Chapter 1 Introduction

1.1 Basic Introduction

A robot is an electromechanical machine that is controlled by computer program to perform various operations. Industrial robots have designed to reduce human-effort and time to improve productivity and to reduce manufacturing cost. Today human-machine interaction is moving away from mouse and pen and becoming much more pervasive and much more compatible with the physical world. Android app can control the robot motion from a long distance using Bluetooth communication to interface controller and android. Microcontroller ATMEGA328P-PU can be interfaced to the Bluetooth module though UART protocol and code is written in embedded C language.

Figure 1.1 Bluetooth Control RC car.

As per the commands received from android app the robot motion can be controlled. The output motion of a robotic vehicle is accurate and repeatable. Pick and Place robots can be reprogrammable and tool can be interchanged to provide for multiple applications. The purpose of this work is to design and implement an Android Controlled Bluetooth Robot which is used for Surveillance, home

automation, wheelchairs, military and hostages Rescue applications.

1.2 About the Project

Bluetooth controlled car is controlled by using Android mobile phone instead of any other method like buttons, gesture etc. Here only needs to touch button in android phone to control the car in forward, backwardd, left and right directions. So here android phone is used as transmitting device and Bluetooth module placed in car is used as receiver. Android phone will transmit command using its in-built Bluetooth to car so that it can move in the required direction like moving forward, reverse, turning left, turning right and stop.

1.3 Block Diagram

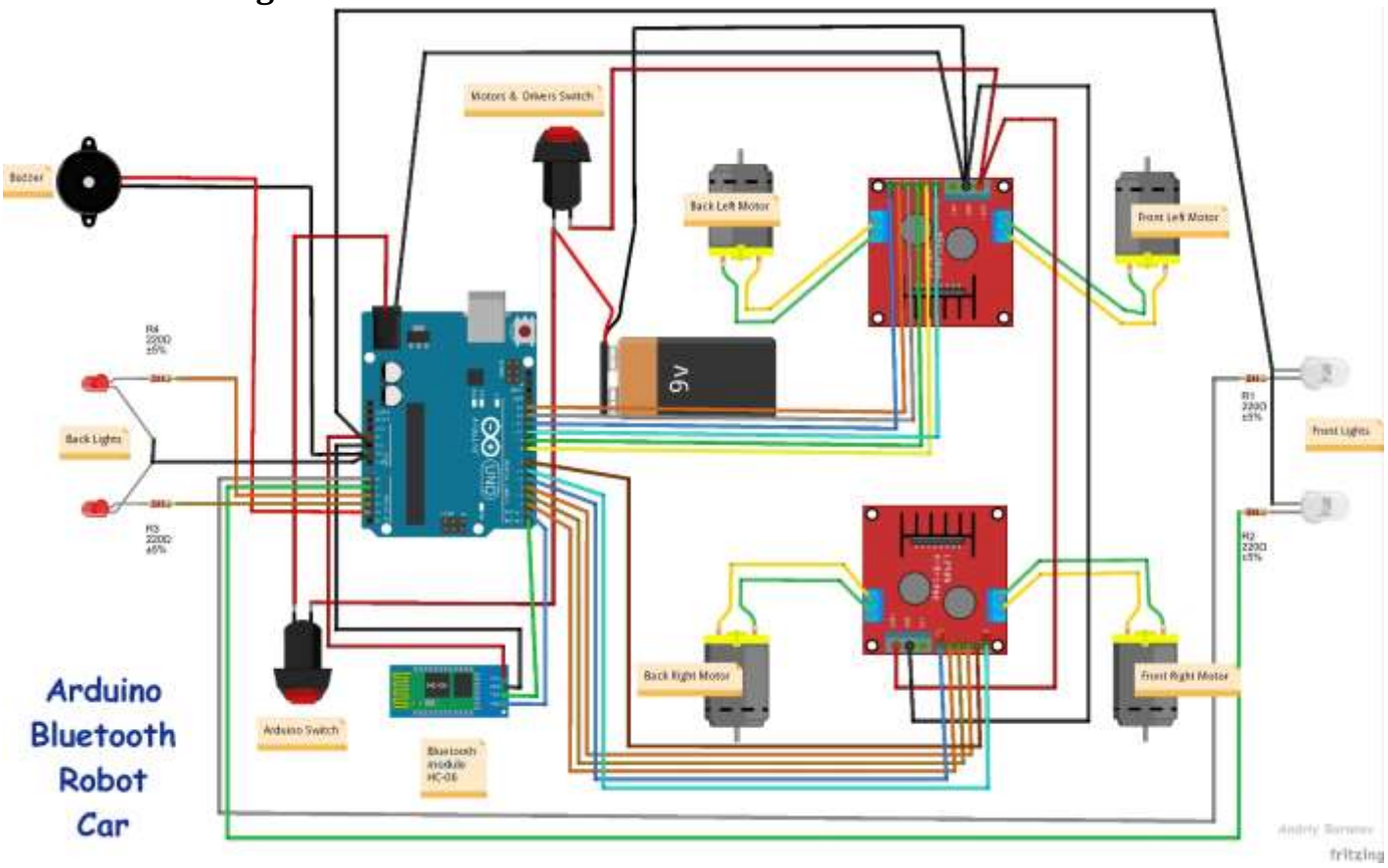


Figure 1.2 Block Diagram

1.4 Components Used

1.	Smart Car Chassis 4WD	1
2.	L298 Motor Driver Module	2
3.	Wheel	4
4.	HC-05 Bluetooth Module	1
5.	Smart Phone	1
6.	Battery	4
7.	12 v charger	1
8.	Arduino Uno	1
9.	Connectors	As per required

Table 1.1: Components

1.5 Literature review

Various researches have been made by different researchers in developing this project. However, they serve a different application and have different technologies implemented. Some of those papers are mentioned below stating their technology and application. Jorge Kazacos Winter [2] has developed android controlled robot automation. Main aim of his project was the transfer of information wirelessly between a smartphone and the robot and developing the robot and its communication system underneath a low price and open source philosophy. He used 3D design technique to style the structure of the robot with the facilitation of parametrical modelling software. The style, when fed to the 3D printer can print the parts of the robot in a layered manner one by one and can then use these parts to assemble the robot simply. He has used Arduino micro-controller and Wi-Fi technology in this robot. M.Selvam [4] in his paper has projected design to develop a robotic system which has a wireless camera attached to it for surveillance. Bluetooth was implemented in his project for providing connection between robot and smartphone. Wireless night vision camera was used for providing remote surveillance. The video which is recorded by camera is then transmitted to TV unit through Radio Frequency signal. He used 8051 micro controller for the robotic unit. Vito M Guardi [1] has evolved the method of Bluetooth technology by developing an android app for a robot which is driven by a microcontroller. The central idea of his work is to show that one android app can be operated using totally different electronic devices. Vito M Guardi has invented a communication protocol for android smartphone and robotic platform over a Bluetooth. Ranjith Kumar Goud and B.Santhosh Kumar [3] have invented a pick and drop robot. They wanted it to be used for diffusing a bomb remotely with safety. For the robotic arm, they used a pair of motors and another pair as the wheels of the robot for controlling the movement. Connectivity is established using Bluetooth. The micro-controller used is LPC2148. They had also attached a wireless camera for remote surveillance. They have worked on this project mainly for industrial and military applications. Xiao Lu, Wenjun Liu, Haixia Wang, Qia Sun [8] have published a paper based on a project in which the smartphone is capable of IFLYTEK voice as well as handwritten input. The design is therefore robust, suitable, and practical for use and it also ensures the reliability of the full system. For connectivity between the smartphone and robot, wifi is used. Use of wifi makes it easy and absolutely convenient for controlling the robot so that it can act according to the commands. Arpit Sharma, Reetesh Verma, Saurabh Gupta, Sukhdeep Kaur Bhatia [9] have configured an android smartphone which can control a robot via Bluetooth technology. The phone uses motion sensors and records the gestures sent via an android mobile phone. It also has an inbuilt accelerometer and Bluetooth module for controlling the movements of a robot.

