Online Monitoring of Power Transformer To Improve Their Maintenance And Operation

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Abstract- *The primary point of the paper is to secure continuous information of transformer remotely over the web falling under the class of Internet of Things (IOT). For this constant perspective, we take one temperature sensor, one potential transformer and one current transformer for observing T, V, I information of the transformer and afterward send them to a remote area. These three simple qualities are taken in multiplexing mode and associated with a programmable microcontroller of PIC16f877a families through an ADC 0808. They are then sent straightforwardly to a Wi-Fi module under TCP IP convention to a committed IP that shows the information continuously graph structure in any web associated PC/Laptop for show in 3 unique diagrams. Thus, This Transformer Health Measuring will distinguish or perceive startling circumstances before any genuine disappointment which prompts a more prominent unwavering quality and huge cost reserve funds.*

Keywords- Current Sensor, Microcontroller Relay Overload, transformer, internet of things

I. INTRODUCTION

This system is designed for online monitoring of distribution transformers parameter can provide useful Information about the transformers health which will help the utilities to optimally use their transformers and keep the asset in operation for a long time. Transformer is used for providing electricity to the consumers. It provides the required voltage to the consumers by stepping down the voltage in distribution side.

So, monitoring the distribution transformer is the unapproachable task for the electricity department to monitor those transformers regularly. This paper provides a solution for reducing the man power in monitoring of the transformer in online by analyzing various parameters like voltage, current, temperature. The power system any unbalance cortication informed IOT.AB switch open without permission informed officer using IOT Line voltage stress & power transformer winding stress for premier & sectary controlling & monitoring using IOT.

The on-line monitoring system integrates a Global Service Mobile (GSM) Modem, withstand alone single chip microcontroller and sensor packages. It is installed at the distribution transformer site and the above mentioned parameters are recorded using the built-in 8-channel analog to digital converter (ADC) of the embedded system.

Customers by measuring those parameters voltage, current, temperature of a windings, oil Level of a transformer by using various sensors and in the future trends various updates may be come across towards the innovative ideal system.

It installation on Wireless technology.

II. SYSTEM ANALYSIS

Power transformer monitoring and controlling is a process used to measure, monitor, and control the performance of power transformers. This process involves collecting data on the performance of the transformer, analyzing it, and then making adjustments to the transformer to ensure that it is operating properly.

1. Data Collection: The first step in the power transformer monitoring and controlling process is to collect data on the transformer’s performance. This data can include measurements such as voltage, current, temperature, and other parameters. This data can be collected directly from the transformer itself, or it can be gathered from other sources such as sensors and meters.

2. Data Analysis: After the data has been collected, it must be analyzed to determine the transformer’s current condition and performance. This analysis typically involves comparing the data to normal parameters and thresholds to identify any issues or anomalies.

3. Adjustments: Once any issues or anomalies have been identified, adjustments can then be made to the transformer to ensure that it is operating properly. This can include making

changes to the transformer's settings, or even replacing parts of the transformer if necessary.

4. Monitoring: The final step in the power transformer monitoring and controlling process is to monitor the transformer's performance over time. This involves regularly collecting data on the transformer's performance and comparing it to the baseline parameters to ensure that it is operating within the normal range.

Overall, the power transformer monitoring and controlling process is an essential part of maintaining and operating power transformers. By collecting and analyzing data, making adjustments, and monitoring the transformer's performance, it is possible to ensure that the transformer is running properly and efficiently.

III. PROPOSED METHODOLOGY

Smart distribution transformer is needed in the future trends electric power system since is going to be digitalized transmission of electricity in future. So the people will contact through the utility and customers by measuring those parameters voltage, current, temperature of a windings, oil Level of a transformer by using various sensors and in the future trends various updates may be come across towards the innovative ideal system This work presents design and execution of real time monitoring and fault detection of transformer and record key operation indictors of a dispersion transformer like load current, voltage, transformer oil and encompassing temperatures and humidity. This system is designed for online monitoring of distribution transformers parameter can provide useful Information about the transformers health which will help the utilities to optimally use their transformers and keep the asset in operation for a long time.

