

DESIGN AND DEVELOPMENT OF UNDERGROUND CABLE FAULT DETECTION FOR FUTURE SMART CITY

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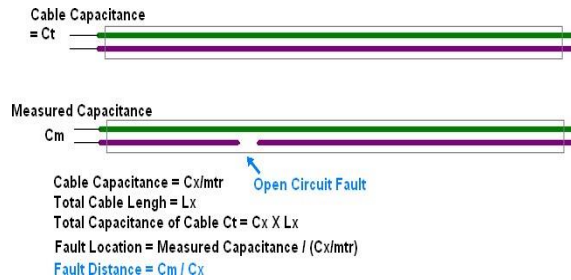
Abstract—To prevent unnecessary impediment, cables are buried. These force cables transmit electrical power, and because they are buried, it is very difficult to pinpoint exactly where a shortfall occurred. There are several factors or reasons that might cause a deficit, such as burrowing, tremor, development work, and so forth. The mending process for the cable is difficult since it doesn't know where the precise problem with the cable occurred. A very fundamental method used in metropolitan areas is underground cable framework. The defect in an underground cable line that extends kilometres from the base station to a specific location is anticipated to be discovered in this article. With the aid of a prospective divider arrange placed over the cable, the framework detects flaws. When a cable line fault is discovered, a voltage is generated in accordance with the resistors' organised mixture. The microcontroller notices this voltage and updates the client.

Keywords : ESP2866 Micro controller , Node MCU, Relay , Wireless Heat Sensing Sensor , Arduino IDE , IOT.

I INTRODUCTION

The development of the intensity framework matrix makes use of underground wires. These subterranean cables are not impacted by any weather elements, such as rain, holiday, or other issues. An issue with an underground cable might arise simply as a result of earth vibrations or other digging operations. It is quite difficult to address the issue because it occurred in an ambiguous location. Optical fibre structure is used to overcome this obstacle. Alongside the force cables, several optical strands are installed. The optical fibre structure continuously measures various parameters at a number of checkpoints located at regular intervals along the force cable (for example, power, current, and cable temperature). When a problem arises, estimates of the surrounding regions' parameters alter in an unexpected way. Information is gathered from the checkpoints' ambient variables where the insufficiency occurred. This method allows for the precise separation of the cable deficiency to be discovered. Once the problem region has been identified, we begin to send high voltage over the damaged line to pinpoint its precise location. There are numerous benefits in this underground of electric cables over the lines as it will never give danger to wildlife or low flying aircrafts, not easy to steal.

Open Circuit Fault



Earth Fault

An earth fault occurs when an electrified conductor makes an unintentional contact with the ground or the equipment frame. The fault current's return path is through the grounding system and any persons or equipment that forms a part of that system.

II LITERATURE SURVEY

Yang and Xia recently suggested a broad deficiency area model for subterranean force cable in conveyance framework using voltage and current estimates at the sending-end in a study published in November 2008. The study of a proportional circuit that employs a circulating parameter technique to simulate an underground cable framework is presented in the paper. Additionally introduced is the investigation of succession organisations in a three-stage arrangement using limit conditions. With the aid of current and voltage circumstances, the examination is used to address the problem area [1].

Westrom, who published his findings in February 1997, explains how a precise count of the cable deficiency's area may be obtained by injecting a series of pulse beat streams into the accused cable shortly after the event that caused the problem. This method uses a heartbeat generating machine.

It has been dubbed the 'shortcoming separation locator' [2].

In August 2000, Zhao, W provided a better strategy to deal with cable defect area framework, essentially consisting of synchronised testing method, wavelet inquiry, and travelling wave standard.

This study gives a definite wavelet evaluation of broken transient waveforms and, as a result, chooses the ideal wavelet levels for this particular application[3], in addition to the prologue to three major strategies and a design of the new plan. A wavelet-based problem area conspire for mature cable frameworks was introduced by Gilany et al.

in January 2007 when synchronised .advanced deficiency recorded information is available at the two endpoints of the cable. In multiend-matured cable frameworks, the wavelet peculiarity identification hypothesis is used as an astonishing sign handling tool to assess the area of the problem[4].

The cost of a line blackout must be considered when determining how quickly to resolve the problem. Schulze, Member, IEEE et. al. Peter Schegner, "Two Terminal Fault

Location on Unsymmetrical Transmission Lines", IEEE, 2010, developed this concept. Shortcoming locators that rely on a few different methodologies are a component of computerised security transfers [5].

