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RC Car Using ESP32 Bluetooth Module

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Abstract —

We've made a RC Car bot which is controlled through ESP32 Bluetooth module using an android application designed using MIT App inventory. We've used L298N Motor Driver Module. With the android application, we can control if the car's movement is over forward, backward, left or right**,** this is made possible due to the servo motors. A 9V battery is used in this case.

Keywords — RC Car, Bluetooth, MIT App Inventor, ESP32

I. INTRODUCTION

In the hardware part of the project, we've used a plastic chassis with 2 wheels attached, 2 servo motors, L298N motor driver and a 9V battery and for the software arena – we've built an android application using MIT App Inventor and the code with proper instructions for the specific movement of the car bot using inbuilt ESP32 Bluetooth module using Arduino IDE software.

As for the research done for this project, we've studied a couple of research papers titled as follows:

- Arduino based Bluetooth controlled RC Car
- FPGA based Bluetooth controlled land vehicle
- Surveillance car bot of future of surveillance car bot
- Smartphone controlled multipurpose robot car

II. METHODOLOGY/EXPERIMENTAL

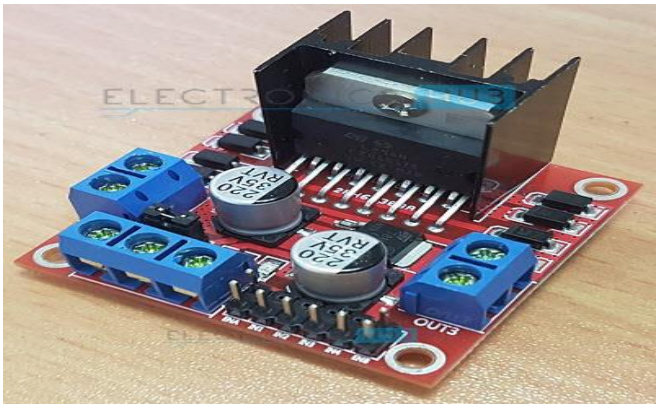
To couple ESP32 module with the vehicle bot, which is connected to the Android app, we must first select from a list of Bluetooth clients that it displays. Through this method, we uploaded the information and instructions for this software's left, forward, backward and right actions. A similar signal is sent via the Bluetooth to Bluetooth module (inbuilt ESP32) when we push a button in an Android application.

Similar to this, a Bluetooth module for Android has been developed. When buttons are triggered using the application, the relevant signal is sent, and the motor driver then operates the wireless car. The pin that corresponds to the specific input is set to high when signal data enters the module. The motor driver switches in accordance with the data bit; if the data bit is low, the corresponding motor driver pin is inactive; if the data bit is high, the corresponding motor driver pin is active. For various car directions, we have developed functions. This Bluetooth-controlled automobile has five requirements that must be met in order to provide directions.

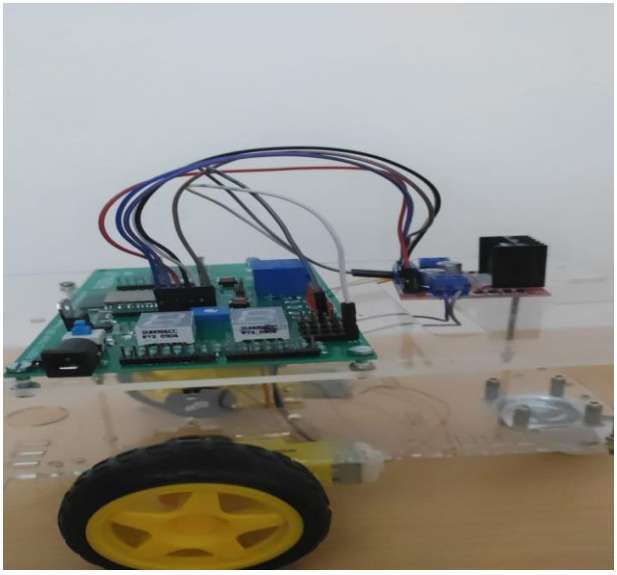
A. Components

A plastic chassis with 2 wheels attached, 2 servo motors, L298N motor driver and a 9V battery, Arduino IDE software, MIT App inventory.

