



**Savitribai Phule Pune University**



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K.R.T.ARTS, B.H.COMMERCE &  
A.M.SCIENCE COLLEGE,  
NASHIK-422 002  
(NAAC ACCREDITED "A++"GRADE)**

*A  
Project Report*

*On*

**"MULTI-FUNCTIONAL ROBOT"**

**[OBSTACLE AVOIDING ,LINE FOLLOWER ,SMARTPHONE CONTROL ,VOICE  
CONTROL ,REMOTE CONTROL ROBOT]**

**Submitted to**

**Dept. of Electronic Science**

**BY**

**GUPTA SURAJ RAMSEVAK**

**T.Y.B.Sc.**

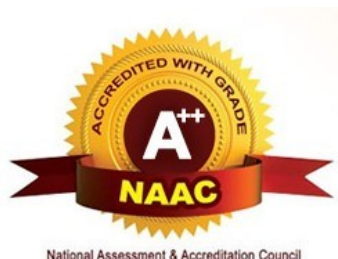
**Roll No:- --10-----, Univ. Exam Seat No:------**

**Guide: Prof.--S.K.Jadhav**

**2021-22**



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# **CERTIFICATE**

This is to certify that **GUPTA SURAJ** of T.Y.B.Sc., **Roll No. 10,**  
**Exam. Seat No:-----** has completed project satisfactory as partial  
fulfillment of curriculum during academic year **2021-22.**

**Prof.-S.K.JADHAV**  
**Project Guide**

**Prof. S.S.Demse**  
**Head of Department**  
**Electronic Science**

**Internal Examiner**

**External Examiner**

## INDEX

Sr.No.	Topic Name	Page No.
1	Acknowledgement	
2	Abstract	
3	Introduction	
4	Literature survey	
5	Block Diagram	
6	Component Specification	
7	Hardware Designing <ul style="list-style-type: none"><li>● Circuit Diagram</li><li>● Working</li></ul>	
8	Software Development <ul style="list-style-type: none"><li>a) Algorithm</li><li>b) Flow chart</li><li>c) Program code</li></ul>	
9	Advantages and applications	
10	Result and Conclusion / future scope	
11	Reference	

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I express my sincere thanks to lab assistant Shri. U.S.Derle , Shri. Rathod and Mr. Sachin Gangode for providing the essential facilities to carry out all necessary things of my project work.

Finally, I would like to thank my class friends without whom I would not have been able to complete this project in due time.

**SURAJ RAMSEVAK GUPTA**

**Name of student.**

## **Abstract**

The aim of this project is to develop a prototype of a Multi-Functional robot car that performs a various function in order to provide a very powerful and versatile robot while also reducing the hardware usage as much as possible. In this project, Arduino UNO is used as a central component, to which all the other components are interfaced. The designed vehicle is controlled wirelessly through a smartphone with the help of a HC-05 Bluetooth module. We create android based app to control the robot with the help of MIT APP INVENTOR. We design the UI of the app. The chassis is simple one made from PVC Sheet with high gauge thickness.

My Arduino based Robot having many types of features. It is not only smartphone control Robot we can switch this robot into Obstacle avoiding mode as well as Line Follower Mode for this feature we add the ultrasonic sensor to sense the obstacle in its path and IR sensor to sense the track and follow according to it. We also add a TSOP1838 Ir receiver because of this we can control this through ir remote. We also add a Voice Control system in this robot.

