International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 03 | Mar 2020 www.irjet.net p-ISSN: 2395-0072

DETECTION OF FOIBLE POINT LOCATING SYSTEM FOR HYPOGEN TRANSMISSION LINES

A. Suganthi [1], R. Sathiyaveni [2], S. Deepa[3] ,T. Suvaikin punitha [4] Professor, Dr.P.Gomathi [5] Dean

[1,2,3,4,5]*N.S.N. College of Engineering and Technology, Karur, Tamilnadu, India.*

Abstract - *This system proposes a fault detection model for underground power cable using Arduino Uno. If any fault occurs in underground, the detection of fault cable is more complicated. The supply chain may be affected by conditions of over voltage, over current and under voltage. These problems are detected manually, so it requires more time and more cost and also it's not detected accurately. This model was proposed for automatic underground cable fault detection by using Arduino Uno through web application. The proximity sensor is used to detect the cable fault, the ESP 8266 is used to transfer the data to the cloud and the GPS is used to identify the correct fault location. The current sensor is used to detect the current passing level like the current is passed in the cable or not. It detects the fault which are later stored in cloud. The stored information instantly initiates a message to the area lineman and the control station stating the exact street location where fault is happening. It is then sent to the authenticated person through the notification via web application.*

Key Words: Underground cable, fault location, fault detection, location method, micro controller.

1. INTRODUCTION

A bundle of electrical conductors used for carrying electricity is called as a cable. An underground cable generally has one or more conductors covered with suitable insulation and a protective cover. Fault in the cable can be any defect or non-homogeneity that diverts the path of current or affects the performance of the cable. So it is necessary to correct the fault. Power transmission can be done in both overhead as well as in underground cables. But unlike underground cables the overhead cables have drawback of being easily prone to the effects of rainfall, snow, thunder, lightning etc. this requires cables with reliability, increased safety ruggedness and greater service. So underground cable are preferred in many areas specially in urban places. When it is easy to detect and correct the fault in overhead line by mere observation, it is not possible to do so in an underground cable. As the buried deep in the soil it is easy to detect the abnormalities in them. Even when a fault is found to be present it is very difficult to detect the exact location of the fault. This leads to dugging of the entire area to detect and correct the fault which in turn causes and manpower. So it is necessary to known the exact location of fault in underground cables.

1.1 FAULTS IN UNDERGROUND CABLES

1) **Open circuit fault:** Open circuit faults are better than short circuit fault, because when this fault occurs, current flows through cable becomes zero. This type of fault is caused by break in conducting path. Such faults occur when one or more phase conductors break.
2) **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. Further short circuit fault can be categorized in two types, Symmetrical fault - In this, all three phases are short circuited and Unsymmetrical fault - In this, fault magnitude of current is not equal & not displaced by 120 degree.

1.2 FAULT DETECTION METHODS

It could be implemented by various methods.

A. **Online Method:** In this technique, the sampled current and voltages are utilized to figure out the faulty points.

B. **Offline Method:** Here a special instrument is used to figure out service of cable among the sphere. Offline techniques are Tracer technique and Terminal technique

C. **Tracer Method:** The fault of the cable is detected by walking on the cable in this technique. Magnetism or perceptible signal is applied on the cable to identify the fault. This system helps in location of fault accurately. It is a technique used to detect fault location of cable from one or both ends without tracing.

D. **Terminal Method:** This system is utilized to chase general areas of the fault on buried cable. The above method gives solution for dealing with the problems only to alert the personnel. The sensed fault location is serially communicated towards the server with the help of GSM module from where information can be retrieved through IoT.

2. EVALUATION

2.1Existing system

A bundle of electrical conductors used for carrying electricity is called as a cable. An underground cable generally has one or more conductors covered with suitable insulation and a protective cover. Commonly used materials for insulation are varnished cambric or impregnated paper. Fault in a cable can be any defect or non-homogeneity that diverts the path of current or affects the performance of the cable. So it is necessary to correct the fault. But the existing system used to detect the underground cable faults is more difficult. Manually detecting the underground cable fault is difficult, then more manpower is consumed in that work and also it does not accurately detect the fault location. Later, it passes the intimation to the consent person which consumes more time and high cost.

2.2Drawbacks

- No accuracy in fault location
- No intimation is passed to the consent person in case of any failures
- Consumes more time

2.3Proposed system

This system proposes a fault detection model for underground power cable using Arduino Uno. The proximity sensor is used to detect the cable fault, the ESP 8266 is used to transfer the data to the cloud and the GPS is used to identify the correct fault location. The current sensor is used to detect the current passing level like the current is passed in the cable or not. They are used to detect the fault then these detected details are stored in cloud. That information instantly initiates a message to the area lineman and the control station stating the exact street location where fault is happening. Then detect the location of fault in underground cable lines from the base station to exact location in kilometers.

Deviation occurs in the resistance value, this is called fault point and that point can be identified with help of Arduino technology. It measures changes in impedance and calculate the distance of the fault. Also, it initiates a message to area lineman and control station at exact street location where fault is happening. This information is sent to the authenticated person through the notification by using a web application.

