A IOT Based Technology for Effective Underground Distribution Lines Monitoring System

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Abstract. This paper proposed to determine the precise location of such a defect in underground cables from the access point within numbers of Km's using an Arduino with microcontroller module. For such reason, even when a network malfunctions, it's indeed tough location of the defective connection for making it challenging to fix the attached broken connection. This article would aid with in performance is dependent & recognition locate the underground transmission breakage because of the difficulty to loc the cable fault. This setup uses a rectifying electricity supply as well as an Arduino microcontroller module. In this, bi - directional dc current sensor devices are connected to the module using the integrated Analog - to - digital gadget to provide quantitative microcontroller which it indicates the length as km. The fault is being caused by the switching set and A relay is controlled by a relay driver module. A monitor that is associated with the microcontroller shows the results. In the instance of such a fault conditions and a Micro controller module collects the changing voltage throughout the series resistors, which is later transferred to an Analog - to - digital to deliver exact digital information and thus further displays the computationally expensive position in km from ground station.

Keywords. Arduino microcontroller, Fault detection, Overhead wires, Underground faults, Switch, Resistors, LCD Display, Relays.

1 Introduction

Radiofrequency Trans detectors have really been suggested in [1] again for identification of coiled wire issues. The Radio receiver component is positioned in a reachable location, and transmitters unit being attached at frequent intervals and along length of the line. This voltage variation circuits keeps track of the cable's operating voltage & automatically shuts down power when there is significant voltage instability.

In this [2], this sensor periodically logs the measured value as well as the condition of both the lids and also the gathered data are actually transferred towards another ATMega 328p Chip. The LORA technology, which permits extended transmis-

sion, may be used to transport all statistics to the holding locations, where it could then be stored in the clouds after post-processing.

Numerous defects affect both the procedure for detecting cabling problems to use the Impulse Reflections Methodology , which again is dependent around examination of such electrical impulse's cabling response. Using only a GSM and internet of things, the information is transmitted to a specific website as well as an integrated Display screen [3].

In [4] this approach is especially well suited to identify SLG small faults, because are almost always happening in underground pipes and therefore are based on the examination of the overlapping fault conditions and reverse sequencing current inside the time - frequency domain.

It is challenging to locate the root of the problem since the full section must be dug up to inspect the powerline adapter for problems. Just that this area needs to be probed to determine the cause of the fault because the maintenance workers are aware exactly whatever portion is defective. This is needed to calculate the underground distribution fault's location from the access point in kilometres [5].

The potential between the sequence resistance fluctuates in the occurrence of a fault current, and this potential is transmitted to the ADC to produce accurate digital information for such an Arduino uno microcontroller module that has been configured to indicate the accurate fault position as from access point in km [6–9].

The efficiency of the Tracing approach was taken into consideration when designing the concept of such a subsurface power fault range detector. For communications infrastructure, electricity supply systems, and automobiles, the localisation of cabling problems is crucial. Reflectometry techniques are frequently employed to identify and pinpoint cable defects [10,11].

In [12] includes two techniques to identify the specific position of electrical wire defects or insulating issues. The initial one is focused upon that Varley looping mechanism, and the other utilizes electromagnetic detection. An induction coil detects the electromagnet-ic region that is created when the current is passed through all the cables.

Defect switches usually positioned every recognized km in order to physically cause problems. Furthermore, the distances to the defect first from ground station may be calculated, and a Lcd screen is then employed to reveal the precise position of the defect [13].

In [14,15] a string of individual defects involving strong welding current are what define the cabling failure mechanism. They frequently go unnoticed until they ultimately cause a persistent defect. The purpose of this work is to create an small damage detection technique that is both reliable and useful.

In [16,17] the suggested system determines where the problem is exactly. Several switches are placed at each distance away to create faults. A website presents details regarding the incidence of a defect. In order to pinpoint the precise site of problems, faulty switching are produced every km. A collection of resistors that indicate the network's length are placed in this configuration. It provides a distance in km between the fault's actual position and the ground station.

The installation of a cables fault diagnosis detection technique enabled by IOT is beneficial for quickly identifying errors and their locations. Anti-establishment cabling are vulnerable to a variety of defects because of the environment beneath, the wear and tear, and rats [18].

