Iot based motor monitoring and controlling

Vaibhav Tribhuwan, Shubham Vibhute, Pravin Parsi, Prasad Dhamale
DEPARTMENT OF ELECTRICAL ENGINNERING
TRINITY COLLEGE OF ENGINEERING & RESEARCH, PUNE-28, india.

Abstract

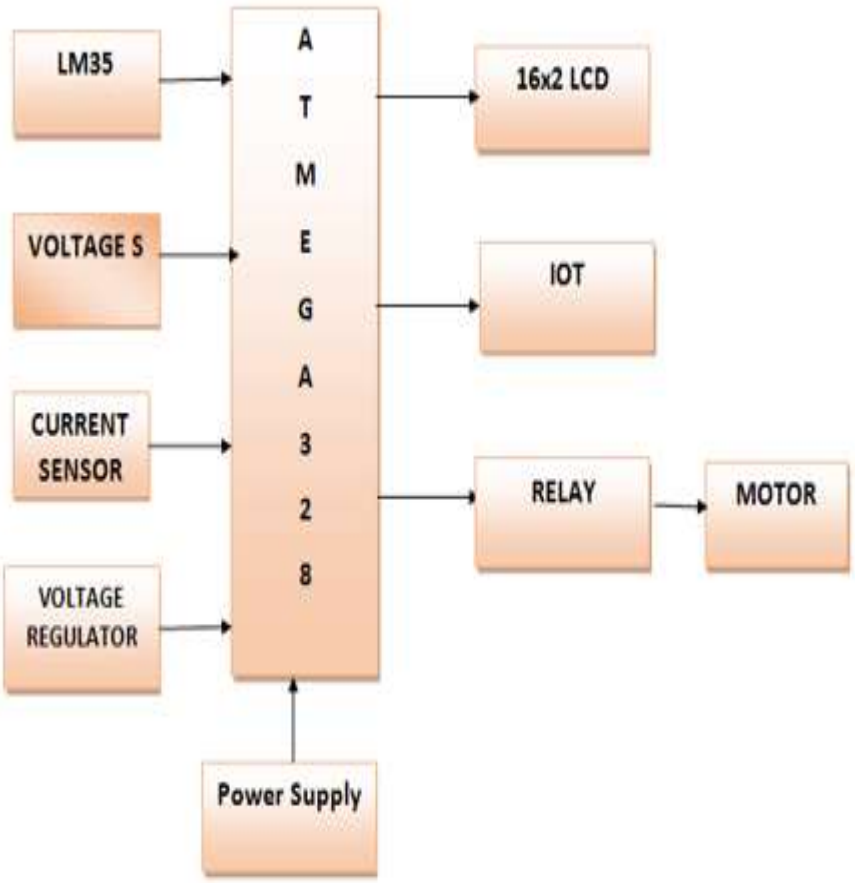
In this Project, the design aspects of an embedded device which can control up to 8 devices by sending a specific SMS message from a mobile phone are presented. This controller is extremely handling at places where we have to control the ON and OFF switching of the devices but no wired connection to that place is available. To implement this, a GSM modem is connected to a programmed microcontroller which would receive the SMS from a reference cell phone. The control signal part of the received SMS is extracted and is changed to microcontroller-preferred format. The monitoring is will be done by interfacing a LCD to the microcontroller. AT commands were used for controlling the functionality of modem's (Global Systems for Mobile Communication) is vastly used because of its simplicity in both transmitter and receiver design, can operate at 900 or 1800MHZ band, faster, more reliable and globally network. Here the system is capable of controlling the motor by receiving control message from an authorized mobile number. Microcontroller is the heart of our system, which controls the overall operation of our system. System is always alert for receiving SMS from valid number and that message can be displayed on the LCD (Liquid Crystal Display).

I. Introduction

Induction motors run at fixed speed and are ideally suited to application where a constant motor output speed is required. However there are some application where varying motor output speed . While equipment like conveyors may be fine for a fixed speed there are some application which are better suited to running at variable speeds such as fan, pumps, winders and precision tools. Some wise scientist once said that control system is a system where we can shut down the machine whenever we want. That's the difference between controlled and uncontrolled machine.

Our project is about make this control system efficient and dynamic. As the name suggested the automatic control is for controlling the motor from remote place, look over it's operating conditions, get feedback from the motor itself. Our target is to control the motor from distant place by mobile DTMF tone and also get feedback by SMS while it is in ON or OFF condition. Again we also get these feedbacks by SMS as well.

Components used and block diagram :-



Block diagram of iot based motor monitoring and controlling

3.2WORKING:-

The block diagram precisely illustrates the method we are going to adapt towards the solution. The main blocks are microcontroller, temperature sensor, current sensor, Wi-Fi module & internet server.

The data obtained from the sensors is fed as input to the microcontroller block. Temperature sensor we are going to use is LM35 which has sensing capacity from -55 to 125 degree Celsius.

It is a sensor which gives information in digital form. The temperature communicates over a 1-Wire bus that by definition requires only one data line (and ground) for communication with a central microcontroller.

We are going to use non-invasive current sensor which is also called as split core current transformer. This current sensor will measure a load .

Here, the sensors used act like an input to the microcontroller because the sensors are going to detect the surroundings and act accordingly. In microcontroller block, the obtained information is decoded and processed. Processing the information is done using codes which we would have already dumped in the microcontroller.

Decoded information is given as input to Wi-Fi module which shares the same chip as microcontroller known as Arduino. Wi-Fi module operates with the help of the hotspot. Wi-Fi module also acts as a channel between the obtained information and internet server. The real time information is displayed on the website we have chosen "Thingspeak.com".

The data is in the form of graphical representation because of which we can easily analyze the situation or present condition of the device continuously on the website. If there is any correction required, then the control action will be taken quickly to remove it. This is a quite well designed architecture planned to solve the industry problems efficiently.

AT-MEGA328:-

MICROCONTROLLER:

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments.

cd panel :-

LIQUID CRYSTAL DISPLAY:-

LCD stands for **L**iquid **C**rystal **D**isplay. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

1. The declining prices of LCDs.
2. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.
3. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.
4. Ease of programming for characters and graphics.

These components are "specialized" for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They areused for writing different messages on a miniature LCD.

DC MOTOR:-

Fig 1.3 dc motor

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.

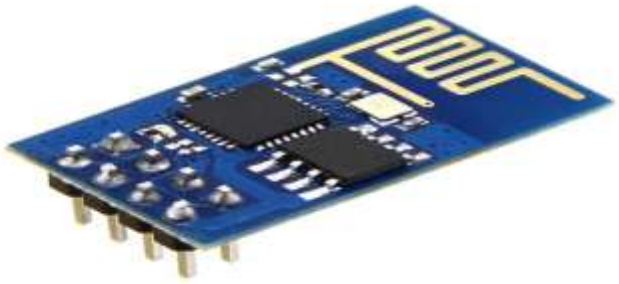
Relay :-

FEATURES OF 5-PIN 5V RELAY:-

- Trigger Voltage (Voltage across coil) : 5V DC
- Trigger Current (Nominal current) : 70mA
- Maximum AC load current: 10A @ 250/125V AC
- Maximum DC load current: 10A @ 30/28V DC
- Compact 5-pin configuration with plastic moulding
- Operating time: 10msec Release time: 5msec
- Maximum switching: 300 operating/minute (mechanically)

Iot module

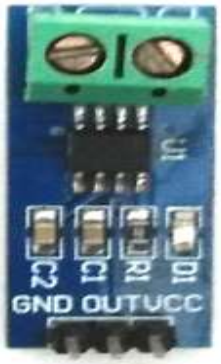
- The ESP8266 is a system on a chip (SOC) Wi-Fi microchip for Internet of Things (IoT)



applications produced by Expressive Systems.

