Speed Control of AC Motor

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Abstract: An enormous number of motors have been using in our daily life ranging from home appliances to industrial machinery. During the last decade, there has been tremendous change industry automation and home automation. Electric motor is always the essential part in home appliances as well as industrial applications in the automation. There is always a need to control the speed of the motor to run the appliances smoothly. Other important part of the appliances is the microcontroller. Microcontroller is always the essential part in all the embedded system applications because of its economical price and easy to customize to any specific need. Electronic devices like thyristors, diodes have been widely used in industrial applications to control the speed of the motor The Objective of this paper is to control the induction motor speed by using triac and zero crossing detector. Usually in many industrial applications speed varying is important to run the process in different stages, this paper demonstrates the mechanism of varying the speed of the AC Motor. The circuit is equipped with microcontroller and the induction motor. Induction motor is controlled by using triac and zero crossing detector by controlling the pulses of input AC signal. Microcontroller input is connected with two input modules that is one increment switch and one decrement switch. Increment switch is used to increase the speed of motor by varying in steps that is already dumped the code in microcontroller and also same for decrement switch. An LCS screen has been used to display the speed of the motor. Touch screen is used to operate the motor.

Keywords: Microcontroller, LCD screen, Rectifier, PWM, Embedded systems, AC Motor, Triac, Zero Crossing detector.

I. INTRODUCTION

The Objective of this paper is, controlling the AC Motor speed by using Microcontroller interfaces with touch screen and the speed displayed on LCD. By using a Pulse Width Modulation method, the motor speed will be controlled from 0% - 100%. If the motor crosses predefined threshold level, system alerts the user with a buzzer alarm. Automation is the widely used term in the electronics field. The research on automation has fetched many developments in the prevailing technologies. Touch screen sensor is one among those technologies, which had tremendous developments. Touch screen haven been using in almost all the embedded applications due to its user-friendly interface. Devices with Touch screen functionality can operate very easily by anyone without much technical knowledge and any assistance from a technician. The contact-less speed measurement method is used to measure the motor. PWM method is used to control

Revised Manuscript Received on August 05, 2020.
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the motor speed. By operating the touch screen, user can control the motor speed. The direction of the motor can also be controlled by operating the touch screen. Microcontroller is the control device for the total system. The Microcontroller receives input from touch screen sensor and operates consequently on the motor speed. IR module sends the speed of motor to Microcontroller, which displays it on LCD screen. Whenever the speed crosses the set threshold level, the controller takes the accountability of alarming the buzzer to alert the user. The Microcontroller used in the paper has been programmed using Embedded C language.

II. OVERVIEW

Embedded system, an amalgamation of software and hardware to accomplish a committed task. Some of the main components used in embedded systems are Microprocessors or Microcontrollers. Microprocessors called as general-purpose processors, as they solely receive the inputs, process it and deliver the output. In difference, a microcontroller not only receives the data as input but also handles it, communicates the data with multiple interface devices, controls processed data and thus finally provides result. This paper "Speed monitoring of AC induction motor" using PIC16F876, PIC16F72 microcontroller is an exclusive paper which has object such that home appliances can be controlled by using a touch screen sensor interface. Objective of this paper can also use, to control home appliances like fans, lights, auto washing machines, many more electrical devices and day-to-day life, by interfacing the touch screen sensor hence manual switching mechanism has been eliminated and we can operate any home appliance just by a gentle touch on touch screen sensor.

III. PROPOSED SYSTEM

This paper endeavors a new speed control procedure of single phase AC induction motor. It is available at economical cost; with high efficiency, this drive is proficient of supplying a single-phase induction motor with PWM modulated sinusoidal voltage output. An ARDUINO family Microcontroller is used to control the circuit operation .The device is a substitute for frequently used TRIAC phase angle, control drives. The circuit is capable of supplying single-phase induction motor with inductive or resistive load and with variable AC voltages. It is comparable to TRIAC control, the voltage applied to the load can be changed from minimum to maximum value. Furthermore, a PWM technique has been used and it can be compared with phase angle control, which will be used for TRIAC, which produces considerably low higher order harmonics.