1.6 Motivation

We've projected this research work to provide simpler hardware architecture, but with powerful and concise computational platforms required to build the Robot. Our purpose on educational robotics is simple architecture so as to serve the students an elegant idea so that they can build their own robots at low cost and use them as a decent platform for experiments in several courses, also aid the robot’s designer to focus on their research instead of Bluetooth connection infrastructure.

1.7 Project Plan

The project plan was divided into five major milestones each spaced approximately Ten days apart.

1. Project Description and Plan of Work
2. System Model
3. Components Purchasing
4. Implementation / Hardware / Software
5. Project Demonstrations

The sequence that we met these milestones was out of sequence with the required milestones. Experience told us to get the hardware done as soon as possible as this is often requires a lot of time. By doing so, and because of unforeseen difficulties, we fell behind slightly with the System Modelling and flight Controller. After working closely we were able to complete the milestones only slightly behind schedule.

1.8 SYSTEM OVERVIEW

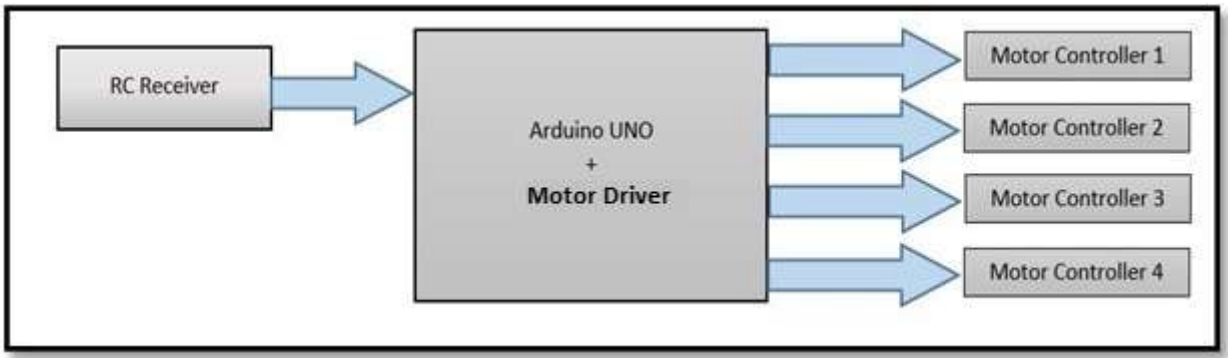


Figure 1.3 Arduino Setup

1.9 Controls

- First make sure your HC-06 Bluetooth module is paired with your mobile. The default password for pairing is “1234” or “0000”. Check the manual of Bluetooth module.

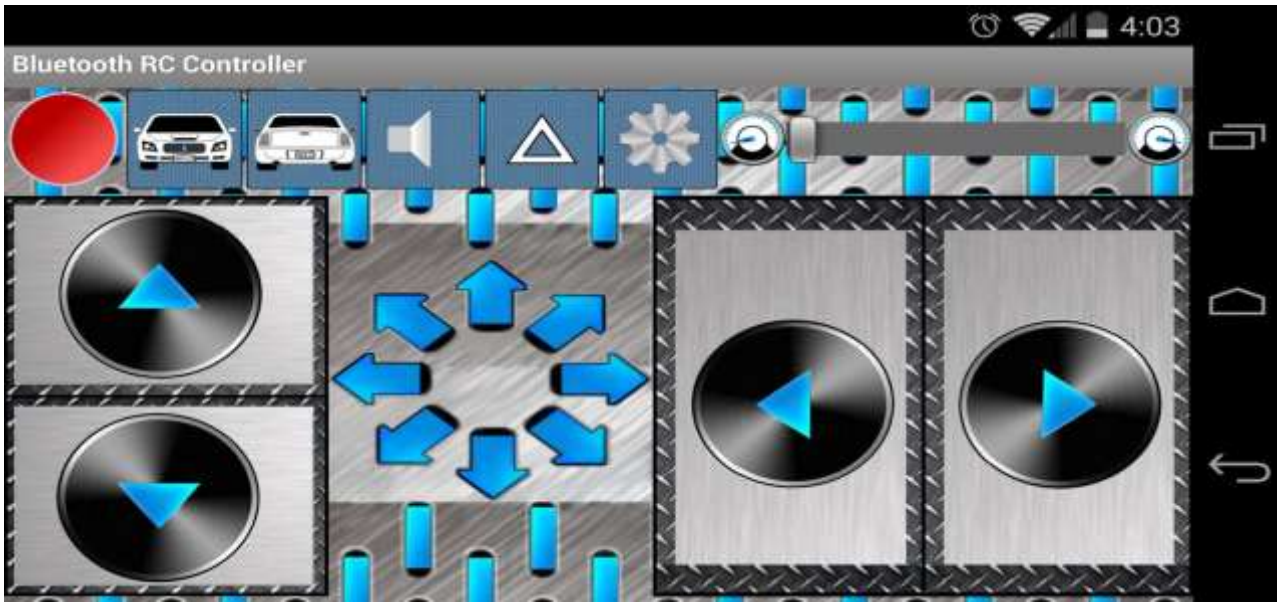


Figure 1.4 Arduino Bluetooth RC Car application.

- Click on “SELECT DEVICE” icon to select paired Bluetooth module.

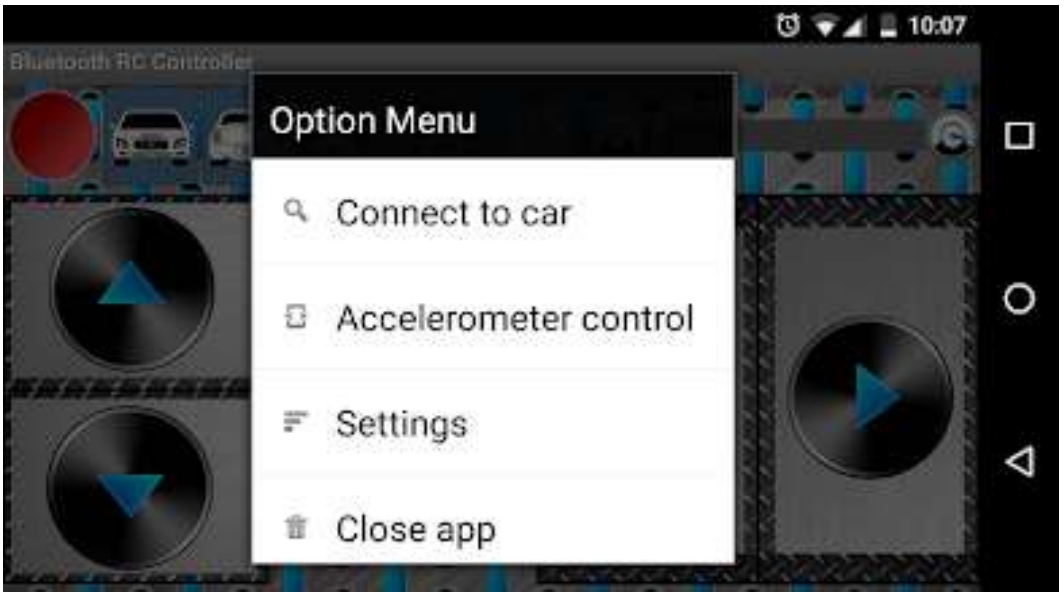


Figure 1.5 Bluetooth Connection Search.

