

IOT BASED FAULT FINDING OF AN UNDERGROUND CABLE

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Abstract - The main objective of this project is to determine the distance of underground cable fault from base station in kilometers. These project was based on arduino which is the heart of our system. The system circuit will determines the fault from the divider circuit based on ohms law and display the output on LCD display. Because of these output we determines whether the fault occurs or not and according to it maintenance work can proceed with the exact location of fault. These information was also send to the monitoring android app through the cloud by using wi-fi module which enables the user to monitor the system online. These system will reduced the lot of efforts, reduce the time for maintenance as well as save the cost of repairing.

Key Words: fault finding, underground, IOT based cable fault, Short Circuit fault, Open Circuit fault

1. INTRODUCTION

These project was made in order to reduce the efforts of human when the fault occurs in major cable network such as Optical Fiber network used in internet, Intercommunication network, Telephone network and electrical wires for power supply. These project works online on internet. When the fault is detected in the circuit based on the principle of ohms law i.e. when the wire gets short circuited to ground, the resistance across the potential divider network gets vary. According to these variation in resistance we will determine whether the fault is occurred in the network or not. According to these value the arduino board display the current status of underground cable network in the form distance in kilometer from base station will displayed on LCD panel as well as same data will transferred online through the cloud to the monitoring android app connected with the system circuit through the WIFI which allows the operator to monitor the network from any part of the world.

2. TYPES OF FAULTS

Faults occurring in underground cables are mainly classified under the categories mentioned below.

- 1] Short Circuit Fault
- 2] Open Circuit Fault

3] Earth Fault

1] 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. Because of which these fault occurs.

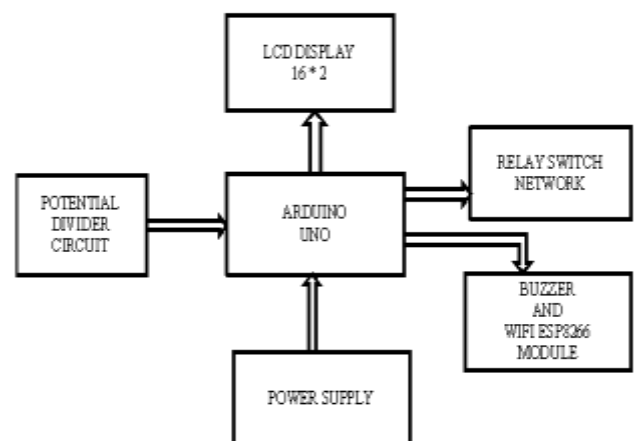
2] Open Circuit Fault

These fault occurs due to some unwanted cause happens in network when the circuit is opened.

3] Earth Fault

These fault happens due to an inadvertent contacts between the energized conductor and equipment frame and earth.

3. PROPOSED MODEL



3.1. ARDUINO UNO

The Arduino Uno is an open source microcontroller board based on the microchip ATmega328P microcontroller and developed by arduino.cc the board has 14 digital pins, six analog pins, and programmable with the arduino IDE via a type B USB cable . Its source is between the 7 to 20 volts. The hardware reference design is distributed under a creative commons attribution share a like 2.5 licence and

is available on the arduino website. The Uno board and version 1.0 of arduino software were the reference version of arduino.

3.2. LCD DISPLAY

One of the most common device used with an Arduino Board is an LCD 16 * 2 display. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively. Some of the characteristics of device are mention below. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters. In contrast, the LED must be refreshed by the CPU to keep displaying the data

3.3. RELAY DRIVER IC ULN2003

ULN2003 is an IC which is used to interface relay with the microcontroller since the output of the micro controller is maximum 5V with too little current delivery and is not practicable to operate a relay with that voltage. ULN2003 is a relay driver IC consisting of a set of Darlington transistors. If logic high is given to the ICs input then itsoutput will be logic low but not the vice versa. Here in ULN2003 pins 1 to 7 are IC inputs and 10 to 16 are IC outputs.

3.4. USER INTERFACE

3.4.1 SWITCHES

There are in all 12 switches which are used to indicate or create fault in the 1Km of each section of the cable line.

3.4.2 LCD DISPLAY

The fault occurring at a particular distance and the respective phase is displayed on a LCD indicating fault in a particular section of the cable.

3.5 Wi-Fi MODULE

The ESP8266 WIFI module is self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your wi-fi network. The ESP8266 each capable of either hosting or application or off loading or Wi-Fi networking function from another application processor.

3.6 TRANSFORMER

Transformer is static device is transfer electrical energy from one circuit to other circuit with change voltage and current without in change frequency. In this step-down transformer is use. Usually, DC voltages are required to operate various electronic equipment. And this voltages are 5v, 9v and 12v.but this voltage cannot be obtained directly. Thus AC input available at the main supply i.e. 230v is to be brought down the required voltage level.

This done by transformer. Principle of transformer is according to faraday law of electromagnetic induction.

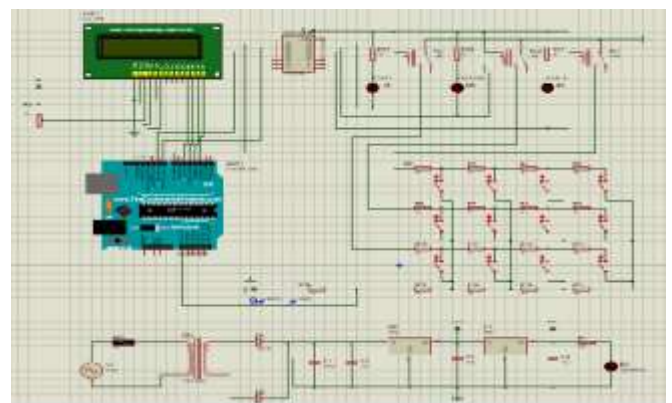
3.7 BUZZER

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as mouse click or keystroke.

3.8 ARDUINO IDE SOFTWARE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

4. CIRCUIT DIAGRAM



5. WORKING

The project uses four sets of resistances in series representing cables i.e.R10,R11,R12,R13 and R17,R16,R15,R14 then R21, R20,R19,R18, then R25,R24,R23,R22 as shown in the circuit diagram, one set for each phase. Each series resistors represents the resistance of the underground cable for a specific distance thus 4 such resistances in series represent 1-4kms. 3 relays are used to common point of their contacts are grounded while the NO points are connected to the input of the R17, R21 & R25 being the 3 phase cable input. R10 is fed with a series resistor R1 to 5v supply. The common point of R10 & R1 is given to input pin of 6 of ADC0804

duly wired. 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 cable 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 occurs in the resistance, the value of the voltage will be changed that particular point is called FAULT. We are finding out those faults.

6. CONCLUSION

Hence we design the following circuit and observed that circuit is working well and provide the desired output. It is capable of determining the exact location of fault from the base station and displays the distance in kilometres.

7. FUTURE SCOPE

[1] Further this project can be enhanced by using capacitor in an ac circuit to measure the impedance which can even locate the open circuited cable, unlike the short circuited fault only using resistors in DC circuit.

[2] By using GSM Module we can send SMS about the location of the fault to the concerned authority.

[3] The range of accuracy of fault detection can be increased to 100m by increasing the number of series resistors for commercial application by power stations.

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