

IoT Based Underground Fault Detection

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Abstract— IOT based totally underground cable line fault detection system is useful for find out faults and its region in very easy way .Underground cables were extensively used with the development of strength system grid .Underground cables are susceptible to a wide type of faults because of underground situations, wear and tear, rodents .Detecting fault source is difficult due to the fact whole line is to be dug in order to test fault at cable line. The repairmen understand precisely which component has fault and most effective that vicinity is to be dug to stumble on the fault supply. It saves numerous time, cash and permits to carrier underground cable lines faster. We use IOT technology that permits the government to reveal and take a look at faults over internet the usage of Android App. The device detects fault with the assist of potential divider community laid throughout the cable. When a fault gets created in a cable line, a particular voltage receives generated as in line with the resistors community combination. This voltage is sensed through the microcontroller and is up to date to the person. The data conveyed to the consumer is the gap to which that voltage corresponds to. The microcontroller detects the fault cable line data and presentations this information over LCD show, it transfers this facts over net to display on line in a Android App. Android App to broaden the web system that hyperlinks with the machine to display the cable faults online.

Keywords: Underground Cable, Fault Detection, Fault Location, Location Methods, Microcontroller

I. INTRODUCTION

Underground cables were broadly used with the development of power system grid. Till remaining a long time cables were made to lay overhead & currently it is to put underground that is advanced to earlier approach. Because the underground cable no longer laid low with any negative weather situation including storm, snow, heavy rainfall as well as pollutants. But while any fault passed off in underground cable, then it's far tough to locate the precise area of fault. Today the sector is become digitalized so this paper is supposed to discover the area of fault in virtual manner. The underground cable device is more not unusual exercise observed in lots of urban areas. While faults can arise for exclusive reason in cable line, the repairing process related to that precise cable is difficult due to no longer knowing the exact area of cable fault. As it is very difficult to find the precise vicinity or defective location manually, which all of sudden affects the efficiency of the cable wire because of losses happened. Now a days many strategies had already been implemented in an effort to locate cable line fault. But the trouble came up is how to come across fault in cable cord while it's far underneath grounded, and how to get right of entry to or retrieve the ones statistics associated with faulty vicinity whenever it's miles required. In order to fill the ones gaps, we proposed the machine

which detects the precise place of the fault and thru the way of IoT it's serially communicated towards server. The mission "IoT primarily based underground cable line fault detection gadget the usage of Android App" is used for discover and locating the faults. The guide technique is very time eating. Here, we recommend a cable fault detection over IoT Android app that detects the precise fault role over IoT that makes repairing paintings very easy. For most of the global operated low voltage and medium voltage distribution traces underground cables had been used from many decades. The complexity of the entire community incorporates numerous components which can fail and interrupt the power supply for the end user. Use of underground strength cable is increasing because of safety considerations and more advantageous reliability in transmission and distribution these days. Due to protection motives and excessive-energy requirements use of underground cables has been extended. To boom the reliability of the device proper fault detecting and finding techniques are required. The inaccessibility of the underground cable makes the location and detection of fault within the cable a hard project. The fault detecting and finding strategies play a completely vital role in maintaining the system and thereby growing the reliability.