2.4 PROPOSED WORK

Receiver will receive SMS through GMS it give information about cable fault.

- Registers are used as cable. Fault is created by relay .Relay act as switch it is open or close switch .It is connected to controller unit.ADC is inbuilt in ARM7 which convert analog input in digital format .Where the fault is generated is display on LCD in Km.
- If voltage is not same at transmitted and receiver side then system consider as there is fault in cable .It send the SMS to receiver where the fault is generated.
- One another option is there to know the where the fault occurs in the cable.

2.5Features

- It has higher efficiency
- Less fault occur in underground cable
- It is cost effective
- Easy identification of faults
- Detect other types of cable fault such as Short circuit fault, cable cuts, Resistive fault, Sheath faults, Water trees, Partial discharge.

3. SYSTEM REQUIREMENTS

3.1Software requirements

- Embedded C
- PHP

3.2Hardware requirements

- Current sensor.
- Underground Cable.
- Arduino.
- Relay Driver.
- LCD Display

4 SYSTEM IMPLIMENTATION

4.1IMPLEMENTATION

The proposed approach supports real-time detection of cable defect tracking down in IoT using a proximity sensor, Current sensor, and underground cable, Arduino Uno, LCD and GPS. A proximity sensor is able to detect the presence of nearby objects without any physical contact. It often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. It also measures the heat of an object as well as detects the motion of an object. Both proximity sensor and current supply sensor are inputs to the Arduino Uno and then the LCD is an output part of an Arduino Uno.

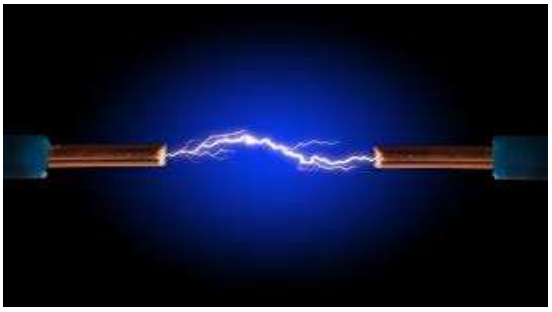

Fig 1: Cable Fault Detector

If underground cable was detected all the time continuously, then the micro controller can pass this information to the cloud through the web page to consent user. First the proximity sensor detects the nearby object accurately and finds the presence of any fault in it. If the fault occurs, the cable axis is changed from x to y. The cloud also passes the intimation to consent user through the webpage, so that they safeguard the cable. Then the current sensor can detect the analog or digital signals are passing through the cable or not passing it. This information is detected by using this current sensor and it is stored in cloud.

4.2 POWER SUPPLY

A power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another and as a result, power supplies are sometimes referred to as electric power converters. A DC power supply is one that supplies a constant DC voltage to its load. Depending on its design, a DC power supply may be powered from a dc source or from an ac source such as the power mains.

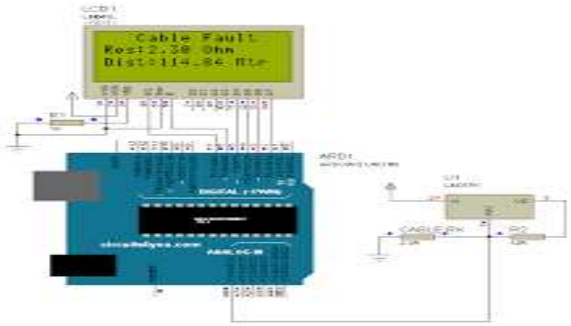

Fig 2: Power Supply Circuit

4.3 LIST OF MODULES

The modules are listed below,

- Creation of IoT Web Page
- Creation of Cloud Framework
- Monitoring Underground Cable
- Prediction of changes
- Provide Locations
- Notification

1. Creation of IoT Webpage

This webpage is accessed by all the authorized persons. Also the notifications and alert intimations are passed through the WebPages. If any access is performed by the sensor, then this IoT webpage is used to access the processes.

2. Creation of Cloud Framework

The Cloud framework is created in that stage. This framework maintains all the details of sensor sensed data. Authenticated persons get the notification from that cloud framework.

3. Monitoring Underground Cable

This module is used to monitor the cables. Any changes in it are detected at the earlier stages and it prompts for correction.

4. Prediction of changes

This module is used to predict the cables before complete damage. The Ultrasonic sensor, IR senor are used to easily predict the changes. Thus the ranges of cable changes are detected and it is forwarded to the cloud.

5. Providing Locations

This module is used to predict the correct locations. The Nano GPS is used to predict the location of the cable fault occurred places which is then forwarded to cloud.

6. Notification

It is used for intimation of alert notifications to consent users. The cable fault is detected and its intimations are forwarded to cloud. Cloud can forward those intimations to consent users properly.

