

CHITTAGONG UNIVERSITY OF ENGINEERING AND TECHNOLOGY



Project Name: Bluetooth controlled car

ETE-300

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1 Introduction

Robots are always a fancy topic for students, hobbyists and DIYers. A Bluetooth-controlled Arduino car is a versatile and exciting project that combines robotics, electronics, and wireless communication to create a remotely controlled vehicle. In this project, I make use of Bluetooth technology to control my machine car. I do not call this a robot as this device does not have any sensors. Thereby, senseless robots are machines. The project aims are to design a Bluetooth control Arduino car and write a program into the Arduino microprocessor. Arduino car contains an Arduino microcontroller with basic mobility features. In this project, I make use of Bluetooth technology to control our machine car. This project involves building a small, programmable car or robot that can be wirelessly controlled using a Bluetooth-enabled smartphone or computer. It's a great way to learn about microcontroller programming, motor control, and wireless communication while having fun with a mobile robot.

2 Aims and Objectives

The primary aim of a Bluetooth-controlled car project is to design and build a mobile robotic vehicle that can be controlled remotely using a Bluetooth-enabled device, such as a smartphone or computer. The project aims to demonstrate the practical application of wireless communication, microcontroller programming, and motor control in a fun and educational manner. The significant aims and objectives of a Bluetooth-controlled Arduino car project typically encompass a range of educational, technical, and practical goals. Such a project can be an excellent way to learn about electronics, programming, and wireless communication while building a fun and interactive device.

- **Educational Development:** To provide a hands-on and engaging platform for individuals, especially students and enthusiasts, to learn about electronics, microcontroller programming, and robotics.
- **Technical Skill Building:** To develop practical skills in designing, assembling, and programming electronic devices, including motor control and sensor integration.

- **Wireless Communication:** To introduce the concept of Bluetooth communication and its practical applications in remote control scenarios.
- **Arduino Programming and Motor control:** To learn how to program an Arduino microcontroller to interpret and respond to Bluetooth commands for motor control. To gain expertise in controlling DC motors, including speed regulation and direction changes using a motor driver or H-bridge.
- **Critical Thinking and Creativity:** To encourage participants to think critically and solve technical challenges that may arise during the project. To promote creativity and innovation by allowing participants to personalize and extend the functionality of the Arduino car, potentially adding features like obstacle avoidance or line following.

3 Components

Table 1: Component table

Arduino
Motor Shield L293D
12V Battery
HC-05 Bluetooth Module
DC Gear Motor
Connecting wires
Wheels

Arduino: Arduino is an open-source electronics platform that allows you to create interactive electronic projects. It consists of both hardware and software components and is widely used by hobbyists, students, and professionals to develop a wide range of projects, from simple blinking LED lights to more complex robots and home automation systems.

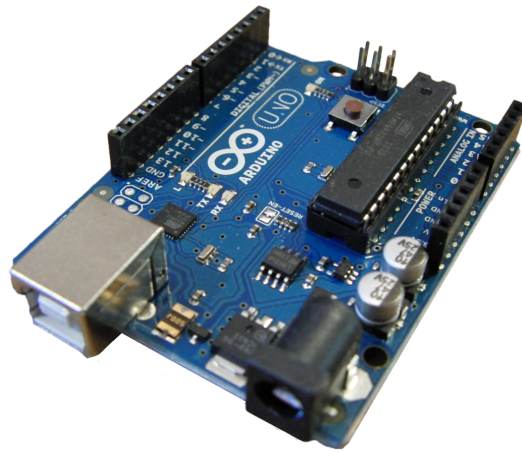


Figure 1: Arduino

Motor Shield L293D: The L293D motor shield is a popular add-on board for Arduino that allows you to control DC motors. It's commonly used in robotics and motor control projects, including building Arduino-based cars. The L293D motor shield is designed to simplify motor control and drive motors in both directions (forward and reverse) with speed control.

