Transformer Fault Detection Using Wireless Sensor Networks and IOT

N. Mekala, T.A. Geethagayathri

Abstract--- This describes transformer fault detection using wireless sensor networks and IoT. In this approach, a microcontroller based hardware unit has been developed to continuously monitoring the parameters like current, voltage, temperature and winding resistance of the Transformers. The fault detection can identifying disconnection of significant network. In a transformer monitoring and controlling system, the transformer is connected with one microcontroller based hardware unit, Wireless sensor network and IOT for collecting and storing data accordingly communicate the observations of the transformers through computer interface developed with IOT safe and economic data communication in various field. As a result, while the fault location detection becomes have developed in the past, a variety of methods of fault detection method of fault detection and location relate to the voltage transformer. To monitor the sensor with status using sensors and interface to the microcontroller.

Keywords--- Fault Identification, Transformer, IOT (Internet of Thing), Wireless Sensor Networks.

I. INTRODUCTION

The method system is intended to automatically detect faults when they occur analyse the error to determine the type and then send information based on the fault type and fault location to the control some place via IOT. The device location is determined by the IOT Network each transformer having a unique identification and hence is used as the device's address.

Monitoring and controlling of the transformer have a challenging task for engineers in industries. All electrical and non-electrical parameters like frequency, current, voltage, temperature, and winding resistance of the transformers are essential for this system. The performance of a transformer is If any change in the transformer and switch of quality of the transformer has changed, the transformer's false detection continues to be a dangerous activity in some industry in the industry during this process. A wireless control and surveillance system suggests a transformer based on IoT safe and economic data communications in the industry sectors. The microcontroller-based system creates a control signal to collect and store the data and to control or control the transformer by creating a computer interface accordingly. Single phase and three phase transformers are prevalent in their factories. Therefore they are required to ensure uninterrupted security, non-stop operation, and performance.

Nowadays the automation industry is the essential requirement. Transformers are the nerves of many industries. Therefore, the proper and accurate operation requires industrial automation. The wire line can be very expensive or impossible due to physical conditions. One volume, the concentrators will monitor the parameter of the transformers to collect and send data through IOT directly affected by whole fundamental qualities

II. RELATED WORK

In the past, there was a pilot project to install electronic meters at the base of the electrical poles to measure polar-loaded distribution transformers [1]. This measures voltage, current, power and power factor for the transformer, power, and power transformers if a meter is

N. Mekala, M.E, Asst. Professor, Dept of EEE, The Kavery Engineering College, Mecheri, Salem, Tamilnadu.
T.A. Geethagayathri, M.E, PG Student [PSE], Dept of EEE, The Kavery Engineering College, Tamilnadu.

required to record a specific transformer load. Measurement details in logbook [3]. This method requires more burden on ergonomics and travel time and costs [4]. The measurement unit is a microcontroller based device that can send data through various communications media such as RF, Wi-Fi, and network cable [5]. Providing data from central unit measurement units serves as a collecting server [6]. HMI acts as a visual unit and controls the overall system [7]. The electricity transformer is a transformer power supply, which is directly provided to low voltage users, and its functional level is an important component of the entire distribution network operation [8]. The process of transformations of the distribution (based on their name) is guaranteed for a long time [9]. They will be significantly reduced, even if they lose too much losses and deliver a large number of customers. [10] Overloading and freezing of transformers is a major cause of failure in supply transformers. The detection system is not reliable [11]. The core performance of the device is data monitoring system [12] which lacks uncertainty, poor resistance prevention, low data accuracy or data monitoring system. The supply of power supply can not guarantee credibility if it is sent to the real time data transaction [14]. Depending on the requirements above, a distribution transformer needs real time monitoring system to find all transaction parameters and send it to the tracking centre. [15].

