

Project Report
RC BLUETOOTH CONTROLLED CAR
USING ARDUINO UNO



Presented by:

Hamza Iftikhar (21-CS-45)

Department of Computer Science

University of Engineering and Technology, Taxila

Fall 2021

Project report

Contents

Abstract.....	3
Acknowledgement	3
Introduction:.....	4
Project aim	5
Project Objective.....	5
Project Scope and Limitations:	5
Hardware Components.....	6
Software components.....	6
Hardware Description	7
Bluetooth Technology:.....	7
Arduino UNO Board:.....	7
L298D	8
Jumper Wires	9
Software Description	10
Circuit Diagram	11
Working	12
Source Code	13
Benefits	15
It's just fun.....	15
Competition.....	15
Socializing.....	15
Enhancing an interest.....	15
Hand to eye coordination	15
Applications and future scope.....	16
Conclusions:.....	16
Deliverable Hardware	17

Abstract:

A remote controlled vehicle is any mobile machine controlled by means that is physically not connected with origin external to the machine. There are many types in it, based on the controls – radio control device, Wi-Fi controlled and even Bluetooth controlled. These devices are always controlled by humans and take no action autonomously. The main target in such vehicles would be to safely reach a designated point, maneuver the area and reach back to the point of origin.

In this project we make use of the Bluetooth technology to control our machinecar. We don't call this as a robot as this device doesn't have any sensors. Thereby, sensor less robots are machines. This machine can be controlled by any human using his android mobile phone, by downloading an app and connecting it with the Bluetooth module present inside our car. User can perform actions like moving forward, backward, moving left and right by the means of command using his-her mobile phone app.

Arduino play a major role in the control section and had made it easier to convert digital signals and analogue signals into physical movements. The major reason for using a Bluetooth based tech is that we can change the remote anytime – mobiles phones, tablets and laptops and physical barriers like wall or doors do not affect the car controls.

Acknowledgement:

First and foremost, I would like to take this opportunity to thank our lab instructor for his guidance and advice on this project at the same time I also won't forget my group member and also friends to because they quit good which sharing some of their information to complete this project. Last but not the least , I am very grateful to our university, where they gave us enough of time, opportunity and guidance to complete this project and at the same time, I would like to thank my friends and classmates who helps me a lot to complete this project.

Thank you!

:-Introduction:-

The world is at the dawn of a smart phone era where everything in our day-to-day life is and can be controlled with a smartphone. The main purpose of this project is to create a remote interface to control Car with wireless technology. Bluetooth-powered robotic car is a relatively inexpensive, easy-to-use, and efficient way to go. The aim of the project is to design an Arduino system and write a program on Arduino Microprocessor. The Arduino car contains an Arduino microcontroller with basic navigation features.

The program will be compiled through Arduino IDE to the Arduino microprocessor & loaded into it after proper checking of logic to minimize any hardware loss / damage. We will use an android application that will provide user an interface to interact with the Arduino powered car. The interface will be easy to use and will control Arduino microprocessor via the Bluetooth after giving instruction to Arduino for various actions through interface through the Bluetooth module

Here only needs to touch button in android phone to control the car in forward, backward, 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.

Project aim:

The aim of the project is to design an Arduino system and write a program on Arduino Microprocessor. The Arduino car contains an Arduino microcontroller with basic navigation features. Our aim is to design Bluetooth control RC car. Which can be controlled by a smart phone application. It can be controlled by using Android mobile phone instead of any other method like buttons, gesture etc.

Project Objective:


The objective of this project is to implement a low cost, reliable and scalable CAR that can be ON AND OFF using Bluetooth module, using a Arduino UNO to achieve hardware's implicitly. The interface will be easy to use and will control Arduino microprocessor via the Bluetooth after giving instruction to Arduino for various actions through interface through the Bluetooth module.