IOT-based underground cable line shortfall identification framework was introduced in "Underground Power Cable Detection and Inspection Technology Based on Magnetic Field Sensing at Ground Surface Level" by Xu Sun, Wing Kin Lee, Yunhe Hou, et al. and Philip W. T. Pong in 2014. Since the development of intensity framework lattice, underground cables have been widely used [6].

Before attempting to find underground cable faults on directly shrouded important cable, it is essential to understand where the cable is set up and what path it follows, according to Manish Paul et. al., Raj Kamal Kakoti on "Underground Cable Fault Locator." Knowing the precise path is much easier to understand whether the problem occurs on the auxiliary cable. It is advisable to master cable finding and following before beginning the shortfall discovery procedure [7] since it is very difficult to locate a cable deficit without knowing where the cable is.

The issues in locating the vague shortfall region have been a key problem, according to Ms. Pradnya's research on IoT- based innovation visit deficit in subterranean cables due to the cessation of paper plastic protection due to compound reaction or poor workmanship during setup. The majority of underground faults are located by completely exposing the cable in order to conduct a visual aid inspection. In the unlikely event that visual inspection is not helpful, the entire cable size is changed. This manual approach not only costs a lot of money, but it also causes the force distribution company to lose a lot of money [8].

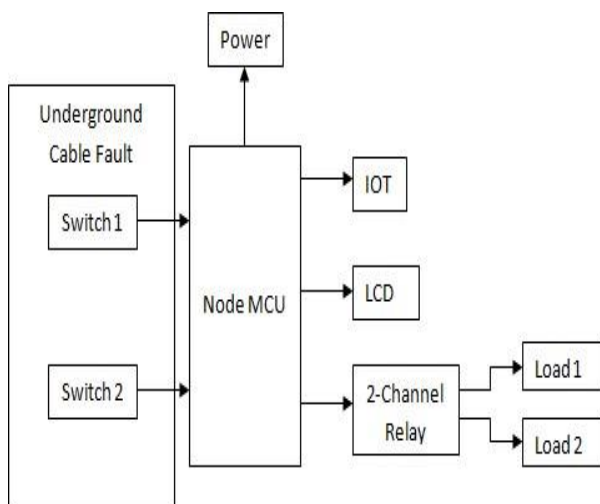
areas over the web. The suggested architecture provides a realistic and straightforward solution for natural and environment checking applications [9].

III PROPOSED SYSYTEM

several systems for cable line shortfall detection have been refined during the last few of decades. Overhead cable lines are the most well-known approach in use. The shortcomings of this approach are easily identified; nevertheless, the difficulty with this strategy is that it cannot be used in some densely populated metropolitan regions. As a result, we use buried wires. IoT innovation has been realised in this research, which will evaluate the flaws on the web that may be detected by a human.

Depending on the resistor organise mix, a certain amount of power is generated when a problem is formed at a junction shorting two lines together. We suggest an IoT- based framework in this study since the current one is ineffective. The project's objective is to use an IoT Gecko platform to determine the underground cable's distance from the base station in kilometres. Although it is used in many metropolitan areas, the underground cableline system is not particularly widely recognised in rural areas. Due to their many limitations, and do not frequently use various fault detection procedures such sectionalizing techniques, acoustic localization strategies, or Murray circle approaches. Most often, blame is attributed to construction projects and other factors. Since we have no clue whatsoever about the precise location of the cable line deficit, it is difficult to completely expose cable lines.

IV BLOCK DIAGRAM



V SOFTWARE AND HARDWARE REQUIREMENTS

Arduino **Integrated** **Development**
Environment(IDE) Any programming language with compilers that generate binary machine code for the target processor may be used to create a programme for Arduino hardware. For their 32- bit ARM Cortex-M and 8-bit AVR based microcontrollers. The Arduino IDE uses specific code structuring rules to support the languages C and C++. A software library from the Wiring project, which offers numerous standard input and output procedures is provided by the Arduino IDE.



Fig.1 Arduino IDE interface

which are combined with a programme stub main() to create an executable cyclic executive programme using the GNU toolchain, which is also distributed with the IDE. The executable code is transformed by the Arduino IDE's use of avrdude into a text file with hexadecimal encoding, which is then loaded into the Arduino board by a loader programme in the firmware.