- When press “up arrow” it sends the data “A” to Bluetooth module connected with the circuit. When microcontroller detects “A” the robot/robot car moves FORWORD.

- When press “DOWN ARROW” it sends the data “B” to Bluetooth module connected with the circuit. When microcontroller detects “B” the robot/robot car moves REVERSE.

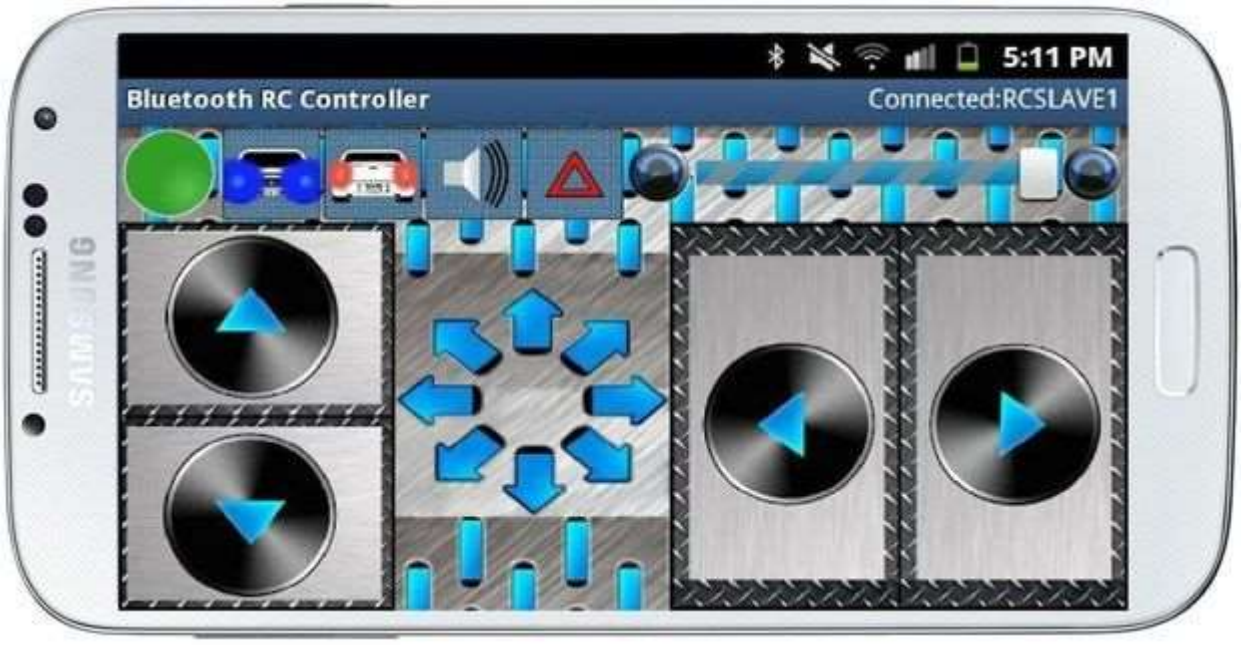


Figure 1.6 to bluetooth connection on to move the robot forword,backword,left and right direction

- When press “LEFT ARROW” it sends the data “C” to Bluetooth module connected with the circuit. When microcontroller defects “C” the robot/robot car turns LEFT.

- When press “RIGHT ARROW” it sends the data “D” to Bluetooth module connected with the circuit. When microcontroller defects “D” the robot/robot car turns RIGHT.

- When press “STOP” button which is in the centre of remote it sends the data “E” to the Bluetooth module connected with the circuit. When microcontroller defects “E” the robot/robot car gets stopped

- Click on “DISCONNECT” icon to disconnect paired Bluetooth module.

Chapter 2 MATERIALS & METHODS

2.1 SMART ROBOT CAR FRAME

DC 6V 4-wheel Robot Smart Car Chassis Kits car with Speed Encoder for Arduino Mechanical structure is simple, very easy to install The car comes with tachometer encoder Uses four deceleration direct current machine curve to be nimble, the directivity is good. Four actuations, horsepower fullness. The chassis big and steady very easy to expand Specification of Motor Voltage:DC 6V Current:120MA Reduction rate:48:1 RPM (With tire):240 Tire Diameter:66mm Car Speed(M/minute):48 Motor Weight (g):50 Motor Size:70mm*22mm*18mm Noise:<65dBContains: 1x DIY Intelligent Car.

Figure 2.1 Car frame

Feature:

- Smart car chassis tracing car Robot car chassis with code disk, Ideal for DIY.
- This car is the tachometer encoder.
- With a 4 AA battery box (batteries not included).
- Can be used for distance measurement, velocity.
- Can use with other devices to realize function of tracing, obstacle avoidance, distance testing, speed testing,

- wireless remote control.
- Size: 21 x 15 cm (L x W).
- Wheel size: 6.5 x 2.7cm (Dia. x H).

Figure 2.2 Car frame in many position

Specifications:

- Material:Stainless steel+ABS plastic+Brass.
- Wheel diameter:about 6cm.
- Floor thickness:about 3mm.
- Car length:about 25cm
- Car width: about 14.8cm

2.2 L293D Motor Driver IC

Microcontroller cannot supply the current required to run DC motor. So satisfy this requirement IC's are used to drive the motor. The L293 and L293D are quadruple high current half –H drivers. The L293D provides bidirectional drive currents of up to 1A at voltage from 4.5V to 36V. The L293D is designed to provide bidirectional drive currents of up to 600-MA at voltages from 4.5V to 36V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high current/high voltage loads in positive-supply applications. On the L293D, external high-speed output clamp diodes should be used for inductive transient suppression. A Vcc1 terminal, separate from Vcc2, is provided for the logic inputs to minimize device power dissipation. The L293 and L293D are characterized for operation from 0ɔC to 700C.

Figure 2.3 Motor Driver

Specifications

- Current Draw: 30A Continuous/35A Burst
- Voltage Range: 2-4s Li poly
- BEC: 5V3A Linear
- Weight: 35g

Working of Motor Driver:

The 4 input pins for this l293d, pin 2, 7on the left and pin 15, 10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1.In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.

2.3 DC Motor

60RPM Centre Shaft Economy Series DC Motor is high quality low cost DC geared motor. It has steel gears and pinions to ensure longer life and better wear and tear properties. The gears are fixed on hardened steel spindles polished to a mirror finish. The output shaft rotates in a plastic bushing. The whole assembly is covered with a plastic ring. Gearbox is sealed and lubricated with lithium grease and require no maintenance. The motor is screwed to the gear box from inside. Although motor gives 60 RPM at 12V but motor runs smoothly from 4V to 12V and gives wide range of RPM, and torque. Tables below gives fairly good idea of the motor's performance in terms of RPM and no load current as a function of voltage and stall torque, stall current as a function of

voltage.

