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# Car Control using Wireless Application

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**Abstract:** ***In the current era the Internet of Things (IoT) is becoming an important part of our daily life. It is employed in a variety of applications like smart buildings, intelligent transport systems, smart grid, etc. The aim of this project is to contribute to the evolution of the Internet of Things (IoT) application in intelligent transportation systems. The focus is to develop a smartphone-based wireless controlled car demonstrator for education. Indeed, recent technological evolution has revolutionized the use of smartphones in our lives. The idea is to allow people to take control of their cars wirelessly. It is developed by using the MIT inventor app. This application is installed on the smartphone and it is linked to the embedded controller via the Bluetooth interface. The intended code, to take control over the automobile, is sent by the concerned person by using this application. The command is transmitted to the embedded controller via the Bluetooth port. After the recognition, the received command is executed by the module and a flag is returned to the smartphone-based soft application.***

**Keywords:** IOT, Bluetooth, Application

## 1. Introduction

Smartphone has quite changed the traditional way of human to machine interaction. The smartphone is now a vital part of a person's life. Android could be a software platform for mobile devices that features associate OS, middleware, and key applications. Android is a safe and secure operating system. All of its essential tools are combined in software called SDK which stands for Software Development Kit. It is known that all manual operations have been replaced by automated mechanical operations. The main objective of this project is to develop an Android app for controlling the robot using Bluetooth. Bluetooth is employed for its numerous blessings over alternative wireless technologies. Hardware technology utilized in smartphones has also greatly improved. Hence, can we are able to say that mechanical man Android smartphones will serve an excellent profit for industrial, commercial and other general-purpose applications.

The DC motors are widely used for providing variable speed drive system in industrial applications resembling automation, electrical traction, military instrumentality, fixed disk drives, thanks to their high potency, noise-free operation, compactness, dependability, and low maintenance and cost. Many connection technologies are used nowadays such as GSM, Wi-Fi, WLANs, and Bluetooth. Every technique has its own distinctive characteristics and applications. Among these wireless connections, Bluetooth technology is usually enforced.

The system hardware consists of a controller equipped with a Bluetooth communication module. It is connected to the motors and other alternative components of the car. When the mobile application is turned on and is connected with the current system via Bluetooth, one will operate the automobile by giving wireless commands from the app mistreatment using the functions already programmed in the app. The vehicle will move in all the four told directions: left, right, front and back. For forward movement, movement of both the motors will be in the same direction and for backward motion; the movement of the motors will be in the opposite direction. For left and right movements, either of the motors will rotate and during the mode of stopping both, the motors will come to rest. Instructions are given to the motors through the mobile app by the user.

## 2. Block Diagram

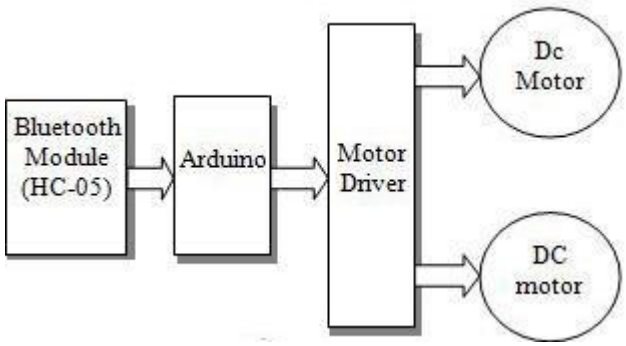


**Figure 1:** Block Diagram of Car Control

**Android**

Android is a very popular open-source operating system (OS), based on the Linux kernel, used in mobile devices such as tablets and smartphones. Android incorporates a terribly easy interface that depends on direct interaction between the user and therefore the device i.e. by using touch gestures. These gestures are like real-world actions, which include swiping, tapping, scrolling and pinching, controlling the on-screen objects, together with a virtual keyboard for taking input in text form. In the project, the android smartphone has an installed app which is used for controlling the robot unit. The Smartphone normally come with inbuilt technology to establish the connection. The technology used in this project is Bluetooth.

