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REVIEW ON UNDERGROUND CABLE FAULT DETECTION USING IOT

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ABSTRACT

Underground cables have been used extensively with the development of the power system grid .Extension cables often present in a wide variety of faults due to underground conditions, aging and crying, mice. Finding the source of the error is difficult because the entire line will be dug to check for error in the cable line. Editors know exactly what part is wrong and only that part of the site has to be dug to find the source of the error. So it saves a lot of time, money and allows you to quickly serve underground cable lines. The aim of this project is to determine the distance of the underground cable death from the station at Km. We used Short Circuit Fault for this project with the help of switches and a specific distance.

Keywords: Arduino Board, IOT Module, Display, Cable Fault, Buzzer Etc.

I. INTRODUCTION

In this project we have proposed a closed exhibition of underground communication lines with Arduino. The purpose of this paper is to determine the separation and suspicion of the sub-station link in the channel by miles. In this work we have used the basic concept of ohm's low .If there is a suspicion in the framework of the separation found in the fluid gem show (LCD).

Until the last decade, the links were intended to be placed on the head and, meanwhile, no underground link beyond the previous strategy. opposing weather conditions, for example, hurricanes, snow, heavy rains and pollution do not affect underground lines But when suspicion occurs in underground lines it is difficult to find fault with the underground link.

We will find the exact location of the case. Now that the world is on the verge of digital integration in this way, this business is seeing the exact location of the case in computer construction.

Underground cable frame is a growing trend common in many urban areas. Despite the fact that the suspicion occurred for unknown reasons, at the time, the process of correcting this particular link was difficult due to ignorance of the exact location of the link separation. The blame in the link can be seen in two circles.

Faults in underground cables Types of errors

Mistakes come in many forms. Common mistakes are given below.

- Short Circuit Error
- Open Circuit Error
- Earth error
- **Short Circuit Error**

A short error occurs when there is an insurance dissatisfaction between the stage conductors or between the stage breakers (s) and the ground or both. Disruption of the defense results in a shorter route system that results in shorter circuit conditions.

- **Open Circuit Error**

An open-circuit error occurs when a circuit is blocked by a failure. If the circuit is not closed that is called an open circuit fault.

- **Earth Error**

The fault of the world is the random connection between the participating operator and the ground or the mechanical framework. The current error log is a set-up for any task force or frequency that ends up being part of that system.

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Fault detection methods

- **The Road To The Internet**

This method uses and analyzes the sample voltage and current to detect error points [3]. The online path of the lower cable is less common than the upper lines.

- **Non-Latest Way**

In this method a special tool is used to check the output of the cable in the field. This offline method can be divided into two methods. It is a tracer method and a storage method.

- **Tracer Method**

In this way a point error is obtained by moving the cable lines. The error point is indicated by an audible signal or an electrical signal. Used to pinpoint the error location very accurately.

- **The Last Way**

It is a technique used to find the wrong location of a cable from one or both ends without following the trail. This method is used to find the normal error location, to speed up the tracking of the buried cable.

II. LITERATURE REVIEW

Prof. Vikramsingh R. Parihar1 et al. The system automatically detects faults, analyses and classifies these faults and then, calculates the fault distance from the control room using an impedance-based algorithm method. This project is to determine the distance of underground cable fault from the base station in kilometers 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 The main aim of the project is to detect and locate the fault in underground cable. In the urban areas, the electrical cable runs in undergrounds instead of overhead lines. Whenever the fault occur the repairing process becomes difficult. It is very difficult to identify the exact location of the fault in underground power cable line. This project will ensure a shorter response time for technical crew to rectify these faults. Fault occur due to short circuit fault, low voltage fault, high voltage fault

III. PROBLEM IDENTIFICATION

Generally there are different types of faults. Frequently occurring faults are given below

- Short Circuit Fault · Open Circuit Fault
- Earth Fault

Short Circuit Fault

A short circuit fault occurs when there is an insulation failure between phase conductors or between phase conductor(s) and earth or both. An insulation failure

Results into formation of a short circuit path that triggers a short-circuit conditions in the circuit.

Open Circuit Fault

An open-circuit fault occurs if a circuit is interrupted by some failure. If the circuit is not closed that is called open circuit fault.

Earth Fault

An earth fault is an inadvertent contact between an energized conductor and earth or equipment frame. The return path of the fault current is through the grounding system and any personnel or equipment that becomes part of that system.

