

Transformer Load Sharing with S.M.S. Alerting

Nitin Nehra¹ Munesh Kumar² Nutan Bijaraniya³ Pankaj Gupta⁴ Avadhesh Sharma⁵

^{1,2,3,4}Student ⁵Assistant Professor

^{1,2,3,4,5}Department of Electrical Engineering

^{1,2,3,4,5}S.K.I.T Jaipur

Abstract— The main aim of the project is Transformer allocation whenever load is increased for certain value and also sending this change in illumination to the relevant authority via SMS by using GSM Modem. The objective of this project is to preserve the domestic supply and power transformers from overload power. Drop in efficiency and overheating in secondary winding can be obviated with the help of this project. The demand for electricity is increasing every day and frequent power cuts is causing many worriment in various areas like industries, hospitals and houses resulting in load increment hence overload. An alternate arrangement for power is a must. This project uses parallel transformers for load sharing at highest load on first transformer then automatically load transfer on second transformer. Load sharing of the transformer is cinch with the help of this project theme and the life of the transformer is increased. The project is also used as a sustained power supply .If short circuit fault occurs, the transformer will be protected. A microcontroller of 8051 extraction is used. The output of microcontroller is given to the relay drive IC, which switches relevant relay to maintain uninterrupted supply to the load. The output shall be observed the current status, as to which derivation supplies the load is also displayed on an LCD. The global system for mobile communication is used as it is accepted standard for digital communication and is helpful in sending message to authority via SMS whenever load is shared between the parallel transformers.

Key words: GSM Modem, UPS, Microcontroller, Embedded System, 8051, SIM300

I. INTRODUCTION

The Project denominated as ‘Transformer Load Sharing with SMS Alerting’ designed with Microcontroller 8051(AT89C52). Utility associations have enormous extent of money spend in transformers of all types, including distribution and power transformer. Operating, maintaining, and investigate all power transformers are not an easy work. In order to reduce burden on maintenance of such transformers a new perception has been discovered.

This project is mainly used to protect the transformer from getting deteriorated due to electrical disturbances or excessive load.

The heat parameters are fed as base values, using a keypad to the Microcontroller 8051 and the output signal are provided to operate a relay by comparing the base values with the operating parameters. The application consists of a board of electronic components inclusive of a Microcontroller 8051 with programmable logic. It has been designed to work with high accuracy. The heat parameters of the power transformer are fed to the Microcontroller 8051 as base values. By comparing the values the Microcontroller 8051 produces a trip signal which operates the relay and in turn the affinity between main transformer and parallel transformer is started and capacity is shared, thus protecting the power transformer from malfunctioning. The main aim of the matter is

Transformer sharing whenever load is increased for certain value and also sending this change in information to the respective authority via short message service (SMS) by using GSM Modem [1].

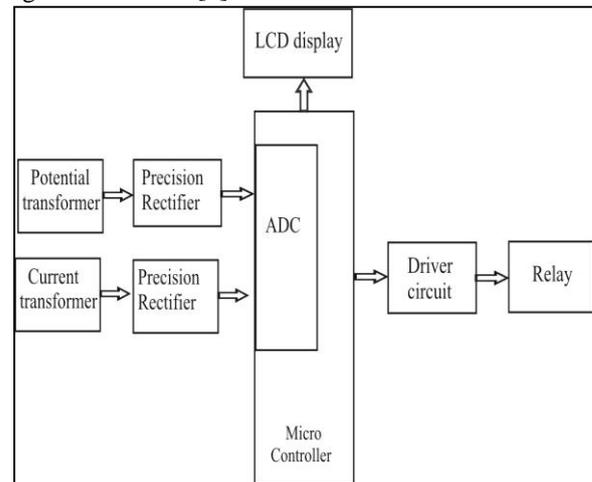


Fig. 1: Block Diagram

The objective of this project is to protect the sedentary supply and power transformers from overload power. Drop in efficiency and overheating in secondary winding can be preserved with the help of this project. The demand for electricity is increasing everyday and frequent power cuts is causing many obstacles in various areas like industries, hospitals and houses resulting in load increment hence overload. An alternate arrangement for power is a must. This project uses parallel transformers for load sharing at highest load on first transformer then automatically load transfer on second transformer. Load sharing of the transformer is cinch with the help of this project theme and the life of the transformer is increased. The project is also used as a sustained power supply .If short circuit fault occurs, the transformer will be protected. A microcontroller of 8051 extraction is used. The output of microcontroller is given to the relay drive integrated circuit (IC), which switches appropriate relay to maintain sustained supply to the load. The output shall be observed the current condition, as to which source supplies the load is also exhibit on an liquid crystal diode (LCD). The global system for mobile (GSM) communication is used as it is accepted standard for digital communication and is helpful in sending message to authority via SMS whenever load is shared between the parallel transformers [2].

