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DESIGN AND DEVELOPMENT OF UNGROUND CABLE FAULT DETECTION USING GSM

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Abstract— Underground cables are used for electrical power

transmission from the power system grid to substations and consumers especially in city and densely populated areas such as railway stations, hospitals, airports etc. In underground cable systems, cables are positioned under the surface. Generally, the process of detecting the underground cable fault is complex, time-consuming, and costly. When any fault occurs, identifying, and tracking the source of the fault is complicated because the entire line is to be drilled to inspect the cable line fault. This project presents a microcontroller-based underground cable fault identified by the voltage sensor. The purpose of the underground cable fault through the voltage sensor. The fault in RYB can be identified by the voltage sensor. This project aims to find out the underground fault. By using GSM service providing an alert of the exact fault. The underground fault is processed by the Nano micro-controller and sends fault identified through the GSM alert message. This is to send the LCD screen connected to the Nano micro-controller and monitors underground fault through voltage and current sensor and buzzer alert is also given if cable fault is identified.

Keywords: Underground fault monitoring, GPS, LCD display and voltage and current sensor.

INTRODUCTION

In this project we proposed a fault localization model for the underground cable lines with Nano microcontroller. The purpose of this project is to determine underground cable fault. In this project we used a simple concept of ohm's low. When a fault occurs in the system the distance located on liquid crystal display (LCD). Until the last decade, cables were designed to be placed above the head and, at present, there is no underground cable that is higher than the previous method. adverse weather conditions such as storms, snow, torrential rains and pollution does not effect on underground cable. We will find the exact location of the fault. Now the world has become digitized so, the project is to detect exact location of the fault in digital form. Underground cabling system is a more common practice in many urban areas. Although the fault occurs for some reason, at that time, the repair process for this particular cable is difficult because of not knowing the [exact location of the cable breakdown. Fault in cable can be classified in two groups.

LITERATURE SURVEY

1]. International Journal of Engineering Research & Technology (IJERT)"underground fault detection", February-2020.

This method used to detect the fault location in underground lines without any effort This method used to locate the type of circuit occurs; the voltage drop varies with the default length on the cable, as the current varies. A plurality of resistors is used to represent the cable and a DC voltage is supplied at



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one end and the defect is detected by detecting the voltage variation the defect area to accelerate the tracking of the buried cable.

[2] INDUSTRIAL UNDERGROUND POWER CABLE FAULT IDENTIFICATION USING Nano microcontroller CONTROLLER, Prabakaran K, Assistant Professor, Department of Electronics and Instrumentation Engineering, Erode Sengunthar Engineering College, Tamilnadu, India, 2020.

This work provides a set of guidelines that result in a balanced approach between high accuracy and a practical implementation of a WUSN test bed. The identification and elimination/mitigation of each variable which significantly affects the experiment results is the basic approach behind the proposed guideline. The main aim of this paper is to detect the fault in a cable using Nano microcontroller microcontroller kit.

[4] WIRELESS UNDERGROUND SENSOR NETWORKS: RESEARCH CHALLENGES, Ian F. Akyildiz, Erich P., Broadband Wireless Networking Laboratory, Stuntebeck, School of Electrical and Computer Engineering, Georgia Institute of Technology, 75 5th St. NW, Atlanta, GA 30308, United States, 2019.

The cable is placed underground of the farming land. Usually it is difficult to detect the fault but this paper uses a simple solution such as Wireless underground sensor networks to detect the fault. It simply uses the soil wireless transmitter and receiver to pass the information that where the fault occurs by placing the sensors to a particular range. The main advantage is that it does not use any kind of waves inside the soil, it uses the electrons to transmit the information obtained from the microcontroller kit. This work introduces the concept of a Wireless Underground Sensor Network (WUSN) that can be used to monitor a variety of conditions, such as soil properties for agricultural applications and toxic substances for environmental monitoring.

[5] C. Zhang, X. Kang, X. Ma, S. Jiang, and X. Qu, "On-line incipient faults detection in underground cables based on single-end sheath currents," in Asia-Pacific Power and Energy **Engineering Conference, APPEEC, 2019.**

For this the world is moving towards digitalization to find the solution of such problem. In most of the urban areas the underground power cables are most commonly used since it does not require much area. It is buried beneath the earth and promote clean environment.

[6] Islam, M. F., Oo, A. M. T., Azad, S. A. (2019). Locating underground cable faults: a review and guideline for new development. 22nd Australasian Universities Power Engineering **Conference (AUPEC).**

[7] Wang, Q., Tang, C., Wu, G., Chen, G. (2020). Fault location in the outer sheath of power cables. Journal of P The cable fault locating equipment currently being used is comparatively heavy. Moreover, in many cases, one method is not enough and accurate fault detection may require more than one method to be put together. However, organizing multiple tests with complicated equipment and to finally diagnose the fault is a time consuming task. Detecting the cable faults and pinpointing the fault location makes task faster and easier for the field engineers through design and construction of a light weigh portable machine.

Underground system contributes potential advantages through minimized operations and maintenance costs, less storm damage, reduced tree trimming costs and reduced loss of regular electricity sales for utility customers. An appropriate recognition of a faulty segment is required to diminish the intervention time fault. Fast and precise fault location plays a significant role in speeding up system renovation, diminishing great financial loss and operating cost thereby minimizing power loss time and most importantly ameliorating systemavailability and performance. Various fault locating methods like the sectionalizing methods, Murray loop methods and acoustic detection methods

EXISTING METHOD

The available of existing system that human power is needed to monitor the underground fault detection.



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The underground fault detection only short circuit fault can be identified. No other fault can be identified manually.

If underground fault want to be identified then entire ground should be digged.

This requires lots of human power and time consumption to check underground fault.

Devices used to identify underground fault will be very difficult and complex to identify fault in underground.

Cost requires to identify the underground fault will require lots of time

This device is not reliable to use because identifying cable fault will be difficult, that is this device can identify only fault short circuit

PROPOSED SYSTEM

• The Nano is a small, complete, and breadboard board based on the ATmega328 (Arduino Nano 3.x). This nano micro-controller will send information to all the device. Controller will manage the whole process.

GSM is used to send SMS alert message of cable fault in which wire the fault is occurred.

This cable fault detection happens by using voltage sensor, voltage sensor one and voltage sensor 2 is connected with junction 1 which will identify fault in cable R.

Voltage sensor 4 and voltage sensor 5 is connected with junction 2 which will identify cable fault of wire Y.

Voltage senor 3 and voltage sensor 6 is connected with junction 3 which will identify cable fault of wire B.

Once after finding cable fault in LCD display it will show that in which wire cable fault is identified and buzzer indication is also given.

After displaying in LCD and giving buzzer sound a SMS will be send through GSM. This GSM device is connected with

BLOCK DIAGRAM





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CIRCUIT DIAGRAM



CONCLUSION

In this project we discuss maximum of the content material of our project. In this project, we identify the precise area of short circuit, voltage and current fault within the underground cable from feeder result in using Nano microcontroller. This circuit is fabricated to discover open circuit fault, short circuit fault, voltage fault, current and earth fault. Once faults arise within the cable, the display unit shows the precise fault area that displays in LCD display and we can know where the cable fault is identified through the GSM as SMS alert message.

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