

Automatic Monitoring And Isolating The Faults In Electrical System Using Gsm With Auto Fensing Alerts

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Abstract- The purpose of this project is to monitor and isolating the electrical system devices during faults remotely using GSM modem. The GSM modem provides the communication mechanism between the user and the microcontroller system by means of SMS messages.

This system continuously monitoring the electrical parameter (like voltage, current etc), and temperature continuously using microcontroller and control to the power devices then immediately send particular alert message to the user. Here this system can provide continuous monitoring and control system and isolate the faulty system using GSM technology. User can control multiple electrical devices by sending suitably formatted SMS message to the microcontroller based control system.

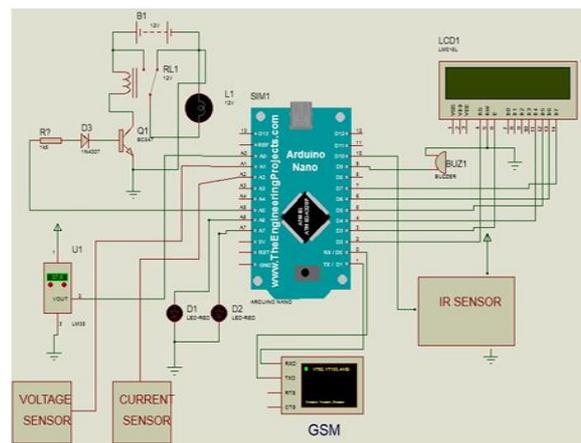
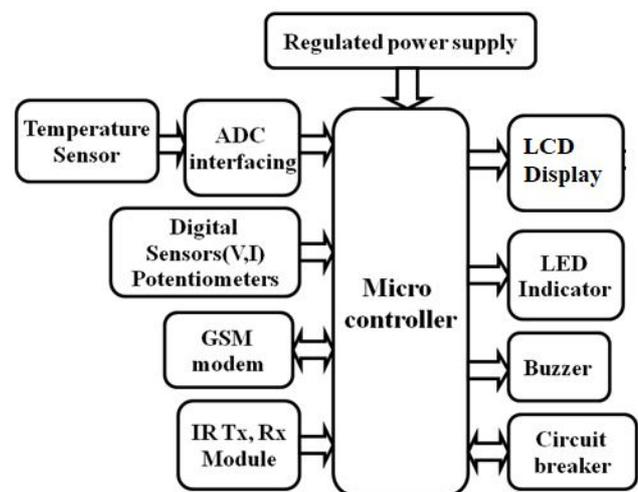
This system also continuously monitors the status of devices connected to it. If the status of any critical device changes from ON to OFF or vice versa, then microcontroller based system automatically sends the SMS alerts back to user. After completion of the command implementation this system sends the confirmation messages back to the calling user.

“Automatic monitoring and control the electrical system using GSM modem” is a modern era automation system where we can control the status of the appliances from anywhere in the world. Here the devices to be controlled are interfaced with a GSM mobile unit, which is capable of receiving instructions in the form of Short message service and performs the necessary tasks.

This project finds its applications in industrial environment, home automation and for any other commercial purposes. Here we cannot only control the ON and OFF status but also receive the feedback from the system about the current status of the device.

IR sensors are to connect shocking system and alert message; if any unauthorized person crosses the limits then the IR sensor will send you the appropriate message to owner’s mobile phone.

I. BLOCK DIAGRAM AND CIRCUIT DIAGRAM



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II. THE COMMUNICATION SYSTEM

The GSM modem is a wireless modem that works with a GSM wireless network. Unlike the dial-up modem, the GSM modem sends and receives data through waves. It requires a SIM card from a wireless network carrier to function. Whenever the set threshold is bridged, the system sends an instant message to the utility mobile phone, stating the existing fault and the location using the GSM modem.

III. OPERATION OF THE GSM

GSM Modems are controlled by the microcontroller using the AT commands. However the GSM modem supports a fixed and extended set of AT commands. Defined in the GSM standards are these extended set of AT commands which enables the following functions;

- Send SMS messages.
- Reading, writing and searching phone contacts.
- Monitor signal strength.
- Read, write and delete SMS messages

IV. AUTOMATIC POWER LINE FAULT DETECTION

In present systems, there are no simple and effective techniques to automate the fault detection and location. This process is generally carried out manually as they get information about fault from the side of users. The immediate action to be done is to switch of the power supply.

A. Fundamentals

In some systems, this is only automated using relays or ELCBs. The proposed system is an Automatic Power Line Fault Detector that can easily and accurately detect and locate the fault occurred in the power line. It consists of a line unit as well as a master station. The system makes use of voltage and current transformers which are placed at different points on the line to detect the fault. Detection includes checking whether the line is faulty or not and if it is, then identifying in

which category this fault falls. This is found out by checking the values of current and voltage transformers. The obtained result is then transmitted to master station so that it can continuously monitor the status of lines. If the line is faulty, the master pushes the line after the faulty one to open. Thus fault occurred at a point on the line will not affect the next sections of the line. The location where which the fault is occurred is also predicted using this system.

