Innovative Journal for Opportunities and Development in Science & Technology,
Volume 4, Issue 2, March. 2024
Paper Id: – IJ2023V4I2 -6 A-E
ISSN 2582-6026

INDUCTION MOTOR CONTROLLER AND PROTECTION SYSTEM

[1]Khandekar Rushikesh Anna, [2]Jadhav Sachin Raosaheb, [3]Sonavane Akash Kakasaheb [4]Wakchaure Sanket Ranjandas, [5]Bodhare T. S.

[1]UG Scholar, Electrical Engineering, M.I.T Polytechnic, Dhanore, Yeola.
[2]UG Scholar Electrical Engineering, M.I.T Polytechnic, Dhanore, Yeola.
[3]UG Scholar Electrical EngineeringM.I.T Polytechnic, Dhanore, Yeola.
[4]UG Scholar Electrical Engineering, M.I.T Polytechnic, Dhanore, Yeola.
[5]Asst.Prof., Dept. of Electrical Engineering, M.I.T Polytechnic, Dhanore, Yeola.

ABSTRACT- The fundamental and durable structures of induction motor, as well as their low manufacturing cost, make them popular components in a wide range of current applications. Providing a safety net for Workers are essential for businesses.Ensuring the safety of industrial motors, lift motors, pumps, and other equi pment is the driving force behind improvement.The main objective of an induction motor is to safeguard it from several challenges, including single phasing and overheating.One of the main reasons this problem has arisen is the need to provide security for industrial motors, pumps, lift motors, and other devices of a similar nature.The motor immediately stops if any one of the three phases is absent or if the motor temperature rises above the set t hreshold.The system's three-phase power supply is linked to three one-stage transformers.
If there is a phase available, the transformer circuit will lose power.Relays can be used to turn off motors by pro viding a signal to thepole contactor. As a result, the motor's three-phase power supply has been cut off. Temperature readings are taken from a thermistor (DHT22) that is attached to the motor. At higher temperatures, the three-phase supply will be cut off by a four-pole contactor, and the motor will shut off. This manuscript resolves the uses transformers to solve the problem of single phasing. Also, our project addresses the issue by using microcontroller. It senses all the three phases and decides whether to supply power to induction motor or to disconnect. It deals with the temperature problem, and it uses a thermistor to disconnect the circuitry, whereas in our project, a microcontroller senses the overwhelming temperature and acts accordingly, i.e., give a signal and then move towards disconnection.

I. INTRODUCTION

It is the most often used kind of electric motor in the majority of applications.Its lower synchronous speed has led to it being called an induction motor.The magnetic field is created when a spinning machine rotates at a constant s peed; the magnetic field's strength is determined by the frequency and number of poles.An induction motor's rotati onal speed is always slower than a synchronous motor's because of the stator's rotating magnetic field, which oppo ses the rotor's magnetic flux.The stator current of the rotor never gets close to the synchronous speed, which is the

speed at which the rotor's magnetic field rotates. An induction motor's output power supply determines which type of induction motor it is. Single-phase and three-phase induction motors are among them. Neither single-phase nor three-phase induction motors can be considered autostarting. Double excitations are required to run a machine in the majority of cases. In a DC motor, for example, the stator receives one power supply and the rotor receives another power supply via under the brush arrangement.

II. METHODOLOGY

This system uses the esp32 as its primary controlling board.The esp32 is linked to all of the sensors and control circuitry.The motor's temperature is monitored via a thermometer.Attached to esp32 is its output.To measure vi brations in the motor, a vibration sensor is employed.Attached to esp32 is its output.To measure how much the motor shaft rotates, a rotary encoder is utilised.Connected to esp32 is its output.Send and receive commands an d data by using this mechanism to communicate with the controller.
To control the motor's speed, a motor driver is utilised.