Given its low cost, small size and adaptability with embedded devices, the ESP8266 is now used extensively across IoT devices. Although it's now been succeeded by the newer generation ESP32 microcontroller chip**, the ESP8266 is still a popular choice for IoT developers and manufacturers**

CURRENT SENSOR :-



The **ACS712 Module** uses the famous **ACS712 IC** to **measure current** using the Hall Effect principle. The module gets its name from the IC (ACS712) used in the module, so for you final products use the IC directly instead of the module.

These ACS712 module can measure current AC or DC current ranging from +5A to -5A, +20A to -20A and +30A to -30A. You have to select the right range for your project since you have to trade off accuracy for higher range modules. This modules outputs Analog voltage (0-5V) based on the current flowing through the wire; hence it is very easy to interface this

module with any microcontroller. So if you are looking for a module to measure current using a microcontroller for you project, then this module might be the right choice for you.

Arduino :-

In this tutorial, we assume you're using an Arduino or Genuino Uno or an Arduino or Genuino Mega 2560. If you are using a retired board as ArduinoDuemilanove, Nano or Diecimila please refer to the driver installation instructions end of this document. If you have another board, read the corresponding page linked in the main getting started page.

III. Result

The various factors and machinery which has to be controlled by manual labour can be controlled using phone or computer. Various factors like temperature, moisture, can be easily be detected using sensors which will further inform about the increase and decrease of various factor on device and with this switching on off of various machinery can be controlled. The data collected from various sensors can stored into cloud and can be used anytime afterwards for future reference. Production through greenhouse using IOT has been increased and minimal wastage of water and other resources has been reduced.

IV. Discussion

Greenhouse system are very common in countries having colder climate like countries in subtropical, temperate and frigid zones. In UK and other Northern European countries have started using IOT controlled in their dutch light greenhouses. Even India is being working on it. India has a huge mountainous border across Himalaya which needs to be protected and hence Indian army has a huge mountainous warfare trained army. During harsh climate leads to blockades of land routes till these regions and lack of connectivity occurs leading to lack of food supply. Hence greenhouse is very important in places like ladakh and to maintain it in harsh climate and yield the production of vegetables, greenhouse controlled using IOT is necessary. On 20th August 2020 Lieutenant Governor R.K. Mathur has sanctioned the Ladakh greenhouse project under which 2000-2500 greenhouses will be set up in Leh and Kargil each, where vegetables can be grown during the winter season and would be controlled automatically.

CONCLUSION

The project proposes a new technique for ON OFF control of Induction motor. In this project the ON OFF control of Induction motor is done SMS based methods are reliable and accurate but these methods involve complex circuitry and control. This method provides smooth control technique for ON OFF control even up to rotor standstill position with less power dissipation, simple circuitry easy control with low cost. proposed technique for motor control can be used effectively. This technique achieves result with utmost accuracy as in case of conventional methods, this has been proved in this project. This project proposes a technique for ON OFF control of motor.

REFERENCES

[1]. P. Ramya,“Arduino Microcontroller Based Online Ambient Monitoring Using Internet of Things”, 2016.

[2] Madan B. Matsagar2, Avinash D. Kale ,"Remote Temperature Monitoring System Using ARM, Arduino andZigBee",2016.Sonawane3,Chandrakant L.Ambekar4 ,Vijay S. Kale ,"Remote Temperature Monitoring SystemUsing ARM, Arduino and ZigBee",2016.

[3] P.V.Rama Raju, G.Naga Raju, Abdul Vahed,"IOT based power monitoring system and control", Journal of Emerging Technology and Innovative Research, Volume:04, Issue:11, November 2017.

[4] G. Covic and J. Boys, "Modern trends in inductive power transfer for transportation applications," IEEE J. Emerg. Sel. Topics Power Electron., vol. 1, no. 1, pp. 28–41, Mar. 2013.

[5] (2015). The wireless power consortium (WPC) website [Online]. Available: http://www.wirelesspowerconsortium.com/