II. FLOW CHART

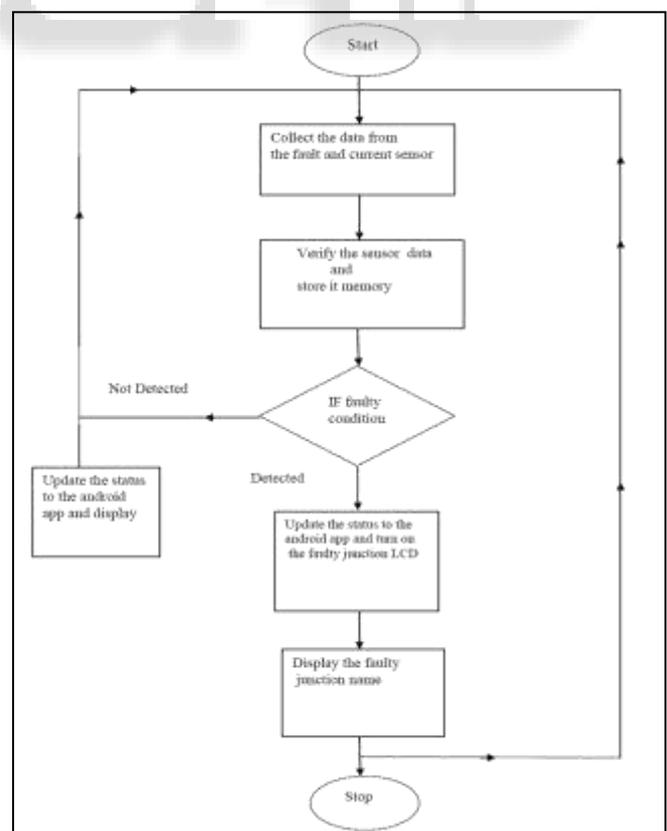


Fig. 1: Flow Chart

III. BLOCK DIAGRAM

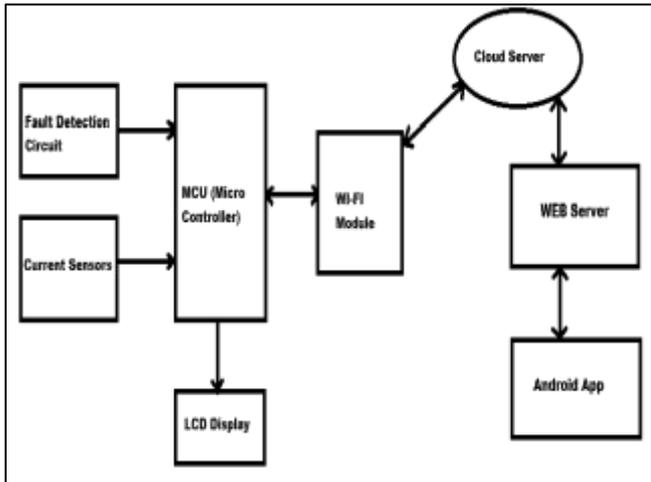


Fig. 2: Block Diagram

IV. METHODOLOGY

Many strategies were advanced in cable line fault detection over the last few a long time. Generally, we use overhead traces. It can easily perceive the faults however in rushed locations or acquainted towns we will't use overhead traces. So, we are moving to underground cables. In this paper, IoT generation that lets in the authorities to display and test faults over internet the use of Android app. The machine detects fault with the help of potential divider community laid across the cable. Whenever a fault receives created at a point a selected voltage gets generated as in step with the resistors network combination. As the present device is not green, this paper proposes a device based on IoT App. The objective of this mission is to determine the distance of underground cable fault from base station in kilometers the usage of an IoT platform. The underground cable line device is used in many city regions. Various fault finding techniques just like the sectionalizing strategies, acoustic detection method, Murray loop methods are not used a lot due to the fact they be afflicted by many hazards.

The sectionalizing approach can't be hired due to the fact segment sensible checking of underground cable isn't viable. The acoustic technique can also become disastrous at the time of rain and its miles a bit bulky approach too. The Murray loop technique is primarily based on the precept of Wheatstone and due to unique resistances of leads there are many electrical, phone and other signal cables are laid underground. In ordinary strategies we've to test with the gadget wherein the fault is passed off. It required lot of time and the workload is also more. In IoT based totally underground cable line fault locator on every occasion a fault is taking place inside the cable line, we will see the vicinity within the IoT online gadget. Then the admin can inform to the repairman. Many time faults arise due to production works and different reasons. It is hard to dig out cable lines complete because its unknown specific place of the cable line fault. The information conveyed to the consumer is the space to which that voltage corresponds to the fault occurring at a particular distance and the respective phase is displayed and additionally it transfers this information over internet to Android APP to show on-

line. This paper makes use of Android App to increase the web device that links with the machine to show the cable faults online at the Android App. The undertaking is assembled with a hard and fast of representing cable duration in KM's and fault introduction is made with the aid of set of junctions at each recognized KM to move check the accuracy of the identical. The android app can store all the activities within its database, these statistics allows in the future evaluation and it can be shared via excel files the use of mailing options.

