Transformer Monitoring and Control by Using IOT

1st Ranpise A.N,2nd Bhagyawant S.D, 3rd Bharade P.S, 4th Aadmane S.S, 5th Ms.Salunkhe R.S.

[1]Student,[2] Student,[3] Student,[4] Student,[5] Professor.
[1]Electrical Engineering,
[1]Karmayogi Institute of Technology (Polytechnic), Shelve, Pandharpur, India
[1]ranpiseanmol1014@gmail.com, [2]surajbhagyawant270@gmail.com, [3]
prathameshbharade12@gmail.com,
[4]adamanesatyajit@gmail.com,[5]salunkherutuja177@gmail.com

ABSTRACT - The study introduces a new way to find problems in transformers using the Internet of Things (IoT) and a type of advanced computer system called ensemble machine learning (EML). The IoT system has two main parts: one measures vibrations in the transformer, and the other sends this data to a far-away computer. Then, they use a combination of deep belief networks (DBNs), stacked denoising autoencoders (SDAs), and relevance vector machines (RVMs) to analyze the data. DBNs and SDAs help understand the data, while RVMs decide if there's a problem. They also have a smart method to combine these techniques for better results. Finally,

INDEX TERMS – IOT, Transformer, Current Sensor, Oil Level Sensor, Relay, Aurdiano

I. INTRODUCTION

The Energy is super important for our daily lives. Think about how often we use electricity—it's pretty much constant, right? Lots of things, like buildings and gadgets, need electricity to work, and a key part of getting electricity where it needs to go is the power transformer. These transformers are crucial because they take electricity from high-voltage power lines and make it safe for use in homes and businesses. But these transformers need to work well to keep everything running smoothly. They're expensive and need to last a long time, but factors like overuse or extreme conditions can shorten their lifespan.

To make sure transformers stay healthy, researchers are using high-tech methods like the Internet of Things (IoT). This means they're using smart sensors and computer systems to keep an eye on how transformers are doing. By collecting and analyzing data from these sensors over time, they can spot any problems early on, before they cause big issues. This helps keep everything running smoothly,

II. PROBLEM STATEMENT

A transformer is a device that changes the voltage of electricity as it moves from one circuit to another. It can increase or decrease the voltage, depending on what's needed. We use transformers for lots of things, like sending electricity over long distances or powering small devices at home.

Here's how it works: Inside a transformer, there are two coils of wire called the primary and secondary coils. When electricity flows through the primary coil, it creates a magnetic field. This magnetic field then induces, or creates, an electric current in the secondary coil. Depending on the number of coils in each coil and their arrangement, the voltage can be either increased or decreased.

So, basically, a transformer helps us control the voltage of electricity to make sure it's safe and useful for different purposes.