**User Interface**

The user interface, of the overall system, is provided using the custom made android app using Graphical User Interface (GUI). The Graphical User Interface provides user, the assorted management modes, to manage dynamically the automaton unit. When the app is started, the connection between the app and the RC unit is first established using

Bluetooth. The GUI of android provides a user-friendly real-time experience to the user, to control the robot.

**The Android Application**

The application used in this work is Android RC. The app can be installed on an Android smartphone to control the RC unit. The app shows buttons for movement of the automobile in various directions. The commands are as follows: Left, forward, backward and right.

**RC Module**

RC module is the main operating unit of this method. This unit consists of an ARDUINO chip, the two motor drivers, and a Bluetooth module connected to the circuit. Motor drivers are used to controlling the dc motors. The ARDUINO no resides at the center of the unit. It is responsible for communicating with the smartphone, using the Bluetooth module and control the motors using the motor driver. The RC unit is powered using a 9V battery connected to ARDUINO and control signal is received via Bluetooth.

**Components Used**

**Arduino UNO Board**

The ARDUINO Uno may be a microcontroller board supported on the ATmega328 (datasheet). Figure 2 shows the Arduino UNO board. It has fourteen digital input/output pins (of that VI may be used as PWM outputs), VI analog inputs, a sixteen rate ceramic resonator, a USB association, an influence jack, an ICSP header, and a reset button. It contains everything required to support the microcontroller; merely connect it to a pc with a USB cable or power it with associate degree AC-to-DC adapter or battery to urge started.

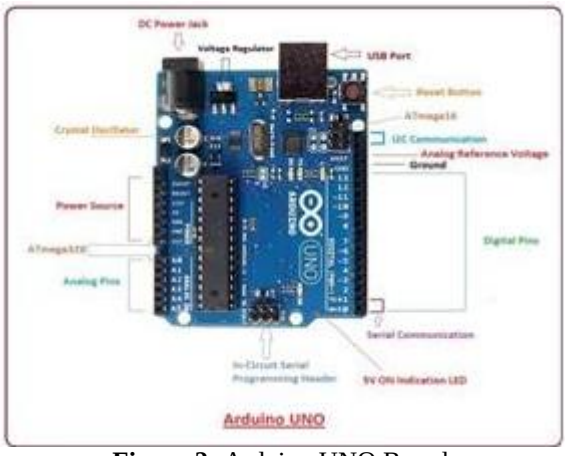


**Figure 2:** Arduino UNO Board

The Uno differs from all preceding boards in this it doesn't use the FTDI USB-to-serial driver chip. Instead, it options the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter

**L293D Driver Circuit**

L293D is a dual H-bridge motor driver integrated circuit (IC) and is shown in Figure 3. Motor drivers act as current amplifiers since they take a low-current management signal and supply a higher-current signal. This higher current signal is employed to drive the motors. L293D contains 2 inbuilt H-bridge driver circuits. In its common mode of operation, 2 DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of 2 motors will be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or eleven will stop the corresponding motor. Logic 01 and ten can rotate it in clockwise and anticlockwise directions, respectively. Enable pins one and nine (corresponding to the 2 motors) should be high for motors to begin in operation. When the associate in nursing change input, the driver gets enabled. As a result, the output becomes active and add a section with their inputs. Similarly, once the change input is low, that driver is disabled, and their outputs area unit off and within the high-impedance state.