Among the Internet - of - things application areas that piques the curiosity of the private, social, and academic worlds is medicine [19-21]. Patient care, employee happiness, and operating excellence in the health industry are all increasing thanks to the advent of Cloud - based iot technology. A survey is being done to examine the most recent Iot solutions, elements, and price trends in heath while also attempting to re-

search the most recent advancements in Internet and cloud programming application scenarios.

2 Related Work

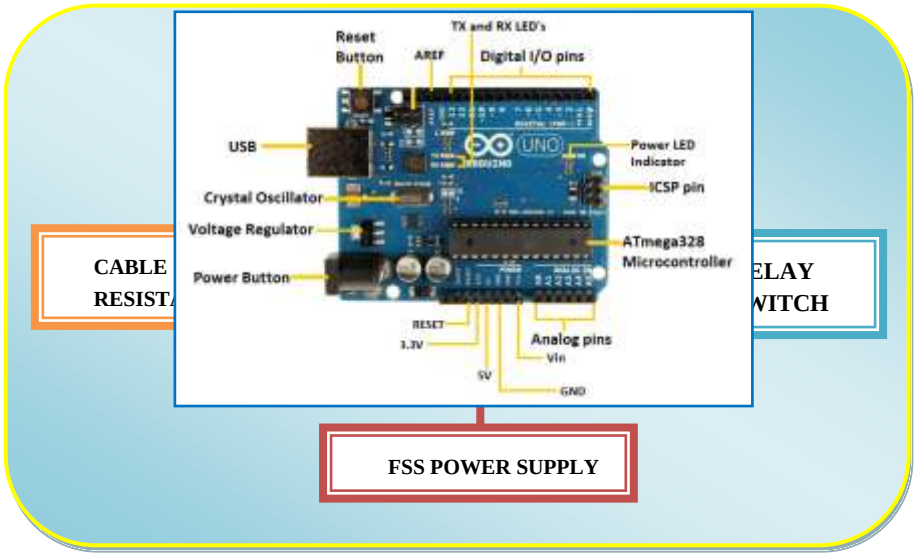


Fig. 1. Block diagram of the proposed system

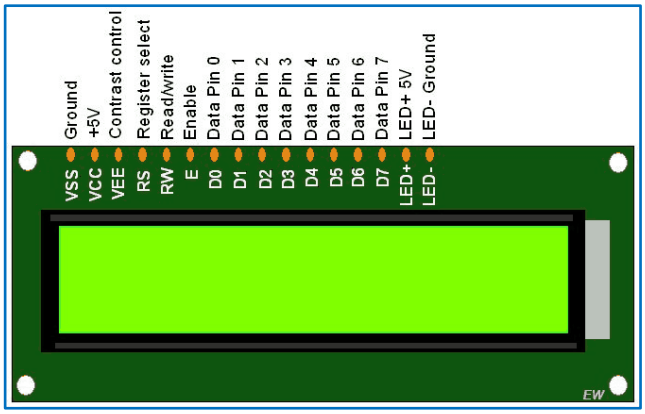
The module received the programme through uploading. Inside the instance of a cable problem, a programme was created thus that it could automatically open the relay port and therefore only detach the problematic wires. Each of the additional lines is running properly. Relays are merely electrical switches that act as breakers in the event of line faults. The ARDUNIO UNO method is provided. We are able to recognize the situation and shut off the troublesome line right away because the connection on the relay changes from just being ordinarily closed into generally open.

Basic Components Used:

A. ARDUINO UNO:

The most recent iteration of the transparent Arduino software is called Arduino UNO. It comprises software and a programmed electronic circuitry, sometimes known as a mcu. Computing code is created and uploaded using programs to the actual motherboard. All of it necessary to operate the mcu is contained in the Arduino.

Fig.2. Arduino UnoArchitecture



B. LCD Display:

Since the liquid crystal display (LCD) seems to be an alphanumeric screen, it may show letters, numerals, and unique characters. Rather than immediately emitting light, fluid crystalline make color images or monochromatic by using a backlighting or reflection. 16 × 2 alphabetic displays have been utilized in this instance. LCDs are frequently used during horizontal television sets, video units to be produced, computer screens, television advertisements, portable devices, handheld games so on.

