Automatic Underground Cable Fault Detection by using GSM

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Abstract— This project is the knowing the faults and abnormal condition is occurring in underground cables by using an arduino. The basic idea behind the working of this project is ohms's law. At the feeder end, if a DC voltage is applied, based on the location of the fault in the cable value of current also changes. So in case of a short circuit fault like L-G or L-L fault the change in voltage & current value are measured across the resistor is then fed to the in-built ADC of the arduino. This value is processed by the arduino and the fault is calculated in terms of distance from the base station. That value is sent to the LCD and also to the mobile through the GSM interfaced to the arduino board and it displays exact location of the fault from the base station in kms for all the three phases. This project are arranged with a set of resistors which represent the length of the cable. At every known km fault switches are placed to create the faults manually. Finally the fault distance can be determined.

Keywords: ARDUINO UNO (ATMEGA 328), Underground Cable Fault, GSM, LCD

I. INTRODUCTION

In a bundle of electrical conductors used for carrying electricity is called as a cable. An underground cable generally has one or more conductors covered with suitable insulation and with a protective covers. Generally used materials for insulation are varnished cambric or impregnated paper. Fault in a cable can be any defect or non-homogeneity that diverts the path of current or affects the performance of the cable. So it is very important to correct the fault.

Power Transmission can be done in the both overhead as well as in underground cables. But unlike underground cables the overhead cables have the drawback of being easily prone to the effects of rainfall, snow, thunder, lightning etc. This requires cables with reliability, increased safety, ruggedness and greater service. So underground cables are preferred in many areas specially in urban places. If it is simply to find and exact faults in over head line by mere observation, it is not possible to do so in an underground cable. As they are buried deep in the soil it is not simple to detect the abnormal condition in them. Even when a fault is work to be present it is very difficult to detection for the exact location of the fault. This leads to dugging of the entire area to detect and actual the fault which in turn causes loss of money and manpower. So it is very important to know the exact location of faults in the underground cables. What so ever the fault is the voltage of the cable has the practice to change accidentally whenever a fault occurs. We make use of this voltage change across the series resistors to detect Yuan Liao, Ning Kang has presented fault location algorithms without utilizing line parameters. By utilizing unsynchronized voltage and current measurements from both ends of line without requiring line parameters based on the distributed parameter line model. The fault location estimate is not sensitive to measurement errors while line parameter estimates are sensitive to measurement errors. Thus relatively precise.

II. WHAT IS CABLE FAULT? & TYPES OF FAULT

The A cable fault is when the insulation of a power cable deteriorates enough that it's no longer able to contain the voltage, causing a short. Basically, it's a hole, or a crack, burning through the cable.

A. Open circuit Fault

Open circuit faults are better than short circuit fault, because when these fault occurs current flows through cable becomes zero. This type of fault is caused by break in conducting path. Such faults occur when one or more phase conductors break.

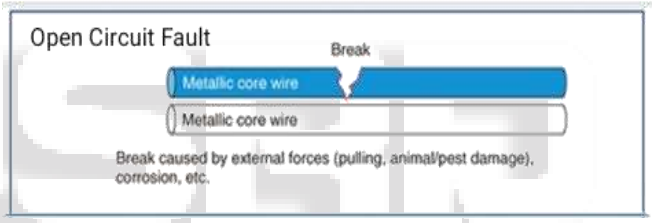


Fig. 1: Open circuit Fault

B. Short circuit Fault

Short circuit fault occur due sudden increase the current in underground cable, and this SC current is higher than the rated current of the cable and due to this fault the cable will burn out and our system is damage.

