Wi – Fi Control Robot Using Node MCU

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Abstract—**The Field of robotics has been exponential growth with the amalgamation of multiple domains. The holistic approach is proving to be a boon, where communication engineering, mechanical engineering, embedded system and so many more are together creating robot with high flexibility. Present technologies can only control robots up to a radius of 500 meters, but our aim in this project is to target controlling a robot from a remote location which is more than 1000 miles away. We use WIFI as the medium foe communication. We are achieving this operation by communicating using two computers. These computers connected to the Wi Fi pass on serial data and also communication is established between one computer located near the robot and a microcontroller present, which control its trajectory. Moreover robot will be having its own senses to dodge obstacle, which will also give about its position. Future scope of this project is to establish the same connection but make the bot intelligent and autonomous.**

Keyword:- **Embedded system, Wi- Fi communication, Serial communication**

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I. INTRODUCTION

In the present day, technology has so improved that an Unmanned Aerial Vehicle (UAV) also called as Drone can be controlled from a distance ranging from 2km to 20,000km. The Mars Rover, which was sent to Mars to explore various features of the planet is an autonomous robot which is programmed such that it performs the desired task as it is intended to do. There are many such systems which are controlled either by Radio Frequency transmission or by creating intelligence. Robots are called Non-autonomous robots. These robots have the programming logic to do the desired task but the decision power lies in the hand of controller (human) handling the robot. Here the interface can be made using two methods:

A. Wired –The connection between controller and robot is maintained using wired interface. This interfaces can be serial or parallel but the technology is transmission of signal, which is sent in the form of specific pattern to the robot to carry out the specific task, these patterns with the help of a microcontroller governing its motion.

B. Wireless –Here the connection between controller and robot is achieved by wireless interface such as:
  ➢ Bluetooth
  ➢ Wi-Fi
The underlying technology is transmission of signals wireless in air by transmitter which is captured by the receiver and sent to microcontroller mounted on the robot to carry out the task. At the present demand for robots in this developing world to carry out work effectively and accurately, the development of cost effective robots is necessary[1].

II. OBJECTIVE

The motion of robot controlling via internet is one of the easy means as it requires the user to access the designated webpage to guide it. This system can be used in defence 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.

III. EXISTING SYSTEM

Working of the Wi-Fi controlled robot is very easy, we just need to Drag or Slide the joystick in the direction, where we want to move the Robot. If we want to move the Robot in Forward direction then we need to Drag the Joystick 'circle' in Forward direction. Like we can move the Robot in Left, Right and Backward direction by Dragging the Joystick in respective direction. Now as soon as we release the Joystick, it will come back to centre and Robot. Blynk App sends values from Two Axis Joystick to Arduino through Wi-Fi medium. Ardunio receive the values, compare them with predefined values and move the robot accordingly in that direction[2].
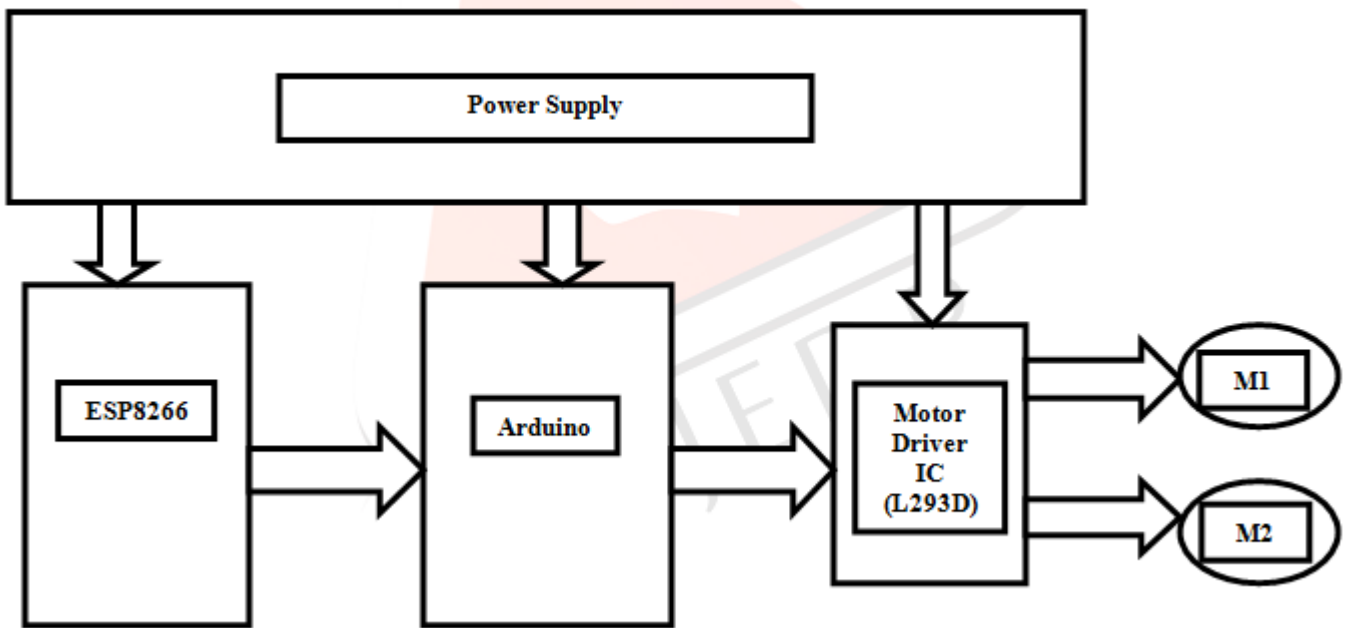
Fig 1:- Block Diagram of Wi- Fi Control Robot Using Arduino

