A Report on

REMOTE CONTROL ROBOT CAR

for

Mini Project 1-a (REV- 2019 'C' Scheme) of Second Year, (SE Sem-III)

in

Electronics & Telecommunication Engineering

by

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CERTIFICATE

This is to certify that the project entitled **Remote Control Robot Car** is a bonafide work of

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submitted to the University of Mumbai in partial fulfillment of the requirement for the award of **Mini Project 1-a (REV- 2019 'C' Scheme) of Second Year, (SE Sem-III)** in **Electronics & Telecommunication Engineering** as laid down by the **University of Mumbai** during the academic year **2021-22**

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ABBREVIATION

1. V: Volt
2. USB: Universal Serial Bus
3. SD3: Serial Data pin3
4. Node MCU: Node Micro Controller Unit.
5. DC: Direct Current
6. GND: Ground
7. VCC: Voltage At the Common Collector

LIST OF FIGURES

LIST OF TABLES

CH-1. INTRODUCTION

1.1 Need :-

To us the need of internet and the things which are internet based are very much important nowadays. IOT or internet of things is the very important part in both computer and our daily lives. The below model describes how the ardunio programs the car motor module and by IoT we actually rotate the wheels and give direction to the car. IOT gives us the opportunity to work with different platforms and it helps us to create various interesting modules to work on. We also tested the applications used to drive the car. Due to the new concept of Wireless Controlled Car using Bluetooth, Wifi and IOT, we were able to come up with various possibilities that can take place. There are different types of Robots, from simple ones like a toy car to the advance ones like a industrial robots. We are building a Remote Control Robot Car which can be controlled by our android smartphones which should be wifi enabled. This a robot car which can turn in any direction (front , reverse , right , left) with just controlling from the android application called the Blynk App. It is very useful for the people who have some disabilities, they can control their car with their smart phone.

This is an Wifi controlled RC car. It is controlled by a smart phone application. Wifi controlled car is controlled by using Android mobile phone instead of any other method like buttons, gesture etc. 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 NodeMCU module placed in car is used as receiver. Android phone will transmit command using its in-built Wifi adapter to car so that it can move in the required direction like moving forward, reverse, turning left, turning right and stop.

1.2 Definition :-

Remote Control Robot Car : This is a simple car made up of simple components. This WiFi controlled robot runs with the wifi signal. The robot car can be easily moved from one place to another just by a single device. Robot car can be used for security purpose with the installation of a camera.

Node MCU : NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif, and hardware which is based on the ESP-12 module.

L298N Motor Driver : This L298N Based Motor Driver Module is a high power motor driver perfect for driving DC Motors and Stepper Motors.

CH-2. COMPARATIVE STUDY

Paper 1:

Fire Extinguisher RC Robot : In this paper, a robot that extinguishes fire in real time is designed to extinguish the fire in the event of a fire disaster. It consists of two fire sensors that sense fire and then relay the signal to the module for motion control. The robot is then designated using a modern GSM to move to the fire location and extinguish the fire and also alarm the customer via a cell phone.

Paper 2:

RF Controlled Robot : A robot is a mechanical or virtual artificial agent, usually an electro-mechanical machine that is guided by a computer program or electronic circuitry in conventional robotics, the controlling and operation of robots is usually done by using RF [Radio Frequency] circuits.

Paper 3:

RC Robot with Bluetooth Control : The paper describes the design and realization of the mobile application for the Android operating system which is focused on manual control of mobile robot using wireless Bluetooth technology. The application allows the robot control interaction with the display, or voice. When we use a graphical interface, we can monitor the current distance of the robot from obstacles.

CH-3. PROBLEM STATEMENT

- To make a Robot which can be controlled using Smart phone using wifi connection.

- To understand the interface of the commercially available F transmitter. It also aims to learn the receiver module that is Encoder and Decoder respectively to transfer data over the air to the motors in the robot car.

- To make a Robot Car which can work when user provides the appropriate input.

