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Speed Control Of Induction Motor Using Internets Of Things

Swati G. Wanjari
Department of Electrical Engineering
BE,TGPCET,Nagpur
Nagpur, India
swatiwanjari2@gmail.com

Sonam A. Walke
Department of Electrical Engineering
BE,TGPCET,Nagpur
Nagpur, India
sonamwalke5758@gmail.com

Praveen H. Matale
Department of Electrical Engineering
BE,TGPCET,Nagpur
Nagpur, India
Matalepraveen17896@gmail.com

ShrehaliMulewar
Department of Electrical Engineering
BE,TGPCET,Nagpur
Nagpur, India
shrehalimulewar95@*gmail.com*

Prof. Pratik Ghutke
Department of Electrical Engineering
TGPCET,Nagpur
Nagpur, India
Pratik.electrical@tgpcet.com

Dr. Harikumar Naidu
Department of Electrical Engineering
TGPCET,Nagpur
Nagpur, India
hod.electrical@*tgpcet.com*

***Abstract*—**The rapid growth of industry and advancement of technology has resulted in reduction of human efforts, the main reason for which being machines. Machines are playing an important role in our life. In this project, we use internet to establish communication between the user and Monitoring unit.The internet of the ever growing network of physical object and feature an internet protocol (IP) address for internet connectivity and the communication that occurs between the objects and other enabled device and system.This system consists of microcontroller, Induction motor and WI-FI module. Here we are controlling the speed of the motor using webpage through WI-FI. The induction motor speed variation can be easily achieved for a short range by stator voltage control. The terminal voltage across the stator winding of the motor can be varied for obtaining the desired speed control by controlling the firing angle of the semiconductor power devices (MOSFET in our project).

Keywords*—Induction motor, internet, internet protocol, WI-FI,webpage, MOSFET.*

I. Introduction

In addition, the availability of fast-processing, stable and sensitive products provided particular benefits in industrial automation. As a result of the developments in Communication technologies, systems are no longer monitored and controlled by personnel using classic methods, but automatically by computercontrolled or remote-controlled devices. Industrial environmental conditions have been upgrading day by day with this newly introduced automatic techniques as a result of getting rid of the conventional procedures of manufacturing increasing huge workloads.The next generation industries will be Technological developments have enabled to be taken classic systems place by Automatic and advanced systemsdefinitely more advanced and automatic as compared with existing ones. This brings on a new terminology of “Smart Industries” in this new era of Monitoring as well as controlling of various Industrial applications. As an emerging technology brought about rapid advances in modern wireless telecommunication, Internet of Things (IoT) has attracted a lot of attention and is expected to bring benefits to numerous applications. The newly introduced concept of “Internet of Things” (IOT) is providing a helping hand to achieve the Industrial automation through remote access. In IOT each device or devices constituting a system will be able to

communicate with the other devices or system in the same premises over a common platform. Hence this leads to exchange of relevant data, statistics, logs and various other parameters information among various devices to improve their performance, which will help industries to have better productivity, management and increased throughout.

II. PROPOSED BLOCK DIAGRAM

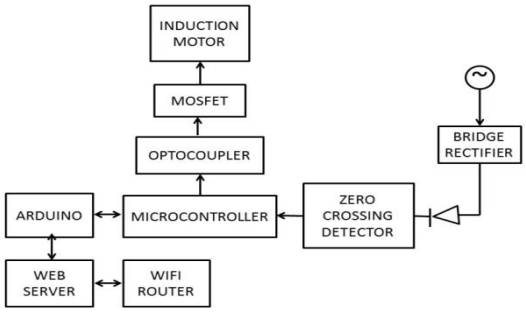

Fig. 1 Circuit architecture of speed control of induction motor using internet of things

Induction motors have been used widely in different fields ranging from domestic appliances to industrial machinery. This necessitates a speed control mechanism that is efficient and is also safe to use. Induction Motor Speed Control Project serves this purpose of controlling the speed of the induction motor.

Induction motor runs through direct AC line the amount of power given to it decides to what RPM it does rotate. We can modulate the power of the AC line to vary the speed of the induction motor through AC driver circuitry. An Atmega family microcontroller is used to give PWM power to an opto-coupler which drives the MOSFET giving supply to the induction motor.

In this project the Induction motor is controlled throughwebsite. The induction motor is connected with website through microcontroller and web server. The PHP language is used for developing website. The website links are act as variable for the website, these variable values are accessed through website by processing 3 compiler software. The processing 3 software send the variable values from website to the arduino program through serial port. The read values from the serial port is passed to the microcontroller 89C51 to there firing pins at port P1.0 , P1.1 ,P1.2 . the port P1.0 is used for starting the induction motor start or stop. The port P1.1 is used for incrementing the angles of the sinusoidal signal, whereas the port pin P1.2 is used for decreasing the firing angle to the IM.

COMPONENTS –

Bridge Rectifier

A Bridge rectifier is an arrangement of four (or more) diodes in a bridge circuit configuration that provides the same polarity of output for either polarity of input.

When used in its most common application, for conversion of an alternating-current (AC) input into a direct-current(DC) output, it is known as a bridge rectifier. A bridge rectifier provides full-wave rectification from a two-wire AC input, resulting in lower cost and weight as compared to a rectifier with a 3-wire input from a transformer with a center-tapped secondary winding.[1]

The essential feature of a diode bridge is that the polarity of the output is the same regardless of the polarity at the input.

