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IoT Based Short Circuit Cable Defect Spotting Using Arduino

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ABSTRACT: Underground cables are used for transmission and distribution of electric power. Normally we use overhead wires for transmission and distribution of electric power, where in some areas it is not possible and impractical like urban areas. We use underground wires for safety purpose, and it is free from natural calamities like thunderstorm, lightning, heavy rains and falling objects across the wires. But there is a problem in construction of underground cables that is we cannot detect the exact faults in the wires, they are used to damage by ground movements, more over they are more expensive than overhead wires. In our project we are detecting the exact location of fault in the wire by Arduino kit, which reduces the time and money. In this we are using a simple concept called ohms law. In this project we are using Arduino Nano, Power supply, LCD Display, in addition to this we are using Wifi module, Buzzer and Blink app. RPS gives the power supply to circuit. Here the total project depends upon the resistance of the cable. We are using wifi module and Blink app, as wifi is used to connect or transfer data from LCD display to mobile phone. Blink app is used to get alert messages from LCD display through Wifi to alert the workers in the work place and to take immediate action the fault cable.

KEYWORDS : Arduino Nano; WIFI; Underground cable,IOT; Natural calamities; Short circuit; Arduino Software(IDE)

1.INTRODUCTION

In our project underground cables are used for transmission and distribution of electric power. Normally we use overhead wires for transmission and distribution of electric power, where in some areas it is not possible and impractical like urban areas. We use underground wires for safety purpose, and it is free from natural calamities like thunderstorm, lightning, heavy rains and falling objects across the wires [9]. But there is a problem in construction of underground cables that is we cannot detect the exact faults in the wires, they are used to damage by ground movements, more over they are more expensive than overhead wires.

Now a days world is becoming more digitalized so we want to detect the short circuit cable in KM. Normally whenever the short circuit occurs in the cable the workers is to dig the ground in search of the cable fault. By this process time and money both are wasted and it create inconvenience to the public. So to avoid all these problems we came across this project.

In our project we are detecting the exact location of fault in the wire by Arduino kit [8], which reduces the time and money. In this we are using a simple concept called ohms law. In this project we are using Arduino Nano, Power supply, LCD Display, in addition to this we are using Wifi module, Buzzer and Blink app. RPS gives the power supply to circuit [6]. Here the total project depends upon the resistance. The resistance depends on the length of the cable and cable material. For every cable by default resistance will present. Whenever short circuit occurs in the cable we have to calculate the resistance value from current and voltage upto the short circuit point by ohms law. By that resistance value we are getting the distance in KM. Here we are using the ADC converter where it will convert the analog data to digital data and it display in the LCD display board.

Here we are adding a new technology that is Wifi and Blink app to the project [7]. Wifi is used to send or transfer data from LCD to mobile phones and the message can get by installing Blink app through IOT [10]. By this we can easily alert the workers to take immediate action on that fault wire. Finally buzzer is used to alert the working area.

II. LITERATURE REVIEW

Vivek KR Verma, Mayank kumar, kushal patel, pankaj kr singh kushwaha, Shashi KR sharma works on a project of UNDERGROUND CABLE FAULT DETECTION USING IOT. They work to find exact location and fault in the cable. They have used Arduino Mega Microcontroller kit, GSM. The main aim of this project is to work with IOT. The output of the project is shown on the Internet. The output is displayed on the LCD display board which they have connected to this project. In this project they have used GSM module known SIM 900 and wifi module which they have used is ESP 8266. Whenever the cable falls under fault they try to find exact location of the fault in accurate [1].

Joshi describes this project Distance Calculation for Underground Cable Fault Using IOT works to determine the exact location of the fault in the cable. In this they have used Microcontroller 8051 to convert the analog data to digital data. The software used in this project is Kiel compiler and followed by on which the languages they have used is Assembly language. The distance is measured in the LCD display board. The distance measured in KM. The LCD is associated with microcontroller. In this project they have used a simple principle called ohms law, where current (i) is directly proportional voltage (v) and voltage is indirectly proportional to resistance. And another concept also they used is resistance is directly proportional to length of the cable. By this concepts they have followed and calculated the distance of fault in the cable [2].

