



A MinorProject Report  
On  
**BLUETOOTH CONTROLLED CAR USING ARDUINO**

Submitted in partial fulfilment of requirements for the award of the degree

of

**BACHELOR OF ENGINEERING**

in

**COMPUTER SCIENCE AND ENGINEERING**

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**KARUR – 639 113**

November, 2019



## **M. KUMARASAMY COLLEGE OF ENGINEERING**

**(Autonomous Institution affiliated to Anna University, Chennai)**

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### **BONAFIDE CERTIFICATE**

Certified that this minor project report “**BLUETOOTH CONTROLLED CAR USING ARDUINO**” is the bonafide work of “**HISHORE N (18BCS4028), MOHAMMED ISMAIL K (18BCS4050), RAGUNATH N (18BCS4075), RAJARAM J (18BCS4077)**” who carried out the project work during the academic year 2019-2020 under my supervision. Certified further, that to the best of my knowledge the work reported here in does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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## ABSTRACT WITH PO AND PSO MAPPING

ABSTRACT	POs MAPPED	PSOs MAPPED
<p>Our project is based on Arduino, motor driver and Bluetooth module. Arduino is an open source prototyping platform based on easy-to-use hardware and software. Arduino uses an ATmega328 microcontroller. Since robotics has become a major part in our daily life and also in the engineering field and it plays a vital role in the development of new technology. This is a very simple and easy type form of remote control car, where the ordinary micro-controller has been replaced by Arduino and IR sensors has been replaced by a Bluetooth module. The remote can be used in any android or IOS Mobile phone. This car is more efficient than normal IR controller. Because rather than the other controller, Bluetooth can be controlled upto 33feets. This is the major reason for moving of bluetooth controlled car. Our project can be made in a bigger scale for real time vehicles.</p>	<p><b>PO 1(3)</b> <b>PO 2(3)</b> <b>PO 3(3)</b> <b>PO 4(2)</b> <b>PO 5(3)</b> <b>PO 6(3)</b> <b>PO 7(2)</b> <b>PO 8(3)</b> <b>PO 9(3)</b> <b>PO 10(3)</b> <b>PO 11(2)</b> <b>PO 12(1)</b></p>	<p><b>PSO 1(3)</b> <b>PSO 2(3)</b></p>

Note: 1- Low, 2-Medium, 3- High

**SUPERVISOR**

**HEAD OF THE DEPARTMENT**

## **ABSTRACT**

Our project is based on Arduino, motor driver and Bluetooth module. Arduino is an open source prototyping platform based on easy-to-use hardware and software. Arduino uses an ATmega328 microcontroller. Since robotics has become a major part in our daily life and also in the engineering field and it plays a vital role in the development of new technology. This is a very simple and easy type form of remote control car, where the ordinary micro-controller has been replaced by Arduino and IR sensors has been replaced by a Bluetooth module. The remote can be used in any android or IOS Mobile phone. Our car is more efficient than normal IR controller. Because rather than the other controller, Bluetooth can be controlled upto 33feets. This is the major reason for moving of bluetooth controlled car. Our project can be made in a bigger scale for real time vehicles.

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## **LIST OF ACRONYMS/ABBREVIATIONS**

Wi-Fi  
UART

WIRELESS FIDELITY  
UNIVERSAL ASYNCHRONOUS  
RECEIVER/TRANSMITTER

# **CHAPTER 1**

## **INTRODUCTION**



**Figure:1.1(Bluetooth Controlled Car)**

### **1.1 OVERVIEW**

Now a days due to advancement in technology various newly designed sectors make use of Wi-Fi enabled robot for various applications. Mostly they are used for security purpose. The robot car can be easily moved from one place to another just by a single device. Robot can be used for security purpose with the installation of a camera. In this project, we will deliberate how to control robot controlled car using Wi-Fi module through android application of an android mobile phone. The advantage of using robot controlled car is it can be used for various purposes like to reduce manual work. This project can be modified quite easily to include a cameras well that can stream the videos to the user over Wi-Fi. to see because they do not have access to glasses or contact lenses. Of the 37 million people across the globe who are blind, over 15 million are from India. One of the most common problems that many blind and visually impaired people experience is their day-to-day challenge in coping with their impairment. Equipment such as Braille, reading glasses, or a walking stick are just some of the few things that help visually impaired people get along with

their lives. With the advancement of technology, a common Android smart phone equipped with specific applications can aid visually impaired and blind people in functioning. Presently, the most enhanced choice of smart phones among visually impaired users is either an iPhone with a very worthy tool called Voice Over or an inexpensive selection of one of the Android-based smart phones. Using a modern smart phone has an advantage that they provide a wide range of services such as digital camera, speech recognizer, etc. We have delivered an Android based smart phone as a system for image processing and object recognition module which work on images captured by a visually impaired user using a built in camera.