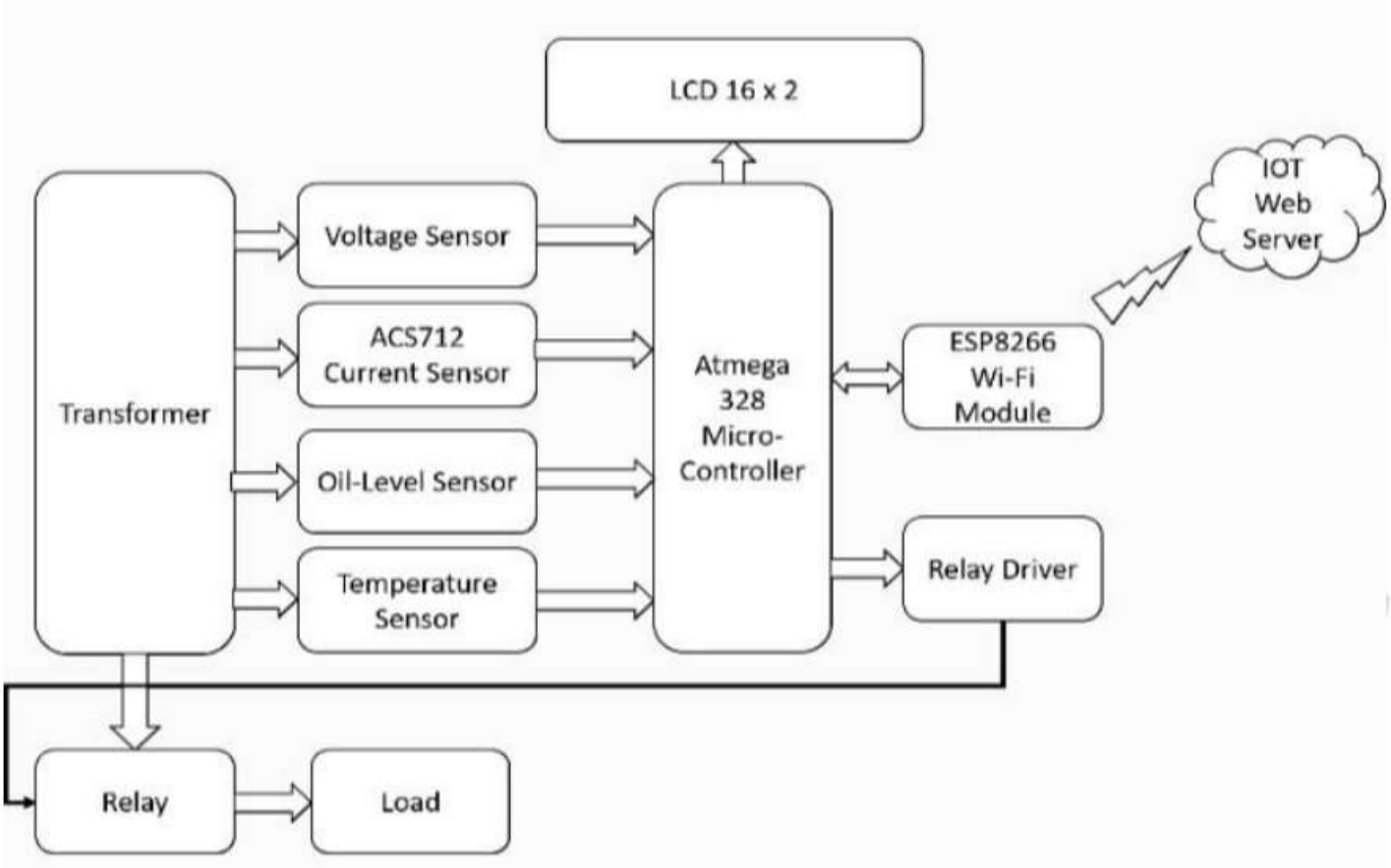
III. LITERATURE SURVEY

Internet of Things (IoT) Based Real-Time Monitoring System for Power Transformer"**
Authors: R. Singh, A. Bhaskar, P. K. Ray
This paper discusses the implementation of an IoT-based monitoring system for power transformers. It covers the design and development of the system, focusing on data collection, transmission, and analysis for real-time monitoring and control of transformers.

Transformer Health Monitoring and Control Using Internet of Things (IoT)
Authors: A. Kumar, S. S. Riaz, R. Gupta
This study presents a comprehensive overview of IoT applications in transformer health monitoring and control. It discusses various sensors, communication protocols, and data analytics techniques employed in IoT-based transformer monitoring systems.

Review on IoT Enabled Condition Monitoring Techniques for Power Transformers
Authors: R. Singh, A. K. Sharma
This review paper provides an in-depth analysis of IoT-enabled condition monitoring techniques specifically applied to power

III . BLOCK DIAGRAM



IV. METHODOLOGY

The Internet of Things (IoT) connects objects that weren't connected before, making them accessible through the internet. This helps improve everyone's lives by using data from these connected objects. For a monitoring system project, we need to create a circuit schematic using Fritzing software. The schematic should show how three sensors—temperature, sound, and current sensors—are connected to an ESP32 microcontroller. The ESP32 is powered by a 5.5V power source using the Vin and GND pins.

In the world of IoT, billions of connections between machines (M2M) make everything possible. These connections help share data between objects and people, adding value at the right time. Power providers often use a system called Supervisory Control and Data Acquisition (SCADA) for monitoring distribution transformers online, but expanding this system is costly.

