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IOT BASED UNDERGROUND CABLE FAULT DETECTION

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ABSTRACT :

Underground cables have been extensively used in the development of power grid systems. Underground cables are susceptibleto a wide range of faults as a result of underground conditions, wear and tear, and rodents. Detecting the source of the fault is difficult because the entire line must be dug to check the fault at the cable line. The repairmen know exactly which part is faulty,and only that area needs to be dug up to findthe source of the problem. As a result, it savestime and money while also allowing for fasterservice of underground cable lines. The goalof this project is to determine the distance between the underground cable fault and thebase station.

INTRODUCTION:

Because of reliability and environmental concerns, underground cables have been widely used. To improve distribution system reliability, accurate identification of a faultedsegment is required in order to reduce interruption time during fault, i.e., to restore services by determining a faulted segment ina timely manner. An exhaustive search inlarger-scale distance has been conducted in the traditional method of detecting a fault. This is inefficient and time-consuming. Not only is manpower not used, but the restoration time may vary depending on the reliability of the outage information. As a In a electrical utilities, some of the transmission lines plays the major role ofevery power systems. With regard to this, cost of power delivery, and accurate fault location for the transmission of electric linesis of vital importance in restoring the power services and reducing outage time as much as possible. By an accurate source detecting andfinding the exact faults on high voltage transmission network is very important for all result, developing an efficient method for locating a fault can improve system reliability. Because of safety concerns and improved reliability, the use of underground power cable is growing till last decade's cables were made to lay overhead & currentlyit is lay to underground cable which is superior to earlier method. Because the underground cable are not affected by any adverse weather condition such as storm, snow, heavy rainfall as well as pollution. Butwhen any fault occur in cable, then it is difficult to locate fault. So we will move to find the exact location of fault. Now the world is become digitalized so the project is intended to detect the Location of fault in digital way. The underground cable system ismore common practice followed in manyurban areas. While fault occurs for some reason, at that time the repairing process related to that particular cable is difficult dueto not knowing the exact location of cable fault.

the utilities to allow a quick maintenanceaction for the concern authority of a repairingperson or crew. Detecting the cable fault in the underground can be

categorized as a Open conductor faults, shorted faults, andhigh impedance faults. Which it may occur inthe transmission lines. This we can able to dousing the arduino microcontroller to monitorthe cable in the underground with the use of loaded program in the microcontroller. A short circuit to the earth fault can be mostly located using a method called frame method.The fault occurring in the underground may be due to the short circuit to anotherconductor in the cable, short circuit to the earth, high resistant to earth, open circuit andsome of the machine digger can also able to fault the underground cable in the transmission lines.

PROPOSED SYSTEM:

Underground cables are prone to a wide variety of faults due to underground conditions, wear and tear, rodents etc. Also detecting fault source is difficult and entire line is to be dug in order to check entire line and fix faults. So here we propose cable fault detection over IOT that detects the exact faultposition over IOT that makes repairing workvery easy. The repairmen know exactly which part has fault and only that area is to be dug to detect the fault source. This saves alot of time, money and efforts and also allows to service underground cables faster. We use IOT technology that updates the monitored fault information to internet. The system detects fault with the help of potential dividernetwork laid across the cable. Here we are using current sensor to detect faults when overcurrent fault detected the load will be disconnected .And a message will be sent to the authorized person with location where fault occurred.

BLOCK DIAGRAM:

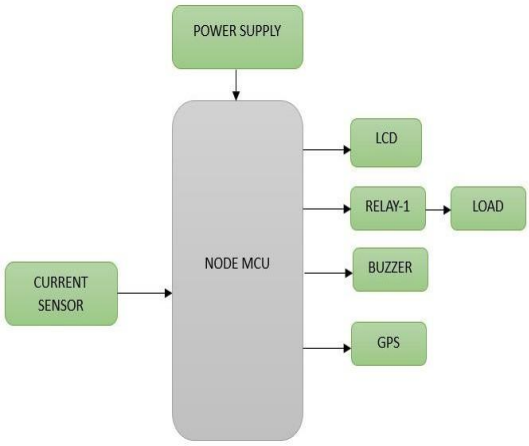

Fig1 :Block diagram of proposed method.

