

# Accident Prevention System For Blind Turns



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# Abstract

- ❖ Speed control is in the need of the hour due to the increased rate of accidents reported in our day-to-day life.
- ❖ In this project, we propose
  - I. An automatic speed control system based on color detecting sensor which detects the colors strips painted on roads.
  2. An alert system based on ultrasonic sensors which helps us in detecting vehicles on other end of curve.

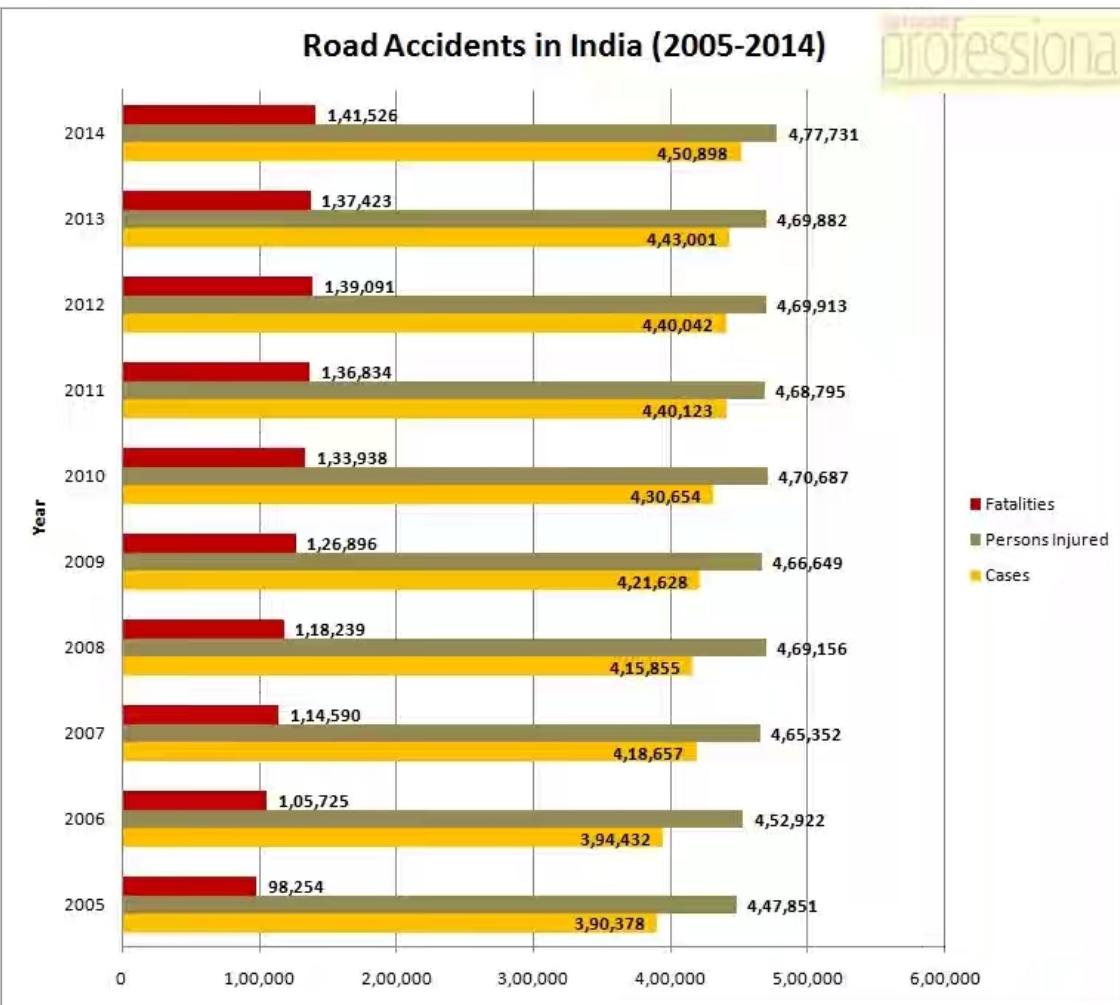
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# INTRODUCTION

- The **population** of our country has been increasing rapidly which indirectly has increased the **vehicle density** and with **increasing technology** the rush through life has also increased which became the causes of **Road accidents**.
- India accounts for highest number of road deaths in the world according to **International Road Federation(IRF)**, out of which major of the deaths were due to overspeeding.



Ref-3

- Over the past few years overspeeding accounted for highest share of 66% accidents and 61% of deaths.
- Many accidents also occur due to rear end collisions which mostly take place at blind turns, as the driver is not aware of the vehicle coming from opposite side.
- Reasons for overspeeding :
  1. people in hurry.
  2. people who enjoy driving fast.
  3. Driver is unaware of the speed limit.





**DELHI POLICE**

24 Hours Traffic Helpline 011-25844444

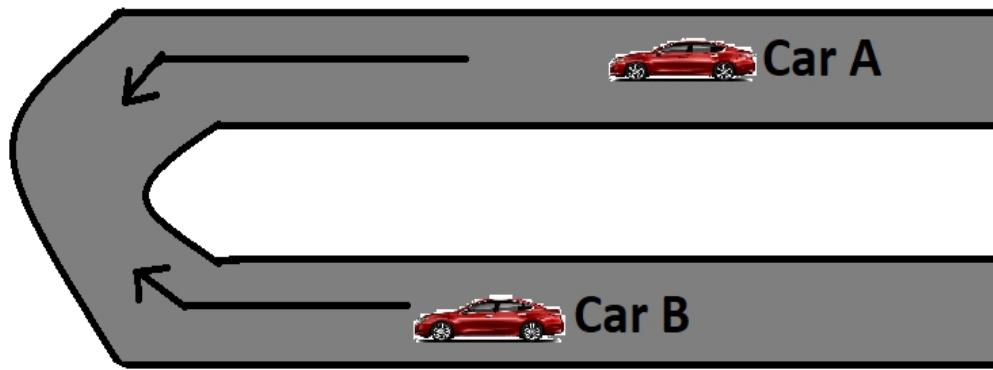


**SPEED** thrills... but **KILLS**

## **Problem:**

1. We see many accidents in our day to day life. One of the current existing problem is accidents at blind turns (with no divider) and overspeeding.
  
2. The turns are called blind turns as the driver is unaware of the presence of a vehicle on the other side of the turn, which leads to bumping of vehicles into each other and if the speed of vehicle is high then the extent of accident becomes severe.