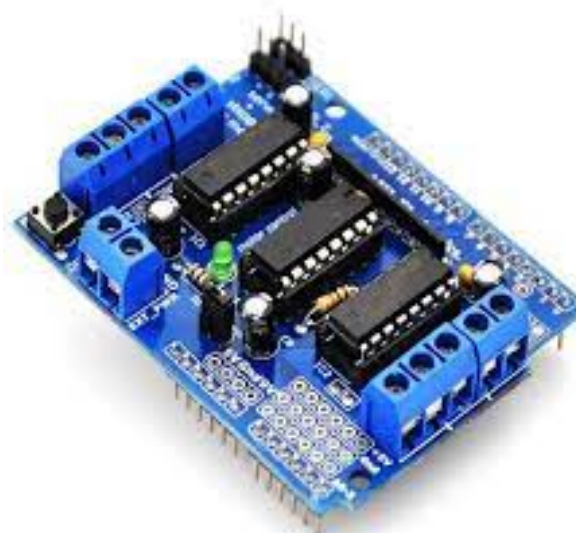


Figure 2: Motor Shield L293D

HC-05 Bluetooth Module: The HC-05 is a popular Bluetooth module that can be used for wireless communication in various electronics projects. Using the HC-05 Bluetooth

module for an Arduino car project is a popular choice because it allows you to control and communicate with the car wirelessly from a smartphone.



Figure 3: HC-05 Bluetooth Module

DC Gear Motor: DC gear motors are a type of electric motor that combines a traditional DC (direct current) motor with a gearbox. The gearbox is an essential component of these motors, as it allows for the reduction of speed while increasing torque.



Figure 4: DC Gear Motor

12V Battery : A 12-volt battery is a type of electrochemical cell or storage device that provides electrical power with a voltage of 12 volts. It is a common voltage for various applications, ranging from automotive batteries to backup power sources, and it is used in a wide range of electrical and electronic devices.



Figure 5: 12V Battery

Wheels: An Arduino car or any other robotic vehicle project, wheels are mechanical components that provide mobility and are responsible for the movement of the vehicle. wheels are a crucial component of an Arduino car, and their proper selection, alignment, and control are essential for the successful operation of the vehicle.



Figure 6: Wheels

Connecting wires: Connecting wires, often referred to as electrical or electronic wires, are fundamental components used to establish electrical connections between various devices, components, and circuit elements in an electrical or electronic system. They serve as conductive pathways for the flow of electric current.



Figure 7: Connecting Wires

4 Methodology

The operating of the robot-controlled car is very easy and freely available everywhere in the world. To activate Motors and motor drivers here two 9 voltage power(18volts) is supplied. Bluetooth Rc car app is installed in Smart phone which helps to controls the robot car, motors and motor drivers which moves robot car in several places Bluetooth Rc car app has different common keys to move the robot different directions with the help of Smartphone. Bluetooth Rc car app is used to send the signals and to receive signals in between Smartphone and Arduino hardware. Here Arduino acts as main controller of the device which receives signal or commands and sends these commands to motors and motor drivers to perform a particular task. Robot controlled car made up of 2 motors and 1 motor driver which move the car in 4 directions, So here Arduino controls whole system. These all components are attached to robot chassis. To code the Arduino Ide (Arduino) software is used. Arduino is associated to computer or laptop using data cable to upload the code and once coding is uploaded then I remove the cable.