Specification:

- DC supply: 4 to 12V
- RPM: 60 at 12V
- Total length: 46mm
- Motor diameter: 36mm
- Motor length: 25mm
- Brush type: Precious metal
- Gear head diameter: 37mm
- Gear head length: 21mm
- Output shaft: Centred
- Shaft diameter: 6mm
- Shaft length: 22mm
- Gear assembly: Spur
- Motor weight: 100gm

Figure 2.4 Motor

2.4 Wheels:

This is 65mm Robot Wheel for BO Motor (Yellow).The wheel is made up of high-quality rubber which gives maximum traction while operating. The wheel is strong and sturdy as it features a nylon reinforced plastic rim.

Features:

1. Tire with sponge liner for more strength
2. With upgraded tire tread for greater friction
3. New design wheel for better combination with the motor
4. Diameter: 65 mm
5. Width : 28 mm
6. The material of Wheel: High-strength plastic
7. The material of Tyre: Rubber
8. Color: Yellow

Figure 2.5 Wheels

2.5 HC-05 Bluetooth module

This module is capable of communicating with pc, mobile phone or any other Bluetooth enabled device. It is interfaced with the microcontroller over the serial UART port of micro-controller. Bluetooth is a wireless communications protocol running at 2.4 GHz, with client-server architecture, suitable for forming personal area networks. Bluetooth is an extremely integral feature designed for low power devices. Bluetooth is a standardized feature or specification that is available in all Smartphone running on android, laptops and computers. It is very handy as it can be easily fitted with a module to allow Bluetooth communication. Bluetooth is the only appropriate communications protocol that has no fear of getting the frequency interferences because it uses the MAC Address of the device i.e. Bluetooth allows the connectivity between two devices using their MAC Address.

HC-05 module shown in Figure-1 is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature). HC-05 module work on 3.0V low power operation and 3.0 to 4.2V I/O controls. It has integrated antenna, edge

connector and UART interface with programmable baud rate. HC-05 module has default Baud rate: 38400, Data bits:8, Stop bit:1,Parity: No parity and supported baud rates are 9600, 19200, 38400, 57600, 115200, 230400, 460800.

Specification:

- Model: HC-05
- Input Voltage: DC 5V
- Communication Method: Serial Communication
- Master and slave mode can be switched

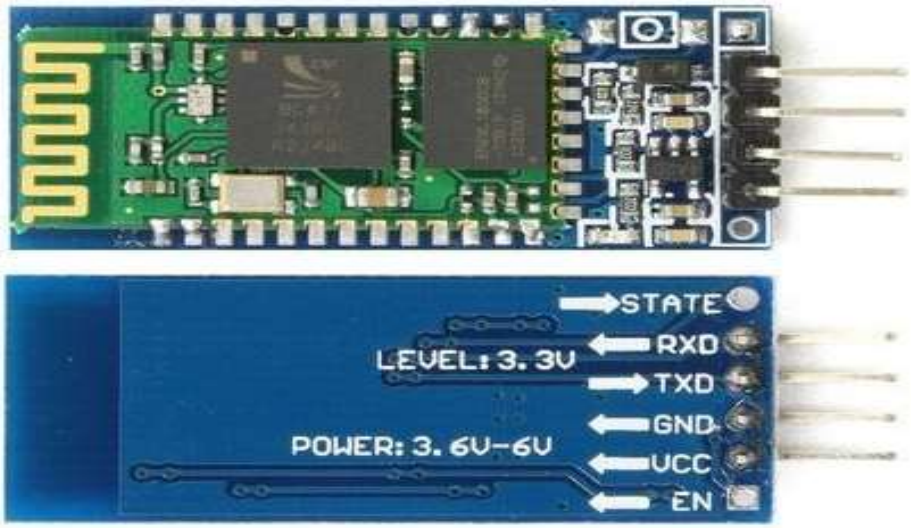


Figure 2.6 HC-05 Bluetooth module

2.6. Arduino Uno

Arduino is a software company, project, and user community that designs and manufactures computer open-source hardware, open-source software, and microcontroller based kits for building digital devices and interactive objects that can sense and control physical devices.

These systems provide sets of digital and analog I/O pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++.

The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Types of Arduino Boards:

2.5.1 Arduino Uno
2.5.2 Arduino Mega
2.5.3 Arduino Mega ADK
2.5.4 Arduino Pro
2.5.5 Arduino Ethernet

2.5.6 Arduino Zero
2.5.7 Arduino Due
2.5.8 Arduino Genuino
2.5.9 Arduino Yun
2.5.10 Arduino Leonardo
2.5.11 Arduino Fio

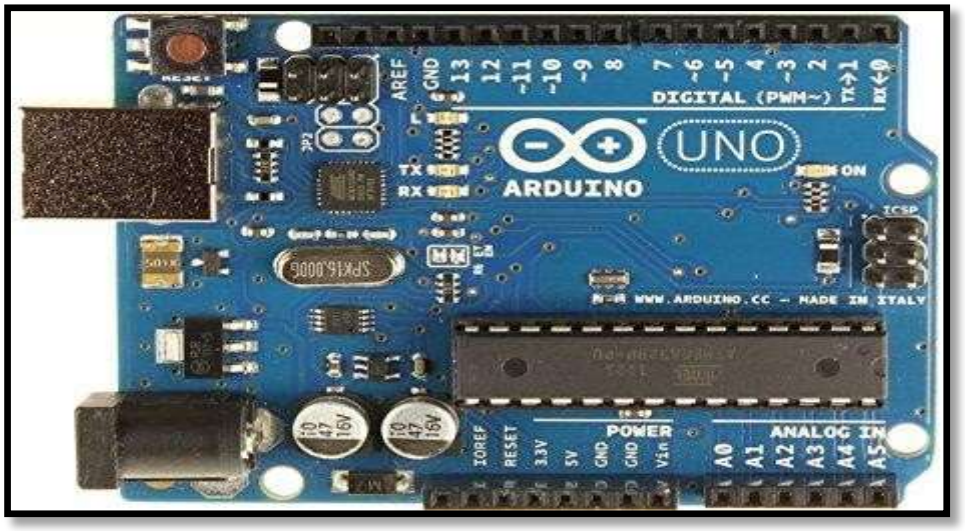


Figure 2.7: Arduino Uno

2.7 LIPO Battery

A lithium polymer battery, or more correctly lithium-ion polymer battery (abbreviated variously as LiPo, LIP, Li-poly and others), is a rechargeable battery of lithium-ion technology in a pouch format. Unlike cylindrical and prismatic cells, LiPos come in a soft package or pouch, which makes them lighter but also less rigid.

Quadcopters typically use LiPo batteries which come in a variety of sizes and configurations. We typically use 3S1P batteries, which indicates 3 cells in parallel. Each cell is 3.7 volts, so this battery is rated at 11.1 volts. LiPo batteries also have a C rating and a power rating in mAh (which stands for milliamps per hour). The C rating describes the rate at which power can be drawn from the battery, and the power rating describes how much power the battery can supply. Larger batteries weigh more so there is always a trade-off between flight duration and total weight. A general rule of thumb is that doubling the battery power will get you 50% more flight time, assuming your quadcopter can lift the additional weight.