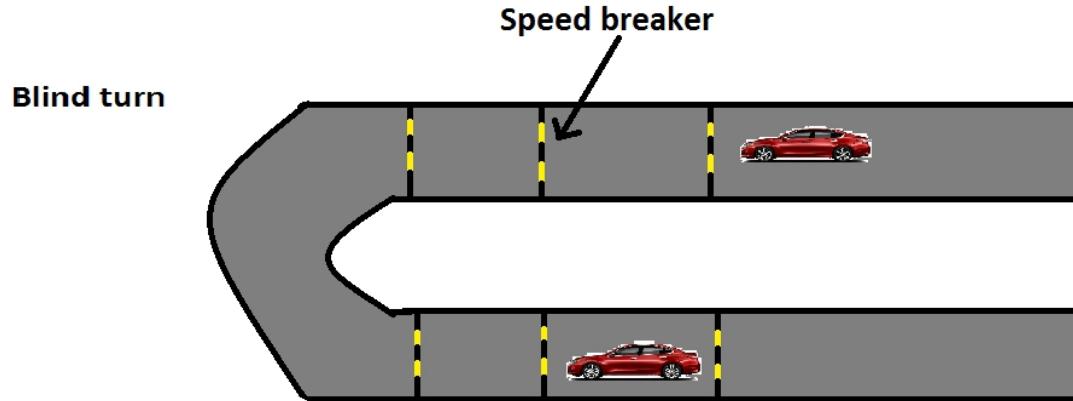
Blind turn



In the above figure we can see that the two cars A & B are coming in opposite directions. Since both doesn't know the presence of each other at the end of turn this leads to probability of collision.

# Possible Solution:

Use speed breakers at turn to reduce speed and decrease possibility of collision.  
But there exists certain disadvantages like:



- 1. Maintenance Cost**
- 2. Ride Discomfort**
- 3. Loss of Lives**
- 4. Construction Cost**

# **Proposed Solution:**

Considering the disadvantages of the above model and to overcome those we proposed a design which provides both

- I. Automated Speed control**
- 2. Alert system for detection of vehicle at turn.**



# **LITERATURE REVIEW**

- ❖ Sandor Szabo, Joseph Falco and Richard Norcross[4] proposed a design to determine potential safety benefits and user acceptance of integrated rear-end, lane-change/merge and road departure crash warning system for vehicles and heavy commercial trucks.
- ❖ The authors used Laser scanners (front ) to measure the ranges to obstacles in front of the tested vehicle and calibrated cameras( front and sides) to measure the distance to lane markers and the vehicle's position within the lane

- ❖ In S.P. Bunker, et al [5] described a real-time online safety prototype that controls the vehicle speed under driver fatigue.
- ❖ The purpose of such a model is to advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents. The main components of the system consist of number of real time sensors like gas, eye blink, alcohol, fuel, impact sensors and a software interface with GPS and Google Maps APIs for location.

- ❖ In Jyotika Kapur et al [6] dealing with India there has been an increase of 17.4% in the total number of road accidents during the period of 2011-2012. This percentage has raised eyebrows and caught the attention of many to curb the growing rate.
- ❖ It is found that 80% of the times it is the fault of the driver. This can be avoided if we could device a mechanism which could alert the driver about the coming jeopardy. This can be achieved by monitoring the distance between two cars using Bluetooth.
- ❖ If the distance decreases than the one specified, the driver would be signaled and according to the signal, necessary actions will be taken by the mini gadget present in the car. This paper proposes that with the help of Bluetooth technology, we can keep track of the speed of the car and take appropriate actions to avoid accidents.

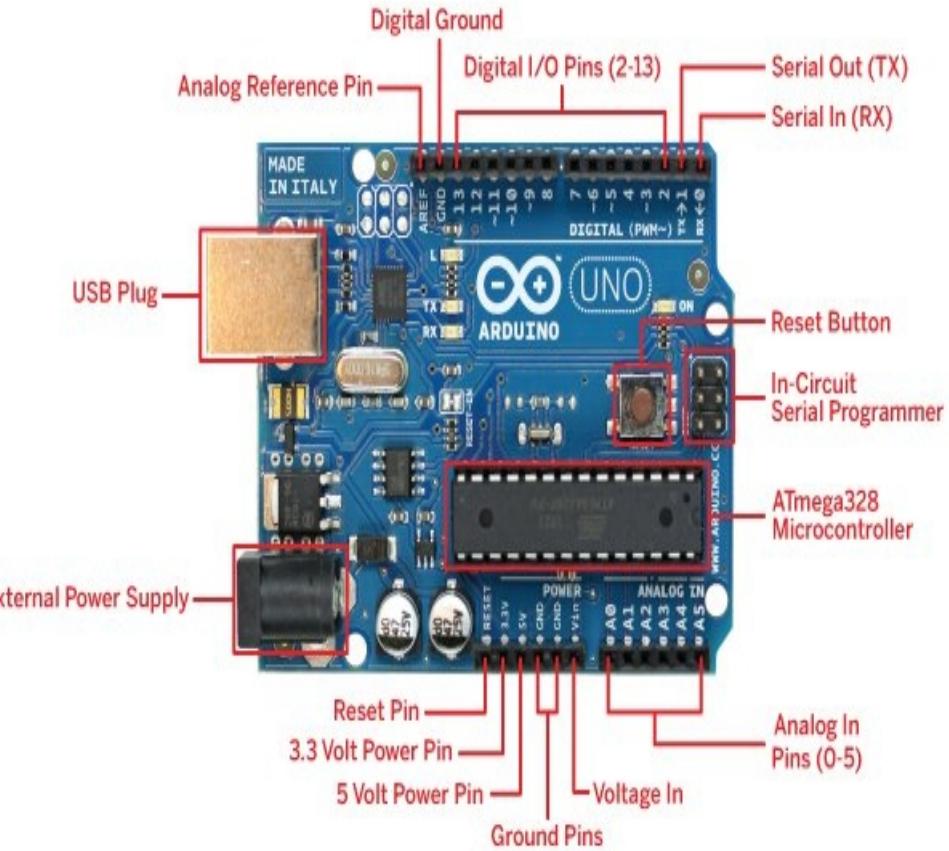
- ❖ K.Dhamodharan, S. Naresh Krishna, R.Thanasekaran[7] proposed a model which includes controlling of speed at curves, using displacement sensors to sense distance between itself and obstacles, speed sensor to detect speed and also a night vision camera facility was provided and a load sensor that calculates the load carried by the vehicle.
- ❖ The type of displacement sensor they have used is Ultrasonic Sensor which can accurately detect the object and measure the distance between them by transmitting a short burst of ultrasonic sound toward a target. When the sound is reflected, it returns to the sensor as an echo.



# **SOFTWARE & HARDWARE TOOLS**

# I.Arduino UNO

Arduino is a  
Microcontroller used  
for building interactive  
devices that can  
Sense and control  
Objects in the physical  
& digital world.



## USB Cable A to B

This cable is used to establish connection between arduino and the system.



## 2. Arduino IDE 1.8.5

The **Arduino integrated development environment (IDE)** is a open source cross-platform java application that serves as a code editor and compiler and is also capable of transferring firmware serially to the board.



