International Journal of Research in Engineering, Science and Management
Volume 5, Issue 4, April 2022
https://www.ijresm.com | ISSN (Online): 2581-5792

Automatic Load Sharing of Transformer and Parameter Monitoring

Vivek Vishnupant Chouguler[1*], L. S. Patil[2]
[1]PG Student, Department of Electrical Engineering, D. Y. Patil College of Agricultural Engineering & Technology, Talsande, India
[2]Professor, Department of Electrical Engineering, D. Y. Patil College of Agricultural Engineering & Technology, Talsande, India

***Abstract*: A transformer is a permanent device that transfers power from one level to another. The primary goal of load sharing is to prevent the transformer from overload. The effectiveness of the transformer decreases as a result of the overload, and the windings become overheated and maybe burned. As a result, the transformer is protected by sharing load on it. This will be accomplished by using a microcontroller to connect another transformer in parallel. The load on the first transformer is compared to a reference value by the microcontroller. When the load exceeds the reference value, the additional load is shared by the second transformer. As a result, the two transformers operate effectively and harm is avoided. The sensor unit, control unit, and microcontroller are the main modules employed here. Switching is also sent to the control station using a GSM modem. The project's benefits include transformer protection, continuous power delivery, and short circuit protection.**

***Keywords*: Transformer, Sensing unit, Control unit, Arduino, GSM module.**

1. Introduction

A transformer is a fixed device that transforms energy from one voltage level to another. It's an inductively connected electrically separated device that adjusts voltage level without changing frequency. The heart of the power system is the distribution transformer, which is one of the most critical pieces of equipment in the system.[2] The distribution transformer's ability to operate reliably is critical to the operation of a power system. As a result, essential factors such as voltage and current must be monitored and controlled in order to evaluate the distribution transformer's performance. As a result, it aids in preventing or minimizing the disturbance caused by a sudden unexpected breakdown.[1] Transformers, being one of the most important pieces of equipment in the electric power system, require protection as part of the overall system security strategy. The internet of things aims to link previously disconnected objects. By utilizing these linked items and data created, the internet of things has the potential to improve everyone's quality of life.[6] As a result, we may use IOT to monitor the transformer characteristics on the screen. A transformer is a fixed device that transforms energy from one voltage level to another. It's an inductively connected electrically separated device that adjusts voltage level without changing frequency. The heart of the power system is the distribution transformer, which is one of the most critical pieces of equipment in the system.[3] The distribution transformer's ability to operate reliably is critical to the operation of a power system. As a result, essential factors such as voltage and current must be monitored and controlled in order to evaluate the distribution transformer's performance. As a result, it aids in preventing or minimizing the disturbance caused by a sudden unexpected breakdown. Transformers, as one of the most important pieces of equipment in the electric power system, require protection as part of the overall system. [4]

2. Objectives

1) The load is automatically shared by transformers.
2) There are no mistakes made by hand.
3) It protects the primary transformer from damage caused by issues like as overload and overheat are two words that come to mind when thinking about overload and overheating
4) The customers are provided with an uninterrupted power supply.
5) To design and fabricate gear that will track performance by including the load's power consumption into the load sharing procedure Consideration.

3. Block Diagram

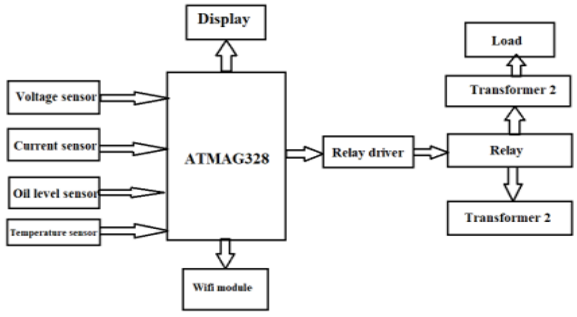

Fig. 1. Block diagram [5]

The hardware components and programmed microcontroller were used in this transformer parameter monitoring through the internet system. If we wish to monitor data from a transformer, such as temperature, current, and voltage, this system is directly connected to these components.

The current sensor, voltage sensor, and temperature sensor

*Corresponding author: gajkumar.kavathekar@ritindia.edu

then perceive their corresponding data; however, this data is in analogue form and must be converted to digital form by the ADC, which is connected to the current, voltage, and temperature sensors. The microcontroller then receives this data, displays it on an LCD display, and sends it to the Wi-Fi module. Then there's this module, which is connected to a wireless network, and we may get this data from our computer or mobile device via any specific IP address. This information is presented in several charts, including current, voltage, temperature, and oil level charts, on a dedicated webpage. Different chart shapes might be used to represent this data in various formats.

