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Underground Cable Fault Finding

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Abstract

Underground cables have been widely used with the development of power system grid. Underground cables are prone to a wide variety of faults due to underground conditions. Detecting the fault source is difficult.in this project is capable to finding exact location of fault. With the help of Bluetooth Connectivity and notification on Respective mobile with the help Of GSM.

Keywords – Underground, fault, detect, Location

INTRODUCTION

Up to last decade the cables where made to lay overhead but because of urbanization, weather condition like ice, wind. The concept of underground cable is started, which is superior to the earlier method. Underground cables are not affected by adverse weather conditions but it has some challenges such as, difficulties in laying the cables & once it laid, if fault occurs it is hard to find & clear it. present trend of laying cables for various purposes is to lay underground. Companies prefer laying the cables underground because the climatic adversities don't affect this. With advantages come challenges. There are many difficulties in laying the cables and once laid in case of any complaints, It is difficult and costly to fix it. This paper is about that is designed by us which is capable of finding where the complaint lies, so the engineer can directly get the hole dug at that point and fix the issue. The basic principle of Electromagnetic Theory is employed to detect the discontinuity in the cable. Using a signal injector, a low frequency signal is passed through the wire and the induced magnetic field is used to detect the fault. Fault location in underground lines without any effort this method used to locate the type of circuit occurs; the voltage drop varies with the default length on the cable, as the current varies. A plurality of resistors is used to represent the cable and a DC voltage is supplied at one end and the defect detected by detecting the voltage variation the defect area to accelerate the tracking of the buried cable. device has been designed using the ohm's law principle. This Technology is used to find out the exact location of the fault and to send data in graphical format to our website using a GSM Module at the same time it display on the LCD screen.

LITERATURE SURVEY

Presented Design & Implementation Of Fault Identification In Underground Cables Using IOT .This project is to determine the distance of underground cable fault from the base station in kilometres and displayed over the internet. Underground cable system is a common followed in major areas in Metro cities. While a fault occurs for some reason, at that time the fixing process related to that particular cable is difficult due to exact unknown location of the fault in the cable. This Technology is used to find out the exact location of the fault and to send data in graphical format to our website using a GSM module at the same time it display on the LCD screen.

The project uses the standard theory of Ohms law, i.e., when a low DC voltage is applied at the feeder end through a series resistor (Cable lines),then the current would vary depending upon the location of the fault in the cable as the resistance is proportional to the distance. In case there is a short circuit (Line to Ground), the voltage across series resistors changes according to the resistance that changes with distance .This is then fed to an ADC to develop precise digital data which the programmed microcontroller of the 8051 family displays in kilometre. Presented Analysis of Underground Cable Fault Distance Locator

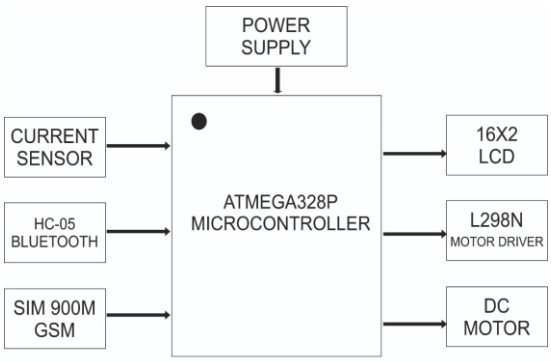
.Underground cables are prone to a wide variety of faults due to underground conditions, wear and tear, rodents etc. Also detecting fault source is difficult and entire line is to be dug in order to check entire line and fix faults. So here we propose cable fault detection over IOT that detects the exact fault position over IOT that makes repairing work very easy. The repairmen know exactly which part has fault and only that area is to be dug to detect the fault source. This saves a lot 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 divider network laid across the cable. Whenever a fault gets created at a point shorting two lines together, a specific voltage gets generated as per the resistors network combination. This voltage is sensed by the microcontroller and is updated to the user. The information conveyed to the user is the information regarding Based Underground Transmission Cable Fault Location System. The transmission line fault location requires intense human effort and resources. Typically this process is time consuming and while digging the cable there is a risk of damaging the insulation. This paper provides a simple and safe alternative by automating the process of fault detection

and location. The project uses the simple concept of OHMs law where a low DC voltage is applied at the feeder end through a series resistor.

The current would vary depending upon the length of fault of the cable in case there is a short circuit of LL or 3L or LG etc. The series resistor voltage droop changes accordingly which detects the exact location of the fault for process of repairing that particular cable. The proposed system finds the exact location of the fault. This system uses an Arduino micro controller kit and a rectified power supply. Here the current sensing circuits made with a combination of resistors are interfaced to Arduino micro controller kit to help of the internal ADC device for providing digital data to the microcontroller representing the cable length in kilometres.

The fault creation is made by the set of switches. The relays are controlled by the relay driver. A 16×2 LCD display connected to the microcontroller to display the information. In case of short circuit, the voltage across series resistors changes accordingly, which is then fed to an ADC to develop precise digital data to a programmed Arduino micro controller kit that further displays exact fault location from base station in kilometres. The project in future can be implemented by using capacitor in an AC circuit to measure the impedance which can even locate the open circuited cable.

