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IOT BASED TRANSFORMER MONITORING SYSTEM

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ABSTRACT

Transformers are the main building block in a power system. Any damages in transformer adversely affects the balance of a power system. The damages are mainly occurring due to overloading and inefficient cooling. The main objective of the real time monitoring of the health conditions of the distribution transformer using IOT technology. The parameters such as temperature, voltage, current, and oil level of a transformer are monitored, processed and recorded in servers. For this purpose, we use sensors interfaced with Espwroom 32 microcontroller. The recorded data can be send using Wi-Fi module and accessed from anywhere around the world using IOT technology. This helps in identifying human dependency, and solving a problem before a failure without human monitoring.

Keywords: Transformers, Health Conditions, Microcontroller, IOT Technology.

I. INTRODUCTION

The 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. 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. So, we need a distribution transformer system to monitor all essential parameters operation, and send to the monitoring system in time. It provides the necessary information about the health of the transformer. This will help and guide the utilities to optimally use the transformer and keep this equipment in operation for a longer period. 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).

II. METHODOLOGY

This Proposed project presents design and implementation of IOT embedded system to measure load currents, over voltage, transformer oil level and temperature. This is implemented by using on-line measuring system using Internet of Things (IOT), with single chip Arduino 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, details are automatically updated in the internet through serial communication. This Internet of Things (IOT) will help the utilities to optimally utilize transformers and identify problems before any catastrophic failure occurs. Thus, online measuring system is used to collect and analyze temperature data over time. So, Transformer Health Measuring will help to identify or recognize unexpected situations before any serious failure which leads to a greater reliability and significant cost savings. Transformer is one of the important electrical equipment that is used in power system. Monitoring transformer for the problem before they occur can prevent faults that are costly to repair and result in a loss of electricity.

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III. MODELING AND ANALYSIS

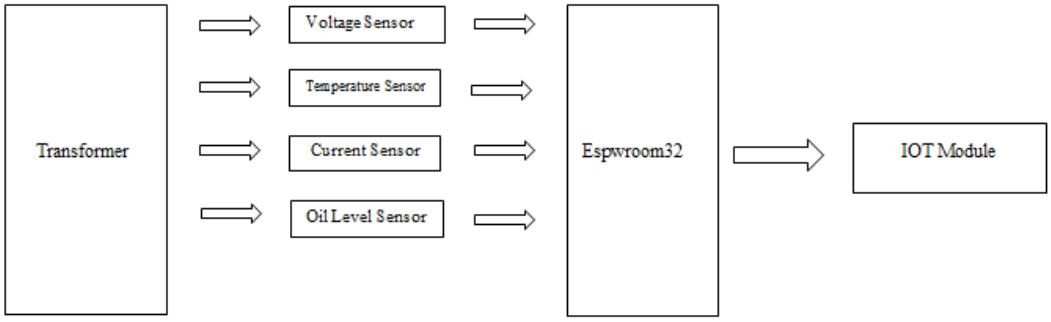

Figure 1: Block Diagram

For This Proposed Real-Time Framework, We Take a Voltage sensor, oil level, A Current sensor And a LM35 Temperature Sensor for Monitoring Voltage, Current, Temperature, Respectively Data of The Transformer and Then Send Them to A Desired Location Anywhere in The World. These Three Analog Values Are Taken in Multiplexing Mode Connected to A Programmable Microcontroller Arduino. Then The Values Are Then Sent Directly Through a Wi-Fi Module Under TCP IP Protocol to A Dedicated IP That Displays the Data in Real Time Chart Form in Any Web Connected PC / Laptop/Mobile for Display. The Real Time Data Is Also Seen at The Sending End Upon an Android App Interfaced to The Microcontroller. The Supply of Power Is Given Through Step Down Transformer 230/12V, Which Steps Down the Voltage To 12V AC. This Is Converted to DC Using a Bridge Rectifier and It Is Then Regulated To +5V Using a Voltage Regulator 7805 Which Is Required for The Operation of The Arduino, 3.3 Volt for The Wi-Fi Unit and Other Component. If Overvoltage, less oil, over temperature And Over current Happens Then Microcontroller Will Send Data Message to An Android App And laptop.

IV. RESULTS AND DISCUSSION

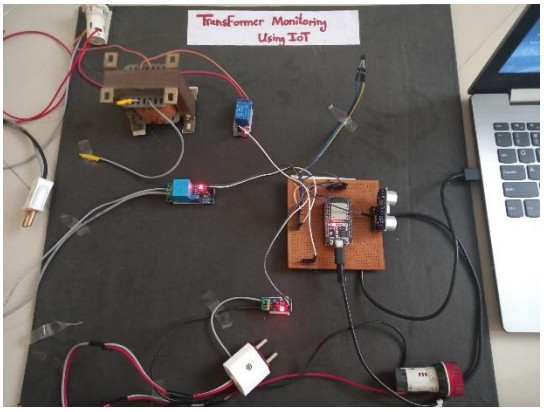

Figure 2: Project Hardware

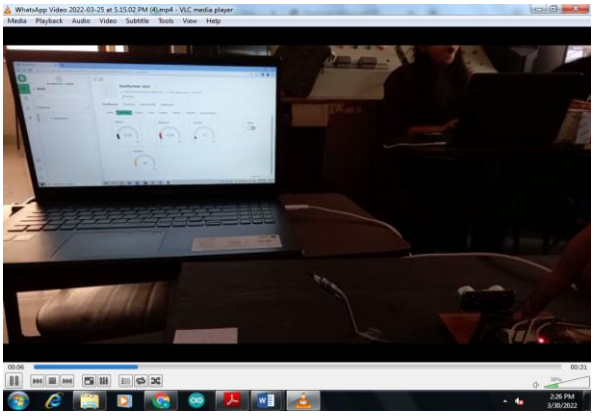

Figure 3: Experimental Results

The proposed technique with results has shown that the protection scheme works properly with accuracy, sensitivity of this scheme very high for the abnormal and faulty conditions. Transformer Health Monitoring will help to identify or recognize unexpected situations before any serious failure, which leads to greater reliability and significant cost savings. If transformer is in abnormal condition, we can know from anywhere. No human power needs to monitor the transformer. Details about the transformer are automatically updated in webpage. Voltage to DC.

V. CONCLUSION

The main goal of the project is to design and construct an Internet of Things Transformer Monitoring System which can display real time state in the transformer. After the construction of the device, the system was tested successfully. That is the device can monitor the condition of the transformer and send data accumulated from the sensors through the Wi-Fi and displayed over the IoT platform

VI. REFERENCES

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