FEEDER PROTECTION FROM OVER LOAD AND EARTH FAULT RELAY

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Abstract: *A busbar in electrical power distribution refers to thick strips of copper or aluminum that conduct electricity within a switchboard , distribution board , substation, or other electrical apparatus.*
 In this project bus bar can be protected from the over current condition. Industrial instruments failures have many causes and one of the main causes is over load.
 The primary of the distribution transformer or any other transformer is designed to operate at certain specific current, if that current flowing through that instrument is more than the rated current, then immediately the System may burn because of over load, through this project we are going to protect the bus bar from over load condition.
In this project work for generating high current more loads are applied to the circuit; so that the current will be increased. Whenever the over current occurred the circuit will be tripped.
 To trip the circuit, we are using one relay which will control through our microcontroller. When over load is occurred relay will trip the total circuit and buzzer will on to indicate over load.

Keywords: Arduino uno, current sensor, relay, laod.

I.   INTRODUCTION

In electric power distribution, an automatic overload protection system is a circuit breaker equipped with a mechanism that can automatically close the breaker after it has been opened due to a fault.
Automatic overload protection systems are used in coordinated protection schemes for overhead line power distribution circuits.
These circuits are prone to transitory faults such as shorting or overload. With conventional circuit breaker or fuse, a transient fault would open the breaker or blow the fuse, disabling the line until a technician could manually close the circuit breaker or replace the blown fuse.
But an automatic overload protection system will make several pre-programmed attempts to re-energize the line. If the transient fault has cleared, the automatic overload protection system circuit breaker will remain closed and normal operation of the power line will resume.

II.   WORKING OF THE PROJECT

The microcontroller ARDUINO UNO is heart of our project.
 Feeder protection from overload is the prototype module which consist of ARDUINO UNO microcontrollers, current sensor, ADC 0808, relay module, 16*2 LCD module, GSM module, GPS MODULE. Buzzer, Bulb, feeder supply and power supply. The automatic overload protection System circuit has a current sensing unit to detect the over current through the power line. The basic two reasons for the over current in a power line are overload and short circuit. So, when these faults occur the current sensor gives a signal to the line controller circuit. In this project work for generating high current more loads are applied to the circuit; so that the current will be increased. The current sensor in the system is connected in series with the power line and sense the current flow through the power line. The output of CT is connected to the overload circuit. Whenever the over current occurred the circuit will be tripped. To trip the circuit, we are using one relay which will control through our microcontroller.

III. PROPOSED TECHNOLOGY

To overcome the problems of existing system , we have proposed an prototype model which will prove the concept of feeder protection from overload or short circuit. In this system current sensor is used to detect the overload condition or short circuiting on the feeder lines and immediately take the action to turn of load automatically through relay using microcontroller and sends sms through gsm module on users mobile, when overload or short circuit detects. By using gps trace the location.
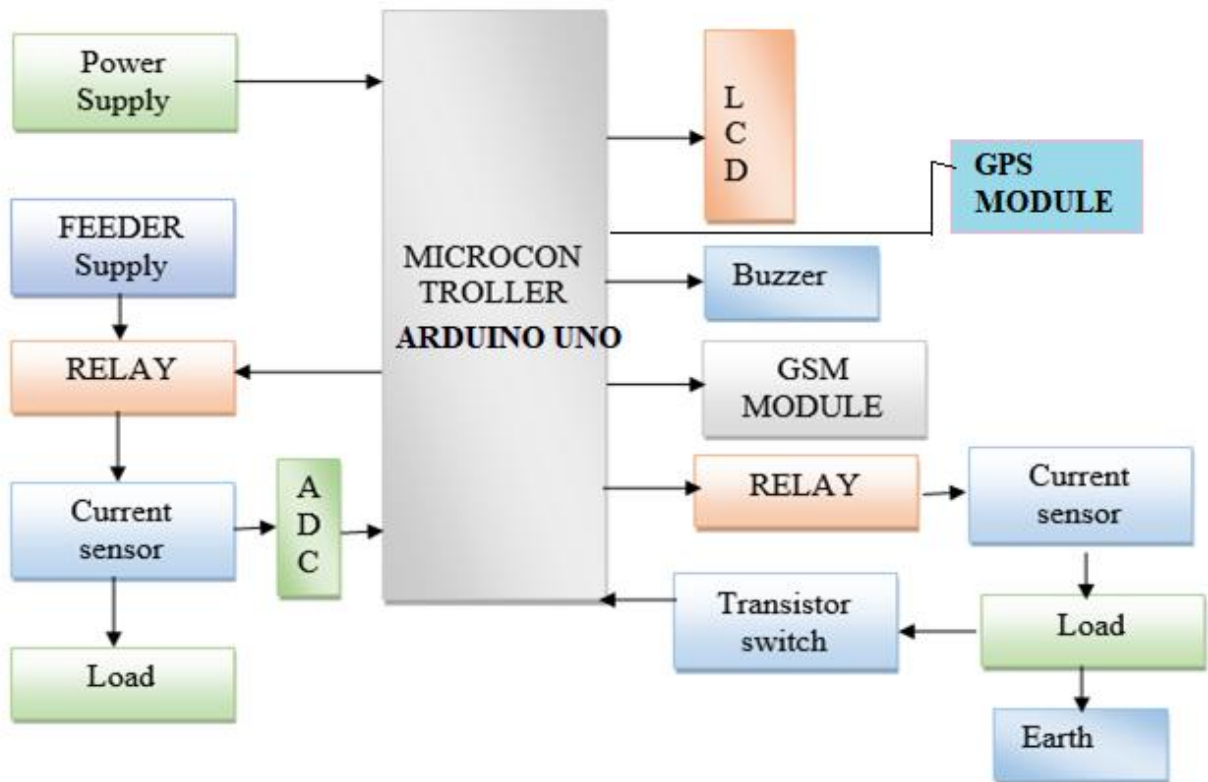
IV. BLOCK DIAGRAM

