Research Article

IOT-BASED INDUCTION MOTOR PROTECTION SYSTEM

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Abstract: The main aim of the paper is to process the time data acquisition under the supervisory physical parameter of a power induction motor. In industries the heavy capacity induction motors are used. Therefore, it has essential to observe all the processes and control the factors affecting them. Adapting a technology like an internet of things one can do the objective effectively, and thus record and the control is obvious than the manpower or existing one.

Keywords: Internet of Things , IOT , Induction Motor, TRIAC, Arduino. Voltage, Current.

INTRODUCTION

The main objective is to extend the reliability of the motor application by using the recent technology advancement. This work makes sure the continuous monitoring of induction motor. By ensuring the system reliability abnormality are easily identified and simply rectified. As induction machine are used nearly 90% in industries, the economic data monitoring is required. The productivity of industries may be increased by doing the preventive maintenance of induction machine. By taking fortification the failure of system and value of mental attitude power motor is protected. The main goal of the server is to provide fast and relevant information about the real word objective and application.

Machines systems are preferred driven by electric motors in today's developing industries. AC Because of the simplerotor structure, induction motors are low-cost and need lit- tle maintenance. Induction motors also have a high power factor, are small and compact, are durable, and are less expensive. An induction motor offers the advantages of superior speed control, long-term overload capacity, and strong beginning torque. As a result, induction

motors are employed in industries, crane elevators, residential, and farm motors.

The Internet of Things (IOT) has received much attention as a technology that has accelerated current wireless com- munication innovations. For the most part, it has a lot of advantages. The Internet of Things (IoT) is lending a hand in achieving industrial automation via remote access. IoT devices that make up a system can connect with other devices on the Commman platform. As a result of this sys- tem, important data and numerous other parameters infor- mation are exchanged across devices in order to optimise their performance. This prototype exhibited IOT-based In- duction motor monitoring parameters such as voltage, cur- rent, and speed using a senser and cloud, and managing thespeed of the induction motor using TRIAC control sinceits speed can be readily changed by altering the supply voltage. The project's major goal is to develop a low-cost, effective protection system for induction motors. The pro- tective system should guard against undervoltage and overvoltage. The sustainability of production in industries can be maintained by continuously monitoring the parame-ters, and the production of industry may be improved by using more efficient motors. Detect any problems that oc- cur in the induction motor.

SYSTEM DESIGN

In this circuit for microcontroller and sensor a 5V DC, and 12V transformer is used to step down 230V to 12V and rectified with (1N4007 diode) centred tap rectifier with capacitor filter of 1000uf; output is DC 12V-14V in step with transformer ratings. The battery output is given to the Arduino board, which is required to convert in 5V regulated for microcontroller and other devices, here we've got used LM7805 regulator for getting 5V regulated DC. For motor driver it's separately accustomed cancel loading effect. In this Arduino board (atmega328 28 pin microcontroller) works with 16MHz frequency used for (timer configuration), the unwanted frequency produced is bypassed by the capacitor of 27pf capacitor. 6 channels 10 bit inbuilt ADC available, 6 PWM pins available, multiple serial communication available, up to twenty programmable pins available.Atmega328 microcontroller pins 14, 15, 16, 17, 18, 19 are connected to LCD respectively. LCD shows text as our programming conditions. Like dam level is 25% etc. Microcontroller input temperature sensor is connected with A0, voltage sensor to A1 phase sensor to A2 and current sensor to A3 (current transformer), Wi-Fi modem is connected to pins of microcontroller to TX and Rx pins. It requires 3.3V supply given LM317 variable transformer, with 330 ohms and 560 ohm resistors. All capacitors of 0.1uf near analog /

digital/ microcontroller are connected to chop back spikes within the circuit, spikes produced by inductive load / sparking contacts of loads and capacitor of 1000uf/25V at regulator output is connected for the cancel loading effect within the circuit while driving the high current source.

RESEARCH METHODOLOGY

From the flow chart above, it can be described as follows.

a) Study of Literature, conducting a literature review related to the issues discussed so as to provide confidence that this research can be carried out and also reduce errors in research.

b) Identification of Needs, identifying and analyzing needs of the problems discussed so that this research can be carried out.

c) System Planning, properly managing the design of the problems obtained and there are three parts to the process, namely mechanical design, electronic design, and program design.

d) Monitoring System Realization, carrying out the overall design of the system to be implemented.

e) Testing and Data Collection, testing the design that has been realized in the hope thatthe system can run well.

f) Functional Testing, testing the components used to determine whether the components are functioning as they should. Functional testing consists of testing sensor PZEM-004T, NodeMCU, and Relays.

g) Performance Testing, conduct overall testing of the designed system. If the performance obtained is not in accordance with the design, corrections and improvements are made.

h) Result and Discussion, conduct a review and analysis of test data so as to find new ideas to draw conclusions

THEORETICAL FRAMEWORK :

Internet of Things :