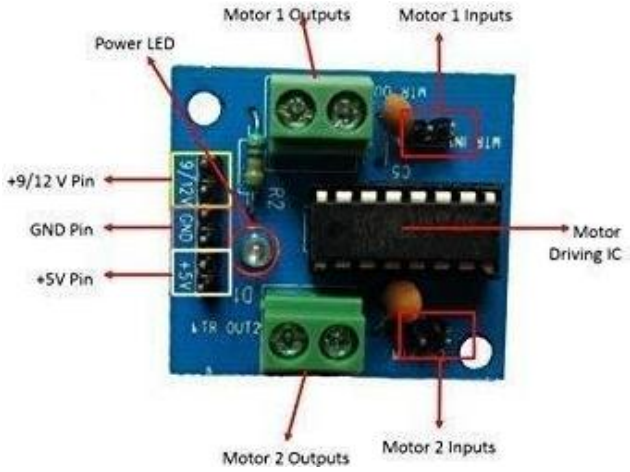


**Figure 3:** L293D Driver Circuit

**HC-05Bluetooth Module**


**Figure 4:** HC-05 Bluetooth Module

HC-05 module could be straight forward to use Bluetooth SPP (Serial Port Protocol) module, designed for clear wireless serial association setup. Figure 4 shows the Bluetooth module. Serial port Bluetooth module is a 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 along with CMOS technology and AFH (Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm.

**Source Code**

The source code used in the Arduino microcontroller for receiving the signal from the Bluetooth and for controlling the direction of the rotating front and rear motors of the car is mentioned below.

```
#definem1113
```

```
#definem1212
#definem2111
#definem2210 voidsetup()
{
    Serial.begin(9600); intoutput; pinMode(m11,output);
    pinMode(m12,output); pinMode(m21,output);
    pinMode(m22,output);
 }
 charstr[2];
 chari;
  voidforward()
{
    digitalWrite(m11,LOW); digitalWrite(m12,LOW);
    digitalWrite(m21,HIGH); digitalWrite(m22,LOW);
  }
voidbackward()
 {
    digitalWrite(m11,LOW);digitalWrite(m12,LOW);
    digitalWrite(m21,LOW);digitalWrite(m22,HIGH);
 }
 voidstp()
 {
    digitalWrite(m11,LOW);digitalWrite(m12,LOW);
    digitalWrite(m21,LOW);digitalWrite(m22,LOW);
 }
 voidleft()
 {
    digitalWrite(m11,LOW);
    digitalWrite(m12,HIGH);
    digitalWrite(m21,LOW);
    digitalWrite(m22,HIGH);
 }
 voidright()
 {
    digitalWrite(m11,HIGH);digitalWrite(m12,LOW);
    digitalWrite(m21,HIGH); digitalWrite(m22,LOW);
 }
 voidloop()
 {
 do
  {
    charch=Serial.read();
    str[i++]=ch;
     if(str[i-1]=='1')
    {
        Serial.println("forward");
        forward();
        i=0;
     }
   elseif(str[i-1]=='2')
    {
        Serial.println("backward");
  backward();
        i=0;
     }
    elseif(str[i-1]=='3')
{
serial.println("right");
right();
        i=0;
     }
    elseif(str[i-1]=='4')
{
        serial.println("left");
        left();
     i=0;
     }
    elseif(str[i-1]=='5')
    {
    serial.println("stop");
    stp();
     i=0;
    }
  }
  while(Serial.available());
}
```

**Overall Circuit Diagram**

The circuit diagram of the hardware which shows the connection between Arduino, Bluetooth, and motors is shown in Figure 5. It also shows a motor driver L293D which is responsible for the movement of the motors in both directions. RxD pin of the Arduino is connected to the TxD pin of Bluetooth and vice versa. A supply of 5V is provided to the motors.