Fig. 1: Block Diagram

Block diagram for is as shown in figure [2].

A.　　　ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

B.　　　Current sensor
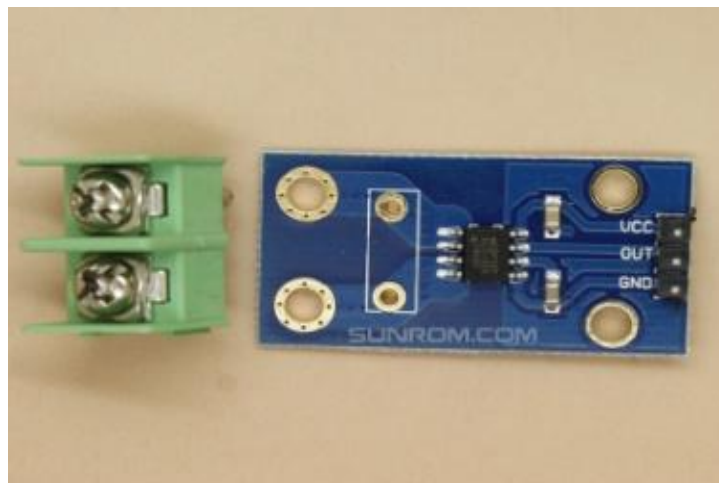
ACS712 current sensor operates from 5V and outputs analog voltage proportional to current measured on the sensing terminals. You can simple use a microcontroller ADC to read the values.

C.   Power Supply

This project uses regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

D.   Dc SubmesibleMotor

  DC Voltage: 12V
  Maximum lift: 40-110cm / 15.75"-43.4"
  Flow rate: 80-120L/H
  Outside diameter of water outlet: 7.5mm / 0.3"
  Inside diameter of water outlet: 5mm / 0.2"

  Specification
  Diameter: Approx. 24mm / 0.95"
  Length: Approx. 45mm / 1.8"
  Height: Approx. 30mm / 1.2"
  Material: engineering plastic
  Driving mode: brush-less dc design, magnetic driving

E.   Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

F.   GSM

SIM900 GSM Module – This means the module supports communication in 900MHz band. We are from India and most of the mobile network providers in this country operate in the 900Mhz band. If you are from another country, you have to check the mobile network band in your area. A majority of United States mobile networks operate in 850Mhz band (the band is either 850Mhz or 1900Mhz). Canada operates primarily on 1900 Mhz band.

G.   GPS

The Global Positioning System (GPS) is a space-based navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.

H.   LCD

Fig. 16*2 LCD.

