

## Automatic Load Sharing of Transformer 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.

**KEY WORDS** – Arduino, GSM, LED, Sensor, Transformer.

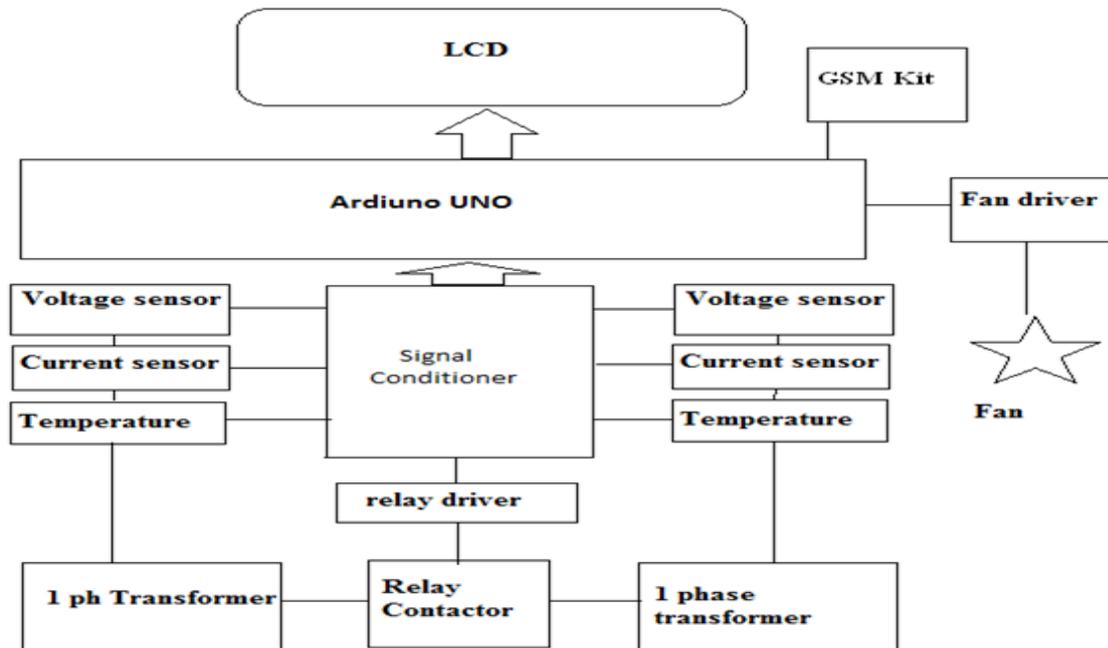
### 1. INTRODUCTION

Transformer is a static device which transfers the electrical power from one circuit to another circuit with desired change in voltage and current at constant frequency. Transformer is only one device which operates at higher efficiency at full load condition. But some abnormal conditions occur at overloading conditions. Also transformer efficiency gets reduced due to increased heating and increased losses. So it is very essential to share this load other transformer or replace the transformer of higher rating. Later technique is not feasible economically so the first technique is practically employed to supply load efficiently. We are employing the first technique to supply the load efficiently and reliably.

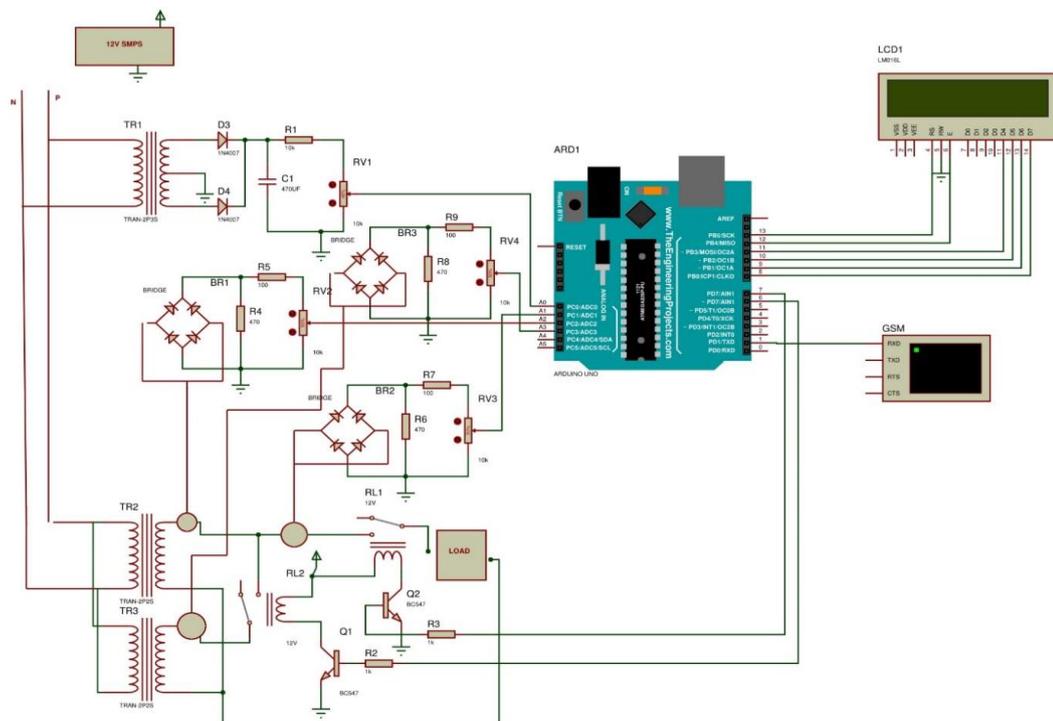
To accomplish this requirement there is one method of manual approach. In this other transformer is connected manually during heavy loading condition. But practically manual approach is not efficient. So we are employing Arduino to make the switching of transformer automatically. Arduino is an automation 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. This arrangement offers proper maintenance facility for both transformers. All this advantages will

make this system very efficient.

## 2. BLOCK DIAGRAM



### 2.1. CIRCUIT DIAGRAM



### 3.OPERATION

In the proposed system, only one transformer is operating to feed the loads. A standby transformer is connected in parallel through a circuit breaker and relay. The current transformer continuously measures the load current and feeds it to the Arduino. The reference value or the maximum load limit is entered by the user and priority level of the load is also set by the user or concern authority. As the load demand increase during peak hours, a single transformer would not be able feed all the load. During this condition, when the load demand exceeds the reference value, the Arduino will give a control signal to energize the relay coil. Thus the stand by transformer will be connected in parallel and share the load equally. Since the transformers are of the same ratings. Thus all the loads are fed efficiently providing un-interrupted power supply.

When the load increases to further to a value which is greater than the capacity of the two transformers, priority based load shedding will be implemented. The loads which have the lowest priority will be shut down by opening the respective circuit breaker.

When the load decreases, and comes to normal working condition, first transformer will be shut down in order to avoid thermal loading. This is done because the first transformer operates for a longer time interval than standby transformer and its body temperature rises. By providing alternative switching the transformers can be cooled by natural methods. This will improve the efficiency of the system.

### 4. CONCLUSION

Thus we conclude that this system of auto load sharing will improve system efficiency, increase reliability and will reduce manual interference. The “Automatic load sharing of transformer using Arduino” demo unit operates two transformers in parallel to share the load automatically with the help of change over relay and microcontroller circuit. It protects from overloading and overheating thus providing un-interrupted power supply to the customer.

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