# INTRODUCTION

With the increase of technological advancements, everyone wants multitask-enabled products. In the past, numerous robotic cars were built to perform certain type of tasks. With this project, a wide scope of capacities is incorporated into a solitary model of a military automated vehicle, industrial used ,household purpose and many more. The multi-functional robot consist multiple features we control this robot thorough mobile application which we design this app with the help of MIT APP INVENTOR . In this robot we can control the robot through smartphone and also we shift this robot into obstacle avoiding mode through mobile in a single click . When it is shifted to Obstacle Avoiding mode it detect the obstacle in front of him and change the path easily to avoid the obstacle. This also has a features of line follower or we can also say that it follows a track. We add the 1838 IR sensor because of this we can not only control the robot thorough smartphone but also it can control by an transmitter remote. The aim of this project is to develop a prototype of a Multi-functional robot car that performs a various function in order to provide a very powerful and versatile robot while also reducing the hardware usage as much as possible. In this project, Arduino UNO is used as a central component, to which all the other components are interfaced. The designed vehicle is controlled wirelessly through a smartphone with the help of a Bluetooth module.

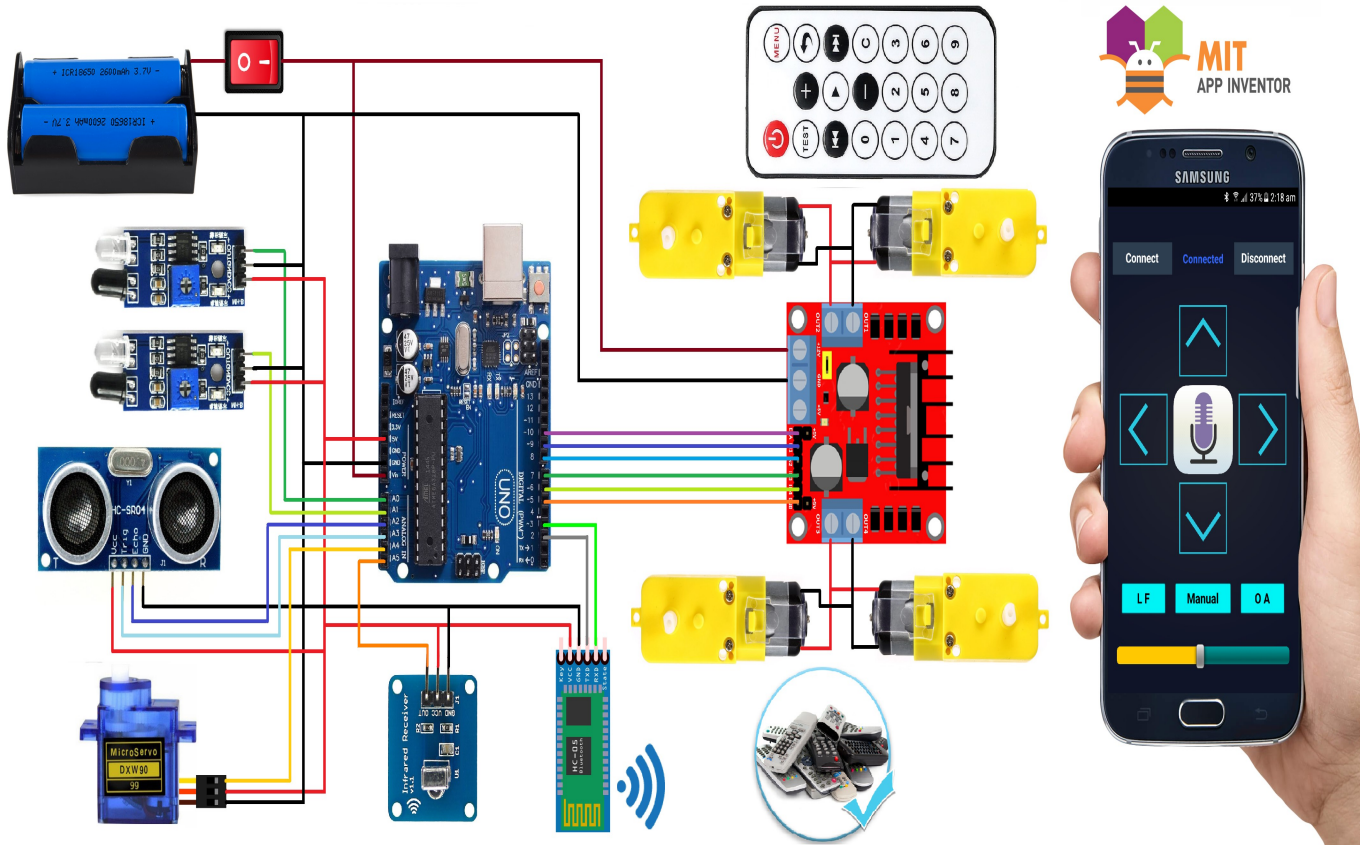
## LITRATURE SURVEY

In this paper, a robot is designed to allow it to follow a black line path while accommodating various other features such as collision detection and avoidance or falling from a certain height with great stability and control. The design is incorporated with IR sensors, Bluetooth modules interfaced with a central Micro-controller Arduino UNO. The robot is controlled by used end connected through long range Bluetooth connectivity and the path of the car can be changed from the used side [1].