The Internet of Things (IoT) is a network of physical devices embedded with electronics such as software, sensors, actuators and connectivity (Parashar et al., 2016), enabling these objects to interconnect and exchange data. With technical advances, our interactions with information systems change, both at work and during leisure time. Information technology, sensors, and networks are becoming smaller, more powerful, and used more frequently. Society no longer only encounters information technology at meeting points in their lives,

such as in the office or at a desk, but as information and communication infrastructure, which is present in more and more areas of daily life. These infrastructures are characterized by the fact that they include not only classic devices (Le Galès, 2011), for example, PCs and mobile phones, but that information and communication technologies are also embedded in objects and environments (Ashmitha et al., 2021)

Sensors :

A sensor is a tool or device used to convert physical quantities into electrical quantities (Borghetti et al., 2020). Sensors are devices used to detect induced signals originating from the conversion of an energy such as electrical energy (Bašić, 2019), physical energy, chemical energy, biological energy, mechanical energy and others. Sensors can also function in implementing a device that can work automatically when using the sensor used (Maulana, 2014).

Relay:

A 5V relay is used in this project, which is directly connected to the NodeMCU ESP8266. The ESP8266 pulse signal is sent to the relay (Ragavi et al., 2022). If the sensor data has a deviating value, Arduino identifies it and sends a command to the relay. A single pole throw relay was used in this project. NO (normally open), NC (normally closed), 5V, GND and common pins are the five pins on the relay (Sung et al., 2019).

NodeMCU ESP8266 :

The NodeMCU ESP8266 microcontroller is an electronic board based on the ESP8266 chip made by Espressive Systems, has a microUSB port that functions for programming or power supply. NodeMCU supports the Arduino (Integrated Development Environment) IDE software (Ouldzira et al., 2019).

LCD I 2C

LCD (Liquid Crystal Display) Inter-Integrated Circuit (I 2C) or liquid crystal display is a hardware device that can display a character of letters (Pyrgas et al., 2016), numbers or symbols. LCD is made with CMOS (Complementary Metal Oxide Semiconductor) logic technology which works by not producing light but

refracting the surrounding light towards the frontlit or transmitting light from the backlit (Heru Susanto, 2018).

Blynk IoT

Blynk IoT as an IoT platform that provides remote hardware control and monitoring systems (Artiyasa et al., 2020). The Blynk application can run on all operating systems such as Android and IOS as well as website platforms (Karuppusamy, 2020). Blynk operation control can be applied with microcontrollers such as the ESP8266, Arduino, and Raspberry Pi modules. The user interface on Blynk IoT is simpler and easier to understand, users only need to create a device by setting a widget and configuring a virtual pin with the widget (Blynk.io, n.d.).

DATA AND SOURCES OF DATA :

In this circuit for microcontroller and sensor a 5V DC, and 12V transformer is used to step down 230V to 12V and rectified with (1N4007 diode) centred tap rectifier with capacitor filter of 1000uf; output is DC 12V-14V in step with transformer ratings. The battery output is given to the Arduino board, which is required to convert in 5V regulated for microcontroller and other devices, here we've got used LM7805 regulator for getting 5V regulated DC. For motor driver it's separately accustomed cancel loading effect. In this Arduino board (atmega328 28 pin microcontroller) works with 16MHz frequency used for (timer configuration), the unwanted frequency produced is bypassed by the capacitor of 27pf capacitor. 6 channels 10 bit inbuilt ADC available, 6 PWM pins available, multiple serial communication available, up to twenty programmable pins available.Atmega328 microcontroller pins 14, 15, 16, 17, 18, 19 are connected to LCD respectively. LCD shows text as our programming conditions. Like dam level is 25% etc. Microcontroller input temperature sensor is connected with A0, voltage sensor to A1 phase sensor to A2 and current sensor to A3 (current transformer), Wi-Fi modem is connected to pins of microcontroller to TX and Rx pins. It requires 3.3V supply given LM317 variable transformer, with 330 ohms and 560 ohm resistors. All capacitors of 0.1uf near analog / digital/ microcontroller are connected to chop back spikes within the circuit, spikes produced by inductive load / sparking contacts of loads and capacitor of 1000uf/25V at regulator output is connected for the cancel loading effect within the circuit while driving the high current source.

RESULTS AND DISCUSSION :

From observations or result. This system will protect the motor from several faults such as undervoltage, overvoltage andcircuit will switch on motor under safety conditions . It Displayall results on kit display as well as mobile phone . when fault occurs it sends notification to user also measures speed of induction motor.

By analyzing motor parametersmake the motor to be operated in protective and safe in nature, It also helps in calculating a new data to interact with social media and other gadgets from blynk app, We operate motor parameters on mobile application by connecting to hotspot module. Through blynk app continously monitored the motor parameters and if fault takes place it will get alert notificationon android application. In industries required monitoring datavalue for maintenace and power consumption. In case the motor gets overvoltage ,undervoltage than its rated value it will get automatically disconnected from supply and motor gets off.

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