Li Po batteries have three main things going for them that make them the perfect battery choice for RC planes and even more so for RC helicopters over conventional rechargeable batterytypes such as NiCad, or NiMH.

- Li Po batteries are light weight and can be made in almost any shape and size.
- Li Po batteries have high discharge rates to power the most demanding electric motors.
- Li Po batteries hold lots of power in a small package

Just as with other lithium-ion cells, LiPos work on the principle of intercalation and DE intercalation of lithium ions from a positive electrode material and a negative electrode material, with the liquid electrolyte providing a conductive medium. To prevent the electrodes from touching each other directly, a microporous separator is in between which allows only the ions and not the electrode particles to migrate from one side to the other.

Unlike lithium-ion cylindrical and prismatic cells, which have a rigid metal case, LiPo cells have a flexible, foil-type (polymer laminate) case, so they are relatively unconstrained. By themselves the cells are over 20% lighter than equivalent cylindrical cells of the same capacity.

Being lightweight is an advantage when the application requires minimum weight, such as in the case of radio controlled models. However, it has been investigated that moderate pressure on the stack of layers that compose the cell results in increased capacity retention, because the contact between the components is maximized and delamination and deformation is prevented, which is associated with increase of cell impedance and degradation.

Figure 2.8: Lipo Battery 3000 mAh 11.1 v

2.8. Smart Phone

The smart phone is the transmitter of this circuit. It sends the data to microcontroller through Bluetooth module. It also helps to send the instruction of forward, backward, left, right to the microcontroller. Actually, the smart phone is used as a remote of this system. Here we the Bluetooth RC Controller application (Figure 3) as the operating remote of this system. The advantage of this project is that the application software designed for android phones is kept simple but attractive with all necessary built-in functions. The novelty lies in the simplicity of the design and functioning.

Figure 2.9: Smart Phone Application.

Chapter 3

Project Description

3.1 Principle of Operation

The working principle is kept as simple as possible. The working principle of the circuit has been elaborated with the help of a block diagram, of the system interconnection as shown in Figure 6. As seen from the Figure 6. A DC power supply is required to run the system. The DC power supple feeds the Microcontroller and the Bluetooth module. The Bluetooth module receives the signal sent from an android smart-phone, where the application software coded in C language is installed. The microcontroller, thereby, sends instructions, which when executed, helps in functioning of the motor driver. The movement and functioning of the motor can be controlled by using the android based application software.

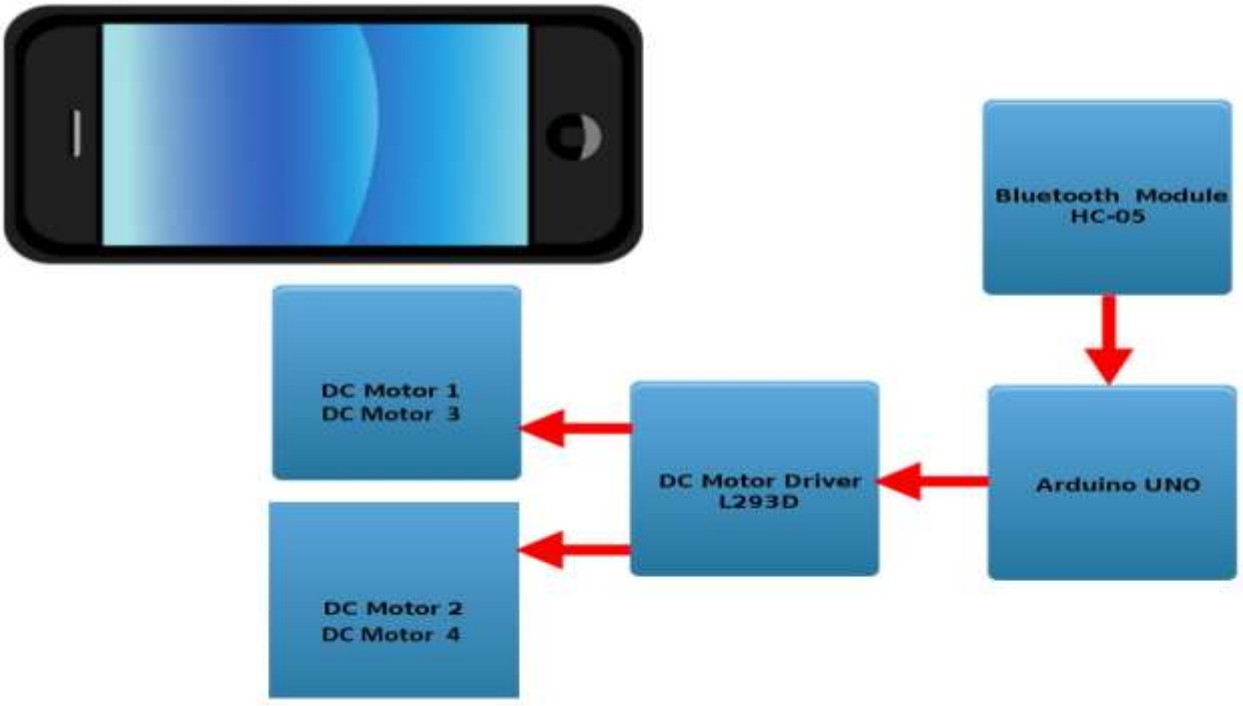


Figure 4.1: Block diagram of the proposed system.

Hardware of this project consists of Arduino UNO, Bluetooth module and a motor driver IC. The Bluetooth module is connected with the Arduino UNO board for the connection with the user. Through the Bluetooth module for monitoring and controlling the particular motor reaches the board and process accordingly and the output of the Arduino goes to the motor driver IC and it controls the particular motor.

Our proposed project consists of the following three sections:

a) Input section

b) Microcontroller section

c) Output section

In our android application base Bluetooth controlled the robotic car, the user interacts with the system with a smart phone. In this method user must be present within in range (< 15 meters) to control the system. In future we would try to extend the range using Internet of Things (IoT) [12]. When user sends any data to the Arduino board then the corresponding pin of Arduino goes to high state and switches the motor driver ic in the on mode. The corresponding motor moves as per the input data. Here in this project the user (android application) is the input section. This device is connected with the Arduino board (microcontroller section) by the means wirelessly i.e. Bluetooth module. The system can now be connected with the motors (output section) to be controlled via wireless connectivity. The circuit diagram of this project is shown below:

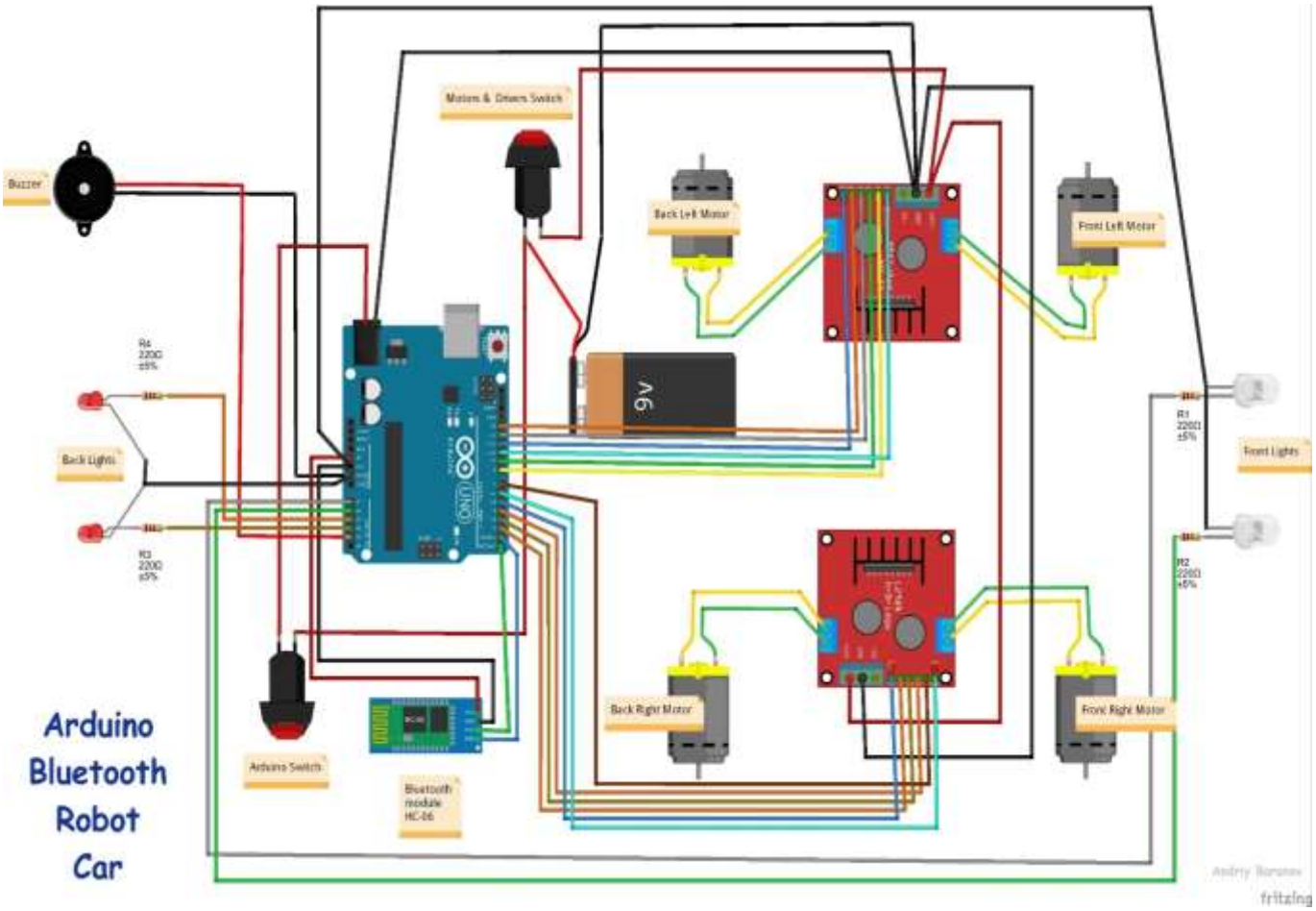


Figure 4.2: Circuit diagram of the project.

Here at first we construct the circuit as shown in Figure 4.2.

Then through the data cable we insert the commands in the microcontroller ATMEGA 328P. These commands help the microcontroller to interface with the Bluetooth module HC05 and also with the motor driver IC L293D. Here the Bluetooth module act as a receiver which receives the instruction from the smart phone (remote or transmitter). Then the microcontroller decides the operation for the instruction which is coming from the smart phone. The functions of the given instructions are operated by microcontroller. The instructions are sent by the smart phone. We can easily control the movements of the dc motor. The Bluetooth module can operate below the 10 m range, which we would try to extend in future. Here we are using four 12 V, 200 R.P.M DC motors and a 9 V DC battery as main power supply of this system. Until we send any instruction to the microcontroller the motors remain stop. When any input is given then the motors moves as per the preloaded functions in the microcontroller. Figure 8 shows the snapshot of the whole Bluetooth Based Smart Phone Control Robot Project.

Chapter 4 Project Overview

4.1 Software Used

Many companies provide the Arduino, some of them provide shareware version of their product on the Web. We can download them from their Websites. However, the size of code for these shareware versions is limited and we have to consider which assembler is suitable for our application.

4.2 Arduino

The Arduino Integrated Development Environment - or Arduino Software (IDE)- contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

4.2.1 Writing Sketches

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right-hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

4.2.2 Sketch Book

The Arduino Software (IDE) uses the concept of a sketchbook: a standard place to store your programs (or sketches). The sketches in your sketchbook can be opened from the File > Sketchbook menu or from the Open button on the toolbar. The first time you run the Arduino software, it will automatically create a directory for your sketchbook. You can view or change the location of the sketchbook location from with the Preferences dialog.

4.2.3 Tabs, Multiple Files, and Compilation

Allows you to manage sketches with more than one file (each of which appears in its own tab). These can be normal Arduino code files (no visible extension), C files (.c extension), C++ files (.cpp), or header files (.h).

4.2.4 Uploading

Before uploading your sketch, you need to select the correct items from the Tools > Board and Tools > Port menus. The boards are described below. On the Mac, the serial port is probably something like /dev/tty.usbmodem241 (for an Uno or Mega2560 or Leonardo) or /dev/tty.usbserial-1B1 (for a Duemilanove or earlier USB board), or /dev/tty.USA19QW1b1P1.1 (for a serial board connected with

a Key span USB-to-Serial adapter). On Windows, it's probably COM1 or COM2 (for a serial board) or COM4, COM5,

COM7, or higher (for a USB board) - to find out, you look for USB serial device in the ports section of the Windows Device Manager. On Linux, it should be /dev/ttyACMx , /dev/ttyUSBx or similar. Once you've selected the correct serial port and board, press the upload button in the toolbar or select the Upload item from the File menu. Current Arduino boards will reset automatically and begin the upload. With older boards (pre-Diecimila) that lack auto-reset, you'll need to press the reset button on the board just before starting the upload. On most boards, you'll see the RX and TX LEDs blink as the sketch is uploaded. The Arduino Software (IDE) will display a message when the upload is complete, or show an error.

When you upload a sketch, you're using the Arduino bootloader, a small program that has been loaded on to the microcontroller on your board. It allows you to upload code without using any additional hardware. The bootloader is active for a few seconds when the board resets; then it starts whichever sketch was most recently uploaded to the microcontroller. The bootloader will blink the on-board (pin 13) LED when it starts (i.e. when the board resets).

4.2.5 Libraries

Libraries provide extra functionality for use in sketches, e.g. working with hardware or manipulating data. To use a library in a sketch, select it from the Sketch > Import Library menu.
This will insert one or more #include statements at the top of the sketch and compile the library with your sketch. Because libraries are uploaded to the board with your sketch, they increase the amount of space it takes up. If a sketch no longer needs a library, simply delete its #include statements from the top of your code.

There is a list of libraries in the reference. Some libraries are included with the Arduino software. Others can be downloaded from a variety of sources or through the Library Manager.
Starting with version 1.0.5 of the IDE, you do can import a library from a zip file and use it in an open sketch.

