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Department of Electronics and Communication Engineering

**Microprocessors and Microcontrollers (EC8691)**

Mini Project Report



**PROJECT TITLE:** Wi-Fi Car using NodeMCU ESP8266

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References:

- [https://www.researchgate.net/publication/336495945\\_Wi - Fi Control Robot Using Node MCU](https://www.researchgate.net/publication/336495945_Wi-Fi_Control_Robot_Using_Node_MCU)
- <https://iotdesignpro.com/projects/wifi-controlled-robot-using-esp12>

**Rubrics:**

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## **ABSTRACT**

Wi-fi is controlled by using a Blynk android application instead joystick method. Here only needs to move the joystick in Blynk android application to control the car in forward, backward, left and right directions. So here Blynk android application is used as a transmitting device and inbuilt wi-fi module placed in the car is used as a receiver. Blynk android application will transmit command using wi-fi to the car so that it can move in the required direction like moving forward, reverse, turning left, turning right and stop.

## **INTRODUCTION**

Robotic evolution starts with some basic ideas. It minimizes the human efforts and it can be deployed in a surveillance application, Industrial Pick and Place Robots latest Humanoid robots are developed in the modern world. Now a day's robotic cars are developed by using Wireless technology. Wireless technology in Robotics starts with Bluetooth, WI-FI, and Zigbee Communication. Based on the Requirement and Application they deployed the communication in Projects. And we have numerous android Applications in Play store to control a Robot car. Blynk is a Popular App used in this Project it has a lot of Features like buttons, gauges, Sliders and Plotting Features also. By using Wi-Fi technology we can connect a greater number of Robotic Car to control it very useful for surveillance application. Now a day's Indoor localization Technologies are developed on that case also we can deploy this type of Wi-Fi-controlled Robotic Car.

## **EXISTING SYSTEM**

Now a day the advancement in technology various new designed smart makes use of Wi-Fi robot for various applications. Mostly wi-fi network was using home security purpose. The various applications are done by robot car like doing different works on the command ex- switching on the lights when the robot is given the command by the Wi-Fi enabled device.

## **PROPOSED SYSTEM**

The car was controlled by the wi-fi network in Blynk android application. The wi-fi robot car can be easily moved from one place to another place by using the command in Blynk application. We can make the car do the various task using wi-fi network technologies.