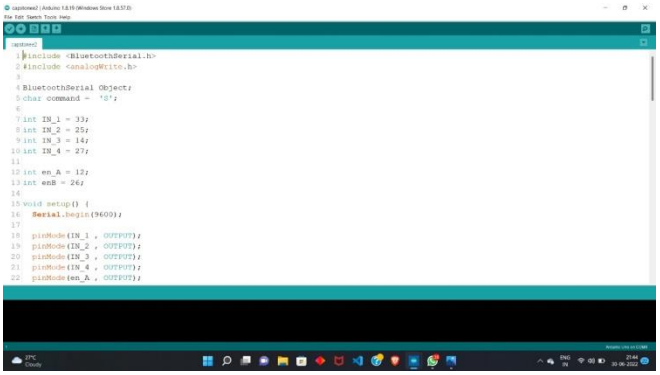
1. ESP32 is interfaced with other systems to provide Wi-Fi and Bluetooth functionality using UART communication protocol.
2. In order to control the DC motors of the robot with Arduino, a motor driver module "L298N" is used. The speed of the DC motors was controlled by the input voltage transmitted to the motor using a PWM (Pulse Width Modulation) signal.
3. Ardiuno IDE software is used to upload the instructions and code into ESP32 microcontroller, the basic code till now is written in C language



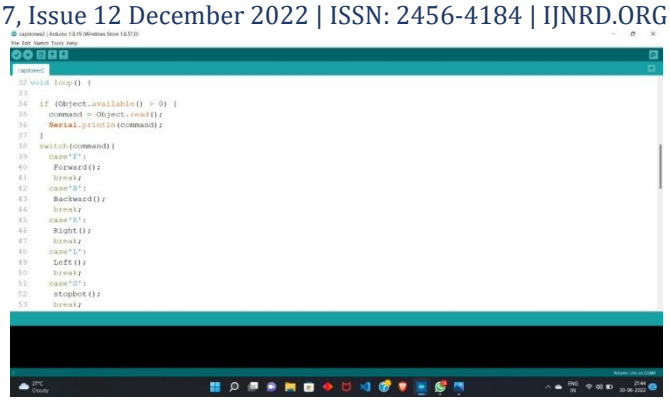
B. Design



C. Testing



```
#include <BluetoothSerial.h>
#include <analogWrite.h>

BluetoothSerial Object;
char command = 'S';

int IN_1 = 33;
int IN_2 = 25;
int IN_3 = 14;
int IN_4 = 27;

int en_A = 12;
int enB = 26;

void setup() {
  Serial.begin(9600);

  pinMode(IN_1 , OUTPUT);
  pinMode(IN_2 , OUTPUT);
  pinMode(IN_3 , OUTPUT);
  pinMode(IN_4 , OUTPUT);
  pinMode(en_A , OUTPUT);
```



```
void loop() {

  if (Object.available() > 0) {
    command = Object.read();
    Serial.println(command);
  }
  switch(command){
    case'F':
     Forward();
     break;
    case'B':
     Backward();
     break;
    case'R':
     Right();
     break;
    case'L':
     Left();
     break;
    case'S':
     stopbot();
     break;
```

III. Results and Discussions

A smart android application may be used to stop the vehicle bot from moving or to move it forward, backward, left, or right.

This vehicle is a Bluetooth-controlled Arduino-based vehicle. An app for a smartphone is used to control it. Instead of using buttons, gestures, or any other control method, an Android smartphone is used to operate a Bluetooth-controlled car. Here, moving the car forward, backward, left, or right merely requires touching a button on an Android phone. In this case, an Android phone serves as the transmitter and a Bluetooth module installed in the vehicle serves as the receiving device.

Android will use its built-in Bluetooth to send commands to the automobile so that it can go in the desired directions. Furthermore, the temperature and humidity sensors and temperature sensors will collect data from the environment and communicate it to the android app for display.

IV. FUTURE SCOPE

By using the WLAN module rather than Bluetooth module, we could increase the range for the operation. Also, with the use of different sensors alongside the chassis, the use of the car bot can be increased as it can be used to collect the data from the sensors and displayed on the android application.

V. Conclusion

At present, this project is very simple and elegant i.e. the car bot that's only capable of controlled land movement at present could be made more useful as with the improvements mentioned in the earlier (FUTURE SCOPE) section. We chose this project due to our interest in designing

and coding an interface that could control the Car bot through Bluetooth.

In this project, we have researched about 'Robotics' and as a result, a robotic car with many functionalities is proposed. The robot car is wirelessly controlled via an android application through the Bluetooth module.

VI. Acknowledgment

through the Bluetooth module. We would like to thank our project guide professor Milind Patwardhan to assist us throughout the project.