

## Fault Detection and Protection of Single Phase Induction Motor

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**Abstract** — Objective of this paper is to see flaws of single stage IM and control. By prudence of various reasons single stage insistence motor may experience diverse starting issues. It's essential to shield motors from such faults. The various lacks are over-voltage, under-current, under-voltage, under-current, over-bother, over-temperature, etc. So indentify such charges most monster parameters are voltage, current and temperature. Here single stage attestation motor is guaranteed using advanced microcontroller AVR ATMEGA16. For this the variable potentiometer is associated over the apparatus by which we can contrast the voltage of the motor. In case motor goes past certain temperature the motor may be routinely turn off using temperature sensor LM35.

**Keywords:** *Microcontroller AVR atMega16, IM (Induction Motor)*

### I. INTRODUCTION

Various motors are used in family unit sorts of device and Industrial machine contraptions. Electric motors are basic and key to various affiliations. These motors perform wide going limits as required. Selection Motors are used for robotization, devices, insistence control; since they are striking, strong and extreme. Assertion Motor continues running at surveyed speed when control is supplies at grasped detail, at any rate factor speed is required by various applications for their exercises. Various sorts of AC selection motors are open in market. Different applications use different motors as indicated by essentials. An AC enrollment motors are less bewildering to structure than DC motors. Enrollment motors are strong yet they are acquainted with undesirable nerves which causes issues achieving lower adequacy or dissatisfactions. Misguided game plan, shortcircuits or over the top weight prompts these electrically related flaws. Because of assembled goof or trademark happening events further adds to this. Checking of an insistence motors is a creation improvement for assertion of beginning flaws and to swear off amazing dissatisfaction of a mechanical framework. In any case liberal, regardless slanted to dissatisfaction, achieving solitary time which may wrap up being in all regards over the top [2]. Everything thought about starting late, condition seeing of electrical machines has gotten increasingly essential affirmation. Control of parameters like

current, voltage, weight and temperature is ended up being significant for the soundness of insistence motor. In light of issues in such parameters can be hurting to assertion motor. Checking structures in IMs uses a mix of mechanical and electrical contraptions, for instance, stream/voltage exchanges, timekeepers, contactors, etc. These real frameworks join some mechanical pivotal bits of the rigging which can cause issue in course of advancement decreasing life and limit of structure. Basically PC based confirmation structure and PLC based system has been appeared yet they in like manner have their restriction like easy to cutting edge change module cost, etc. Structures subject to chip for protection are developed yet they need control movement, only introduction on screen and ringer is available [1].

### II. THE SYSTEM STRUCTURE

#### A. If all else fails System Architecture

Plan objectives are blemishes insistence by then watching and controlling motor. Pick the point of convergence of past what many would consider potential estimations of voltage, current, speed, temperature. In the long run gotten focal point of past what many would consider possible estimation of these parameters are overviewed and are investigated on persistent reason. Transformer is used to wander down 230V AC gained from the supply into 12V AC. The stage rectifier used to change over 12V AC into DC. Voltage controller is used to reduce swells in dc

for instance unadulterated DC grabbed which is genuine for microcontroller. Using microcontroller programming and hand-off, out of range parameters can be seen, in this manner we can shield the motor from insufficiencies. Here we use current sensor for current estimation. LM35 is used for temperature estimation and potentiometer for voltage estimation [3].

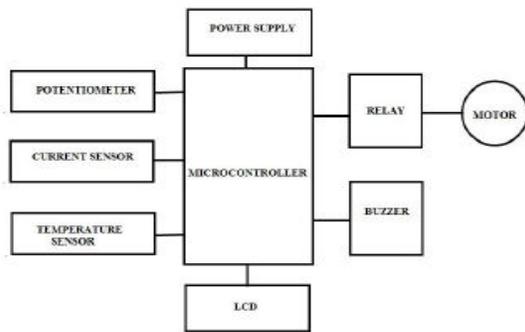


Figure 1. System architecture

The whole structure can be isolated two domains. Beginning part bases on rectifier and little scale controller. Second part pivots around estimation of motor of parameters like current, voltage and temperature. Heart of system is AVRatMega16. Using microcontroller, basic parameters are changed over into motorized.