II. METHODOLOGY

Our paper presents an reasonable GSM based interactive control system. A number of literatures related to the topic of control systems and automation were reviewed and analyzed.

- 1) Microcontroller
- 2) GSM Modem
- 3) Relay
- 4) LCD Display

A. Microcontroller

The microcontroller incorporates all the features that are found in microprocessor. The microcontroller has fabricated in ROM, RAM, Input Output ports, Serial Port, timers, interrupts and clock circuit.

The I/O, memory, and on-chip peripherals of a microcontroller are tabbed depending on the specifics of the target application. Since microcontrollers are dominant digital processors, the degree of regulation and programmability they provide significantly enhances the effectiveness of the application.

- Microcontroller can be classified on the basis of their bits processed like 8bit MC, 16bit MC.
- 8 bit microcontroller expedient it can read, write and process 8 bit data.Ex.8051 Microcontroller. Basically 8 bit specifies the width of data bus. 8 bit microcontroller means 8 bit data can travel on the data bus or we can read, write process 8 bits [3],[4].

B. Gsm Modem:

The SIM 300 GSM module has been chosen to achieve the SMS functionality. MSEB can at any instance get the degree by just sending an SMS to the DP. As SIM 300 has the facility to read the received Message. we have dictated a Assembly program to control the DP through message without any hardware changes.

C. Relay:

Relays are components which allow a low-power circuit to switch a relatively high current on and off. The current become zero it does capacity shedding of that particular zone.

To make a relay operate, you have to pass a suitable pull-in and holding current through its energizing loop. In each case the coil has a resistance which will draw the right pull-in and holding currents when it is allied to that supply voltage. So basic idea is to choose a relay with a coil designed to operate on the supply voltage you are using for your control circuit capable of switching and then provide a relevant relay driver circuit so that low-power circuitry can control the current through the relays coil.

D. Lcd Display:

When electric charge is applied they align to block the light entering through them, whereas when no-charge is applied they become transparent. Light cursory through makes the desired images appear. This is the basic concept behind LCD displays. LCDs are most generally used because of their advantages over other display technologies. They are thin and flat and deplete very small amount of power compared to LED displays and cathode ray tubes (CRTs) [5].

Features

- 1) 5V Operating voltage
- 2) 40 Programmable I/O Pins
- 3) Meeting the computing needs of task at hand efficiently and cost effectively.
- 4) Speed of Operation
- 5) Packet Data
- 6) Power consumption
- 7) Amount of RAM and ROM on chip.
- 8) No. of I/O pins and timers on chip

III. DESCRIPTION OF THE WORKING STANDARD

This project works on the principle of Parallel operation of Transformers and have an arrangement of relays, loads, transformers, GSM modem, Microcontroller. Two transformers are connected in parallel, in which one is working and the other one is in off condition. Whenever there will be a condition of overloading means load on transformer cross the specified value it will give relay the signal and relay will trip making transformer 2 in ON condition and load will be shared between two transformer thus decreasing the overload condition and saving the transformer and other electrical devices[6].