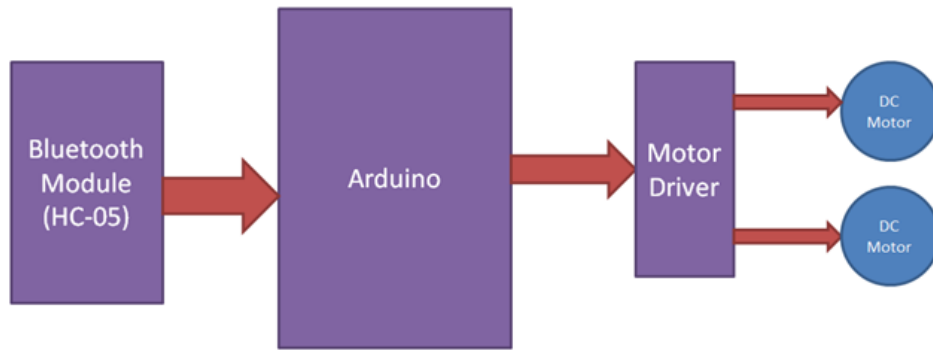


Figure 8: Block diagram of methodology

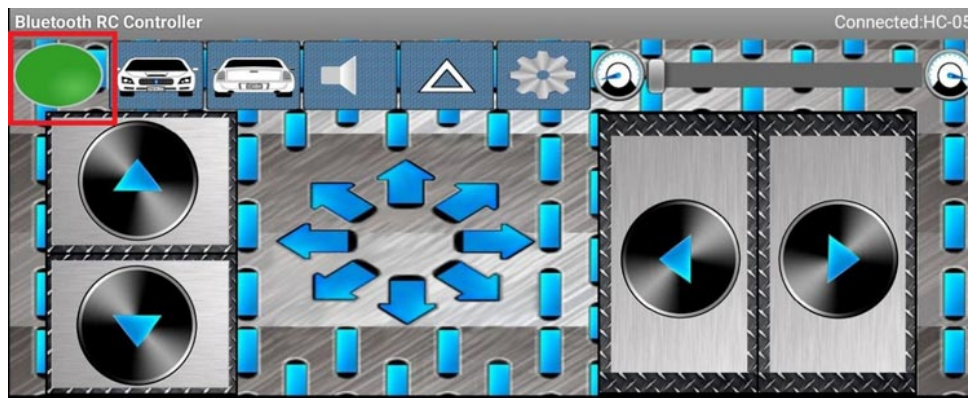


Figure 9: Bluetooth RC Car app interfaces of this designed model

In the upper figure represents Bluetooth RC controller application interfaces. Every user can operate this robot car easily without train the controlling. User can turn on Bluetooth in both Car and Smartphone to connect the device. After turn on the Bluetooth searching for available devices that means scanning. If the device is detected then the device is connected to app. In case the device is not detected then wait for searching devices. So here app has 4 buttons to move 4 directions. Arrow up button and down button is used to move the robot car front and downward directions and another two buttons is used to move the robot car right and left directions. Each and every button will be subjected to each operation to handle the robot car easily. These buttons are easy to use to operate freely when compared to every project in the world.

Circuit Connection:

