

Protection And Monitoring of Single Phase Induction Motor With RPM Detector

Patil Dattraj N.
Department of Electrical
Engineering
Universal College of Engineering
and Research, Pune, India

Khatal Hanmant D
Department of Electrical
Engineering
Universal College of Engineering
and Research, Pune, India

Kumbhar Vikram R
Department of Electrical
Engineering
Universal College of Engineering
and Research, Pune, India

Gire Ganesh S.
Department of Electrical
Engineering
Universal College of Engineering
and Research, Pune, India

Ms. Chivate A.S
Asst.Professor.
Department of Electrical
Engineering
Universal College of Engineering
and Research, Pune, India

ABSTRACT

This paper is based on automatic protection and speed control of single phase induction motor with variation of ambient temperature. Induction motor are used in many industrial application or home appliances. The main purpose of our paper is to protect the induction motor. When the induction motor temperature is increased above the set value then the induction motor is immediately stop and the motor will restart again when the motor temperature comes down to the normal temperature. There are different components of fault identification and protection of induction motor such as Timer, Contactor, Relays, Current Transformer and Potential Transformer etc. The system eliminates the need of manual measurement of speed with the help of tachometer there continuous measurement of speed through RPM detector and this measured reading display on LCD.

Keywords— PIC18F877A, Monitoring, IR sensor, Relay, LM35.)

1. INTRODUCTION

There are a wide range of AC motors and motor characteristics in existence, because of the numerous duties for which they are used. Induction Motors are generally utilized as a part of industry due to their rigidity and speed control flexibility. Induction motor is the backbone for every industry. In the case of motor overheating LM sensor is used which sense the temperature of winding if it is exceed the specified limit then once again motor fails to start. Induction motor is most widely used motor. It requires least maintenance as compared to other electrical motors. The main objective of the work is to make a cheap and reliable protection system for three phase induction motor system. The protection system should protect the system from voltage unbalancing, under voltage, overvoltage and thermal protection. All motors need protection, but fortunately the more fundamental problems affecting the choice of protection

are independent of the type of motor and the type of load to which it is connected.

2. LITERATURE SURVEY

All the faults occurs in single phase induction motor have been analyzed The faults are likely to happen are overvoltage, under voltage, load faults . Advanced signal processing technique have been used detect fault. Physical parameters like temperature, Speed, torque & direction measured using sensors . All these parameter are vital in checking the proper working of the motor. Protection is very important for any system. In last passed years many techniques for protecting induction motor developed. In over voltage protection system of single phase induction motor protects the motor from over voltage, the voltage which is more than rated voltage. In under voltage protection of single phase IM feeds the protection from the under voltage.

3. BLOCK DIAGRAM

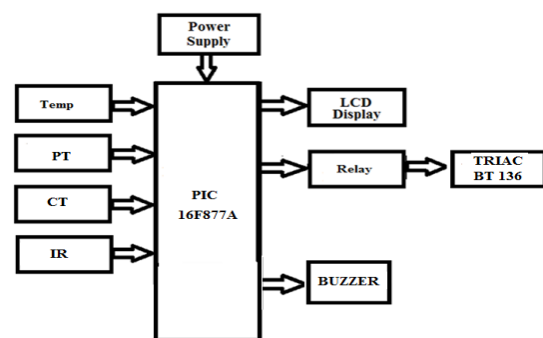


Fig.No.1 Block Diagram of waste management system.

The below figure shows the block diagram of waste management system. The Block diagram consist of PIC18F4520, water sensor, soil sensor, humidity sensor, temp.sensor and water pumping Motor,relay_1/2/3,lcd display, power supplies in 24 v dc and 12 v dc and 5 v dc supply.

3.1 Block Diagram Description

3.1.1 PIC 16F877A

PIC is a family of microcontroller made by MICROCHIP Technology. The first part of the family where available in 1976.The Hardware capabilities of PIC devices range from 6-pin SMD, 8-pin DIP Chips up to 100-pin SMD chips, with discrete I/O pins, ADC and DAC modules, and communications ports such as UART,I2C, CAN, and even USB. Low power and high-speed variations exists for many types.

3.1.2 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16 X 2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16 x 2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5 x 7 pixel matrix. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

3.1.3 Power Supply

It is mainly used to provide DC voltage to the components on board. It supply 12V for DC motor, 3.3V for microcontroller and 5V for others. Either the 900 MHz or 1800 MHz frequency band.

3.1.4 IR Sensor

This is the most fundamental type of sensor available in the market. The basic concept is simple. There is an emitter which emits infrared (IR) rays. These IR rays are detected by a detector. This concept is used to make proximity sensor (to check if something obstructs the path or not, etc), contrast sensors (used to detect contrast difference between black and white, like in line follower robots), etc. The circuit diagram of a basic IR sensor is given below. So even you can make one by yourself.

3.1.5 LM35

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of $\pm 1/4^{\circ}\text{C}$ at room temperature and $\pm 3/4^{\circ}\text{C}$ over a full -55°C to 150°C temperature range.

4. PROTOTYPE MODEL

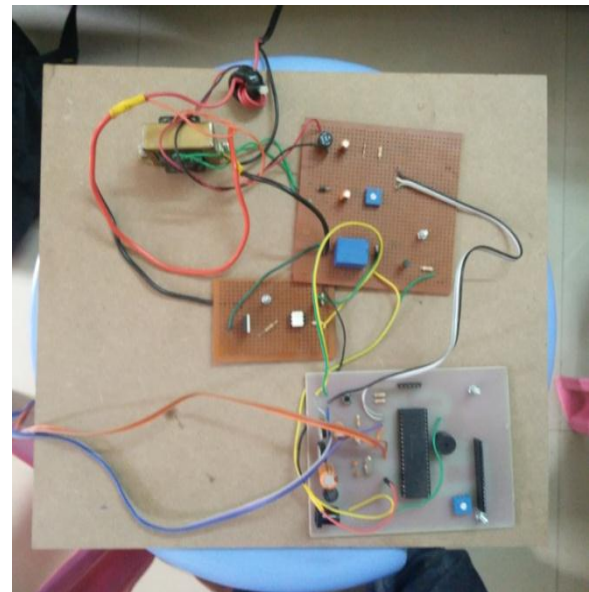


Fig.No.2 Prototype Model

5. CONCLUSION

Taking into account the various research papers discussed so far we conclude that an induction machine supports various faults during its operation like over voltage, over current, over temperature, over speed, inrush current etc. And this fault needs to be quickly detected so that the induction motor is protected from getting damaged. Various fault detection methods discussed with their corresponding advantages and limitations.

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