# UNDERGROUND CABLE FAULT DETECTOR

A. Arul Prasath, AP/CSE, Dhirajlal Gandhi College of Technology, Salem, Tamilnadu
P. K. Sri Aishvarya, IV-CSE, Dhirajlal Gandhi College of Technology, Salem, Tamilnadu
S. Yasodha, IV-CSE, Dhirajlal Gandhi College of Technology, Salem, Tamilnadu
V. Prabhu, IV-CSE, Dhirajlal Gandhi College of Technology, Salem, Tamilnadu
K. Obuli Mohan, IV-CSE, Dhirajlal Gandhi College of Technology, Salem, Tamilnadu
Contact E-mail: pksriaishvarya@gmail.com

*Abstract*— **Underground cables are prone to a wide variety of faults due to underground conditions, wear and tear, rodents etc. Also detecting fault source is difficult and entire line is to be dug in order to check entire line and fix faults. So here we propose a cable fault detection over IOT that detects the exact fault position over IOT that makes repairing work very easy. The repairmen will not know exactly which part has fault and only that area is to be dug to detect the fault source. This saves a lot of time, money and efforts and also allows to service underground cables faster. The system detects fault with the help of potential divider network laid across the cable. Whenever a fault gets created at a point shorting two lines together, a specific voltage gets generated as per the resistors network combination. This voltage is sensed by the microcontroller and is updated to the user. The information conveyed to the user is the distance to which that voltage corresponds to. The microcontroller retrieves the fault line data and displays over LCD display, also it transfers this data over internet using GSM module and GPS to send the SMS that links with the exact location to display the cable faults over mobile phones.**

*Index Terms*—**Location finding, Latitude, Longitude, SMS, Detection.**

## I. INTRODUCTION

WSNs technologies must be applied in underground cables to identify fault location and decrease the difficulty of checking the entire line to fix faults. The sensor network is in developing low-cost energy efficient routing protocols with simple operation and high reliability.

When a fault occurs due to some reason, the process of fault tracking without knowing the location related to that particular cable is very difficult. The proposed system is designed to track the exact location of the fault occurred in the cable.

In this project repairmen can monitor the cables. The RF sensor can sense the voltage drop, current and then detect the exact fault location using GPS. Repairmen can view the data using their mobile phones. Detection is done using voltage drop and sent as SMS using the GSM module.

The main aim of this project is to save the time and digging of roads. It makes the work easier for the repairmen by identifying exact fault location.

## II. PROJECT DESCRIPTION

Underground cables are prone to a wide variety of faults due to underground conditions, wear and tear, rodents etc. Also detecting fault source is difficult and entire line is to be dug in order to check entire line and fix faults. So here we propose a cable fault detection over IOT that detects the exact fault position over IOT that makes repairing work very easy.

The repairmen will not know exactly which part has fault and only that area is to be dug to detect the fault source.

This saves a lot of time, money and efforts and also allows to service underground cables faster. We use IOT technology that allows the authorities to monitor and check faults over internet.

The system detects fault with the help of potential divider network laid across the cable. Whenever a fault gets created at a point shorting two lines together, a specific voltage gets generated as per the resistors network combination. This voltage is sensed by the microcontroller and is updated to the user. The information conveyed to the user is the distance to which that voltage corresponds to. The microcontroller retrieves the fault line data and displays over LCD display, also it transfers this data over internet to display online.

We use GSM module and GPS to send the sms that links with the exact location to display the cable faults over mobile phones.

## II. LITERATURE SURVEY

### *Underground Cable Fault Distance Conveyed Over GSM*

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.

Use of underground power cable is expanding due to safety considerations and enhanced reliability in the distribution and transmission systems in recent times. Due to safety reasons and high power requirements in densely populated areas, use of underground cable has seen a sharp hike in recent times .Till last decade's cables were made to lay overhead& currently it is lay to underground cable which is superior to earlier method. Because the underground cable are not affected by any adverse weather condition such as storm, snow, heavy rainfall as well as pollution. But when any fault occur in cable, then it is difficult to locate fault. So we will move to find the exact location of fault.

Now the world is become digitalized so the project is intended to detect the Location of fault in digital way. The underground cable system is more common practice followed in many urban areas. While fault occurs for some reason, at that time the repairing process related to that particular cable is difficult due to not knowing the exact location of cable fault.