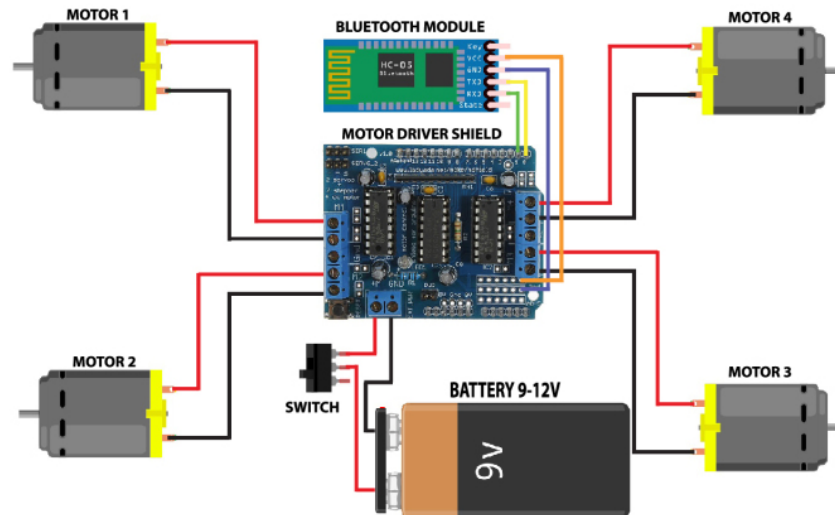


Figure 10: Motor Shield connection

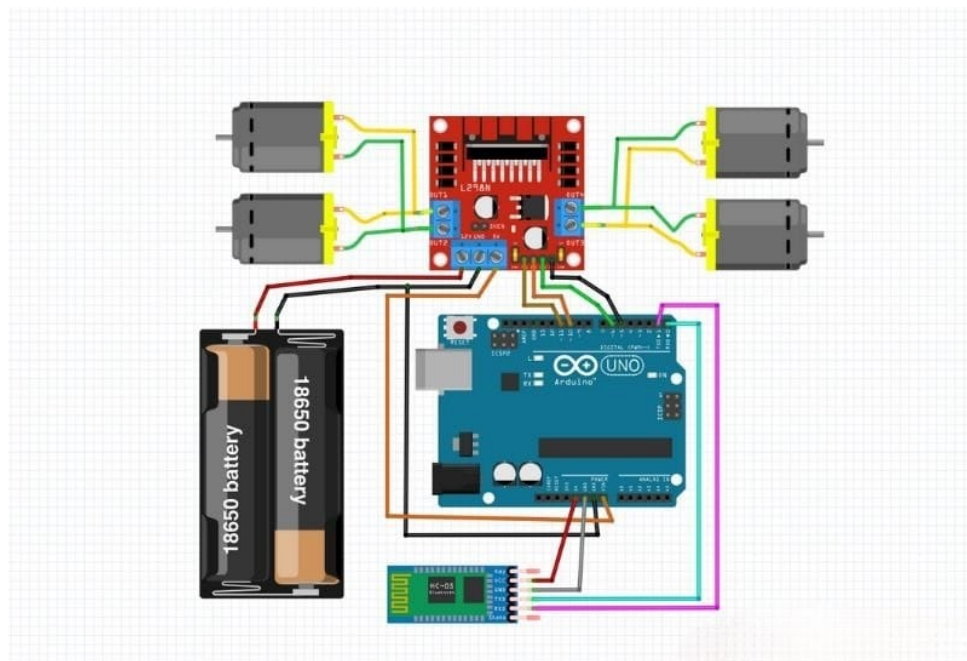


Figure 11: Overall connection

Program 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
  pinMode(9,OUTPUT); //Led
  Serial.begin(9600);
}

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 == 'W'){ //turn led on or off)
    digitalWrite(9,HIGH);
  }

  else if(t == 'w'){
    digitalWrite(9,LOW);
  }

  else if(t == 'S'){ //STOP (all motors stop)
    digitalWrite(13,LOW);
    digitalWrite(12,LOW);
    digitalWrite(11,LOW);
    digitalWrite(10,LOW);
  }

