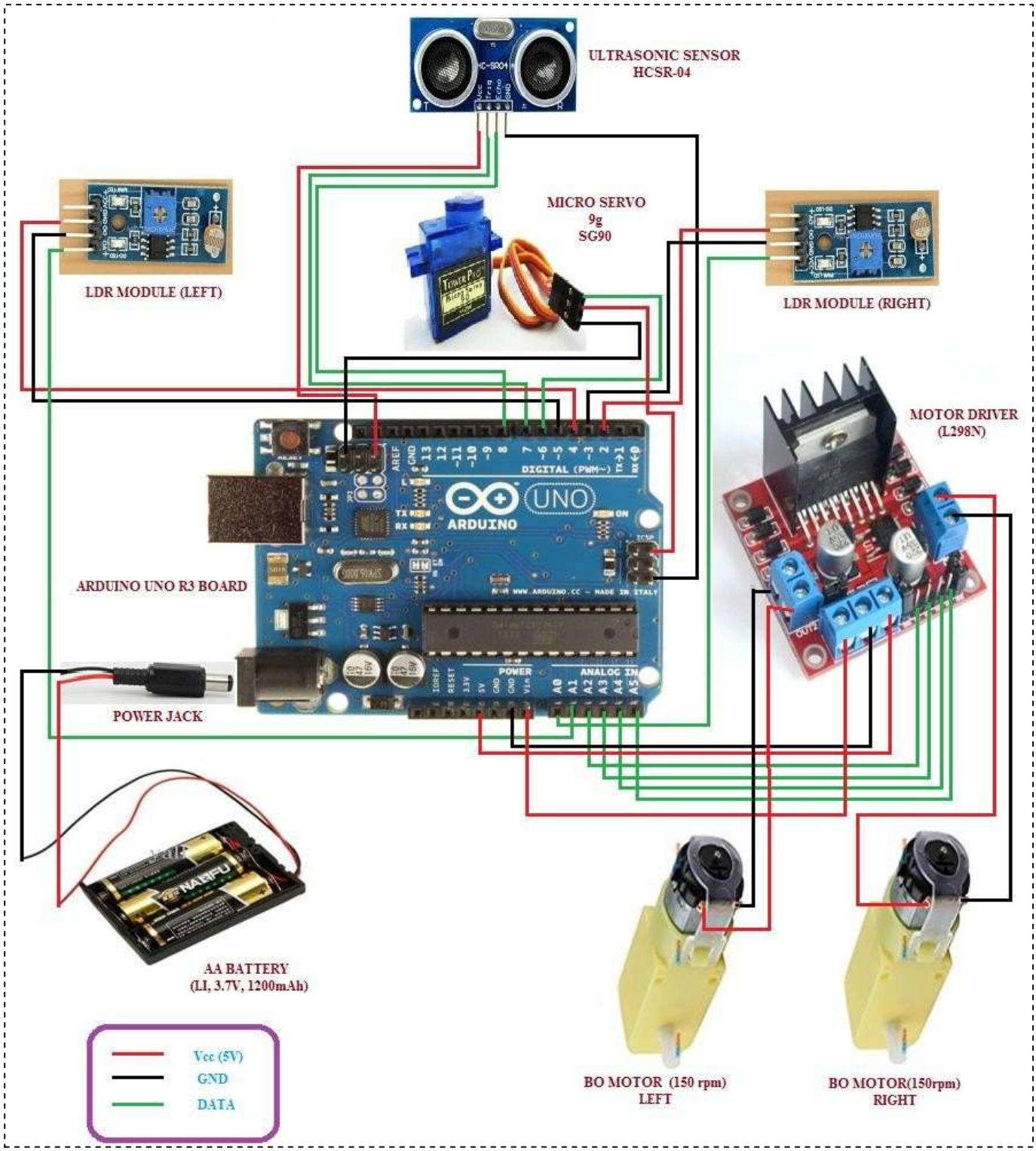
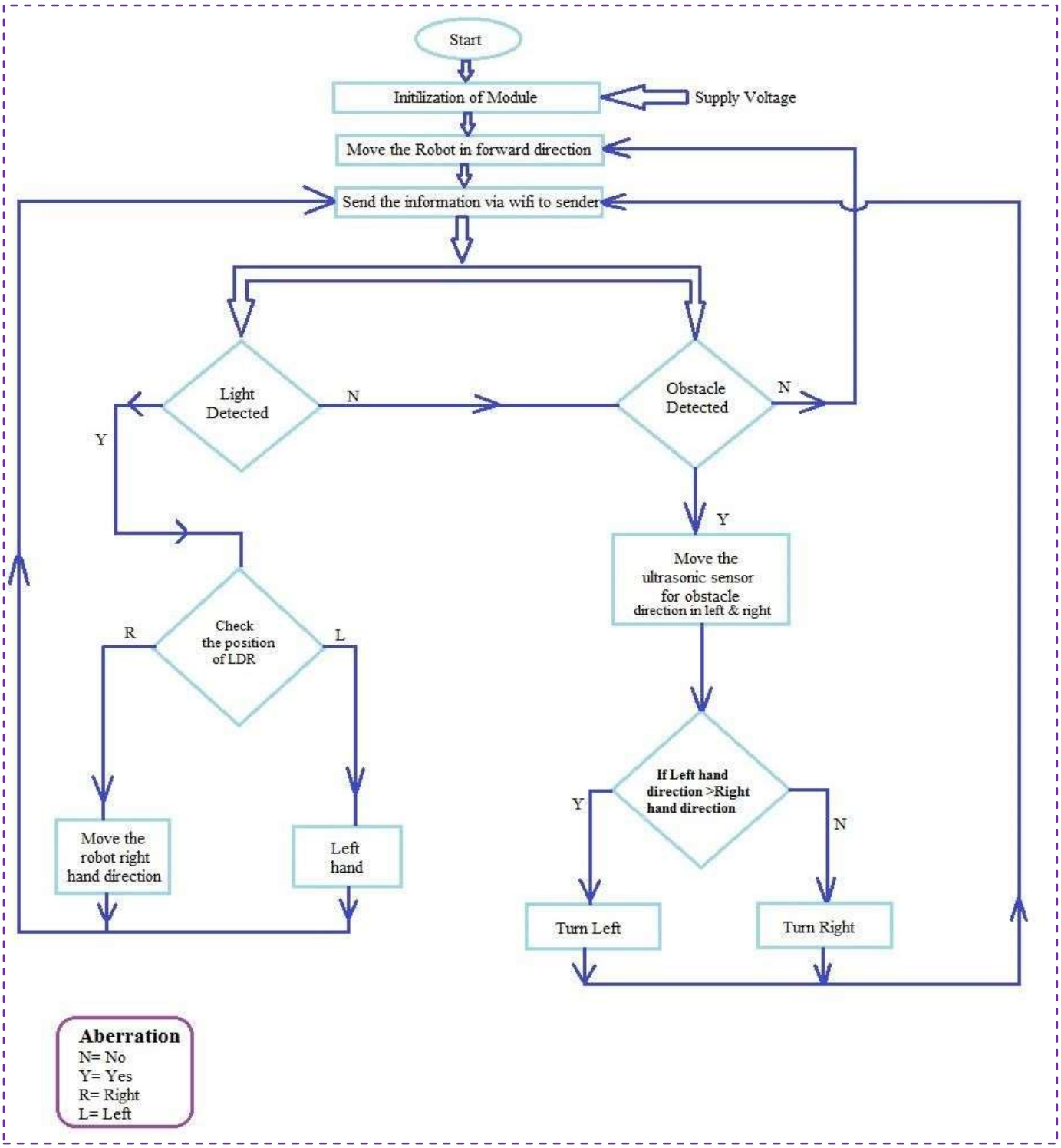


