# Design and Implementation of Real Time Transformer Monitoring System Using IOT Technology

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**Abstract**:  As we know a large number of transformers are distributed over a wide area in present electric systems, it's difficult to monitor the condition manually of every single transformer. With the progress and development of national economy as well as power system, reliability and safety issues of power system have been more important. Development of distribution Transformer Health Monitoring System has been done in that reason. Distribution transformer is the most vital asset in any electrical distribution network and therefore it needs special care and attention. This THMS can monitor the health status of the distribution transformer in real time aspect. So automatic data acquisition and transformer condition monitoring has been an important issue. This project presents design and implementation of a mobile embedded system to monitor load currents, over voltage, transformer oil level and oil temperature. The implementation on-line monitoring system integrates Global Service Mobile (GSM) Modem, with single chip microcontroller and sensors. It is installed at the distribution transformer site. The output values of sensors are processed and recorded in the system memory. System programmed with some predefined instructions to check abnormal conditions. If there is any abnormality on the system, the GSM module will send SMS (Short Message Service) messages to designated mobile telephones containing information about the abnormality according to the aforesaid predefined instructions. This mobile system will help the utilities to optimally utilize transformers and identify problems before any catastrophic failure occurs. This system will be an advanced step to the automation by diminishing human dependency. As it is a wireless communicating system, there is no need of large cables which are of high cost. Thus, THMS offers a more improved transformer monitoring.

**Keywords:**  IOT; Transformer health  monitoring; Microcontroller; Embedded System; Transformer.

## I.        INTRODUCTION

When we look towards our daily routine, we can say that electricity is the major part of our life and transformers plays the role of electricity carrier to us from stations. Transformer plays a vital role in electricity distribution system. Maintaining a transformer and controlling it is very risk. The demand for power is very high. Transformers get overloading, heating, low or high voltage/current resulting in unexpected failures and loss of supply to a large number of customers thus effecting system reliability due to the use of electricity. Overloading, heating, low or high voltage/current affects the efficiency of the transformer and gives a drawback in electricity distribution system. It is mandatory to avoid problems in the transformer due to overloading, heating, low or high voltage/current. According to the above requirements, we need a distribution transformer real-time monitoring system to monitor all essential parameters operation, and send to the monitoring center in time. It leads to online monitoring of main functional parameters of distribution transformers which will provide necessary information about the health of distribution transformers. This will help and guide the utilities to optimally use the transformers and keep this equipment in operation for a longer period. An online-monitoring system is used to collect and analyze temperature data over time. Transformer Monitoring System will help to identify or recognize unexpected situations before any serious failure which leads to a greater reliability and significant cost savings.
Widespread use of mobile networks and GSM modems, have made them an attractive option both for voice media and wide area network applications.

## II.        LITERATURE REVIEW

Many companies for online monitoring of transformers, they use Supervisory Control and Data Acquisition system, which is an expensive proposition. Many transformers are currently monitored manually, where a person goes and sees

transformer and maintains the records. This paper is a presentation of the design implementation of Real Time Transformer Monitoring System through GSM module. Cost effectiveness and remote location will be given priority to this project. In case of software driven system total system requires lot of connection and apparatus and technically skilled personnel. Fault information will available only in control room. On the other hand, this designed system has less complexity to install and doesn't require anysort of skilled personnel and can be notified remotely.

## III. PROPOSED METHODOLOGY-

Automatic decision making is the main feature of THMS. Decision making steps are given in a flow chart on Fig.01, which indicates how system takes decision. At first all the sensors, processing controller and IOT modem initialization occurs. After the initialization process required data are measured from sensors and some commonly used components simultaneously. Then the microcontroller starts to compare the incoming values with the saved values in the EEPROM memory. When there is at least one parameter's value denied the saved value, then the microcontroller takes action to send this message to the controller cell. If there is no over rated values of current and voltage or oil level is in safer level or the oiltemperature is in the predefined value range, then the microcontroller jumps back to the testing procedure. This process continues until the decision-making logic's output is negative. When the decision-making logic's output is affirmative, then instantly microcontroller will take action for further execution. After sending the information, the loop continues again.
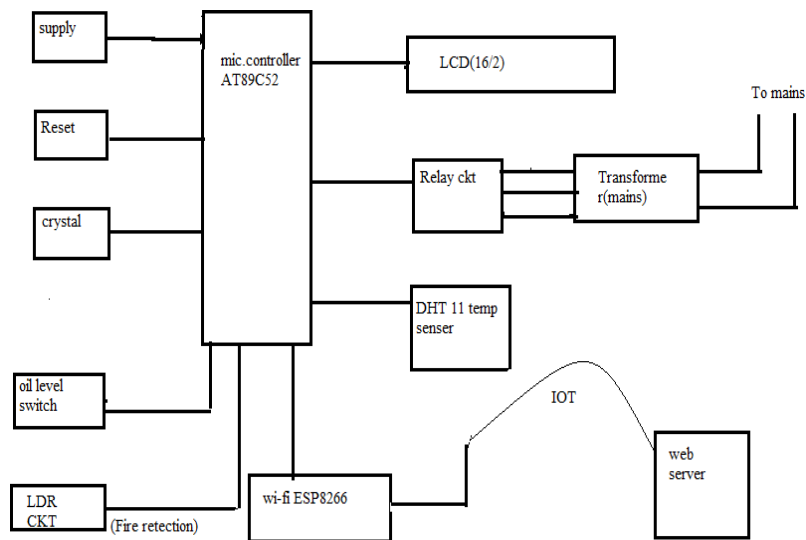


Fig. Block diagram

## IV. CONCLUSIONS

The final stage of electricity distribution is the delivery of electricity from generating power plant to end users. Distribution system network carries electricity by the transmission system and delivers its load centers. Thus, it is very essential to have high efficiency, high reliability and high service quality in a distribution system. This study gives remedies from the difficulties of determining fault occurring causes in transformer and it overcomes the drawback of previous working methods the project mainly focuses on the efficiency of monitoring process of the transformer by using wireless communication that eliminates the use of large cable which are of high-cost low reliability and maintenance. The IOT networking helps in better way of communication which enhances the improvement steps in process. So, use of PIC16F877A microcontroller make the system real time embedded system and aids very much in industry needs the designed system is connected to ad distribution transformer and is able to send abnormal operating parameters information to a mobile device using a GSM network. The system Hardware was constructed from the available components. The experimental Results came out as expected.

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