CH-4. Mini Project DESIGN (PRINCIPLE AND WORKING)

4.1 BLOCK DIAGRAM

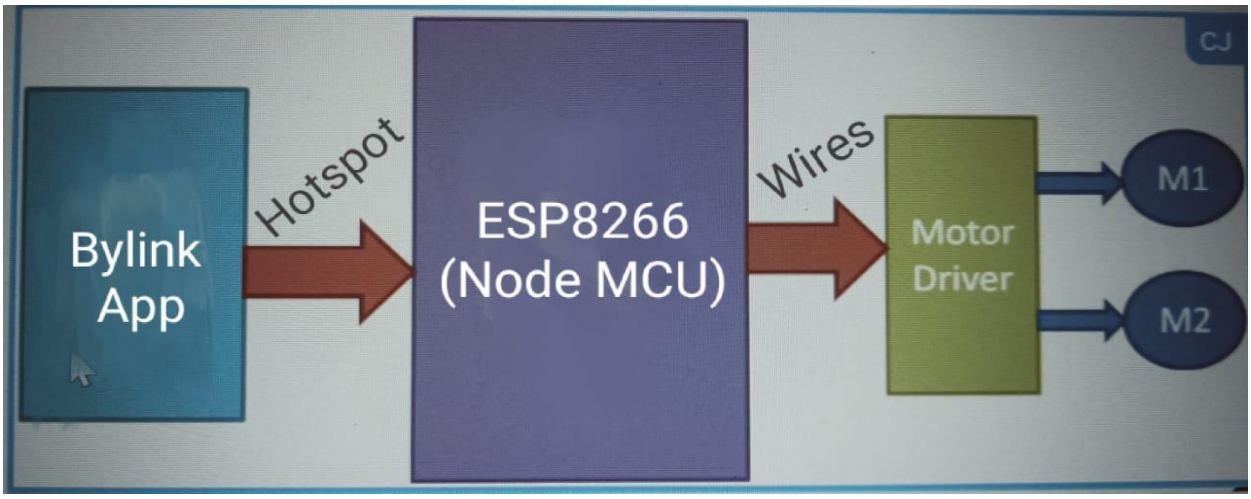

Figure 4.1.1:- Block Diagram of RC Robot Car.

4.2 BLOCK DIAGRAM DESCRIPTION

➢ The Block Consist of three main Block:-

❖ Bylink App:-

- In this the Node MCU which is the wifi Module, this is been Connected to our Mobile phone device.
- For connection, Mobiles Hotspot is been Programmed and then connected, while the App provides Platform for the motion of the car.

❖ Node MCU:-

- Its is same as Ardino, but a Wifi IOT Module, which is the control system of the Project.
- The Node MCU is been Programmed by selecting its respective pins and that pins will acts as the controller to the L298N motor driver.

❖ **Motor Driver;-**

- The motor driver works according to the instruction provided by the Node MCU.
- The pins Such as Enable pins and Input Pins is been connected to the Node MCU, while the Small Screw boxes on the either side is been connected to Motor 1 and Motor 2 Respectively.
- While the central Screw box is also connected to Node MCU and to positive supply os the Battery.