## **1.2 DOMAIN INTRODUCTION**

Robots are always a fancy topic for students, hobbyists and DIYers. If you are beginner, then building a robot (like a car or an arm) is probably one of the important projects to do after learning about the basics. If you remember the earlier tutorial, I have discussed about HC-05 Bluetooth Module and how to interface one with Arduino. Also, I have provided a simple Bluetooth Controller App, which can be installed on your Android Phone and start transmitting the data. As a continuation to that project, I will be implementing Bluetooth Controlled Robot using Arduino and a few other components and build a simple robotic car that can be controlled using an Android Phone (through an App) over Bluetooth Communication.

## **1.3 PROBLEM STATEMENT**

The main objective of the project is to control the robotic vehicle in a desired position. Also the main objective of the project is to control the robot by the voice or push buttons. Human Robotic Interaction is achieve. The goal of voice controlled Robot is to listen and act on the commands received from the user. The proposed system consist of two blocks: transmitter and receiver block both use the microcontroller of the AVR family and a battery for the power source. Using this application we can control the robotic vehicle by using personal computer. The project is designed to control a robotic vehicle by voice commands and manual control for remote operation.

- Robotics will reduce the work of human.
- Military applications.
- Assistive devices like wheelchairs.
- Home automation

## **1.4 OBJECTIVE**

We are now living in the 21st century. Now, smart phone has become the most essential thing in our daily life. Android application based smart phones are becoming each time more powerful and equipped with several accessories that are useful for Robots. This project describes how to control a robot using mobile through Bluetooth communication, some features about Bluetooth technology, components of the mobile and robot. We present a review of robots controlled by mobile phone via moving the robot upward, backward, left and right side by the android application such as Arduino, Bluetooth. Bluetooth has changed how people use digital device at home or office, and has transferred traditional wired digital devices into wireless devices. Here we are using

Bluetooth communication, interface microcontroller and android application. We are using Arduino software to interface the Bluetooth module with microcontroller. According to commands received from android the robot motion can be controlled. We derived simple solutions to provide a framework for building robots with very low cost but with high computation and sensing capabilities provided by the smart phone that is used as a control device.

- Our proposed project aims at a robotic vehicle operated commands by using the application in the android mobile. The system operates with the use of a android device which transmits voice commands to an 8051 microcontroller to achieve this functionality.
- This bluetooth controlled car is used where the humans where not reached or not capable of driving the vechicles.
- This car is used as toy for the children.

## **CHAPTER 2**

### **Literature Survey**

1. Robot Control Design Using Android Smartphone Authors : Mrumal.K.Pathak, Javed Khan, Aarushi Koul, Reshma Kalane, Raunak Varshney The purpose of this paper is to provide powerful computational android platforms with simpler robots hardware architecture. This paper describes how to control a robot using mobile through Bluetooth communication, some features about Bluetooth technology, components of the mobile and robot. It present a review of robots controlled by mobile phone via moving the robot upward, backward, left and right side by the android application such as Arduino, Bluetooth.

2. Smart Phone Controlled Robot Using ATMEGA328 Microcontroller Authors : Aniket R. Yeole, Sapana M. Bramhankar, Monali D. Wani, Mukesh P. Mahajan In this paper have designed a robot that can be controlled using an application running on an android phone. It sends control command via Bluetooth which has certain features like controlling the speed of the motor, sensing and sharing the information with phone about the direction and distance of the robot from the nearest obstacle.