Fig.3. LCD 16*2 Display Architecture

C. Channel Relay (5V):

Every channels on this 5V, 4-channel fix the problems board requires a 15-20mA driving current. It has the ability to operate a variety of high-current equipments . It has high-current relay which operate at either AC 240V or DC 30V.

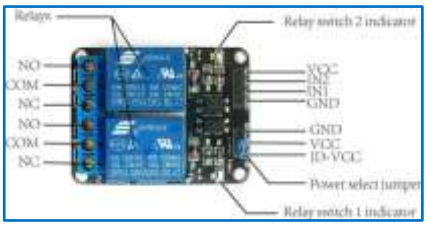
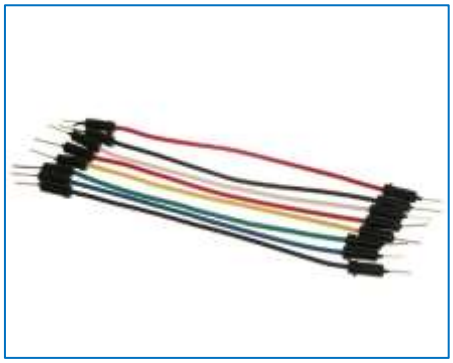


Fig.4. Channel Relay Architecture

D. Switch:

A switch is an electronic gadget composed of a several sets of moveable conducting material that are wired to other circuits. Whereas no current may flow across two contacts that are isolated, current is flowing between two contacts that are together. Multiple switching may be interconnected within one wire for the purpose of controlling lights, which is a typical application.

Fig.5. Switch



E.Resistor:

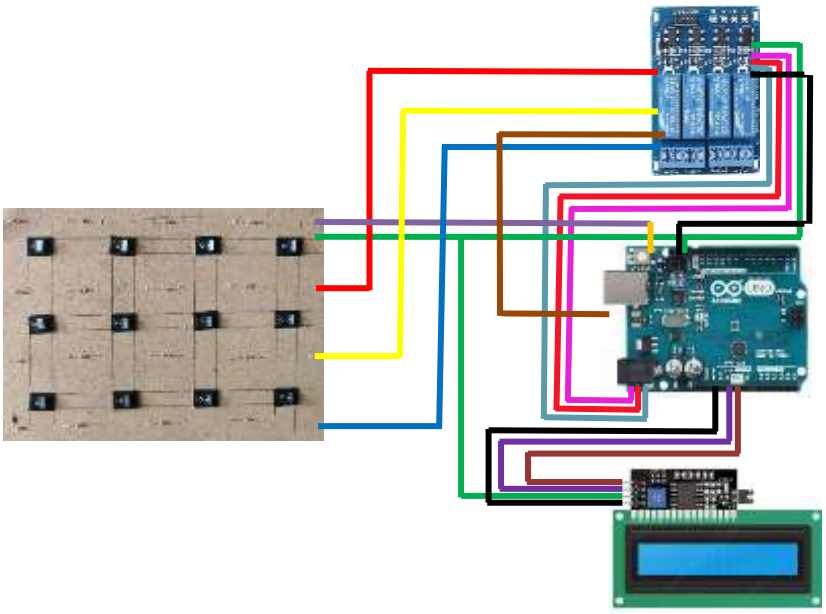
Permeability is implemented as a circuit by resistors, which are passively two-terminal electrical components. Reducing flow of current, modifying signal strength, and dividing voltages are also all accomplished in integrated devices by the employment of resistors. Motor controllers may employ high-power resistance that have a large thermal capacity to discharge watts of electricity.

Fig.6. Resistor

F. Connecting Wires:

A part of a circuits which proactively addressing is the conductive wire. It is constructed using a materials that conducts current, such as copper or tungsten. In a system, conductive wires are depicted in various color to indicate their purpose. Earthing wires should be green, neutral wires should be black, and live lines should typically be red.