Figure 2: Circuit diagram of Obstacle Avoidance Based Light Following Robot

4. FLOW DIAGRAM :(As per coding)

Figure 3: Flow diagram of Obstacle Avoidance Based Light Following Robot.



5. ALGORITHM:

```
int right=0;
int left=0;
int statuss=0;
int a=0;
int val1=230;  //left sensor threshold
int val0=400;  //right sensor threshold
#include "Ultrasonic.h"
#include <Servo.h>

Servo myservo;

Ultrasonic ultrasonic(7,8);  //trigger, echo.
void setup()
 {
       myservo.attach(6);
       Serial.begin(9600);


      pinMode(A5,OUTPUT);
      pinMode(A4,OUTPUT);
      pinMode(A3,OUTPUT);
      pinMode(A2,OUTPUT);

      pinMode(2,OUTPUT);
      pinMode(3,OUTPUT);
      pinMode(4,OUTPUT);
      pinMode(5,OUTPUT);
      pinMode(13,OUTPUT);

     digitalWrite(2,1);
     digitalWrite(3,0);
     digitalWrite(4,1);
```

```
      digitalWrite(5,0);
      digitalWrite(13,0);
      myservo.write(80);



  }

void loop()
  {

    int s0=analogRead(A0);
    Serial.print("Right");
    Serial.println(s0);
    int s1=analogRead(A1);
    Serial.print("Left");
    Serial.println(s1);



    int ultra=ultrasonic.Ranging(CM);
   Serial.print("Ultra");
   Serial.println(ultra);
   delay(200);

   if(ultra>20)
     {
       statuss=0;
     }
  if(ultra<20)
    {
      statuss=1;
    }

  if(statuss==0)
    {

        if((s1>val1)&&(s0<val0)&&(a==0))
          {
```