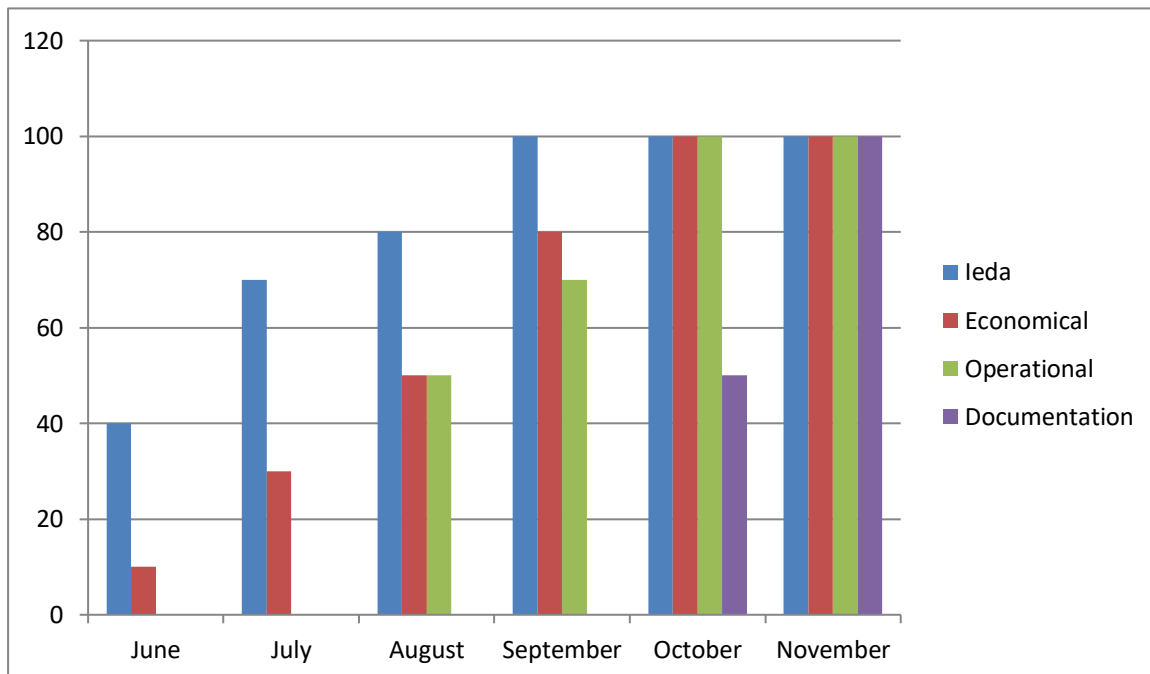
3. Android Mobile Phone Controlled Bluetooth Robot Using 8051 Microcontroller Authors : Ritika Pahuja, Narender Kumar A robot is usually an electro-mechanical machine that is guided by computer and electronic programming. Many robots have been built for manufacturing purpose and can be found in factories around the world. This paper develop the remote buttons in the android app which control the robot motion with them. And in which Bluetooth communication is use to interface controller and android. Controller is interfaced to the Bluetooth module though UART protocol.

4. Robot Controlled Car Using Wi-Fi Module Authors : S R Madkar, Vipul Mehta, Nitin Bhuwania, Maitri Parida This paper, deliberate how to control robot controlled car using Wi-Fi module through android application of an android mobile phone. It is also show that the appliances can be controlled even in the absence of an android phone by sending a normal SMS. This project can be modified quite easily to include a spy camera as well that can stream the videos to the user over Wi-Fi. Solar cells are instead of the regular lithiumion battery for the project.



## CHAPTER 3

### FEASIBILITY STUDY



**Figure 3.1(Feasibility Study for Bluetooth controlled car)**

1) Idea: The firm has to purchase a machine with Pentium processor or higher. The computer must be running windows XP or any other higher version of windows. As the hardware and the software of developing the system is already available, the system is technically feasible. The concern will only be in which system the software is being developed and in which it will be implemented. The proposed system is developed in EMBEDDED SYSTEM and will be implemented on android 4.0 or above. The project is beneficial only if it can provide a successful and accurate access to the users.

2) Economic Feasibility: This is concerned with the cost incurred for development and implementation of the system, the maintenance of the system and the benefits derived from it. The hardware and software required for the system is already available. In this we examine the cost of developing the system with regard to what the organization can afford. The only cost involved is for coding, implementation and maintaining of the system. Hence the system is economically feasible.

3) Operational Feasibility: As per the videos gathered in youtube and the circuit diagram, the car had assembeled and after . And after finishing this work it ready for test drive.