Project Scope and Limitations:

The world is at the dawn of a smart phone era where everything in our day-to-day life is and can be controlled with a smartphone. The main purpose of this project is to create a remote interface to control Car with wireless technology. Bluetooth-powered robotic car is a relatively inexpensive, easy-to-use, and efficient way to go. We can easily use it anywhere and it will easy our daily life tasks. But this is at very basic level it can only perform limited tasks, but we can upgrade it in many types for its multi functionality.

Project report

Hardware Components:

Sr #	Components	Specifications	Model Pictures
01	Arduino Board	UNO	
02	Bluetooth Modules	HC-05	
03	Motor Drive Shield	L298D	
04	DC Gear Motor	12v ,300RPM	
05	Stainless Steel Nails and Nylon Jumpers		
06	Connecting Wires and Jumper Cables		
07	Battery	LIPO	

Software components:

- Arduino 1.8.91
- Proteus 8
- Android application

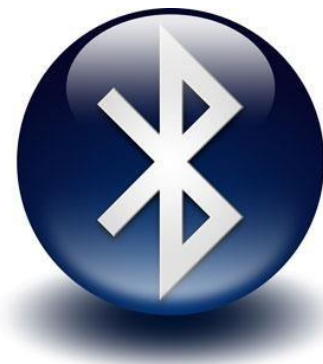
Hardware Description:

Bluetooth Technology:

Bluetooth wireless technology is a short range communications technology intended to replace the cables connecting portable unit and maintaining high levels of security. Bluetooth technology is based on Ad-hoc technology also known as Ad-hoc Pico nets, which is a local area network with a very limited coverage.

WLAN technology enables device connectivity to infrastructure based services through a wireless carrier provider. The need for personal devices to communicate wirelessly with one another without an established infrastructure has led to the emergence of Personal Area Networks (PANs). Bluetooth specification details the entire protocol stack. Bluetooth employs Radio Frequency (RF) for communication. It makes use of frequency modulation to generate radio waves in the ISM band.

The usage of Bluetooth has widely increased for its special features. Bluetooth offers a uniform structure for a wide range of devices to connect and communicate with each other. Bluetooth technology has achieved global acceptance such that any Bluetooth enabled device, almost everywhere in the world, can be connected with Bluetooth enabled devices. Low power consumption of Bluetooth technology and an offered range of up to ten meters has paved the way for several usage models. Bluetooth offers interactive conference by establishing an adhoc network of laptops. Bluetooth usage model includes cordless computer, intercom, cordless phone and mobile phones.



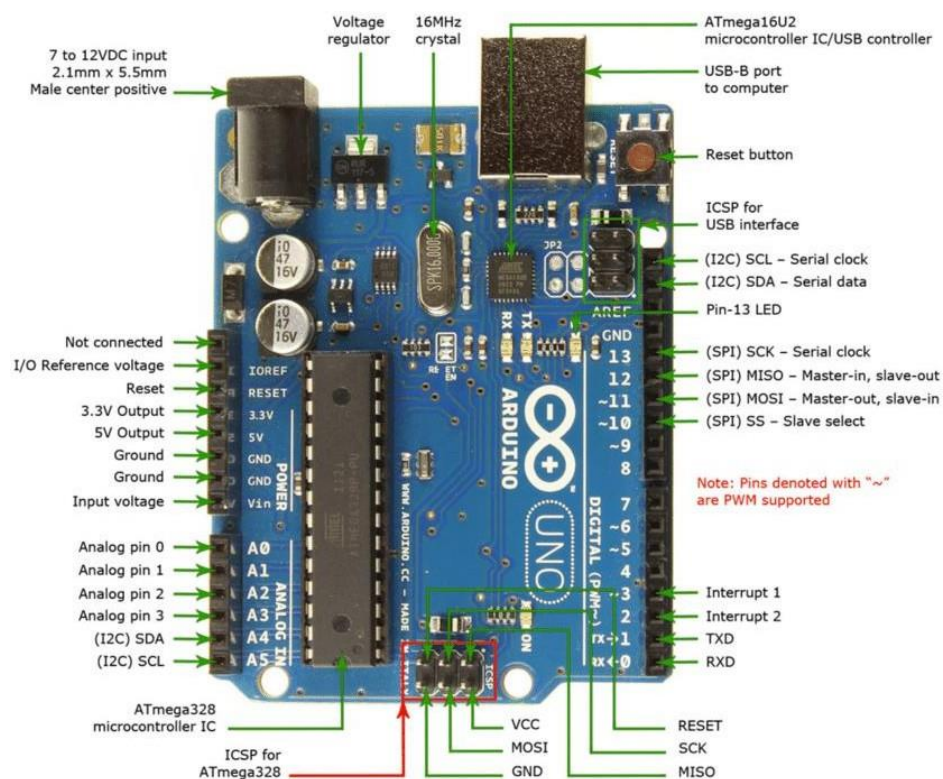
Arduino UNO Board:

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P ([datasheet](#)). 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

Project report

a USB cable or power it with an AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

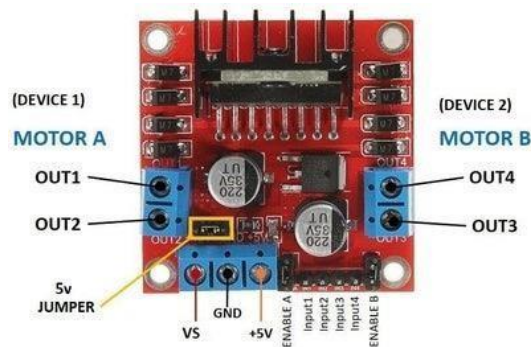


L298D:

This **L298N Motor Driver Module** is a high power motor driver module for driving DC and Stepper Motors. This module consists of an L298 motor driver IC and a 78M05 5V regulator. **L298N Module** can control up to 4 DC motors, or 2 DC motors with directional and speed control.

Project report

Pin Name	Description
IN1 & IN2	Motor A input pins. Used to control the spinning direction of Motor A
IN3 & IN4	Motor B input pins. Used to control the spinning direction of Motor B
ENA	Enables PWM signal for Motor A
ENB	Enables PWM signal for Motor B
OUT1 & OUT2	Output pins of Motor A
OUT3 & OUT4	Output pins of Motor B
12V	12V input from DC power Source
5V	Supplies power for the switching logic circuitry inside L298N IC
GND	Ground pin



Jumper Wires :

A jump wire is an electrical wire or group of them in a cable with a connector or pin at each end. Wires are used to connect components to each other on the breadboard or other prototype, internally or with other equipment or components, without soldering.

Project report

Wire connectors could be male or female. A male connector is commonly referred to as a plug and has a solid pin for a center conductor. A female connector is commonly referred to as a jack and has a center conductor with a hole in it to accept the male pin.



Software Description :

Arduino software is used to put the instruction of whole functions of this system to the microcontroller. Here we use programming language.

The program is burnt in the microcontroller using burner software. The program is stored in the EEPROM of the microcontroller, which is present in the NodeMCU ESP8266. By this software we put the data

and instruction for forward, backward, left, right operation of this system. In android application when we press a button, a corresponding signal is sent through the Bluetooth-to-Bluetooth module (HC-05) which is connected with the NodeMCUESP8266. Similarly, an android application has been built for Wi-Fi module and when the buttons been pressed through the application the corresponding signal has been sent through the NodeMCU ESP8266 and the motor driver drives the wireless car. When signal data arrives the NodeMCU ESP8266 the pin which corresponds to the particular input is set to high. Now that pin gives the output to the motor driver section.

Motor driver switches accordingly the data bit, if the data bit is low then the corresponding pin of the motor driver doesn't work else high bit then the corresponding pin of the motor driver is on. We have used Arduino IDE version 1.8.91 for writing program. There are two steps of the programming. First set up section where we define all the variables. Second loop part where the program runs continuously.

Project report



Arduino IDE 1.8.19

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board.

