



ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 6, June 2017

Automatic Transformer Load Sharing System Using GSM Modem

Sayali R. Tirpude, Dr. Harikumar Naidu, Pratik Ghutke

Dept. of Electrical Engg, TGPCE, Nagpur, India

HOD, Dept. of Electrical Engg, TGPCE, Nagpur, India

Assistant Professor, Dept. of Electrical Engg, TGPCE, Nagpur, India

ABSTRACT: The development of any country depends upon a large extent on availability and usage of electricity. In normal we used to control the industrial equipments by manual operation. It is overcome by a new mode of communication which is used to control all those equipments through load sharing mechanism by a single message from anywhere. The main aim of this project is to protect the failing or damage of transformers having applied more load on it to share these with another backup supply using GSM technology. The purpose of this project is to provide a secured environment for the transformers from overloads which are distributing power to certain regions by sharing these overloads with another parallel supply.

KEYWORDS: Step-down transformer, ARM7, filter & regulator, Relay.

I. INTRODUCTION

Nowadays, in Industrial applications most of the appliances operate on three phase supply. This paper is about developing a system that can support one of the other slave transformer supplies with the help of existing main transformer. The project basically consists of Arm7 LPC 2148 which generate pulses at its output. ARM7 has inbuilt flash EPROM. LPC 2148 Microcontroller Based Energy saver with RTC which uses LPC2148 microcontroller as its brain. Data stored remains in the memory even after power failure, as the memory ensures reading of the latest saved settings by the micro controller. Port 0 and Port 1 is used for generating six pulse output. This controller continuously checks for live condition of both main as well as slave transformers connected to it. In this project, we are using two transformers for sharing of power upon exceeding the loads. These two transformers are connected with the relay which is controlled by the embedded controller. Through the microcontroller, we are controlling this sharing of power with the help of relay. The relays will trips to another transformer upon exceeding the limit of load. The ADC is an analog to digital converter which converts the values of analog current value to the digital value. This information is passed to the controller and then the controller checks the instruction and forwards it to the GSM modem. The modem immediately sends that particular SMS to the mobiles for which it is assigned and this will be displayed as load status on the LCD display. This relay is driven with a transistor. Contrast control preset is given for LCD contrast control. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer. The mains power supply phase is stepped down by transformer to deliver 12V, 500 mA, which is rectified by diode and filtered by capacitor to produce the operating voltage for the operational amplifier. The voltage at inverting pin of operational amplifier is taken from the voltage divider circuit.



International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 6, June 2017

II.METHODOLOGY

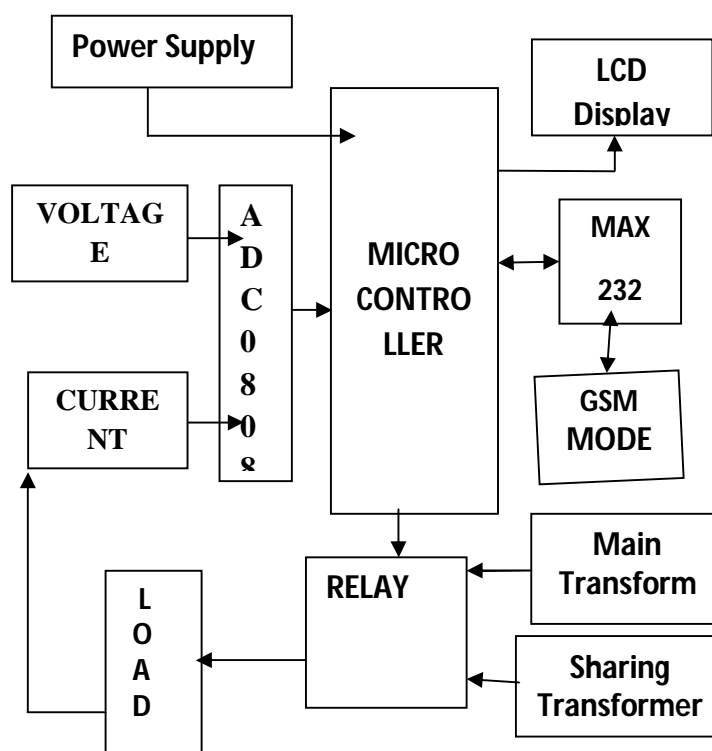
During the design of the automatic load shared transformers a lot of considerations, conditions which at the end give rise to design.

Board Technical Specifications:

Processor : LPC2148
Real time Clock : DS1307 on i2c Bus /w Battery
Data Memory : 24LCxx on i2c Bus
LCD : 16x2 Backlight
LED indicators : Power
RS-232 : +9V -9V levels
Power : 7-15V AC/DC , 500 mA
Voltage Regulator : 5V Onboard LM7805

BLOCK DIAGRAM

In this project uses regulated 12V, 500mA power supply. The 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.



