IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
Special Issue || Dec. 2019 || PP 25-29
International Conference on Management Practices, Innovations & Research 2019

A Speed Controlling, Monitoring and Protection of Dc Motor Using Internet of Things (IOT)

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Abstract: *This paper shows the control and the study of the DC motor by using IoT. The DC drive systems are oftenly used in various industrial applications such as, actuation, manipulators and robotics. The Internet of Things (IoT) refers for the rapid growing network of physical objects that feature an Internet protocol (IP) addresses in which the internet connectivity and the communication that occurs between these other internets enabled devices, objects and systems. The DC Motor has been widely used in industries because of its properties such as improved efficiency, accuracy and economic benefit in addition to reduce human intervention. IOT allows objects to be sensed or control remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer based system.*
Keywords: *DC motor, IOT, Sensors, Wi-Fi module , Wi-Fi router, Micro-controller*

I. Introduction

IoT based embedded systems are used in different fields like technology, space, defense, research etc. So we have decided to use this system for controlling, monitoring and protection of DC motors. In different industries more than two DC motors are used for different applications so the maintenance of the motors is being difficult task for the operators in the industry. By the use of IoT based system any operator can check any motor's present status from the control room. Also if he finds any abnormal condition in any motor of the plant he can stop the motor from the control room by the use of IoT based system. He/ She can record real time readings of various parameters like voltage, current and temperature by using IoT based system on a single computer screen.

In this project we are developing about a system which provides protection to the DC motor as well as helps in monitoring and controlling the different parameters. By using Wi-Fi and web server and with the help of some transducer we can easily achieve our goal to protect control and monitor different parameters. We have provided different controls through internet to avoid faults in DC motor.

II. Proposed System

In this system we are going control the speed, directions of the DC motor via internet of things (IOT). This circuit diagram consist of two part the main processor the microcontroller, MOSFET, relay driver unit , dc motor, temperature sensors , IR sensor these are all interconnected to each other . The second part is the IOT which consist of Wi-Fi module, Wi-Fi router, website, web server. This system can be operated online as well as offline. We had developed a website using PHP language, which gives command to the microcontroller to achieve following objective

a) To control the speed of motor
b) Change the directionof motor Now the microcontroller receives the signal from the website.

The microcontroller uses pulse width modulation. Microcontrollers fires the MOSFET .MOSFET is connected to IR sensor to calculate the frequency of the DC motor . The microcontroller also fires the relay which in turn changes the direction of dc motor in accordance with the command from web server . The temperature sensor detects the temperature and shows the output on the display