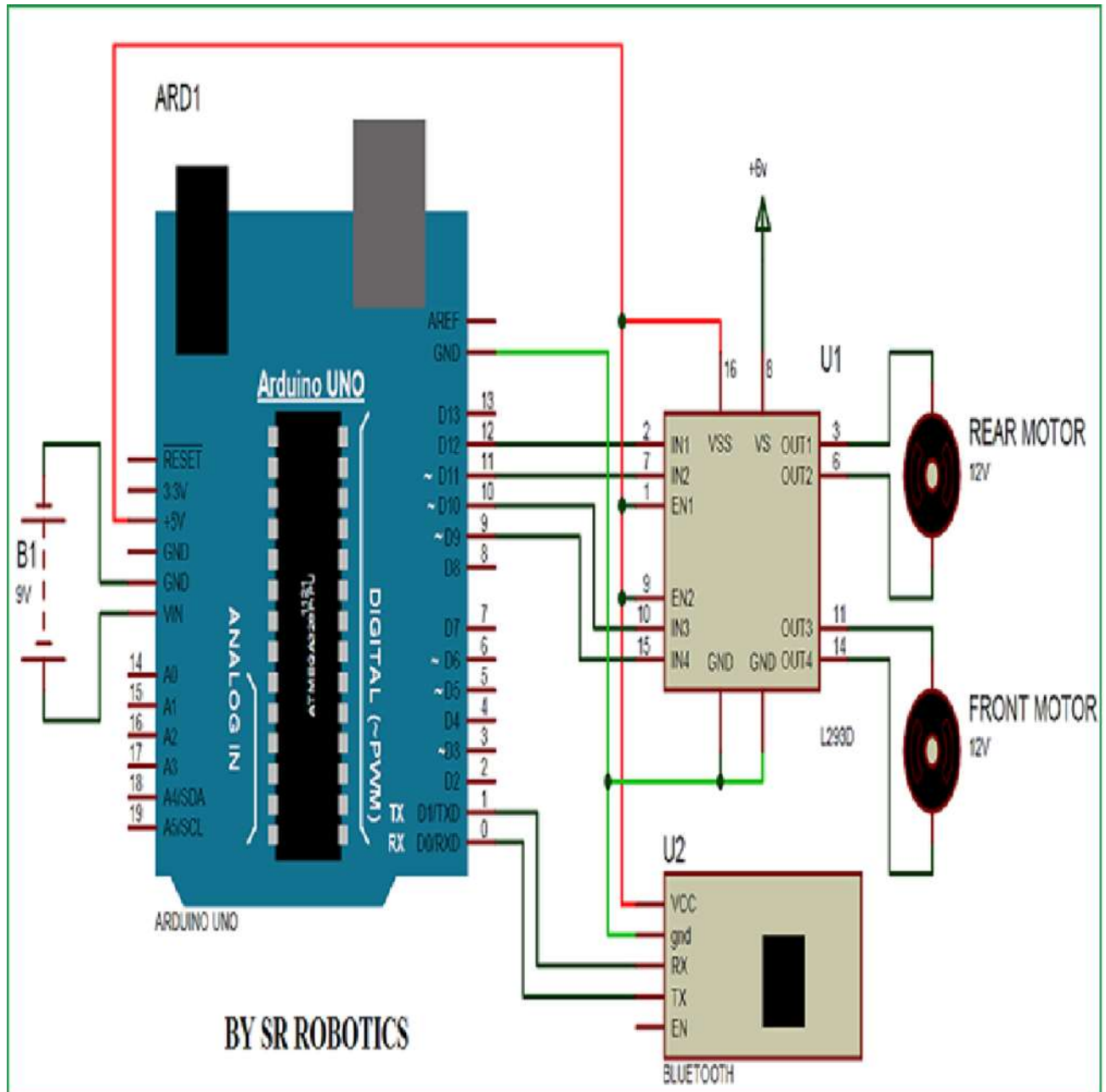
Thus the system that is going to be developed will be highly accurate and can process the bluetooth signals at a much faster rate. With better algorithms the software is assured to give better results without compromising in the genre of quality on accessibility

4) Documentation: The documentation is completed after getting approval of supervisor.

