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TRANSFORMER HEALTH MONITORING AND PROTECTION SYSTEM USING IOT

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Abstract: ***An critical feature of an energy delivery grid is the distribution transformer. The distribution transformer is a device that specifically distributes electrical energy to low-voltage consumers. This project shows a distribution transformer control and safety scheme. Which is an integrated device that monitors various parameters that have a direct impact on the transformer. Present, voltage, oil level, and temperature are all monitored using various sensors. Arduino takes steps in response to the analysis of these sensors in order to keep transformer working conditions consistent. The proposed system is low-cost and simple to use, and it can track, secure, and view data on the website. The proposed framework is low-cost and simple to use, and it can track, secure, and view data on a website using IoT technology.***

Keywords: Transformer, sensors, Arduino, IoT

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I INTRODUCTION

Transformers are critical part of electrical delivery grid. Monitoring of transformers is important to prevent transformer failure. In India, the rate of transformer failure rises during the summer, with overloading and overheating being the most common causes. The control of operating parameters is critical to the transformer units' reliability and survival. Since distribution transformers are directly attached to the customer load, abrupt changes in load will result in a fault.

The new control scheme is manual, time-consuming, and labour-intensive, and it lacks existing values for parameters such as overload current and transformer overheating. This would reduce the transformer's lifespan and place people in risk while they are around it. This project is about an Internet of Things-based wireless tracking system that protects transformers from theft and accidents.

II. PROPOSED WORK

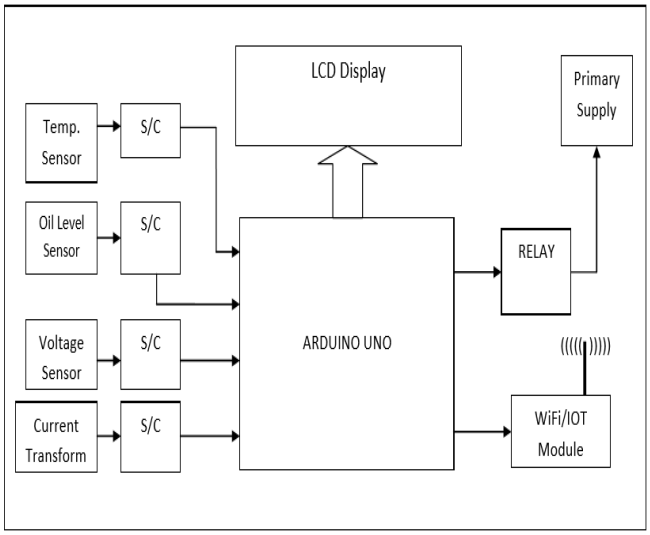
The heat produced during transformer operation raises the temperature of the transformer's internal structures. More efficient transformers have a lower temperature increase, whereas less efficient transformers have a higher temperature rise..

III. PROBLEM STATEMENT

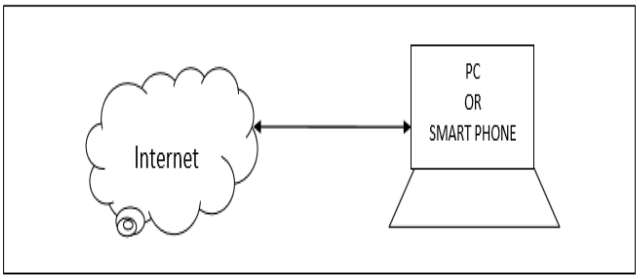
The aim of our project is to develop and incorporate a monitoring system.and a distribution transformer's primary parameters, such as Currents in the load, oil level, voltage level, and temperature The concept of an online surveillance system incorporates a standalone Arduino and various sensors. The ARDUINO Microcontroller is used to record the above parameters, which are built on the distribution transformer hand. The gathered data is stored and saved in the system's memory. If the device encounters an abnormality or an emergency condition, the values will be reflected on the monitor in accordance with certain predefined instructions programmed in the microcontroller.

IV.SYSTEM BLOCK DIAGRAM

Block Diagram:



(a) Distribution Transformer Site



(b) Power Distribution Company Control-room

V.EXPLANATION

1.Temperature sensor :

Temperature sensors calculate the amount of heat energy or even coldness generated by an object or device, allowing us to "feel" or detect any physical change in that temperature, providing an analogue or digital output. The LM35 series of precision integrated-circuit temperature sensors have an output voltage that is proportional to the temperature in Celsius (Centigrade). In comparison to linear temperature sensors measured in degrees Kelvin, the LM35 has the advantage of not requiring the consumer to remove a significant constant voltage from the output to obtain convenient Centigrade scaling.