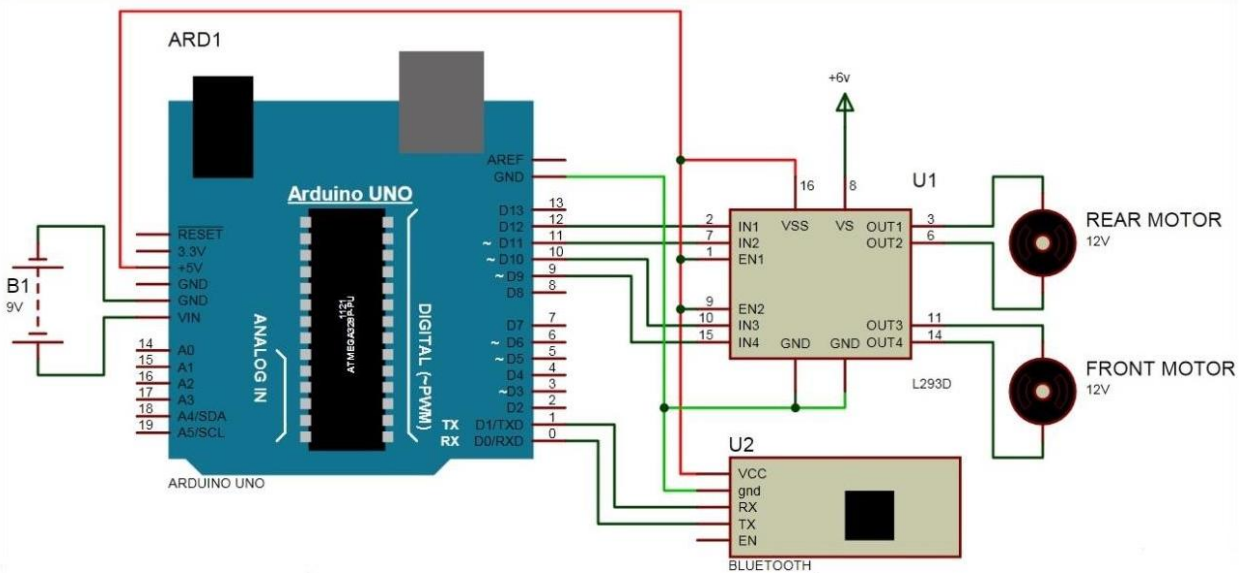


**Figure 5:** Circuit Diagram showing the connection between Arduino, Bluetooth and motor

## 3. Results and Discussion

Connections were made as per the circuit diagram and hex file of the code of Arduino was attached to the Arduino UNO. The hardware working model was constructed and tested with the results of the source code interfaced with Arduino UNO. The working model is shown in Figure.6.

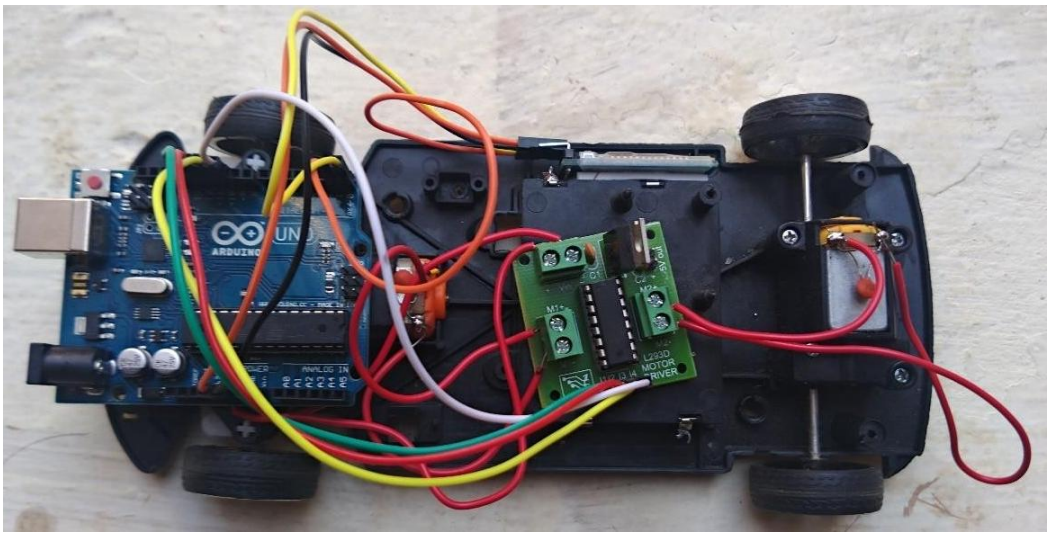

**Figure 6:** Hardware Prototype

## 4. Conclusion

In this project, an IoT based smart transportation system is devised. It is realized by combining the emerging IoT technology with a smart combination of an Android-based Smartphone, Bluetooth wireless interface, controller and a server. The system and hardware working model are tested for a range of 9 meters between Smartphone and front-end electronics. The prototype is kept active. The Android-based application platform is developed with MIT App inventor. The inputs and outputs are kept accessible.

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