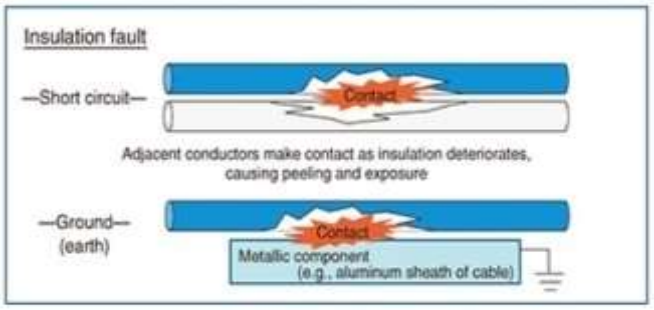


Fig. 2: Short circuit Fault

III. BLOCK DIAGRAM

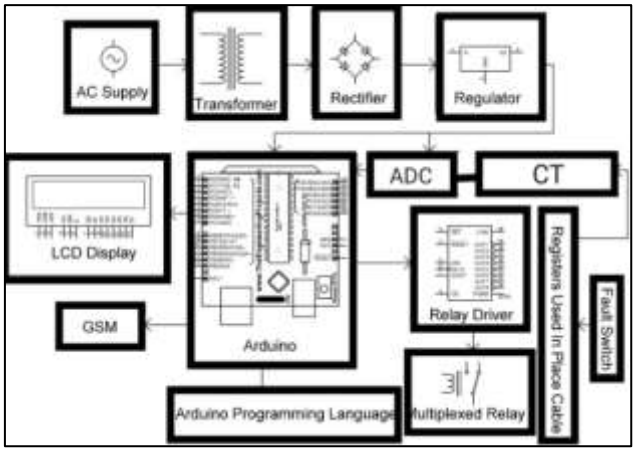


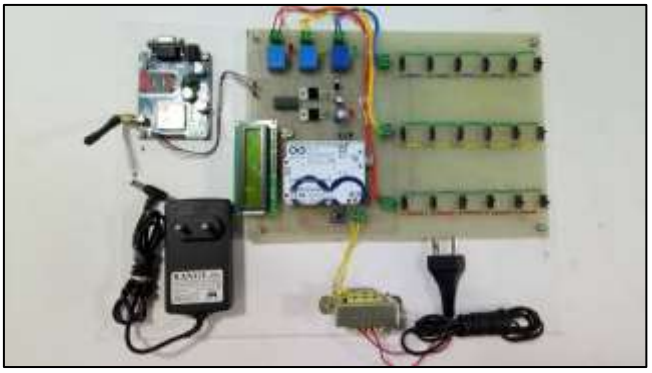
Fig. 3: Block Diagram

IV. WORKING

Non One relay for each phase R ,Y and B three relays are used and the common points of the relays are grounded and the points are connected to the inputs of R17,R21 and R25 and being the three phase cable input. As supply needed for the relays is higher than that of the Arduino, Relay driver is used to boost the supply and provide it to the relays. A 230V AC supply is applied to the transformer from where it is stepped down to 12V Aciform the transformer the alternating current gets converted into direct current when it passes through a Bridge wave rectifier. The 12V DC then goes to the voltage regulator where it gets converted from 12V DC to 5V DC. Voltage regulator is used also converts the variable Dc supply into constant DC supply.

This 5V DC When fault is induced by operating any of the 12 switches they impose conditions like LG,LL, LLG fault as per the switch operation. As a result of the fault, there is a change in voltage value. This voltage value measured across the resistance is fed to the ADC of the Arduino. Using this value, the arduino computes the distance. Finally the distance of the fault from the base station is displayed in kms in LCD and Mobile.

V. EXPERIMENTAL PROJECT IMAGE



VI. ADVANTAGES

- Less maintenance
- It has higher efficiency than other
- Less fault occur in underground cable
- Improved public safety
- It is protected from moisture & lighting stroke
- Less space required for cabling
- It can detect other types of fault cable such as Short circuit fault, Open circuit, cable cuts.

VII. CONCLUSION

Thus the project on Underground cable fault know using Arduino was done and the distance of the fault from the base station in kms was shown for the three individual phases R,Y and B.

Circuit can be tested with various resistor values to display different fault conditions In this project faults upto a distance of 4km can be detected. When the fault switches are operated to fault condition then the phase corresponding to that particular switch is considered as the faulty phase. So the faulty section can easily be located.

VIII. FUTURE SCOPE

In this paper we detect the exact location of short circuit fault in the underground cable from their feeder end in km by using arduino. In future, this project can be implemented to calculate the impedance by using a capacitor in an AC circuit and thus measure the open circuit fault.

IX. OBJECTIVES

The main objective of this project is to detect the faults and abnormalities occurring in underground cables using an arduino.The basic idea behind the working of this project is ohms law.

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