Akash jagtap, Jayesh patil, Bhushan patil, Dipak patil, Aqib AI Husan, Ansari, Atul Bharhate these people operate on the project to detect the exact location of the fault in the cable. In this paper Arduino based Underground Cable fault Detection, to detect the fault in the cable they have used Arduino Uno, LCD display to display the value in KM. Relay drivers are used in this to control the relay switches. The idea to work with this project is that roof wires are not possible in urban areas so subway cables are introduced. But there is a problem that we cannot easily detect the fault in the cable. This is the reason motivated them to do this project [3].

Shweta desai, Ketan Walunjkar, Vipul Bhojar, Priyanka Maske, Shantanu singh these describe this project Underground Cable Fault Detection Using ARDUINO, GSM, GPS, to detect the exact location with accurate value they have used Microcontroller AT Mega, GSM, and GPS to find out the exact location of the fault in the cable. They have used LCD display to display the values in KM at which the distance occurred. Using of overhead wires is not possible in urban areas so underground cables came into action. By this underground cables many advantages and also disadvantages are presented. The main disadvantage is that we cannot able to detect the exact location of the cable. By this project we can able to detect the exact location of fault occurs [4].

Mr. N. Sampathraja, Dr. L. Ashok Kumar, Ms. V. Kirubalakshmi, Ms. C. Muthumaniyarasi and Mr. K. Vishnu Murthy they narrated this project to detect the faults of cable. In this paper, they have utilized the components such as PIC16F877A microcontroller and it mainly works with IOT and the main aim of this project is to detect the exact location of the cable fault. In this project IOT is used to display the values over the Internet through Wifi module ESP8266 is used. The webpage is designed by HTML and the information is displayed over the webpage. This webpage is used to display the values over internet [5].

III. PROPOSED METHOD

Generally we use overhead wires for transmitting and distributing the power to various locations. But in urban areas it is not possible to construct overhead cables instead of that underground cables are used. But there is a disadvantage of constructing underground cables i.e., whenever any fault occurs it is unable to detect the exact location of the fault. At the same time many advantages are also there they are underground cables are less affected by lightning, wind, freezing, animals do not affected, etc. we cannot detect the exact fault in the cable when cable falls under the fault condition. For this purpose we implementing this project. In our project it is easy to detect the exact location of the fault cable. In our project we are using three cables. For these cables we are adding resistors manually. To short circuit the cables we are using switches. Whenever we short circuited the cable it shows a resistance value at that switch and at how much distance is also displayed in the LCD display board. In our project we are using Arduino Nano because it occupies less space. We are using wifi module and Blink app as wifi is used to connect or transfer data from LCD display to mobile

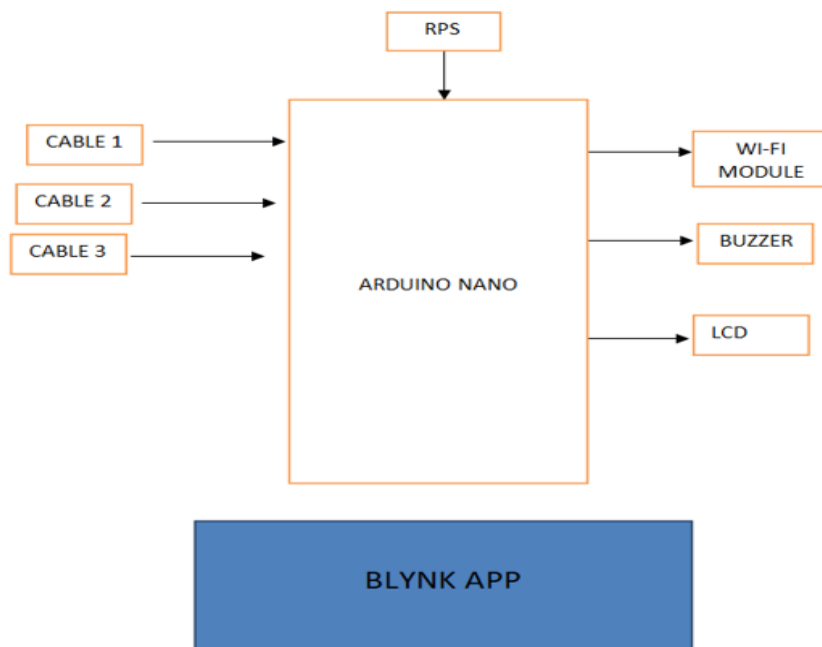


phone. Blink app is used to get alert messages from LCD display through Wifi. Our project concept is mainly based on the ohm's law.