2.Voltage sensor :

In an electrical power device, it is used to calculate voltage. When a voltage is too high for an instrument to use, it can be scaled down to a standardised low value. A voltage sensor measures the voltage in a wire and produces a signal proportional to that voltage. The generated signal could be analogue voltage, current, or even digital output. It can then be used to display the measured voltage on a voltmeter or saved for further study.

3.Current Sensor :

New sensors are a cost-effective and accurate approach for current sensing in processing, industrial, and networking networks. Typical implementations include motor control, load monitoring and maintenance, over-current fault detection, and any intelligent power management system. A current sensor senses and produces a signal proportional to the electric current flowing through a cable. The generated signal could be analogue voltage, current, or even digital output. The current measured in an ammeter will then be shown using it.

4.Oil Level Sensor :

We're using a liquid level sensor that floats. It will be a sensor with a variable resistance. It will rotate from 0® to 90® and its resistance will vary from 0 ohm to 1k ohm.

5.Relay Unit :

Every electrical system's make and break contact is handled by the Switching Unit. This unit, on the other hand, is made up of drivers and actuators. The relay is powered by [C1815] transistors, which are used as motors. Relays are used as active components, and resistors and diodes are used as passive elements. The processing unit's output switches on the appropriate transistor, which then activates the relays. The incoming phases from the public utility supply are connected to the relay terminals, and the load's single phase output is also connected to the relay outputs.

6.LCD Unit :

The LCD display device shows the status of the system's phase voltage switching and digital range as a result of the resulting phase voltage switching. It consists of a 16 x 2 LCD module that is interfaced with the microcontroller and is used to view the chosen healthiest available step to feed the load as it is processed.

VI.WORKING

The proposed system uses an Arduino to control a distribution transformer's voltage, current, oil level, and temperature. These distribution transformer parameters can be displayed on a computer or mobile device using IoT technology, which is a high-performance technology that integrates database recording and simulation on a single platform. The monitored parameters are compared to the transformer's rated values, and the Arduino is programmed to take corrective action if the monitored values surpass the rated values, displaying the value on a remote PC.

Transformer temperature and oil level was detected using an LM35 temperature sensor and a float type level sensor. Arduino receives these values as inputs and executes the

desired operation. The Arduino will switch off the power supply to the delivery transformer if the voltage and current values surpass the rated values (overloading). If the temperature of the delivery transformer increases above the rated values, the Arduino can switch off the power supply (overheating). The microcontroller is programmed to constantly scan the transformer and adjust the parameters at fixed intervals.

VII.APPLICATIONS :

• The LM35 is simple to use and can be used in the same way as other integrated-circuit temperature sensors. It can be bonded or cemented to a surface and maintain a temperature that is within 0.010C of that of the surface.

• This assumes that the ambient air temperature is nearly equal to the surface temperature; if the air temperature is much higher or lower than the surface temperature, the real temperature of the LM35 die would be somewhere in the centre.

• This is particularly true for the TO-92 plastic box, where the copper leads are the primary thermal route for heat to enter the device, causing the temperature to be closer to that of the air than that of the surface. To avoid this problem, make sure the wiring to the LM35 is kept at the same temperature as the surface of interest as it exits the unit.

• The simplest way to do this is to cover these wires with a bead of epoxy, which will ensure that all of the leads and wires are at the same temperature as the surface, and that the temperature of the LM35 die is unaffected by the ambient temperature.

VIII.LIMITATIONS:

We know that the system requires a wifi internet connection near the transformer, but that problem will be solved in the near future as internet access will be available everywhere.

IX.ADVANTAGES :

1. Gives highly accurate output.

2. Provides continuous remote monitoring of the transformer.

3. Protect the transformer from getting damaged. 4. Avoids accidental conditions like explosion of transformer

X.CONCLUSION

This project uses Arduino to measure the voltage, current, oil level, and temperature of the distribution transformer. The tracked parameters are transferred from the Arduino to the PC using IoT technology. Environmental conditions will make the transformer's everyday operation difficult. We won't be able to get rid of them, but we can keep track of the effects.

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