HARDWARE DESCRIPTION:

NODE MCU:

NodeMCU is an open-source Lua-based firmware and development board designed specifically for IoT applications. It includes firmware based on Espressif Systems' ESP8266 Wi-Fi SoC and hardware based on the ESP-12 module.The NodeMCU Development Board can be easily programmed with Arduino IDE since it is easy to use Programming NodeMCU with the Arduino IDE will hardly take 5-10 minutes. All you need is the Arduino IDE, a USB cableand the NodeMCU board itself.

NodeMCU ESP8266 Specifications & Features

- Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106
- Operating Voltage: 3.3V
- Input Voltage: 7-12V
- Digital I/O Pins (DIO): 16
- Analog Input Pins (ADC): 1
- UARTs: 1

- SPIs: 1
- I2Cs: 1
- Flash Memory: 4 MB

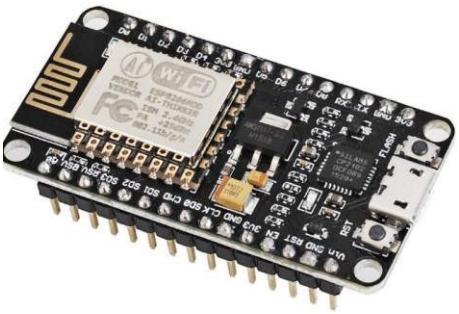

Fig 2: NodeMCU.

CURRENT SENSOR:

The ACS712 is a fully integrated, hall effect-based linear current sensor with 2.1kVRMS voltage isolation and a integrated low-resistance current conductor.Technical terms aside, it's simply put forth as a current sensor that uses its conductor to calculate and measure the amount of currentapplied.

The features of ACS712 include:

- 80kHz bandwidth
- 66 to 185 mV/A output sensitivity
- Low-noise analog signal path
- Device bandwidth is set via the newFILTER pin
- 1.2 mΩ internal conductor resistance

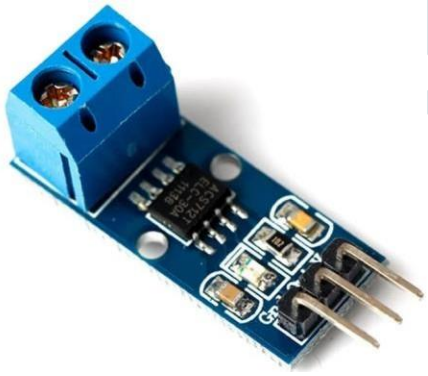

Fig 3:Current sensor.

NEO-6 GPS module :

The NEO-6 module series is a family ofstand-alone GPS receivers featuring the high performance u-blox 6 positioning engine. These flexible and cost effective receivers offer numerous connectivity options in a miniature 16 x 12.2 x 2.4 mm package. Their compact architecture and power and memoryoptions make NEO-6 modules ideal for battery operated mobile devices with very strict cost and space constraints. The 50- channel u-blox 6 positioning engine boasts a Time-To-First-Fix (TTFF) of under 1 second.The dedicated acquisition engine, with 2 million correlators, is capable of massive parallel time/frequency space searches,enabling it to find satellites instantly. Innovative design and technology suppresses jamming sources and mitigates multipath effects, giving NEO-6 GPS receivers excellent navigation performance even in themost challenging environments

Fig 4:NEO-6 GPS Module

RESULTS:

CONCLUSION:

The purpose of this project is to identify the fault in the underground cable and to pinpointthe exact location of the fault from the powerstation. We can calculate the distance using

the microcontroller. This project proposes an underground cable fault location. The purpose of this paper is to pinpoint the exactlocation of a cable fault. When a fault occurs,such as a short circuit, voltage drop, or a change in current, this kit is used to locate thefault and send a message via the GSM module, as well as the exact location via GPS, which is also displayed on the LCD display.

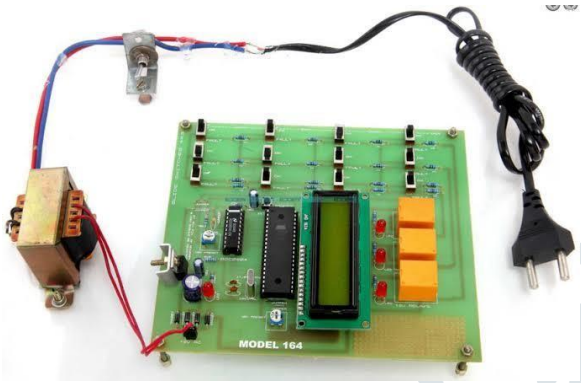

Fig 5:Under ground cable fault detection system

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