## CHAPTER 4

### PROJECT METHODOLOGY

#### 4.1 BLOCK DIAGRAM OF BLUETOOTH CAR



**Figure:4.1(Block Diagram of Bluetooth car)**

#### System Architecture

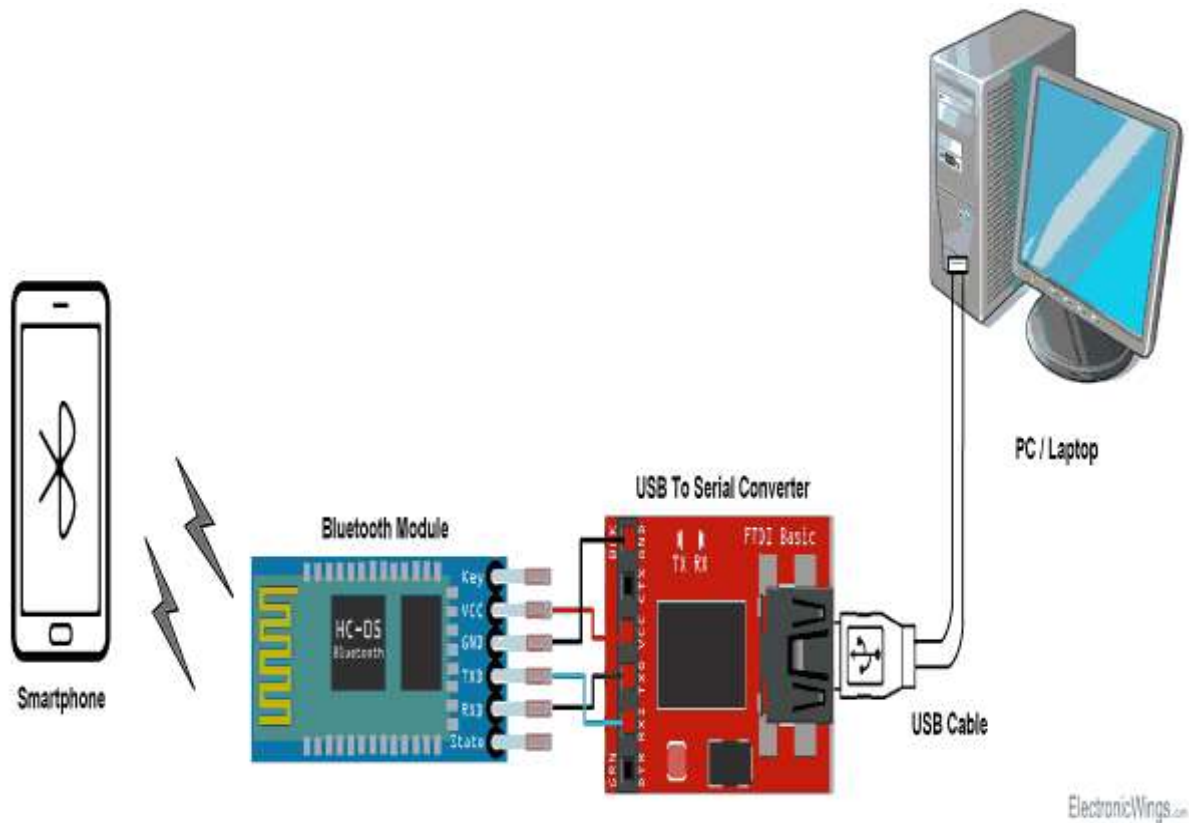
The overall system design consists of following modules:

- (a) Hardware Connection.

- (b) Application Software
- (c) User Access
- (d) Voice Recognition
- (e) Preprocessing
- (f) Prediction of Output.

First of all the system starts with the Hardware Connection between the robot and the smart phone which is attach with the robot by using the Bluetooth Connectivity Connection. Then after the connection is establish the user will start the application program which is installed in the server computer. A smart phone Android operated robot. Now here is a simple to control your robot using Bluetooth module and microcontroller ATMEGA32 with your android Smartphone device. The controlling devices of the whole system are a microcontroller. Bluetooth module, DC motors are interfaced to the microcontroller. The data receive by the Bluetooth module from android smart phone is fed as input to the controller. The controller acts accordingly on the DC motor of the robot. Voice Controlled Robot (VCR) is a mobile robot whose motions can be controlled by the user by giving specific voice commands. The speech is received by a microphone and processed by the voice module. When a command for the robot is recognized, then voice module sends a command message to the robots microcontroller. The microcontroller analyzes the message and takes appropriate actions. The objective is to design a walking robot which is controlled by servo motors. The above figure shows the block diagram of our project in which there is server which is on user site and from which user can interact with the robot by using voice command or manual command. Also the robot contain smart phone attach with it.