RPS is used for power supply for entire circuit. Buzzer is used to alert the workers at the work place, blink app is used to receive data on mobile phones for to take immediate action on the fault cables.

The Arduino Nano is a small, complete and breadboard-friendly board based on the ATmega328P(Arduino Nano3.X). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It works with a Mini-B USB cable instead of a standard one. In this Microchip AVR(8-bit) is the CPU, SRAM is the memory and Flash and EEPROM is the storage of the Arduino Nano.

BLOCK DIAGRAM:



Normally in real time Resistance is directly proportional to length of wire we already know the resistance of the cable that is R_1 and length of the cable L_1 . When fault occurs then, we have to find resistance of that fault wire. We know current (i) and voltage (v), by this we can calculate resistance(R) by ohms law. After finding R then, by ratios we can find distance at which the fault occurs.

IV.RESULTS

Hence the project is to detect the fault location in the underground cable using Arduino nano micro controller. It measures the values of resistance and distance at which the short circuit occurs in the cable from LCD display. It sends the message to the mobile phones of the workers to take immediate action on the fault cable.

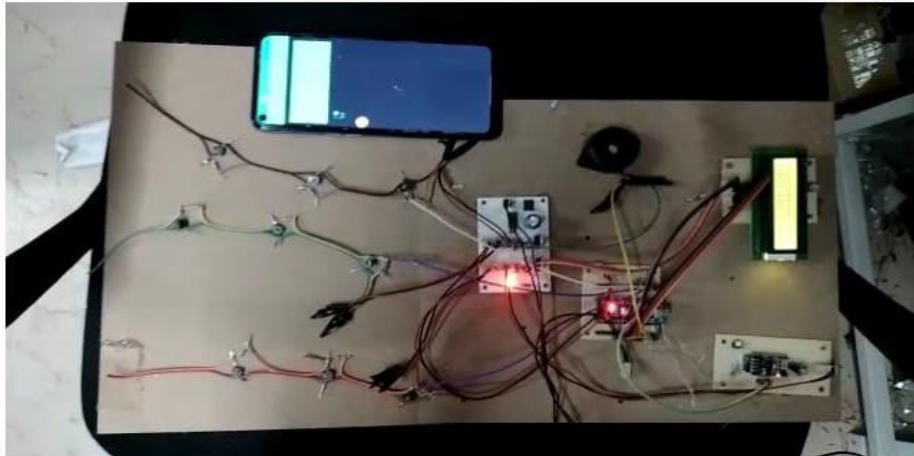


Fig 1 Total design of the project

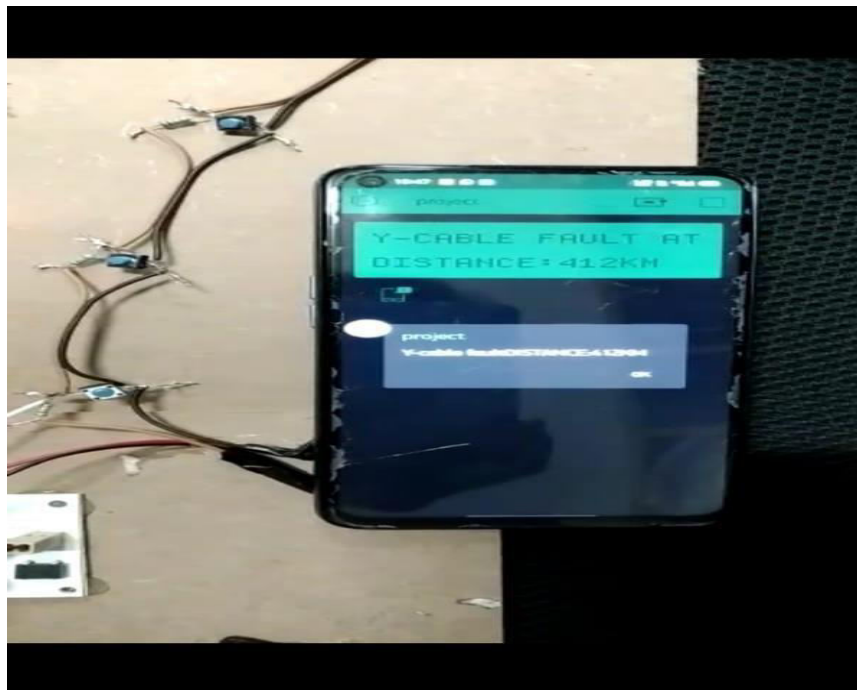


Fig 2 display message in mobile phones

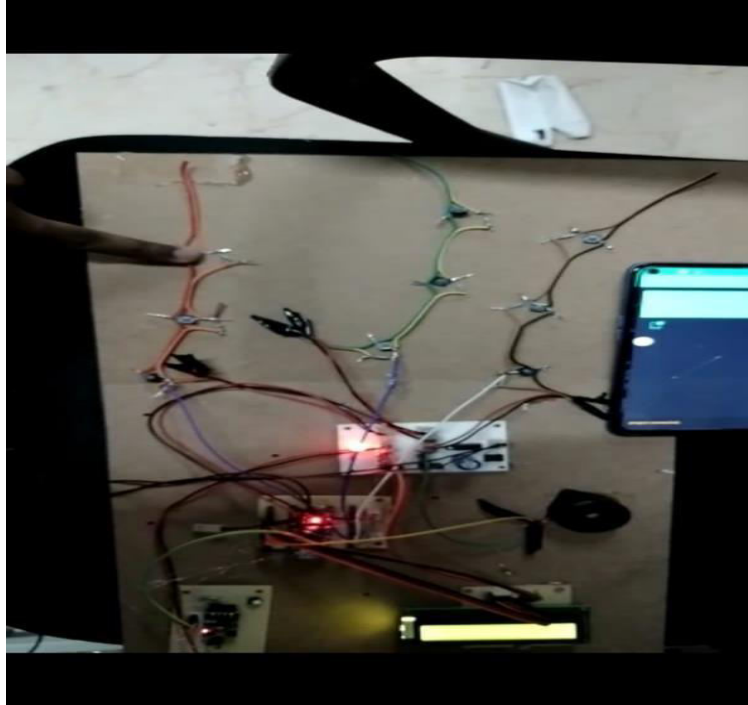


Fig 3 short circuiting the cable by pressing the switching



Fig 4 displaying distance at which the fault occurs

Figure 1 describes the total connections of the project in which LCD display, Arduino Nano, cables with a switch as those switches are used to short circuit the cable.

