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Arduino Based Underground Cable Fault Detector

Abhilesh netake[1], Yogesh[2], Swanand[3],Akash[4], Swapnil[5]
[1]*professor* ,[2]*Student*
[1,2,3,4,5] *Department of Electrical Engineering, Sandip institute of engineering and management,Nasik.*

Abstract: *The project is intended to detect the location of fault in underground cable lines from the base station to exact location in kilometers using an Arduino micro controller kit. In the urban areas, the electrical cable runs in undergrounds instead of overhead lines. Whenever the fault occurs in underground cable it is difficult to detect the exact location of the fault for process of repairing that particular cable. The proposed system finds the exact location of the fault. This system uses an Arduino micro controller kit and a rectified power supply. Here the current sensing circuits made with a combination of resistors are interfaced to Arduino micro controller kit to help of the internal ADC device for providing digital data to the microcontroller representing the cable length in kilometers. The fault creation is made by the set of switches. The relays are controlled by the relay driver.*
Keywords: *Arduino UNO, LCD, Buzzer.*

I. Introduction

Generally we used to overhead lines. We can easily identify the faults but in rushed places or familiar cities we couldn't use overhead lines. So, we are moving to underground cables. Underground cables used largely in urban area instead of overhead lines. We can't easily identify the faults in the underground cables.This project deals with microcontroller, buzzer and LCD.

This proposes greatly reduces the time and operates effectively.

II. Related Work

Programs uploaded in Arduino UNO kit to detect faults from the underground cables. When a fault occur in the underground cables, we can find out faults through Arduino controller kit. LCD display which displays the faults in Kilometre. In this project we created faults manually. Cable has many types. Every cables has different resistance which depends upon the material used. The value of the resistance is depends upon the length of the cable. In here resistance is the leading role of the project

.If any deviation occur in the resistance, the value of the voltage will be changed that particular point is called FAULT. We are find out those faults.

TYPES OF FAULTS

Faults has many types. Frequently occurs the faults are given below

- Short Circuit Fault
- Open Circuit Fault
- Earth Fault

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.

Open Circuit Fault

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

Earth Fault

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

III. Existing System

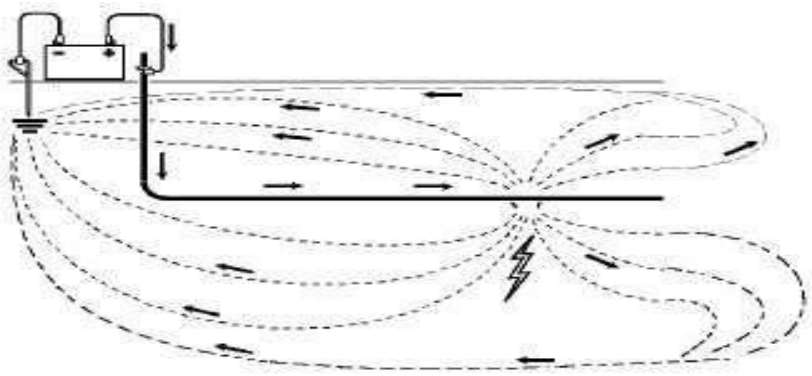
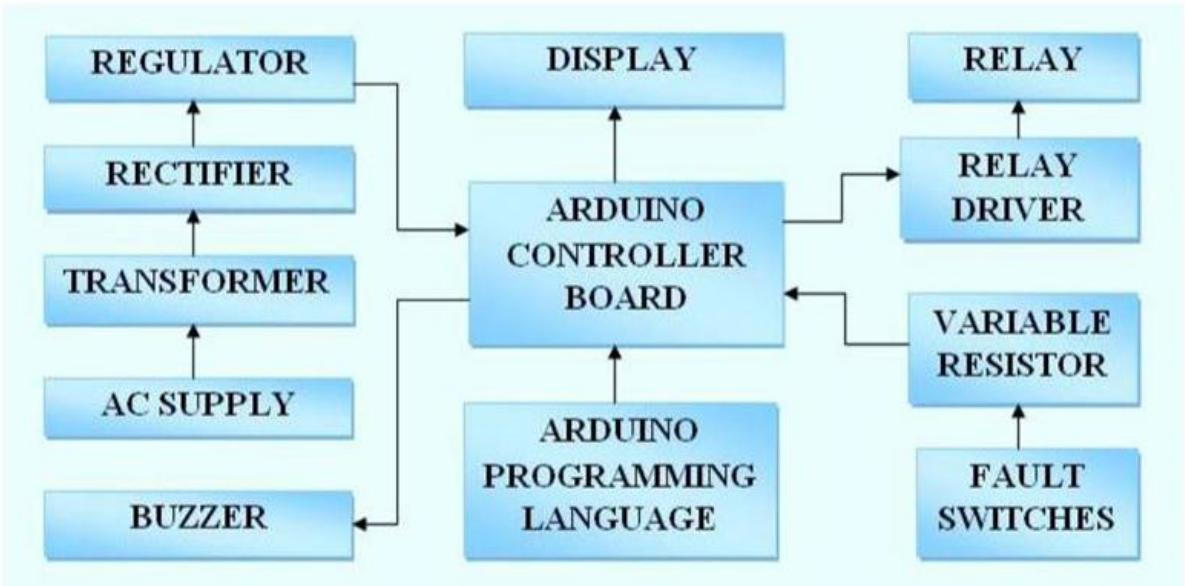


