

Over Voltage and Under Voltage Load Protection using GSM Alert

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Abstract—Automation is considered as the important aspect in current scenario. Automation of electrical distribution field can be helpful in enhancing of efficiency, increase in reliability and most important is the electric service quality. Automation helps in reduction of human efforts, enhance human operator capability and most important save lot of time. Insulation and damage of appliances due to Under and over voltage problem is typically seen in Indian scenario. This work is about the catastrophic condition due to under and over voltage problem. This problem can be economically reduced by the automation methodology. In this paper GSM Module with SMS alert system is designed and developed to automate the electric distribution system.

Keywords: Automation, over voltage and under voltage, GSM module.

I. INTRODUCTION

Protection circuits are used for safe operation of various electrical appliances such as refrigerator, motors, etc from voltage fluctuations. Most commonly used protection circuits i.e. over and under voltage protection circuit can be utilized for solving the problems of voltage variation due to different electrical distribution situations.

In normal condition (220 V), operation is normal supply to the appliance. If there is sag (200-220 V) in the system, the operation is to trip the appliance. If there is swell (240-396V), in the system, the operation is

to trip the appliance. Similarly, in case of Over voltage (>240V) or under voltage (<220V) in the system, the operation is to trip the appliance.

This work is done to develop a system that can be utilized for monitoring the low and high voltage and then tripping is the objective that avoid the problems related to the damages in appliance, industrial machines which have variable fluctuating AC main supply. In this project, an integrated circuit (IC) is used as quad comparator and window comparator. In this system, when error occurs the input voltage is not in the window range and with this trigger the relay connected to the load is cutoff to avoid the damages.

This is an automation turn on and off circuit, in this circuit no manual control is needed and AC main power supply will be turned on and off automatically as per the change in the input supply voltage. The main rationale is to provide effective protection to domestic appliances and various other electrical devices which needs protection from under and over voltage scenario in the main power supply.

The work in this paper is about the safeguarding the devices from the major variations in the AC supply. The general aspect or devices of this work consist of GSM Module Controlling the Arduino and Networking. The block diagram is shown in figure 1.

In this block diagram, the basic description is given about the components used in the proposed circuit. A step-

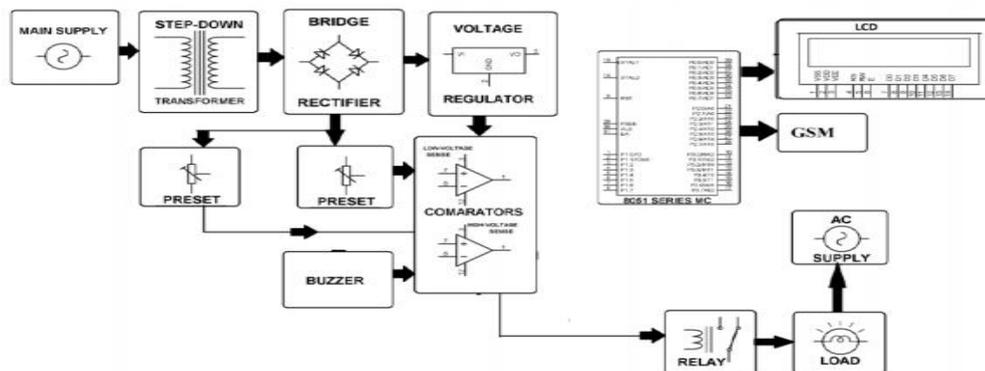


Fig. 1: Block Diagram

down transformer is used to generate the 12 volt supply from the AC main supply. A bridge rectifier and filtering process is done with the help of capacitor to eliminate or reduce the harmonics in the supply. The unregulated power supply is provided to the voltage regulators and its output is connected to LM324 Integrated circuit and

relays as input supply. Afterwards, the Integrated circuit comparators are utilized for analyzing the over and under voltage which can control the relay connected to the relay. The relay is used to disconnect the load from the supply unit and hence protects the electrical appliance

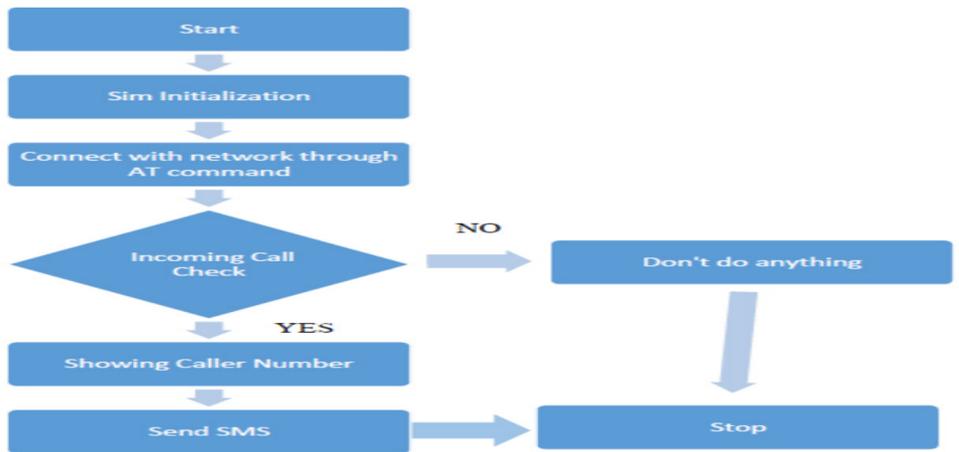


Fig. 2: Proposed Diagram for Protection of Electrical Devices

II. PROPOSED FAULT MANAGEMENT SYSTEM

Power quality is the major concern these days for the automated appliances in domestic and industrial scenario. This circuit is helpful in attaining the required high-quality power and also helps in improvement of power factor. With the help of this circuit the, removal of swell, sag, outage, under voltage and over voltage can be done easily and this will help the end user.

The proposed system will be efficient in handling the over and under voltage easily by tripping the circuit whenever the comparator signals the change in output and this is carried as trigger to the relay. In this work the main aspect is to get the basic insight about the relays and MCB to provide a response for over and under voltage.

III. CONCLUSION AND FUTURE SCOPE

In this work, the major challenge is to utilize the integrated circuit based comparator to provide a trigger signal to the relays to cutoff the voltage supply to the load to overcome the damages which can occur due to over and under voltage in any domestic or industrial purpose appliance. This system is cheaper system and provide an alert to the consumer via SMS with the help of GSM module utilized in the proposed circuit. The main aim of the paper is to access the risk with the help of comparator and window comparator. This system can be further modified with the help of sensors and also with the help of online monitoring tools.

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Normal Voltage Supply:



Fig. (a)



Fig. (b)

Fig. 3: Proposed Model for Protection of Electrical Devices

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