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Protection Scheme and Auto Power Off on Mains Failure

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ABSTRACT: Our project is proposed to develop a solid state protection scheme and auto power off on mains failure. This circuit is suitable for industrial applications to protect the expensive machines from the fault circuit as well as for residential applications to protect home appliances and other electronic equipments from over current, over voltage or from false triggering. This circuit uses the micro controller ATMEGA 328 as its core element. Also there is an LCD interface medium provided and other alarming systems to show the occurrence of fault and its value

KEYWORDS: basic block diagram, Working, simulation graph

I.INTRODUCTION

Over current and voltage protection is an important factor in residential and industrial area. If the protection circuit is not provided it may cause damage to machines and appliances connected to the power system. If the fault is too large or heavy it may cause fire and damage to the whole area. The main reason for over voltage is lightening which may suddenly rise the voltage to high value. Another reason is that if there is an open point in the circuit due to short circuit the voltage may rise to high value and cause over voltage. The over current occur when there is contact between two phase leading to high current and drop in potential. In case of a motor over current occurs when there is an increase in load leading to drawing of large amount of current and causing over current. The protection circuit is also necessary for monitoring the fault .This help to automatically cut off the power when the fault occurs.

Our circuit consist of an over current over voltage protection and to auto power off on mains failure .So it helps us identify the fault very easily. to It can also shows the instantaneous value of voltage or current in the circuit hereby we can know how much increase in voltage and current has occurred. An LCD interface with LED indications and buzzer alert on fault detection is provided. This helps us to identify which fault has occurred. Whenever an over current or over voltage fault occurs the circuit turns off and on next turn on process the fault is displayed in the LCD screen Also the magnitude of fault current and voltage is showed

II. LITRATURE SURVEY

Related work to our topic is conventional ELCBs and MCBs used in electrical protection scheme. Also separate protection circuit schemes like snuber circuits, solid state relays and other triping circuits. But our circuit has a combined protection of over current, over voltage and false triggering protection

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III. BLOCK DIAGRAM

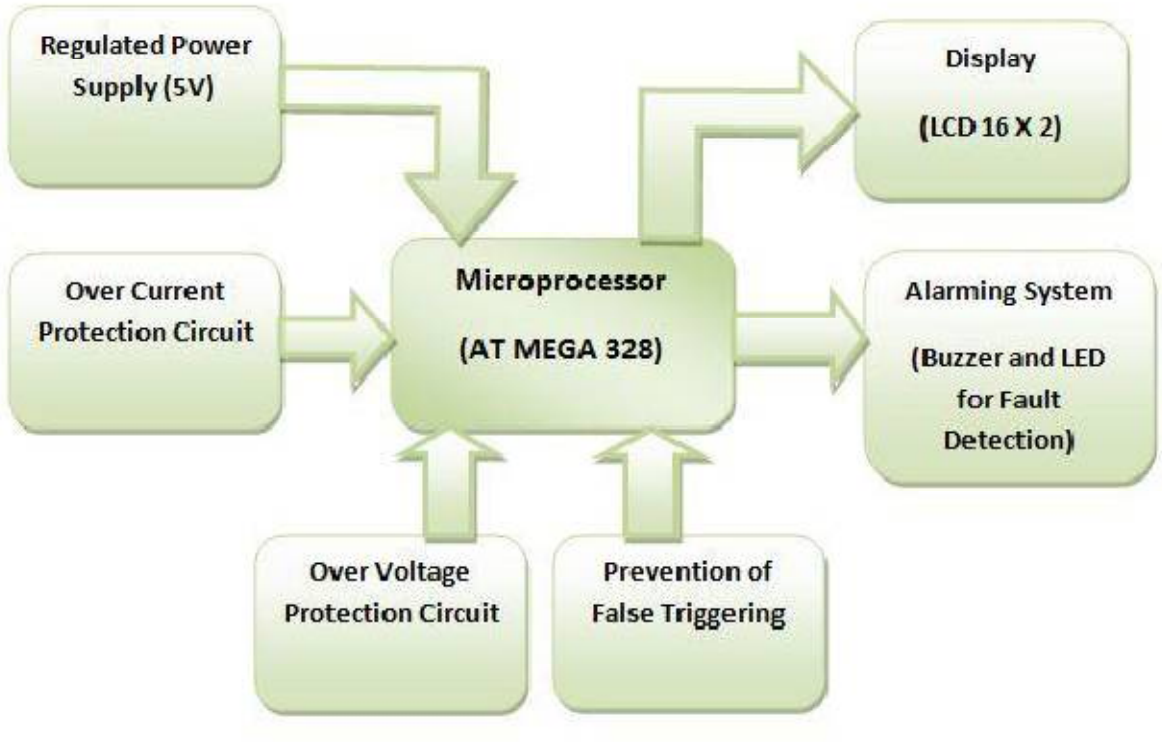

Fig. 1 Block diagram

The basic block diagram of our circuit is shown. Its core element is ATMEGA 328 Micro controller. Mains derived power supply of 5 volt is used for the working of micro processor .the over current protection circuit consist of a current transformer for sensing the fault current. in over voltage protection scheme a voltage divider circuit is used for the detection of fault.