4.3 a) CIRCUIT DIAGRAM

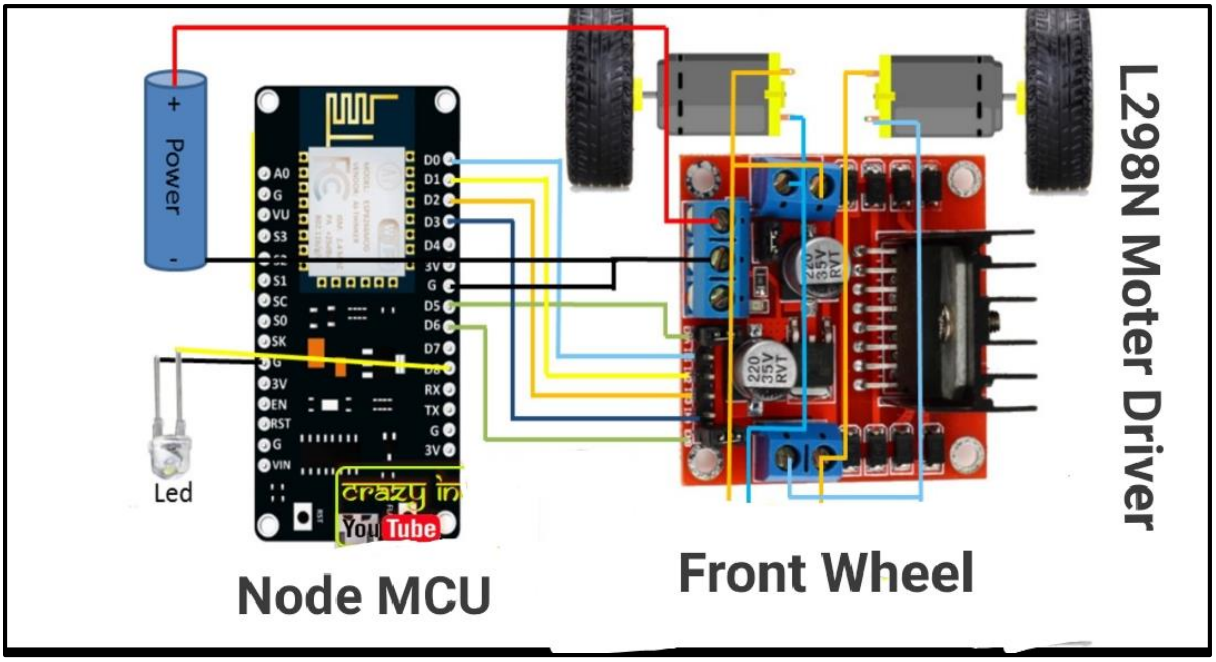

Figure 4.3.1 Circuit Diagram of RC Robot Car.

4.3 b) WORKING

❖ Node MCU with L298N(moter driver):-

- As in the earlier circuit Diagram, we can see the connection of Node MCU with the L298N Motor Driver.
- We can select the function of the particular pin by Programming and then connect the respective pins on the L298N Motor driver.
- Here for e.g by referring the circuit diagram we can see that the Pin D0 to D3 of the Wifi Module is been connected to the Inputs of the Motor Driver, while D5 and D6 is been connected to the Enable Pin of Motor Driver.
- This is how the Half Part is been Connected... now for the further half...

❖ L298N(motor driver) with Motors:-

- Also, we can referring the circuit diagram for the connections of L298N with the motors .
- The screw box is to be connected to the two Motor which is refer as Moter A and Moter B.
- While the Big screw box, which content 3 screw, is been connected to the Node Mcu and the positive power supply of the Battery.
- This is how the Whole circuit is been connected.

