

Analysis on IoT Based Underground Cable Fault Detector

Kunal Amrute [1], Mayuri Berad [2], Yatish Lohe [3], Pooja Konge [4], Vivek Mahavadivar [5]

^{1,2,3,4}Student, Department of Electronics Engineering, K.D.K.C.E, Nagpur, India

⁵Professor & HOD, Department of Electronics Engineering, K.D.K.C.E, Nagpur, India

Abstract—The aim of this project is to work out the space of underground cable fault from base station and verify the precise location of fault. The underground television square measure followed in scores of urban areas rather than overhead lines. Whereas a fault happens for a few reason, at that point the repairing method associated with that individual cable is tough thanks to not knowing the precise location of the cable fault. The projected The projected system uses the traditional thought of ohm's law i.e once DC voltage applied at a feeder finish through A sequence of resistance i.e cables lines ,then the present would vary relying upon the position of fault in he cable. This IOT technology is employed to search out out the precise location of fault associated to send information to the web site exploitation an IOT module at an equivalent time it displays on liquid crystal display screen.

Keywords : underground cable system ,IOT technology, ohm's law ,Atmega 32microcontroller.

I. INTRODUCTION

The underground cable system are followed in lots of urban areas instead of overhead lines .overhead lines has lots of disadvantages such as they are more expensive to manufacture and their cost may vary depending on construction as well as the voltage rating . Underground cable system have the advantages of not getting affected by any adverse whether condition such as snow , heavy rain falls as well as pollution but it has its own drawback of immediate fault in the underground cable. It is Very difficult to detect the fault due to not knowing the exact location of fault and our main objective is to determine the exact location of fault. The proposed system is to find the exact location of fault by using ohm's law i.e when a low DC voltage applied at feeder end through a series resistor (cable lines), the current would vary depending upon the location of fault in the cable. In present scenario when a fault occurs, detecting fault is difficult and entire line has to dug, in order to check entire line and fix the fault. Till now many techniques had already been implemented in order to detect the fault in cable wires but the problem came up is how to detect fault in cable wire when it is underground. Before fixing any fault in cables, the fault has to be identified first. There are many ways to find the cable fault location. This paper deals with the method to locate faults and identify the phase line in damaged cables. It's terribly troublesome to sight the fault because of not knowing actual location of fault and our main objective is to work out the precise location of fault. The projected system is to search out the precise location of fault by victimization ohm's law i.e once a coffee DC voltage applied at feeder finish through a series electrical device (cable lines) ,the current would vary relying upon the placement of fault within the cable. In gift state of affairs once a fault happens, sleuthing fault is troublesome and full line must mamma, so as to envision entire line and fix the fault. Until currently several techniques had alreadybeen enforced so as to sight the fault in cable wires however the matter came up is the way to sight fault in cable wire once it's underground. Before fixing any fault in cables, the fault must be known 1st. There square measure some ways to search out the cable fault location. This paper deals with the strategy to find faults and establish the part line in broken cables.

II. LITERATURE REVIEW

Frequent fault in underground cable due to adverse whether or not or not condition like serious rain falls, snow or due to reaction and most underground faults ar placed by unearthing the total length of cable to vary visual review to be applied. The analysis work will facilitate identification and placement of Underground cable fault whereas not unearthing the total length of cable victimization IOT technology. We've got a bent to propose cable fault detection over IOT that detects the precise fault position over IOT that produces repairing work very easy. This protects lots of some time, money and efforts and to boot permits to service underground cables faster. Throughout this paper we've got a bent to gift two that} which is in a position to be very useful to identify the precise distance of fault of underground system from base station. The analysis work will facilitate in distinctive and placement of underground Cable fault whereas not unearthing the total of the cable before repair orreplace entire cable due to issue in locating the fault. Once any fault like short happens, fall will vary counting on the length of fault in cable, since this varies. A set of resistors therefore accustomed represent the cable and a dc voltage is fed at one end and thus the fault is detected by the change in voltage using a analog to voltage device and a microcontroller is used to make the desired calculations therefore the fault shows in the LCD display.

III. Methodology

IOT devices are used to monitor and control electronic, electrical and mechanical systems in homes and buildings in order to improve convenience and safety. The evaluation of IOT in the electronic and electrical Power industry transformed the way things performed in usual manner it increase the use of wireless commutation. The aim of IOT is not just only connecting things such as machines, device and appliances but also allowing the things to communicate, exchange control data and other information while executing .The system design with mainly components like Atmega microcontroller, relay driver, LCD display, wifi Module, transformer etc.

1. Atmega microcontroller:

Atmega16 is an 8-bit high performance microcontroller from the Atmel's Mega AVR family. Atmega16 is a

40Pin microcontroller based on enhanced RISC (Reduced Instruction Set Computing) architecture with 131 Powerful instructions. It has a 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes

2. LCD display (16*2):

An LCD is an electronic display module and has wide range of applications as compare to LED's. A 16*2 LCD Display is very basic module and is very commonly used in various device and circuits.

