

A Review on IOT Based Underground Cable Fault Detection System

Rushikesh Pachkawade¹, Vaishanavi Wagh², Vaishanavi Salunke³, Dipali Wajire⁴, Asst. Prof. Prachi Tayade⁵

^{1,2,3,4} Student, Electrical Department, Manav School of Engineering and Technology, Maharashtra, INDIA.

⁵ Asst. Prof., Electrical Department, Manav School of Engineering and Technology, Maharashtra, INDIA.

ABSTRACT

Nowadays underground cables are used over than overhead lines in urban areas. Locating the fault in the underground (UG) cable is tedious and there is a probability of damaging the insulation while digging the cable. The proposed system offers easy and smart fault detection by automating it using a ATmega16 controller. The basic concept of Ohm's law is applied at the feeder end though a series resistor. In case of short circuit of LL or LLG or LG the current flowing in the faulty sections will vary depending on the length of the line. This paper aims at estimating the location of fault distance and intimate. It is predictable to find a serious solution in maintenance environment of electric power applications to find extensive length of power cables using electrical means. This paper clarifies about length measurement of cable which can be lengthy for finding the location of open circuit point on a power cable using passive electrical parameters like capacitance. For the parameter calculation micro controller helped with display devices and resistive circuit are used. The microcontroller use algorithm to find the capacitance of the underground cable. The algorithm also computes the time charge ratio, with the help of passive parameters like current limiting resistance and definite capacitance of cable. The time charge ratio thus services the microcontroller to estimate the length of the cable.

Keyword : -IOT, Node MCU Wifi Module, Arduino, Power Lines, Google Database.

1. INTRODUCTION

- Underground cables have been extensively used for power distribution networks over the years. This is because of their suitability for underground connections, better security from activities of vandals and thieves, and resistance to hazardous climatic conditions such as thunderstorms and whirlwind.
- They are cheap, easy to maintain and environmental friendly. They have condensed maintenance and operating costs such as lower storm restoration cost.
- Life-wire contact injuries are drastically reduced. It indications to the removal of unattractive poles and wires on the streets thereby attractive the visual range of the drivers and walkers on the streets.
- The underground cable system is actual beneficial for distribution mainly in urban cities, airport and defense services. When faults occur, the power flow is redirected towards the fault and the supply to the neighborhood is impeded.

2. LITERATURE REVIEW

- ❖ Till last decades 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. The most common types of fault that occur in underground cables are:

1. Open circuit fault.
 2. Short circuit fault.
- Earth fault.

1. Open circuit fault When there is a break in the conductor of a cable, it is called open-circuit fault. The open-circuit fault can check by a megger. For this purpose, the three conductors of the 3 core cable at far end are shorted and earthed. Then resistance between each conductors and earth is measured by a megger. The megger will indicate zero resistance in the circuit of the conductor that is not broken. However if a conductor is broken the megger will indicate an infinite resistance.
2. Short-circuit fault When two conductors of a multi core cable come in electrical contact with each other due to insulation failure, it is so called as short-circuit fault. Megger can also be used to check this fault. For this the two terminals of a megger are connected to any two conductors. If the megger gives a zero reading it indicates short-circuit fault between these conductors. The same is repeated for other conductors taking two at a time.
3. Earth fault When the conductor of a cable comes in contact with earth, it is called earth fault or ground fault. To identify this fault, one terminal of the megger is connected to the conductor and the other terminal connected to the earth. If the megger indicates zero reading, it means the conductor is earthed. The same procedure is repeated for other conductors of the cable

3. PROPOSED SYSTEM

- To detect the fault in the designed circuit and display it on the LCD screen the ATmega328p microcontroller is used.
- The system firstly convert analog signals to digital signals.
- These signals are generated by the microcontroller
- Microcontroller compare the input signal of the ADC with the given set range of value, if the input signal range is less than or greater than the range of set value, the microcontroller will direct a signal to the relay to trip the circuit and simultaneously send the signal to the LCD to display the fault that has happened.
- We can calculate the distance of fault via this project.