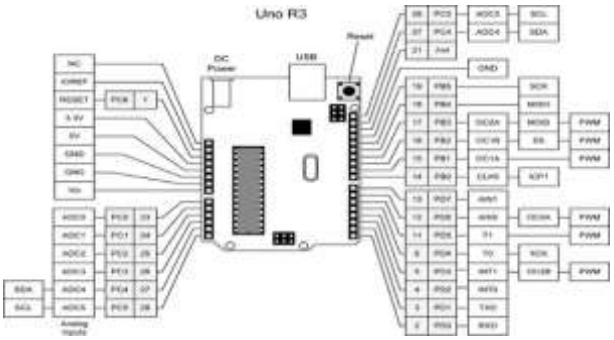
```
            left_spin();
          }

      if((s1<val1)&&(s0>val0)&&(a==0))
        {
           right_spin();
        }

    if((s1<val1)&&(s0<val0)&&(a==0))
       {
         forward();
       }

     if((s1<val1)&&(s0<val0)&&(a==1))
       {
          stopp();
        }

      if((s1>val1)||(s0>val0))
       {
         a=0;
        }

 }

if(statuss==1)
 {
    stopp();
    myservo.write(0);
    delay(2000);
    int right=ultrasonic.Ranging(CM);
    digitalWrite(13,1);
    delay(300);
    digitalWrite(13,0);
    Serial.print("Right");
```

```
        Serial.println(right);



        myservo.write(180);
        delay(2000);
        int left=ultrasonic.Ranging(CM);
        digitalWrite(13,1);
        delay(300);
        digitalWrite(13,0);
        Serial.print("Left");
        Serial.println(left);
        myservo.write(80);

    if(right>left)
        {
          right_spin();
          Serial.println("Go Right");
         delay(1000);
         stopp();
         a=1;
         delay(1000);
        }
     if(left>right)
        {
          left_spin();
         Serial.println("Go left");
         delay(1000);
         stopp();
          a=1;
         delay(1000);
        }

     }

}

  void stopp( )
```

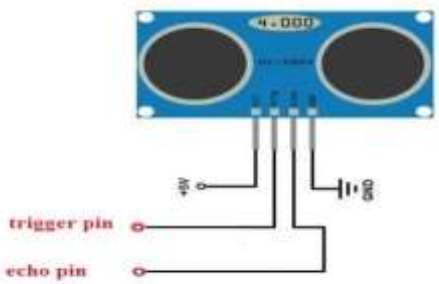
```
  {
    digitalWrite( );
    digitalWrite( );
    digitalWrite( );
    digitalWrite( );
 }


void forward()
 {
   digitalWrite( );
   digitalWrite( );
   digitalWrite( );
   digitalWrite( );
 }

void left_spin()
 {
    digitalWrite( );
    digitalWrite( );
    digitalWrite( );
    digitalWrite( );
 }

void right_spin()
 {
    digitalWrite( );
    digitalWrite( );
    digitalWrite( );
    digitalWrite( );
}
```

6. COMPONENTS USED:

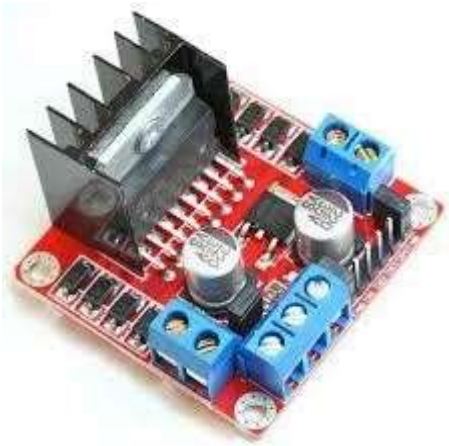
6.1 ARDUINO UNO R3 (Embedded Application Board)

