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Fault Location Spotting in Underground Cable

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ABSTRACT: Underground cables are prone to a wide variety of faults due to underground conditions, wear and tear, rodents etc. Diagnosing a fault source is difficult and the entire cable should be taken out from the ground to check and fix faults. The paperwork is intended to detect the fault in underground cable lines from the base station to another substation using a Microcontroller. To locate a fault in the cable, the cable must be tested for faults and fault creation is made by a set of switches at every known distance between two substations. In case of fault, the voltage drops and changes accordingly, which is then fed to a programmed microcontroller IC that further displays on IOT fault. IOT is used to display the information over the Internet using the Wi-Fi module ESP8266. A web page is created using HTML coding and the information about occurrence of fault is displayed in a web page or also can use an android application for the same. While a fault occurs due to many reasons in the cable, at a time of removing or repair process, there is difficulty in locating also nearby location of the fault. The system proposed in this project is used to find out the sub area location of the fault and display it to the dedicated application over the internet using Wi-Fi module.

KEYWORDS: Underground cable, ESP8266, Webpage, IOT, HTML

I. INTRODUCTION

Power supply networks are growing continuously and their reliability is becoming more important than ever. The complexity of the whole network comprises numerous components that can fail and interrupt the power supply for the end user. For most of the worldwide operated low voltage and medium voltage distribution lines, underground cables have been used for many decades. Underground high voltage cables are used more and more because they are not influenced by weather conditions, heavy rain, storm, snow and pollution. Even though the Cable manufacturing technology is improving steadily, there are still influences which may cause cable to fail during test and operation. A cable in good condition and installed correctly can last a lifetime of about 30 years. However, cables can be easily damaged by incorrect installation or poorly executed jointing, while subsequent third-party damage by civil works such as trenching or curb edging. Fault in cable is represented as any defect and inconsistency, caused by breaking of conductor and failure of insulation and weakness or non-homogeneity that affects performance of cable. 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 that can break the path of 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 the 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. Underground cables are preferred in many areas especially in urban places. When it is easy to detect and correct the faults in overhead lines by mere observation, it is not possible to do so in an underground cable. As they are buried deep in the soil it is not easy to detect the abnormalities in them. Even when a fault is found to be present it is very difficult to detect fault. This leads to debugging of the entire area to detect fault between two sub section units, which in turn causes wastage of money and manpower.



II. RELATED WORK

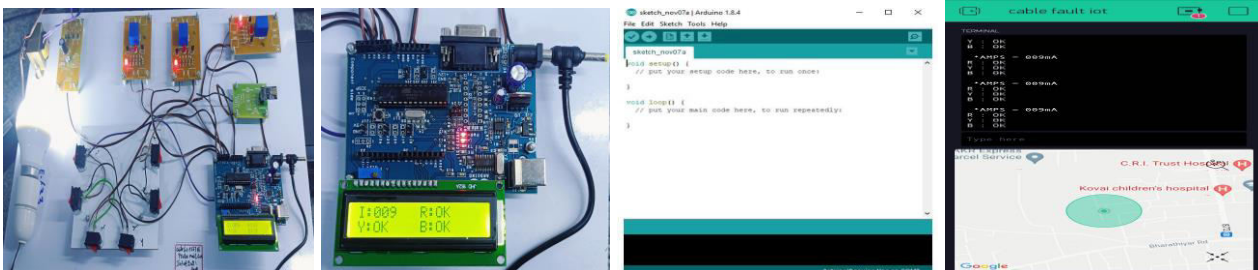
There are lots of methodologies to identify shortcoming in power lines. In the current era faults are the major problems in the power transmission line. For better power quality and continuity of power, it is necessary to reduce the faults from power lines as soon as possible. So many methods are proposed related to fault identification. By using Arduino regulator find out exact fault position. Once faults are in the string, the display unit displays the exact fault position. In this system, the measured current is detected as being in the small or medium current range. The RMS value per current cycle is transmitted to a back-end covering system to negotiate real-time monitoring. This system detects only the position of short circuit fault in underground string line, and describe the position of open circuit fault, to describe the open circuit fault capacitor is used in ac circuit which measures the change in impedance & calculate the distance of fault.

III. METHODOLOGY

In this study, we developed a prototype of Underground cable fault detection. If a fault occurs, the voltage drops and changes accordingly, which is then fed to a programmed microcontroller IC that further displays the IOT fault. IOT is used to display the information over the Internet using the Wi-Fi module ESP8266. A web page is created using HTML coding and the information about occurrence of fault is displayed in a web page or also can use an android application for the same. While a fault occurs due to many reasons in the cable, at a time of removing or repair process, there is difficulty in locating also nearby location of the fault. The system proposed in this project is used to find out the sub area location of the fault and display it to the dedicated application over the internet using Wi-Fi module.

IV. EXPERIMENTAL RESULTS

Figures show the experimental results. Fig(a) shows the hardware setup of the system (b) shows the sample output displayed on LCD (c) shows the arduino IDE software screen (d) shows the output display screenshot



(a)

(b)

(c)

(d)

V. CONCLUSION

The work automatically sends data to cloud about fault with the help of Atmega328 and ESP8266 Wi-Fi module in a webpage or IOT application. Fault in a cable can be any defect that can break the path of the performance of the cable. So it is necessary to correct the fault. Underground cables are preferred in many areas especially in urban places. With the help of this system, we can get to know the location of the fault in the cable which are buried underground. Therefore, this system does not lead to debugging of the entire area to detect the fault. Hence, the expenditure and manpower gets reduced. The benefits of fault are fast repair to revive back the power system and improve the system performance. It reduces the operating expense and the time to detect the faults in the field. The Arduino microcontroller works based on the output of power supply status. The IOT module is vital due to which it can quickly update the status on IOT and many substation which can be done through common app of IOT.



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