In this system, we used three sensors for monitoring that is voltage sensor, a current sensor, and temperature sensor. An 8-bit microcontroller that has 8-channel analog to digital converter (ADC) and several digital input/output ports. The ADC is used to read the parameters, the embedded software algorithm that takes care of the parameters acquisition, processing, displaying, transmitting and receiving. And same time an electric switch in which the opening and closing of contacts and extinguishing of the electric arc are accomplished by means of compressed air An air-break switch consists of three basic structural elements: a reservoir with a supply of compressed air, an arc extinguisher, and an electro pneumatic actuator also used in this system.

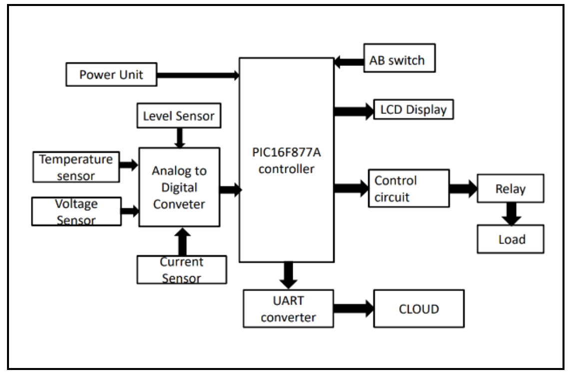

Figure1.Block diagram

IV. SYSTEM DESIGN

This system is designed for online monitoring of distribution transformers parameter can provide useful Information about the transformers health which will help the utilities to optimally use their transformers and keep the asset in operation for a long time. In this system, we used three sensors for monitoring that is voltage sensor, a current sensor, and temperature sensor. Then the values of all the sensors are sent sequentially as per the frequency of multiplexing of the ADC by microcontroller PIC16F877A and IOT Module. The power system any unbalance cortication informed IOT. AB switches open without permission informed officer using IOT.

The design of a monitoring system that consists of a GSM modem that is integrated with standalone single chip embedded system to monitor and record key operation indictors of a distribution transformer like load currents, transformer oil and ambient temperatures. The paper is organized as follows; section two discusses the proposed hardware architecture. The power system any unbalance cortication informed IOT. And same time AB switch open without permission informed officer using IOT to this system.

1. Temperature Sensor: The temperature sensor will be used to measure the temperature of the transformer. It will be connected to the ADC (Analog to Digital Converter) to convert the analog temperature signals into digital signals for further processing.

2. Voltage Sensor: The voltage sensor will be used to measure the voltage of the transformer. It will be connected to the ADC to convert the analog voltage signals into digital signals for further processing.

3. Level Sensor: The level sensor will be used to measure the level of the transformer. It will be connected to the ADC to convert the analog level signals into digital signals for further processing.

4. ADC (Analog to Digital Converter): The ADC will be used to convert the analog signals from the temperature, voltage, and level sensors into digital signals for further processing.

5. PIC16F877A Controller: The PIC16F877A controller will be used to process the digital signals from the ADC and send them to the UART converter.

6. UART Converter: The UART converter will be used to convert the digital signals from the PIC16F877A controller into a format that can be sent over the cloud.

7. Cloud: The cloud will be used to store
the data from the UART converter and provide access to the data for analysis and monitoring.

8. AB Switch: The AB switch will be used to switch between the main and backup power sources for the transformer.

9. LCD: The LCD will be used to display the status of the transformer and any errors or warnings.

10. Control Circuit: The control circuit will be used to control the AB switch and monitor the status of the transformer.

11. Relay: The relay will be used to control the switching of the AB switch.

12. Load: The load will be the device that the transformer is powering.

Overall, this system will be used to monitor and control the transformer using temperature, voltage, level sensors, an ADC, a PIC16F877A controller, a UART converter, a cloud, an AB switch, an LCD, a control circuit, a relay, and a load.