LPC2148 controller:-The ARM7TDMI- CPU is a general purpose 32 bit microprocessor, which offers high performance and very low power consumption. The ARM architecture based on Reduced Instruction Set Computer (RISC) principles. This simplicity results in a high instructions throughout and impressive real time interrupt response

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

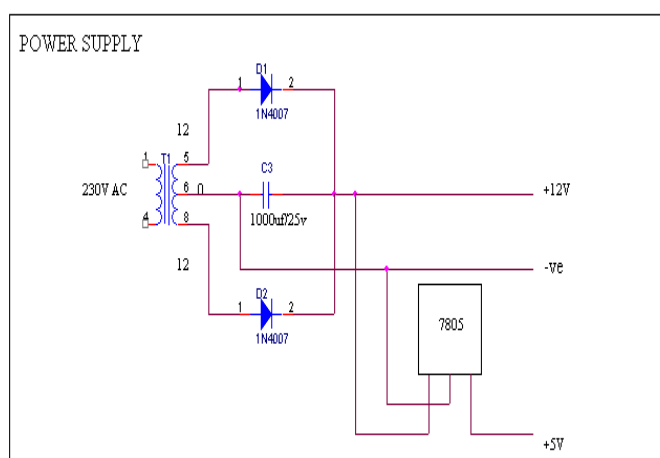
(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 6, June 2017

from a small and cost effective processor core. The LPC2148 SRM is designed to accessed as a byte – addressed memory. The data is only written to SRAM when software does another write.

Power-supply-Requirement of power supply is the main task, power supply of +5V and +12V is required for the circuit. The supply of +12V needed for the Relay connections and 7805 regulator IC which has given +5V to the circuit. Power supply is generated after rectifying the step downed AC which again passes through filter capacitor & ripple eliminator circuits.



As the step down transformer is used for providing the supply to the input channel through the variac (Dimmer stat) or AC Mains, Variac of rating 230V AC can be used to control and vary the voltage level as per the requirement.

Voltage regulator: A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level. In this project, power supply of 5V and 12V are required. In order to obtain these voltage levels, 7805 and 7812 voltage regulators are to be used.

GSM:-GSM (Global System for Mobile communications) is the technology that underpins most of the world's mobile phone networks. The GSM platform is a hugely successful wireless technology and an unprecedented story of global achievement and cooperation. GSM has become the world's fastest growing communications technology of all time and the leading global mobile standard, spanning 218 countries. GSM is an open, digital cellular technology used for transmitting load data services. GSM operates allowing the transmission of basic data services such as SMS.

Display- Use of 2x16 LCD Display, which has normally shows scrolling text. By using left justifying the higher four data bits are used for displaying the data, and Enable and RS pins are used for operating the LCD display. The R/W pin connected to ground because it is only used for busy check and that precision checked out by giving suitable delays. Pin1 is connected to the ground, pin 2 is connected to +5v and pin 3 is connected to the trim pot through resistor to improve the readability of the LCD and varies with the brightness of the surrounding.

IV. ADVANTAGES

- Highly sensitive.
- Complete elimination of manpower.
- System can be monitored and controlled from anywhere.
- Mobile number can be changed at anytime.
- Transformer status will not be lost in power failure conditions.

V. APPLICATIONS

- Hostels and Hotels
- Street lights
- Offices



ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 6, June 2017

- Industrial applications
- Electrical Substations
- Power grids

VI. CONCLUSION

After the implementation of the design, various tests were carried out and achieved its design and construction purpose. The system worked according to specification by monitoring overloads and over-current. With this project we can avoid the breakage or failure of transformers from overloads by converting these overloads to other section of transformer. So, that transformer can constantly distribute power to the required regions here by changing over to the active energy supply. This automatic electronic system operates without human intervention hence the sluggishness of manual operation is eliminated and demand will be completed without interruption and breakage.

REFERENCES

1. K.Y.C. Cheung, Large – scale Energy Storage IES2, 2003 Imperial College London.
2. G. Wood and M. Newbrough, “Dynamic energy – consumption indicators for domestic appliances: environment behavior and design,” *Energy Buildings*, vol 35, pp. 821-841, 2003.
3. “Estimated impacts of energy and climate change policies on energy prices and bills”, 2010.
4. “NEC releases household power storage system”, 2012.
5. APX-ENDEX. APX Power UK.
6. “Load profiles and their use in electricity settlement”.
7. “General Lifestyle Survey – Trends in household size :1971to2009”, 2010.
8. Functional Design Specification, 2012.
9. T. Jech, *Set Theory*, 2002, Springer.
10. B.M.Weedy, *Electric power Systems*, 2012, wisely.
11. LV Network Templates Data, 2012.
12. Common Distribution Charging Methodology, 2010.
13. “Pricing Data.”
14. “Market Overview”, 2011 National Electricity Transmission System (NETS) seven YEAR Statement, 2011.