Refer to the [Getting Started](#) page for Installation instructions.

SOURCE CODE

Active development of the Arduino software is [hosted by GitHub](#). See the instructions for [building the code](#). Latest release source code archives are available [here](#). The archives are PGP-signed so they can be verified using [this](#) gpg key.

DOWNLOAD OPTIONS

Windows Win 7 and newer

Windows ZIP file

Windows app Win 8.1 or 10 [Get](#)

Linux 32 bits

Linux 64 bits

Linux ARM 32 bits

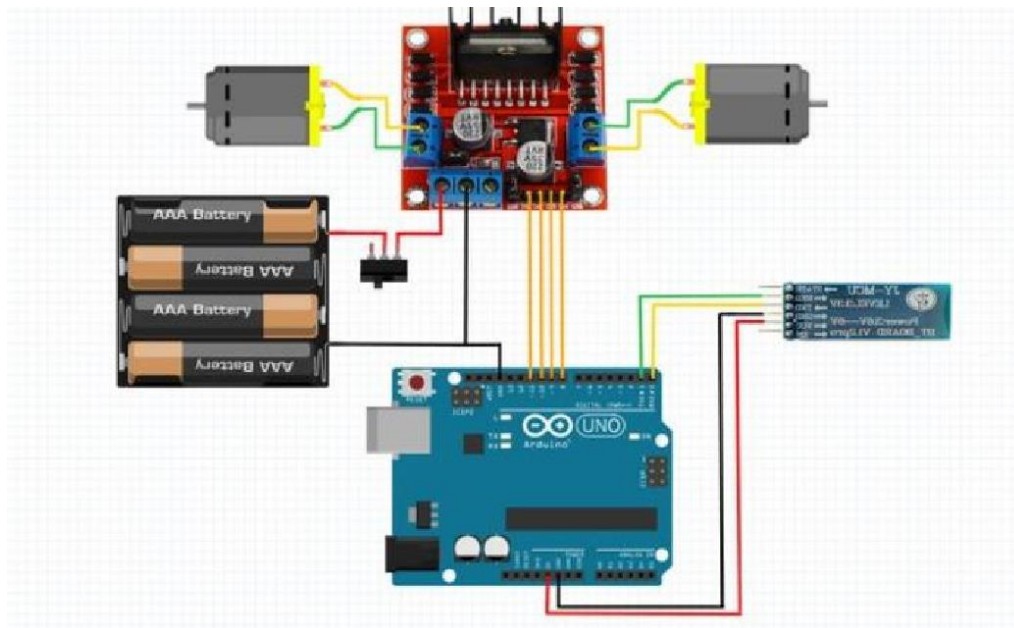
Linux ARM 64 bits

Mac OS X 10.10 or newer

[Release Notes](#)

[Checksums \(sha512\)](#)

Circuit Diagram:



Project report

and passes the same to Motor Drive through its digital pins. Motor Drive will get this through their input pins and exercise them through their output pins were motor is connected.

Source Code:

```
char t;

void setup() {
  pinMode(13,OUTPUT); //left motors forward
  pinMode(12,OUTPUT); //left motors reverse
  pinMode(11,OUTPUT); //right motors forward
  pinMode(10,OUTPUT); //right motors reverse
  Serial.begin(9600); // baud rate: bits processing per second

}

void loop() {
  if(Serial.available()){
    t = Serial.read();
    Serial.println(t);
  }

  if(t == 'F'){ //move forward(all motors rotate in forward direction)
    digitalWrite(13,HIGH);
    digitalWrite(11,HIGH);
  }
}
```

```
else if(t == 'B'){    //move reverse (all motors rotate in reverse direction)
```

```
digitalWrite(12,HIGH);
```

```
digitalWrite(10,HIGH);
```

```
}
```

```
else if(t == 'L'){    //turn right (left side motors rotate in forward direction, right side  
motors doesn't rotate)
```

```
digitalWrite(11,HIGH);
```

```
}
```

```
else if(t == 'R'){    //turn left (right side motors rotate in forward direction, left side motors  
doesn't rotate)
```

```
digitalWrite(13,HIGH);
```

```
}
```

```
else if(t == 'S'){    //STOP (all motors stop)
```

```
digitalWrite(13,LOW);
```

```
digitalWrite(12,LOW);
```

```
digitalWrite(11,LOW);
```