❖ Principle on Motors motion:-

CONTROLING THE SPEED

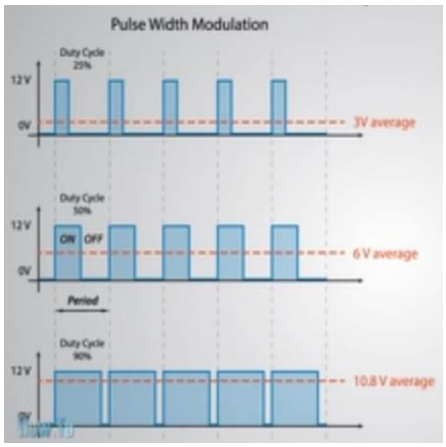

Figure 4.3.2 Controlling

PROVIDING DIRECTIONS

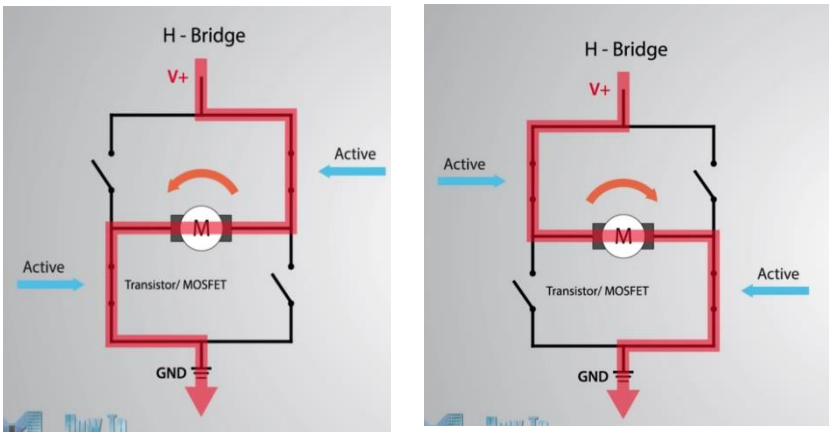

Figure 4.3.3 Directions

❖ **Principle on Motors motion:-**

- The speed of the Motor is control by the Enables pins of the Motor Driver.
- Principle use for speed control, is PWM.
- While we can see that for the change in direction, the pins responsible will be input pins of the motor and an device which will be used is H-Bridge, which is in built in L298N Motor Driver.

4.4 METHODOLOGY

1) Make Connection As Per Circuit Diagram, Make Connection On NodeMCU
2) And Then Connect NodeMCU To The Wifi using hotspot/Router.
3) Then Connect The NodeMCU pins Output L298N Motor Driver.
4) Then Start Programming the NodeMCU Module.
5) Programme The NodeMCU Using Arduino IDE Software.
6) Download the Blynk Library zip File, Install it from add library files.
7) Download the NodeMCU boards From preferences, by inserting the library link
in it.
8) Set The Output Of NodeMCU (D0 – D14) For Different Control Function.
9) Compile the Typed Programme check whether errors are occur or not….
10)Upload the Programme onto NodeMCU using macro-type USB Cables.
11)Then Connect The NodeMCU Module To the Internet using Router/Hotspot.
12)Now Pair The NodeMCU Module With Android Application . i.e Blynk App.

CH-5. COMPONENTS/TOOLS TO BE USED

5.1 COMPONENTS

1. **Node MUC :**

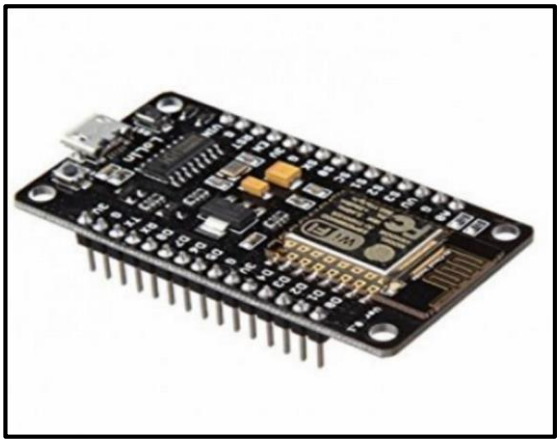

Figure 5.1.1a: Node MCU

The Heart Of Home Automation, Used to Process the Information/Commands/Instruction provided by the User or Owner, Its function is to Process the data & Pass the signal to the Relay and Switch the loads as per given Input.

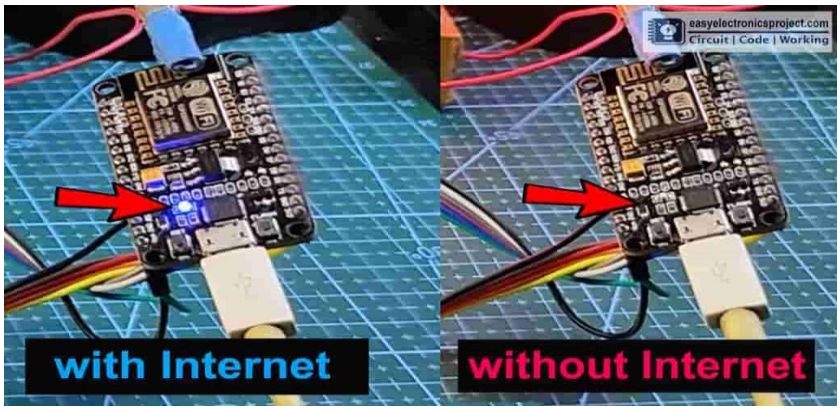

Figure 5.1.1b: Node MCU

2. **Connecting wires:**

Jumper wires were used for the connection of Node MCU to 5v SPDT Relay. Normal wires were used for connecting the bulbs, power supply, etc.

