



Load Sharing of Transformer using Fuzzy Logic Controller

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ABSTRACT:

This project Report describes Automatic Load Sharing of Transformers to protect the transformers under overload condition and makes sure the supply is uninterrupted. When load on transformer one exceeds 0.7 mA then the secondary transformer that is slave transformer will automatically turn ON. Our main purpose of this project is to give us uninterrupted power supply. Our power distribution system works on Transformer; it is main component in the system if it gets overloaded then the supply will stop. A lot of peoples have faced power cut due to the transformer failure and it takes too much time to restore the supply for such times this project can give us the continuous power flow until the main transformer backs in action. Nowadays it has become a main concern to overcome from this problem this project is going to be very helpful such problems were a source of motivation for this project. If we connect another one transformer in parallel with main transformer, then if main transformer gets overloaded then the slave transformer will come into work and the supply will continue.[1]

Introduction:

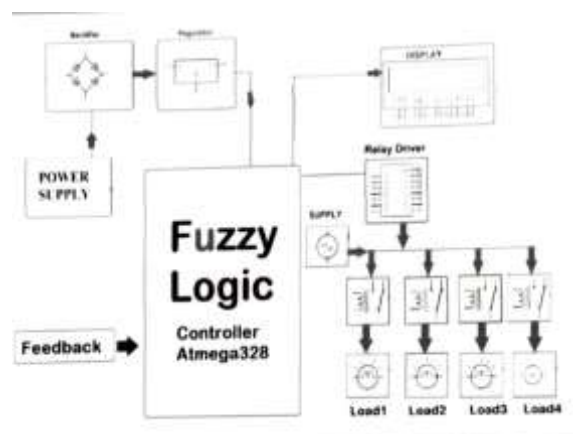
Different types of circuit breakers and switches are used to maintain the smooth flow of distribution network. As the demand of power supply can change drastically depending upon the load requirement, the control and monitoring of these accessories is required for these switches and CB as they are imposed to the different climatic conditions . For fast operations of the distribution network, modern technologies like signaling, computers, and communication are used. These automatic systems need to be control and monitored with the help of human machines interface. The loads are modifying with the help of these computer aided power system by automatic opening and closing of the switches and CBs which loads towards Load Balancing . Nowadays load balancing is used drastically to enhance the system security and to degrade the distribution feeder losses. Large number of switches is there which are normally closed and normally open. By altering the position of these feeder switches the load currents can be transfers from one feeder to another depending upon the requirement [3] Transformer is the vital component in the electric power transmission and distribution system. The problem of overloads, voltage variation and heating effects is very common. It takes lot of time to its repair and also involves lot of expenditure. This work is all about protecting the transformer under overload condition. Due to overload the efficiency gets reduced and the secondary winding gets overheated or it may be burnt. So, by reducing the extra load, the transformer can be protected. This can be done by operating another transformer in parallel with main transformer through comparator and change over relay. The comparator 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, two transformers work efficiently under overload condition and the damage can be prevented. For home appliances, commercial and industrial loads, the transmitted voltage must be stepped down to a distribution level. This may happen in several phases. In sub-stations the voltage gets stepped down from transmission level (in the tens or hundreds of thousands of volts range) to the distribution level (typically less than 10,000 volts).

Objectives:

Maximum Electrical efficiency. Increases availability of electrical system. Maximizing Electrical system flexibility. Making system fully automatic. The main objective of this study was to protect transformers from overloaded condition by sharing the load.

Fuzzy Logic Controller: There are three principal elements to a fuzzy logic controller: \rightarrow Fuzzification module (Fuzziifer) \rightarrow Rule base and Inference engine \rightarrow Defuzzification module (Defuzzifier) Fuzzy control is based on a logical system called fuzzy logic. It is much close in spirit to human Thinking than classical logical systems . The LFC has been reported in several papers is to maintain Balance between production and consumption of electrical power. Due to the complexity and Multi-variable nature of power systems, a conventional control method has not provided satisfactory solutions. The fuzzy logic control has tried to handle the robustness , reliability and nonlinearities associated with power system controls. Therefore a fuzzy logic controller (FLC) becomes nonlinear and adaptive in nature having a robust performance under parameter variations with the ability to get desired control actions for complex uncertain , and nonlinear systems without their mathematical models and parameter estimation.[4]

Circuit Diagram



Components

In the block diagram circuit breakers are used to make and break the connections to the transformers. A relay is used to send a tripping signal to the circuit breakers and they are energised on receiving a signal from the microcontroller. The current transformer is used for measurement purpose.

Circuit breaker A circuit breaker is used to isolate the faulty point of the power system in case of abnormal conditions such as faults. It is a protective device which energizes and de-energizes a circuit and provides over-current protection. Circuit breakers operate on receiving a signal from relay.

Transformers A transformer is an electrical device that transfers electrical energy between two or more circuits through electromagnetic induction. Transformers convert AC voltage from one level to another level with a little loss of power. A transformer operates on the principals of “electromagnetic induction”, in the form of mutual induction. The transformer used here is a step-down transformer so that it can be directly fed to the measuring devices by rectification. **Microcontroller** The microcontroller is used to compare the load current with reference value. Atmega328 is the controller used for this purpose

Relay Relays are components which allow low power circuit to operate high current application circuits. It is an electrically operated switch and is used where it is necessary to control a circuit by a low-power signal with complete electrical isolation between control and controlled circuits, or where several circuits must be controlled by one signal. The relay used here is of electromagnetic type.

Current Transformer The Current Transformer is a type of “instrument transformer” that is designed to produce an alternating current in its secondary winding which is proportional to the current being measured in its primary. Current transformers reduce high voltage currents to a much lower value and provide a convenient way of safely monitoring the actual electrical current flowing in an AC transmission line using a standard ammeter. The principle of operation of a current transformer is same as that of an ordinary transformer.[5]

Advantages : 1) The load is shared by transformers is automatically. 2) No manual errors are taking place. 3) It prevents the main transformer from damage due to the problems like overload and overheats. 4) Un-interrupted power supply to the consumers is supplied.

Application : Power generation & distribution system Process Industry. Protection from overloading of transformers. Uninterrupted power supply

Conclusion

Transformers is one of the most significant and expensive equipment in the electrical power, transmission and distribution system, hence transformer required maintenance and protection With increasing in a load demand need to increase load capacity of transformer to satisfy the consumers this can done by parallel operation of transformer In this project the parallel operation take place automatically with the help of microcontroller, which provide un-interrupted power supply and avoid load sharing.[13]

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