In protection of false triggering circuit consist of a TRIAC connected across the phase and neutral and an opto coupler to the gate of TRIAC. Alarming or indication devices used are 2 LEDs for fault detection and a buzzer for voice indication in case any fault occurred. An LCD display is provided for the indication of fault in text format and also to display the magnitude of the fault

III. WORKING

OVER CURRENT PROTECTION

A current transformer is used to detect the over current in the circuit. The current carrying conductor act as the primary which is put inside the current transformer. A small value of current in ranges of micro ampere is induced in the secondary of current transformer with respect to primary. Corresponding ratio of current is converted into a voltage across the 1k resistor. Since the micro controller can only detect positive value of voltages, a 2.5 volt is added with the voltage from CT section. This voltage is passed through the micro controller and is processed using the desired program code. This value is used to indicate the instantaneous value of current and also to detect the fault by comparing it with a reference value. If a fault current is detected, the micro controller sends necessary information to the opto coupler to turn it off and trips the whole circuit. It also stores the magnitude of the fault current in the internal SROM memory of 1kb

OVER VOLTAGE PROTECTION

In over voltage protection circuit we use a voltage divider circuit with two resistors, One is of mega ohm range and other is of kilo ohm ranges majority of voltage drops across the mega ohm resistor and corresponding small value of voltage is obtained across the kilo ohm range resistor. This small ratio of voltage is converted into digital form by the inbuilt ADCs in the micro controller. This ratio is used for showing the instantaneous value of voltage .Also the ratio is

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used to compare with a reference value to detect the fault. When a fault occurs, the micro controller sends turn off signel to the opto coupler and their by the whole circuit is tripped

PROTECTION OF FAULT TRIGGERING

The opto coupler is used as the control switch for the triggering of TRIAC. The turn on and off process of the opto coupler is carried out using the desired program code by the microcontroller. So once the TRIAC get turned off, it can be only turned on by the programmer or user by Appling an on signal to opto coupler

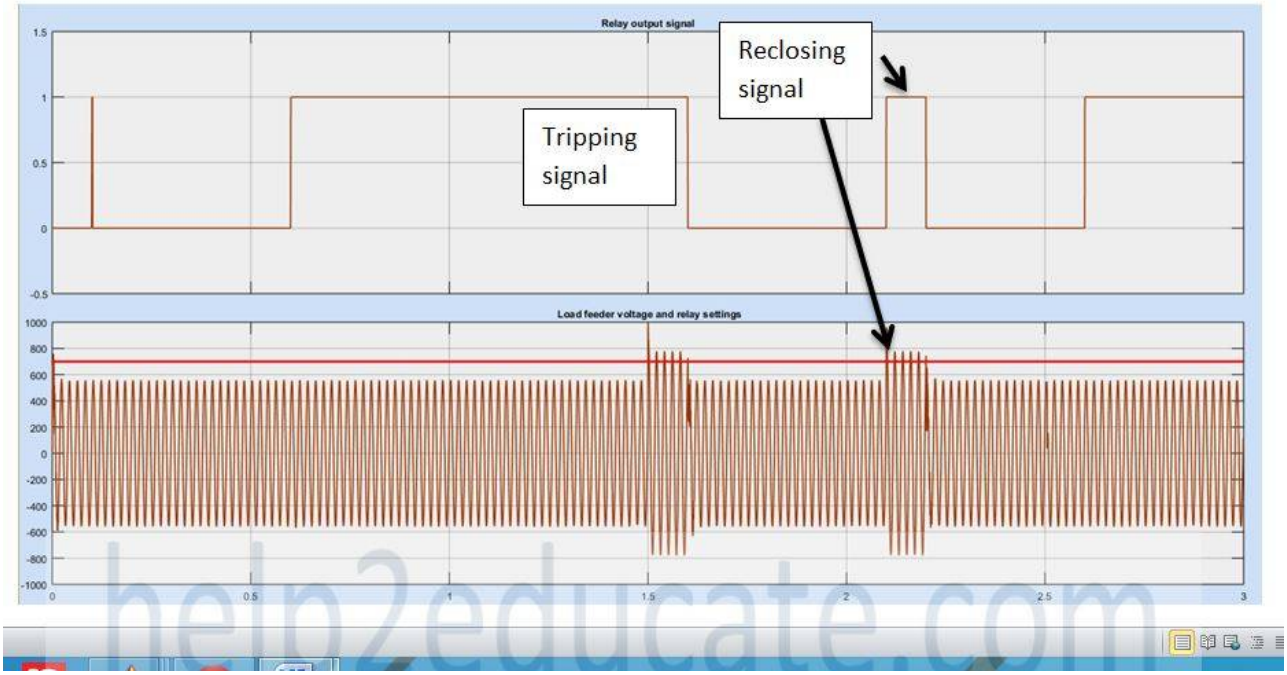

Figure shows the simulation output of over voltage protection scheme

V. SOFTWARE USED

. ARDUINO: Support every level of software developer from the professional applications engineer to student in learning about embedded software development.

Proteus 8 professional: It has been used to simulate the result in software. It is a software used for simulation of electronic circuits as well as PCB designing.

VI. CONCLUSION

Our circuit is applicable for industrial as well as residential applications The circuit interaction and information provided is easy to evaluate with the LCD display and warning alarms .We conclude and hope that our circuit is useful for Industrial automation, Electronic appliances. The circuit interaction and information provided is easy to evaluate with the LCD display and warning alarms .We conclude and hope that our circuit is useful for Industrial automation, Electronic appliances

VII. ACKNOWLEDGEMENT

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