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UNDER GROUND CABLE FAULT DETECTION OVER IOT

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ABSTRACT

Underground Cable System is a common practice followed in urban areas. While a fault occurs due to many reasons in the cable, at a time of removing or repairing process, there is difficulty in locating the exact location of the fault. The system proposed in this paper is used to find out the exact location of the fault and display it to the dedicated website over internet using Wi-Fi module, giving prior information to the authorized person at other end.

Keywords:- Relay Driver ULN 2803, PIC16F877A, Wi-Fi Module ESP – 8266.

1. INTRODUCTION

For the real worldwide operated voltage distribution lines underground cables have been used from many years. In order to reduce to sensitivity of distribution networks to environmental influences underground voltage cables are highly used. Underground cables have been used in power distribution networks due to the advantages of underground connection, more enhanced security than overhead lines in adverse weather conditions, less liable to damage by storms or lightning. It is less costly for larger distance, eco- friendly and low maintenance cost. But if any fault occur in cable, then it is difficult to locate fault and it's type. So this system is used to detect the location and type of fault in digital way. The requirement of locating the faulty point in an underground cable in order is to facilitate quicker repair, improve the system reliability and reduced outage period.

2. TYPES OF FAULTS & DETECTION

Programs uploaded in Microcontroller to detect several of faults from the Underground Cables, we can find out faults through Microcontroller and LCD display which displays the faults in kilometer.

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The faults created are manually by using switches. Cable has many types. Every cable has different resistance which mainly depends upon the material. The value of the resistance is depends upon the length of the cable wire. If any changes occur in the resistance, the value of the voltage will be changed that particular point is called Fault. A fault has many types & is given below.

1.1 SHORT CIRCUIT FAULT

A short circuit fault occurs when there is an insulation failure between phase conductors or between phase conductor and earth or both. An insulation failure results into formation of a short circuit path that triggers a short – circuit condition in the circuit.

1.2 OPEN CIRCUIT FAULT

An open circuit fault occurs if a circuit is interrupted or interfered by a failure. If the circuit is not closed that is called open circuit fault.

1.3 EARTH FAULT

An earth fault is an inadvertent contact between a charged conductor and earth or equipment. The return path of the fault current is through the grounding system and any personnel or equipment that becomes part of that system.

2 BLOCK DIAGRAM DESCRIPTION

The proposed system detects underground cable fault distance from base station using ohms law, microcontroller and relay switches concept. It is classified in four parts as shown in fig. 1.

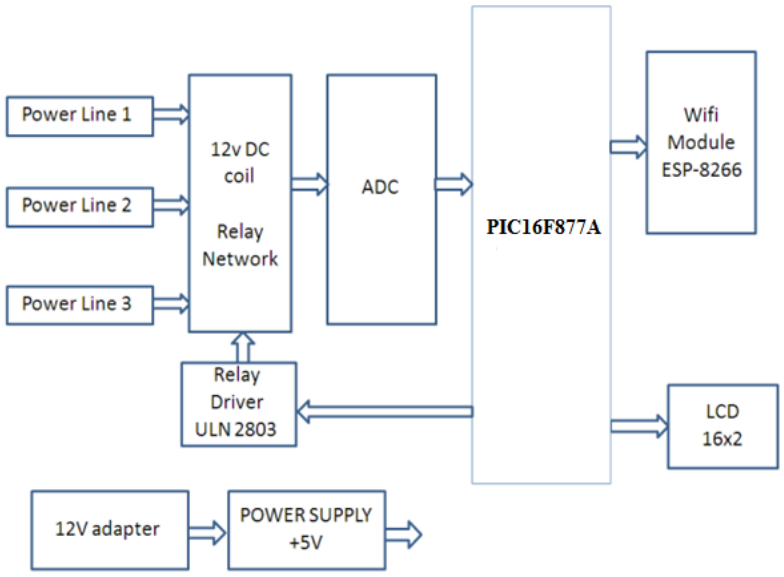

Fig.1. Block diagram of system

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DC POWER SUPPLY

This part consist of AC supply of 230V is step – down using step – down transformer, full wave bridge rectifier converts AC signal to DC & regulator is used to produce constant DC voltage.

CABLE FAULT DETECTION

This part is denoted by asset of resistors and three phase cable along with switches. Current sensing part of cable represented as set of resistors & switches are used as fault creators to indicate the fault at each location. This part senses the change in current by sensing the voltage drop due change in length of the resistor.

CONTROLLING

Next is controlling part which consists of ADC which receives input from the current sensing circuit as AC input, converts this voltage into digital signal and then it feed the microcontroller with that signal. The microcontroller is also a part of the controlling unit and makes necessary calculations regarding the distance of the fault according to our program.

DISPLAY PART

This part consists of the LCD display which is interfaced to the microcontroller which slows the status of the cable and the distance of the cable from the base station, in case of any fault. The proposed system uses the simple concept of ohm's law where a low voltage is applied at the feeder end through a series resistor. In case there is a short circuit current would vary depending upon the length of fault of the cable. The voltage drop across series resistor changes accordingly which is then fed into the ADC to develop digital data in which the programmed microcontroller would display the same in kilometers. The system consists of few set of resistors representing cable length in KMs eg. 1K ohm resistor for 1Km cable.

4. ALGORITHM AND FLOWCHART

ALGORITHM

Step 1: Initialize the ports, declare timer, ADC, LCD functions.
Step 2: Begin an infinite loop; turn on relay 1 by making pin 0. 0 high.
Step 3: Display "R:" at the starting of first line in LCD.
Step 4: Call ADC Function, depending upon ADC output, displays the fault position.
Step 5: Call delay
Step 6: Repeat steps 3 to 5 for other two phases.

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FLOW CHART

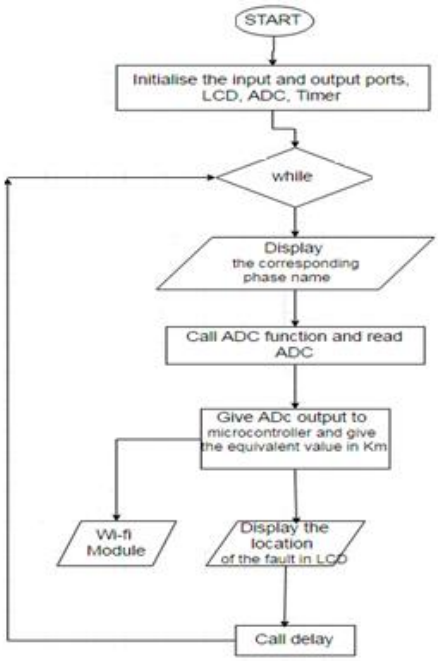

Fig. 4. Flow chart of the system

5. CONCLUSION

It's difficult task to identify the short circuit faults in Underground cables in an appropriate phase. By using ohms law we can find out exact fault location in particular phase of wire. Once faults occur in the cable, with the help of microcontroller and the display unit displays the exact fault location that occur in appropriate phase of the cable to dedicated website with the help of IOT. Buzzer system is used to create an alerting signal which is helpful to humans if there is any failure in updating of data to dedicated website. Buzzer system creates an alerting sound signal, once if the fault occurs in the underground cable which helps us to solve the problem as earlier as possible.

FUTURE SCOPE

The proposed system in this paper detect only the location of short circuit fault in underground cable line, and also detect the location of open circuit fault, to detect the open circuit fault capacitor used in circuit which measure the change in resistance & calculate the distance of fault. For future research, the system would proceed with similar neural networks structure for different types fault section and fault location estimation.

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