*Verify*

Checks code for errors compiling it.



*Upload*

Compiles code and uploads it to the configured board

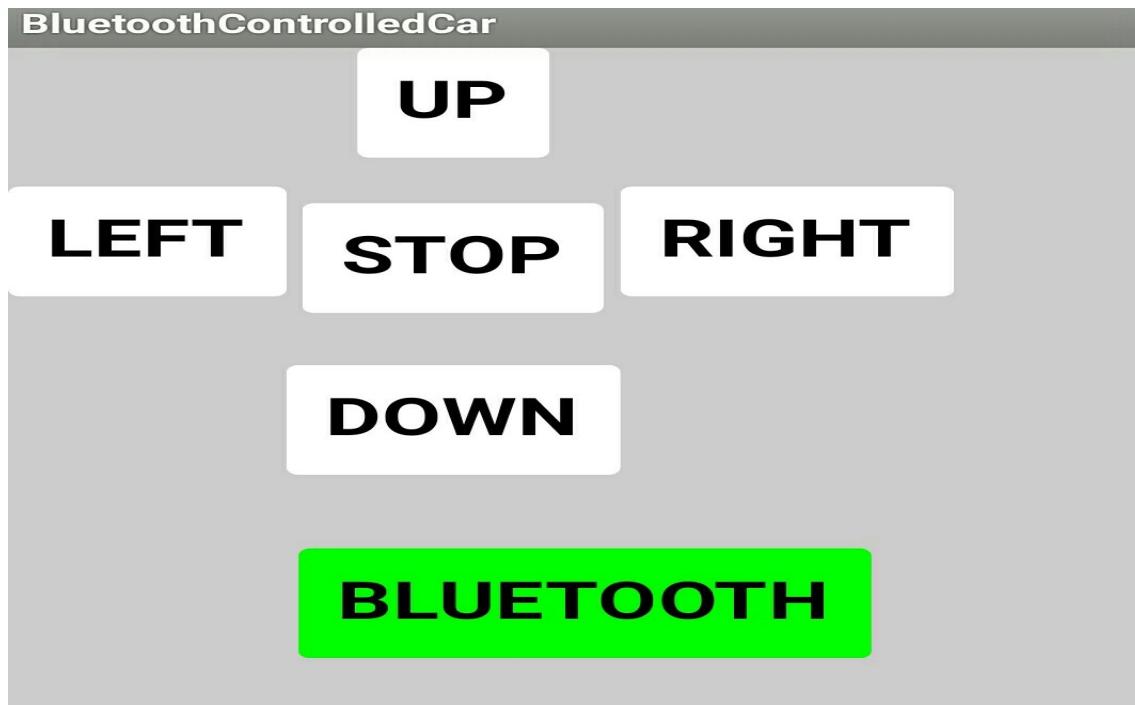


*Serial Monitor*

Opens the serial Monitor.

### **3. Bluetooth Car App**

This app controls the movement of car by sending signals to the Bluetooth sensor mount to the car.



# Creating the App :

```
when ListPicker1 .BeforePicking
do set ListPicker1 . Elements to BluetoothClient1 . AddressesAndNames

when ListPicker1 .AfterPicking
do set ListPicker1 . Selection to call BluetoothClient1 .Connect
address "00:21:13:00:B6:75"
set Label5 . Text to "CONNECTED"

when Button1 .Click
do call BluetoothClient1 .SendText
text "F"

when Button2 .Click
do call BluetoothClient1 .SendText
text "B"

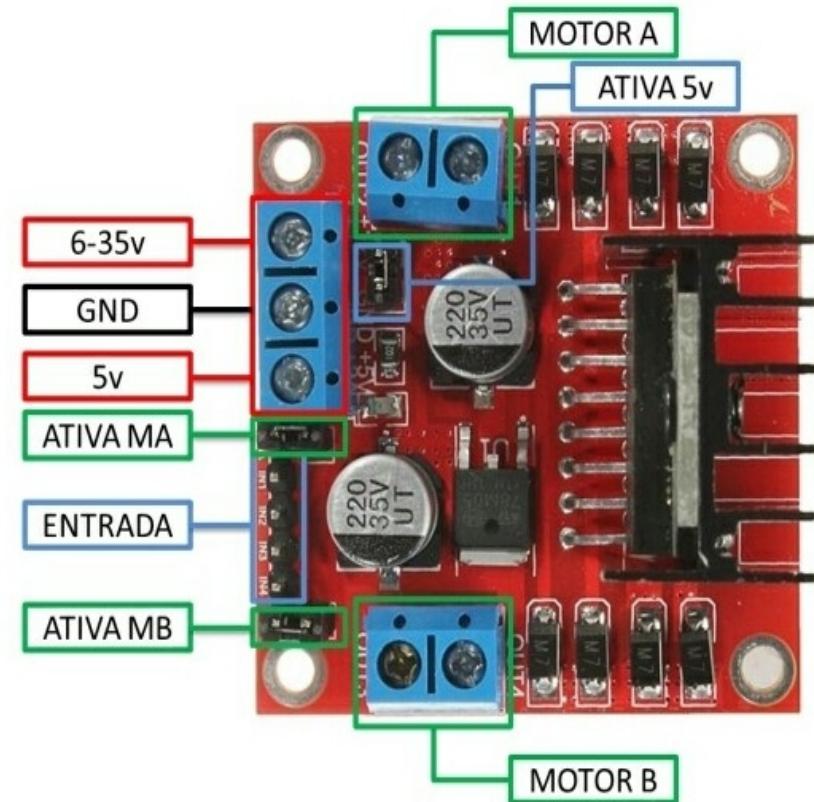
when Button3 .Click
do call BluetoothClient1 .SendText
text "L"

when Button4 .Click
do call BluetoothClient1 .SendText
text "R"

when Button5 .Click
do call BluetoothClient1 .SendText
text "S"
```

## 4. L-298 Motor driver

- ❖ L-298 is a motor driver (H-Bridge) which has two inputs to control a device.
- ❖ L-298 is able to control two different DC motors simultaneously as it has two Pulse Width Modulation (PWM) pins.



## 5. TCS3200

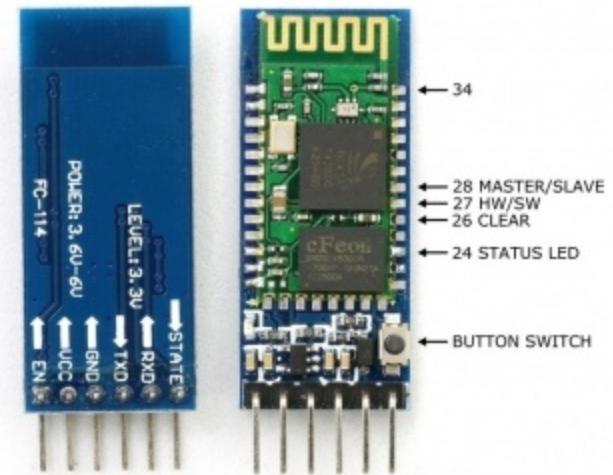
- ❖ TCS3200 has both RGB and clear light sensing elements.
- ❖ The color detection takes place based on color sensing done by photodiode.