III. PROPOSED SYSTEM

In this method, we detect e fault identification. The method consists of microcontroller and sensors. When a low voltage is from the Input source line, then the current would differ and fault identify by using sensors. The sensors detect the input source, and if any fault occurs, the data will send the microcontroller. The input source in the connected with bi-directional that current can flow in both the directions attached to the input source line, The Current transformer is the generation of voltage across the opposite edges of the current carrying conductor which is placed in a magnetic field, method only needs the information from the hall sensors and interface to the microcontroller. The fault happening at a specific output and the particular phase is displayed on an LCD interfaced to the microcontroller. Electrical energy must be delivered to consumers in a safe, efficient, economical and reliable way

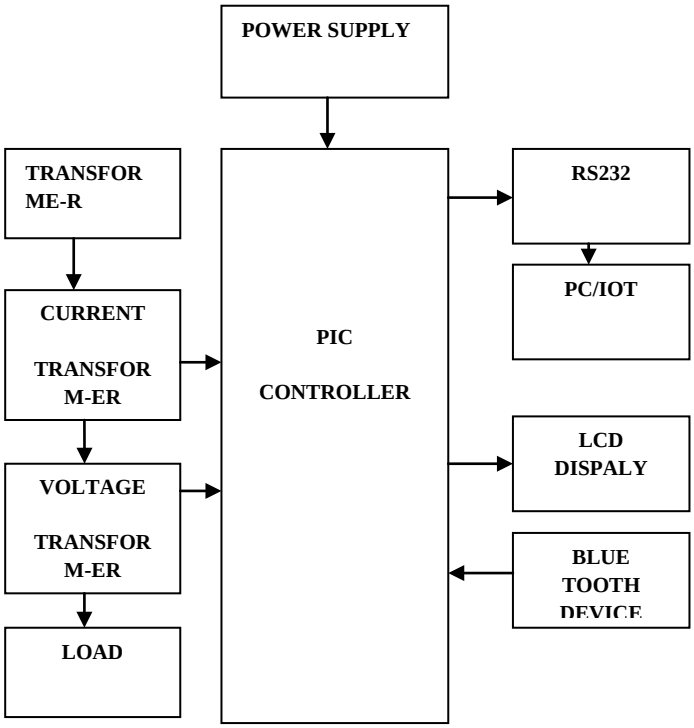


Figure 1: Proposed Block Diagram

IV. BLOCK DIAGRAM OF EXPLANATION

A. Voltage Transformer

The voltage transformer is called a potential transformer. In the power grid system, electricity voltage has been downgraded to some protected value, which is often offered to low-moderator meters and environment. Commercially accessible relays and meters are used for widespread voltage, so the transformer is usually used for distribution of electricity in the power distribution. But it is used to increase the voltage. The only purpose is to reduce tax losses on transmission lines

B. Current Transformer

Current transformers use high voltage currents to reduce the lowest value, and provide a convenient way to safely

monitor surveillance of real power flow in the AC power line using standard current. Unlike the voltage transformer, the current transformer has one or more changes in its primary terminal. This primary winding can be a single flat pattern, a coil or a heavy wire covered around a core or bus strip through a central pit. Because of this type of torque, the current transformer is continuously referred to as a "series transformer" as the primary sequence in the current steering column**.**

C. IOT (Internet of Thing)

This difficulty has led to proposals that do not fit into the practical implementation of the IOT systems, at different times and sometimes. Hence, from a computer perspective, IOT networks, along with back-up network services and devices, are not a good practice due to its innovation and complexity. In addition to technical issues, the adoption of the IOD model is a barrier to the absence of a clear and widely accepted business model that will attract investment that encourages investing in these technologies.

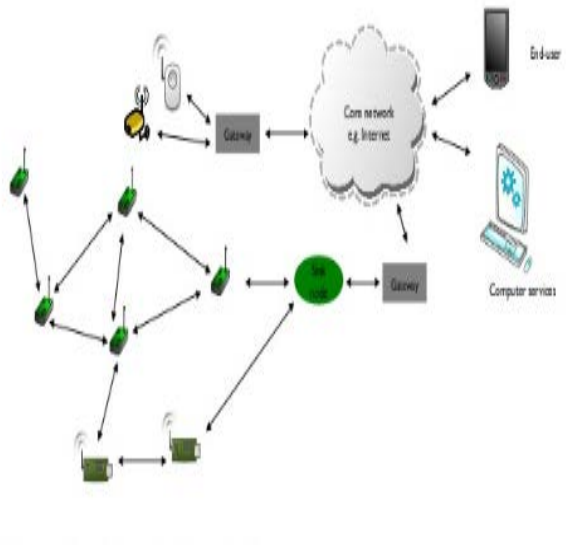


Figure 2: IOT based WSN Network

In this way WSN, testing the algorithm realized a parameter tracking system using the IOT protocol. It performs tasks such as monitoring the alternator through the RF control interface, scaling parameters, grid voltages, level currents, and observing all parameters of transformers such as temperature and temperature in the atmosphere. All parameter values will be transferred to the control system and the parameter values will be displayed on the monitor using the GUI. This can be used for industrial applications and educational purposes, and it can be successfully adapted to experimental research.

