Load Demand Control And Switching During Fault Condition By Using Microcontroller

Arvind S. Hirole [1], Vishal S. Kshirsagar [2], Sandeep P. Kharat[3], Prof.Yogesh P.Sushir[4],Prof.Jitendra Hanumant[5] , Prof.Komal P. Hole[6]

[1, 2, 3] Dept of Electrical Engineering

[4,5,6]Assistant Prof., Dept of Electrical Engineering

[1, 2, 3, 4, 5, 6] Dr. V.B.K.C.O.E.Malkapur,Maharashtra, India

Abstract- *In our India due to increasing population, demand of the Electrical Energy is also growing. Because of precious variety of application available to do much more work .Over voltage and Under voltage which is cause of improper operation of load and failure of the Equipment, also due to unbalance load, some manmade & Natural condition or activities supply related barriers comes. In this paper described the way of control the demand of power according to the availability of supply by using microcontroller ATmega328.This designed system is applicable for both Industrial and Domestic level by dividing in two parts i.e. primary and secondary. When the regulated supply feed from seller then, both primary and secondary load will be switch ON during the fault condition. If the under voltage occur at consumer side, primary load will switch OFF and secondary remain ON. After returning the rated supply both Load get auto-restored.*

Keywords- ATmega328, Auto-restored, Power Demand Control.

I. INTRODUCTION

The under and over voltage is the power quality related problems occurs due to increase demand from the consumer. The Over voltage may be damage component connected to power supply as insulation failure damage electronics component, heating, flashover and burn out equipments etc. The under voltage is less effective and live in power system for just some few millisecond but, if it is large or live for certain time then, it is harmful for specially to Induction motor. So, to avoid the failure from such problem this 'LOAD DEMAND CONTROL AND SWITCHING DURING FAULT CONDITION BY USING MICROCONTROLER' is designed. Here, with microcontroller Relays and Liquid crystal display are also used to protection, switching and for display status of operation where it is working normally or under fault condition.

1.1) Objective:- The main object behind this project is to protect the Load from the failure by the occurring under voltage and over voltage problem in power system, and also to give the allow only one which is sustainable by the available power supply.

II. MODEL DESCRIPTION

Block Diagram Description:-

A] Microcontroller ATmega328

The high-performance Atmel 8-bit AVR RISC based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SPRAM, 23general purpose I/O lines, 32 flexible timer/counters with compare mode, internal and purpose working resistor, 3 flexible timer/counters USART, SPI serial port, a byte-oriented 2-wires serial interface, b-channel 10-bit A/D converter. The device operates between 1.8-5.5volts. Also this microcontroller contains 28 pins.

B] IC LM358 (operational amplifier)

It is linear devices that have all the properties necessary to DC amplification and are used intensively as signal conditioning, filtering and also for mathematical operation such as addition, subtraction and integration. It is basically 3 terminal device, one is output terminal and two are input i.e. Inverting and Non-Inverting terminals.

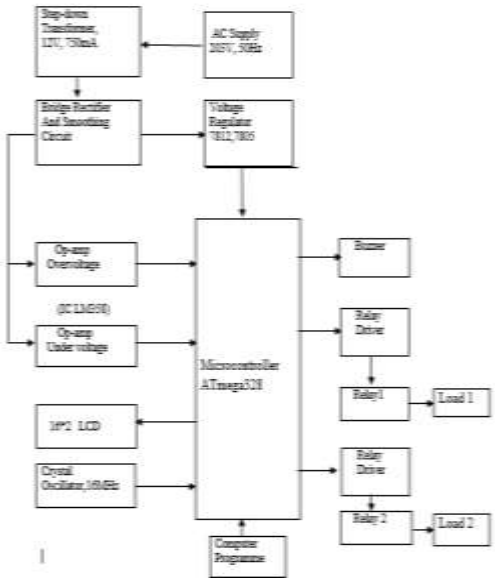

Figure 1:- Block Diagram Complete Control Module

C] Transformer:-

Here, the 12 volt 750m Amp step down transformer is used. It gives the low voltage output for to drive the system operation.

D] Voltage Regulators:-

Here two voltage regulators are used to generates the recommended dc regulated voltage supply for both high voltage and low voltage condition. 7805 and 7812 are three terminal voltage regulators have input , ground and output pins. It generate 5V and 12V fixed DC supply. The 78xx is the series and last 05, 12 shows the output voltage.

E) Cristal Oscillator:-

A crystal oscillator is an electronics oscillator circuit that use the mechanical resonance of vibrating crystal of piezoelectric material to create an electrical signal with a precise 16MHz frequency.

F) 16*2 LCD:-

It is an electronic display which use for wide range of application. The 16*2 LCD mince it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5*7 pixel matrix. This display are economical, easily programmable and no limitation of display special & custom characters.

G) Relay:-

This Relay is use for the protection and switching. The main operation is to control a circuit with using low voltage 12 volt.

III. WORKING

During attendance of rated supply, both load shows satisfactory operation on the rated power supply. Whereas supply voltage exceed beyond the specified limit i.e. 110% of that time both load gets switched OFF by controlling action of Microcontroller and Relay circuit. If the voltage dropped less than rated limit, instantly primary load get switch OFF and secondary remain ON condition for which the power is satisfactorily available.

IV. POWER SUPPLY DESIGNING

Power Supply Designed and Circuit Connection

Figure 2: - Block Diagram of Supply System

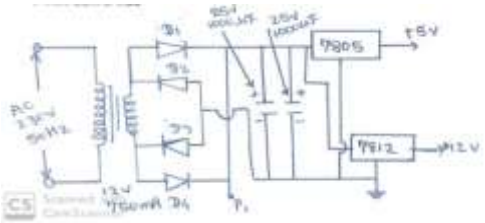

Figure 3:- Circuit Connection of Supply System

The designed of power supply module feed the overall system component. The microcontroller, IC358, relay and for relay driver work on the different voltage level. For that, the above supply system provide the specific values of supply. Given step- down transformer convert the 230V (AC) into 12V, 750mA (AC) after that with the help of bridge rectifier and filter circuit convert into DC supply. Finally 5V and 12V DC supply generate by using 7805 and 7812 Voltage Regulator.

V. RESULT

Our research get the observation that, it is one pf the best way to avoid the interrupted operation of the load as well as provide the protection during undervoltage and overvoltage

condition . In future this technique can be implemented by addition control from the load or consumer side.

Table:-1 Observation of Work

Sr. No.	Condition	Description
1	Normal Condition	Here we apply the rated voltage to the both loads then both are in ON state. And system is fault free.
2	When fault Occur (Under Voltage)	If voltage gets dropped due the fault that time primary load get cut off and secondary remains ON.
3	When fault occur (Over voltage)	In that both load get cut from the supply to avoid failure

The screenshot of project model while taking the output is given by:-

Figure 4:- Both Loads are in ON position during rated supply

Figure 5:- Primary load is OFF and secondary is ON during under voltage supply

Figure 6:- Both Load OFF during over voltage supply

VI. CONCLUSION

The circuit attend vital respond effectively to under voltage and over voltage variation in case of single phase circuit, phase failure and imbalance operation in case of three phase circuit. The liquid crystal displays specify, operation status of the system whether it is operating normally or faulted condition. The range of normal voltage can be adjust with the variable resistor, it can be made very sensitive to operated against under voltage and over voltage

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