S2	S3	PHOTODIODE TYPE
L	L	Red
L	H	Blue
H	L	Clear (no filter)
H	H	Green



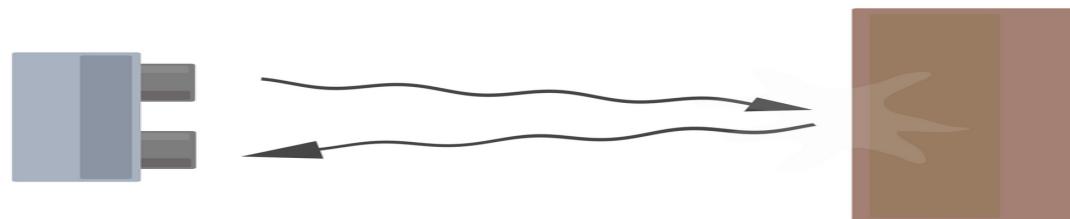
## 6. Bluetooth sensor

**HC- 05 module** is an easy to use **Bluetooth SPP (Serial Port Protocol) module**, designed for transparent wireless serial connection setup. In order to pair this with mobile use pass code as 0000 or 1234.



## 7. Ultrasonic sensor

This is a transceiver which works on the principle similar to radar or sonar and evaluates attributes of object based on echo.



$$distance = \frac{speed\ of\ sound \times time\ taken}{2}$$

## 8. Car Module

### Specification :

- Operating voltage : 3v ~ 12v dc
- Rpm : Approximately 100 rpm
- No load current : 40 ~ 80ma



## 9. Jumper Wires



These wires are used to interconnect components of a breadboard or other prototype or test circuit, internally or with other equipment or components without Soldering.

# 10. LED's



Light emitting diode  
emits light when activated.



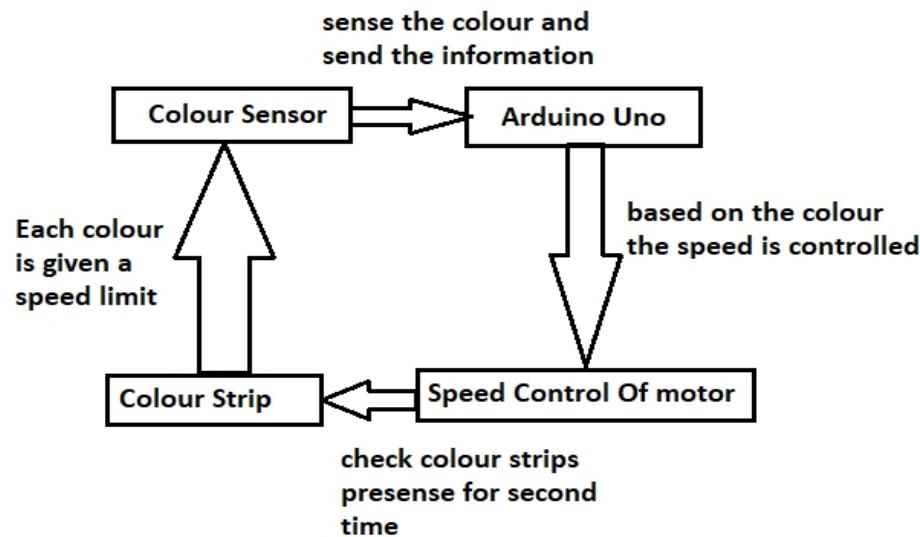
# **PROPOSED DESIGN**

This work is design to develop a new system that can control speed of the system based on color strips on the roads where the speed control within limit is required.

- various color strips are marked on turnings and vehicle will have a sensor attached which will recognize the color marked on the road and accordingly maintain the vehicles speed in that particular limit.
- For alerting the vehicle on the opposite side of the curve we used an ultrasonic sensor & LED placed before both the ends of the curves. When an Ultrasonic sensor detects any vehicle on one side of the LED on the other side glows.

# **Design for Speed Control :**

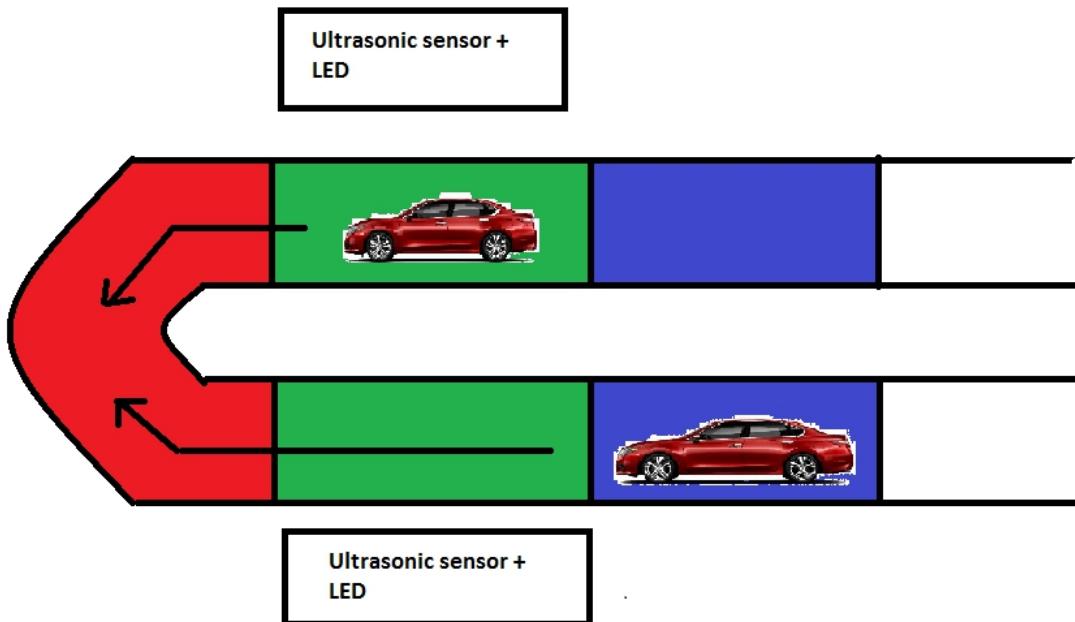
The Road is painted in stripes with Red, Green, Blue color's, Inorder to gradually bring down the speed of vehicles. Detection of blue decreases the speed a little, while the green color makes the car to move at moderate speed and the red color means minimum required speed.