A. Working Principle

The fault detection sensors and current sensor analyzes the wires in every junction. When there is a problem is detected in the particular junction the sensor sends the signals to the microcontroller. The microcontroller analyses the signal and sends the command to the WIFI module and LCD display. The LCD displays where the problem is detected. The WIFI module sends the data to the cloud servers to transfer it to android app. The server creates the virtual memories on the android app and stores the received data on it. The virtual memories indicate the app user where the fault found. These virtual memories can be stored for the future analysis. The virtual memories data can be stored in the excel sheet format. These excel sheet contains the where the fault found and its time.

V. HARDWARE DESCRIPTION

A. Atmega328P

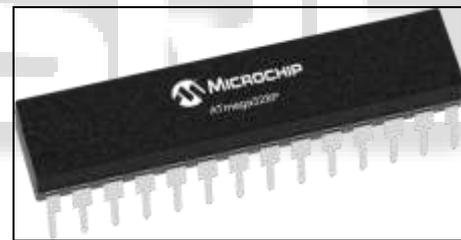


Fig. 3:Atmega328P

Atmega328p is a low power, CMOS 8-bit microcontrollers based on the AVR® enhanced RISC architecture. By executing instructions in a single clock cycle, the devices achieve CPU throughput approaching one million instructions per second (MIPS) per megahertz, allowing the system designed to optimize power consumption versus processing speed.

B. IOT WI-FI ESP8266 Module

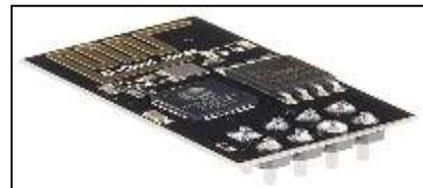


Fig. 4: IOT WI-FI ESP8266

The ESP8266 Wi-Fi Module is an integrated TCP/IP protocol stack that can give any microcontroller access to our Wi-Fi network and thus acts as host. The ESP8266 is capable of hosting an application data and updating over server address in particular interval. Each ESP8266 module is pre-programmed with an AT command set firmware, you

can simply connect microcontroller and get about as much Wi-Fi ability as a Wi-Fi Shield offers. The ESP8266 module is a highly cost effective board with a huge, and ever growing, community.

C. LCD 16x2 Display Module



Fig 5: LCD 16*2 Display Module

Liquid Crystal Display (LCD) is broadly utilized in diverse electronics' packages. It is typically utilized in diverse systems to reveal unique fame and parameters. LCD16x2 has 2 traces with 16 characters in each line. Each man or woman is made from 5x8 (column x row) pixel matrix.

D. AD/DC Adapter



Fig 6: AD/DC Adapter

An AC/DC adapter or AC/DC converter is a sort of external energy deliver, frequently enclosed in a case much like an AC plug. Other common names encompass plug p.C., plug-in adapter, adapter block, domestic mains adapter, line power adapter, wall wart, energy brick, and strength adapter. This module is 230 V AC – 12V, 2A DC Adapter Module.