IV. AIM & OBJECTIVES

- To design an efficient impedance-based and robust underground fault detection and buzzer alert based system with IOT technology for underground transmission lines.
- To reduce response time needed to rectify and save expensive transformers from damage or theft which usually occurs during longer power outages.
- To increase productivity of technical crews since The time needed to locate faults will be minimized.

To ensure stability and reliability of the power supply system in the country to boost economic growth.

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V. BLOCK DIAGRAM

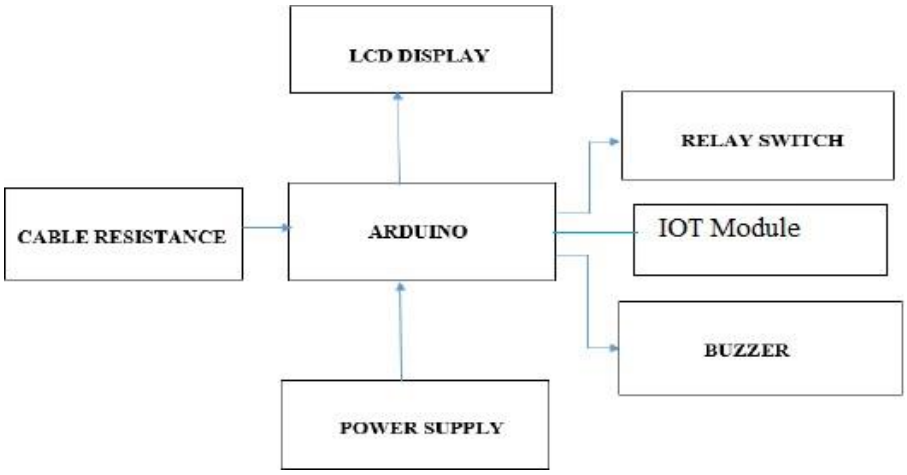

Fig 1: Block Diagram of system

VI. WORKING

- Arduino is the advanced version of embedded system. These Arduino has ample types but we selected Arduino UNO. It easily adapts to other devices using serial port.
- Relay is nothing but an electrical device that acts as a switch; if any fault occurs in the line it will disconnect the line using relay. The connector of the relay moves from normally closed conduct to normally open conduct. we can easily find the fault and disconnect the Faulty line.

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.

Okokpujie Kennedy et al. In this paper the scholars presents the study of the use of GSM technology, to provide a reliable monitoring and fault detection system.

Appropriate designed specific sensors were used to monitor

The changes in transmission parameters such as voltage,

Current, temperature and frequency

The transmission line fault location requires intense human effort and resources. Typically this process is time consuming and while digging the cable there is a risk of damaging the insulation .This paper provides a simple and safe alternative by automating the process of fault detection and location. The project uses the simple concept of OHMs law where a low DC voltage is applied at the feeder end through a series resistor.

S. Chellam et. Al. In this paper, the identification and alleviation of the single line fault in overhead distribution line is presented. Due to the GSM technology is applied to measure, protect and control the distribution lines against various fault conditions.

- Display unit is connected to the Arduino kit which is used to display where the fault occurs.
- Once faults occur in the cable, the display unit displays the exact fault location and also displays which phase is affected in the cable and how long it's affected and buzzer system is used to create an alerting signal. Buzzer systems create an alerting sound signal, once the fault occurs in the underground cable.

VII. COMPONENTS SPECIFICATION

1. Arduino Uno (12v)

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.

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2. LCD Display

A liquid crystal display (LCD) is a thin, flat panel used for electronically displaying information such as text, images, and moving pictures.

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs). 16*2 LCD display

3. Power supply Unit

A step-down transformer is a type of transformer that converts the high voltage (HV) and low current from the primary side of the transformer to the low voltage (LV) and high current value on the secondary side of the transformer. The reverse of this is known as a step up transformer.

4. Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal.

5. Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as mouse click or keystroke.