3. wifi module (ESP8266):

The ESP8266 is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability. This Small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP Connections using Hayes-style commands.

4. Transformer:

Here we used step down transformer which is use to convert electrical energy into mechanical energy from one circuit to another and help to convert high primary voltage to low secondary voltage.

5. Relay:

Relay are switches that open and closed circuit electronically. Relay are control one electrical circuit by using openings and closing contact in another circuit.

IV. Working and Implementation

The system works mainly on the principle of Ohm's Law where a low DC voltage is applied at the feeder end .

Types of faults in cables:

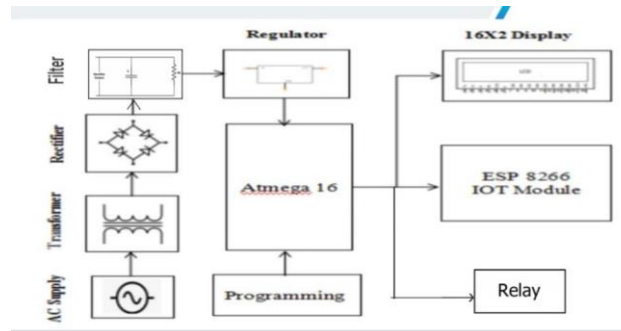
1. Open circuit fault: When there is a break in a conductor of the cable .it is called open circuit fault of the cable. this type of fault is caused by break in. Conducting path. Such faults occurs when one or more phase conductor breaks.

2. Short circuit fault: when two conductors of multi-core cable come in electric contact with each other due to insulation failure ,it is called as short circuit fault.

3. Earth fault: when the conductor of the cable comes in a contact with earth, it is called as earth fault through fault sensing circuit.

The proposed system is an IOT enabled underground cable fault detection system Which is based on the Principle of ohm's law .block diagram shows the working of the system, when the power supply is provided by using step-down transformer, rectifier and regulator. The current sensing circuit of the cable provides the magnitude of voltage drop across the resistor to the microcontroller and based on the voltage the fault distance is located on the LCD screen.

Block diagram:



Above figure shows the working of the project by Using circuit diagram and tables we conclude the results.

Circuit diagram.

V. Advantages:

- Lower maintenance cost, fewer interrupt.
- Lower tree-trimming cost.
- Less maintenance
- It has higher efficiency
- Less fault occur in underground cable

VI. Future Scope:

1. The open circuit fault can be detected Using a capacitor in an AC circuit Which measures the change in impedance and calculate the distance of faults.
2. GPS or GPRS can be used to know the location of fault.

VII. conclusion

In this paper we detect the fault in the underground cable by using IOT technology. For this we use a simple concept of ohm’s law. The work automatically displays the phase, distance and time of occurrence of fault by using ESP8266 wifi module in a webpage .It reduce the operating expense and the time to locate the faults in the field and it is believed that this model can be promising technology to solve future fault location detection problem.

References:

1. Shrivastava, Shiv Pratap Raghuvanshi. “Underground cable fault Detection using Arduino”, International Journal of Electronics, Electronics and Computational system (May 2016), Volume-5,Issue-5
2. .Dushyant Chandra, Prabhat Singh, Pravesh Pratik Rajguru, Mr. Swapnil A.Namekar. “Detection of short circuit fault in the Underground cable using microcontroller”, International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control (2017, June), ISO 3297:2001 certified, vol.5, Issue 6
3. .Sahana S, Harish Kumar BM, Anu S M, Vani H V, Sudha T,Prashanth Kumar H K. “Analysis of fault detection and its location using Microcontroller for underground cables”, International Research Journal Of Engineering and Technology (IRJET).
4. Hans, Ms. Snehal C. Kor, Ms. A. S. Patil. “Identification of Underground Cable fault locator and development”, International Conference on Data Management, Analytics, and Innovation (2017).
5. Rati Ranjan global, Ajit Kumar Maharana, Lipun Kumar Patel, Rohit Behera. “Underground cable fault distance locator by using Microcontroller”, International Journal of Informative and Futuristic Research (IJIFR), Vol 4, Issue 7, March-2017.
6. Nikhil Kumar Sain, Rajesh Kajla, and Mr.Vikas Kumar, Underground Cable Fault Distance Conveyed Over GSM, International Organization of Scientific Research Journal of Electrical and Electronics Engineering, Volume 11, Issue 2, April 2016.
7. Dhivya Dharani. A and Sowmya. T, Development of a Prototype of Underground Cable Fault Detector, International Journal Electrical, Electronics, and Computer Systems,volume 2,2014.