### *Analysis of fault detection and its location using microcontroller for underground cables*

Underground cables are prone to a wide variety of faults due to underground conditions, wear and tear, rodents etc. Also detecting fault source is difficult and entire line is to be dug in order to check entire line and fix faults. So here we propose cable fault detection over IOT that detects the exact fault position over IOT that makes repairing work very easy. The repairmen know exactly which part has fault and only that area is to be dug to detect the fault source. This saves a lot of time, money and efforts and also allows to service underground cables faster.

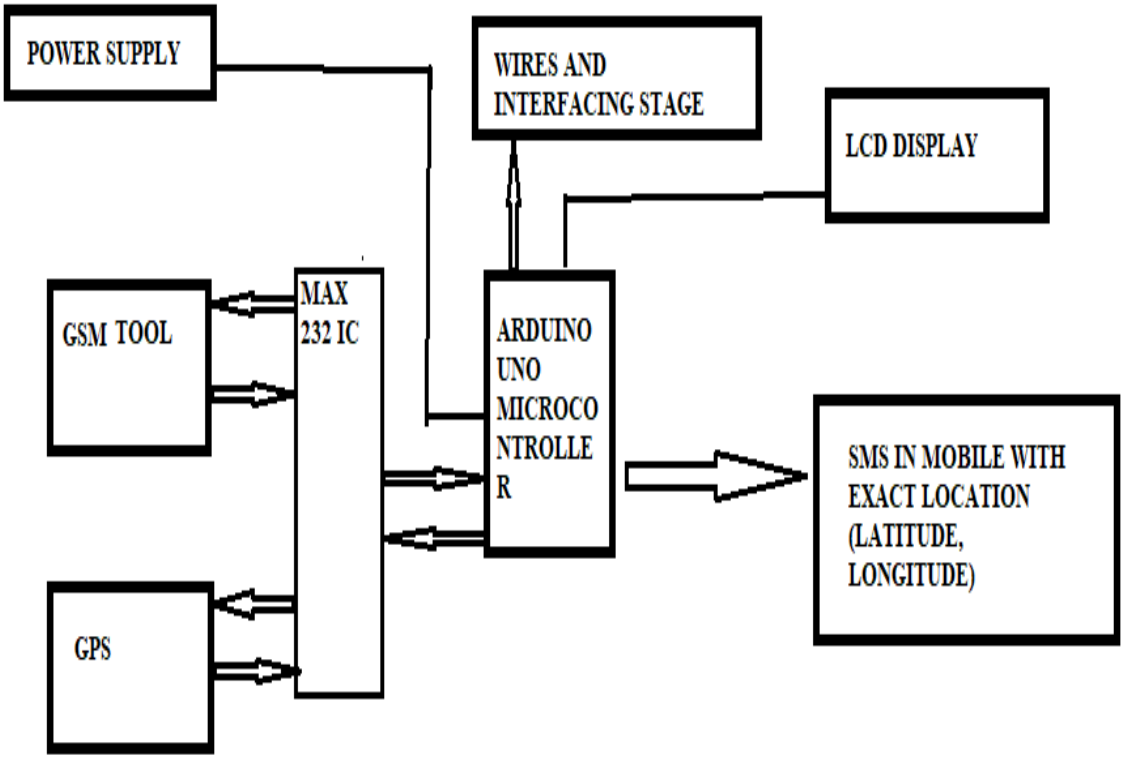
We use IOT technology that updates the monitored fault information to internet. The system detects fault with the help of potential divider network laid across the cable. Whenever a fault gets created at a point shorting two lines together, a specific voltage gets generated as per the resistors network combination. This voltage is sensed by the microcontroller and is updated to the user.

The information conveyed to the user is the information regarding faults detection. The microcontroller retrieves the fault line data and displays over LCD display, also it transfers this data over internet to display on Gmail server.

## IV. EXISTING SYSTEM

- In the existing system of underground cables have higher initial cost and insulation problems at high voltages.
- If a fault does occur, it is difficult to locate and repair the fault because the fault is invisible.
- The Arduino and other component require 5V DC Supply.
- Angular value required time to read so some delay occur.
- Only the buzzer is used to notify fault.

## V. SYSTEM ARCHITECTURE



The system architecture shows the sequential execution of the proposed system. This figure indicates how the actions are performed in the application.

## VI. PACKAGES

**Arduino Board:**

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino Boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino Programming Language and the Arduino based on processing.

**RF Sensor:**

The RF sensor operates by defining a sensitive volume and interrogating the values of these parameters for whatever materials invade this volume. Any or all of the parameters may be simultaneously measured by either a single sensor or a sensor pair and the sensor deduces the nature and behaviour of the invading items from the resulting signature. The sensitive volume is defined by a radio frequency antenna which is tuned to the sensor electronics.

