UNDERGROUND CABLE FAULT DETECTION USING IOT

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Abstract

The project is intended to detect the location of fault in underground cable lines from the base station to exactlocation in kilometers using an Arduino micro controller kit. In the urban areas, the electrical cable runs inundergrounds instead of overhead lines. Whenever the fault occurs in underground cable it is difficult to detectthe exact location of the fault for process of repairing that particular cable. The proposed system finds the exactlocation of the fault. This system uses an Arduino microcontroller kit and a rectified power supply. Here thecurrent sensing circuits made with a combination of resistors are interfaced to Arduino micro controller kit tohelp of the internal ADC device for providing digital data to the microcontroller representing the cable length inkilometers. The fault creation is made by the set of switches. The relays are controlled by the relay driver. A16x2 LCD display connected to the microcontroller to display the information. In case of short circuit thevoltage across series resistors changes accordingly, which is then fed to an ADC to develop precise digital datato a programmed Arduino micro controller kit that further displays exact fault location from base station inkilometers. Whenever a fault occurs in a cable the buzzer produce the alarm to alert and to take an immediateaction by field workers.

1. INTRODUCTION

Underground cables are being utilized for the advancement of intensity framework matrix. These underground cables are not affected by any climate conditions like rainfall, day off, factors and so forth. An issue may happen in an underground cable just because of earth tremors or any burrowing procedure. Since the area of the issue happened is obscure it is very hard for the fixing procedure. This hindrance is handled with the assistance of optical fibre framework. A lot of optical strands is put alongside the force cables. The optical fibre framework continually quantifies different parameters, (for example, power, current and temperature of the cable) at numerous checkpoints situated at

customary interims on the force cable. When an issue happens the estimations of the parameters of the encompassing territories change unusually. The information is acquired from the environmental factors of the checkpoints from where the shortcoming is happened. the inexact separation of the cable shortcoming is found. When the area has been recognized we start to transmit high voltage over the broken cable to locate the specific area of the issue. 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, 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. Locating a faulted segment of underground cable system requires broader aspects of consideration and analysis. Unlike overhead lines, underground cables have the characteristics of smaller inductance but larger capacitance. The analysis becomes complicated when various types of underground cables are used. An example would be a cable system that consists of more conductors such as core, sheath, and armor. In term of analyzing such cable system, mutual impedances and admittances among those conductors must be considered in the circuit analysis. This complicates the analytical aspect of identifying a fault location. In general, fault location techniques for underground cable network can be categorized in two groups: 1) Tracer and 2) Terminal. The tracer method is an exhaustive way to locate a faulted segment by “walking” through the cable circuits. A faulted segment can be determined from audible or electromagnetic signals and requires dispatching crew members to the outage area.

2. RELATED WORK

This project is to determine the distance of underground cable fault from the base station in kilometres and displayed over the internet. Underground cable system is a common followed in major areas in Metro cities. While a fault occurs for some reason, at that time the fixing process related to that particular cable is difficult due to exact unknown location of the fault in the cable. This Technology is used to find out the exact location of the fault and

to send data in graphical format to our website using a GSM module at the same time it display on the LCD screen. The project uses the standard theory of Ohms law, i.e., when a low DC voltage is applied at the feeder end through a series resistor (Cable lines),then the current would vary depending upon the location of the fault in the cable as the resistance is proportional to the distance. In case there is a short circuit (Line to Ground), the voltage across series resistors changes according to the resistance that changes with distance .This is then fed to an ADC to develop precise digital data which the programmed microcontroller of the 8051 family displays in kilometres.

Online Method

This method utilizes and processes the sampled voltages and current to determine the fault points. Online method for underground cable are less common than overhead lines.

Offline Method

In this method special instrument is used to test out service of cable in the field. This offline method can be divided into two methods .They are tracer method and terminal method.

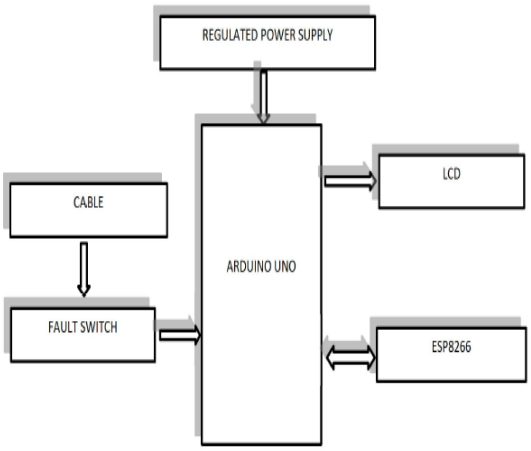
Tracer Method

In this method fault point is detected by walking on the cable lines. Fault point is indicated from audible signal or electromagnetic signal. It is used to pinpoint fault location very accurately.

Terminal Method

It is a technique used to detect fault location of cable from one or both ends without tracing. This method use to locate general area of fault, to expedite tracing on buried cable.

3. IMPLEMENTATION



Block Diagram

The basic assumption of the underground cable fault locator is to determine the distance in kilometres between the underground cable fault and the base station.

 Cable failures are a common occurrence in many urban areas.

 When a problem develops for any cause, fault tracking is extremely difficult without knowing the position of that specific wire. Therefore, the system is built to pinpoint the exact location of the cable problem.

 The ability of a person to track down and locate a fault in an underground cable

is mostly dictated by his or her expertise, knowledge, and experience.

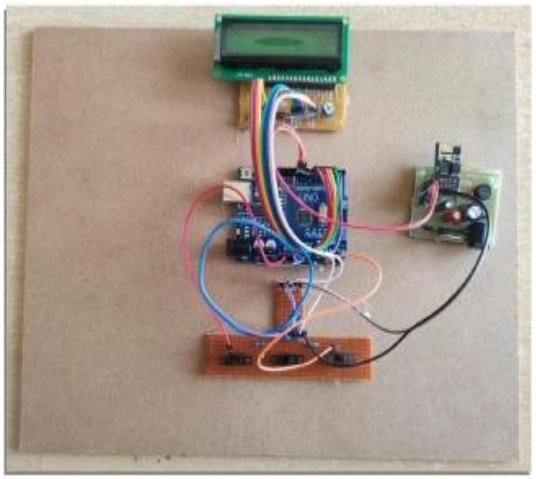
 Although tracing the connection can be tough, it is very likely to get even more complex when the more underground plant is installed. It's also crucial to understand how the machinery works. It employs the Ohms Law idea, in which a low voltage DC is given to the feeder end via a series resistor, and the current varies depending on the position of the defect in the cable.

 If a short circuit occurs from line to ground, the voltage across the series resistor changes

correspondingly, and the data is supplied to analog to digital converter to produce precise data, which the pre-programmed 8051 microcontrollers show in kilometers.

 It is built with a collection of resistors to represent the length of a cable in kilometers. And the fault creation is built with a set of switches at every known kilometer (KM) to cross-check the accuracy of the same. An LCD interfaced to the 8051 microcontrollers displays the fault occurring at a certain distance and phase.

4. EXPERIMENTAL RESULTS



Business model

Working model

5. CONCLUSION

The IOT based underground fault detector is used for detecting any flaws in an underground cable system. This system can choose the region where the fault has occurred and can send the co-ordinates to the user. The strategy used being helpful in discovery of deficiencies in underground cables.

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