

Development of IoT Based and Wi-Fi Controlled Communication Robot by using Node MCU



K. R. Naga Jyothi, M. Monish Sai, S. Suryanarayana, Venkata Ratnam Kolluru, Rajendraparasad Narne

Abstract: This paper explains the Internet of Things (IoT) based Wi-fi controlled robot by using Node MCU for android applications. Some of the sensors such as temperature sensor, pressure sensor, humidity sensor, ultrasonic sensor is used to develop the smart application. The smart robot has been implemented and used with android mobile instead of a normal joystick method. The reaction time of the sensors is less than 0.03sec. The humidity sensor can be able to range upto 10 to 45 degrees. The main aim of this application is to control the robot by an android application and can be controlled with a distance up-to 20mts. The rate of data will be refreshed in the database in every 30 seconds, which means the developed smart robot can work dynamically. These types of Robots are called Nonautonomous robots. This application has been developed by using Node MCU.

Keywords : Android, IoT, Node MCU, Wi-fi, Robot, Sensor.

I. INTRODUCTION

IoT is the bleeding edge correspondence medium to interconnect remote contraptions, sensors and actuators. Its passes on the commitment in getting to and naming framework system to accumulate and exchange of data. It for the most part helps in controlling and getting to an isolated area where man machine intervening is past the domain of creative mind and offer security. Wi-Fi engages cover accessibility, perpetual correspondence, arrange among devices in the Local Area Network (LAN). In this paper we included Dc engines, temperature sensor, ultrasonic sensor, lithium particle battery, engine driver, Node MCU

Dc motor[1] assumes a significant job for pivot applications. For little mechanical applications 300RPM, 12v DC outfitted engines will be utilized with an apparatus box. It tends to be controlled over a range .Temperature sensor [2] is utilized to quantify the temperature in degrees centigrade, how matter gives off an impression of being hot or cold or moderate, and it will be responded in 0.002 sec a. An

obstruction temperature finder is a variable resistor can fluctuate a difference in electrical opposition is straightforwardly corresponding to the temperature in exact and repeatable. Ultrasonic sensor[3] measures the division to the particular body and moreover checks the time among release and assembling it uses simply ultrasonic segment for outpouring and gathering. it can show the difference of separation when the objective is getting moved. Weight sensor [4] can be characterized as power per unit region that a liquid applies on its surroundings Broadened Wi-Fi can in like way be named as IoT. In the ebb and flow condition it is fundamental and huge for any server empowered structure to help interwork, interconnect all the sharp devices and the contraptions related electronically by procedures for Wi-Fi to share things locally and to keep up a basic conventional ways from switch traffic An essential number of the scientists has done undertakings in IoT . With the open forming this paper proposes a strategy of unique remote controller, which uses Wi-Fi remote correspondence progress, giving a sharp remote controller to access and control the BOT. In setting on NODEMCU ,the controller is seen as a control terminal which issues leads through Wi-Fi module and appears turned information, with the objective that the controller acknowledges the control of the working status of the BOT. Resulting to exploring the accessible arrangement, this paper bases on Internet of Things. This robot is compelled by motor drive and center point mc devices have transmitters and beneficiaries to make the movement. The transmitter (flexible whiz) send the request to beneficiaries. The data heading is set up by parts and occupations done by custom bot. Mechanized advancement starts with some basic considerations. It constrains the human undertakings and it might be passed on in a lot of fields like military, perception application, Industrial Pick and Place Robots latest Humanoid robots are made in the propelled world. Directly a day's mechanical vehicles are made by using Wireless advancement. It accept a noteworthy activity in various applications Section II of this article provides the detailed information of sensors used. Section III gives the idea of proposed methodology with block diagram. Section IV shows experimental setup and Section V for Results and Discussions. Section VI concludes the paper

II. WORKING OF VARIOUS SENSORS

Sensors are the key elements to develop IoT applications. This section gives the information of various sensors used to develop the proposed application. The information is as follows:

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* Correspondence Author

K. R. Naga Jyothi*, Studing ECM, Koneru Lakshmaiah Education Foundation, Vijayawada, India. Email: jyothichinnu1998@gmail.com

M. Monish Sai, Studing ECM, Koneru Lakshmaiah Education Foundation, Vijayawada, India. Email: medarametlamonish99@gmail.com

S .Suryanarayana, Studing ECM, Koneru Lakshmaiah Education Foundation, Vijayawada, India. Email: suryanarayana3001@gmail.com

Venkata Ratnam Kolluru, Associate Professor, ECM Department, Koneru Lakshmaiah Education Foundation, Vijayawada, India.