B. Design Equations

To design the system we have to consider the design equations. The design equations are used for taking necessary actions whenever a fault is present on the power distribution line. When the power line is having no fault present on it when ever, $I_p=I_n$ (1) and both are below threshold. If the line is open circuited then, $I_p=I_n=V=0$ (2) Where I_p and I_n are the phase and neutral currents and V is the phase to neutral voltage. The condition for short circuit can then be, $I_p>Threshold$ (3) and that for ground fault is, $I_p>I_n$ (4)

C. Block Diagram of System

The block diagram of both post unit and main unit are separately analyzed here. The block diagrams of both post and main unit are shown below. A typical power distribution line is powered by transformers placed at certain locations. The transformer secondary will be star connected so that it will have a set of three phase lines and neutral line. Each single phase customer get supply from a phase line and a neutral line. It is important to note that this arrangement is quite complex and is difficult to locate faults. To analyze the fault, here we use a small circuitry called post unit which is mounted on various points in the line. Individual post unit will examine its input voltage and load current and using suitable algorithm it finds the fault if any. The post units always send the status of line to main unit which is placed at the transformer end. Post unit also cuts the connection to subsequent section whenever a fault occurs. The main unit also consists of set of sensors that give the status of line at that point and it accepts the information received from the post units. It sends information to the authorities of power provider about the fault including its type and location if it finds the line faulty. Power for the post units to work can be provided by using solar panels so that the unit will very efficiently work. An LCD is placed in all the units which will display the status at that point of power line. The status include the main power supply, voltage and current at that point, identification number of that unit, fault type if any etc. The complete unit is controlled by a micro controller.

V. RESULT ANALYSIS

When there is fault in the electrical system i.e, variations in the parameters like voltage, current, frequency, temperature and if any unauthorised person enters into the restricted danger or substation then we get the alerts by the GSM from the control of microcontroller.



Fig: when hardware kit in off condition

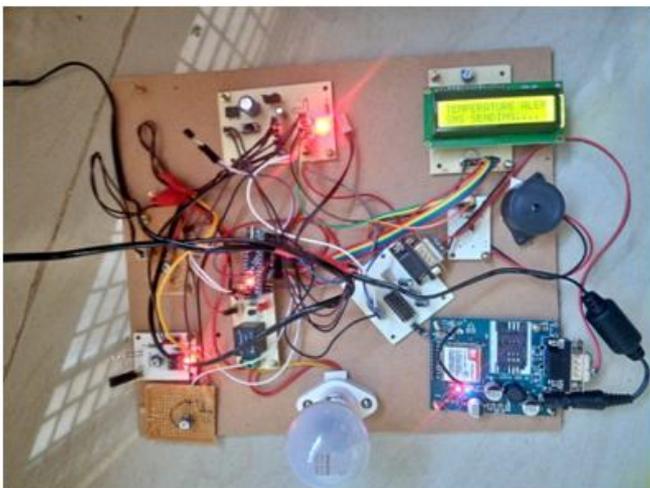


Fig: when hardware kit in on condition

We will get the sms alerts from the GSM through the control of Arduino Nano microcontroller the different alert sms messages are sended and fault is automatically controlled the alert sms are shown below

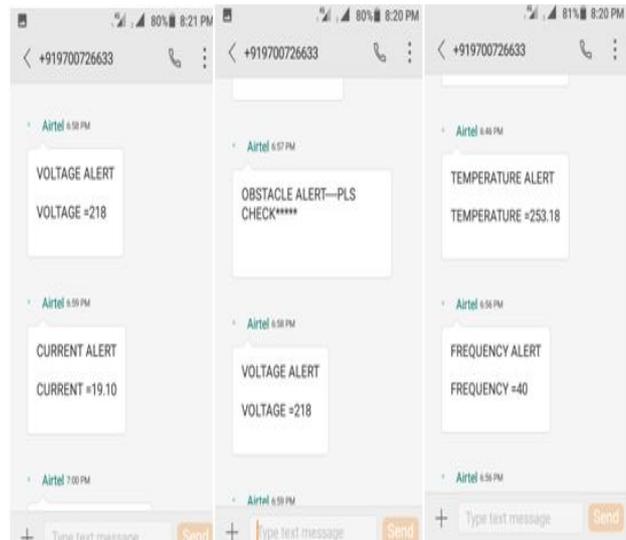


Fig: sms alert images

A fault detection system enabled by the use of the GSM wireless network for communication was achieved. The fundamental objectives of this research work were achieved as the system designed was able to detect transmission fault. The occurrences of faults were displayed and the message was sent through the GSM network over to the utility mobile phone. A bi-directional communication was established as the system was able to receive command from the utility phone to set a short circuit limit.

In this project work, we have studied and implemented a complete working model using a Microcontroller. The programming and interfacing of microcontroller has been mastered during the implementation.

This work includes the study of **GSM modem using sensors**. GSM network operators have roaming facilities, user can often continue to use there mobile phones when they travel to other countries etc..

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