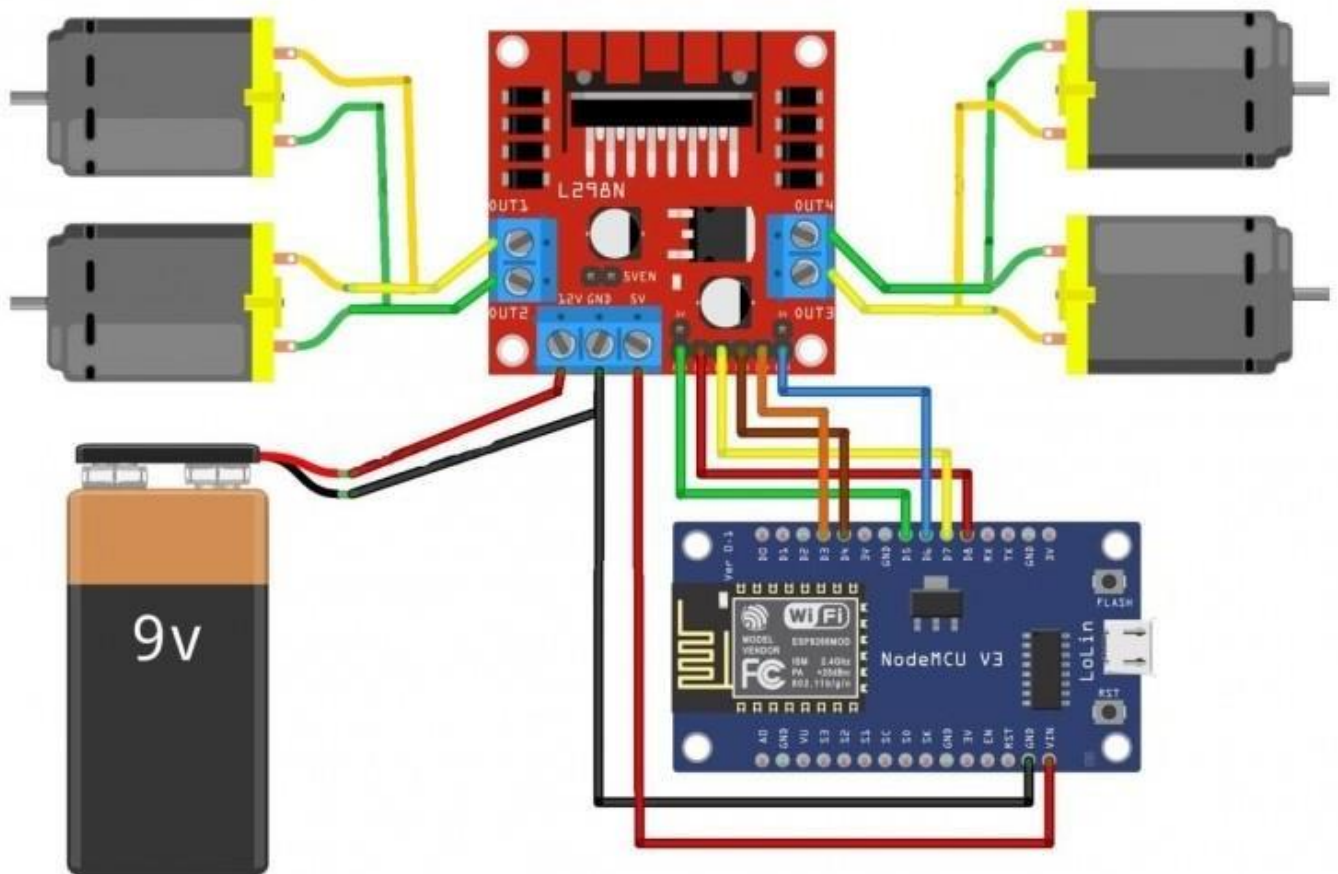
## **COMPONENTS USED**

- ESP8266
- Wheels - 4
- Gear Motor
- L298N Motor Driver
- Li-Po Battery
- Battery Holder
- Wires
- MDF Board

