

# WIRELESS TRANSFORMER PARAMETERS MONITORING SYSTEM USING IOT

CHEVURU.SUJITH ESWAR<sup>1</sup> M.HARISH KUMAR ACHARI<sup>2</sup>

B.PRUDHIVI TEJA<sup>3</sup> SK.JAVEED<sup>4</sup> P.V.V.DURGA PRASAD<sup>5</sup>

Under Graduate Students, Department of EEE, Narayana Engineering College, Nellore.

**Mr. A.PRASAD** M.Tech

Assistant professor, Department of EEE, Narayana Engineering College, Nellore.

Email: [sujitheswar99@gmail.com](mailto:sujitheswar99@gmail.com)<sup>1</sup> [harishcherry1240@gmail.com](mailto:harishcherry1240@gmail.com)<sup>2</sup>

[prudhvicri030@gmail.com](mailto:prudhvicri030@gmail.com)<sup>3</sup> [javeedsk2711@gmail.com](mailto:javeedsk2711@gmail.com)<sup>4</sup> [prasad.99633@gmail.com](mailto:prasad.99633@gmail.com)<sup>5</sup>

**ABSTRACT:-** Distribution transformers is one of the most important element of electrical power system. Transformer is a device which is continuously working in order to improve the efficiency of the transmission system. The present paper proposes continuous online monitoring of distribution transformer using IOT (internet of things). The internet of things connects the unconnected things .previously the things that weren't accessible have been made accessible because of it. The transformer is subjected to various faults such as over-current, increase in temperature, oil-level, etc. All these faults are persistently monitored throughout by the Arduino which regularly sends the health information of the transformer via the 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 for display in 3 different charts. .this data can be accessed from anywhere in the world by a web connected

pc/laptop .so the maintainence of the distribution transformer can be successfully implemented by the use of this project ideology.

Keywords: - Distribution Transformers, Arduino, IOT (Internet on thing), Wi-Fi module.

## INTRODUCTION

In power system, distribution transformer is an electrical equipment which supplies power from the generating station to consumers directly. Distribution transformer has a long service if they are operated under rated conditions. Their life is significantly reduced if they are

subjected to overloading and voltage unbalance for a long time, also low oil level and high winding temperature leads to insulation failure resulting breakdown. Overloading and ineffective cooling of transformers is the major cause of failure in distribution transformer. Distribution transformers are currently monitored manually which cannot provide information about occasional overloads and overheating of transformer oil and windings.

Most power companies use supervisory control and data acquisition (scada) system for online monitoring of power transformer extending the scada system for online monitoring of distribution transformer at the remote area is an expensive proposition due to long distance . According to the above requirements, we need a distribution transformer real-time monitoring system to detect all operating parameters such as winding and oil temperature, oil level and load current, continuously and sent to the monitoring centre in time.

In power systems, distribution transformer is electrical equipment which distributes power to the low-voltage users directly, and its operation condition is an important component of the entire distribution network operation. Operation of distribution transformer under rated condition (as per specification in their

nameplate) guarantees their long life. However, their life is significantly reduced if they are subjected to overloading, resulting in unexpected failures and loss of supply to a large number of customers thus effecting system reliability. Overloading and ineffective cooling of transformers are the major causes of failure in distribution transformers. The monitoring devices or systems which are presently used for monitoring distribution transformer have some problems and deficiencies. Few of them are mentioned below.

Ordinary transformer measurement system generally detects a single transformer parameter, such as power, current, voltage, and phase. While some ways could detect multi-parameter, the time of acquisition and operation parameters is too long, and testing speed is not fast enough. Detection system itself is not reliable. The main performance is the device itself instability, poor anti-jamming capability, low measurement accuracy of the data, or even state monitoring system should is no effect. Timely detection data will not be sent to monitoring centres in time, which cannot judge distribution transformers three-phase equilibrium. A monitoring system can only monitor the operation state or guard against steal the power, and is not able to monitor all useful data of distribution transformers to reduce costs.

Many monitoring systems use power carrier communication to send data, but the power carrier communication has some disadvantages: serious frequency interference, with the increase in distance the signal attenuation serious, load changes brought about large electrical noise. So if use power carrier communication to send data, the real-time data transmission, reliability cannot be guaranteed. According to the above requirements, we need a distribution transformer real-time monitoring system to detect all operating parameters operation, and send to the monitoring centre in time.