IV. CIRCUIT DIAGRAM

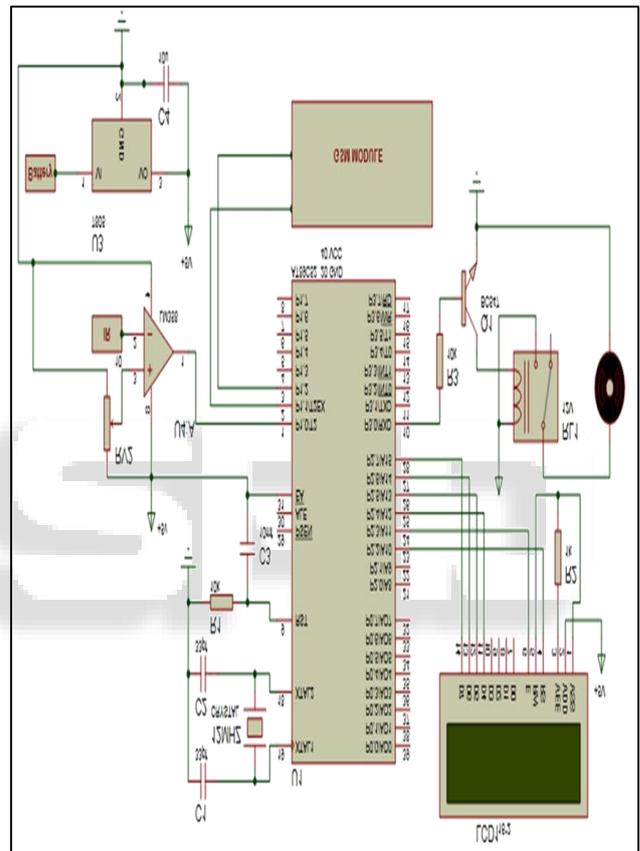


Fig. 2: Circuit Diagram

V. RESULT

Normally electrical power transformer gives the supreme efficiency at full capacity. If we run numbers of transformers in parallel, we can swap on only those transformers which will give the total demand by running nearer to its full capacity rating for that time.

When load boost we can switch no one by one other transformer connected in parallel to accomplish the total excitation. In this way we can run the system with maximum efficiency.

VI. CONCLUSION

Protection of power transformer is a big threat nowadays. By the help of microcontroller-based relay, protection of transformer is achieved very quickly and accurately. This system overcomes the other drawbacks in the survive systems such as maintenance and response time [7].

When paralleled transformer kVA are the same, but the percent impedances are different, then unequal capacity division will occur. The same is true for unequal percent impedances and unequal kVA. Circulating current only survive if the turn proportion do not match on each transformer. The magnitude of the circulating currents will also depend on the X/R proportion of the transformers. Delta-Delta to Delta-wye transformer paralleling should not be attempted [8].

VII. FUTURE SCOPE

There is a chance of increasing or decreasing future exaction of power system. If it is predicted that power exaction will be increased in future, there must be a provision of connecting transformers in system in coordinate to accomplish the extra demand because it is not economical from business point of view to install a bigger rated single transformer by anticipate the increased future demand as it is avoidable investment of money.

Again if future exaction is reduction, transformers running in parallel can be evacuated from system to balance the capital investment and its return [9], [10].

REFERENCES

- [1] A. Jadhav, and P. Gadhari, "Interactive Voice Response (IVR) and GSM Based Control System". Proceedings of the National Conference "NCNTE- 2012" Mumbai 2012.
- [2] F.E. Gentry et.al., 'Semiconductors Controlled Rectifiers', Prentices-Hall of India, New Delhi, 1964
- [3] Guzman, A., S. Zocholl and G.Benmouyal, 2000. "Performance analysis of traditional and improved transformer differential protective relays. Hector J. Altue (Universidad Autonoma de Nuevo Leon) SEL.
- [4] Sidhu, T.S., M.S. Sachdev and M. Hfuda, 1996 Computer simulation of protective relay design for evaluation their performance. Power System Research Group University of Saskatchewan, Canada
- [5] D. Rudrapalet. al. "Automated Load Shedding Period Control Systems", International Journal on Computer Sc. & Engineering, Vol 3, Issue 5, pp.1159 - 1168, May 2011.
- [6] Mao, P.L. and R.K. Aggarwal, 2001. A novel approach to the classification of transient phenomena in power transformers using combined wavelet transform and neural network. IEEE Trans. Power Deliv., 16:4.
- [7] Guzman, A., S. Zocholl, G.Benmouyal, and H.J.Altuve 2001. "A current based solution for differential protection IEEE Trans., Power Deliv.
- [8] Sachdev M.S., T.S. Sidhu and H.C. Wood, 1989. A digital relaying algorithm for detecting transformer winding faults. IEEE Trans. Power Deliv., 43:1638-1648.
- [9] [9]B.K. Bose, 'Evaluation of Modern Power Semiconductor Devices and Future Trends of Converters,'IEEE Vol.28, No.2,pp.403-413, March/April 1992.
- [10]I. Petrov, S. Seru, and S. Petrov, "HOME AUTOMATION SYSTEM", School of Engineering Science, 2011.