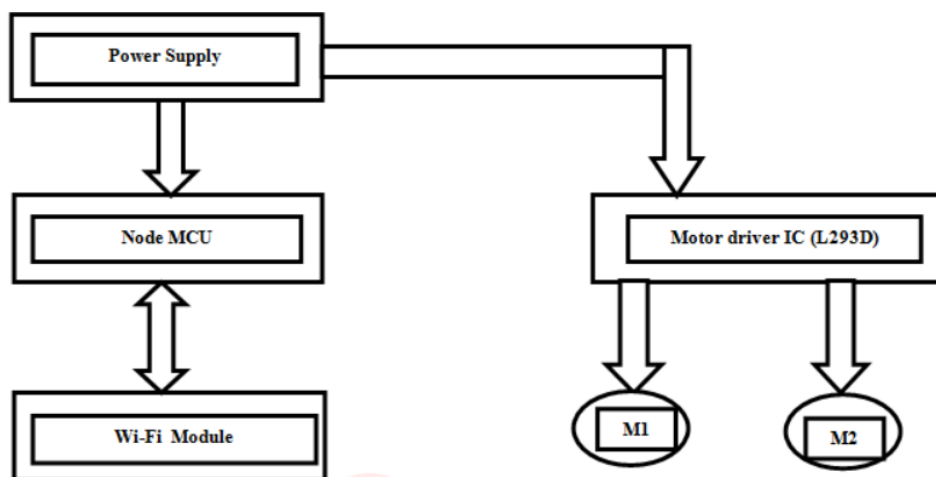
## **SOFTWARE REQUIREMENTS**

- Arduino IDE
- Blynk android application

## SCHEMATIC DIAGRAM



## BLOCK DIAGRAM



## **COMPONENTS DESCRIPTION**

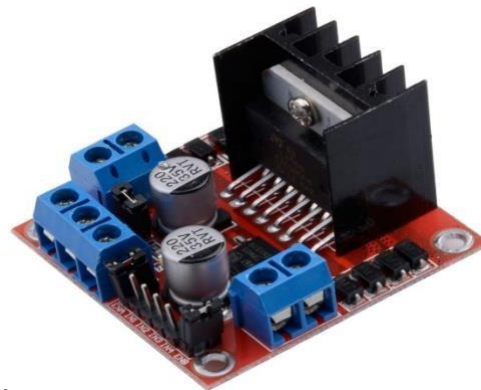
### **1) NODE MCU ESP8266**



NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson, and spiffs.

### **2) MOTOR AND MOTOR DRIVER L298N**

An electric motor is an electrical machine that converts electrical energy into mechanical energy. L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver Integrated Circuit(IC).



The l293d can drive small and quiet big motors well.

### **3) POWER SUPPLY**

To drive the vehicle, we are using a 12 volt rechargeable battery which gives the maximum speed and torque. The Arduino board and Ethernet Shield is energized by a 5 volt battery which synchronizes with its operating voltage. Hence we are using dual power source to meet our requirements.

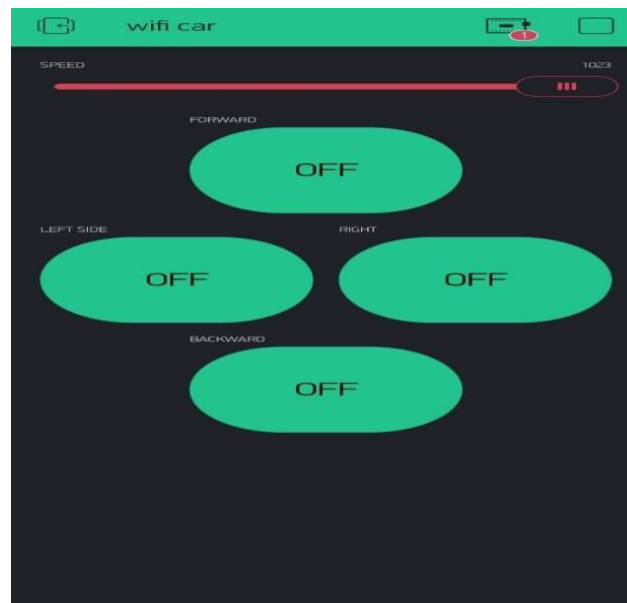


## **SOFTWARE DESCRIPTION:**

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.

## **BLYNK APP:**

Blynk is a hardware-agnostic IoT platform with white-label mobile apps, private clouds, device management, data analytics, and machine learning. Blynk makes complex IoT technology simple. We designed, developed, and tested the building blocks of a complete IoT solution, so businesses who run on Blynk don't have to.



## **BLOCK DIAGRAM EXPLANATION/WORKING**

- The robot car is operating with Nodemcu esp8266 controller and the command is given by the Blynk android application in a mobile phone using the wi-fi network.
- The Nodemcu esp8266 as inbuilt wi-fi module and the devices connected with robot car.
- Both wi-fi is connected with an authentication token.
- When this WIFI-controlled car is powered on, the Nodemcu board connects to the Blynk cloud via a WiFi connection. Then, when you press the Commands (Forward, Backward, Left, Right) buttons on the interface created in the Blynk app, those values will be sent to the Nodemcu board via the Blynk cloud. Then, the gear motors rotate according to those values. The [L298N motor driver](#) board is used for this. Also, the speed of these motors can be controlled by the slider created in the Blynk app.

