

Arduino Based Cable Fault Detector (Fault Detector And Distence Locator)

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Abstract— The aim project is to determine the distance of underground cable fault from exact location in kilometers. When any fault like short circuit occurs, voltage drop will vary depending on the length of fault in cable, since . The resistors are therefore used to represent the cable .With the development in technology ,many changes. As technology us to understand its important like in urban areas, the electrical cable runs underground instead of overhead lines, which occupies less space and suppose as the effect and efficient way of transmission .But the problems occur when any fault occurs in the underground cable and it's also difficult to detect the appropriate location of the fault during the of repairing the particular cable and some algorithm in order to modify the location of the fault. The proposed system comprises of current sensors, Arduino uno and wifi modem which creates a pathway between the assembled hardware and internet so that the real time data can be communicated to the server its being serially communicated towards server and along with this everything and connected with help of IOT the real-time data can be arrived I laptops or smartphones from the server.

Keywords-: *electrical cable, current sensors ,of WI-FI Modem, of IOT(internet of things)*

I. INTRODUCTION

The location of the fault and of WI FI modem it's serially communicated towards server .since problems that occur in underground cable is big problem till now.

which is to earlier method. But when any fault occur in cable, then it is difficult to locate fault location. So we will move to find the exact location of fault. We can easily the faults but in urban areas or 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 cannot easily identified the faults location in the underground cables.This project deals with microcontroller, buzzer and LCD. This proposes greatly reduces the time and operates effectively.

Now the worldwide life is become digitalized so the project is to detect the location of fault in digital way. The underground cable system is more common practice followed in many urban areas. While fault occurs for some reason, at that time the repairing process. relays are controlling the relay driver. 16x2 LCD display connected to the microcontroller to display the info. In case of short circuit the voltage across series resistors changes accordingly, which is then fed to an ADC to develop precise digital data to a programmed Arduino micro controller kit that further displays exact fault location from base station in kilometers. The project future can be implemented by using capacitor in an AC circuit to measure the impedance which can even locate the open circuited cable. Whenever a fault occurs in a cable the buzzer produce the alarm to alert and to take an immediate action by field workers.

II. FAULT IN CABLE CAN BE CLASSIFIED IN TWO GROUPS:

1)Open circuit fault: Open circuit faults are better than short circuit fault ,because when these fault occurs current flows through cable becomes zero.

2)Short circuit fault: Further short circuit fault can be categorized in two types:

- a)symmetrical fault: Three-phase fault is called symmetrical fault. In this all three phases are short circuited.
- b)unsymmetrical fault: In this fault magnitude of current is not equal.

FAULT LOCATION METHODS

Fault location methods can be classified as:

1)Online method: This method utilize &process the sampled voltages& current to determine the fault points. Online method for underground cable are less than overhead lines.

2)Offline method: In this method special instrument is used to test out service of cable in the field. There are two offline methods as following:

1)Tracer method: In this method fault point is detected by walking on the cable lines .Fault point is indicated from audible signal or electromagnetic signal. It is used to pinpoint fault location very accurately. Example:

- 1) Tracing current method
- 2) Sheath coil method

2)Terminal method: It is a technique used to detect fault location of cable from one or both ends without tracing .This method use to locate general area of fault.

