

Design & Development of Automatic Switching of line transformer as per load

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Abstract - The transformer is a electrical power device which convert the energy level from high to low or low to high. Transformer is heart of electrical power system. Now a day the load on the transformer gets increases and transformer also gets overloaded. So the winding of transformer gets burnt. Hence it is necessary to protect the transformer. The aim of the project is to get effective utilization of transformer and it's protection under overload condition by automatic tap changer. Due to Overloading it results in drawing more current from transformer and Reduction in voltage levels of transformer. So the transformer gets damaged.

Keywords : Automatic tap changer, Current transformer, Feedback control system, Potential transformer, Transformer.

1 .INTRODUCTION

The project is all about protecting the transformer under overload condition, which is proposed to be done by using motorized automatic tap changer. If there is a change in load which causes drop in transformer voltage, the tap changer will come into picture to adjust the winding ratio and hence neutralize the effect of load on transformer.



Fig-1: Transformer

That way we can regulate the output of transformer under varying load condition. Along with load regulation, project also suggests the use of Current transformer and overload relay circuit for protection of transformer where CT will senses the current through each phase of transformer and under overload condition the transformer can be disconnected from the load using overload relay circuit.

II. METHODOLOGY

The transformer is a device, which converts power level. Due to overload on transformer, the efficiency of the transformer

gets degraded and windings get heated and may get burnt. Problem of transformer under overload condition is overcome by using automatic tap changer which acts as Feedback for this system. This means it is a one type of Feedback control system.



Fig-2: Tap Changer

In this we are using Potential transformer(PT) is used to sense present voltage drop (due to increase in load). Depending on input from PT, tapping can be changed whose provision is made during transformer design (selection of winding taps). Current Transformer is used to sense current through each phase.

Current Transformer

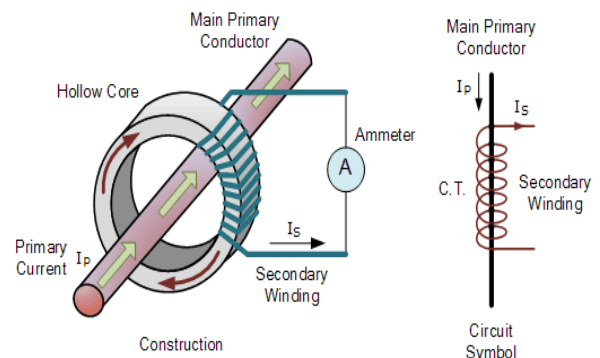


Fig-3: Internal Diagram

In this current transformer there is one conductor which is placed in the inductive coil .Current transformer is used for protection purpose. It sense current through each phase of transformer and based on its value, transformer can be tripped. (overload protection circuit).

Potential Transformer

Potential Transformer is a step down voltage transformer. The high voltage of another transformer is connected to the primary winding of this potential transformer. At the output secondary we get step downed voltage that is nothing but low voltage.

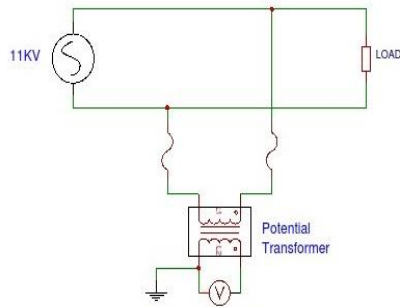


Fig-4: Internal diagram of potential transformer

III. BLOCK DIGRAM

1. Transformer

It is used to step down the voltage from high voltage to low level voltage.

2. Current transformer

It is used to sense the current through each phase of transformer and based on value coming from input the transformer can be tripped.

3. Potential Transformer

It is used to sense and measure the voltage. Based on the voltage coming from the transformer, the step down transformer is selected so that it step down the voltage according to our requirement.

4. Isolator

It is used to isolate the arduino from the high voltage, which is coming from the transformer. Arduino required low voltage so it is necessary to provide the isolation.