It leads to online monitoring of key operational parameters of distribution transformers which can provide useful information about the health of transformers which will help the utilities to optimally use their transformers and keep the asset in operation for a longer period. The parameters like temperature, oil level and over current are monitored by using sensors and the data sent directly to 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 for display in 3 different charts. So, This 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.

## METHODOLOGY

The main objective of the proposed project is to acquire real-time data of transformer remotely over the internet falling under the category of Internet of Things (IOT). For this real-time aspect, we take one temperature sensor, one current sensor and one floating sensor for monitoring Temperature, oil level, over current data of the transformer and then send them to a remote location. These three analog values are taken in multiplexing mode and connected to Arduino Microcontroller. Then the values of all the sensors are sent sequentially as per the frequency of multiplexing of the ADC by Microcontroller. They are then sent directly to 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 for display in different charts. The real-time data is also seen at the sending end LCD display interfaced with the microcontroller.

## EXISTING SYSTEM

For decades, fuse, circuit breakers and electromechanical relays were used for the protection of power system. But, they operate only after the fault occurs. The failure of the transformers in the remote area is unnoticed. If the transformers are working without the parameter values

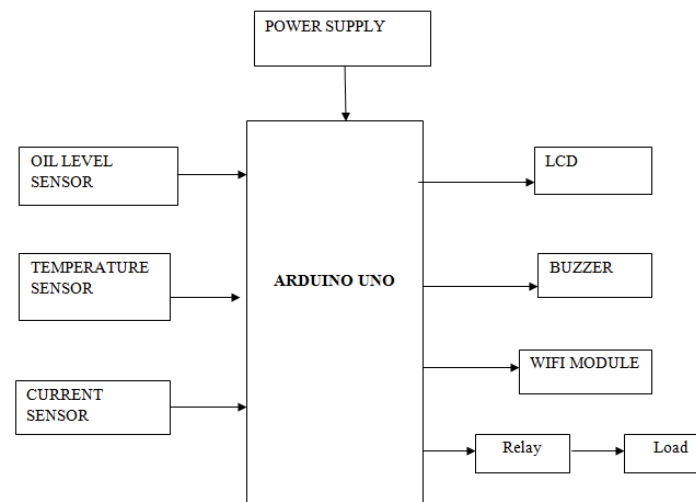
monitoring leads to breakdown during abnormality and lifetime of transformers are reduced.

## PROPOSED SYSTEM

In this project, we designed a system which continuously monitors the transformer parameters with the help of sensors and the main objective of the proposed project is to acquire real-time data of transformer remotely over the internet falling under the category of Internet of Things (IOT). For this real-time aspect, we take temperature sensor, current sensor and a floating sensor for monitoring oil level, temperature and over current. These data of the transformer send to a remote location.

These three analog values are taken in multiplexing mode and connected to a programmable microcontroller. Then the values of all the sensors are sent sequentially as per the frequency of multiplexing of the ADC by Microcontroller. They are then sent directly to 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 for display in Three different charts. The real-time data is also seen at the sending end LCD display interfaced with the microcontroller.

## BLOCK DIAGRAM



## HARDWARE REQUIREMENTS

- Arduino
- Current sensor
- Temperature sensor
- Oil level sensor
- LCD display
- Voltage Regulator
- Relay
- WIFI Module
- Buzzer

## SOFTWARE

- Arduino IDE
- Embedded 'c' language

## ADVANTAGES

- Easy to locate the fault transformer
- It saves time
- It reduces the man power requirements
- Maintenance is low
- Globally monitor from anywhere

## RESULT



## CONCLUSION

An IOT based transformer monitoring system for power transformer has been designed, implemented. it is quite useful as compared to manual monitoring and also it is reliable as it is possible to monitor the oil-level, temperature rise, load current always through an module that is linked with the Arduino with the help of Wi-Fi can be installed to this system to timely receive transformer parameters information after receiving parameters result on any abnormality we can take immediate action to prevent any catastrophic failures of transformers.

Transformer health monitoring will help to identify or recognize unexpected situations before any serious failure this which leads to greater reliability and significant cost savings. If transformer is in abnormal condition we can know from anywhere. No human power need to monitor the transformer. Details about the transformer are automatically updated in webpage when the transformer is in abnormal condition

## FUTURE SCOPE

In future work we can develop database of all parameters of distribution transformer which are placed at different places. We can get all information by placing the proposed system modules at every transformer. We can send the data through Wi-Fi module and also through Ethernet shield. With Ethernet shield we can make remote terminal unit as a server and store data on webpage or website. A Wi-Fi module connects to nearby network and sends information to monitoring node.

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