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# INDUCTION MOTOR AND CONTROLLER AND PROTECTION SYSTEM

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## 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 equipment 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 threshold. 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 the pole 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, Le. give a signal and then move towards disconnection.

**Keywords:** Induction Motor, Lift Motors, Pumps, Microcontroller, Transformers.

## 1. 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.

## 2. 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.

## 3. OBJECTIVE

### A. Primary Objective

1. Prevent Motor Damage: Protect the induction motor from damage caused by electrical faults, overheating, and other adverse conditions.
2. Ensure Personnel Safety: Prevent electricalshocks, arc flashes, and other safety hazards that can harm personnel.
3. Minimize Downtime: Reduce motordowntime and increase overall system reliability quickly detecting and

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responding to faults.

4. Improve Motor Efficiency: Optimize motor performance and reduce energy Consumption.

**B. Secondary Objective**

1. Improve Motor Efficiency: Optimize motor performance and reduce energy consumption by monitoring and controlling motor operating conditionstive
2. Extend Motor Life: Prolong motor life by preventing overheating, overloading, and other conditions that can reduce motor lifespan.

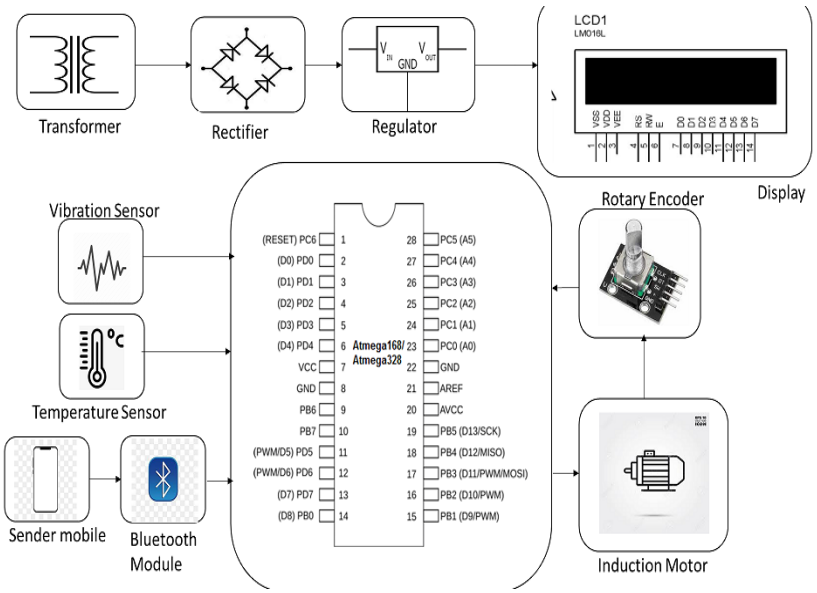
## 4. ADVANTAGE OF ENERGY EFFICIENT MOTORS

1. Reduce running cost
2. Less Heat losses
3. Extended winding lifespan
4. Lower waste heat output
5. Long insulation and bearing life's
6. Optimized and uniform air gap between stator and rotor.
7. Minute maintenance, longer warranties, low failure rates.

## 5. COMPONENTS

1. Atmega 328 Microcontroller
2. Encoder Sensor
3. Temperature Sensor
4. Vibration Sensor
5. Induction Motor
6. Switch Buttons
7. Status LED's
8. Transformer
9. Regulatory Circuitry
10. PCB Board
11. Resistors
12. Capacitors
13. Transistors
14. Cables and Connectors
15. Grid Poles
16. Screws and Bolts

## 6. BLOCK DIAGRAM



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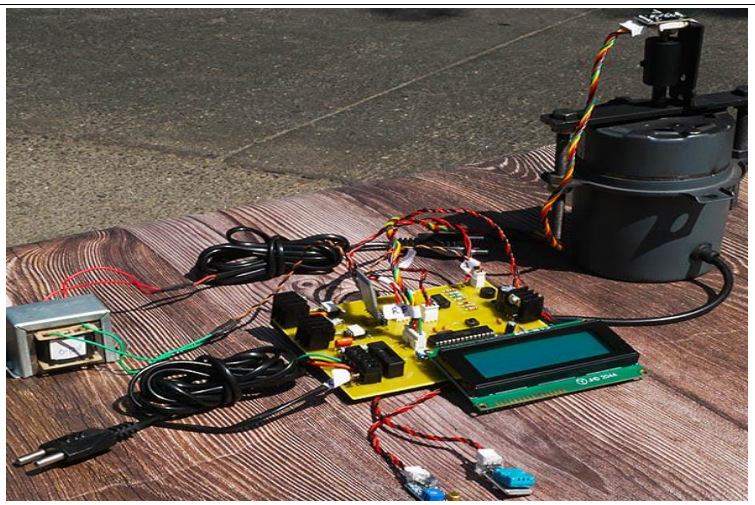

## 7. ADVANTAGES

1. Improved Motor Reliability
2. Increased Energy Efficiency
3. Electrical Shock Prevention
4. Reduced Risk of Fire
5. Reduced Maintenance Costs

## 8. FUTURE SCOPE

A. Emerging Trends

1. IoT Integration: Integrate the protection system with loT devices for Real time and monitoring and control.
2. Artificial Intelligence (AI) and Machine Learning (ML): Implement Al and ML algorithms for predictive maintenance, fault detection, and optimized motor performance.

3. Cloud-Based Services: Offer cloud-based services for monitoring data analytics, and software updates.

Advanced Protection Features

1. Advanced Fault Detection: Implement advanced fault detection technic. such as wavelet analysis and signal processing.

2. Prevent overheating and reduce downtime. Downtime

## 9. CONCLUSION

In this Paper the Induction Motor Controlled Protection System is a comprehensive solution designed to protect induction motors from various faults and abnormalities. The system utilizes advanced technologies, such as current transformers, potential transformers, and programmable logic controllers, to monitor and control the motor's operating conditions. 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. follows software commands. The project is now operational.

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