Automatic Load Sharing of Transformer by Using Arduino

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Abstract: **Transformer is basically a static device which transfers the electrical power from one circuit to another circuit with desired change in voltage and current at constant frequency. It is only one device which operates at highest efficiency at full load condition. But abnormal condition occurs at overloading condition which may result in severe problem in future. To avoid such condition, we are using other standby transformer which supplies the load when overloading occurs on main transformer unit, which switch on automatically by Arduino Microcontroller. This will result in efficient loading of both transformers. Also, when load is normal both transformers can be switched on to supply the load alternately. This will avoid the thermal overloading of transformer. Also, this arrangement will provide proper maintenance facility for both transformers. Whenever the sharing of load on transformer occurs, the operator gets message through the GSM. All these advantages will make this system very efficient and reliable.**

Keywords: **Transformer, Arduino, Load sharing.**

1. Introduction

Transformer is the main component in the electric power transmission and distribution system. The problems of overloading, voltage variation heating effects are very common. It requires high cost for repair and also more time. This work is all about protecting the transformer under overload condition. When overload condition occurs, its secondary winding get overheated and it may burn. So, the transformer can be protected by removing extra load and this can be done Operating another transformer in parallel with main transformer.

To accomplish this requirement there is one method of manual approach. In this other transformer is connected manually during heavy loading condition. But practically manual approach is not efficient. So, we are employing Arduino to make the switching of transformer automatically.

2. Literature Survey

The point of this task is to build up a programmed transformer dispersion and burden sharing framework. It will likewise have sensor to detect the temperature of transformer and offer the load. Parallel activity is accustomed to decreasing the additional heap, the transformer can be ensured. A considerable lot of the scientists in ongoing past concentrated on the compelling burden sharing the status of framework and subsequently to tackle the issue of voltage breakdown. In such manner, voltage dependability list of every transmission line turns into a valuable proportion of intensity framework observing. The record could distinguish when transformer is from its place of breakdown. Execution files to anticipate closeness to voltage strength limit have been a changeless worry of specialists and power framework administrators, as these records can be utilized to programmed load conveyance and sharing. Distributions on the subject significant to voltage security and its improvement are excessively various and so just those significant productions which are legitimately identified with this work have been alluded furthermore, exhibited in this proposition. Dissemination transformers are a significant piece of intensity framework which circulates capacity to the low-voltage clients legitimately, and its activity condition is significant for the whole dissemination organize activity. In any case, their life is altogether decreased on the off chance that they are exposed to over- burdening and over temperature bringing about unforeseen disappointments and loss of supply to an enormous number of clients along these lines affecting framework unwavering quality.

3. Working

Arduino is an automation-based microcontroller device which will automatically switch the transformer into circuit when overloading condition occur for transformer one. Thus, this will result in efficient working of both transformers. Also, when load is constant both transformers are switched on into the circuit alternately. This will avoid continuous heating of only one transformer.

The Arduino compares the load on the first transformer with a reference value. When the load exceeds the reference value, the second transformer will automatically be connected in parallel with first transformer and share the extra load. Therefore, a number of transformers work efficiently under overload condition and the damage can be prevented. In this work, the second transformers share the load of main transformer in the case of over load and over temperature

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conditions. A sensor circuit containing current sensor, Arduino, current transformer etc. is designed to take the data from main transformer and if it is found to be in overload condition, immediately the second transformer will be connected in the parallel to the main transformer and the load is shared. The Arduino will analyze the load current and temperature of transformer and displays the values on LCD.
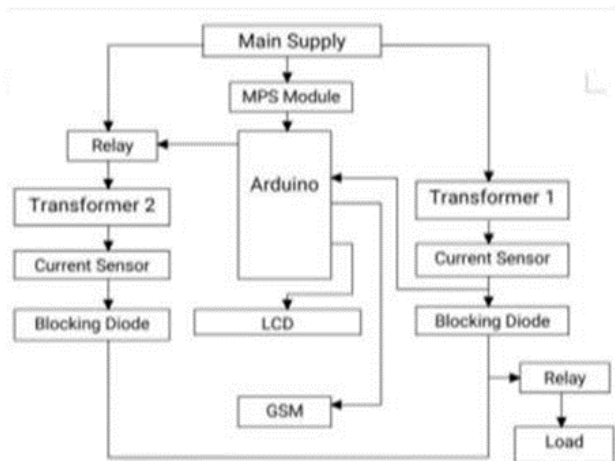

Fig. 1. Block diagram

Whenever loads are added to the secondary side of the transformer, the current at the secondary side rise. As the load current exceeds the rated current rating of the transformer, the temperature of the secondary winding rises, therefore the Arduino will send a trip signal to the relay, thereby turning on the second transformers. Initially when we switched ON the load that load will be shared by the first transformer. Once load has been increased on first transformer above its rated capacity then the stand by transformer (second) will share the load automatically. In this project three modules are used to control the load current. The first module is the sensing unit, which is used to sense the current of the load; the second module is control unit in which relay plays the main role, and its function is to change the position with respect to the control signal and last module is Arduino.

A. Advantages
1. The load is shared by transformer is automatically.
2. No manual error is taking place.
3. It prevents the main transformer from damage due to the problems like overloading as well as overheating.
4. Un-interrupted power supply to consumer is supplied

and short circuit protection.

B. Applications
1. Industrial area.
2. Electrical Substations.
3. Shopping malls.
4. Process industrial power.
5. Distribution station.
6. Agricultural transformer.
7. power Grid.

4. Conclusion

In this consequently manner we conclude that the automatic load sharing system provides uninterrupted power supply and this system protect the transformer from overloading and overheating and due to this system efficiency and reliability is also increases and also lessen human involvement. This system also provides alternating switching to the transformer and because of this it can be cooled by natural method. Due to this power supply is provided without any interruption. This projects aids in using the power supply intelligently in peak load hours. The transformers are connected and disconnected automatically, and hence the burden is divided by automatic sensing of overload, and the transformer's safety increases. There is no need to operate both the transformers at off peak hours. The "Automatic Load Sharing" unit is successfully designed, tested and demonstrated on a smaller scale. This technology gives the un-interrupted power supply to consumers. Any risk of blackout due to overload is eliminated in that particular distribution network. The voltage drops due to overload are overcome in this project.

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