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Underground Cable Fault Distance Conveyed Over GSM

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Abstract: *The main goal of this paper is to identify cable faults and show these faults in Liquid Cristal Display [LCD] and mobile using Arduino and Global System for Mobile Communications [GSM] which is occurring in underground cable. On the feeder side, when a direct current voltage is applied, the current estimates are further changed to address the problem areas of the cable. Therefore, in the event of a short circuit problem (such as an L-G or L-L problem), an Analog-to-Digital Converter [ADC] made by Arduino will adjust the estimated rated voltage through a resistor. This value is prepared by arduino, and the shortage is well determined by the base station. This value is transmitted to the LCD connected to the arduino board and displays the exact area several kilometers away from all base stations in three phases. The task consists of many resistors that communicate the length of the cable. Faults switches induced in every kilometer to calculate exact location of faults.*

Keywords: Arduin, Faults Detection, Underground Cable, Liquid Cristal Display, Global System for Mobile Communications

I. INTRODUCTION

Underground cables have been widely implemented due to reliability and environmental concerns. To improve the reliability of a distribution system, accurate identification of a faulted segment is required in order to reduce the interruption time during fault[5], i.e., to restore services by determining a faulted segment in timely manner. In the conventional way of detecting a fault, an exhaustive search in larger-scale distance has been conducted. This is time-consuming and inefficient. Not only that the manpower resource is not utilized, but also the restoration time may vary depending on the reliability of the outage information. As such, deriving an efficient technique to locate a fault can improve system reliability [6] . Underground cables are prone to a wide variety of faults due to underground conditions, wear and tear, rodents. Detecting fault source is difficult because entire line is to be dug in order to check fault at cable line. The repairmen know exactly which part has fault and only that area is to be dug to detect the fault source. Thus it saves a lot of time, money and allows to service underground cable lines faster. The aim of this project is to determine the distance of underground cable fault from base station in Km.[7]Use of underground power cable is expanding due to safety considerations and enhanced reliability in the distribution systems in recent times. Due to safety reasons and high power requirements in densely populated areas, underground cable has seen a sharp hike in recent times[8] .Till last decade's cables were made to lay overhead& currently it is lay to underground cable which is superior to earlier method. Because the underground cable are not affected by any adverse weather condition such as storm, snow, heavy rainfall as well as pollution. But when any fault occur in cable, then it is difficult to locate fault .So we will move to find the exact location of fault [9]. Now the world is become digitalized so the project is intended to detect the Location of fault in digital way. The underground cable system is more common practice followed in many urban areas. While fault occurs for some reason,at that time the repairing process related to that particular cable is difficult due to not knowing the exact location of cable fault.[10].

II. LITERATURE SURVEY

Dhekale P.M., Bhise S.S., Deokate N.R. (2015): This paper proposes fault place model for secretive power cable using microcontroller. The main concept underground cable fault from base station in kilometres. A set of resistors are therefore used to symbolize the cable and a dc voltage is fed at one end and the fault is detect by detect the vary in voltage using analog to voltage converter and a microcontroller is used to make the necessary calculation so that the fault distance is display on the LCD display.

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Prof. Arjun Nichal, Mr. Sudarshan Bhosal Mr. Vaibhav Shirsavade, Mr. Yogesh Jadhav (2016): This paper propose about fault location model for underground power cable using microcontroller and the thing which is based on the internet means the in order will transfer from end to end the internet access. That is to settle on the detachment of underground cable fault from the base station in the kilometer and also locate the exact location of that broken down place.. When any fault like short circuit occur, voltage drop will vary depending on distance end to end of fault in cable, since the current varies. A set of resistor are then used to signify the cable, since the current end and the fault is detected by detect the change in the voltage using analog to voltage converter and a microcontroller is used to make the required calculation so that the fault distance is display on the LCD display. This fault details after send to any admission point through the internet

Nikhil Kumar Sain, Rajesh Kajla, Mr. Vikas Kumar (2016): This paper suggest fault position model for underground power cable using microcontroller. The aim of this scheme is to conclude the distance of underground cable fault from base station in kilometers. This scheme uses the easy idea of ohm's law. When any fault like short circuit occurs, voltage drop will vary depending on the length of fault in cable, because the current varies. A set of resistors are consequently used to represent the cable and a dc voltage is fed at one end and the fault is detect by detecting the change in voltage using analog to voltage converter and a microcontroller is used to make the required calculation so that the error distance is displayed on the LCD display.

T. Nandhini, J. Shalini, T. Sai Sangeeetha, D. Gnanaprakasam (2017): The project is planned to detect the place of fault in underground cable lines from the base station to exact place in kilometers using an Arduino micro controller kit. In the urban areas, the electrical cable runs in undergrounds as an alternative of overhead lines.

III. Existing System

We have calculated accurately the location of a cable fault, eliminated the noise caused by arcing voltage, enhance the accuracy by interjecting pre-fault pulse signals occasionally into the cable, locate the open circuit and short circuit fault in underground cables using Global system for mobile communication (GSM) module and Arduino programming and simulate the network and fault using software named IDE (Integrated Development Environment) Arduino

IV. Types Of Fault Detection

1. Sectionalizing methods.
2. Murray loop methods.
3. Acoustic detection methods

4.1 Sectionalizing Methods

It involves physically cutting and splicing the cable, which can reduce the cable's reliability. In order to reduce the cable's reliability, the cable needs to be divided into small sections which enable us to find the fault. The sectionalizing method cannot be employed because examining of underground cable is not possible.