Project report

Benefits:

It's just fun:-

The primary reason why you need to play with these cars is that they are fun. There is nothing so satisfying as watching this small, powerful car tear through the backyard with 60 Mph, and quickly blazing across your pavement as you steers it and control the speed as you like. Although you kids will need supervision when playing with RC cars, the play is largely independent, so your kid will learn to form opinions and draw conclusions about their surroundings which can help improve school grades.

Competition:-

Many people find their competition through online games, but the RC car gives a chance to compete in a much healthier way, not to mention in an exhilarating fashion. A kid who loves RC will want to compete with a family member, and would want to race their car much better than the family opponent. This is actually the most alluring aspect of RC cars; a chance to connect with other members of the family, outdoors not indoor.

Socializing:-

Play with RC cars will definitely make your kids new friends. You will most likely come across communities with RC clubs or gatherings on weekends, and Rc cars is a fun way for your kid to make new friends and develop social skills. RC cars have actually evolved to the point that they are now considered as small cars, so you will also come across elder clubs with these cars on their social gathering, so playing with these cars is a great way of making new friends even to the old.

Enhancing an interest:-

The moment your kid plays an RC car, they are slowly developing and enhancing another interest. Maybe they will want to be a car racing driver in future or maybe an engineer. As you might have realized RC cars uses the same fundamental principle as the one on the regular car. Some schools are actually using RC cars as a learning aid.

Hand to eye coordination:-

Just like video games, remote control vehicles can help a player increase hand eye coordination.

Applications and future scope :

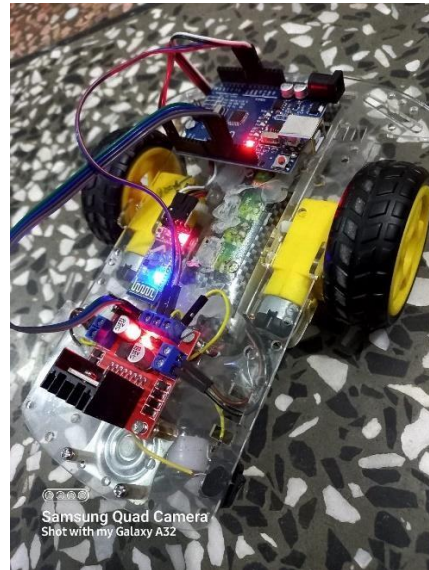
- Using this project we can we can perform many difficult functions in different situations
- the project can be further expanded to different more functions like obstacle detecting line following using different sensors EG ultrasonic sensor etc through these upgradations it will perform many different functions and help us a lot in different fields.
- Additionally we can use it in different different purpose where we can easily done different task only by giving commands using other mobile phones.

Conclusions:

Wireless control is one of the most basic need for all living things but unfortunately do you do huge amount of data and communication overhead the technology is not fully utilized many of the wireless control robots use RF modules but this project make use of Android mobile phone for a robotic control which is very cheap and easily available the control commands available are more than RF modules for this the Android mobile user has to install and application on his mobile the wireless communication technique used to control the robot is Bluetooth technology user can use various commands like move forward reverse move left move right using these command which can send from Android phone Robot has Bluetooth receiver unit which receive command and give it to microcontroller circuit to control motors. Bluetooth robotic car catches signal from Android phone and Arduino we'll make decisions according to our input signal. these cars will perform many functions and can be used in different situations where there will be difficulty from humans to work. It is concluded that smart living will gradually turn into a reality that customer can control their home remotely and wirelessly.

Project report

Deliverable Hardware:



Remarks: