GSM BASED MONITORING AND SPEED CONTROL OF INDUCTION MOTOR WITH PWM TECHNIQE

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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 handle 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).

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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. A recent trend among customers required automation, to develop the motor varying the speed automatically in this project by using android Bluetooth. The AC induction motor is the most popular motor use in consumer and industrial application.There are various method of controlling the speed of AC motor. There are several of method is available for speed control of ac motor one of the method is two vary frequency and voltage of motor. Speed modulation of a single-phase motor is usually achieved either by some electrical means, such as reducing supply voltage by auto-transformer, or by switching windings to change the number of motor poles for different operating condition as required. Voltage control is best method, but it allows only limited speed range to be obtained.

Now frequency acts as interesting alternative to voltage control, In frequency control method when we control the frequency of the motor the air gap flux is saturate and hence to maintain the air gap flux. Therefore, the stator voltage should also be reduced in proportional to the frequency so as to maintain the air-gap flux constant. The magnitude of the stator flux is proportional to the ratio of the stator voltage and the frequency. Hence, if the ratio of voltage to frequency is kept constant, the flux remains constant. In our project the speed of the induction motor control by using GSM. We get wide range of speed in optimum output by using android application.The present world of rapid technological changes there is an urgent demand for the best quality product and services, that can achieved by automation in industries.

Android is the open source software, manufacturers can modified the operating system to suit their current need and phones. By using our mobile we can send message to control the speed and GSM modem interfaced with controller will receive the message and increase or reduce the code.

OBJECTIVES

- To develop the Microcontroller based Speed control and monitoring system.
- The Motor protection and monitoring system includes GSM modem.
- To describe the ON/OFF capability by the Microcontroller.
- The system also provides a monitoring capability which supports data storage and remote interaction with a user.
- These units properly demonstrate the over current protection, control and motoring functions of the system.
- It can avoid the faults and thefts by the over voltage and currents automatically.

II.SYSTEM CONFIGU-RATION AND CONTROL

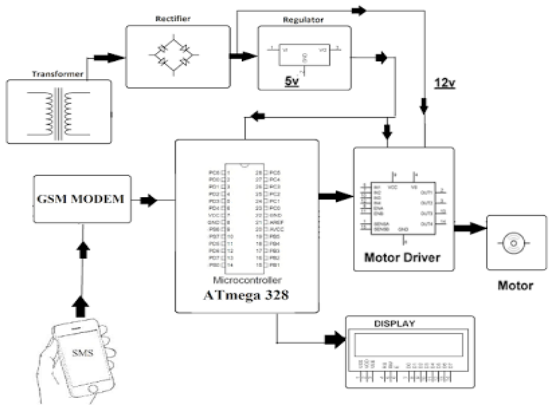


Fig: Block diagram of GSM based Induction motor speed controller

Major role of this project is to receive the SMS to speed control of motor.Initially the SMS is received from the person authorized to use this setup (destination) by the GSM modem (SIM300 MODEM) & is transferred to the microcontroller.

As shown in Figure 1.4 the wireless transference of industrial monitoring messages discussed in this paper is built on the SMS of the GSM network. Data messages produced at one end of the monitoring system are encapsulated into a short message by the gateway and sent to remote monitoring devices at another end. When a short message is received, it can be restored to its original industrial form by removing the SMS PDU head. This is also conducted by the gateway of the monitoring system. If needed, the message content can be put into Gateway. In this project we are using the GSM technology. A micro controller (also micro controller unit, MCU or µC) is a small computer on a singleintegrated circuit consisting of a relatively simple CPU combined with support functions such as a crystal oscillator, timers and microcontroller control the Induction motor. The LCD will give displays the current operation of the system. The micro controller is used to control the relay drivers depending upon.

In the project low cost,secure, ubiquitously accessible auto-configurable, remotely controlled solution for automation of different motors has been introduced. The approach discussed in the paper has achieved the target to control industrial appliances remotely using the GSM -based system satisfying user needs andrequirements.

A. IMPLEMENTATION OF PULSE WIDTH MODULATION

Figure shows a block diagram of the powerconversion unit in a PWM drive. In this type of drive,

a diode bridge rectifier provides the intermediate DC circuit voltage. In the intermediate DC circuit, the DCvoltage is filtered in a LC low-pass filter. Output frequency and voltage is controlled electronically by controlling the width of the pulses of voltage to the motor. Essentially, these techniques require switching the inverter power devices (transistors or IGBTs) on and off many times in order to generate the proper RMSvoltage.

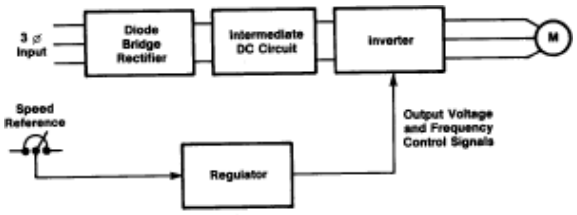


Fig: Power conversion unit PWM

This switching scheme requires a more complex regulator than the VVI. With the use of a microprocessor, these complex regulator functions are effectively handled.

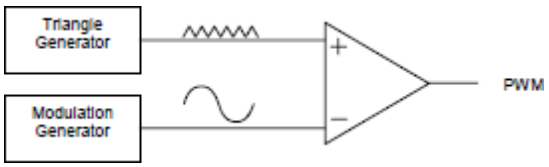


Fig :PWM generator

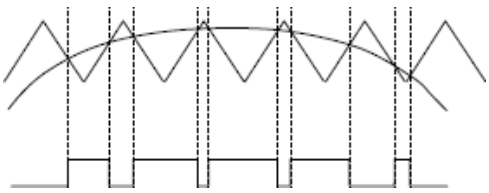


Fig:Output of PWM

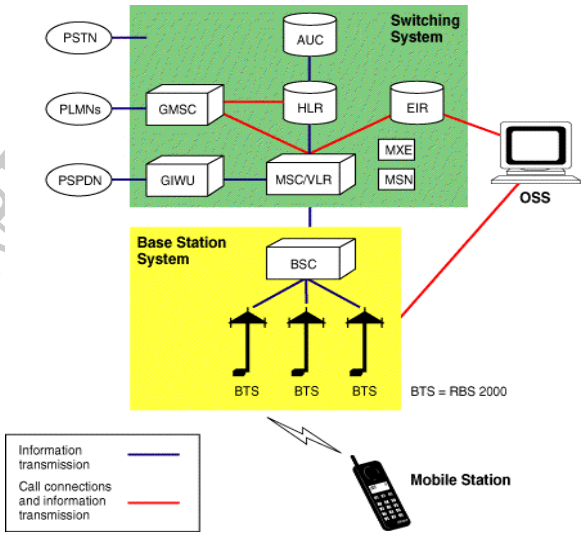
Combining a triangle wave and a sine wave produces the output voltage waveform. AC drives that use a PWM type schemes have varying levels of performance based on control algorithms. There are 4 basic types of control for AC drives today. These are Volts per Hertz, Sensor less Vector Control, Flux Vector Control, and Field Oriented Control. V/Hz control is a basic control method, providing a variable frequency drive for applications like fan and pump. It provides fair speed and torque control, at a reasonable cost.

B.GSM (Global System for Mobile communications)

GSM (Global System for Mobile communications) is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. GSM networks operate in four different frequency ranges. Most GSM networks operate in the 900 MHz or 1800 MHz bands. Some countries in the Americas use the 850 MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated.

The rarer 400 and 450 MHz frequency bands are assigned in some countries, where these frequencies were previously used for first-generation systems.

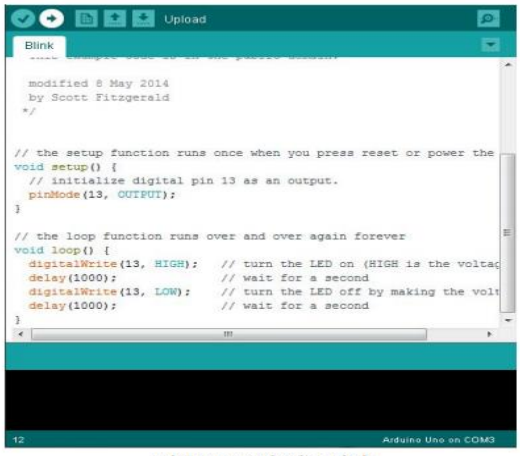
GSM-900 uses 890–915 MHz to send information from the mobile station to the base station (uplink) and 935–960 MHz for the other direction (downlink), providing 124 RF channels (channel numbers 1 to 124) spaced at 200 kHz. Duplex spacing of 45 MHz is used. In some countries the GSM-900 band has been extended to cover a larger frequency range. This 'extended GSM', E-GSM, uses 880–915 MHz (uplink) and 925–960 MHz (downlink), adding 50 channels (channel numbers 975 to 1023 and 0) to the original GSM-900 band. Time division multiplexing is used to allow eight full-rate or sixteen half-rate speech channels per radio frequency channel. There are eight radio timeslots (giving eight burst periods) grouped into what is called a TDMA frame. Half rate channels use alternate frames in the same timeslot. The channel data rate is 270.833 Kbit/s, and the frame duration is 4.615 ms.



C.SOFTWARE DESCRIPTION

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuine hardware to upload programs and communicate with them.

The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom corner of the window displays the configured board and serial port.



Arduino IDE: Uploading Blink

ADVANTAGES

- Availability more.
- We can control the device easily by sending sms and signals.
- More effective.
- Cheaper cost and easy to exchange.

APPLICATIONS

- Utilized for Irrigation purpose.
- No need of manual check for moisture level in soil.
- Multiple remote data collection point.
- Machine to machine Ecofree system.

III.CONCLUSION

The project proposes a new technique for speed control of Induction motor. In this project the speed control of Induction motor is done by varying the duty ratio of the H-Bridge Motor Driver.Conventional methods are reliable and accurate but these methods involve complex circuitry and control. Even though conventional methods are used for speed control. This method provides smooth control technique for speed control even up to rotor standstill position with less power dissipation, simple circuitry easy control with low cost.

Need for effective speed control of Inductionmotor has become an important scenario in recent years for implementing mobile robots and robotic arms etc. Hence the proposed technique for speed 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 speed control and direction control of Induction motor.

This technique of programming Arduino, eliminated the use conventional GSMfor Arduino. External mode in Simulink provided a great opportunity to log real time data and change parameters of real time system.

IV.REFERENCES

- Masayuki Morimoto, Kiyotaka Sumito, Shinji Sato, Katsumi Oshitani, Shigeru Okuma" High Efficiency, Unity Power Factor VVVF Drive System Of An Induction Motor" IEEE Transactions On Power Electronics. Vol 6.No.3.July 1991
- Rodolfo Echavada, Sergio Horta, Marc0 Oliver, "A Three Phase Motor Drive Using IGBT"S And Constant V/F Speed Control With Slip Regulation", 0-7803-3071-4/95 1995 IEEE
- Alfredo, Thomas A. Lipo And Donald W. Novotny, "A New Induction Motor V/F Control Method Capable Of High-Performance Regulation At Lowspeeds" IEEE Trans. Industry Applications, Vol. 34, No. 4 July/ August 1998.
- Rashid M.H, Power Electronics-Circuits, Devices And Applications", Third Edition Printice Hallindia, 2001.
- Lu, Willie W, Open Wireless Architecture and Enhanced Performance, Guest Editorial, IEEE Communication Magazine, June 2003.
- Thida Win, Nang Sabai, and Hnin Nandar Maung"Analysis of variable frequency three phase induction motor drive". World academy of science, Engineering and technology 2008.
- B. Biswas, S. Das, P. Purkait, M. S. Mandal And D. Mitra," Current Harmonic Analysis Of Inverter-Fed Induction Motor Drive System Under Fault conditions", International Conference Of Engineers And Computer Scientists 2009 Vol II IMECS 2009.
- Ku. Trupti Deoram Tembhekar "A constant v/f open loop and closed loop speed control of a threephase induction motordrive".