Rajendraparasad Narne, partner teacher, EEE, Madanapalle establishment of innovation and science, madanapalle

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A. Temperature sensor

A temperature sensor assumes a significant job in numerous applications. To keep up a particular temperature in any applications, for example, creation of therapeutic medications, heat fluids, or clean other hardware. The responsiveness and precision of the location circuit can be basic for quality control for the aforementioned applications. Temperature sensor is reaction time is 0.002sec. Fig. 1 shows the picture of the temperature sensor and the popular name is DHT 11.

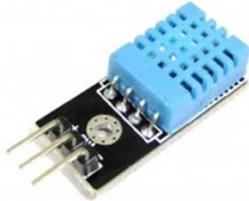


Fig. 1. Pictorial representation of DHT 11 sensor

B. Pressure sensor

A weight sensor is a contraption for pressure estimation of gases or fluids. pressure is a flood of the power required to shield a liquid from extending, and is consistently conveyed correspondingly as power per unit zone. A weight sensor routinely goes about as a transducer it makes a sign as a part of the weight obliged..The pressure sensor is shown in Fig. 2.

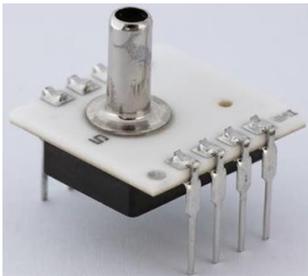


Fig. 2. Picture of Pressure sensor

C. Ultrasonic sensor

An optical sensor has a transmitter and gatherer, however a ultrasonic sensor uses a lone ultrasonic part for both outpouring and social event. In a keen model ultrasonic sensor, a single oscillator transmits and gets ultrasonic waves of course. The photograph of ultrasonic sensor is showed up in Fig. 3. The partition can be resolved with the going with condition $L = 1/2 T$.

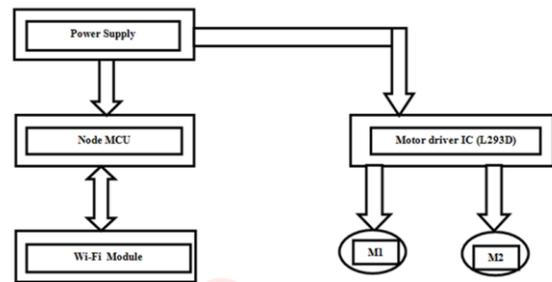


Fig. 3. Photograph of Ultrasonic sensor

III. BLOCK DIAGRAM AND EXPLANATION OF COMMUNICATION ROBOT

The robot car is operating with Node MCU esp32 controller and the command is given by the android application in a mobile phone using the Wi-Fi network. The Node MCU esp32 as inbuilt wi-fi module and the devices connected with robot car. Both wi-fi is connected with an

authentication token. An android application will transmit request using wi-fi to the vehicle with the objective that it can move in the vital bearing like pushing ahead, switch, turning left, turning right and stop. The square diagram of the endeavor is showed up in Fig.4.



The hardware and software requirements to implement the communication robot is as follows:

Hardware requirements

1. NodeMCUesp32 controller
2. DC Motors
3. Motor Driver L293D
4. 9 Volt Battery

Software requirements

1. Net analyzer
2. IB Webcam
3. Arduino

IV. PROPOSED METHODOLOGY AND EXPERIMENTAL SETUP FOR COMMUNICATION ROBOT

The objective is to use robot for surveillance structure over Wi-Fi organize and to live stream the video besides, move sound in the technique. The observation structure gives live video spouting decision and transmits the sound by the usage of programming. The usage in the assignment gives a bit contact of IOT in it. Instead of using standard USB camera for the video and sound transmission, we have focused on making an enormous segment of the programming parts for live video and sound transmission. It very well may be downloaded on the android versatile and used for controlling the robot. We can in like manner control through PC by making close by server

Node mcu

It is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi from Systems, similarly, equipment which depends upon the ESP-12 module. The term Node MCU clearly implies the firmware as opposed to the improvement units. The firmware utilizes the scripting language. It depends upon the undertaking, and reliant on the Non-OS SDK for ESP8266. Node MCU is shown in Fig. 5.