MOSFET

The metal-oxide-semiconductor field-effect transistor (MOSFET) is a type of field-effect transistor (FET), most commonly fabricated by the controlled oxidation of silicon. It has an insulated gate, whose voltage determines the conductivity of the device. Hence by controlling the firing angle of the gate signal we can control the voltage given to the gate signal and hence conductivity. This ability to change conductivity with the amount of applied voltage can be used for amplifying or switching electronic signals.

The main advantage of a MOSFET is that it requires almost no input current to control the load current, when compared with bipolar transistors. In an enhancement mode MOSFET, voltage applied to the gate terminal increases the conductivity of the device. In depletion mode transistors, voltage applied at the gate reduces the conductivity.

Optocoupler

Optocoupler is a component that transfers electrical signals between two isolated circuits by using light.Opto-isolators prevent high voltages from affecting the system receiving the signal.Commercially available opto-isolators withstand input-to-output voltages up to 10 kV and voltage transients with speeds up to 25 kV/µs.

A common type of opto-isolator consists of an LED and a phototransistor in the same opaque package. Other types of source-sensor combinations include LED-photodiode, LED-LASCR, and lamp-photoresistor pairs. Usually opto-isolators transfer digital (on-off) signals, but some techniques allow them to be used with analog signals.

Micro-controller

A microcontroller contains one or more CPUs (processor cores) along with memory and programmable input/output peripherals.

Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications consisting of various discrete chips.

Arduino

The Arduino Uno is a microcontroller board based on the ATmega328 micro controller. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Web server

A Web server is a program that uses HTTP (Hypertext Transfer Protocol) to serve the files that form Web pages to users, in response to their requests, which are forwarded by their computers' HTTP clients. Dedicated computers and appliances may be referred to as Web servers as well.

The process is an example of the client/server model. All computers that host Web sites must have Web server programs. Leading Web servers include Apache (the most widely-installed Web server), Microsoft's Internet Information Server (IIS) and nginx (pronounced engine X) from NGNIX. Other Web servers include Novell's NetWare server, Google Web Server (GWS) and IBM's family of Domino servers.

Web servers often come as part of a larger package of Internet- and intranet-related programs for serving email, downloading requests for File Transfer Protocol (FTP) files, and building and publishing Web pages. Considerations in choosing a Web server include how well it works with the operating system and other servers, its ability to handle server-side programming, security characteristics, and the particular publishing, search engine and site building tools that come with it.

Wi-Fi Router (Tethering and portable Hotspot)

A wireless router is a device that performs the functions of a router and also includes the functions of a wireless access point. It is used to provide access to the Internet or a private computer network. Depending on the manufacturer and model, it can function in a wired local area network, in a wireless-only LAN, or in a mixed wired and wireless network.

Zero crossing detector

A zero crossing detector or ZCD is a one type of voltage comparator, used to detect a sine waveform transition from positive andnegative, that coincides when the i/p crosses the zero voltage condition. Zero crossing detector circuit is used to produce an o/p stage switch whenever the i/p crosses the reference i/p and it is connected to GND terminal.

A zero crossing detector circuit is used here to interrupt AT89C51 after every 10 ms. After getting an interrupt 89C51 will fire MOSFET after some delay from 1 to 9 ms. This will cut the current supplied to motor and so the speed of motor will reduce. Thus by varying the delay after which the MOSFET is triggered one can change the speed of motor.

Pc Software:

Hardware can be interfaced with the pc to control the speed of motor. It has no as such practical use it is just for learning point of view.
Hardware can be connected with pc through a serial port. Serial communication is used to communicate between hardware and software.

Visual basic 6 is used for making this GUI (Graphic user Interface).

Software logic:

The complete operation is based on the software embedded in micro controller AT89C51. The software is written in C language. Compiler is keil 4. Different functions are used for different operations like incangle (), decangle (), init (), uart () and Interrupts functions etc.

III. INTERNET OF THING TECHNOLOGY

The Internet of things (IoT) is the network of physical devices, vehicles, home appliances and other
items embedded with electronics, software, sensors, a ctuators, and connectivity which enables these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure.

The IOT refers to the ever growing network of physical objects that feature an Internet protocol(IP) address for internet connectivity and communication that occurs between these objects and other internet enabled devices and systems.

IV. PULSE WIDTH MODULATION TECHNIQUE

Pulse-width modulation (PWM), as it applies to motor control, is a way of delivering energy through a succession of pulses rather than a continuously varying (analog) signal.

By increasing or decreasing pulse width, the controller regulates energy flow to the motor shaft.

The motor's own inductance acts like a filter, storing energy during the "on" cycle while releasing it at a rate corresponding to the input or reference signal.

In other words, energy flows into the load not so much the switching frequency, but at the reference frequency.

V. ADVANTAGES

1. We can control IM from anywhere and anytime by using this model if it is interface with internet.
2. At whatever speed induction motor stop running when supply is off , the same speed it will operate when again it starts.
3. Technically expert controller is not required.
4. More useful for the patient and disabled person

VI. CONCLUSION

This paper has presented the design and implementation of Internet of things for monitoring and controlling of various application and parameters in industries using wireless communication technique. The key idea of the proposed work is to provide flexible and long distance connectivity between industrial environment and user. The advantages of the developed system are to have a continuous monitoring over industrial applications and also control them if going beyond their threshold conditions. Future work will focus on improvement of above proposed work and adding features to make a reliable smart Industrial monitoring and controlling system.

VII. REFERENCE

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