4.4 Current Sensor

A current sensor is a device that detects electric current in a wire, and generates a signal proportional to that current. The generated signal could be analog voltage or current or even a digital output. It can be then used to display the measured current in an ammeter, or can be stored for further analysis in a data acquisition system, or can be used for the purpose of control. Current sensor can detect the analog or digital signals are passing through the cable or not passing it. Information's are detected by using this current sensor, these information are also stored in cloud.

Fig 3: Current Sensor

4.5 Arduino UNO

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards and other circuits. The board has 14

digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE, via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

Fig 4: Arduino UNO

4.6 ESP 8266

The chip first came to the attention of Western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation. ESP8285 is an ESP8266 with 1 MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.

Fig 5: ESP 8266

4.7 WORKING OF ADC

Working of this project is divided into four parts – DC power supply Part, cable part, controlling part, display part. DC power supply part consist supply of 230v AC then it is step down using transformer, bridge rectifier converts ac signal to dc & voltage regulator 7805 is used to produce constant dc voltage. The set of resistors denote the cable part along with switches. The set of resistors & switches are used as fault creators to indicate the fault at each location this shown by the current sensing part of cable. The change in current is sensed by this part by sensing the voltage drop.

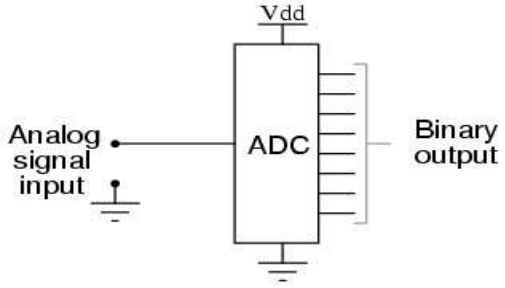

Fig 6: ADC Circuit

5. CONCLUSION

Nowadays, electrical energy is being increasingly used. In order to maintain the reliability and security to an acceptable level, new technologies for protection and power control are needed. For distribution system, underground cables are very important part of transmission these days. Tracking down the fault in cable is very important task. However, the failure of cable does not occur instantly, it is developed slowly over a period of time, distinguished by series of single-phase sub-cycle incipient faults, accompanied by a high arc voltage. It is intended to detect the exact location of circuit fault in the underground cables 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.

6. FUTUREWORK

The project detects only the location of the circuit fault in underground cable line, but it can also be extended to detect the location of an open circuit fault. To detect an open circuit fault, capacitor is used in ac circuits which measures the change in impedance and calculate the distance of the fault. System that can detect, locate and isolate the fault remotely from any location.

REFERENCES

[1] Emmanuel GbengaDada1, Abdulkadir Hamidu Alkali, Stephen Bassi Joseph, Umar Abba Sanda," Design and Implementation of Underground Cable Fault Detector ",Volume 4 Issue-2,2019.

[2] Mr. Karunesh Diwakar, Mr. Sameer Bhambri, Mr. Brijesh Kumar Dubey," Modern Technique to Detect under Ground Cable Fault using Robot", Volume 7 Issue III, Mar 2019.

[3] Tanmay Kedia, Abhijeet Lal, Dr.Abhishek Verma,"IoT Technology Based Underground Cable Fault Distance Detection System Using ATmega 328P Microcontroller",Volume 3, Issue 2 January-March,2018.

[4] Kanchan Kumar bauri,Sanjeev kumar,"Umder ground cable fault didtance detector system using iot wi-fi module & microcontroller",Volume.25,No.3,JULY 2018.

[5] Ajay Singh and M.A. Ansari," Under Ground Cable Fault Detection using IOT", Advanced Research in Electrical and Electronic Engineering, Volume 4, Issue 1 January-March, 2017.

[6] Sujay S,a, R Monisha, Prathibha ," Underground Cable Fault Detection and alert ",Volume: 05 Issue: 02 | Feb-2017.

[7] Priya H. Pande Mandar H. Polade Prof. Pragati D. Pawar," Underground Cable Fault Detection Using Arduino Microcontroller", IETE Zonal Seminar "Recent Trends in Engineering & Technology" – 2017.

[8] Akash Jagtap, Jayesh Patil, Bhushan Patil, Dipak Patil, Aqib Al Husan Ansari," Arduino based Underground Cable Fault Detection", ISSN : 2454-9150 Vol-03, Issue 04, May 2017.

BIOGRAPHIES

A. SUGANTHI Currently Pursuing Bachelor's degree in Computer Science and Engineering from N.S.N. College of Engineering and Technology, Anna University Chennai, India. Her specializations include Internet of Things, Web Developer and Database.

R. SATHIYAVENI Currently Pursuing Bachelor's degree in Computer Science and Engineering from N.S.N. College of Engineering and Technology, Anna University Chennai, India. Her specializations include Internet of Things, Android Developer and Database.

S. DEEPA Currently Pursuing Bachelor's degree in Computer Science and Engineering from N.S.N. College of Engineering and Technology, Anna University Chennai, India. Her specializations include Internet of Things, Android Developer and Database.