D. WSN Network

The Wireless Sensor Network System can not function as autonomous and environmental. The wireless system's overall method of tracking purposes for monitoring purposes not only reduces surveillance costs, but also reduces labor costs, provides flexibility in the system or range. The basic design and function of WSN, which has a high power transfer through IOT technology, is in industrial environments. The development site can reduce WSN measures and reduce energy consumption.

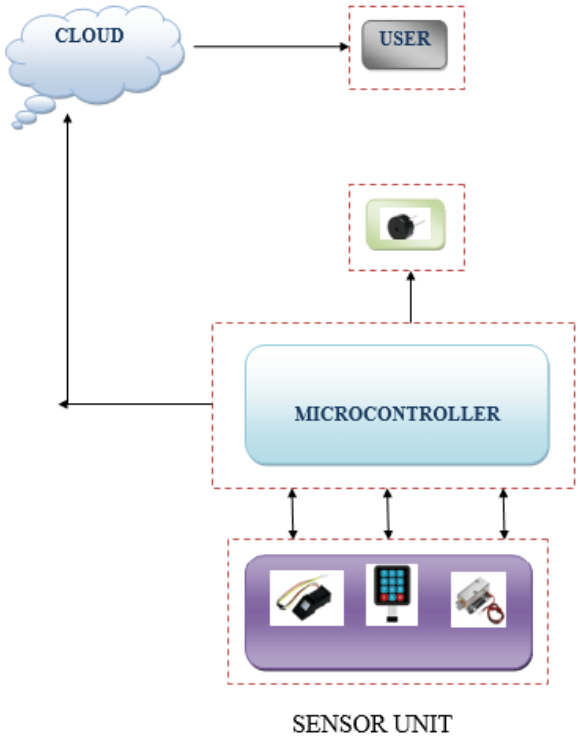
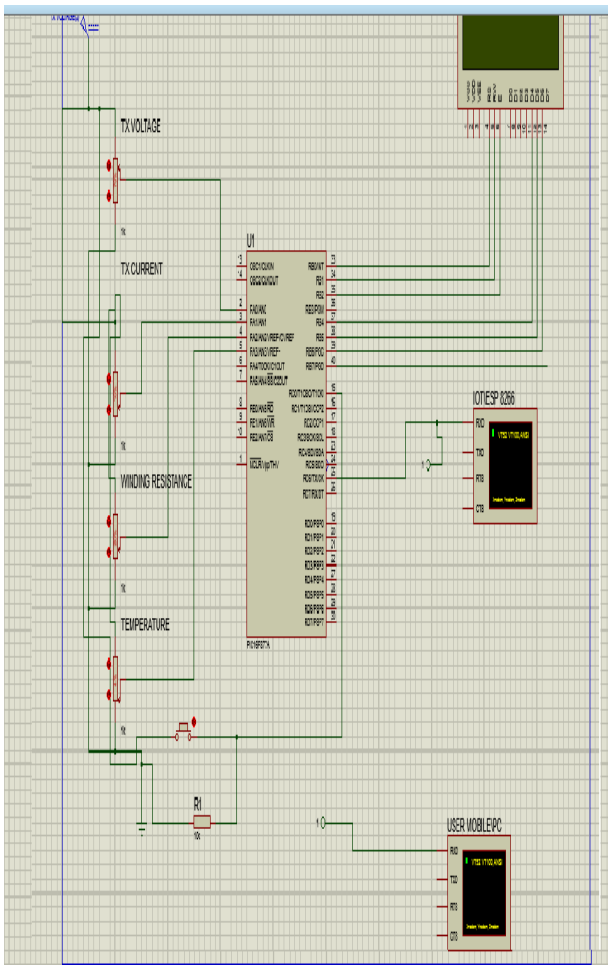