## **Design for Alerting system :**

For this an ultrasonic sensor and an LED is placed before both the ends of the turns. On detection of vehicle on one side the LED on the other side glows which indicates the presence of vehicle i.e alerts the drive about the vehicle coming by.

**Proposed Design**



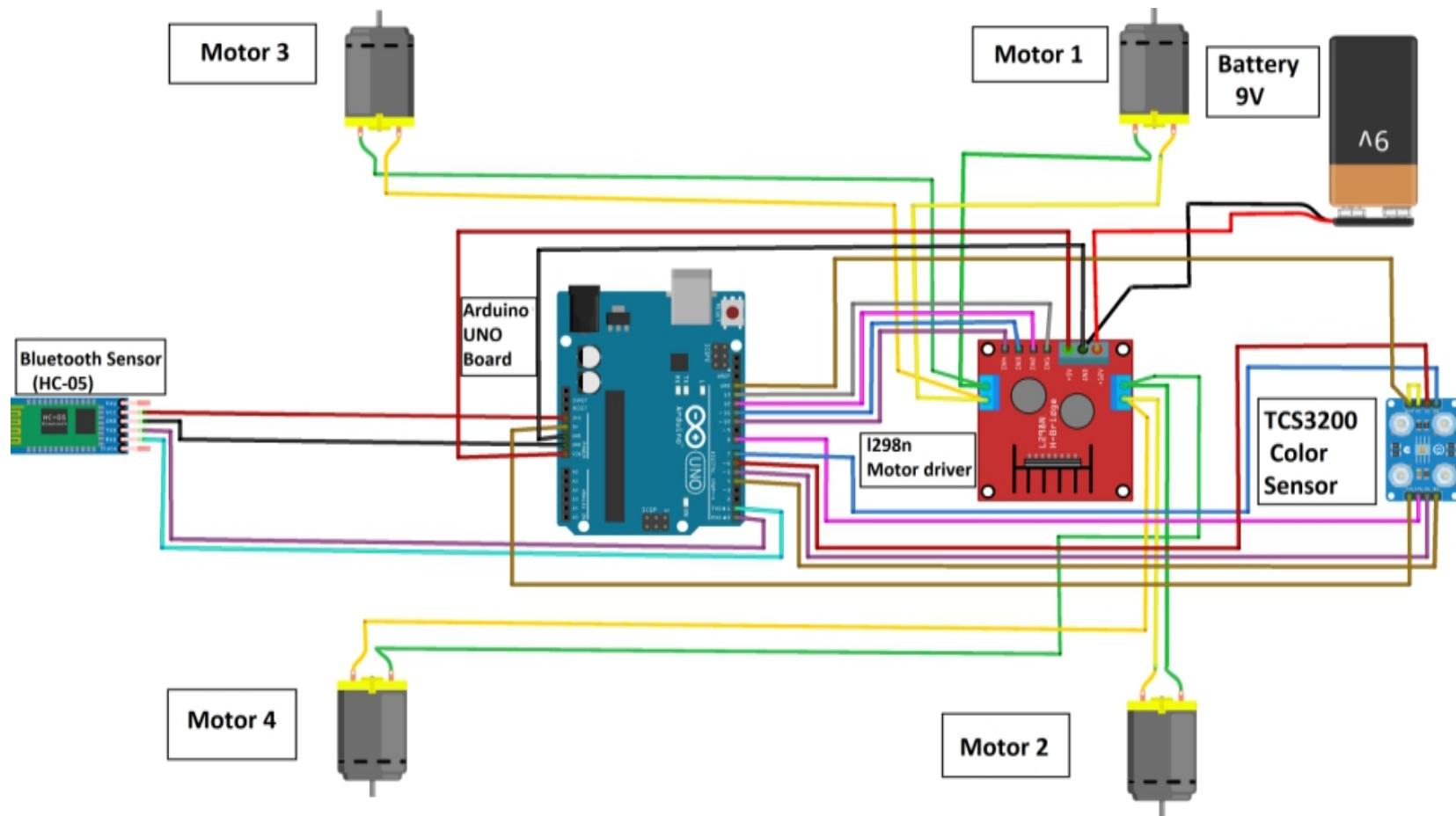


# **IMPLEMENTATION**

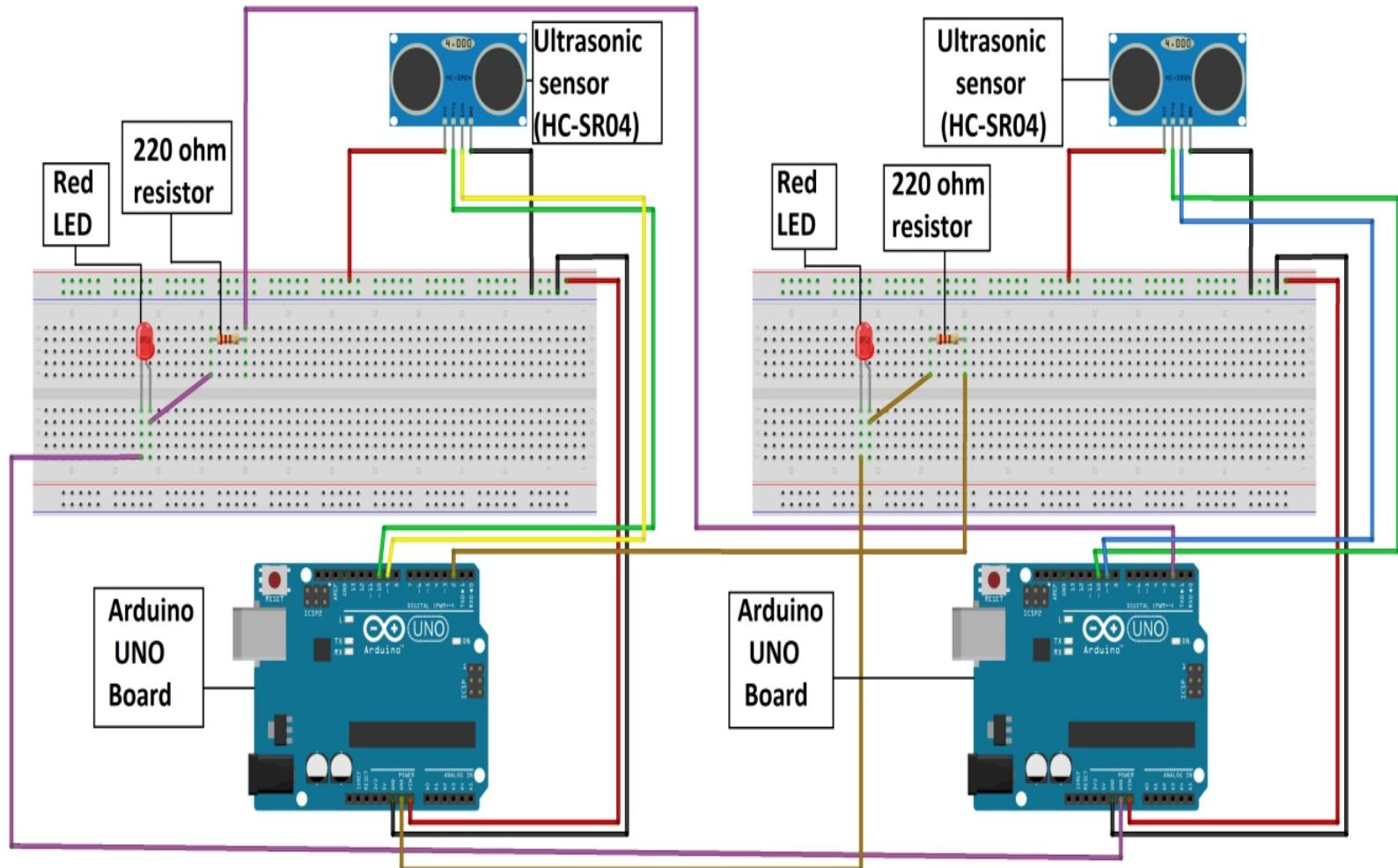
## CIRCUIT DIAGRAM :