4.2.6 Boards

The board selection has two effects: it sets the parameters (e.g. CPU speed and baud rate) used when compiling and uploading sketches; and sets and the file and fuse settings used by the burn bootloader command. Some of the board definitions differ only in the latter, so even if you've been uploading successfully with a particular selection you'll want to check it before burning the bootloader.

4.2.7 Steps for Writing Program Code

STEP 1

Arduino microcontrollers come in a variety of types. The most common is the Arduino UNO, but there are specialized variations. Before you begin building, do a little research to figure out which version will be the most appropriate for your project.

STEP 2

To begin, you'll need to install the Arduino Programmer, aka the integrated development environment (IDE).

STEP 3

Connect your Arduino to the USB port of your computer. This may require a specific USB cable. Every Arduino has a different virtual serial-port address, so you'll need to reconfigure the port if you're using different Arduinos.

STEP 4

Set the board type and the serial port in the Arduino Programmer.

STEP 5

Test the microcontroller by using one of the preloaded programs, called sketches, in the Arduino Programmer. Open one of the example sketches, and press the upload button to load it. The Arduino should begin responding to the program: If you've set it to blink an LED light, for example, the light should start blinking.

STEP 6

To upload new code to the Arduino, either you'll need to have access to code you can paste into the programmer, or you'll have to write it yourself, using the Arduino programming language to create your own sketch. An Arduino sketch usually has five parts: a header describing the sketch and its author; a section defining variables; a setup routine that sets the initial conditions of variables and runs preliminary code; a loop routine, which is where you add the main code that will execute repeatedly until you stop running the sketch; and a section where you can list other functions that activate during the setup and loop routines. All sketches must include the setup and loop routines.

STEP 7

Once you've uploaded the new sketch to your Arduino, disconnect it from your computer and integrate it into your project as directed.

4.3 Applications

- In Domestic Use: This project can be used at homes for many purposes like picking up and placing some objectsfrom one to other.
- In Spying Operations: This robot can help in spying operations. The object recognition and android control makes it Hi-Fi.
- For Handicapped People: This project can help the handicapped people especially those who had lost their feet unfortunately.
- Robo Races: The tilt control of robots can be used in robo races which will be revolutionary.
- Military Application and Hostage Rescue

4.4 Modifications

Other plans in the future include adding a sonic sensor for more accurate altitude determination. Currently the only methods to determine altitude is by using the barometric pressure sensor and the GPS receiver. There is no actual way to safely determine the quadcopters altitude relative to its landing surface. A sonic sensor could solve this problem, and be used to help aid the auto landing command. Another modification can be done by adding more methods of collecting data. Many ports still remain unused on the control board. Adding a camera could allow for digital photo or video to be taken. Adding some way to stream data from the quadcopter to the controller could be another great feature to add to our quadcopter, this would allow for even easier access to the data collected by the quadcopter. Smart phone capabilities could be another feature our group may want to add in the future.

Chapter 5

Result and Conclusion

5.1 Result Analysis

After configuring all the parts, assembling as required, configuring Software, finally we obtained our Bluetooth control Aurdino car which is shown below.

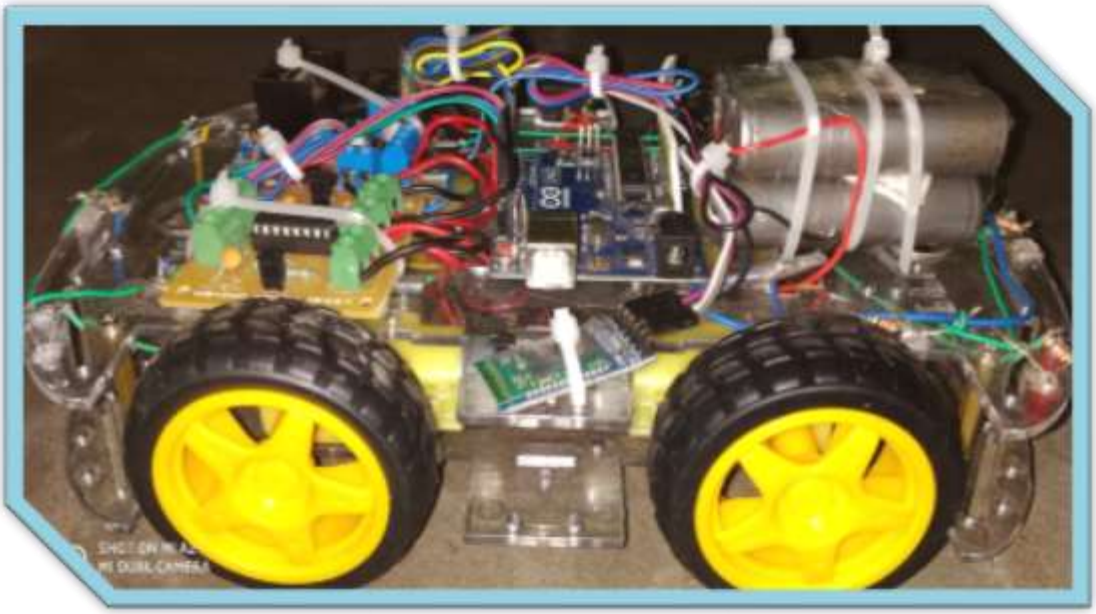


Figure 6.1: Bluetooth control car.