A Bluetooth empowered mechanical vehicle is planned and afterward it gives a point by point similar examination of different sensors utilized in apply autonomy. The planned vehicle is controllable by utilizing a Bluetooth module and a mechanical knock sensor is connected on the facade of the vehicle to decide whether an impact has happened to it likewise gives the specific time of crash [2].

A mechanical vehicle is structured with the assistance of a Micro-controller Arduino UNO. The vehicle is wirelessly controlled with the help of a Bluetooth module. The activity of the structured vehicle is separated into two portions. One deals with wireless communication using an application, and the other deals with avoiding collisions. On detecting any object within a threshold distance, the car stops and analyze all directions forward, backward, right and left. Whichever provides more clearance, the car moves in that direction [3].

## BLOCK AND CIRCUIT DIAGRAM :-



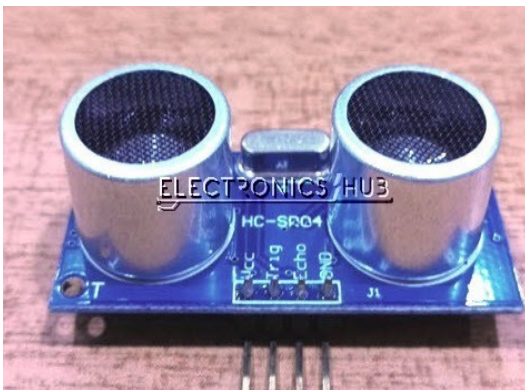


## COMPONENT DESCRIPTION



### 1) ARDUINO UNO R3

Arduino Uno is an ATmega 328p Microcontroller based prototyping board. It is an open source electronic prototyping platform that can be used with various sensors and actuators. Arduino Uno has 14 digital I/O pins and 5 Analog pins. It has 32kb Flash Memory, 2kb Static RAM, 1kb of EEPROM (Electrical erasable programmable read only memory), 16MHz clock speed



### 2) ULTRASONIC SENSOR

As the name indicates, ultrasonic sensors measure distance by using ultrasonic waves.

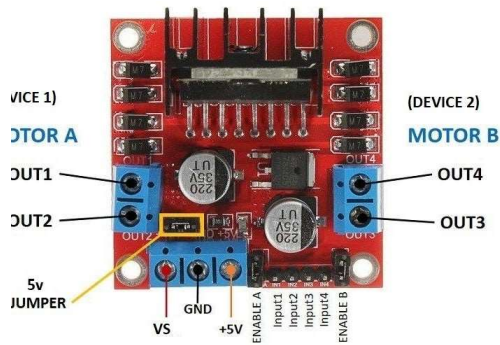
The sensor head emits an ultrasonic wave and receives the wave reflected back from the target.

Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. It has four pins VCC, TRIG, ECHO and GND. It contains Transmitter and Receiver.