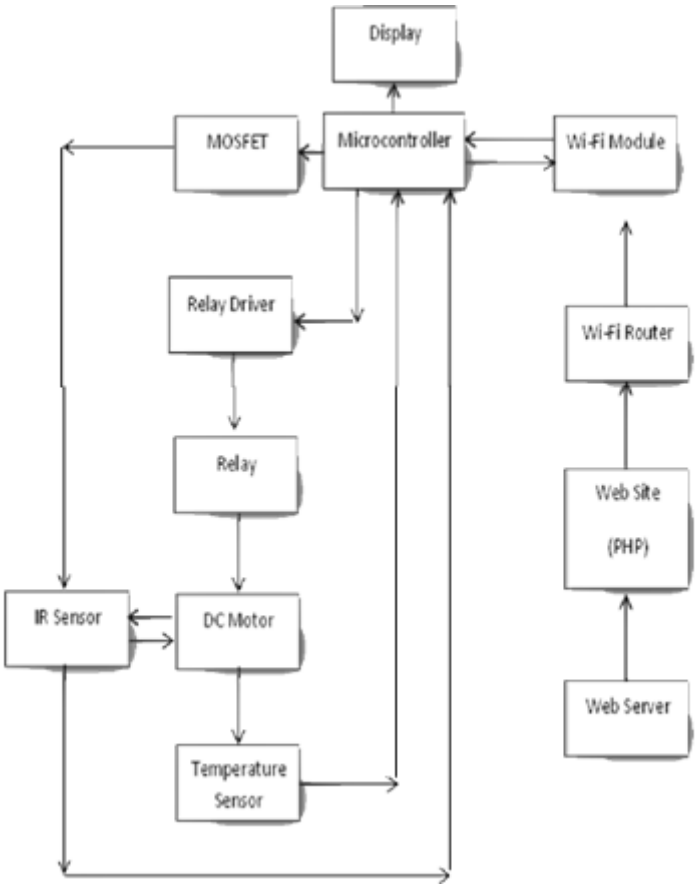


Fig. 1. Basic block diagram of the proposed technique

The above figure shows the basic block diagram of the proposed technique and the below circuit diagram shows the man can operate various factory machineries just by a clicking his Smartphone application.

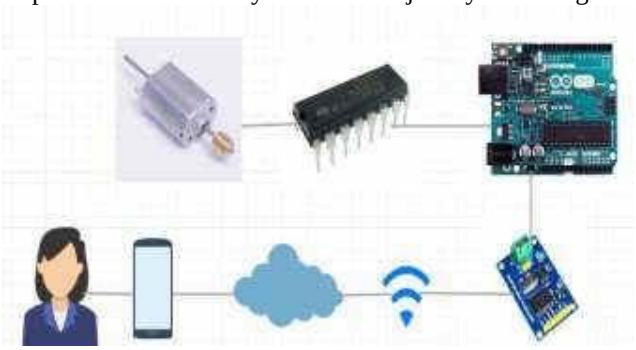


Fig. 2. Schematics representation of proposed technique

Smartphone

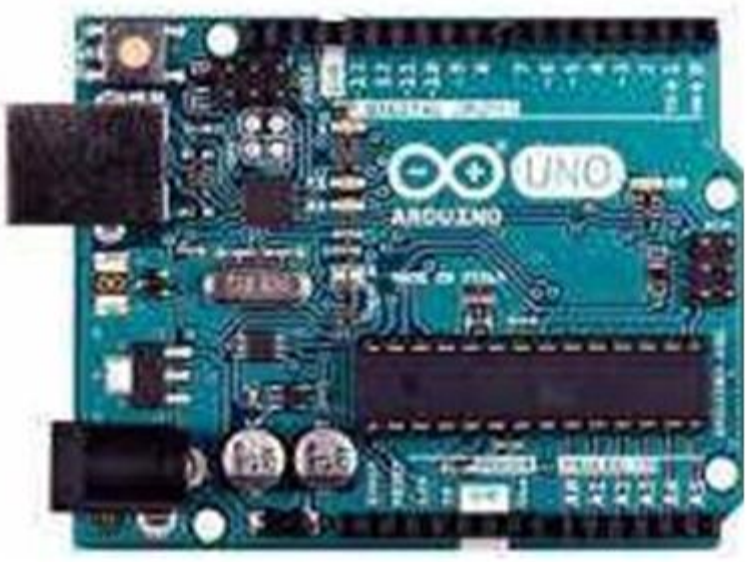
There are about 3 billion Smartphone users in which nearly 82% use android. Out of which the total available devices, 2.4 billion are IoT compatible [7]. The developed android application will be installed on the Smartphone. The Smartphone will use its internet connectivity to send the control data to the web cloud servers such as firebase or one out of the many database platforms which are available. The android application will be user-friendly and easily accessible by all android Smartphone users.

Iot (Internet Of Things)

There is no different definition available for Internet of Things that is acceptable by the world community of users.In fact, there are many various groups including academicians, researchers, practitioners, innovators, developers and corporate people that have defined the term, although its starting use has been attributed to Kevin Ashton,an expert on digital innovation. What all of the definitions have the same idea that the first version of the Internet was about data created by people, while the next version is about data created by things. The best definition for the Internet of Things would be:

III. Microcontroller

The arduino UNO microcontroller comes with the ATmega328P microcontroller embedded. ARDUINO UNO is designed to provide different facilities for communicating with the computers, another ARDUINO and other on-board controllers. The standard operating voltage for the board is 5V. However, the recommended input voltage ranges from 7V to 12V. It contains 14 digital input/output pins, out of which 6 are pulse width modulation enabled pins. There are 6 analog input pins present on the board. It supports a flash memory of 32 KB of which 0.5 KB is used by the boot loader. The clock speed is 16MHz. The SRAM and EEPROM are 2 KB and 1 KB respectively. Also the microcontroller has incredibly convenient sizing wherein its length and width are 68.6 mm and 53.4 mm respectively. The arduino microcontroller will be loaded with a program written on arduino C. The program will be guiding the microcontroller to download the control data from the online cloud web server. The data will be fetched using the Wi-Fi module at regular intervals. This data will be in form of analog values 0-255. Accordingly the microcontroller can be used to modulate the pins of the motor driver IC to make the motor operate in different modes like forward motoring, forward braking, reverse motoring, reverse braking. Also the respective analog values received represent speeds where 0 represents 0 speed and 255 represents full speed. Fig. below shows the arduino UNO microcontroller.



IV. WIFI Module

There are various ways in which the Arduino microcontroller can be connected with the internet. First way is by using the Arduino UNO Wi-Fi board. It is a microcontroller board with Wi-Fi module embedded in it. Second way is to use a separate ESP8266 Wi-Fi module. It has integrated TCP/IP protocol stack. It has 1MB Flash memory. It is IEEE 802.11 b/g/n Wi-Fi. It has 16 GPOI pins. It supports SPI as well as I2C communication protocols. Predefined library is also available for coding. The fig below shows a ESP8266 Wi-Fi module. The hardware connections required to connect to the ESP8266 module are fairly straight-forward but there are a couple of important items to note related to power.

Fig. 4. ESP8266 Wi-Fi module

V. LM35 Module

The LM35 have an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius. (Centigrade) temperature. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. The LM35 is rated to operate over a −55° to +150°C temperature range, while the LM35C is rated for a −40° to +110°C range (−10° with improved accuracy). Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 μA from its supply, it has very low self-heating, less than 0.1°C in still air.

Fingerprints

There are about 30 specific points in a fingerprint scan obtained by the live fingerprint reader. The US Federal Bureau of Investigation (FBI) has evidenced that two individuals can have been more than 8 common minutiae. Recognition decisions in the biometric systems are have to be taken in a real time and, therefore, computing efficiency is the key in biometric apps. It was not the case in biometric forensics where the real-time recognition is not to be a requirement.

Temperature sensor

Temperature is one of the most commonly measured variables and it is therefore not surprising that there are many ways of sensing it. Temperature sensing can be done either through direct contact with the heating source, or remotely, without direct contact with the source using radiated energy instead. There are a wide variety of temperature sensors on the market today, including Thermocouples, Resistance Temperature Detectors (RTDs), Thermistors, Infrared, and Semiconductor Sensors. Thermistors are thermally sensitive resistors whose prime function is to exhibit a large, predictable and precise change in electrical resistance when subjected to a corresponding change in body temperature

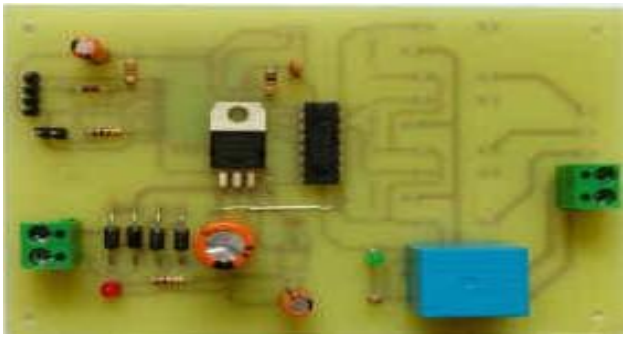


fig. 5. Hardware implimented till date

VI. Conclusion

This paper designs the implementation of Internet of things for controlling, monitoring and direction of DC motor in various application and parameters in industries using wireless communication technique. The basic idea of the proposed work is to provide long distance connectivity between industrial environment and user. It also provides flexibility. The advantages of this proposed system is to have a continuous monitoring over industrial applications and also control them if it goes above the threshold conditions. Future work will focus on improvement of above proposed work and attribute to make a reliable smart Industrial controlling and monitoring system

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