LOAD SHARING OF TRANSFORMER BY USING ARDUINO

Mujawar Shaheen[1], Jadhav Pradnya[2], Jadhav Shweta[3], Gurav Nilam[4]

[1,2,3,4] *Student, Department of Electrical Engineering, Shree Santkrupa Institute of Engineering and Technology Ghogaon, karad, India*

ABSTRACT

A transformer is a stationary device that transforms energy from one level to another. The proposed project's goal is to use load sharing to safeguard the transformer from overload. Overloading a transformer reduces its efficiency, and the windings become hot and possibly charred. As a result, the transformer is protected by sharing load on it. This will be accomplished by connecting another transformer in parallel to the Arduino via a microcontroller. The load on the first transformer is compared to the reference value by both controllers. When the load surpasses the reference value, the residual load is shared by the second transformer. The system will be shut down if the load exceeds the rating of both transformers. The operator receives a communication through GSM whenever the transformer's load is shared. In addition, an IOT is employed to notify the control station about load sharing. Both transformers will be properly maintained under this configuration. As a result, both transformer temperatures, load shared with another transformer, and timing are recorded. These can retrieve around a year's worth of data. All of this contributes to the system's efficiency and dependability.

Keyword: - *Arduino1, Transformer2, Sensing Unit3, etc….*

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 idea of mutual induction is used by transformers to transmit ac voltage from one electrical circuit to another. The heart of the power system is the distribution transformer, which is one of the most critical pieces of equipment in the system. The distribution transformer's efficient operation is critical to a power system's reliability. As a result, essential factors like voltage and current must be monitored and controlled in order to evaluate the distribution transformer's performance. As a result, it assists in avoiding or limiting the disturbance caused by an unanticipated breakdown. Transformers, as one of the most important pieces of equipment in the electric power system, require protection as part of the overall system security strategy. Furthermore, rising population and necessary demands have increased the demand for electrical power. The present systems have become overburdened as a result of the rising demands. Overloading at the consumer end manifests itself at the transformer terminals, posing a threat to the transformer's efficiency and protection systems. The effectiveness of the transformer decreases as a result of the overload, and the windings become overheated and maybe burnt. Repairing it takes a long time and costs a lot of money. Because of any possible contingencies on transmission lines, any breakdown or defect in power systems, or economic factors, transformers are occasionally loaded over nameplate specifications. Thermal overload is one of the causes of distribution transformer damage or tripping. It involves the control against over current tripping of distribution transformers to prevent transformer damage from overloading at the consumer end. The ageing of transformers is influenced by an

increase in the operating temperature of the transformer owing to overloading. One of the most serious implications of overloading power transformers is accelerated ageing. To keep the transformers operating safely, load constraints must be set. Furthermore, when transformers are overloaded, voltage regulation may increase and power factor decreases. The goal of the project is to prevent the transformer against overloading. This is accomplished by connecting another transformer in parallel via a microcontroller and a relay, which shares the first transformer's excess load. To avoid thermal overloading, the transformers are turned alternately. As a result, two transformers perform effectively under overload conditions, preventing damage. If the load grows over the capacity of two transformers, consumers will be prioritized for load shedding, which will ensure uninterrupted service.

1.1 OBJECTIVE

The project's major goal is to safeguard the transformer from overload by sharing load with a standby transformer and to offer users with an uninterrupted power supply.

2. METHODOLOGY

The temperature sensor and load are linked to the main transformer. The current sensor is attached to the load. When your transformer heats up (the temperature at the main) the temperature sensor and load are linked to the main transformer. The current sensor is attached to the load. When your transformer heats up (the temperature at the primary transformer rises) or your load rises, your transformer shears its load. We're utilizing a current sensor, but the output isn't the right voltage, therefore we're using a signal conditioner to convert the current sensor's output to the right voltage. Arduino is used to monitor temperature and current (continuously). When the temperature or current rises, the Arduino begins to shear the load. If your temperature or load exceeds the set point, your load has grown, and a notification will appear on the display indicating that your load has been sheared to another transformer due to either temperature or current. The load shear to the second transformer is then activated by the second relay.