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VIII. FLOWCHART

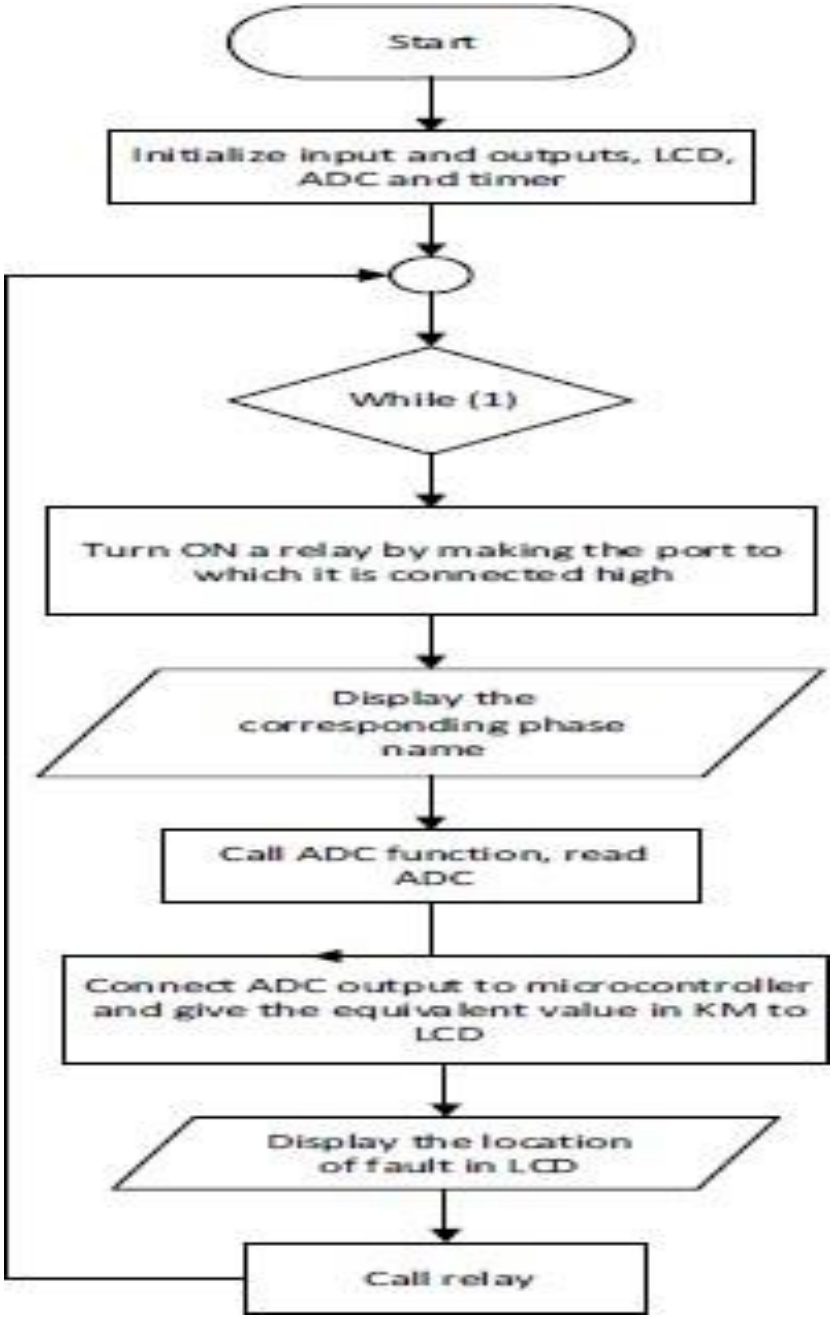

Fig 2: Flowchart of system

IX. ADVANTAGES

- Less maintenance
- It has higher efficiency
- Less fault occur in underground cable This method is applicable to all types of cable ranging from 1kv to 500kv
- It can detect other types of cable fault such as Short circuit fault, cable cuts,
- Resistive fault, Sheath faults, Water trees, Partial discharges.

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X. CONCLUSION

This project is intended to detect the exact location of circuit fault in the underground cables from the feeder end in km by using an Arduino microcontroller. The Arduino microcontroller works based on the output of the cable resistance. Relay helps to separate the faulty line from healthy line.

This project is intended to detect the exact location of circuit fault in the underground cables from the feeder end in km by using an Arduino microcontroller. The Arduino microcontroller works based on the output of the cable resistance. Relay helps to separate the faulty line from healthy line. By using Arduino controller we can find cautious accuse region. At the point when issues occur in the connection, the feature unit demonstrates the distinct accuse territory that shows which stage is affected in the connection and to what degree it's impacted and ringer system is used to make a disturbing sign which is helpful to individuals.

XI. FUTURE SCOPE

In this project we detect the exact location of short circuit fault in the underground cable from 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.

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