### 3) SG90 DC SERVO MOTOR

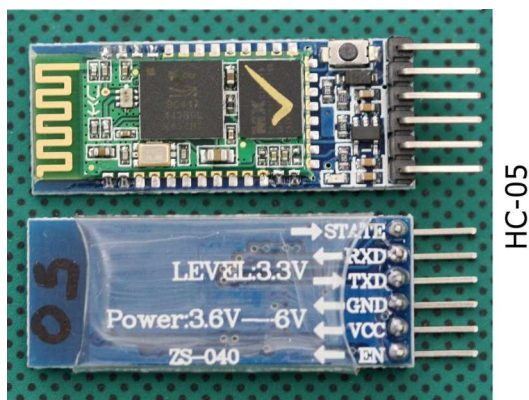
The Tower Pro SG90 is a simple Servo Motor which can rotate 90 degrees in each direction. (approximately 180 degrees in total)



## 4) L298N MOTOR DRIVER SHIELD

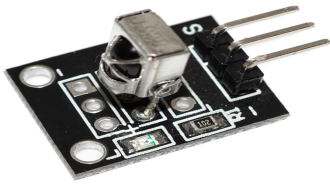
The L298N is a dual-channel H-Bridge motor driver capable of driving two DC motors and one stepper motor. means it can individually drive up to two DC motor for any applications like 4WD robots, Small drill machine, solenoid valve, DC lock etc.

An L298N motor driver module consists of an L298N motor driver chip(IC). which is an integrated monolithic circuit in a 15-lead Multiwatt package. It is a high voltage, a high current dual full-bridge driver designed to accept standard TTL logic levels.



## 5) HC-05 BLUETOOTH MODULE

HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. It has 6 pins  
EN (enable), VCC, GND, TXD, RXD & STATE.



## 6) TSOP1838 IR RECEIVER

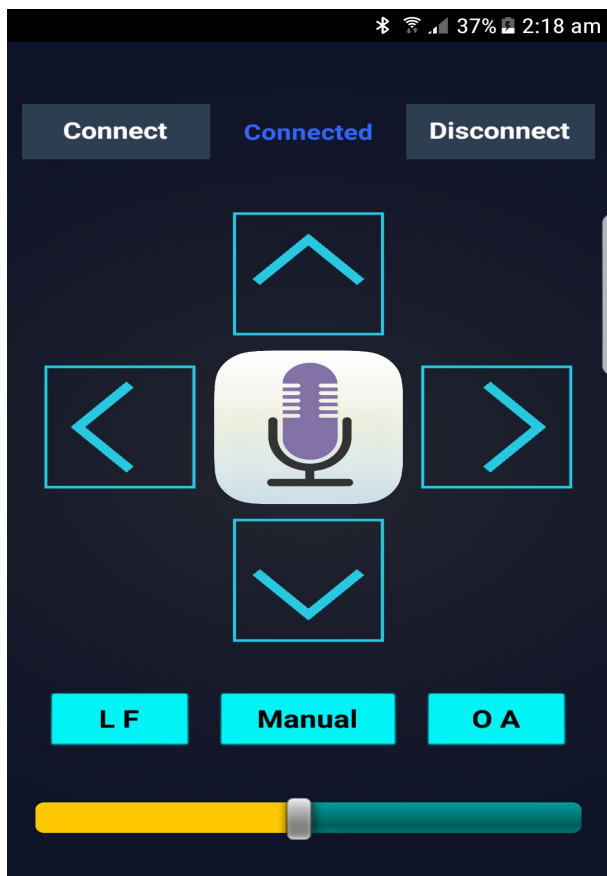
It has three pinouts. Pin 1 is the 'out' pin which gives the sequence depending on the IR signal that has been detected. Pin 2 is the ground pin, which is connected to the ground of the circuit and pin 3 is the VCC pin which connects to the 5.5V, 2.5V and +5V.