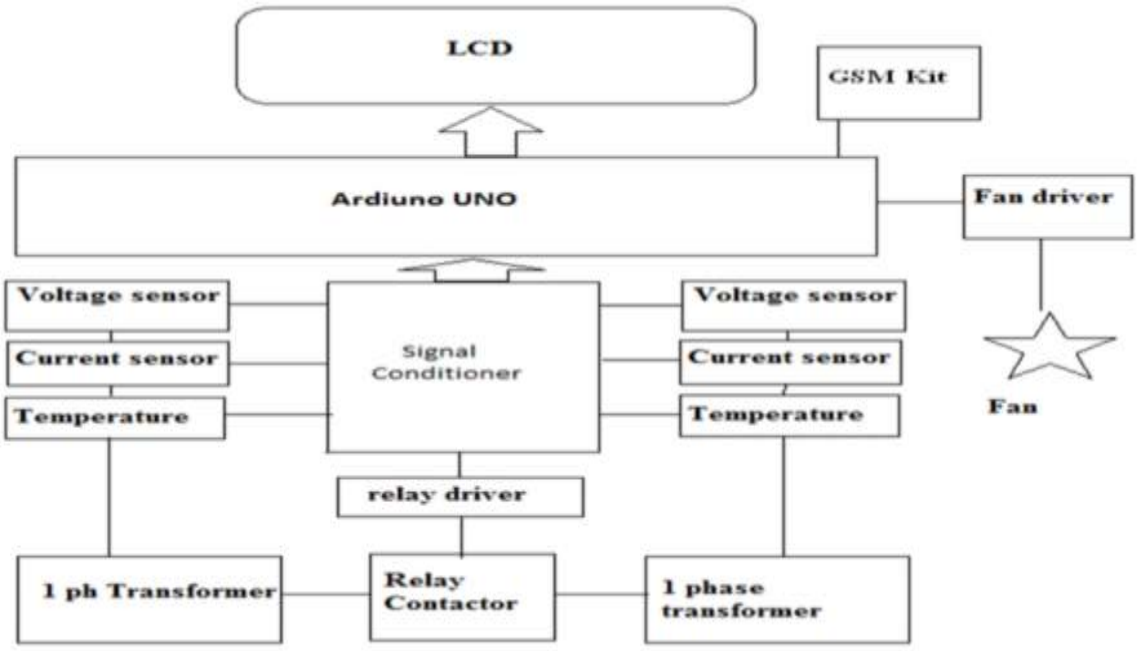

Fig -1 Block Diagram

2.1 Circuit Diagram

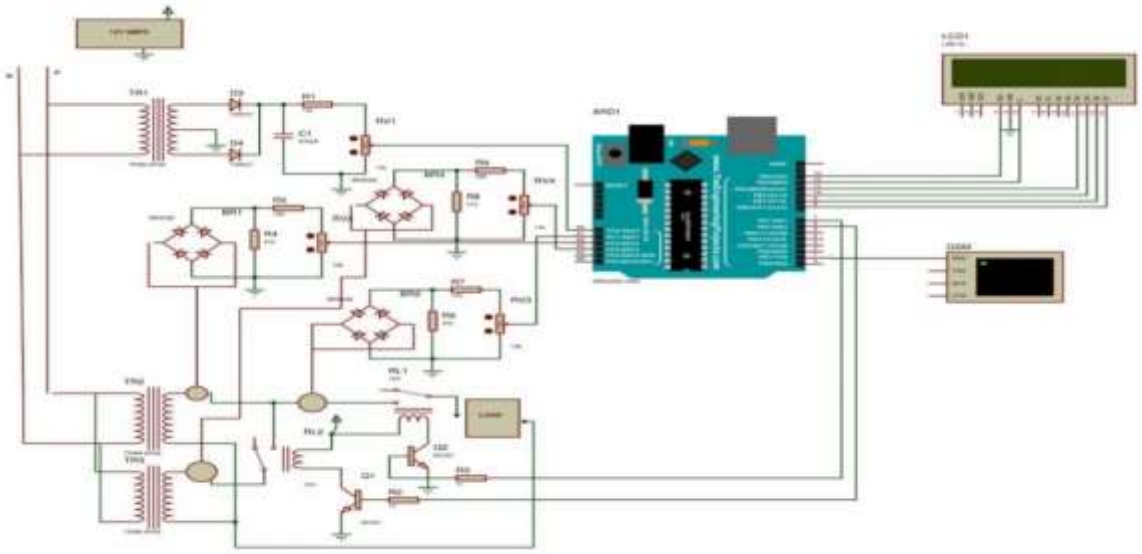

Fig – 2 Circuit Diagram

3. OERATION

Only one transformer is used to feed the loads in the proposed system. A circuit breaker and a relay link a standby transformer in parallel. The load current is continuously measured by the current transformer and fed to the Arduino. The user enters the reference value or maximum load limit, and the user or concern authority also sets the load priority level. A single transformer would not be able to feed all of the load during peak hours when demand increases. When the load demand exceeds the reference value, the Arduino sends a control signal to the relay coil, which energizes it. As a result, the backup transformer will be connected in parallel, sharing the load evenly. Because the transformers are rated the same. As a result, all of the loads are efficiently fed, ensuring an uninterrupted power supply. When the load exceeds the capacity of the two transformers, priority-based load shedding will be enforced. The circuit breaker for the load with the lowest priority will be opened, and the load will be turned off. To avoid thermal loading, the first transformer will be turned off when the load falls and returns to normal operating conditions. Because the first transformer runs for a longer period of time than the standby transformer, its body temperature rises. The transformers can be cooled naturally by enabling alternative switching. This will boost the system's efficiency.

4. ADVANTAGES

1. *Share the load to protect transformers from being overwhelmed.*
2. *No manual error occurs;*
3. *It protects the primary transformer from damage caused by overloading, overheating, and other issues.*
4. *The client receives an uninterrupted power supply as well as short circuit protection.*

5. CONCLUSION

As a result, we can conclude that this auto load sharing system will increase system efficiency, dependability, and eliminate manual interference. With the help of a changeover relay and a microcontroller circuit, the "Automatic

load sharing of transformer using Arduino" demo unit runs two transformers in parallel to automatically share the load. It guards against overloading and overheating, ensuring that the consumer receives uninterrupted power.

6. REFERENCES

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