## 4.2 DESCRIPTION OF WORKING FLOW OF BLUETOOTH CAR



**Figure:4.2(WORKING FLOW OF BLUETOOTH CAR)**

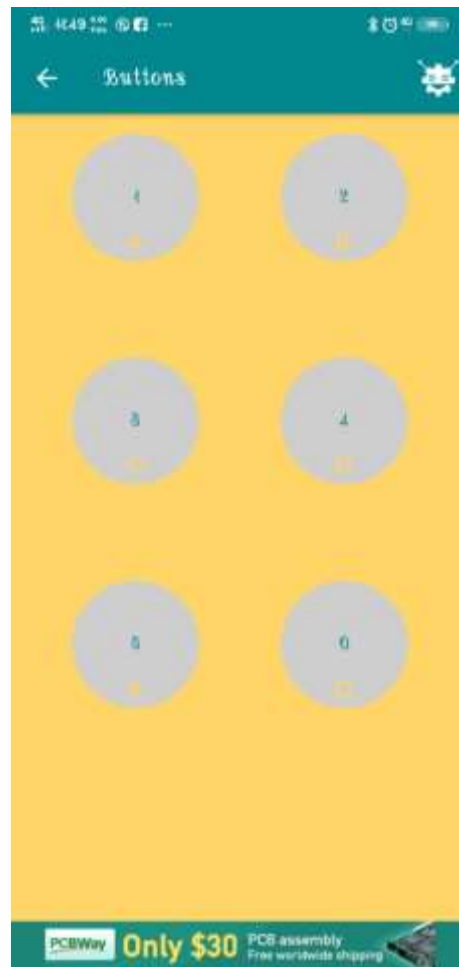
### 4.2. Microcontroller Devices

Microcontroller is an integrated chip and it's also called as embedded system which includes CPU, RAM, ROM, I/O parts. Microcontrollers is like small computers but they are much simpler than the todays computers they can do simple specific tasks to control system. The advantage of the Microcontroller is, it is far cheaper than a complex controller. Microcontroller generally uses metal oxide semiconductor (CMOS) technology on the manufacturing process developers used less power and less resources. Generally microcontrollers' uses 5V DC voltage to work but this can be change by the different microcontrollers.

In this project I used microcontroller to make the car and while doing this I have used microchip's PIC 16F877A microcontroller. PIC 16F877A microcontroller has forty pin four of them for the feeding, two of them for oscillator. Oscillator is a simply clock with constant frequency in the project I have tried two different oscillator one of them 4 Hz and the other were 8 Hz. For the programming PIC microcontroller there are many option PIC microcontroller does not interested complier or editor too much as long as code and configuration setting were true and hex file correctly complied. In my project I used microchip's MicroC editor and complier program. Coddling is not so hard on these microcontrollers the hard part is setting true configuration settings for right hardware. To add hex files to the microcontroller there are many ways we can use debugger or an installer board can fix this problem but for different platforms we need to change our installer software too.

## CHAPTER 5

### RESULTS AND DISCUSSION



**Figure 5.1(Screenshot of Application Used for Bluetooth car)**

This picture deals with the movements of the Bluetooth car according to the Program implemented in Arduino.



**Figure (5.2 Application Screenshot)**

This Figure is the out layer of the APP.

The communication channel which will carry the signal will be 2 types that is cellular connection for word recognition internet connection and for clear connection to the robot instead of using an analogue connection we have used a digital connection that is via Bluetooth.



## **CHAPTER 6**

### **CONCLUSION AND SCOPE FOR FUTURE WORKS**

This project completely reforms the robotic vehicle and gives it a new dimension. It can easily recognize the voice commands and runs smoothly. Further enhancement in project can be used for Home security and military purposes where the commands can be given to robot without risk by increasing the range and by installing cameras. This research work has been narrowed down to short range Bluetooth module. Using a long-range modules and other connectivity devices will result in connectivity with the robot for long distances. Power Optimization such sleep and wakeup schedules can be incorporated.

1. Image processing can be implemented in the robot to detect the colour and the objects.
2. A thermal camera can be installed to sense the heat emitted by bodies useful in military purposes to detect enemies on the lines.
3. Automatic Targeting System can be implemented in the robot for tracking the target.