4. BLOCK DIAGRAM

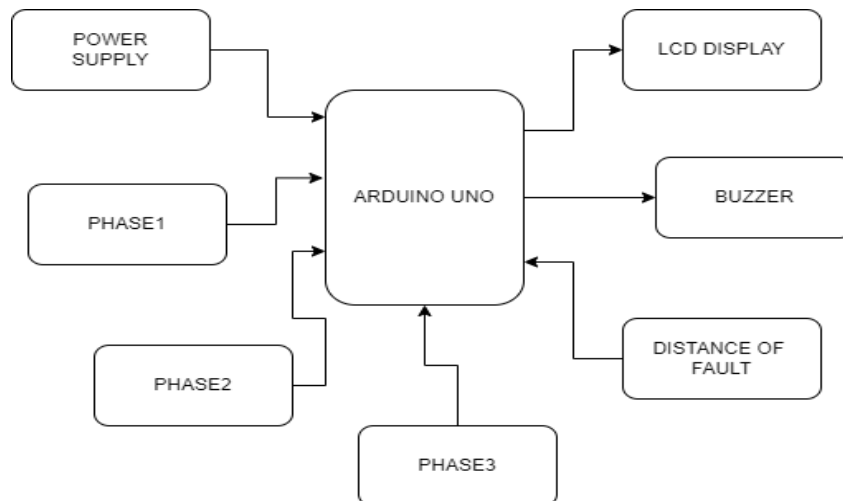


Fig-1 Block Diagram of ARDUNIO UNO

5. CONSTRUCTION AND WORKING

a. Arduino UNO

Arduino Uno is a popular microcontroller development board based on 8-bit ATmega328P microcontroller. Along with ATmega328P MCU IC, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller.



Fig-2 ARDUNIO UNO

b. LCD (Liquid crystal display)

- In this model HD44780 LCD display is used.
- It operates on the voltage range of 4.7V to 5.3V and has 1mA current consumption without backlight.
- It is a Alphanumeric LCD display module means it can display both alphabets and numbers.
- It contains two rows and each row can print 16 characters.
- Each character is build by 5*8 pixel box.



Fig-3 LCD

c. Buzzer

- Buzzer is an audio signaling device, which may be mechanical, electromechanical or piezoelectric and also known as beeper.
- Buzzers or Beepers are typically used in alarm devices, timers and for the confirmation of user input such as a mouse click or keystroke.



Fig-4 Buzzer

d. Potentiometer (Trimpot)

- A Trimpot is a type of potentiometer that comes in a small package.
- It can be easily mounted on breadboard or perf board for quick prototyping and contains three leads.

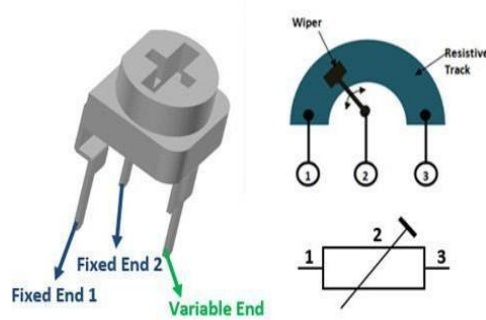
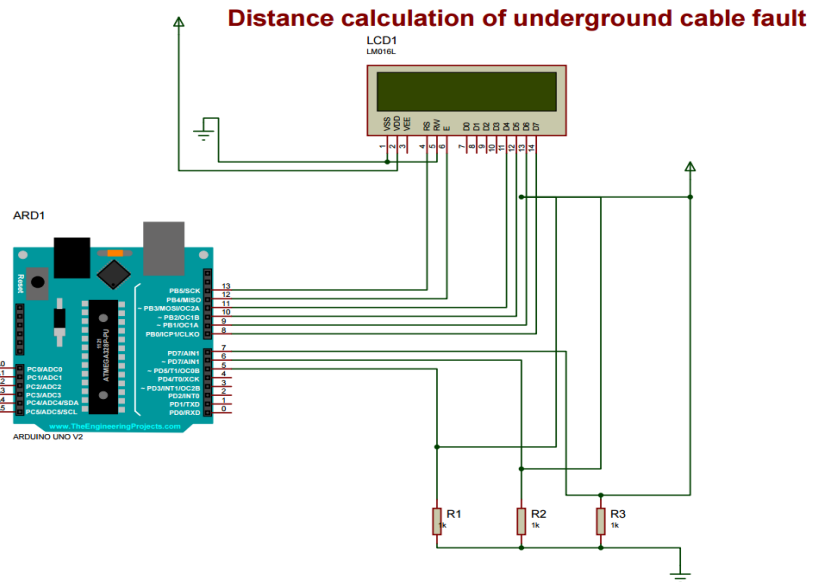


Fig-5 Potentiometer

6. CIRCUIT DIAGRAM



7. ADVANTAGES

- Lower storm repair cost
- Reduced live wire damages
- Rise reliability
- Improves property ethics

8.CONCLUSION

The fault in the underground cables are detected by the wifi module. We are recognizing the fault by the IOT based system. This provided the best outcome and accuracy compare then other system. This technique is also given very fast operation and accuracy. It is useful for stability of the system. It protects the system from the dangerous hazards and save the E-power loss. By using this technique in the future diffusion of fault power in power line and cables can be detect. Here the average accuracy of our proposed system in R, Y, B phase for line to ground fault is 94.23% respectively.

9. FUTURE SCOPE

- With the help of IOT we can detect the location of open circuit fault and the location of short circuit fault in the underground cable line.
- To measure the change in impedance & calculate the distance of fault in the open circuit fault capacitor is used.
- This model is helpful in future for fault detection and correction purpose.

10. REFERENCE

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