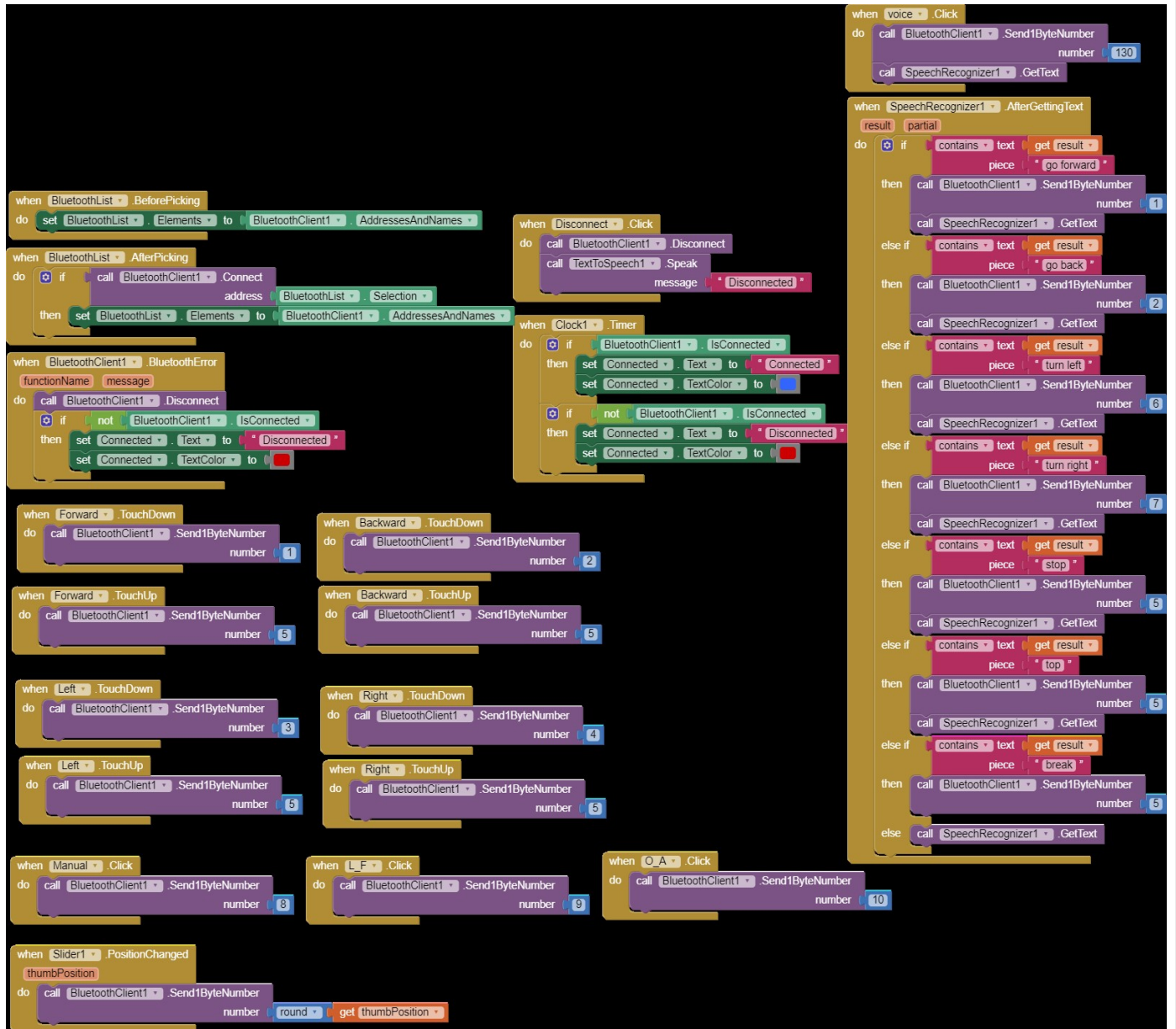


## 7) IR REMOTE

A remote control flashes a pattern of invisible light, which is picked up and then turned into an instruction by the receiver module

## ARCHITECTURE AND BLOCK DIGRAM OF ANDROID APPLICATION :-





## WORKING :-

The aim of this project is to implement a Multi-Functional robot using sensors , motor driver and Arduino . All the connections are made as per the circuit diagram. The working of this project is explain below.

