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UNDERGROUND CABLE FAULT DISTANCE LOCATOR

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ABSTRACT

This project proposes fault Distance locator version for underground strength cable the usage of an Arduino uno. The use of underground cables arise a problem of figuring out the fault area and the gap of cable fault as it isn't usually open to view as in case of overhead cable. Thus, the underground cable fault Distance locator is growth to hit upon the precise fault region and the distance of underground cable fault from based totally absolutely station in kilometers because the machine will discover the faulted cable on underground and could ship the information to the manage room through using a relay. An underground cable gadget is a commonplace practice followed in essential city location. The concepts of Ohm's regulation are Used on this task and are located underground with brief circuit kind fault circumstance. If any fault occurs, the voltage drop will range counting on the duration of fault in cable because the modern-day varies. Tracer technique is used to detect faulted with the aid of manner of stroll thru the cable lines. Fault point is traced by manner of the audible sign or electromagnetic sign. These initiatives are equipped with a hard and rapid of resistors, energy deliver, a set of switches, Arduino Uno and LCD. The prototype of an underground cable fault distance locator is designed with the performance of Tracer method.

1. INTRODUCTION

Till ultimate a few years, 1,000,000 miles Of cables are strung in the air for the duration of the united states of america. But presently it's miles laid inside the underground, that is greater to an earlier technique. Underground cables are not suffering from any damaging climate circumstance like pollutants, heavy rainfall, snow and typhoon. To reduce the sensitivity of distribution networks to environmental impacts underground excessive voltage cables are used an increasing quantity of. Underground cables were extensively utilized in electricity distribution networks due to the benefits of underground connection, concerning more Security than overhead strains in awful climate, plenty less prone to damage thru storms or lightning. It is an awful lot much less high priced for shorter distance, eco- friendly and low protection.

Underground cable device is a Not uncommon workout observed in lots of city areas. However, while any hassle takes area in cable, it's miles very hard to find the appropriate place of the fault because of not information the best region of the cable. So, this undertaking is used to encounter the region of fault in digital way. The requirement of locating the defective point in an underground cable in order is to facilitate faster repair, improve the tool reliability and decreased outage length. The underground cable gadget could be very beneficial for distribution specially in metropolitan cities, airport and defense services.

2. LITERATURE REVIEW

Finding the vicinity of a cable Fault doesn't must be like finding a needle in a haystack. The common strategies of finding faults are

- A. **Sectionalizing:** The process risks reducing Cable reliability, as it relies upon on physical cutting and splicing the cable. Dividing the cable into successively smaller sections and measuring every approach with an ohmmeter or high-voltage insulation resistance (IR) tester permit to narrow down look for a fault. This hard system normally includes repeated cable excavation.
- B. **Time domain reflectometry (TDR):** The TDR sends a low-energy Sign via the cable, causing no insulation degradation. A theoretically first-class cable returns that check in a diagnosed profile. Impedance versions in a "real-global" cable modify every the time and profile, which the TDR show or printout graphically represents. One weak spot of TDR is that it does no longer pinpoint faults
- C. **Murray Loop Test:** It is a bridge circuit used for finding faults in underground or underwater cables. It makes use of the principle utilized in potentiometer take a look at. One surrender of the faulted cable is established thru a couple of resistors to the voltage supply. Also a null detector is established. The superb stop of the cable is shorted. The bridge is added to balance through changing the price of RB. In above decide, RC is proportional to $(1 + (1-x))$ and RD is proportional to 1. Therefore,

$$RA/RB=r=RC/RD = (2l-x)/x \quad (1)$$

$$\text{And hence } x= 2l/(r-1) \quad (2)$$

Where l is the duration on each segment of twine, r is the ratio RA/RB and x is the period of defective segment.

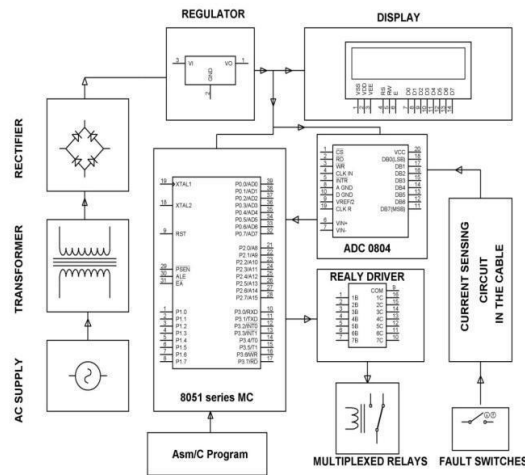
The main downside of this Method assumes that nice a single fault exists, a low resistance while in assessment with cable resistance and cable conductors have uniform resistance in line with unit duration.