Fig.7. Connecting wires



3 Proposed Methodology

FLOW CHART:

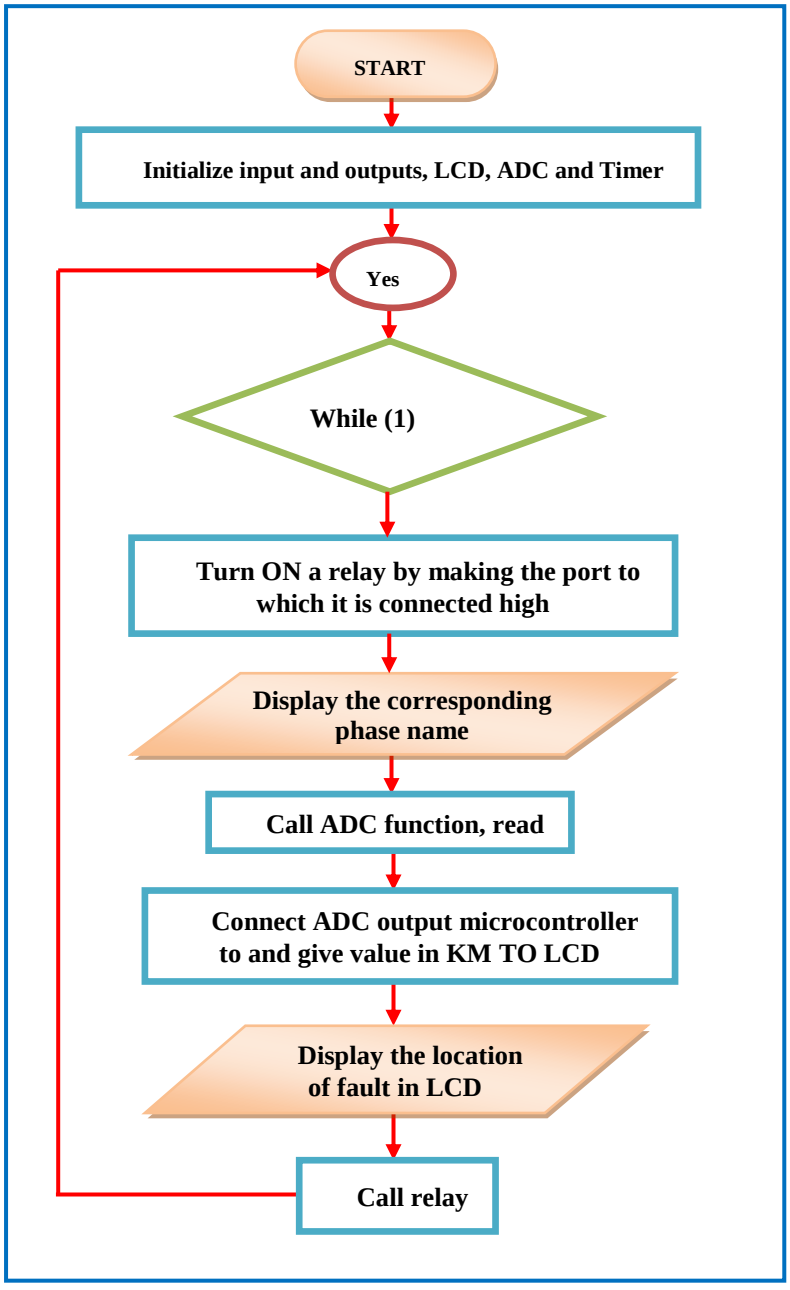


Fig.9. Flow chart for the proposed Arduino Algorithm.

Description:

The Arduino operation used to control the system is based on the following algorithm:

i. Declare ports, initialize timer, ADC and LCD functions.
ii. Start an infinite loop ,make pin 0.0 high, turning on relay 1.
iii. Display "R" (for red phase) on the first line of the LCD.
iv. Call ADC function. The fault position is displayed based on ADC output.
v. Call delay.
vi. Iterate steps (iii) to (v) for the remaining phases.