When we switch on the robot the robot is powered on and then we have to open a Multi-functional robot app connect the HC-05 bluetooth module . After connection you are ready to go give the command to the robot if you press the forward button it sends the unique 1byte no to the bluetooth module this module send the signal to the Arduino and it perform the action and move to the forward direction when you press the reverse button it goes to the reverse direction . When you press the right and left button it move towards right and left.

In this app the lower blocks contain three buttons. First one is the line follower , second is the manual and third is the obstacle avoiding.

When we press the Line follower button It switch into line follow mode and it follow the tracks When we press the obstacle avoiding button it switch into obstacle mode and it avoids the obstacle in front him.

When we press the manual button it shift into manual mode.

The Multi-functional robot also contain a voice control features we give the voice commands to the robot .

If we say “Move Forward” it goes in forward direction only.

If we say “ Go Back” it goes in reverse direction only.

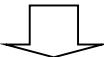
If we say “turn left “ it turn left in 90 degree

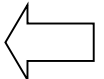
If we say “turn right “ it will move in right direction at 90 degree.

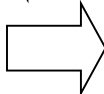
If we say “Stop” or “Break” the motors will turn off and robot stop instantly.

In the multi-functional robot we have used 1838 IR receiver because of this we can control this robot through any IR remote . for this we have to first decode the Remote buttons in hexa decimal number. We have already define the IR remote buttons function.

If we press  button robot move in forward direction only.

If we press  button robot move in reverse direction only.

If we press  button robot move in left direction only.

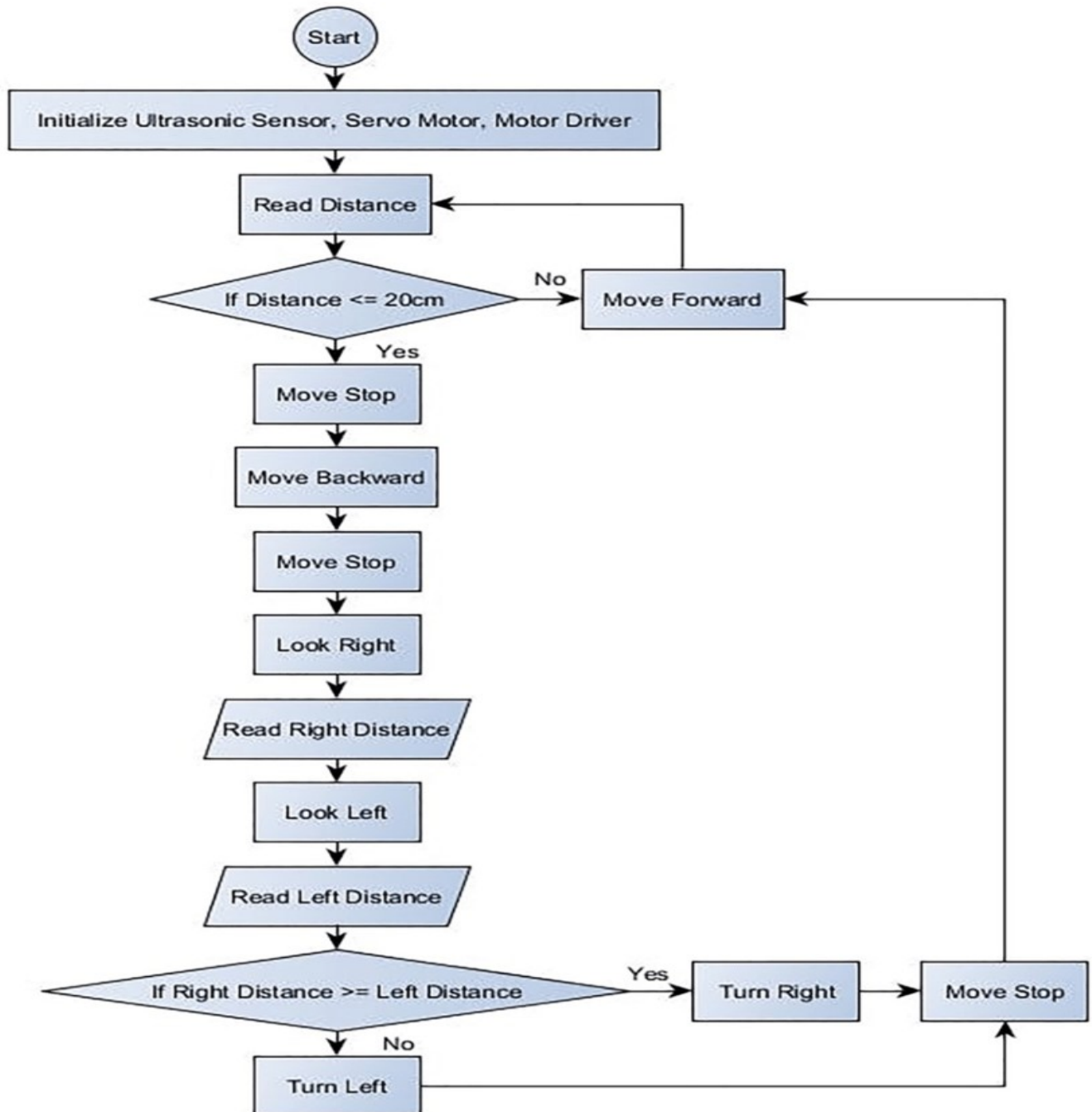
If we press  button robot move in right direction only.

