

Underground Wire Fault Detection Using Arduino

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Abstract- This paper proposes the model of underground wire fault detection using Arduino ,GSM,GPS. This project is basically designed for determining the fault located from the base station to the target station where distance is specified in kms. Whenever the short circuit fault is occurred it used to be very tedious to locate the fault .This system works on the simple concept of ohm's law. Arduino plays the role of the brain .The coordinates and the condition of the fault gets directly displayed on LCD and message alert will be revised on the mobile using GSM &GPS.

Keywords- Ardiuno,GSM,GPS,relay,LED,UNO

I. INTRODUCTION

In early times the thought of overhead cables used to agitate the public. Due to abrasion loss sustention was a big issue. In turn all this had a huge effect on the cost and delicacy. Due to this problem, the quality of life was the matter of the contention for the authorities. Unwonted changing values of the current ,construction faults and the different practices for detecting of the fault was the matter of concern .The underground cable system is very much rudimental for the distribution in metropolitancities ,airports and defense services. This is because the underground cable does not get overblown due to environment.

The desideratum of the project is to make the detection of fault digitized in this digital terrene. Fault in the cable commences dueto :

1. Diverted current
2. Non- Homogeneity of the cables
3. Splintering of conductor and insulation breakdown.

In our project the short circuit fault is the one to be resolved. Tracking down of the fault is based on the type of the fault:-

A. Open circuit fault-

Open circuit fault occurs when there is any breakage of conductor in a cable. If the conductor is not broken then the zero resistance is not detected .However if it is the case then will augur infinite resistance.

B. Short circuit fault-

When two conductors get betrothed with each other due to electrical contact then short circuit is examined. Therefore due to this some voltage drop is possible.

C. Earth fault-

As the name suggest it is the fault related to the earth .Earth fault is also known as the ground fault.

In the following project we are working for the detection of short circuit fault ,that is conceptualized on the ohm's law .When a low dc voltage is given to the feeder through the set of series resistor that repret the fault to the cable line then the current varies. Therefore all the voltage values that get changed accordingly are fed to an ADC to develop accurate data that displays the result via LCD.

Generally we did use the overhead lines because it is easy to find the fault but some area are driven with lots of people, so we moved our focus towards the underground cable.

Transmission lines plays the backbone of the power industries. With concerned to reliability and maintenance costs of power delivery, accurate fault location for transmission lines is essential in restoring power services and reducing wastage of time as much as possible. So that is why underground technique of fault detection is given the preference . The fault from the base station itself is identified in this method .In this case resistance is the main part that plays a leading role. Different cables have different resistance ,so if the resistance varies with the length of the cable the corresponding values changes occur in the resistance .So it is like resistance is proportional to the length ,if length increases resistance also increases and vice versa. If any of the deviation occurs in the resistance that is known as the fault point and detecting that one is the objective of this project .

As aforementioned it uses the ohm's law .The current varies depending upon the length of the cable fault .The resistor drop that occurs due to this fault is fed to the ADC and it develops the precise digital data and the same will be

displayed in the kilometers by undergoing the process in microcontroller that is based on some program on LCD.

II. HARDWARE DESCRIPTION

1. Power Supply Unit
2. Cable part
3. Controlling part
4. Display Part

DC SUPPLY PART: Project 12V AC is to be converted to the 12V DC by the rectifier. Thus Arduino and relay works on the 5V supply.

CABLE PART:

The cable part is represented by the set of the resistors that are connected serially and arranged parallel along the switches. Current sensing part is denoted by the resistor and thus the fault creation lets a voltage drop that is then sensed by this part of the cable due to the changing value of the current

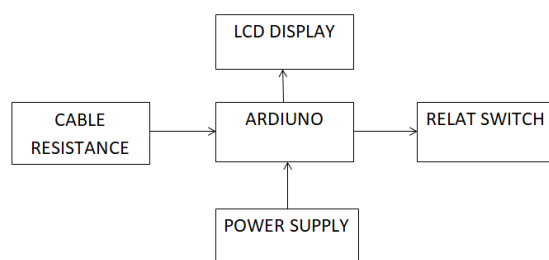
CONTROLLING PART:

The controlling part is handled by the microcontroller and ADC. The proposed system uses the Arduino UNO. The microcontroller behaves as a controller device by driving the relay that in turn controls the switching of the relays for the proper connection of cable at each phase .

DISPLAY UNIT:

The display unit is comprised of LCD for displaying the exact location of the fault.

WORKING:



In INDIA we have been using 230 v commercial voltage .The voltage is the step downed transformer is used for this purpose because it transfers the electrical energy between two or more circuits based on the principle of

electromagnetic induction (EMI). We are using centre tapped transformer (12012). Transformer like step up and step down are used to increment or decrement the values of voltages regarding the desired application.Now the 12V DC voltage (step down) is fed to the rectifier unit.

Bridge rectifier is used for converting the ac to the dc output supply. Thus the output obtained is 12 V DC supply.Then the same is fed to the regulator 7805 used as the voltage regulator for maintaining the constant 5 V dc voltage supply.

Arduino and relay operate on this 5V dc voltage supply. The relay used is SPDT i.e. Single Pole Double Throw.

The program on which our project works is been uploaded to the Arduinokit.Then the power is switched on and the fault is created (manually for the study purpose). Now as the circuit starts operating the fault that is represented by the set of resistors in the parallel rows interfaced with the respective LED starts glowing according to the fault and then the location of the fault is detected by detecting the longitude and latitude of the fault by the use of GPS .now this fault report is send to the desired authorities through the use of GSM and the respective action is taken.

III. CONCLUSION

It is a difficult work to identify the underground fault , so we have used Ardiuno for detecting the fault .by using the Ardiuno we have tried to reduce the complexity as reducing the time and manual labour.

IV. ACKNOWLEDGEMENT

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