IV. PROPOSED SYSTEM

A 12 Volt DC Power Supply has been apply to Microcontroller and Motor Driver. The Microcontroller text input and gives output to the Wi-Fi module. Here by directional arrow has been between the Microcontroller and Wi-Fi module. Motor Driver is the by directional arrow has been used between the Microcontroller and Mobile Control Internet.
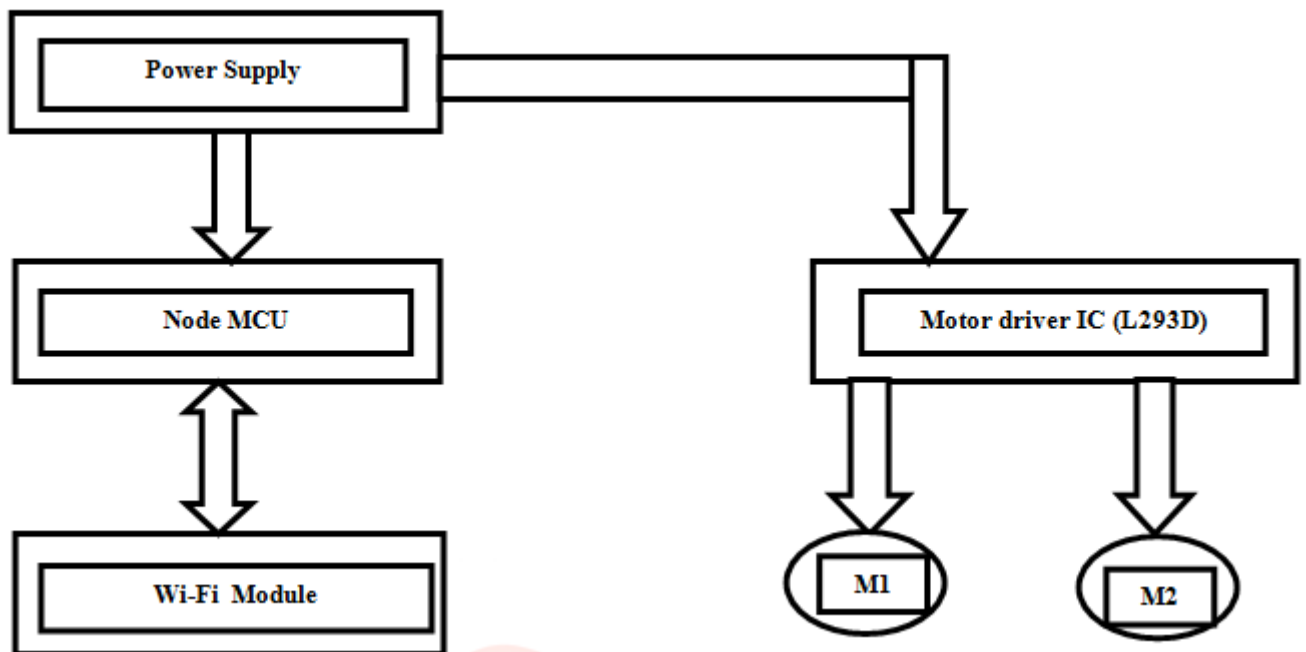

Fig 2:- Block Diagram of Wi-Fi Control Robot using node MCU

V. MODULE / COMPONENT DESCRIPTION

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.