Node MCU



Fig.2 Node MCU

operating system and SDK. This makes it a fantastic option for alltypes of Internet of Things (IoT) projects.

Power Supply Unit

A power source is a crucial component of an electronic circuit. This circuit needs a constant +5 V supply, so a voltage regulator is needed to maintain this voltage. We utilised an IC7805 voltage regulator in this project. Regardless of changes to its input voltage or load circumstances, a voltage regulator produces a fixed output voltage of a predetermined magnitude that remains constant. Voltage regulators come in two flavours: switching and linear. Here, we use a linear regulator that makes use of an active pass device (shunt or series) that is managed by a powerful differential amplifier. It makes adjustments to the pass device to keep the output voltage constant by comparing the output voltage to a passive reference voltage with a precise reference value.

LCD

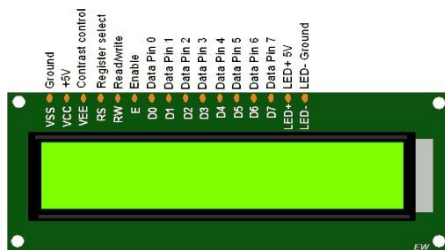


Fig.3 LCD

Two glass boards with a fluid gem substance in the middle make up the LCD display. Anodes are affixed to the inside surface of the glass panels. The fault areas that occurred in the subterranean cable system are shown on this LCD display. An LCD display allows the user to quickly detect the fault and quickly remedy it.

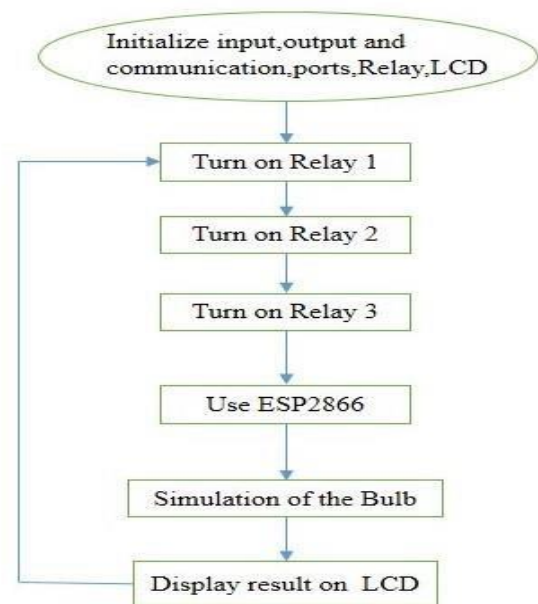
Relay

An electrically controlled switch is a relay. Solid-state relays are one type of working principle, although many relays employ an electromagnet to mechanically activate a switch. Relays are employed when several circuits need to be controlled by a single signal or when a separate low-power signal is required to control each circuit separately. The early relays served as amplifiers in long-distance telegraph lines by retransmitting the signal received on one circuit on a different circuit. To carry out logical processes Relays are widely utilised in early computers and telephone exchanges.



Fig.4 Relay

VI ALGORITHM



Flow Chart

The steps of algorithm are as under:

- Initialize all the input,output and other components.
- After having a check on relay need to assemble the components.
- Manually give the fault on the cable with the help of micro processor.
- Turn on the Relay 2 as same as Relay 1 and will give a 230v to the cable.
- Turn on the Relay 3 after that need to do the simulation of the Bulb.

- i. Using ESP2866 which is a type of micro controller Need to detect the fault occur on the cable.
- ii. Liquid Crystal Display is connected with Node MCU and it will connected to the ground.
- iii. 230v will be given to the connected cable.
- iv. Finally the result will be displayed on the Liquid Crystal Display.

VII CONCLUSION

Any defects in an underground cable system are found using the paper IOT-based underground fault detector. In this paper, two techniques are implemented and executed for the detection of faults which will be occur on underground cable. It can be used for all types of cable and it is a low cost to budget. The location of the issue may be easily determined by this technology, which can also transmit the user the coordinates and display them on the LCD display screen. Thus, the approach employed in this research functions consistently and helps identify the locations of subterranean cable inadequacies. A simple concept circuit is used for the fault to be easily detected and repaired. It detects the exact fault i.e. short circuit and open circuit fault from the feeder end in kilometre by using the microcontroller. So coming to conclude this will assess the people to identify the occurring faults on the underground cable.

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