Automatic Load Sharing of Transformer with Health Monitoring over IOT

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***Abstract*: With the quick changing innovations in the power business, new references handling new advances are going to the market. In view of this reality, there is a critical need to monitor universal encounters and exercises occurring in the field of transformers. Transformers are significant for the electrical vitality. An ongoing tremendous enthusiasm for Machine to Machine correspondence is known as the Internet of Things (IOT), to permit the likelihood for self-decision gadgets to utilize Internet for trading the information. 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 and voltage. LCD screens will be provided in which the consuming current, voltage and set current for each point will be displayed. The Input current will be continuously monitored and when any of the parameters goes above the set point level automatically that particular load will be tripped off so that it ensures that the consumer point will run only at a defined limits. IOT module is used to indicate EB department of each process through internet regular basis. The threshold limit can alter dynamically by the remote user based on the situation.**

***Keywords*: Transformer, Arduino, LCD, Voltage Sensor, Current Sensor, Oil Sensor, Temperature Sensor, Bulb.**

1. INTRODUCTION

Electricity plays a vital role in daily life, relying on various components for efficient distribution. Transformers are crucial in power transmission, ensuring smooth electricity flow. Operating them within rated conditions, as per their nameplate specifications, guarantees a long service life. However, overloading, overheating, and voltage fluctuations can significantly shorten their lifespan, leading to failures and power disruptions. Key causes of transformer failure include excessive load, high oil temperature, and inefficient cooling.

Given the large number of transformers across vast areas, manual monitoring is impractical. An IoT-based system can track essential parameters such as load current, oil level, and temperature in real time, transmitting data to a central monitoring unit. This enables timely maintenance, fault detection, and load-sharing techniques to prevent overloading. By remotely monitoring transformer health, utilities can optimize performance, reduce failures, and extend equipment lifespan, ensuring a reliable and efficient power distribution system.

2. LITERATURE REVIEW

The hardware required for this system includes; Controller: programmable logical controller, PC as a monitor device, Sensors: current transformer, potential transformer, and temperature sensor. In this type of monitoring, the system is connected to a distribution transformer and is able to record and send the abnormal values of the transformer parameters to a mobile device using a GSM network. This technology is used by many of the monitoring systems. Abdul Rahman Al-Ali [1] deals with the recording of transformer load currents, transformer oil, and ambient temperature by implementing a mobile embedded system. The large data about the transformer condition can be processed by using the devices like GSM modem,

programmable logic controller and PC as a monitor device and sensors like a current transformer and potential transformer.

Viswanath [2] presented a paper uses a temperature sensor , pic microcontroller, LCD display ,GSM board and Xbee which is used for send the message to the electricity board. This system is capable of detecting multiple faults in the three phase transmission lines. Mohamed Ahmed Eltayeb El Mustafa Hayatiet [3] have designed decision support system to grid operation engineers with information helps to estimate the loads, fix problems and identify week points in the grid. Distribution transformer monitoring is very important in the grid in fact its abnormality adversely affects the smooth functioning of the smart grid. In this paper they suggested and implemented a method to remotely monitor a group of distribution transformers. Here the microcontroller is used for data acquisition and transmission.

Monika Agarwal et al. [3] This paper represents that they are designing a system where there exits communication between system and operator. For this we are using Transformer, microcontroller, logic level converter and GSM i.e. global system for mobile communication modem. This GSM modem helps to monitor transformer health by sending message to the system.

Hongyan Mao, et al. [3] This paper represents a large number of power distribution transformer stations and they are far away from city, wireless GPRS transmission provides a good communication solution to supervise power distribution transformer stations. The scheme of remote wireless monitoring system for power distribution transformer station based on GPRS wireless network was designed in this paper. A control terminal system implement was mainly given, which adopted LPC2132 as main processor, GR47 as the date communication module. The monitor terminal software and flow chart were also designed. At last, the way of configuring the GPRS module to connect network is analyzed.

3. PROBLEM STATEMENT

In many areas the transformers get blast. There are many reasons for that out of them on big reason is, lots of load on transformer. There should be requirement of system that will detect the problems of the transformers using detection circuitry. Categories the problems and if necessary then switch the load of the transformers. That system should be more reliable and easy to use in any condition

4. EXISTING SYSTEM

Automatic load sharing of transformer with health monitoring over IOT involves using smart sensors and IOT devices to monitor transformer parameters like temperature,load,and oil levels.it dynamically balances the load across multiples transformer to prevents overloading, enhance efficiency, and prolong lifespan. Real -time data is accessible for predictive maintenance and decision making.