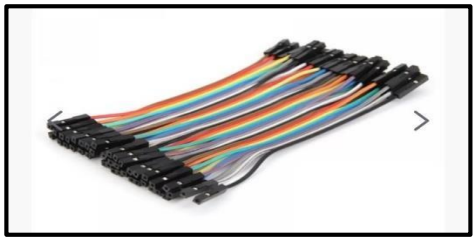

Figure 5.1.2: Connecting wires

3. **Smart phone :**

Used for controlling Purpose, for giving command and gain output , for this Blynk Android app is required.

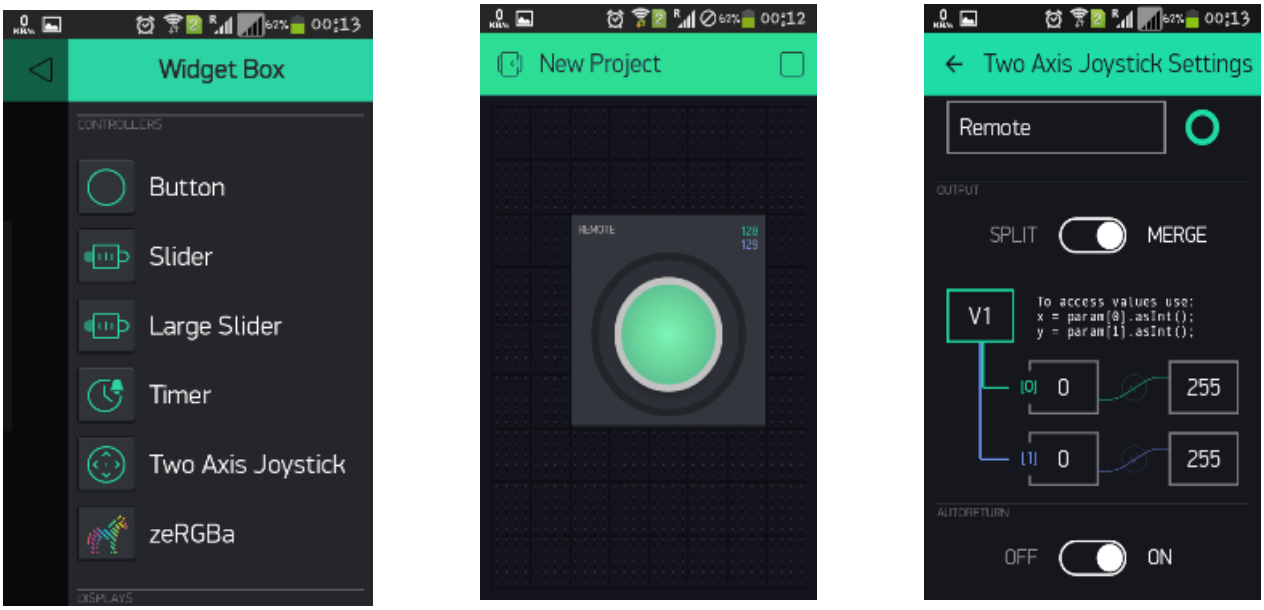

Figure 5.1.3: Blynk android app

4. L289N Motor Driver :

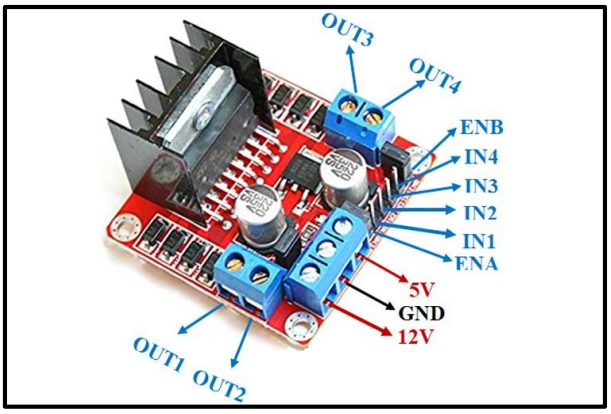

Figure 5.1.4: L289N Motor Driver

This L298N Based Motor Driver Module is a high power motor driver perfect for driving DC Motors and Stepper Motors. It uses the popular L298 motor driver IC and has the onboard 5V regulator which it can supply to an external circuit. It can control up to 4 DC motors, or 2 DC motors with directional and speed control.
This motor driver is perfect for robotics and mechatronics projects and perfect for controlling motors from microcontrollers, switches, relays, etc. Perfect for driving DC and Stepper motors for micro mouse, line following robots, robot arms, etc. An H-Bridge is a circuit that can drive a current in either polarity and be controlled by Pulse Width Modulation (PWM).Pulse Width Modulation is a means of controlling the duration of an electronic pulse.

5.2 SOFTWARE USED

The Arduino Integrated Development Environment is a cross-platform application that is written in functions from C and C++.

It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions, and a series of menus.

It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

CH-6. PROPOSED EXECUTIONS STEPS

6.1 Implemention of components:

Figure 6.1.1: Connections

Explaination:

CH-7. TROUBLESHOOTING

7.1 PROBLEMS / FAULTS IN PROJECT

1. Problem in Connections.
2. The code in the Arduino IDE was throwing errors.
3. There was problem in Wi-Fi connection while executing for many times.
4. There was problem in L289N motor driver, it was not in good condition.

7.2 SOLUTION FOR PROBLEMS / FAULTS IN PROJECT

1. The proper connection was made in the hardware part, with the help of circuit diagram.
2. The error was in the USB port so we have used another laptop to upload the code, and it was uploaded successfully.
3. Libraries installation were pending in the software of Arduino IDE.