The implementation is done using Arduino UNO board as an ideal development platform.

## Implementation of speed control :



## Implementation of alert system :



S.No	color	RPM of Motor	PWM value
1	No color (normal road)	100	255
2	BLUE	98	250
3	GREEN	69	175
4	RED	53	135

$$\text{Velocity (v)} = \frac{2\pi r * \text{rpm}}{60} \text{ m/s}$$

$$V1= 0.31 \text{ m/s} \quad V2= 0.30 \text{ m/s}$$

$$V3= 0.20 \text{ m/s} \quad V4= 0.17 \text{ m/s}$$

## Section of code for speed control

```
int CS=color_sensor_function();
if(CS==4)
    { speed_control(255,255);
      Serial.print("255");
    }
if(CS==1)
    {speed_control(250,250);
      Serial.print("250");
    }
if(CS==2)
    {speed_control(175,175);
      Serial.print("175");
    }
if(CS==3)
    { speed_control(135,135);
      Serial.print("135");
    }
```

```
void speed_control(int a,int b)
{
analogWrite(ENA, a);
analogWrite(ENB, b);
}
```

## **Code section for movement of car**

```
if(t == 'B'){
    digitalWrite(13,LOW);
    digitalWrite(12,HIGH);
    digitalWrite(11,HIGH);
    digitalWrite(10,LOW);
}

else if(t == 'L'){
    digitalWrite(13,HIGH);
    digitalWrite(12,LOW);
    digitalWrite(11,LOW);
    digitalWrite(10,LOW);
}

else if(t == 'S')
{
    digitalWrite(13,LOW);
    digitalWrite(12,LOW);
    digitalWrite(11,LOW);
    digitalWrite(10,LOW);
}
```

## **Section of code for alert system**

```
digitalWrite(trigPin, LOW); // Added this line
delayMicroseconds(2); // Added this line
digitalWrite(trigPin, HIGH);
delayMicroseconds(10); // Added this line
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distance = (duration/2) / 29.1;
if(distance>0 && distance<=20)
    digitalWrite(led,HIGH);
delay(20000);
```



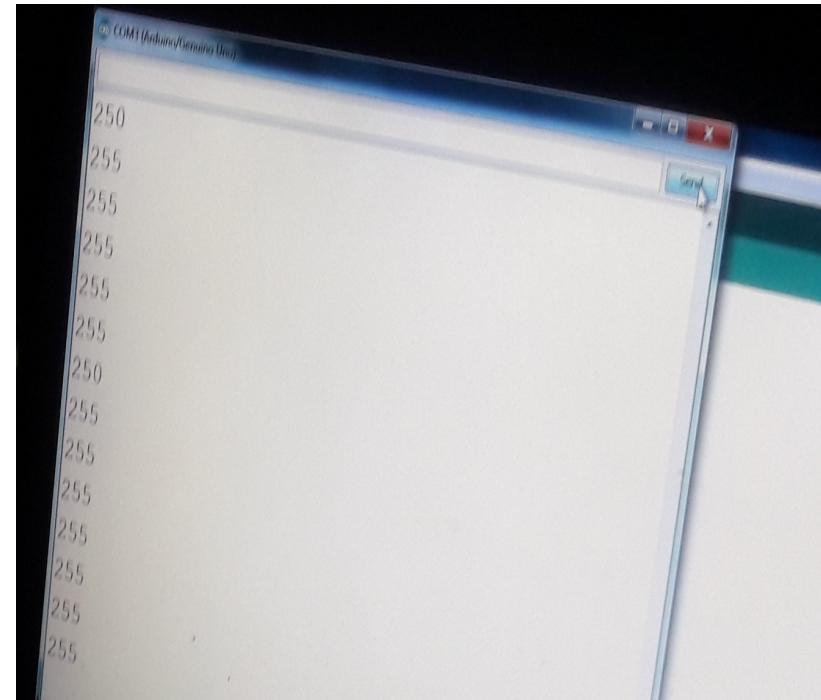
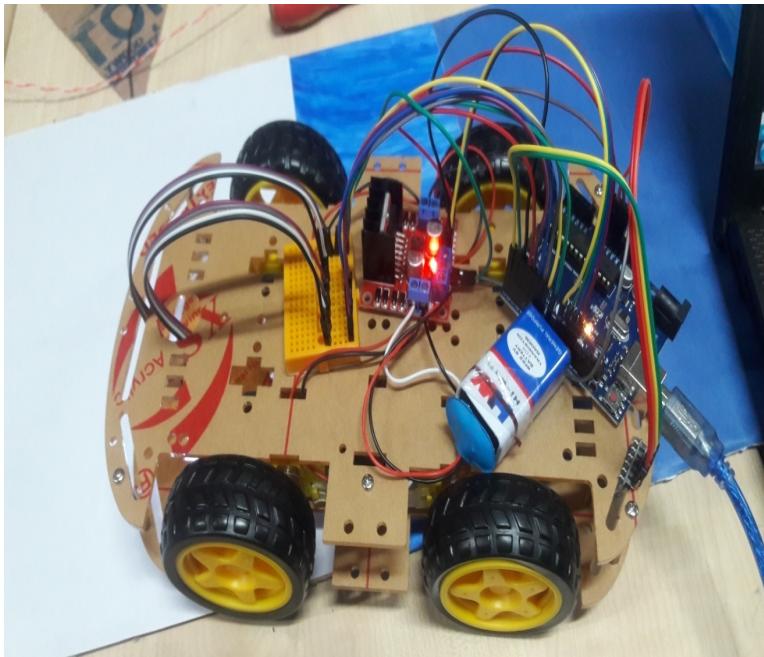
# **RESULTS**