Figure 2 describes after short circuiting the cable the message is sent to mobile phones that fault occurred displayed



with distance in KM.

Figure 3 shows that a person switching on switch, that switch is used for short circuit the cable. To show the fault we are creating the short circuit in the cable. Beside every switch we are adding resistors manually to increase the resistance.

Figure 4 describes that displaying the distance and resistance value on the LCD display board. The distance is measured in KM.

V.CONCLUSION

We have done a major project on IOT Based Underground short circuit cable fault detection using Arduino nano. Normally we use overhead cables to distribute power to specified locations but in urban areas it is not possible to construct overhead cables so construct cables through underground is the option. But whenever any fault occurs it is difficult to analyse the fault. So, we came with this project to detect the fault in the underground from the base station to exact location where the cable can be short circuited. In this project we are using Arduino Nano, it is small in size and having wide variety of application and it works on the resistance of the cable. Blynk app is used to get messages to mobiles and buzzer is used to alert the work place to take immediate action on the fault cable. By constructing cables in underground gives a longer life expectancy, reduces maintenance costs, reduced fire fighting hazards, small voltage drop, not easy to steal and illegal connections. For this reason underground cables are the best solution. but drawback is we cannot easily find the fault. Hence we come across this project to detect the short circuit fault in the cable with distance in KM.

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