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UNDERGROUND FAULT DETECTION SYSTEM USING GSM AND 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 kilometers.

Keywords: *Underground Cable, Microcontroller AT mega, LCD Module, GPS Module, Relay Drive*

INTRODUCTION:- Fault identification and order on transmission lines are significant undertaking to defend electric power frameworks. In an electric power system, a fault is any abnormal flow of electric current. short circuit is a fault in which current flow by passes the normal load. An open circuit fault occurs if a circuit is interrupted by some failure. In three phase systems, a fault may involve one or more phases and ground, or may occur only between phases. In a “ground fault” or “earth fault”, current flows into the earth. The prospective short circuit current of a fault can be calculated for power systems. In power systems, protective devices detect fault conditions and operate circuit breakers and other devices to limit the loss of service due to failure.

Objectiveandscope:- The purpose of this paper is that to send a quick message to the service provider authority as soon as there is fault in transmission line. In this model, we predict the location of fault with the help of distance from pole to pole. In future we can have a GPS (global positioning system) attached to it so that it would be send exact location of fault occur in transmission line in terms of longitude and latitude. In future we can used appropriate programming for finding distance of fault from substation.

Existing project:- GSM module is used to establish communication between a computer and a GSM system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate.

Proposed project:- The present Proposed project is developed by reviewing different papers. In practical electricity, people use the trial and error method to detect the fault location (Line to line fault / line to ground fault) of a distribution line. They feed supply at the single end at a time by dividing that transmission line into two parts and check the fault up to that section. These processes go on until they find the fault area. After checking if they found anything, then it is ok to go forward. This process is done from both ends and they sort out the exact location. The aim of this paper is finding the exact location of the fault. In the proposed concept with the use of wireless network exact location of fault can be diagnosed. There by providing optimum operation of electric power. The objective of this project is to provide with a simple way to detect the fault and show the exact location of occurred fault which will ultimately lead to optimum operation of the whole system and to improve the reliability of distribution network. The aim is to detect the fault in the distribution line and intimate to the server about the fault location. To detect the accurate fault in the distribution lines, the sensor is used. The sensors sense the power characteristics of the transmission line.

Components:-

- Power supply
- Arduino microcontroller
- GSM module
- GPS module
- LCD display
- Relays and switches
- BC547 Transistor

1.Power supply: The power supply circuit consists of step down transformer which is 230 volts step down to 12 volts. In this circuit four diodes are used to made bridge rectifier circuit which supply pulsating dc voltage and then supply to capacitor filter the output voltage from rectifier is supply to filter to remove any AC components present even after rectification. The rectified DC voltage is given to regulator to produce 12 volts constant DC voltage.

2.Arduino UNO Microcontroller: AT Mega 16 microcontroller is an 16 bit high speed micro controller from the Atmel's Mega family. Atmega16 microcontroller is a 16 bit 40 pin micro controller based on enhanced (Reduced instruction set computing) RISC architecture with 131 instruction. The input supply is given to the voltage regulator which also drives a relay driver which controls the relays for proper connection of the Underground cable. If fault occur in relay will be open to switch on alarm of faulty section. LCD display fault location and Arduino send a message using micro controller through GSM & GPS Module in mobile phone.

3. LCD Display: 16x2 LCD has 16 Columns and 2 Rows. There are a lot of combinations of LCD's are available like, 8x1, 8x2, 10x2, 16x1, etc. but the most common one is the 16x2 LCD. So, it will have 32 characters in total and each character will be made of 5x8 Pixels. Operating Voltage - 4.7V 5.3V Current consumption is 1mA It Consists of two rows and each row can print 16 characters. Each character is build by a 5x8 pixel boxes. It Can work on both 8-bit and 4-bit mode.

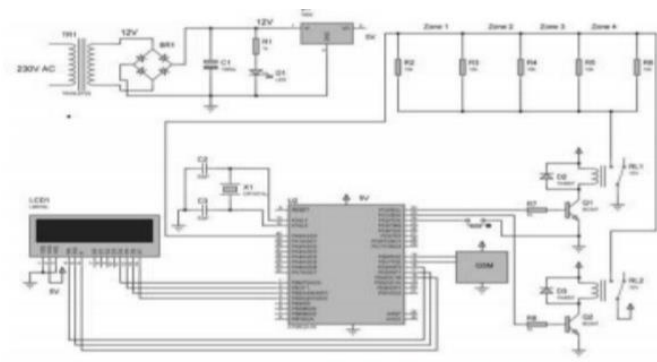
4. GPS Module : Global Positioning System (GPS) makes use of signals sent by satellites in space and ground stations on Earth to accurately determine their position on Earth. Radio Frequency signals sent from satellites and ground stations are received by the GPS. GPS makes use of these signals to determine its accurate position.

5.GSM Module: It is highly flexible plug and use AC – DC power adaptor with DC voltage of 12V. 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.

6. BC547 transistor: It is an NPN transistor. A small current of the base terminal of this transistor will control the large current of emitter and base terminals. The main function of this transistor is to amplify as well as switching purposes. The maximum gain current of this transistor is 800A.

Working:-

The project uses the simple concept of Ohm's law where a low DC voltage is applied at the provider end through series resistor. The current would change depending upon the length(in km) of fault of the cable in case there is a short circuit of LL fault or 3L fault or LG fault etc. The series resistor voltage drop changes according to the fault which is then fed to an Analog to Digital Converter to develop adigitaldata which the programmed microcontroller would display the same in KM's. The project is fabricated with a set of resistors representing cable length in KMS and fault is generate by a set of switches at every known KM to check the accuracy of the same. This is recommended model of underground cable fault using microcontroller.It is classified in four parts –DC power, supply, cable, controlling, display part. The Part of DC power supply consist oftransformer, bridge rectifier converts alternating Ac supply of 230 is step downcurrent to direct current & regulator is used to produce constant dc voltage. The part of cable is represented by the set of resistors along with switches. Current sensing part of cable represented as set of resistors & switches are used as fault generators to show the fault at each location. This part senses the change in current bysensing the potential drop. Next is controlling part which comprises of analog to digital converter which receives input from the current sensing element, converts this voltage into digital signal and feeds the microcontroller with the signal. The microcontroller is also a part of the controlling unit and makes necessary computations regarding the distance of the fault. The microcontroller also operates a relay driver which controls the switching of a set of relays for interconnection of transformer, bridge rectifier converts alternatin current to direct current & regulator is used to produce constant dc voltage. The part of cable is represented by the set of resistors along with switches. Current sensing part of cable represented as set of resistors & switches are used as fault generators to show the fault at each location. This part senses the change in current by sensing the potential drop. Next is controlling part which comprises of analog to digital converter which receives input from the current sensing element, converts this voltage into digital signal and feeds the microcontroller with the signal. The microcontroller is also a part of the controlling unit and makes necessary computations regarding the distance of the fault. The microcontroller also operates a relay driver which controls the switching of a set of relays for interconnection of the cable at each . In case fault occur it send messages through GSM & GPS module and display.



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 which will display in the LCD display.

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