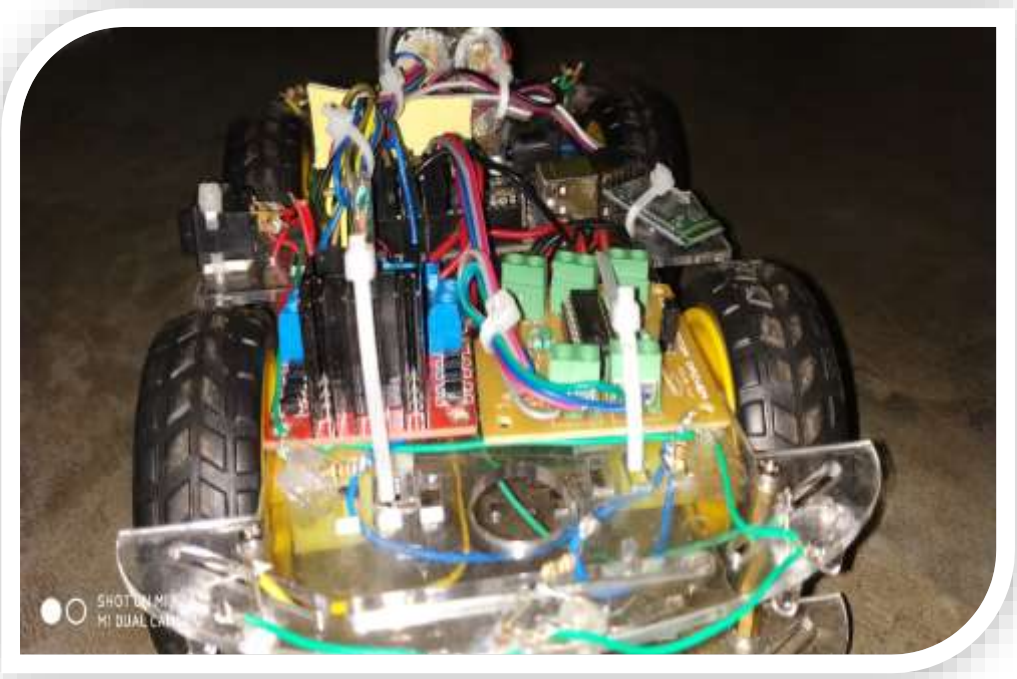
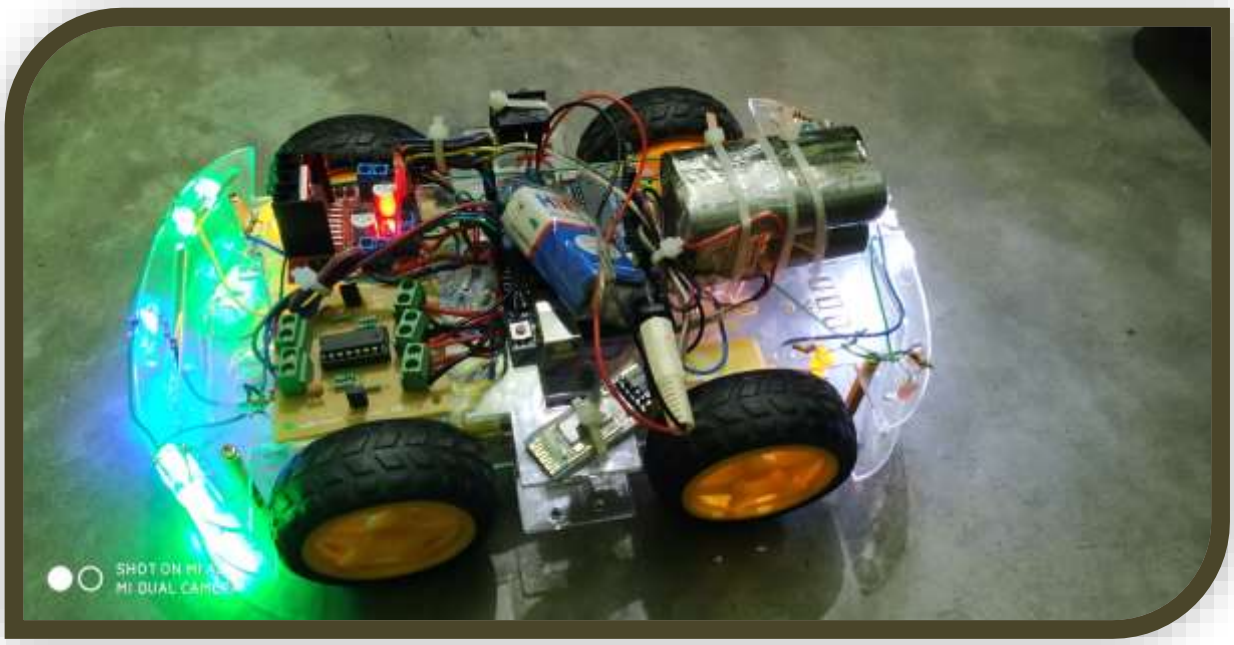


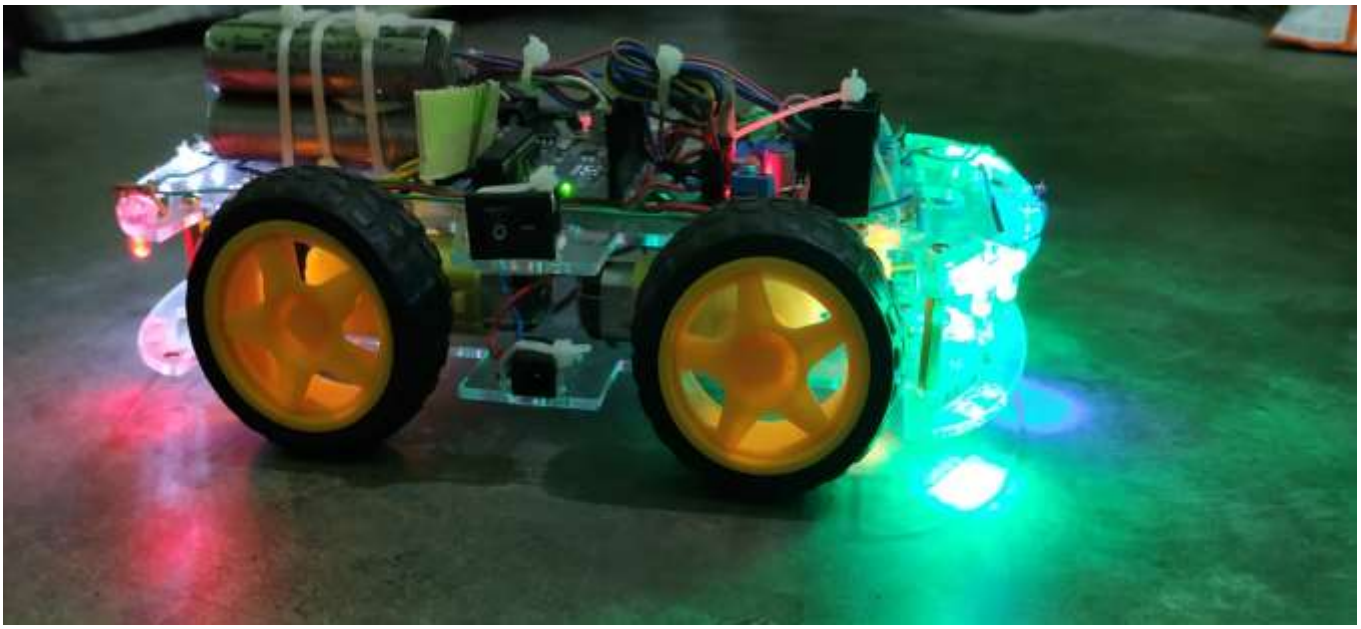
Figure 6.2: Controller

Figure 6.3: Bluetooth Control Car With controller app in smart phone.

5.2 System Verification and Testing

In this section of the document we will be discussing the methods we used to test each component of our car, the problems we faced, and how we solved them.





5.3 Conclusion

The operating system of smart phone is android which can develop effective remote control program. At the same time , this program uses blue-tooth connection to communicate with robot. It has proven to allow for meaningful two-way communication between the Android phone and the robot which would allow a non-expert to interact with and adjust the functionality of a system which uses ATmega328 controller, a single board micro-controller intended to make the application of interactive objects or environments more accessible. The surveillance is always has been a quite sensitive task. And it includes so many risks. So it's better to use robot for this job instead of people. And if you are able to control the robots with efficiency and accuracy then you can guarantee yourself with good results and success. This system is a good step for secure surveillance using robots. Wireless control is one of the most important basic needs for all the people all over the world. But unfortunately the technology is not fully utilized due to a huge amount of data and communication overheads. Generally many of the wireless-controlled robots use RF modules. But our project for robotic control make use of Android mobile phone which is very cheap and easily available. The available control commands are more than RF modules. For this purpose the android mobile user has to install a designed application on her/his mobile.

5.4 Future Scope

A wireless camera is mounted on the robot vehicle for spying and surveillance purpose even in night time by using infrared lighting. Future modifications can be made to perform different tasks with precise control such as:

- □ A Robot Mounted with camera
- □ A headset, with a full-color display
- □ A mission control center.

References

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