# Designed system

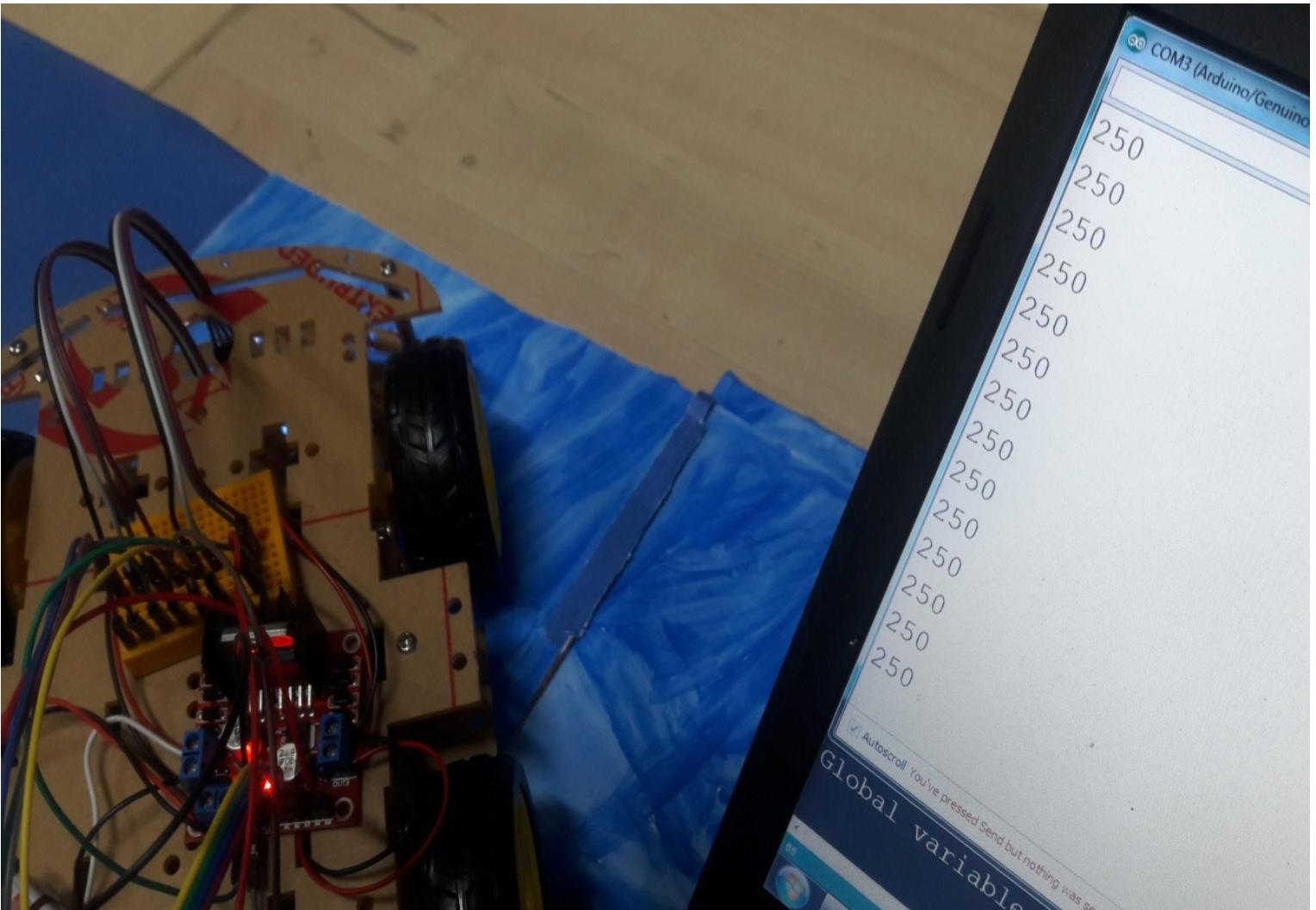
# Output speed when there is no colour on road

255 PWM value implies 100 rpm full speed



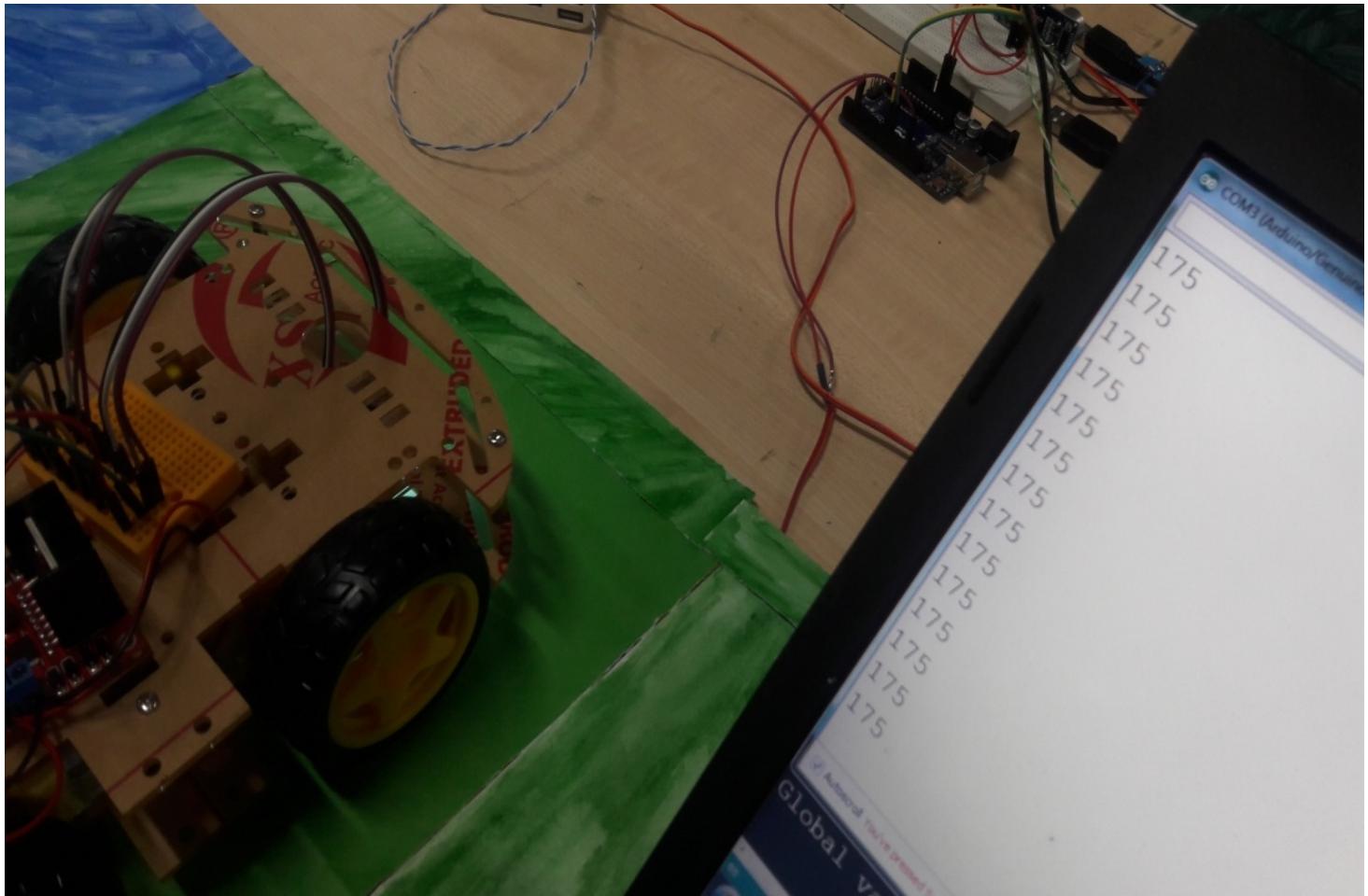
# Output speed when road is painted with blue colour