Figure 1 An A-Frame method of finding cable fault location

In A-frame method, a pulsed direct current (DC) is injected into the faulty cable and earth terminal to locate the ground fault. The DC pulse will flow through the conductor and return via earth from the earth fault location back to the ground stake as showm in Figure 1.The flow of pulsed DC through the ground will produce a small DC voltage. A sensitive voltmeter is used to measure the magnitude and direction of the DC voltage in segments of the earth along the cable route. Analyzing the results of the measuring voltage along the route, the location of the fault in the cable can be pinpointed A-Frame is an accurate method but it is not the fastest one, since the operator has to walk along the length of the cable from the transmitter to the ground fault. This method may face a problem if the return DC finds some easier path back to the earth stake of transmitter instead of returning through the ground. If the ground is sandy, paved which provides high resistance and consequently, less current flows through the ground. In that case, the voltmeter fails to measure the voltage and fault detection becomes complicated.

IV . Proposed System

Underground fault detector deals with finding of exact fault location from the base station itself. Cables have some resistance. We are mainly focusing that resistance. Resistance can vary with respect to the length of the cable. If the length of the cable is increase, the value of the resistance will also increase. If any deviation occurs in the resistance value, we will call that is fault point and finding that place through arduino technology. That fault point is represents the standard of distance (kilometer) from the base station. This value displayed by display unit.



V. Working

Normally people have been using commercial voltage (230V).This voltage is step-down through step down transformer. Transformer is an electrical device that transfers electrical energy between two or more circuits through electromagneticinduction.. Generally, transformers are used to increase or decrease the voltages of alternating current in electric power applications. These step-down voltage goes to rectifier unit.

Rectifier is nothing but an electronic device which used to convert an AC supply into DC supply. This project we were using bridge rectifier.12V AC supply is converts into 12V DC supply. These voltage moves to the regulator unit. Regulator is an electrical device which is used to maintain a constant voltage. Here we were using two voltage regulator. Namely voltage regulator 7812 and voltage regulator 7805.7812 voltage regulator maintains the 12V DC supply. These voltage is enough to operate relay unit and 7805 voltage regulator maintains the 5V DC supply. These voltage is used to handle the Arduino kit.

We uploaded the program in the kit. Program was written if any fault occur in the cable, immediately will open the relay terminal and disconnect that faulty line only. Rest of the other lines operates normally. Now a days embedded system changed metorically.Arduino is the advanced version of embedded system. These Arduino has ample types but we selected Arduino UNO. These Arduino UNO helps to develope many advanced version of ArduinoUNO creates user friendly environment.it easily to adopt other devices using serial port. Next we move the relay.

Relay is nothing but an electrical device here which acted as a switchif any fault occur in the line, will disconnect the line using relay. The connector of the relay moves from normally close conduct to the normally open conducet. we easily find the fault and to disconnect the fault line. Display unit is connect the Arduino kit which is used to where the fault occurs and to display itself.

VI. Conclusion

It’s a difficult task to identify the faults in underground cables. By using Arduino controller we can find out exact fault location. Once faults occur in the cable, the display unit displays the exact fault location that displays which phase is affecteded in the cable and how long it’s affected and buzzer system is used to create an alerting signal which is helpful to humans. Buzzer system create a alerting sound signal, once if the fault occur in the underground cable