## **CIRCUIT EXPLANATION:**

Circuit Diagram of Wi-Fi controlled car is given below. We mainly need a NODEMCU and ESP8266 Wi-Fi module. ESP8266's VCC and GND pins are directly connected to 3.3V and GND of Node MCU and CH\_PD is also connected with 3.3V. Transmitter and Receiver pins of ESP8266 are directly connected to pin 2 and 3 of NODEMCU. Software Serial Library is used to allow serial communication on pin 2 and

3 of Arduino. We have already covered the interfacing of ESP8266 Wi-Fi module to NODEMCU in detail. A L289 Driver Motor Driver IC is used for driving DC motors Input pins of motor driver IC is directly connected to pin 8, 9, 10 and 11 of NODEMCU. And DC motors are connected at its output pins. Here we have use 9 Volt battery for driving the Circuit and DC motors.

### **WORKING MODEL**



### **CONSTRUCTION PROCEDURE:**

#### **Solder Wires to Motors**

Solder a 10cm cable to each terminal of motor.

#### **Attach Motors to Acrylic**

First Cut a foam or any kind of Board in a Preferred Dimension such as 14CM x 10CM. Make sure as photo.

Secondly, glue the four gear motors to the foam board, to do this, use the Glue gun. Attach the motor to the acrylic using hot glue gun on all four sides of the acrylic as shown in the picture.

Pass the motor cable to the back through the acrylic hole.

#### **Motor Driver-> ESP8266:**

- ENA GPIO14(D5)
- ENB GPIO12(D6)
- IN\_1 GPIO15(D8)
- IN\_2 GPIO13(D7)
- IN\_3 GPIO2(D4)
- IN\_4 GPIO0(D3)

### **Attach the Motor:**

Connect the battery to the L298 Motor Driver power supply input. Connect all 6 inputs of L298 to ESP8266 D3, D4, D7, D8, D5 & D6 Pin. Supply 5V to Wemos through L298 5V Pin. Connect the output pins of L298 to left and right motors.

Thirdly, attach the motor driver board and Esp8266 to the top of the cardboard. We can also use metallic or wooden anything that fulfills our requirement.

Tightly screw all the components and mount them on the chassis. Use good quality and strong wheels so that the robot can move even on rough surfaces.

Afterward, connect the gear motors to the Motor driver board.

### **Connecting With Arduino:**

After finishing the Hardware part now we have to connect the Arduino board with the hardware with the help of source code/program. Finally we can able to control the entire kit with the help of the blynk app.

### **APPLICATIONS:**

- i) In Future after adding the facility of camera it can be used for military units to know the situation of the opponent and then start their attack.
- ii) It can also help many physically challenged people to experience the joy of driving.
- iii) As it is controlled by Wi-fi it is also possible to reduce the number of accidents.
- iv) As it is economical it can be used by any people.
- v) The Remote monitoring system based on a WIFI controlled car using Arduino can be implemented in Military services for guiding a soldier and also to use as a detector to detect Land mines by using suitable detectors.
- vi) It can also used in Mining area to sense for poisonous gases or to search for someone who is missing in the place of mining.
- vii) It can used in these area with some fire proof or water proof material if necessary.

### **CONCLUSION:**

The hardware components are successfully assembled and interfacing the microcontroller with robot is achieved. Controlling the motion of robot via webpage as well as from android applet is successfully obtained. Hence the two modules of controlling the robot is successfully tested and demonstrated. Though controlling using Bluetooth limits the range of distance for communication, a smart and easy means to guide a robot is achieved. Controlling the motion of robot via internet is one of the easiest means as it requires the user to access the designated webpage to guide it. This system can be used in defiance applications for detecting landmines in war field and for bomb detections by mounting a metal detector sensor on it. Further, the size of device can be miniaturized based upon specific applications. The Android phone acts as the viewer, either to provide surveillance view or to guide the user while remotely navigating the car. The user is provided with the navigation controller panel to allow control of the RC car movement. With a fully functional prototype, this project may be used for monitoring purposes in a building, in a hazardous area and other such locations. Several improvements can be made to enhance the capability of the project

**NOVELTY:**

The Wi-Fi Car which we have built is small in size so it can be used for spying purpose. With few additions and modifications, this car can be used in army for detecting and disposing hidden land mines. It can be used for surveillance. Wireless camera can be added to the car to incorporate other security features. It can be used in various industries. In military applications, it can be used to target enemy without any human being crossing the territory. With tremendous development of technology, it is bound to have more application in future.