250 PWM value implies 98 rpm



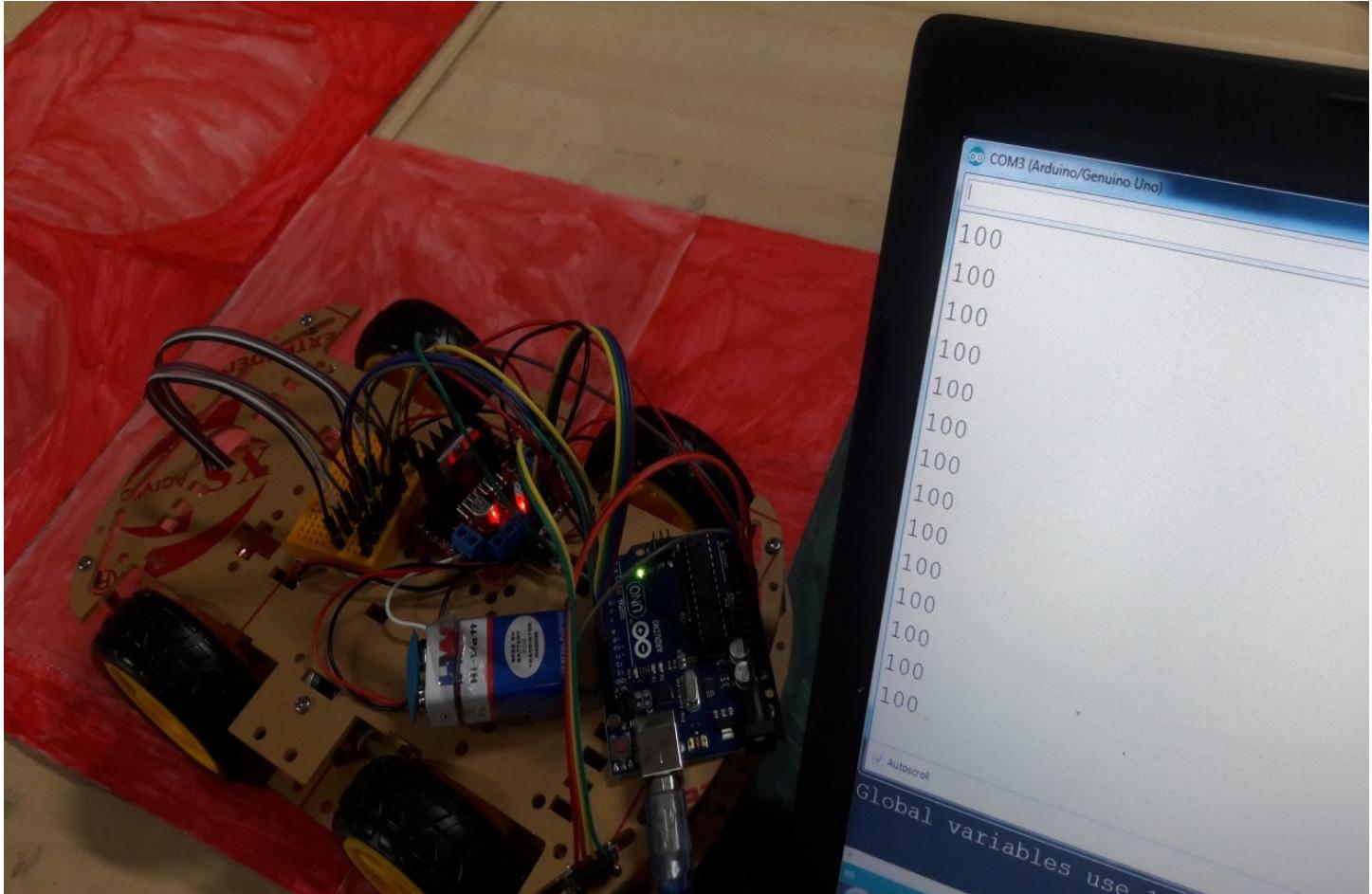
# Output speed when road is painted with green colour

175 PWM value implies 68 rpm



# Output speed when road is painted with red colour

100 PWM value implies 39 rpm



# Alerting vehicle about the presence of another vehicle on other side of road



# Future direction of work

- We can implement this system over normal speed limiting roads.
- This can also be used in place of divider's and speed breakers.
- Usage as a divider helps in prevention of high collisions to divider at night and also helps vehicle in maintaining its path.



## **SUMMARY AND CONCLUSION**

- ❑ In this project, we presented a system design for automatic speed control and vehicle detection at turns to reduce the probability of accidents.
- ❑ It is designed by PWM technique for speed control and echo mechanism followed by ultrasonic sensor for detection of vehicle.
- ❑ The utilization of the customized codes in the design models delivers high level of performance and efficiency.
- ❑ In addition, this implementation is highly advantageous because the system becomes highly flexible, simple and reliable.

# 6. References

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4. Sandor Szabo, joseph Falco, Richard Norcross," An Independent Measurement System For Automotive Crash Warning Systems," *U.S. Department Of Commerce, technology Administration, national Institute Of Standards And Technology, Intelligent Systems Division, Gaithersburg.*

5. S.P. Bhumkar, V.V. Deotare, R.V. Babar “Accident avoidance and detection on highways” Vol.3 Issue2-2012.
6. Jyotika Kapur “Accident Prevention via Bluetooth” Volume 2, Issue 4, July 2013.
7. K. Dhamodharan, S.Naresh Krishnan, R. Thanasekaran, “ROAD CURVE ACCIDENT PREVENTION SYSTEM,” *8<sup>th</sup> Urban Mobility India Conference and Expo 2015*.



**THANK YOU !**