4. For Wi-Fi, we have again generated the authentication code and the problem was being solved.
5. For L289N motor driver we increased the supply voltage and tried again, it started working.

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APPENDIX

Datasheet of Components :

1. **Node MCU :**

Pin Category	**Name**	**Description**
Power	Micro-USB, 3.3V, GND, Vin	**Micro-USB:** NodeMCU can be powered through the USB port **3.3V:** Regulated 3.3V can be supplied to this pin to power the board **GND:** Ground pins **Vin:** External Power Supply
Control Pins	**EN, RST**	The pin and the button resets the microcontroller
Analog Pin	A0	Used to measure analog voltage in the range of 0-3.3V
GPIO Pins	GPIO1 to GPIO16	NodeMCU has 16 general purpose input-output pins on its board

SPI Pins	SD1, CMD, SD0, CLK	NodeMCU has four pins available for SPI communication.
UART Pins	TXD0, RXD0, TXD2, RXD2	NodeMCU has two UART interfaces, UART0 (RXD0 & TXD0) and UART1 (RXD1 & TXD1). UART1 is used to upload the firmware/program.
I2C Pins		NodeMCU has I2C functionality support but due to the internal functionality of these pins, you have to find which pin is I2C.

Table 1.1 Node MCU Pin Configuration

2. L298N Motor Driver :

L298N IC pins	Name	Function
1,15	Sense A, Sense B	Between this pin and the ground, a sense resistor is connected to control the current of the load.
2,3	Out 1, Out 2	Outputs of the Bridge A; the current that flows through the load connected between these two pins is monitored at pin 1.
4	VS	Supply Voltage for the Power Output Stages. A non-inductive 100nF capacitor must be connected between this pin and ground.
5,7	Input 1, Input 2	TTL Compatible Inputs of the Bridge A.
6,11	Enable A, Enable B	TTL Compatible Enable Input: the L state disables the bridge A(enable A) and/or the bridge B (enable B).
8	GND	Ground

9	VSS	Supply Voltage for the Logic Blocks. (A100nF capacitor must be connected between this pin and ground.)
10,12	Input 3, Input 4	TTL Compatible Inputs of the Bridge B.
13,14	Out 3, Out 4	Outputs of the Bridge B. The current that flows through the load connected between these two pins is monitored at the pin.

Table 1.2 L289N Pin Configuration