

## IOT BASED TRANSFORMER HEALTH MONITORING SYSTEM

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### Abstract

The transformer is playing a vital role in the electrical power grid. As it deals with high voltage and current which can greatly affect the functioning and physical condition of the device, continuous monitoring has become an integrated part of its operation. This paper presents a review on IoT (Internet of Things) based electrical parameters monitoring and controlling technology to avoid its successive catastrophic failures. Here, different sensors and server models are used for communication, mostly GSM-GPRS is used. In case of some abnormality, this advanced monitoring system will deliver a message to a dedicated device for further course of action. The work done in recent few years in the field of parameter monitoring using the internet is discussed here.

**Keywords:** Sensors, IoT, GSM, GPRS, Transformer Health Monitoring

### INTRODUCTION

Electricity plays an important role in our life. Every moment of our life depends upon electricity. Electricity has several components and equipment helping human to transfer and regulate the distribution according to usage. The most crucial equipment of transmission and distribution of electric power is transformer. In Power system, an electrical component transformer directly distributes power to the low-voltage users and its operation condition is an criteria of the entire network operation. The majority of the devices have been in service for many years in different (electrical, mechanical, environmental) conditions. They are the main components and constitute the large portion of capital investment. Operation of distribution transformer under rated condition (as per specification in their name plate) guarantees their long service life. However their life is significantly reduced if they are subjected to overloading, heating low or high voltage current resulting in unexpected failure and loss of supply to a large number of customers thus is affecting system reliability. Overloading, oil temperature load current and ineffective cooling of transformer are the major cause of failure in distribution transformer. As a large number of

transformers are distributed over a wide area in present electric systems, it's difficult to measure the condition manually of every single transformer. The main aim of the project is to acquire real-time data of transformer remotely over the internet falling under the category of Internet of Things (IoT).

### 1. DEFINITION

An IoT-based transformer health monitoring system is a smart system that uses sensors, communication technologies, and internet connectivity to continuously monitor the condition and performance of an electrical transformer in real time. It collects important data such as temperature, oil level, load current, voltage, and humidity. and sends this information to a cloud platform or control system.

Detecting faults early Preventing transformer failures

Enabling remote monitoring and control

### 2. PURPOSE

The main purpose of an IoT-based health monitoring system for a transformer is to continuously monitor and maintain the condition of the transformer in real time. It helps in improving reliability, efficiency, and safety of electrical systems. continuously monitor the condition and performance of the transformer in real time using smart sensors and internet connectivity

### 3. METHODOLOGY

This system is designed for online monitoring of distribution transformers parameter can provide useful information about health which will help the utilities to optimally use their transformer and keep the asset in operation for a long time. In this system we used four sensors for monitoring that is level sensor temperature sensor, current sensor and voltage sensor. We used a power supply to operate arduino UNO and WiFi modem. Above figure shows the connection between all modules. Sensor sense the data and display it on LCD 6 display at the same time Wi-Fi module sends the data to the user on given IP address as per program. If we get an unsecured data about the system can avoid failure. This is proposed a model of real-time transformer monitoring system using IoT. This is classified in four parts power supply, controlling, data processing and data uploading.

### 4. NEED OF STUDY

To ensure continuous and reliable power supply. To detect transformer faults at an early stage.

To reduce unexpected transformer failures.

To enable real-time monitoring of parameters like temperature, voltage, and current. To minimize manual inspection and human errors.

To reduce maintenance and operational costs.

To increase the lifespan and efficiency of transformers. To improve safety of electrical equipment and workers.

To provide remote monitoring using Internet of Things (IoT) technology.

### 5. OBJECTIVES

1. To monitor transformer temperature in real time.
2. To measure voltage and current in the transformer.
3. To detect oil level changes in the transformer tank.
4. To transmit data to the cloud using IoT technology.
5. To allow remote monitoring using mobile or web applications.
6. To prevent transformer damage through early fault detection.
7. To improve the reliability and efficiency of the power distribution system.

## 5. SCOPE OF STUDY

The scope of the IoT-based transformer health monitoring system focuses on improving the performance, safety, and reliability of power transformers using modern technology. The scope of this study extends from basic monitoring to advanced smart control, making transformers more reliable, efficient, and suitable for modern automated power systems.

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