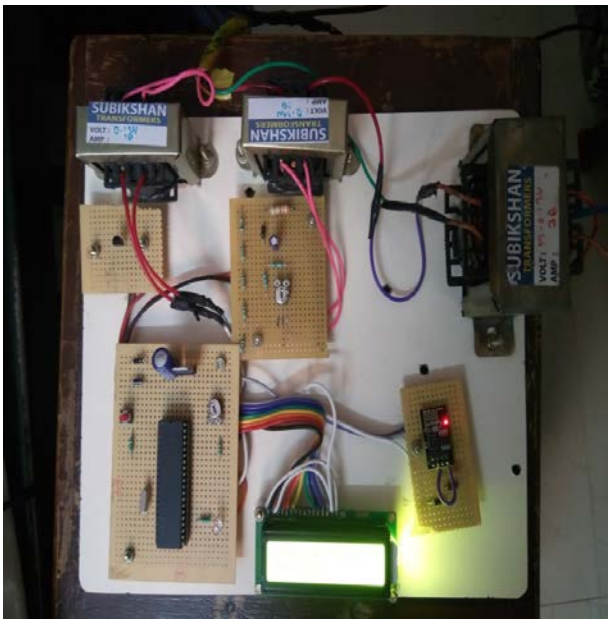
Figure 3: Wireless Sensor Network

V. RESULTS AND DISCUSSION

A. Circuit Diagram



B. Hardware Output KIT

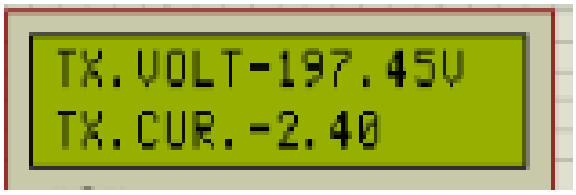


C. Hardware Description

- 230V AC supply is step downed and rectified using rectifier and then filtered for pure DC without any oscillations.
- LCD display is connected to the port C and port D of PIC16F877A.
- Microcontroller reads all entries like temperature and currents, and sends data to the base station using IOT to support RF modules and distinct voltages and resistance designed to function within the IF.
- This mainly monitors four parameters of voltage, current, torque temperature and torque resistance and less expensive, low power wireless sensor networks.
- Receiver module contains an RF module, which is connected to a computer system with MAX232. Tracking data received by IOT is directly transferred to system.

D. Results on LCD

1. Voltage and Current



2. Temperature

3. Resistance

VI. WINDING RESISTANCE

NORMAL VALUES OF TRANSFORMER			
S.NO	Description	Single phase	Three Phase
1	Voltage	230 volts	415volts
2	Current	1 Amps	5 Amps
3	Winding Temperature	45˚ C	50˚ C
4	Winding Resistance	150 milli ohm	200 milli ohm

ABNORMAL VALUES OF TRANSFORMER			
Sl. No.	Description	Single phase	Three phase
1	Voltage	250 volts	450 volts
		170 volts	370 volts
2	Current	> 1 A	> 5 A
3	Winding Temperature	> 45˚ C	> 50˚ C
4	Winding Resistance	>150 milli ohm	>200 milli ohm
REMARKS			
The parameters of phase voltage, phase current, winding temperature and winding resistance values ,open circuit & short circuit are continuously monitored. If, the parameters are observed any abnormal the WSN system has communicate through IOT..			
DISCUSSION			
Implemented the proposed system, the Transformer is continuously monitored and detected the fault and communicated through IOT.			

Applications

- This WSN and IOT based system mainly applied in the transformer for large scale industrial area due to its continuously monitoring technique.
- In generating and distribution station, this method for its fast response.

Advantages

- The main advantage of this concept in this proposal is WSN based IOT.
- The operation of this system is quick due to its monitoring and communicating can be done by same system.
- There is no necessity for the manual control.

VII. CONCLUSION

The fault identification using wireless sensor network and network. The developed of this method using both current and voltage transformer using fault identification. Then Iot is the advanced communication where the interface the multipurpose application. has achieved the target to monitoring and fault detecting system of transformer WSN based IOT is achieved and tested successfully In future will focus on improvement on above proposed work all adding to make smart reliable application.

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