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Since the circuit, aimed at economical cost, medium powered applications, to get the output voltage waveform; it may not need any conservative converter topology . It can modulate mains AC voltage. As related with expensive converter, it needs low in number of active and passive power components. The device endeavored here takes advantage of, economical cost of the phase angle control and the low harmonic content with higher efficiency, which have standard converter topology. The drive accompanies MOSFET with PWM control and load in series with bridge rectifier. This control drive based on this recommended control procedure can be used in consumer as well as industrial products like fans, blowers, and washing machines etc.
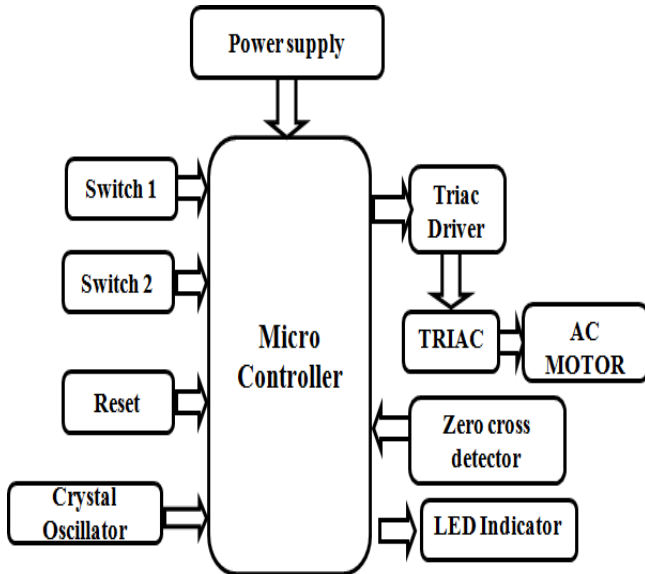

Fig 1 :Microcontroller

IV. CIRCUIT DIAGRAM

The schematic diagram and interfacing of PIC16F876, PIC16F72 microcontroller.
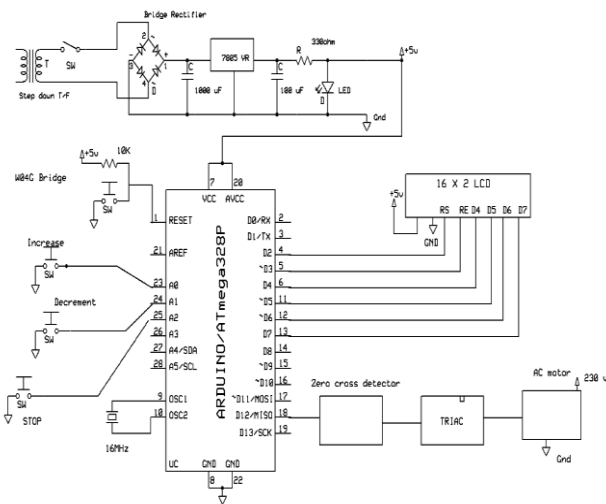

Fig 2 : Interfacing Diagram

The circuit works on the principle of pwm technique for speed control of an induction motor. When we want to increase or decrease the motor this project will be more useful. First to increase the motor increment switch is turned on and it can vary in steps and also when the user want to decrement the speed of motor, decrement switch will be turned on. Both

these switches are provided on left of the microcontroller through pins. These speeds are controlled by using TRIAC and Zero Crossing detector connected to the circuit between the microcontroller and the induction motor. Ie The triac will control the pulses of the Ac supply input by using the microcontroller input signal and also zero crossing detector. Advantages And Disadvantages

A. Advantages:

1. This system eliminates electrical shocks when manual switching mechanism Is used.
2. The electrical appliances can be switched ON/OFF just by a gentle touch.
3. Visual and audible alerts using LCD and buzzer
4. Efficient and economical design.
5. Consume less power.
6. Quick response.
7. High voltage devices can also be operated.

B. B. Disadvantages:

1. Touch screen need to be handled carefully.
2. Interfacing Touch screen to Microcontroller is difficult
   "Float over text" should *not* be selected.

V. RESULTS

The project " Speed monitoring of AC induction motor" was designed such that controlling the AC Motor speed by using Microcontroller interfaces with touch screen and the speed displayed on LCD

VI. CONCLUSION

Speed control of the induction motors is one of the most trending topics nowadays, through this paper we found a new method controlling the speed by frequency variation of the induction motor by using Arduino Uno, this method shows a smooth control of the speed through control the output frequency by setting a code wrote in Arduino Uno coding language. This code will control the whole operation by changing the Arduino output voltage and this will change the output frequency and voltage of the inverter and as a result the speed of the induction motor will be changed, setting a specific time for each speed, the code can be modified easily to get the desired speeds for different applications, it's an efficient method through the following facts, its consume less power as Arduino can operate by connecting 9V battery only,

the scheme can be upgraded to connect Ethernet shield to control the operation from distant area.

FUTURE SCOPE

Our project "Speed monitoring of AC induction motor" is mainly intended controlling the AC Motor speed by using Microcontroller interfaces with touch screen and the speed displayed on LCD. The input is given by the user using touch screen to micro controller which in turn operates the AC motor speed. The input value from the touch screen to the micro controller will be checked and respective operation of that press will be performed like increasing or decreasing the speed of the AC motor. system can be extended by using wireless Zigbee technology to operate the devices from longer distances.

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