- D. **Varley loop test:** If the fault resistance is excessive, the sensitivity in Murray bridge is decreased and Varley loop may be extra appropriate however pleasant a unmarried fault exists. Except that right here the ratio palms are regular and a variable resistance is hooked up to the check stop of the faulty cable.

3. BLOCK DIAGRAM

This is proposed version of Underground cable fault distance locator the usage of microcontroller. It is assessed in 4 additives –DC energy deliver element, cable component, controlling part, display element. DC strength

Deliver part encompass ac deliver of 230v is step-down using transformer, bridge rectifier converts ac signal to dc & regulator is used to produce ordinary dc voltage.



The challenge makes use of the smooth Concept of OHMs law in which a low DC voltage is carried out on the feeder stop via a chain resistor. The modern-day could vary depending upon the length of fault of the cable in case there's a short circuit of LL or 3L or LG and so on. The collection resistor voltage drop modifications therefore that is then fed to an ADC to expand specific digital records which the programmed microcontroller might show the identical in Kilometers. The project is assembled with a tough and speedy of Resistors representing cable period in KMs and fault creation is made by way of a set of switches at each recognized KM to bypass test the accuracy of the same.

4. SCOPE

In this mission, the fault going on At what distance is proven on LCD that is interfaced with the microcontroller. Further connect with the IoT era which provide greater correct fault place with its longitude and latitude co-ordinates.

The impact of fault passed off to the ADC output and voltage across series resistor. The output waveform of every circumstance of switches is generated if the condition is fulfilled.

5. MAIN FUNCTION

- A. **Connections:** The output of the electricity deliver That is 5V is given to the 11th& 32th pin of microcontroller and GND is hooked up to its 12th& 31thpin. Port 2 to three of microcontroller (Analog to virtual converter) is given voltage at great factors (A&B). Port 17,18,23,24, 27, twenty eighth is giving to 16x2 LCD show. Port 26, 27 is giving to GSM. Port 13th& 14thgiving to crystal oscillator which offers clock frequency to the microcontroller. Port 1 of microcontroller Is rest pin is provided by means of manner of reset circuit.
- B. **Operating procedure:** The assignment makes use of ten devices of Resistances in series representing cables as verified in the circuit diagram. Each series resistors represents the resistance of the cable for a specific distance therefore four such resistances in collection constitute 14km's. Switches are used to common factor in their contacts are grounded at the same time as the NO points are related to the center of the resistor of unmarried section cable. When fault on the primary resistor then it propose fault at one kilometer from device

installation and at 5th resistor it suggests fault at five kilometers. While any of the 10 switches (representing as fault switches) are operated they impose situations like short circuit fault, open circuit fault and ground fault as in keeping with the switch operation. The application while finished continuously scans with the aid of going for walks the microcontroller in collection of 1sec C programming language. Thus any issue even as driven to GND via the common touch factor develops a current drift via resistors & the cable by way of way of the fault transfer depending at the created fault. Thus the voltage difference at the analog to digital (inbuilt in microcontroller) pin varies depending on the current drift that is inversely proportional to the resistance per length of cable in kilometers. This numerous voltage is fed to the ADC to extend an 8 bit information to the microcontroller. Program at the identical time as completed shows an output in the LCD show upon the gap of the fault going on in km.

6. ADVANTAGES

The advantages are low voltage drop, low upkeep, low chances of fault taking location and can be very suitable in city regions wherein overhead transmission strains aren't smooth to put in.

7. DISADVANTAGE

The disadvantages are, this is so much luxurious and very tough to look actual fault location. They are inconsistent, any defect, weak factor of the cable, insulation failure and breaking of the conductor. To conquer this hassle, right here is the venture mainly an underground cable fault distance locator, used to find the region of the fault for underground cable.

8. APPLICATIONS

Underground cable tool is a commonplace exercise observed in masses of city areas. However, at the same time as any problem takes area in cable, it's miles very difficult to discover the exact place of the fault due to now not knowledge the suitable place of the cable. So, this assignment is used to hit upon the area of fault in virtual manner.

9. CONCLUSION

In this paper we discover the Region of open circuit and brief circuit fault within the cable from the bottom station in km with the help of PIC 16F877A. In this approach the quick circuit fault at a particular distance within the underground cable can be located using smooth ideas of Murray loop allows to rectify fault correctly. Further this challenge can be more potent by way of the usage of capacitor in an AC circuit to degree the impedance that can even find out the open circuited cable, in comparison to the quick circuited fault best using resistors in DC circuit as observed inside the above proposed task. The fault taking area at a specific distance and the respective section is displayed on a LCD interfaced to the microcontroller.

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