III. COMPONENT SPECIFICATION:

Table 1: Specification of components

1	LCD Display	16*2
2	Power Supply	5V
3	Transformer	230V
4	Voltage Regulator	7805
5	Microcontroller	8051

IV. BLOCK DIAGRAM:

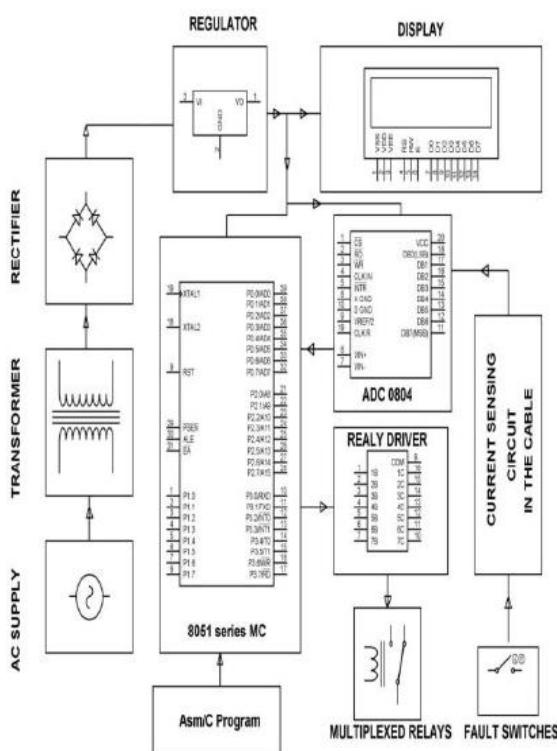


Fig.No.1.Block diagram

The project uses the concept of OHMs law where a low DC voltage is applied at the end through a series resistor. The current would vary depending upon the length of fault of the cable in case there is a short circuit of LL or 3L or LG etc. The series resistor voltage drop changes accordingly which is then fed to an ADC to develop precise digital data programmed microcontroller would display the same in Kilo meters. The project is with a set of resistors representing cable length in KMs and fault creation is made by a set of switches at every known KM to cross check the accuracy of the same.

The underground cable fault distance locator using microcontroller. The DC power supply part ,cable part controlling part, display part. DC power supply part consist of ac supply of 230v is step down using transformer, bridge rectifier converts ac signal to dc & regulator is used to produce constant dc voltage. The cable part is denoted by set of

resistors 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. Next is controlling part which consist of analog to digital convertor which receives input from the current sensing circuit, converts this voltage into digital signal and feeds the microcontroller with the signal.

The microcontroller also forms part of the controlling unit and makes necessary calculations regarding the distance of the fault. The microcontroller also drives a relay driver which in turn controls the switching of a set of relays for proper connection of the cable at each phase. The display part consists of the LCD display interfaced to the microcontroller which shows the status of the cable of each phase and the distance of the cable at the particular phase, in case of any fault.

A. POWER SUPPLY

The power supply circuit consists of step down transformer which is 230v step down to 12v. In this circuit 4 diodes are used to form bridge rectifier which delivers pulsating dc voltage & then fed to capacitor filter the output voltage from rectifier is fed to filter to eliminate any a.c. components present even after rectification. The filtered DC voltage is given to regulator to produce 12v constant DC voltage.

B. TRANSFORMER

transformer is static device which transfer electrical energy into one circuit to another circuit with changes voltage .current without change voltage. dc voltage is required to operate various electronic and this voltage are 5v,9v,12v. but this voltage obtained not directly. 230v brought down to the voltage.

C. 8051 MICROCONTROLLER

Microcontroller is on chip controller. INTEL 8051 is most popular producing in the world market. its 64kpbs external data memory, 64kb programme memory, & 256 bytes data memory. it increases reliability. Hardware is less because single chip microcontroller. smaller access time & speed is high.

D. RECTIFIER

The output of the transformer is fed to the rectifier. is converting into AC to pulsating DC .the rectifier may be half wave or full wave rectifier. In this project the bridge rectifier is used because of its merits of good stability and wave rectification.

E. LCD LIQUID

crystal display are interfacing to microcontroller 8051. Most commonly LCD used are 16*2. In 16*2 display means 16 represent column & 2 represents rows.



Fig.2.LCD Display

V. ADVANTAGES

- 1) Less maintenance.
- 2) It has higher efficiency.
- 3) Less fault occur in underground cable.
- 4) Underground cable fault location model are applicable to all types of cable ranging from 1kv to 500kv&other types of cable fault such as-Short circuit fault, cable cuts, Resistive fault, Sheath faults, Water trees, Partial discharges.

VII. DISADVANTAGES

If a fault does occur, it is difficult to locate and repair the fault because the fault is invisible.

VIII. APPLICATION

Its main application is the to detect the exact location of underground cable fault which is very hard to detect as it is not possible to see such faults which are quite possible in the case of overhead transmission line. So for such cases our project is very helpful as the distance at which the fault has occurred can be calculated and then further action regarding the fault can be taken to overcome them.

IX.FUTURE SCOPE

In this project we detect only the location of short circuit fault in underground cable line, but we also detect the location of open circuit fault, to detect the open circuit fault capacitor is used in ac circuit which measure the change in impedance &calculate the distance in fault.

X.CONCLUSION

In this paper we detect the exact location of short circuit fault in the underground cable from feeder end in km by using microcontroller8051.For this we use simple concept of OHM's law so fault can be easily detected and repaired.

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