V. EXPERIMENTALSETUP

1. Power transformer: A power transformer capable of monitoring and controlling the power.

2. Remote monitoring system: A remote monitoring system with a computer and a network connection to the power transformer.

3. Control software: A software program to control the parameters of the power transformer and to monitor the data from the transformer.

4. Sensors: Sensors to monitor the voltage, current, temperature, and other parameters of the power transformer.

5. Data acquisition system: A data acquisition system to acquire the data from the sensors and transmit it to the control software.

6. Actuators: Actuators to control the power transformer based on the data from the sensors and the control software.

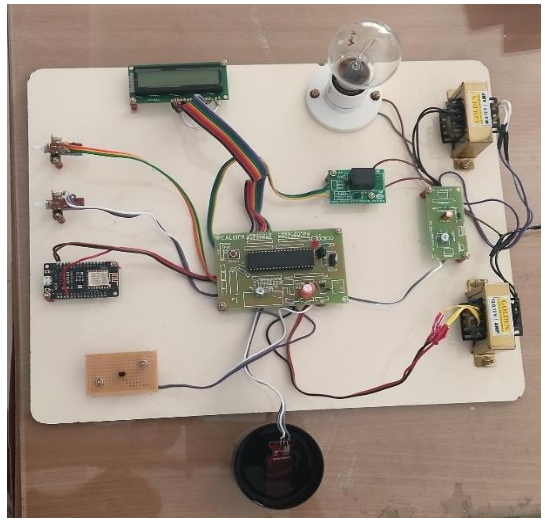

Figure2.Snapshot of proposed hardware kit

7. Power supply: A power supply to power the system.

8. Testing equipment: Testing equipment to test the performance of the system.

VI. RESULT AND DISCUSSION

Power transformer monitoring and controlling can be used to monitor the performance of a power transformer and to detect and prevent potential system failures. This can be done through the use of sensors placed on the power transformer to monitor its temperature, voltage, current, and other parameters. The data collected can then be used to control the transformer and to optimize its operation.

Figure3.Status of Transformer parameters

Power transformer monitoring and controlling can be a valuable tool in the operation of a power system. By monitoring the performance of the power transformer, it is possible to detect problems before they become critical and lead to system outages.

Figure 4.No fault in AB Switch

Figure5. fault in AB switch

Figure6.Reduction of oil level indicator

This can help to reduce the risk of power outages and the associated costs. Additionally, by controlling the transformer, it is possible to optimize its operation and increase its efficiency. This can lead to reduced energy costs and improved overall system performance.

S.NO	PARAMETERS	EXISTING SYSTEM	PROPOSED SYSTEM
1	MAN POWER	HIGH	LOW
2	FAULT DETECTION	HARD	EASY
3	COST	HIGH	LOW
4	CONTROLLER	ARDUINO	PIC
5	ACCURACY	LOW	HIGH

TABLE1.ComparisonOf proposed system with Existing system

VII. FUTURE SCOPE

The system has following future scopes which makes system more reliable and effective:

- System will be capable of communicating in both directions.
- System will be able to measure more transformer parameters.
- Data at monitoring station will get updated whenever requested by monitoring person.
- In Future the project can be implemented with the ARTIFICIAL INTELLIGENCE to control the power transformer parameters.

VIII. CONCLUSION

In conclusion, the integration of Internet of Things (IoT) technology with transformer monitoring and controlling offers numerous benefits in terms of efficiency, reliability, and safety. By connecting transformers to the internet, real-time monitoring of critical parameters such as temperature, oil level, and current can be performed remotely, allowing for timely detection and response to potential issues before they escalate into major problems. This also leads to reduced downtime, minimized maintenance costs, and increased operational efficiency. Moreover, the ability to control transformers remotely provides greater flexibility and responsiveness to changes in demand or other operational requirements. Overall, IoT-enabled transformer monitoring and controlling systems offer a promising solution for enhancing the performance and longevity of transformers while reducing the risks of failures and associated safety hazards.

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