4.2 Murray Loop Methods

Murray loop test is the most common and accurate method for locating earth faults and short-circuit faults. However, to perform the Murray loop test, it is necessary that a sound (good) cable runs along the faulty cable. This test employs the principle of Wheatstone bridge for fault location. The Murray loop method is dependent upon the concept of Wheatstone and is highly inappropriate caused by distinct lead-resistances

4.3 Acoustic Detection Methods

An acoustic detection method and apparatus includes a source of high voltage pulses to be applied to an underground cable suspected of having a ground fault. As the pulses encounter the fault, acoustic energy is generated which may be sensed by a pair of transducers located along the path of the cable. The acoustic method may become catastrophic and hindering at rainy time

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V. PROPOSED WORK

- To determine the distance of underground cable fault from base station in kilometers USING an Arduino.
- To design and construct an less costly underground cables.
- To review and classify faults in underground cable fault detector.

Proposed method has

- Less maintenance
- Better results
- Insufficient underground links
- This strategy works for all kinds of links from 1kv to 500kv.
- Differentiate between different types of cable problems, such as short circuit faults, cable cuts(due to some mechanical works such as construction site), resistance faults, sheath faults(defects in the outer protective sheath of cables), water trees, and partial discharge.

5.1 Block Diagram

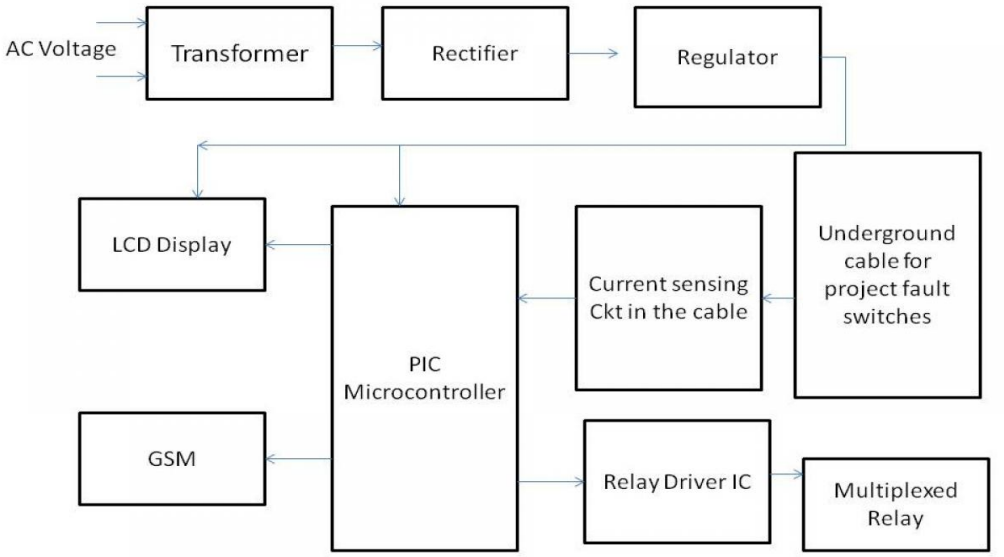

Figure 1: The block diagram of underground cable fault detection

5.2 Algorithm to Detect the Fault using GSM and Arduino Uno Board

This project is composed of an arrangement of series resistors representing a cable, a step down transformer (230/12 volts), a bridge rectifier to convert 12 volts AC (alternating current) into 12 volts DC (direct current), regulator, LCD, Arduino NANO board and GSM module to remotely forward the data. The complete model/project is energized through power circuit which is composed of stepdown transformer, bridge rectifier and regulator ICs , this project uses 2 different voltage level 12V (for Relays and relay driver IC) and 5V (for GSM, Arduino and other components). Arduino is compiled with C language, when circuit is turned on Arduino start its programming cycle and sends signal to relay driver IC to operate relay. When Arduino executes its program cycle then all three cables are scanned with a delay of 500ms. During this scan if any switch is closed(fault is created), Current gets path to ground through relay contact. This flow of current causes drop in voltage, depending upon the path of current, resistance offered and relying on location of fault the drop in voltage is recorded and transferred to the analog pin of Arduino NANO board and it is programmed with C language, executes and processes all the input data and converts analog raw data into simplified digital data using ADC. Digital data is displayed into the 16*2 LCD along with its phase and location of fault. The same data which is displayed on screen is remotely forwarded to the responsible person through GSM module and can be monitored on laptop or pc using serial monitoring techniques. In this model three relays are used to differentiate between the phases and relay driver IC is used to control relay through Arduino programming (C language). Fig.1 indicates the block diagram of underground cable fault detection and displays over mobile

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system through messaging. This project circuit block diagram comprises of various blocks such as a power supply block, Arduino UNO block, multiplexed relays, fault switches, LCD display and GSM module. Hence, this proposed project can be used to detect the accurate location of the fault and also for sending the data to a mobile system in text messaging format along with displaying over an LCD display using GSM module.

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