  delay(100);
}
```

Figure 12: Program Code

Flow Chart:

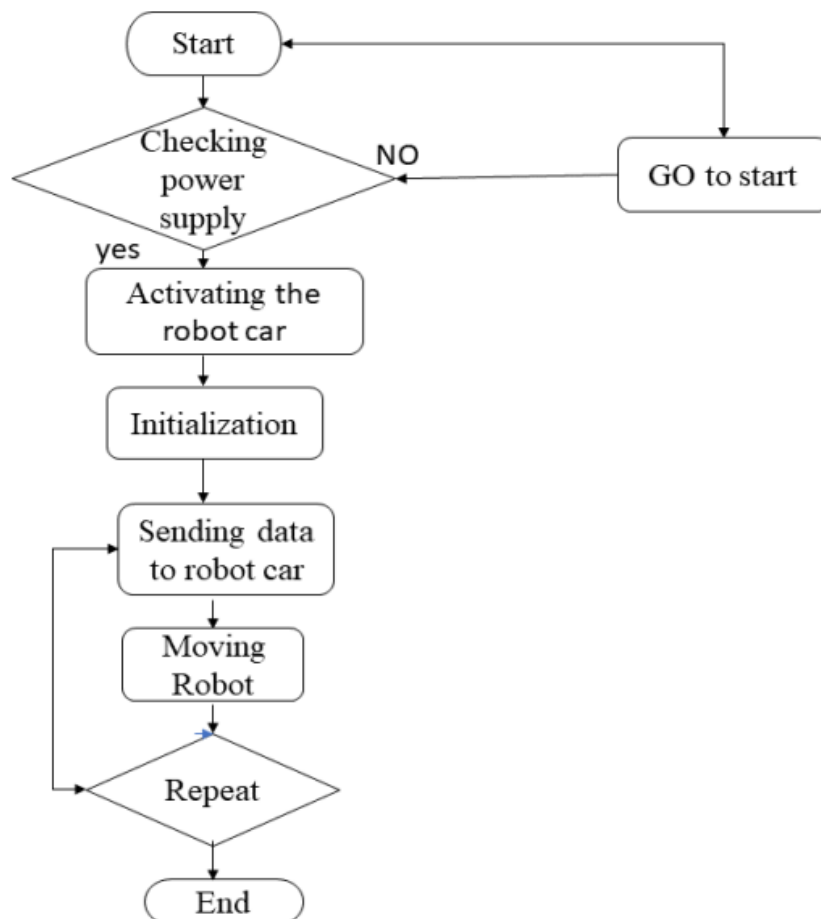


Figure 13: Flow chart

Implementation:

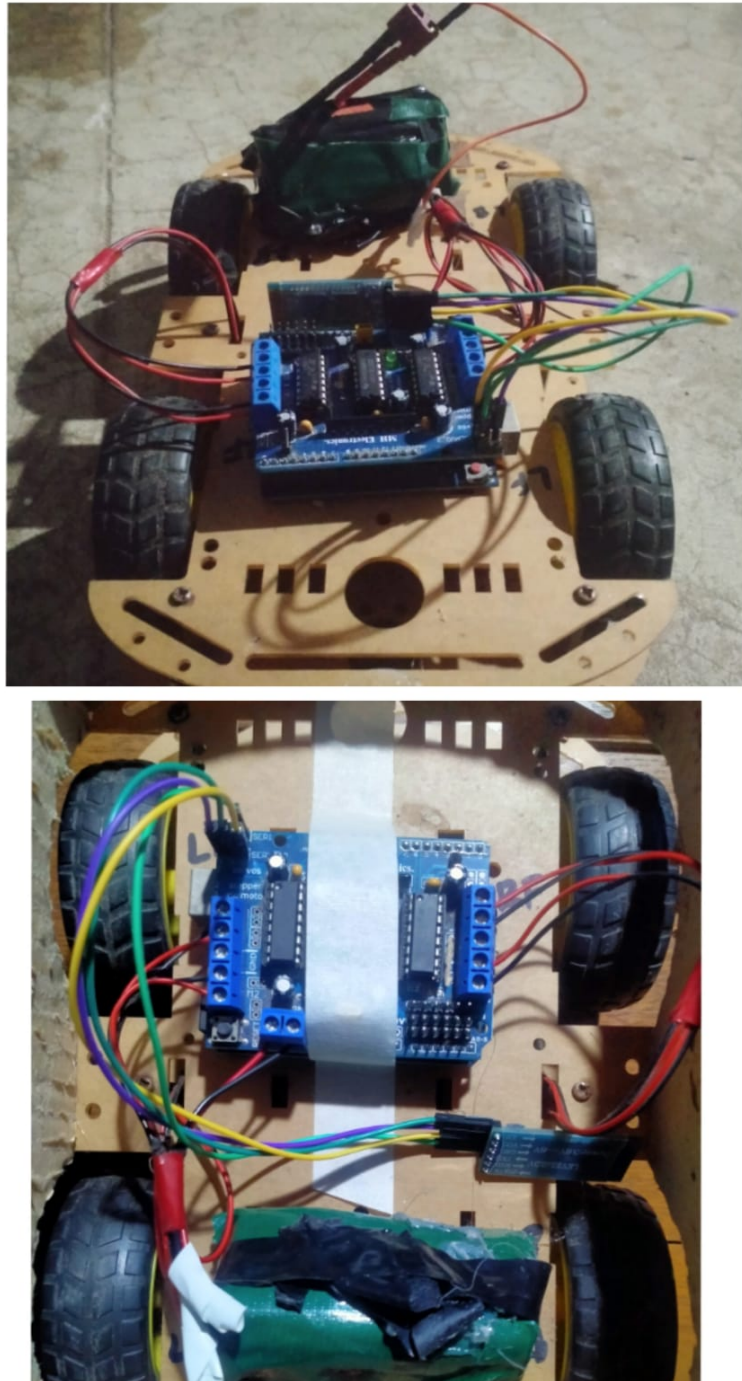


Figure 14: Final wire connection

5 Application and Limitation:

Application

Low range Mobile Surveillance Devices
Military Applications (no human intervention)
Assistive devices (like wheelchairs)
Home automation
Prototyping and Experimentation
Remote Surveillance
Entertainment and Competitions
Security and Surveillance
Demonstrations and Workshops
Learning Vehicle Dynamics
Research and Development

Limitation

- 1.Limited range of bluetooth module
- 2.Cant't work if insufficient power is not provided
- 3.weight sensitive
- 4.Low torque motor can't work
- 5.Improper wheel creates disturbance

6 Result and Conclusion

First time I designed this model successfully without any struggles in this project. I kept the connections to the designed model according to the instructions which is given by me successfully. Finally, this designed model can move the several directions and also it can move the robot car from one place to another place. I have tested this designed model many times and many places it performing tasks according to our requirements without any problems. I have designed this model to control user in long distances with the help of Bluetooth. A Bluetooth-controlled Arduino car project offers a valuable blend of education, technical skill development, and creative exploration. It can be adapted to a wide range of applications and serves as an excellent platform for fostering interest in science, technology, engineering, and mathematics (STEM) fields, as well as promoting innovation and problem-solving skills. Whether for educational purposes or as a hobbyist project, it provides a hands-on learning experience that can be both fun and rewarding.

References

References

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- [4] Bluetooth based Smart Phone Controlled Robot Car using Arduino from iotdesignpro(<https://iotdesignpro.com/articles/bluetooth-controlled-robot-car-using-arduino>)
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