BLOCK DIGRAM



Block Diagram

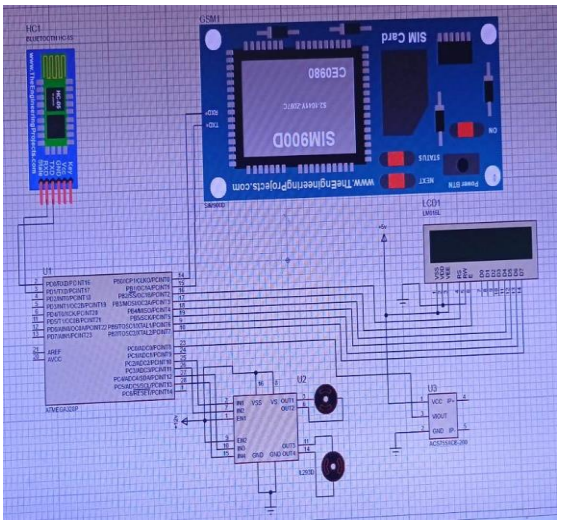
In this project, the main aim is to detect the underground cable fault. Here we have used automatic guided robotic vehicle to detect the fault of the underground cable. Here Current sensors are used to detect the cable fault underground. Here we are using automatic guided vehicle in our system to detect a underground cable fault. We are using ATMEGA328P MICROCONTROLLER to detect the cable fault and to detect and intimate the fault to the authority.

Here to control the motors of the robot we use L298N MOTOR DRIVERA single motor driver IC can drive two dc motors at a time. The dc motors used are having 100 rpm speed.

Here when the fault is get detected then microcontroller firstly send notification on LCD Display & Send the msg on mobile with the help GSM. Robot stops for some time at the fault location and then go further.

We have light panel under the cables. We have attached LDR (light dependent resistor) at down side of the robotic vehicle. If there is any cable crack which gives light to upside of cables and LDR detects the fault of the cable as light is get detected by LDR.

CIRCUIT DIAGRAM



Cellphone controlled robotic vehicle circuit consists of Bluetooth sensor, driver IC L293D and motors. This data at the output is directly given to the driver IC to drive the two motors. These motors rotate according to the decoded output. If the button pressed from mobile is ‘Forward’, it gives a decoded output of ‘0001’.Thus motor connected to the first will have 5 volts to one pin and 0 volts to the another pin and second motor will have 0 volts to one pin and 5 volts to the another pin. Thus second motor starts rotating and first motor is off. So, robot moves in one direction either to left or right. If the robot is to rotate forward or backward then the binary value should be either ‘0101’ or ‘1010’.These values indicate that two motors rotates in the same direction i.e. either forward or backward. The following table gives the low frequency, high frequency and binary output value of each button pressed in the mobile phone.

layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an auto-router and basic mixed mode SPICE simulation capabilities.

Schematic Capture

Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations.

Microcontroller Simulation

The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control, temperature control and user interface design.[6] It also finds use in the general hobbyist community and, since no hardware is required, is convenient to use as a training or teaching tool.

Software Description

Arduino IDE

Arduino is physical computing platform based on a simple I/O board and a development environment that implements the processing /wiring language. Arduino can be used to develop stand-alone interactive objects or can be connected to software running on a computer. Currently shipping version can be purchased pre-assembled. Hardware design information is available for those who would like to assemble the Arduino by hand.

platform application(for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The source code for the IDE is released under the GNU General Public License, version The languages C and C++ using special rules of code structuring.[4] The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, program with the GNU toolchain, also included with the IDE distribution.[5] The Arduino IDE employs the program *avrdude* to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

Algorithm of System

1. START.
2. Power is given to the circuit.
3. Blue tooth connectivity
4. Blue tooth gives signal to motor driver and Robot moves in respective direction.
5. Live Wire Scanner will detect the discontinuity in the cable.
6. If there is no discontinuity, then Robot will move in the respective direction.
7. Message will be sent through SMS on respective mobile phone by GSM.

ADVANTAGES

1. This system is easy to design.
2. Power requirement is less.
3. Also the project is feasible because the cost of the project is very less.
4. Highly reliable system.

DISADVANTAGES

1. Cell phone bill.
2. Mobile batteries drain out early so charging problem occurs.
3. Cost of project increases if cell phone cost is included.

APPLICATION

1. This project is useful in industries where the net of cables is used through underground.
2. This project can be applicable for any underground cable lines.
3. Reduce manual Labor.

FUTURE SCOPE

In this project, we can detect the location of cable fault in underground cable line through robotic vehicle. In extension we can also use some sensors to detect the atmospheric condition of the fault location.

CONCLUSION

In this project we detect the fault of the underground cable from feeder end with the help of buzzer by using microcontroller PIC16f690. Here use of the light and light sensor makes the project highly efficient.

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