## REFERENCES

- [1] M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.
- [2] A study on precise control of autonomous driving robot by voice recognition ,44th International, Symposium on DOI:10.1109/ISR.2013.6695640 Publication Year 2013 [www.migindia.com/modules.php?name=News&file=article & sid=22](http://www.migindia.com/modules.php?name=News&file=article&sid=22)
- [3] Xiaoluet.al. "Robot control design based on smartphone." Control and Decision Conference (CCDC), 2013 25thChinese. IEEE, 2013.
- [4] Yeon-Gyunkim et.al. "Smartphone-controlled user calling system for a mobile robot. "Robotics (ISR), 2013 44th International Symposium on. IEEE, 2013.
- [5] Rouanet, Pierre, et.al. "The impact of human– robot interfaces on the learning of visual objects." Robotics, IEEE Transactions on 29.2 (2013): 525-541.
- [6] Tatiana Alexenko et.al. "Android-based speech processing for eldercare robotics." Proceedings of the companion publication of the 2013 international conference on intelligent user interfaces companion. ACM, 2013.
- [7] Arpit Sharma, Reetesh Verma, Saurabh Gupta and Sukhdeep Kaur Bhatia, "Android Phone Controlled Robot Using Bluetooth", International Journal of Electronic and Electrical Engineering. Volume 7, Number 5 (2014), pp. 443-448
- [8 ] A. Sharma, J. Mondal, C. Pandey, R. Kumar and A. Bhattacharya, "IoT Based Home Automation System Using Arduino"; 7th All India Inter Engineering College Academic Meet - 2016& Innovative Model Competition for a Sustainable Society on 13th March, 2016; Organized by Forum of Scientists, Engineers & Technologists (FOSET) in association with Supreme Knowledge Foundation Group of Institutions, India.
- [9] A. Sharma, J. Mondal, C. Pandey, R. Kumar and A. Bhattacharya, "IoT Based Home Automation System"; Advances in Applied Science; Volume 2017; Article ID 100005, pp. 01-06; Feb. 2017

[10] [https://developer.android.com/training/basics/firstapp/index.ht ml](https://developer.android.com/training/basics/firstapp/index.html)

<https://www.codeproject.com/Articles/628894/Learn-How-toDevelop-Android-Application> <https://www.tutorialspoint.com/android/>

<http://www.coreservlets.com/android-tutorial/>

## APPENDIX

### Program

```
String readvoice="";

char flag;

void setup() {

  Serial.begin(9600);

  pinMode(9, OUTPUT);

  pinMode(10, OUTPUT);

  pinMode(11, OUTPUT);

  pinMode(12, OUTPUT);

}

void loop()

{

  while (Serial.available())

  {

    char c = Serial.read(); //Conduct a serial read

    readvoice += c; //build the string- "*forward#", "reverse", "left" and "right"

    if(c == '#')flag=1;}

  if(flag)

  {
```

```
flag=0;

Serial.print(readvoice);

if(readvoice.indexOf("forward")>=0)

{

    Serial.print("MY ROBO");

    digitalWrite(9, HIGH);

    digitalWrite (12, HIGH);

    digitalWrite(11,LOW);

    digitalWrite(10,LOW);

    delay(100);

}

else if(readvoice.indexOf("back")>=0)

{

    digitalWrite(9, LOW);

    digitalWrite(12, LOW);

    digitalWrite(10, HIGH);

    digitalWrite(11,HIGH);

    delay(100);

}

else if (readvoice.indexOf("left")>=0)
```

```

{
    digitalWrite (9,HIGH);

    digitalWrite (12,LOW);

    digitalWrite (11,LOW);

    digitalWrite (10,LOW);

    delay (800);

    digitalWrite(9, HIGH);

    digitalWrite (12, HIGH);

    digitalWrite(11,LOW);

    digitalWrite(10,LOW);

    delay(100);
}

else if ( readvoice.indexOf("right")>=0)

{

    digitalWrite (12,HIGH);

    digitalWrite (9,LOW);

    digitalWrite (11,LOW);

    digitalWrite (10,LOW);

    delay (800);

    digitalWrite(9, HIGH);

```

```

    digitalWrite (12, HIGH);

    digitalWrite(11,LOW);

    digitalWrite(10,LOW);

    delay(100);
}

else if (readvoice.indexOf("stop")>=0)
{
    digitalWrite (9, LOW);

    digitalWrite (10, LOW);

    digitalWrite (11, LOW);

    digitalWrite (12, LOW);

    delay (100);
}

else
{
    Serial.println("Not Matched");
}

readvoice="";
}

} //Reset the variable

```