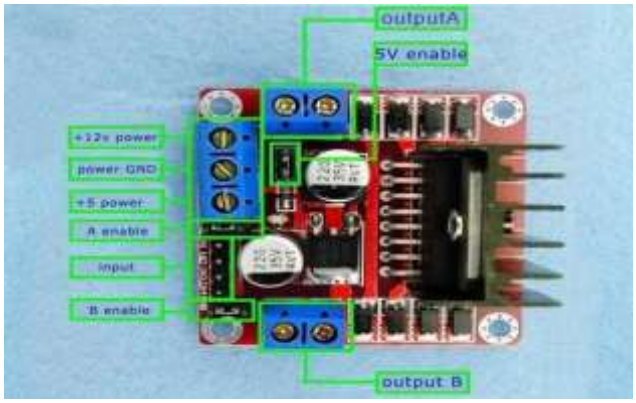


6.2 ULTRASONIC SENSOR HCSR-04

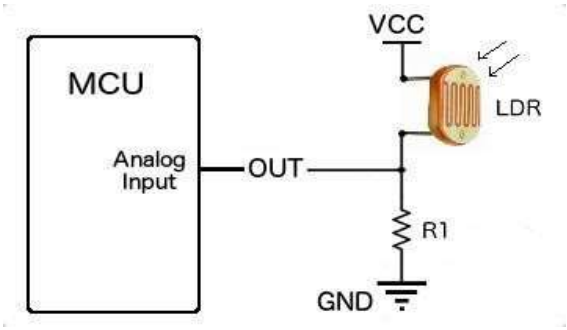


6.3 MOTOR DRIVER BOARD (containing L298N)

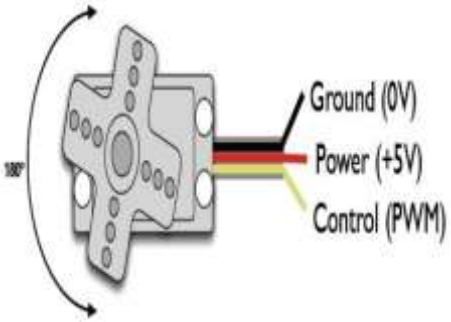




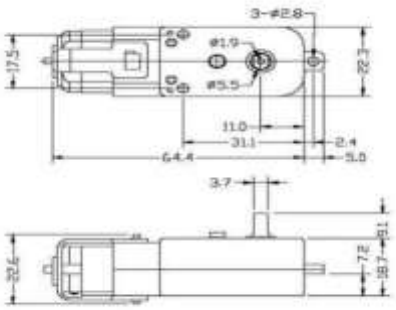
6.4LDR MODULE (2 nos)



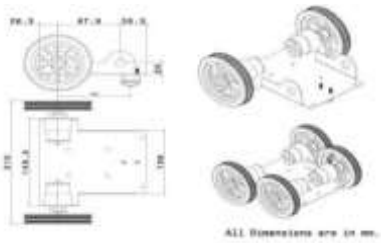
6.5 SERVO MOTOR (1nos)



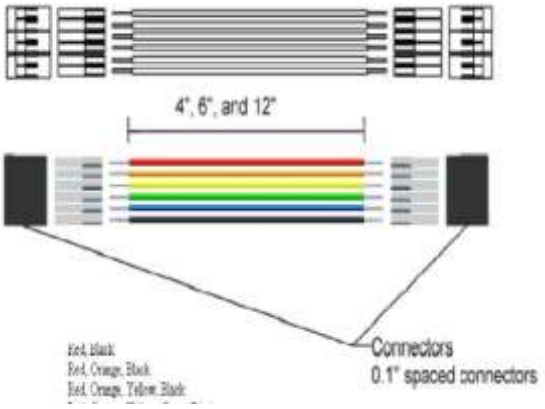
6.6 B0 MOTOR 150 rpm (2 nos)



6.7 CHASSIS & WHEELS



6.8 CONNECTORS (Jumpers)



6.9 BATTERY (2400mhh Li) & HOLDER (3 nos)

6.10 LIGHT SOURCE

7. APPLICATION:

- Automatic Street lights follower.
- Alarm devices in security purpose.
- This technology can also be used to measure light intensity for applications that require greater precision.

8. CONCLUSION:

We made the robot name Obstacle avoidance base Light Following Robot. In the modern era of science and technology it is necessary to reduce the man power and increase the uses of instrument. Through this hardware project we have learnt about many new projects and we have also developed our skill in programming. It was great scope for us to take the technology a little bit far.

ACKNOWLEDGEMENTS:

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[V] International Journal OF Conceptions on Computing and Information Technology Vol. 2 Issue. 4, June 2014; ISSN: 2345-9808

You can watch my module ->https://youtu.be/KfX4ugeJst

10.2. BOOKS:

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10.3. WEB-SEARCH

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[3] http://www.robokitsworld.com

[4] http://www.arduino.cc/en/Main/arduinoBoardUno

[5] http://atmel.in