4. Hardware and Result

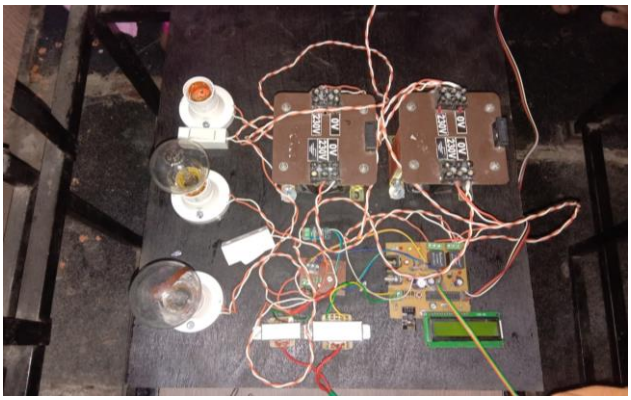

Fig. 2. Hardware setup

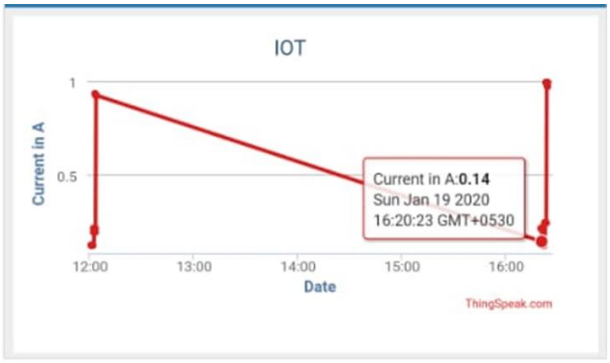

Fig. 3. Output of current

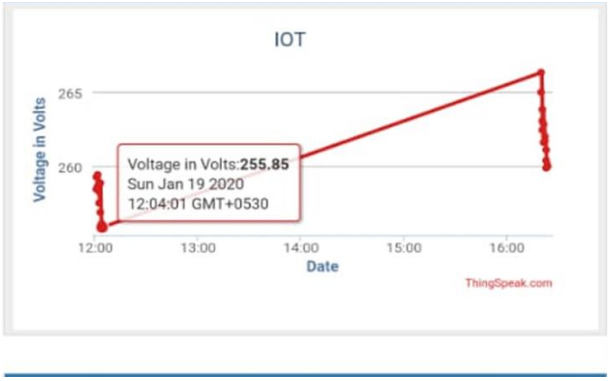

Fig. 4. Output of voltage

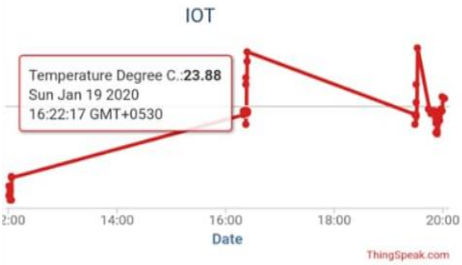

Fig. 5. Output of temperature

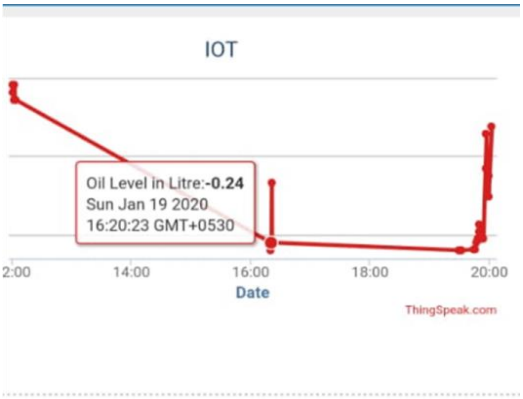

Fig. 6. Output of oil level

5. Conclusion

We discovered that if the load on one transformer increases, the relay will sense the change in current, the microcontroller will activate, and slave transformers will immediately activate to share the load.

The work on "Automatic load sharing of transformers" has been successfully designed, tested, and a demo unit has been fabricated for operating three transformers in parallel to automatically share the load with the help of a change over relay and relay driver circuit, as well as to protect the transformers from overloading and thus provide an uninterrupted power supply to the customers.

References

[1] Monika Agarwal and Akshaypandya, “GSM Based Condition Monitoring of Transformer”, International Journal for Scientific Research Development|, vol. 1, no. 12, 2014.

[2] Gajkumar R. K. and Manoj D. P, “Interleaved high power improved two-stage flyback inverter for photovoltaic applications,” J. Phys. Conf. Ser., 2020.

[3] G. R. Kavathekar, Aditi Abhyankar, Harshada Badhalkar, Priyanka Sutar, Rutuja Patil, “Electricity Generation by Using Roof Wind Ventilator,” GIS Science Journal, 8(7), 38-41, 2021.

[4] Hongyan Mao, "Research of wireless monitoring system in power distribution transformer station based on GPRS," 2010 The 2nd International Conference on Computer and Automation Engineering (ICCAE), 2010, pp. 386-389.

[5] Pathak A. K, Kolhe A. N, Gagare J. T. and Khemnar S. M, “GSM Based Distribution Transformer Monitoring and Controlling System”, IJARIIE, vol. 2, no. 2 2016.

[6] J. H. Estrada, S. V. Ramı´rez, C. L. Cortés and E. A. C. Plata, "Magnetic Flux Entropy as a Tool to Predict Transformer's Failures," in IEEE Transactions on Magnetics, vol. 49, no. 8, pp. 4729-4732, Aug. 2013.