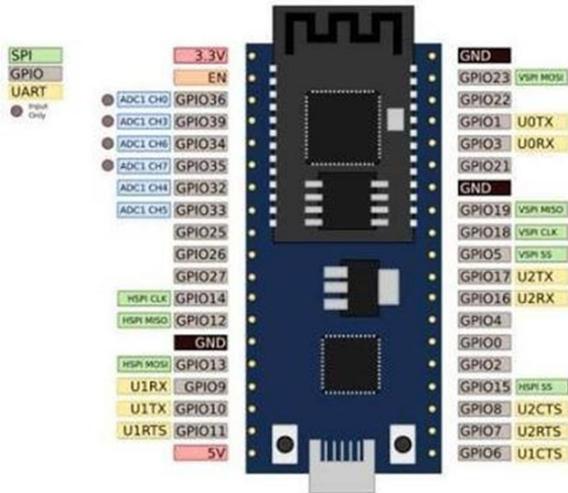


Fig. 5. Pin description of Node MCU

Table 1. Pin description for Node MCU

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

V. MOTOR DRIVER-L293D

L293D is a typical Motor driver or Motor Driver IC which grants DC motor to drive on either bearing. L293D is a 16-stick IC which can control a great deal of two DC motors simultaneously toward any way. It determines that you can control two DC motor with a singular L293D IC. Twofold H-accomplice Motor Driver create circuit (IC). The l293d can drive about nothing and quiet colossal motors besides, check the Voltage Specification toward the finish of this page for more data. • When the empower data is low, those drivers are injured and their yields are off and in the high-impedance state. • A VCC1 terminal, separate from VCC2, is obliged the premise responsibilities to compel contraption control scattering. Stick depiction layout is appeared in Fig. 6.

Essential idea is custom bot is constrained by cell phone by means of hotspot. The custom bot is constrained by explicit telephone application. Hub mcu-esp8366 Wi-Fi module principle work is interfacing the cell phone with custom bot by means of hotspot. The program ought to be downloaded from a web server, in the run. That suggests, you ought to have an online relationship with the Internet. For development reason that is welcome, anyway for run of the mill movement it is ambling. The robot control is problematic, because the motors starts deserting more than 600 (control run 0.1023) on, and stop at underneath 300. This was not contemplated.

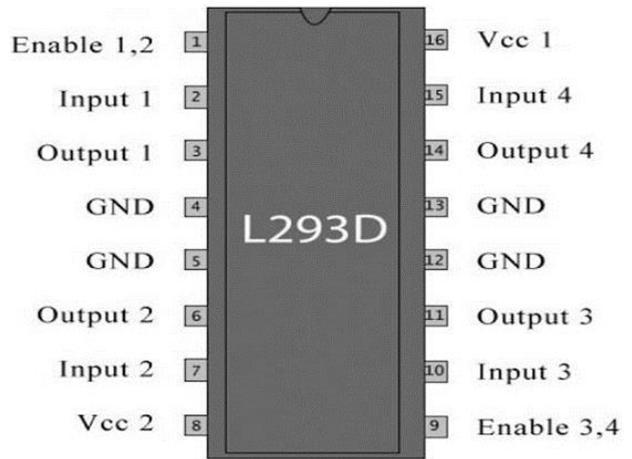


Fig. 6. Motor driver pin diagram

VI. RESULTS

In this project the movement is controlled through the robotic technology, which is also in addition to the advantage of getting it through the Wi-Fi module. Fig. 7 shows the working model, Fig. 8 shows temperature sensor and Fig. 9 shows ultrasonic sensor of communication robot

