Underground Cable Fault Detection Using ARDUINO, GSM, GPS

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ABSTRACT:

As in Power system Generation it is to implement the more long cable which is we are used as underground cable. There is a chance to occur fault in the underground when we used it to distribute in the urban areas on that time it is difficult to find the fault in the underground cable. So that we are using the Arduino microprocessor, GPS and GSM modem to find the fault easily and accurate. The aim of this paper is to detect the fault and to determine the exact distance of underground cable fault from a substation in kilometres.

KEYWORDS: IOT, Underground Cable, Microcontroller AT mega, LCD Module, GPS Module, Relay Drive

I.INTRODUCTION

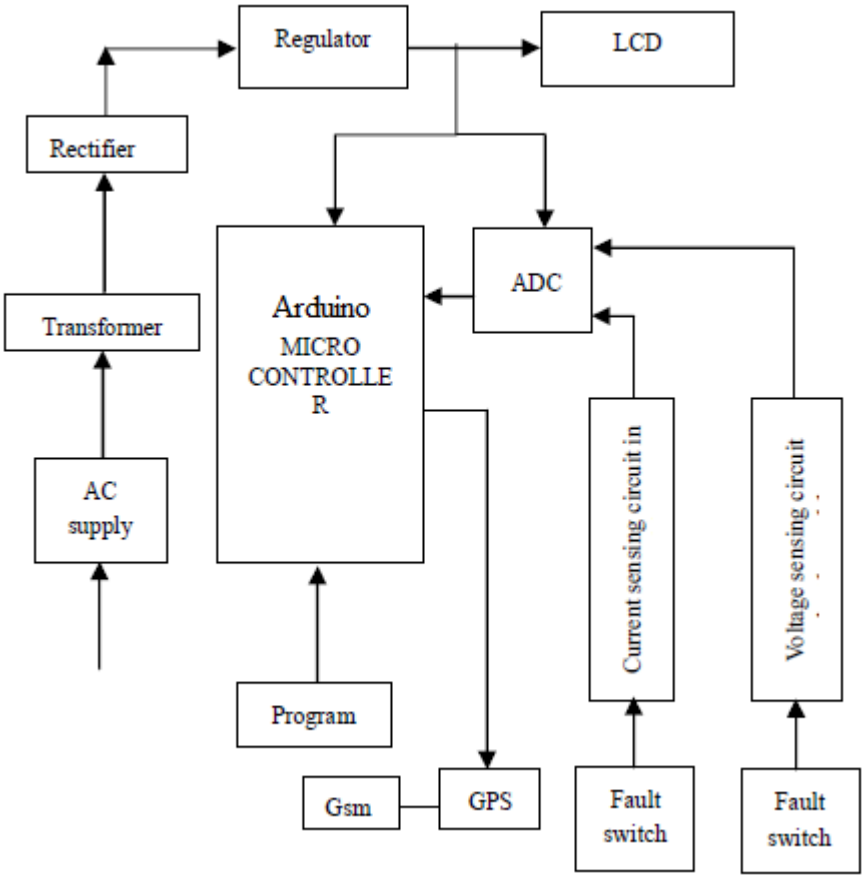
In a electrical utilities, some of the transmission lines plays the major role of every power systems. With regard to this, cost of power delivery, and accurate fault location for the transmission of electric lines is of vital importance in Restoring the power services and reducing outage time as much as possible. By an accurate source detecting and Finding the exact faults on high voltage transmission network is very important for all the utilities to allow a quick maintenance action for the concern authority of a repairing person or crew. Detecting the cable fault in the underground can be categorized as a Open conductor faults, shorted faults, and high impedance faults. Which it may occur in the transmission lines.

This we can able to do using the Arduino microcontroller to monitor the cable in the underground with the use of loaded program in the microcontroller. A short circuit to the earth fault can be mostly located using a method called frame method. The fault occurring in the underground may be due to the short circuit to another conductor in the cable, short circuit to the earth, high resistant to earth, open circuit and some of the machine digger can also able to fault the underground cable in the transmission lines.

Detailed description

Whenever the power is switched ON, all the devices are initialized. This initialization process is done in the setup function of the program. Workflow of the project is done in the loop function of the program. First of all, microcontroller will be waiting for the input from the fault circuit model. Fault circuit model contains switches to representing the cable. Faults are considered to be generated by switching them ON/OFF. Thus, the faults are generated manually by using a model circuit. Whenever the fault is generated the data form this fault model circuit is sent as input to the Arduino. Arduino processes the information about location of fault. Then the fault location data is displayed on LCD. This step is followed by GPS event. GPS module uses NEMA protocol for reading latitude and longitude coordinates. Once the GPS module is triggered, it will take 20 to 25 seconds to establish stable connection between satellite and GPS module. Then it gets the exact values of latitude and longitude. This data is passed to serial interface in the form of NEMA sentences. From there it is passed to Arduino. The data obtained from the NEMA sentences is converted to decimal format in the microcontroller. Then the Arduino will initialize the GSM module to send SMS about location data i.e., distance of the fault location in kilometres and latitude, longitude coordinates. These coordinates can be observed through google maps to observe exact location.

BLOCK DIAGRAM



The input voltage 230V is applied to the transformer initially. Then the transformer (230V/12V) steps down the input voltage to 12V. The output of transformer is fed to rectifier bridge which converts 12V AC to 12V DC. But the output of rectifier is pulsating DC. Hence a capacitor filter (100MF) is used to convert into pure DC. Then 12V DC is applied to a voltage regulator to provide enough voltage i.e. 5V to the ATMEGA microcontroller. Both LCD and controller are interfaced each other . A GSM module is used to send alert messages to the registered mobile number. When there is no fault in the system, it displays a message "R-OK" on the LCD. When a fault occurs(short circuit or open circuit),it displays the type of fault on LCD, along by sending an alert message to the mobile number. The system gives the voltage and current values at normal and abnormal conditions. The location of fault latitude and longitude is shown through GPS system. Also once the fault is cleared, it again sends the message that the fault is cleared

RESULTS

Whenever there is no fault in the underground cable, it displays on LCD that the system is in "good condition" by indicating the normal voltage and current values. When a fault occurs on the line, it displays the type of fault on the system whether it is open circuit or short circuit fault. Also an SMS is sent by using GSM System to the registered user for alerting purpose. Once the fault is cleared, it displays on LCD again as "good condition" which automatically sends SMS indicating that the fault is cleared.. After getting the fault location data it is sent to mobile number using GSM module. The SMS includes distance of location and its coordinates as link and using this link the fault location can be clearly monitored in Google Maps

CONCLUSION

This objective of the paper is to determine the fault occur in the underground cable and to detect the exact location of The fault from the power station. Using the microcontroller we can be able to find the distance. This paper proposes a
Fault location in the underground cable. The aim of this paper is to determine the exact location of fault which occur in the cable. When any fault like short circuit, voltage drop and some other current varies as soon this kit is used to find its fault and give a message through the GSM module and the exact location through GPS and also which will be displayed in the LCD display.

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