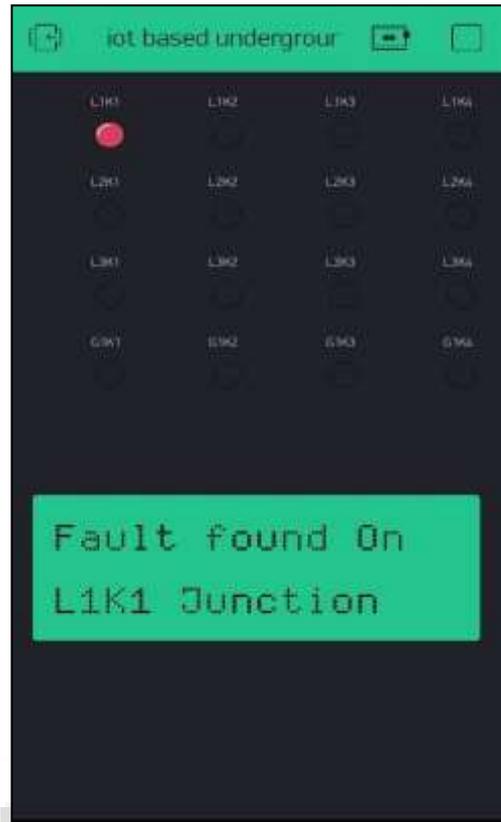
VI. SOFTWARE DESCRIPTION

A. Arduino IDE

The Arduino incorporated improvement environment (IDE) is a go- platform utility (for Windows, macOS, Linux) that is written within the programming language Java. It is used to jot down and add programs to Arduino compatible boards. The Arduino IDE helps the languages C and C++ the usage of special regulations of code structuring. The Arduino IDE elements a software library from the Wiring task, which presents many not unusual input and output strategies. User-written code handiest requires primary functions, for starting the caricature and the principle application loop, which might be compiled and related with a program stub predominant() into an executable cyclic govt program with the GNU toolchain, additionally blanketed with the IDE distribution. The Arduino IDE employs this system avrdude to convert the executable code right into a text file in hexadecimal encoding that is loaded into the Arduino board with the aid of a loader software within the board's firmware.

VII. RESULT AND DISCUSSION

A. Result



The pink LED on the android app shows the defective junction. The defective junction is displayed on the LCD display so as get smooth identification. While there may be no fault LED can be off.

We are the use of three segment identity so on android app we've got used brief terms for the junction names.

L1K1 suggest line1 kilometer 1 junction.

L2K2 suggest line2 kilometer 2 junction.

L3K3 suggest line three kilometer three junction.

G1K1 imply impartial line 1 kilometer 1 junction.

From the above discern we will see that fault is determined on L1K1 junction.

B. Discussion

The fault detection sensors and current sensor analyzes the wires in each junction. Whilst there is a hassle is detected in the precise junction the sensor sends the signals to the microcontroller. The microcontroller analyses the sign and sends the command to the WIFI module and LCD show. The LCD presentations wherein the hassle is detected. The WIFI module sends the statistics to the cloud servers to switch it to android app. The server creates the digital memories at the android app and shops the received statistics on it. The digital recollections suggest the app user in which the fault observed. These virtual memories may be stored for the future analysis. The virtual memories facts can be saved in the excel sheet layout. These excel sheet includes the in which the fault observed and its time.

VIII. CONCLUSION

It's a tough mission to identify the Short Circuit faults in underground cables in the ideal section. By the usage of Ohms regulation we can discover actual fault vicinity specifically section of cord. Once faults arise within the cable, with the assist of microcontroller and the show unit displays the exact fault area that takes place irrelevant segment of the cable to a committed website with the assist of IOT. Buzzer gadget is used to create an alerting sign that is helpful to humans if there is any failure in updating of information to dedicated website. Buzzer device create an alerting sound signal, once if the fault occur within the underground cable which help us to solve the problem as in advance as viable.

IX. FUTURE SCOPE

The proposed system on this paper discover handiest the area of Short Circuit fault in underground cable line, and additionally stumble on the place of open circuit fault, to detect the open circuit fault capacitor is used in circuit which measure the exchange in resistance & calculate the gap of fault. For future studies, the gadget would continue with similar neural networks structure for different types fault phase and fault vicinity estimation.

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