III. BLOCK DIAGRAM

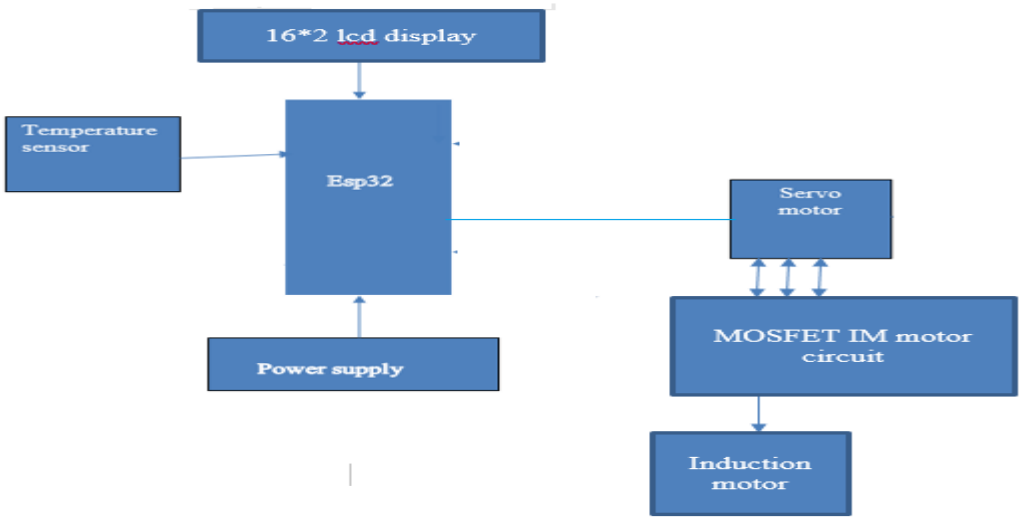

Fig.1- Block Diagram

B. Hardware Implementation

MICRO-CONTROLLER UNIT: The heart of the whole project is the Micro-controller unit. For this project the ESP32 Micro-controller was used. It is a low power general purpose micro-controller with good processing speed, small physical dimension, that is durable and cheap.it having in built wifi and Bluetooth.

In above diagram as we see that the all the components is communicate with the esp32 microcontroller it is the heart of our system and hence the all the devices input and output is attached with the controller . We use ir sensor for detecting any faults in railway track..the overall system communicate with the controller which sense the input coming from the sensor and send this output to the relay .

2) LCD DISPLAY: it display the all the parameter of the process which indicates the temperature of the induction motor ,also the rotation and speed of induction motor.

*3) TEMPERATURE SENSOR :*We use temperature sensor for detecting increase in temperature in motor .

4) THE POWER SUPPLY UNIT: Now days, almost all electronic equipment includes a circuit that converts ac supply into dc supply. The part of equipment that converts ac into dc is called DC power supply. In general at the input of the power supply there is a power transformer. It is followed by a rectifier (a diode circuit) 1a smoothing filter and then by a voltage regulator circuit.Here In our system we were design a 5v and 12v power supply for our electronic device .

*5) 5v relay:*it is using for the switching purpose to control the speed of induction motor.
6) servo motor : the motor is use for the controlling of speed of motor with potentiometer.

IV. CONCLUSIONS

By establishing the hardware interface for Android Bluetooth speed control of induction motors, it is possible to regulate the speed of single-phase induction motors.
The need for gadgets that can operate remotely is growing.Every piece of hardware reacts and follows software commands. The project is now operational.

REFERENCES

[1] W. H. Kersting, “Causes and effects of single-phasing induction motors,” IEEE Transactions on Industry Applications, vol. 41, no. 6, pp. 1499–1505, 2005.
[2] P. E. Sutherland and T. A. Short, “Effect of single-phase reclosing on industrial loads,” in Conference Record of the 2006 IEEE Industry Applications Conference Forty-First IAS Annual Meeting, vol. 5, pp. 2636–2644, Tampa, FL, 8-12 Oct. 2006.
[3] M. Sudha and P. Anbalgan, “A novel protecting method for induction motor against faults due to voltage unbalance and single phasing,” in IECON 2007 - 33rd Annual Conference of the IEEE Industrial Electronics Society, pp. 1144–1148, Taipei, 2007.

[4] P. Pillay, P. Hofmann, and M. Manyage, "Derating of induction motors operating with a combination of unbalanced voltages and over or undervoltages," IEEE Transactions on Energy Conversion, vol. 17, no. 4, pp. 485–491, 2002.

[5] J. Faiz, H. Ebrahimpour, and P. Pillay, "Influence of unbalanced voltage on the steady-state performance of a threephase squirrel-cage induction motor," IEEE Transactions on Energy Conversion, vol. 19, no. 4, pp. 657–662, 2004.

[6] A. Javed and T. Izhar, "An improved method for the detection of phase failure faults in poly phase Induction machines," in 2009 Third International Conference on Electrical Engineering, pp. 1–6, Lahore, 9-11 April 2009.

[7]S. Chattopadhyay, A. Chattopadhyaya, and S. Sengupta, "Analysis of stator current of induction motor used in transport system at single phasing by measuring phase angle, symmetrical components, skewness, kurtosis and harmonic distortion in park plane," IET Electrical Systems in Transportation, vol. 4, no. 1, pp. 1–8, 2014.

[8] C.-Y. Lee, "Effects of unbalanced voltage on the operation performance of a three-phase induction motor," IEEE Transactions on Energy Conversion, vol. 14, no. 2, pp. 202–208, 1999.

[9] D. L. Ransom and R. Hamilton, "Extending motor life with updated thermal model overload protection," IEEE Transactions on Industry Application, vol. 49, no. 6, pp. 2471–2477, 2013.

[10] G. C. Stone, M. Sasic, D. Dunn, and I. Culbert, "Recent problems experienced with motor and generator windings," in 2009 Record of Conference Papers - Industry Applications Society 56th Annual Petroleum and Chemical Industry Conference, pp. 1–9, Anaheim, CA USA, 14-16 Sept. 2009.

[11] M. Cunkas, R. Akkaya, and A. Ozturk, "Protection of AC motors by means of microcontrollers,"in 2000 10th Mediterranean Electrotechnical Conference. Information Technology and Electrotechnology for the Mediterranean Countries. Proceedings. MeleCon 2000 (Cat. No.00CH37099), vol. 3, pp. 1093– 1096, Lemesos, Cyprus, May 2000.