V. SOFTWARE IMPLEMENTATION
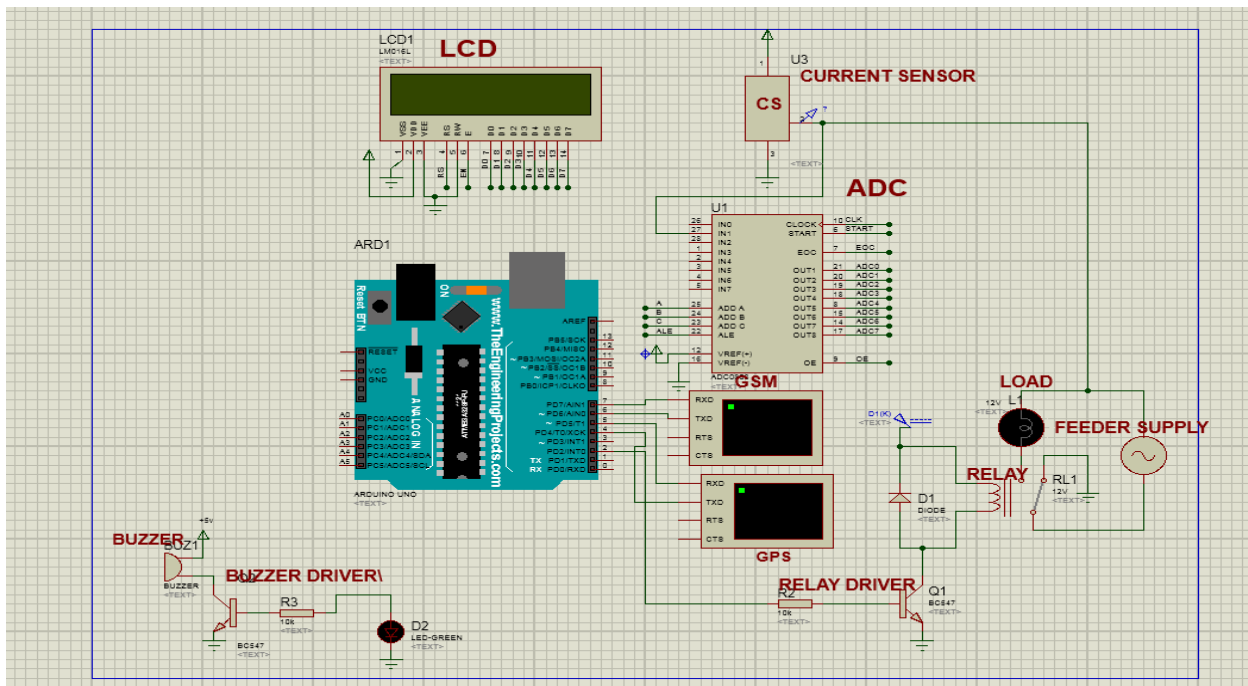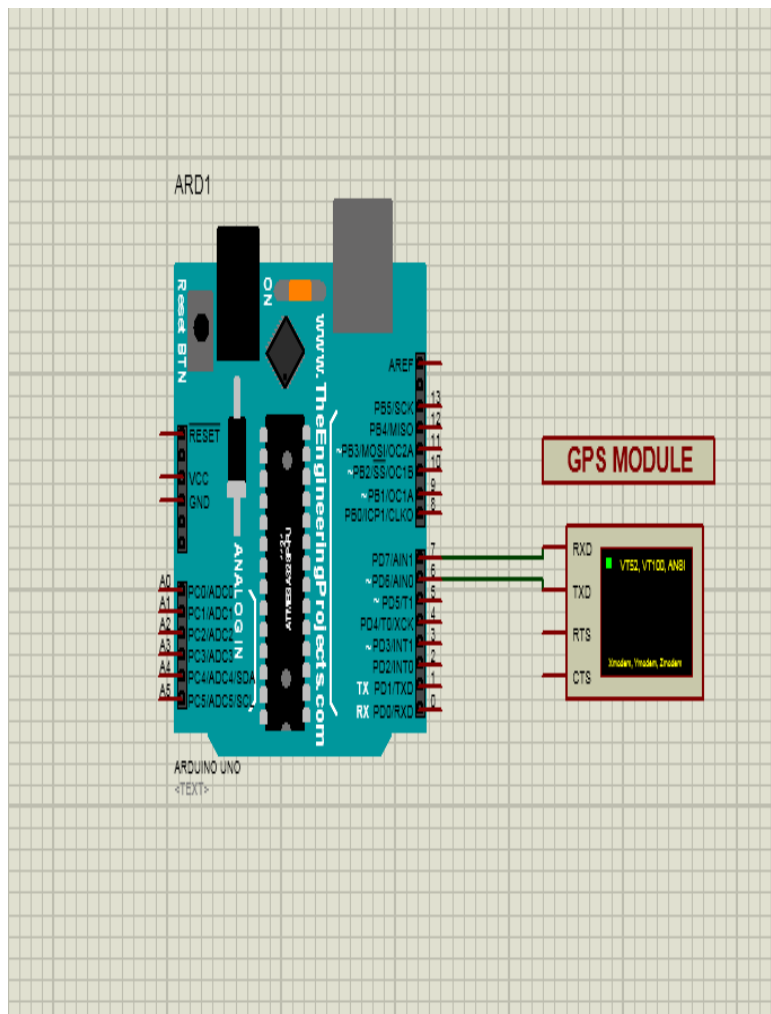

Fig. 3. Circuit diagram
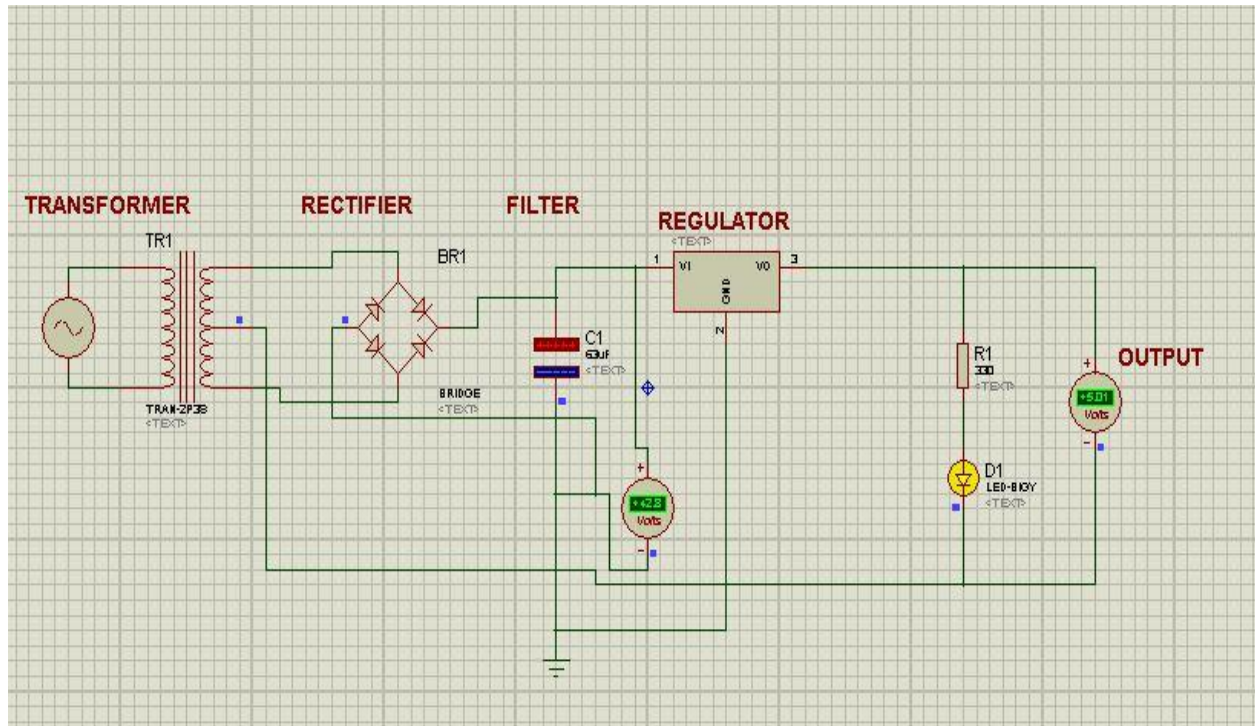

Fig. 4. Interfacing of GPS module with arduino uno

Fig.5 power supply design.

VI. ADVANTAGES AND APPLICATION

A.   Advantages
* Efficient and low cost design.
* Low power consumption.
* Real time monitoring.

B.   Application
* This project is used for protecting Bus bars in sub stations, generating stations etc.
* Used for Industrial appliances protection.
* This system can be implemented in industries.
* This system can be used to monitoring and controlling the home appliances.

VII. CONCLUSION

In our project we studied design to attain control & monitoring of overload condition of feeder lines by measuring the temperature of line. In this project we designed a system in such a way that it will monitor and control the load continuously and that information is send to user mobile number using GSM technology.
And also by using GPS trace the location.

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