NodeMCU:-

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.

Table.1 Details of NodeMCU microcontroller

IO index	ESP8266 pin	IO index	ESP8266 pin
0	GPIO16	7	GPIO13
1	GPIO5	8	GPIO15
2	GPIO4	9	GPIO3
3	GPIO0	10	GPIO1
4	GPIO2	11	GPIO9
5	GPIO14	12	GPIO10
6	GPIO12		

Fig.3 Node MCU

Motor and Motor Driver L293D:-
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 as well, check the Voltage Specification at the end of this page for more info.

VI. CIRCUIT DESCRIPTION:-

Circuit Diagram of Wi-Fi controlled robot 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[3].
A L293D 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[4].
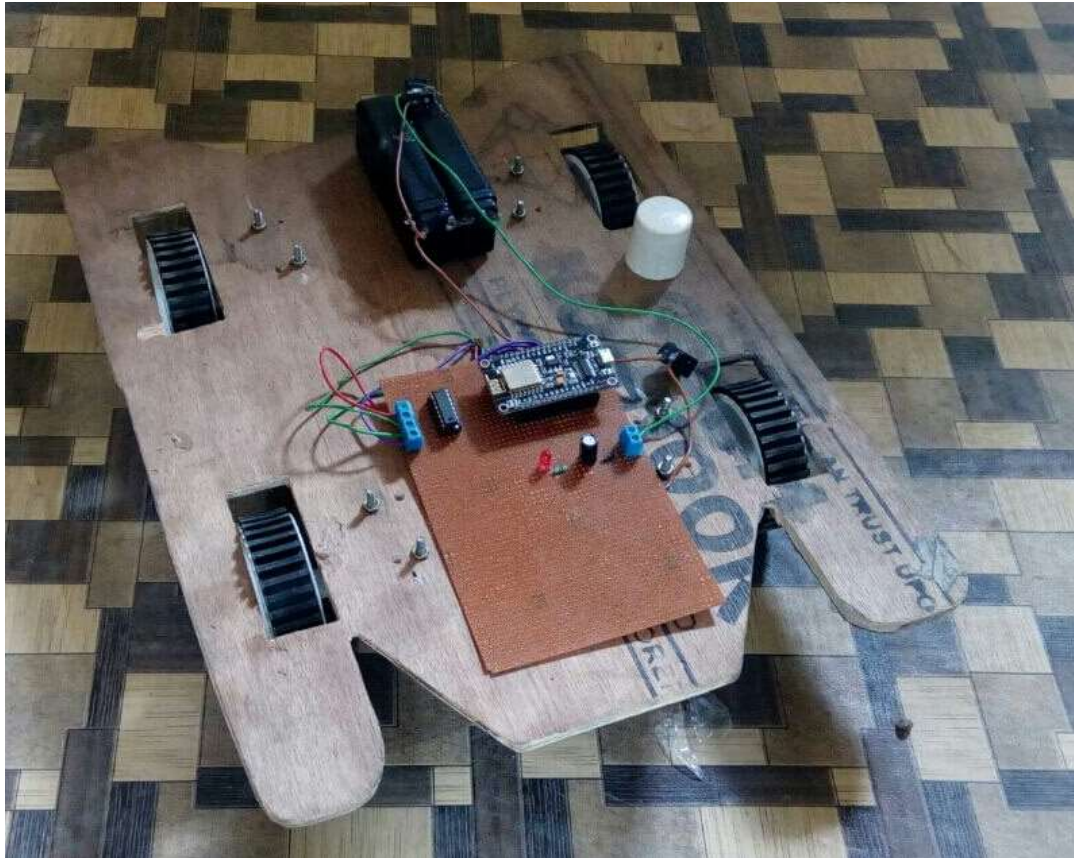
Fig 4:- Real hardware of wifi-robot

VII. RESULT/CONCULUSION

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.

VIII. ACKNOWLEDGMENT

REFERENCES

[1]'Wi-Fi Robot For Video Monitoring & Surveillance System' by Pavan.C, Dr. B. Siva kumar, International Journal of Scientific

& Engineering Research Volume 3, Issue 8, August-2012 ISSN 2229-5518

[2] www.wifibot.com

[3] 'Networking and Internet Applications' by Sangay Yeshi

[4] https://www.rakeshmondal.info/L293D-Motor-Driver