If we press “1” it switch into Line follower Mode

If we press “OK” button it stop the motor

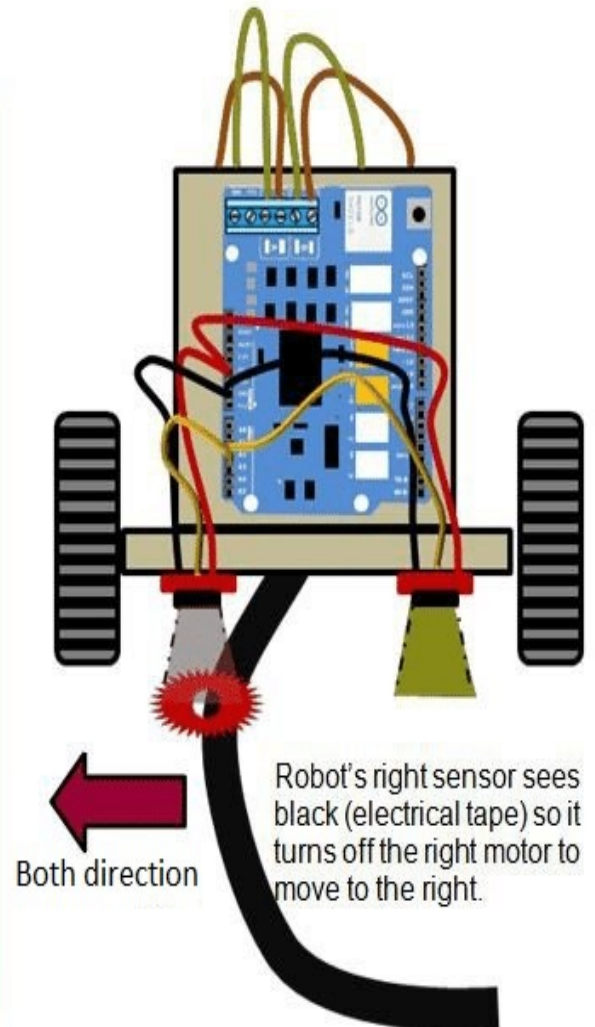
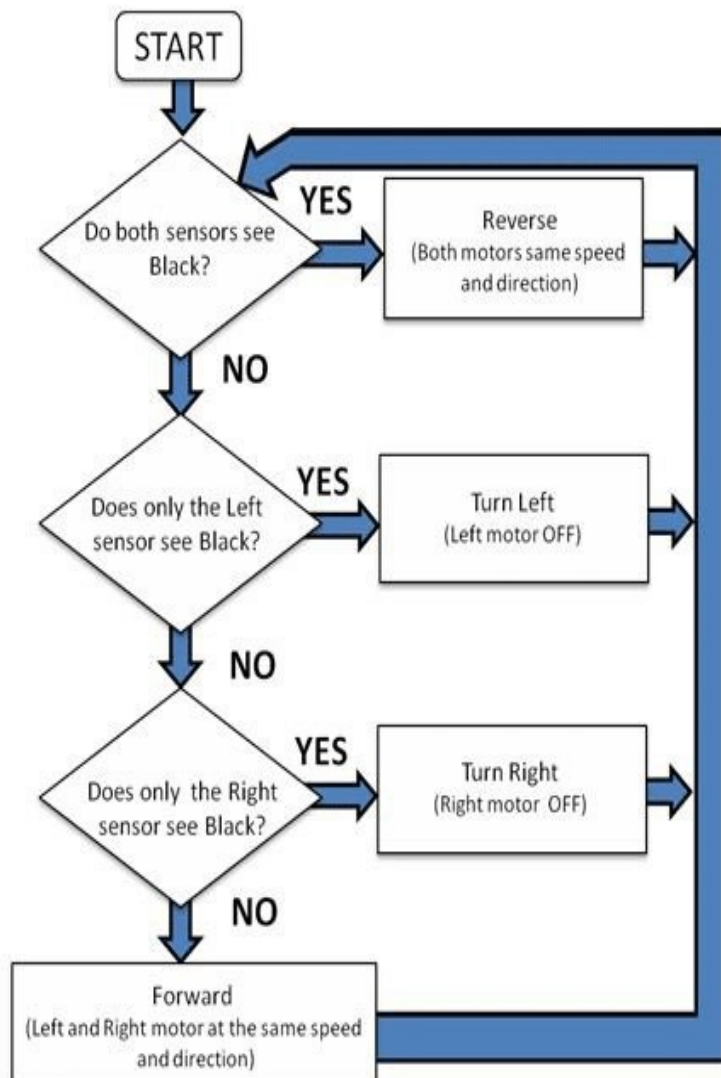


## WORKING FLOW CHART OF OBSTACLE AVOIDING ROBOT





## WORKING FLOW CHART OF LINE FOLLOWER ROBOT



## ADVANTAGES AND APPLICATION

- ✧ IT IS USED IN HOUSEHOLD WORK SUCH AS VACCUM CLEANER .
- ✧ IT IS USED IN VERIOUS INDUSTRIAL AND DOMESTIC APPLICATION SUCH AS TO CARRYBGOODS, FLOOR CLEANING , DELIVERY SERVICES AND TRANSPORTATION
- ✧ IT IS USED IN DANGEROUS ENVIRONMENT ,WHERE HUMAN PENETRAION COULD SYSTEMS.
- ✧ IT IS USED IN ALMOST ALL MOBILE ROBOT NAVIGATION SYSTEM

## CONCLUSION :-

In this project, the field of Robotics is investigated and a robotic car equipped with many functionalities is proposed. The designed model works on wireless remote control with the help of android application which is connected to bluetooth module it also contain obstacle avoiding features , line follower ,voice control and remote control .

During the project, the complete working of Arduino UNO and a variety of sensors is executed and understood. Coding and designing skills form the base and are utilized in the project. The project gives profound knowledge into different advancements and devices for improvement of the venture.

Exposure to various software such as Arduino IDE and android app . There is much scope of improvement in the communication range and considerable reduction in processing time. The use of Wi-Fi technology instead of the more widely used Bluetooth increases the range of communication and improves the overall performance of the designed model.

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