5. PROPOSED SYSTEM

Two transformers are connected with parallel to each other and when excess load then load is switching between two transformers. Arduino AT328P is used as controller that will used to receive the signal from different sensor and operate the load according. LCD Display is connected with arduino that is used to display the health of the transformer.

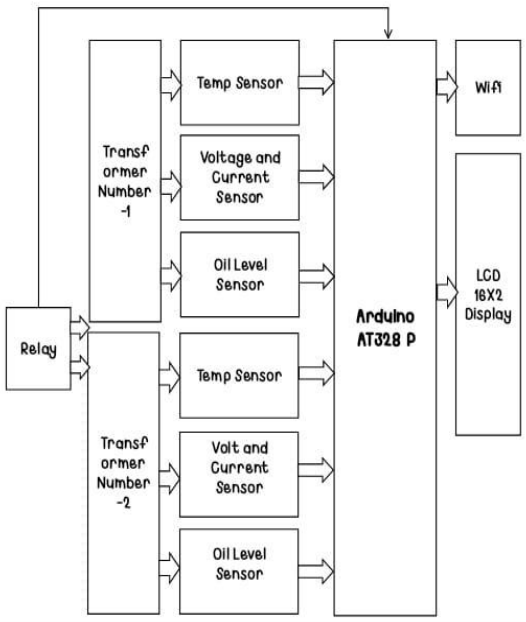

Fig:- Block Diagram Of Transformer Side

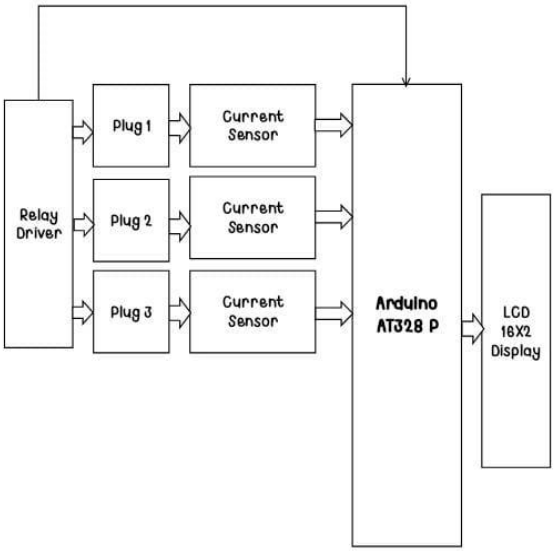

Fig:- Block Diagram Of Load Side

6. REQUIREMENTS

1. Arduino Uno 328p:

Arduino Uno 328P •Arduino AT328P is used as controller that will used to receive the signal from different sensor and operate the load according.

2. Transformer

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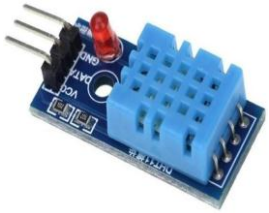
3. Temperature Sensor (DHT 11)

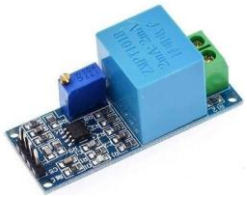


The function of temperature sensor is sence the temperature level of transformer.

4. Level Sensor (PROXIMITY)

The function of oil sensor is sense the oil level of transformer.

5. Voltage Sensor



The function of voltage sensor is sense the voltage of transformer.

6. Current Sensor

LCD Display is connected with arduino that is used to display the health of thetransformer.

7. LCD Display

LCD Display is connected with arduino that is used to display the health of the transformer.

7. FUTURE SCOPE

a. Increased Reliability: Real-time health monitoring and load management canprevent transformer failures, ensuring uninterrupted power supply.

b. Optimized Load Distribution: Dynamic load balancing across transformerscan improve efficiency and extend equipment lifespan.

c. Integration with Smart Grids: Seamless connectivity with smart grid systemsenhances

overall grid efficiency and resilience.

d. Data-Driven Insights: Continuous data collection allows utilities to makeinformed decisions about network expansion and upgrades.

8. ADVANTAGES

1. Optimal load distribution to prevent overloading.
2. Energy savings through efficient load management.
3. Real-time monitoring and remote access via I0T.
4. Early fault detection for proactive maintenance.
5. Reduced downtime and improved reliability.
6. Lower maintenance and replacement costs.

9. CONCLUSION

The project successfully implemented automatic load sharing and real- health monitoring of transformers using Lot, enhancing efficiency, reliability, and proactive maintenance for smart power distribution systems.

10. REFERENCE

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