**GSM Module:**

SIM900 can fit almost all the space requirements in the M2M application with dimensions of 24mm x 24mm x 3 mm. SIM900 is designed with a very powerful single-chip processor integrating AMR926EJ-S core. Quad - band GSM/GPRS module with a size of 24mmx24mmx3mm, SMT type suit for customer application, An embedded Powerful TCP/IP protocol stack Based upon mature and field-proven platform, backed up by our support service, from definition to design and production GSM, which stands for Global System for Mobile communications, reigns as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area.

**GPS:**

A GPS operates independent of user's internet connection or telephone signal. However, their presence increases the effectiveness of GPS positioning. GPS was initially developed by US government for military purpose, but currently anyone with a GPS receiver can receive radio signals form GPS satellites.

## VII. RESULT

The exact fault location is detected by using step down transformer method. It detects the latitude and longitude with Google map link using GPS and SMS is sent to the repairmen using GSM. The SMS can be viewed in mobile phones. By using the exact location of the fault it it easy for the repairmen to fix the fault and save a lot of time.

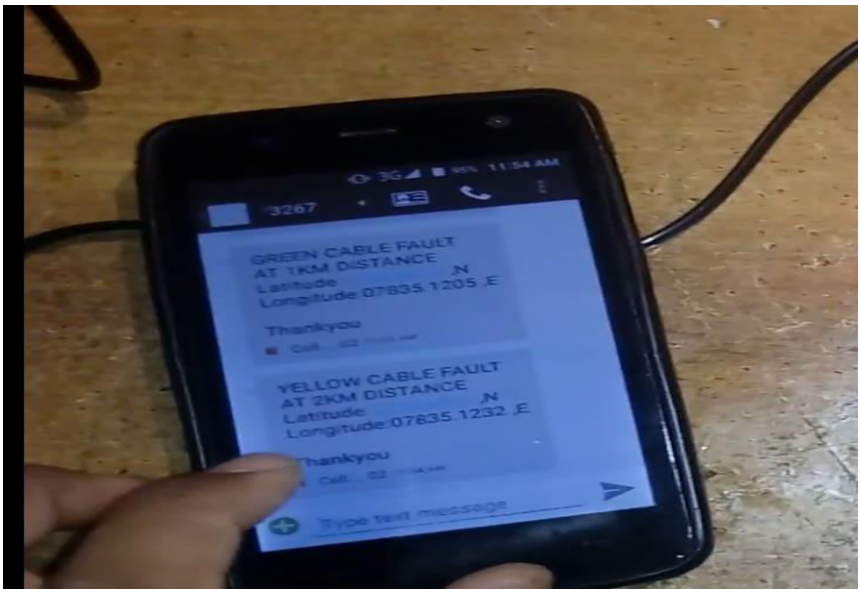



**Fig 4.6.1 Result Analysis**

The above Result Analysis Fig **4.6.1** shows the SMS which is sent to the Electricity Board which is very useful in detecting and location fault in cables.

## VIII. ACKNOWLEDGEMENT

Our sincere thanks to the staff who helped us to prepare the paper for our project.

## IX. CONCLUSION

The project "UNDERGROUND CABLE FAULT DETECTOR" using GSM and GPS has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and the help of growing technology the project has been successfully implemented. The benefits of accurate location of fault are fast repair to revive back the power system, it improves the system performance, it reduces the operating expense and the time to locate the faults in the field.

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## AUTHORS(S) BIOGRAPHY

Mr. A. Arul Prasath, Assistant Professor in the Department of CSE in Dhirajlal Gandhi college of Technology, Salem. He has completed his Master of Engineering.

Ms. P. K. Sri Aishvarya, final year student of Bachelor of Engineering in the department of CSE in Dhirajlal Gandhi college of Technology, Salem. She has given a technical paper presentation on "Big Data into knowledge space with cognitive infrastructure" and won 3rd prize at AVS Engineering College. She has also presented papers on technical topics like Big Data, Internet of Things. Her area of interest is programming and Software Development.

Ms. S.Yasodha, final year student of Bachelor of Engineering in the department of CSE in Dhirajlal Gandhi college of Technology, Salem. Her area of interest is networking.

Mr. V. Prabhu, pursuing final year Bachelor of Engineering in the department of CSE in Dhirajlal Gandhi college of Technology, Salem. His area of interest is Animation.

Mr. K. Obuli Mohan, final year student in the Bachelor of Engineering in the department of CSE in Dhirajlal Gandhi college of Technology, Salem. His area of interest is Multimedia.