TRANSFORMER HEALTH MONITORING SYSTEM
BASED INTERNET OF THINGS

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ABSTRACT:

BACKGROUND/OBJECTIVE: Transformer is one of the imperative electrical gear that is utilized as a part of energy framework. Monitoring transformer for the issue before they happen can avoid issues that are exorbitant to repair and result in lost power.

TECHNIQUES / STATISTICAL ANALYSIS: The principle point of our proposed framework is to obtain real-time data of transformer with web categorized under Internet of Things (IOT). Moreover the real-time data is perceived with the help of sending end LCD display interfaced with microcontroller.

APPLICATION/IMPROVEMENTS: They need to take a gander at it persistently by utilizing this task it can limit working endeavors and enhance precision, strength, proficiency. Here the sensors are utilized to detect the principle parameters of gear, such as, voltage, (over voltage, under voltage) and over current, which is sent to microcontroller. This controller checks as far as possible which additionally send to the IOT web server utilizing IOT module of these data ensures the correct data is close by to the administrator and can settle on valuable choices previously any disastrous disappointment on premise of that data of parameters.

Keywords: IOT; Microcontroller; Transformer health monitoring;

1. INTRODUCTION

Every snapshot of our lifespan depends on electricity. Electricity unit has hardware that helps human to exchange and manage distribution as indicated by use. The transmission and distribution sector of electricity purely depends on transformer. The distribution transformer is an electrical gear in the control cabinet that specifically distributes energy to customers and its operational condition is vital for the distribution of organizational managers. In control panels, an electrical gearbox transformer transmits power specifically to low-voltage customers and its activity status is vital. criteria of the complete system task. The task of distributing the transformer in the recharging conditions (according to the details on its nameplate) guarantees a long service life. However, their life is essentially reduced when they are subjected to excessive loads, heating, low or highvoltage/current which cause surprising disappointments. The excessive and inadequate cooling of the transformers is the fundamental engine of disappointment. The frames of the monitoring
devices used by the distribution transformer present some problems and shortcomings. Because the transformer consists of numerous coupled components, all of these parts should be inspected regularly to keep the transformer in operating condition. As indicated by the previous prerequisites, a continuous monitoring framework of the distribution transformers is required to select each fundamental parameter activity. It guides online regular surveillance of the useful fundamental parameters of the distribution transformers that will provide vital data on the power of the distribution transformers.

2. METHODOLOGY

The concept proposed here is an introduction of the continuous transformer health monitoring system utilizing IOT. Cost viability and remote area will be offered need to this extend. If there should be an occurrence of programming driven system add up to system requires part of association and mechanical assembly and in fact gifted work force. The entire data will be accessible on the site page. Then again, the composed arrangement has less unpredictability to introduce and doesn’t require manpower.

SYSTEM OVERVIEW

Entire block is divided into four parts. These are data collection, data processing, communication and the control part with required power supply unit. Fig.2.1 shows the transformer placed near the monitoring component. The components of the block diagram measures various real-time parameters associated with the distribution transformer.

The information definitely assures the proper health monitoring of commercial transformers that lead the utilities to better usage of their transformers and keep the asset in operation for a long time.

Four sensors such as level sensor, gas sensor, temperature sensor, and current sensor were involved. A power supply is used to operate microcontroller PIC16F877A. Once the data’s are sensed that can be read from the LCD display and at the same time these values are transmitted to the IOT module through the UART cable and the IOT module sends the data to the user on given IP address as per program. This information sufficiently supports the transformer to avoid its sudden failure. For any abnormal conditions in the load side we can control by switching off the relay and if the temperature level above the threshold value, the cooling system automatically will be ON until the temperature value return to the threshold value.

3. SYSTEM DEVELOPMENT INTERFACE UNITS
THMS operates all the time, and gives us the voltage of the distribution line, the grid current, the oil temperature, the oil level and the gas formation in series. The system provides the consequent value for supervise purposes, and provides the data as per the program instruction.

Serial communication between the microcontroller and the IOT module is the first step, and then the module starts checking the parameters. The communication baud rate established was 9600 bps.

To measure all the parameters the supply given to the system step-down transformer is used. This transformer can venture down approaching voltage, which empowers you to have the right voltage contribution for your electrical needs. For instance, if our hardware has been determined for input voltage of 12 volts, and the principle control supply is 230 volts, we will require a stepdown transformer, which diminishes the approaching electrical voltage to be perfect with your 12volt gear. This conversion is achieved by using the Rectifier Circuit/Unit.

CURRENT SENSOR
A device that is used to detect the current in the form of analog signal. It also measures the voltage level of system pursuing.

LEVEL SENSOR
Ultrasonic is used for estimating the oil level, the level estimation can be either consistent or value it attains. The gained information is send to the cloud

GAS SENSOR
CO2 sensor is used to detect the air quality checking and smoke caution. The input voltage provide for the sensor is 5V. The yield of the gas sensor is simple and it changed over to advance by microcontroller.

TEMPERATURE SENSOR
Thermal sensors are sensors for measuring thermal properties or sensors based on thermal principles. Thermal actuators can also be used that will produce mechanical output by thermal expansion principle (or) we can say actuation of devices can be achieved by injecting or removing heat. The sensor can control complex process of the preceding system. LM 35 is used with individual power supplies or with more and less consumables. Since the LM35 device requires less power, it has a very low self-heating.

IOT MODULE AND CONTROL
Internet of things is the network of physical devices, which enable these objects to connect and exchange data to the cloud. Each thing is uniquely identified through the embedded computing system but is able to inter-operate only within the existing internal infrastructure. This concept may also have referred as internet of everything.

In Fig.3.1 shows example page of the control unit appeared that were developed supported with Lumisense IOT board featured with SIM900 GPRS modem. Also equipped with a controller to process all input UART data to cloud.

![Sample webpage](image-url)
This is the output for IOT control segment, if any fault is occurred or the parameters of the transformer exceeds its values the load is switched off through online and the sample webpage for control system is (iotclouddata.com/iotlog/423/controlview.php).

Fig. 3.2 IOT Control Section

After having measured all four of them, the monitoring block looks for the applied condition. As per mentioned condition for the commercial transformer, the system continues to check every snapshot. In case of faulty condition, the microcontroller give the signal to the IOT module through the UART cable, providing the type of fault and specified by command and then delivers a message to the web page to notify and acquire the necessary steps and the modem sends this repeatedly until rectifying fault. After eliminating the error, the total system begins to screen the condition of the transformer again and will be monitored everywhere.

The given figure is the example page of our proposed yield, here the information's are send to the IOT webpage (iotclouddata.com/iotlog/423/iot18view.php).

Fig. 3.3 Implementation layout of Transformer health monitoring system.

The output information obtained from the microcontroller is transferred via IOT to the desired web page. The photograph of the output data unit on the Web page is shown in figure. 3.4.

Fig. 3.4 Output Data Unit in webpage

4. CONCLUSION
The project has been focused on the efficiency of the transformer monitoring process. The total system brings high reliability, almost nullified parasitic effect. The use of PIC16F877A microcontroller makes the system integrated in real time. The designed system is connected to a distribution transformer and can send abnormal operating parameter information to a mobile device using a GSM network, which results in a better way of communication. Results confirm that monitoring of transformer through use of wireless communication that eliminates the use of cables.

5. REFERENCE