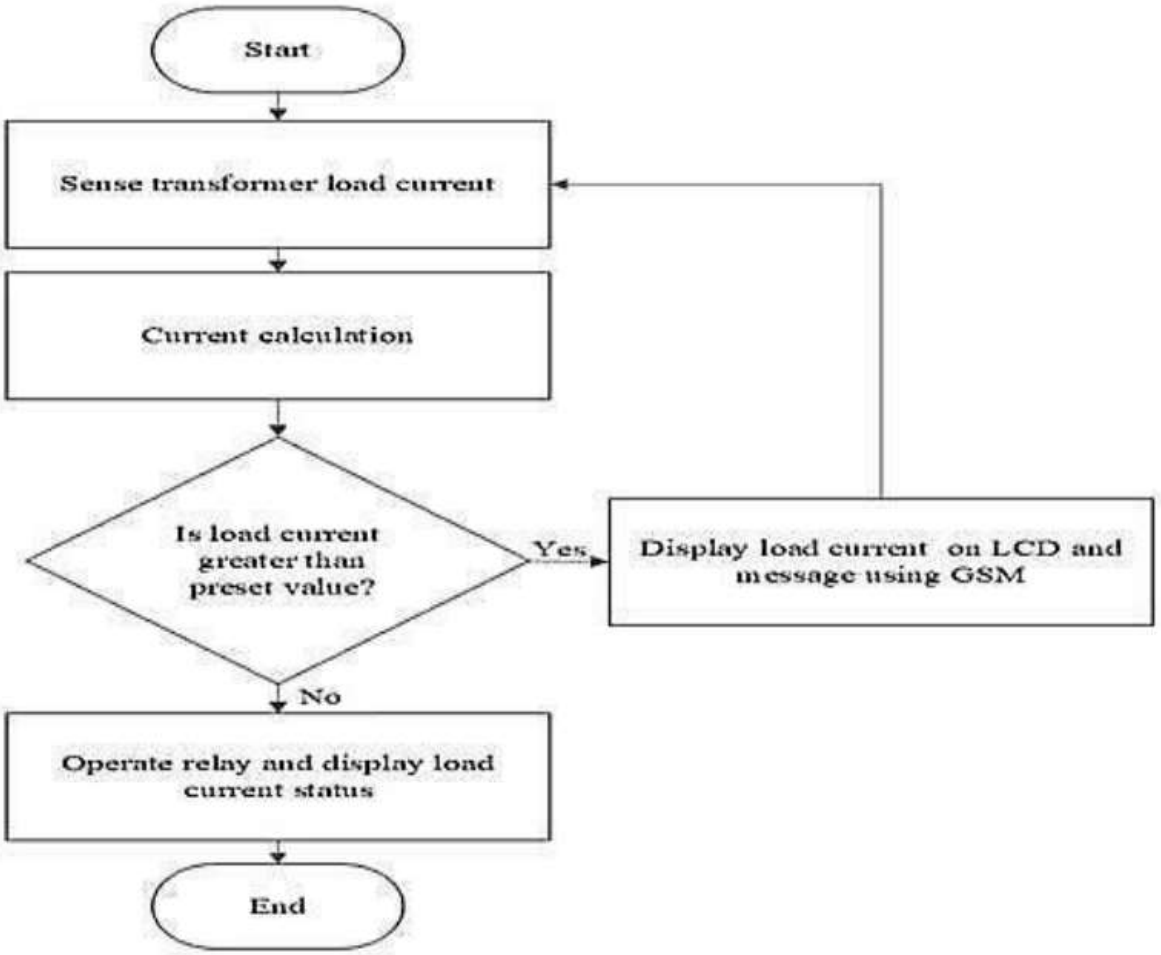
To make the most of distribution transformers and keep them running longer, it's important to monitor key parameters in real-time. This helps identify issues before they become big problems, saving money and increasing reliability by avoiding breakdowns. A real-time monitoring system for distribution transformers should quickly send information to a monitoring center about how they're operating. This proactive approach helps utilities use their transformers efficiently and avoid costly failures.

V. WORKING

The system consists of an Arduino main unit and various sensors connected to it. The Arduino controls the sensors and processes the data they provide. The project aims to monitor the health of transformers in real-time by tracking parameters like temperature, voltage, and current. This data is sent over the internet, allowing for remote monitoring from anywhere. It's a cost-effective solution that enables authorities to quickly respond to power failures or maintenance needs. For example, if the temperature exceeds a certain limit, the system turns on a fan to cool the transformer. Similarly, if the oil level drops below normal, an oil pump is activated to maintain the oil level.

.

VI. IMPIEMENTATION



VII. TECHNICAL SPECIFICATION

1. Sensor: -Temp., oil level sensors, voltage detector.
2. Controller: - Arduino
3. Module: WIFI Module
4. Power Supply: -+5vdc
5. Relay Driver: ULN2803
6. Output device: Motor, FAN

VIII. CONCLUSIONS

Maintaining the health of transformers is crucial for ensuring a reliable electricity supply in our country. By using a microcontroller and three sensors current, sound, and temperature the condition of transformers can be monitored. With the help of Internet of Things (IoT) technology, we can continuously track the health of transformers, whether they are under load or not. This proactive approach helps prevent disruptions to the electrical supply caused by transformer failures.

IX. REFERENCES

[1] Abdul-Rahman AI-Ali, Abdul Khalid & Muhammad Arshad "GSM Based Distribution Transformer Monitoring System," IEEEMELECON2004, May12-15,2004, Dubrovnik, Croatia

[2] K. Sridhar, M. Assarudeen, J. RanjithKumar, E. Sarathbabu "Transformer Health Monitoring and Control Through Arduino," IJAERD – International Journal of Advanced Engineering and Research, vol.5, Issue04,2018.

[3] Monika Agarwal, Akshay Pandya," GSM Based Condition Monitoring of Transformer," IJSRD-International Journal for Scientific Research & Development, Vol.1, Issue12,2014, ISSN (online):2321-0613. https://www.allaboutcircuits.com/textbook/semiconductors /chpt-3/rectifier-circuits/

[4] Mrs. A.P. Khandait1, SwapnilKadaskar2, GirishThakare3, "Real Time Monitoring of Transformer. using IOT", International Journal of Engineering Research & Technology (IJERT), Vol.6Issue03, March2017.

X. ADVANTAGES

1. Detects the faults in real time based on current, voltage, temperature.
2. Increase system reliability and stability by the monitoring system.
3. The system prevents faults and losses of the power supply which significantly benefits utility consumers
4. Overcurrent, over temperature are prevented using this technique

XI. APPLICATION

1. Distribution Transformer Monitoring
2. Smart Grid
3. Power Transformer Monitoring

XII. RESULT

The current, voltage, temperature, and oil level of the transformer are displayed on an LCD screen. This data is also sent to an IoT server where the health of the transformer is monitored and controlled.

On the IoT server, you can see four parameters: temperature, voltage, current, and oil level. You can also view the data entries on the IoT server.