A. Figures

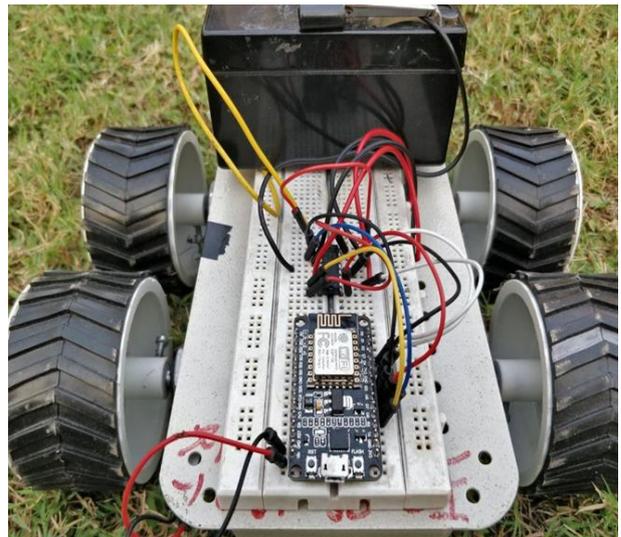


Fig. 7. Working model of communication robot

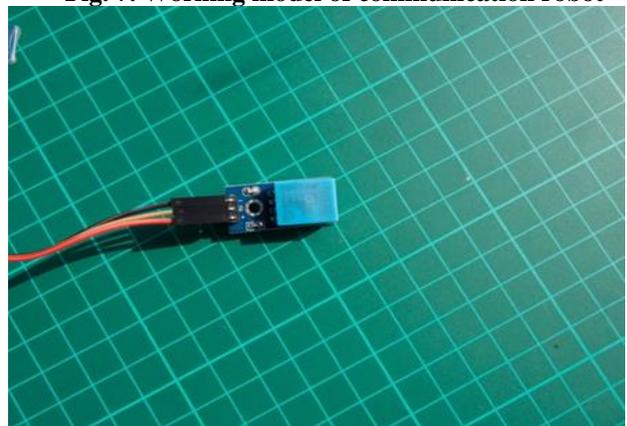


Fig. 8. Temperature sensor in working model

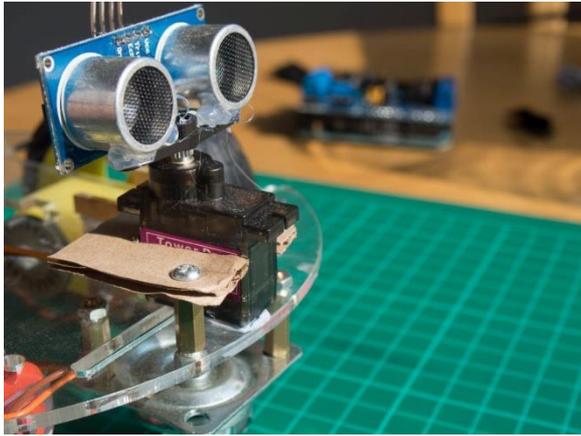


Fig. 9. Ultrasonic sensor in working model

VII. CONCLUSION

The undertaking completed by utilizing the hub mc and engine drive in the field of mechatronics division. New things and new development are being prepared. As the advancement creates bit by bit, it can imagine about the future wherein thing may include each spot. Straightforward and less confounding, which can speedily be used in order to perform. A few repetitive and excess assignments. Despite the way that it is arranged recollecting about the necessity for industry, it can connect for various purposes, for instance, business and research application. The instance of robot made by aluminum it gives the efficiency and more speed to robot. The heading coding is entered in robot it is particularly direct. In spite of the way that it is organized recalling about the necessity for industry, it can loosen up for various purposes, for instance, business and research application. Wi-Fi will be a key access innovation for Internet of Things enablement because of cost inclusion and transfer speed, challenges with portable cell which can be undermined through Wi-Fi.

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AUTHORS PROFILE



K. R. Naga Jyothi, she is currently studing in Koneru Lakshmaiah Education Foundation in ECM department



M. Monish Sai, He is currently studing in Koneru Lakshmaiah Education Foundation in ECM department



S. Suryanarayana, He is currently studing in Koneru Lakshmaiah Education Foundation in ECM department



Venkata Ratnam Kolluru, He is currently working as an associate professor in Koneru Lakshmaiah Education Foundation in ECM department .He distributed 6 research papers in various universal gatherings, 23 research papers distributed in different SCI and SCOPUS recorded worldwide diaries and 6 more research papers imparted (1 got acceptance and 5 are under review) to various SCOPUS/WoS/SCI indexed journals. Currently his h-index is 5 and i10 index is 2. Hiscurrent research interests include IoT, VLSI &Embedded Systems, Solar Cells and MPPT.



Rajendraparasad Narne, He is right now functioning as a partner teacher in Madanapalle establishment of innovation and science, madanapalle in EEE office. His ebb and flow explore interests incorporate IoT, Power hardware.