### III. THE HARDWARE DESIGN

#### A. Single Phase Induction Motor and Relay

Here submersible single stage split stage certification motor of rating 18 watt, which is to be guaranteed. An exchange is an electrically worked switch. Right when current courses through piece of exchange, makes an engaging field which pulls in a switch and changes the switch contacts. Hand-off working here is SPDT (single post twofold toss), which has 5V DC rating.

#### B. Power supply

Power supply gear is needed to get the arranged power supply with the objective that the little scale controller can't be hurt.

5V DC is required for sensible movement of the cut back scale controller. A 50Hz, 230V Single stage AC control supply is given to a phase down transformer to get 12V supply. Stage Rectifier is used to change

over this voltage to DC voltage. To get obvious 5v supply, 2200uf capacitor channels the changed over throbbing DC voltage and a brief time span later given to LM7805 voltage controller.

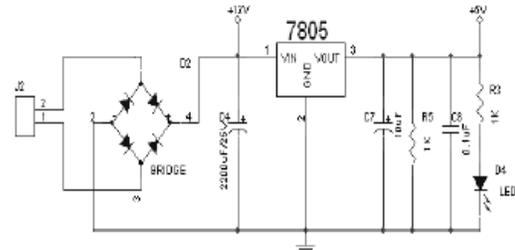


Figure 2. Power supply

#### C. MICROCONTROLLER AVR Atmega16

AVR ATmega16 has 1 kb RAM and 16KB Flash RAM which has 4 ports expressly PORT A, PORT B, PORT C and PORT D. The little scale controller sees or gives out data using these ports. It works at 5V, outmaneuvering this voltage at power supply may comprehend depleting of the IC. It is heart of the structure; clear signs got from different sensors are changed over into cutting edge.

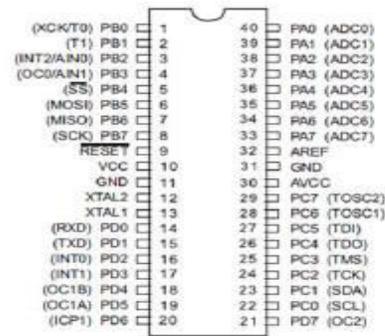


Figure 3. Pin Configuration

#### D. Current sensor

High present affectability of 1 mV/mA with wide working voltage extend 3V ~ 12V, WCS2702 gives exact response for both DC and AC current seeing in system. It gives clear standard with respect to current, gave IM which Microcontroller use to pick the status. Correctly when related current experiences this conduction way, it makes an enchanting field and convert into a relative voltage.



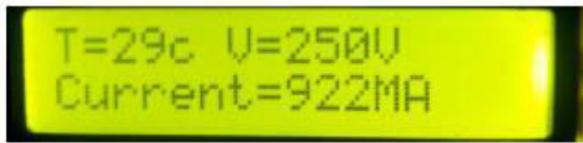


Figure 9. Voltage is above 230V

### C. Current

In the occasion that present of motor is under 750mA, by then need under current is seen and motor quit running and flag alarms

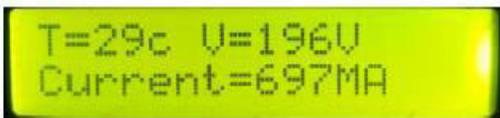


Figure 10. Current is below 750mA

If present of motor is more than 1000mA, by then insufficiency over current is perceived and motor quit running and ringer alerts starts.



Figure 11. Current is above 1000mA

### D. Normal Operation of Motor

Decisively when all parameters are inside recommended go.

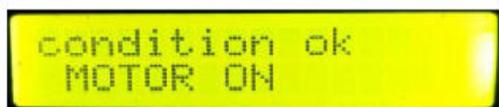


Figure 12. Condition ok LCD Display

### V. CONCLUSION

From the above structure we can see and control the requirements (over-voltage/current, under-voltage/current, overtemperature) of single stage assertion motor. To achieve above reason we use AVR ATmega16 cut back scale controller.

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