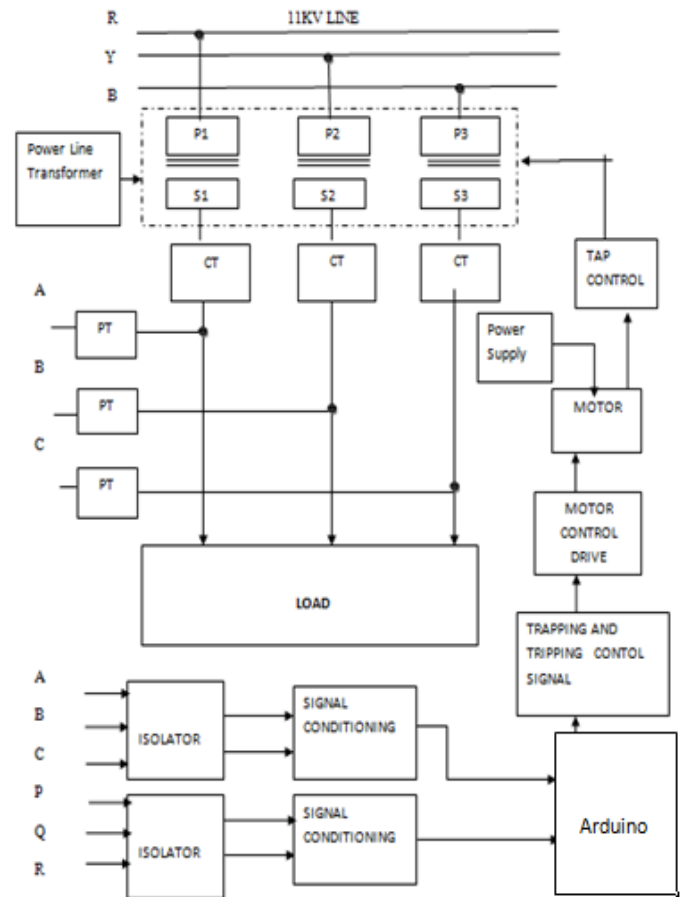


Fig-5: Block Diagram

5. Signal conditioning

Many analog signal requires some form before the signal is digitized. Signal conditioning is the technique of making a signal from a sensor or transducer suitable for processing the next stage.

6. Arduino

It has internal micro-controller. It has additional facility that it has inbuilt ADC which converts the analog value into digital signal.

According to the signal from input it takes decision and control the tapping of transformer with the help of relay.

7. Motor control Drive

It is connected at the output of Arduino. Due to signal coming from arduino relay coil get energies. Then motor start rotating which is connected to tap changer. Then tap changer adjust the voltage level.

8. Relay

According to incoming signal it change the tapping of transformer with the help of tap changer.

IV. INTERFACING OD ARDUINO AND RELAY BOARD

VII.REFERENCE

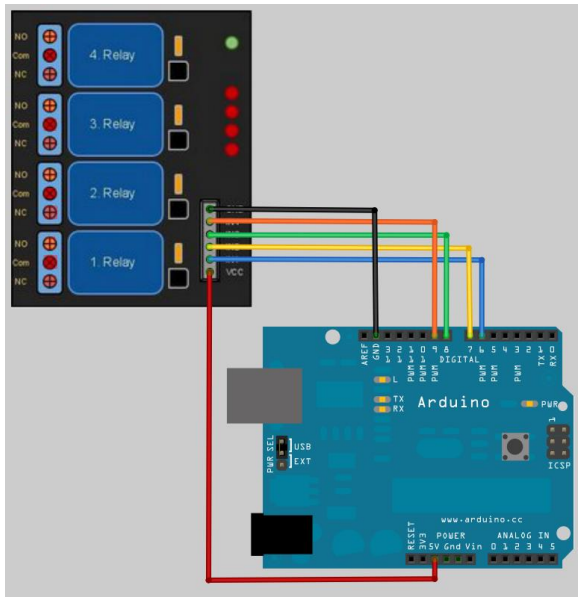


Fig-6: Interfacing Diagram

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V. ACTUAL MODEL

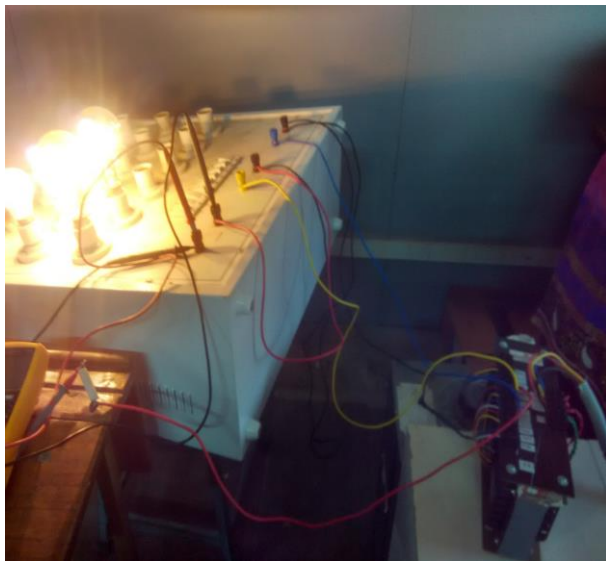


Fig-7: Actual model

VI. CONCLUSION

The proposed system controls automatic tap changer by which output voltage level can be adjusted. With proposed system, overload protection and effective utilization of transformer can be carried out with safe environment that increases the performance of transformer.