Table.1 Component Specifications

Components	Specifications
Arduino Board	Operating voltage – 5V Input voltage(limit)-6 to 20V Digital I/O pins - 14
LCD Display 16 *2	Operating Current – 1mA Operating voltage – 4.7 to 5.3V
Channel Relay	Normal Voltage – 5V DC Normal Current – 70mA Maximum load current-10A/250V AC, 10A/30V DC Maximum switch voltage – 250V AC, 30V DC Operate time: <= 10ms Release time: <= 5ms
Resistor	1 Kilo Ohm Power Rating– 0.25W

4 Experimental Setup & Results

Case-1: When no fault is detected

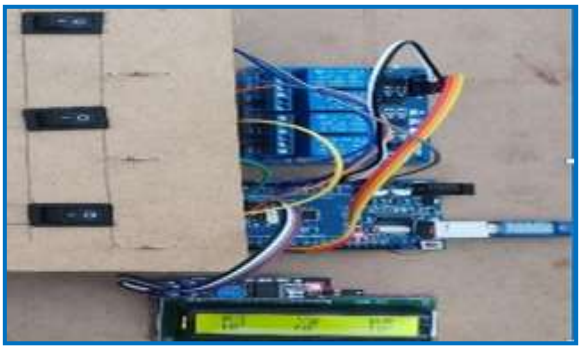


Fig.10.Represents no fault is in RYB phases

Case-2: When fault is detected in R-phase

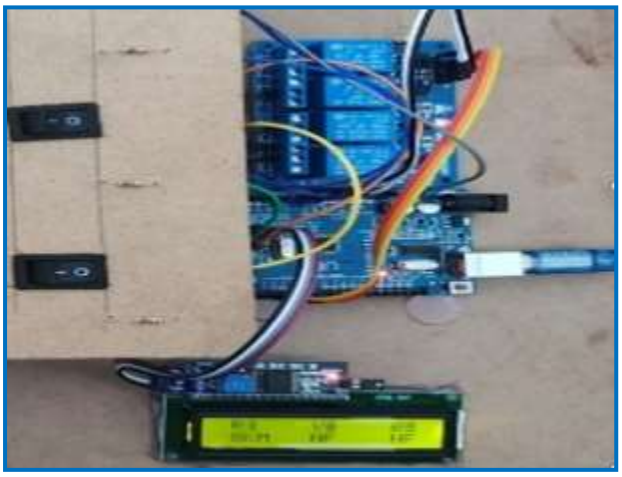


Fig.11.Represents fault is detected in R phase at 8km

Case-3: When fault is detected in R &Y-phases

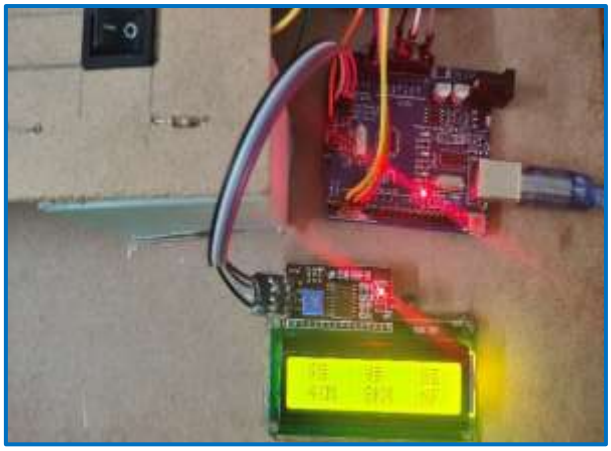


Fig.12.Represents fault is detected in R &Y phase at 4 km & 8km

Case-4: When fault is detected in R Y B - phases

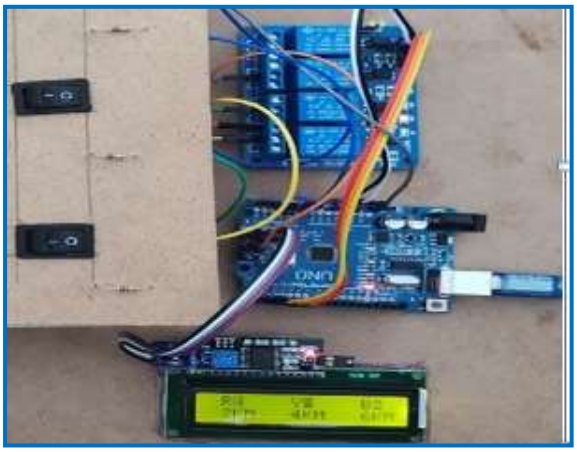


Fig.13. Represents fault is detected in R Y B phases at 2 km , 4km and 6 km

Case-5: When fault is detected in R B - phases

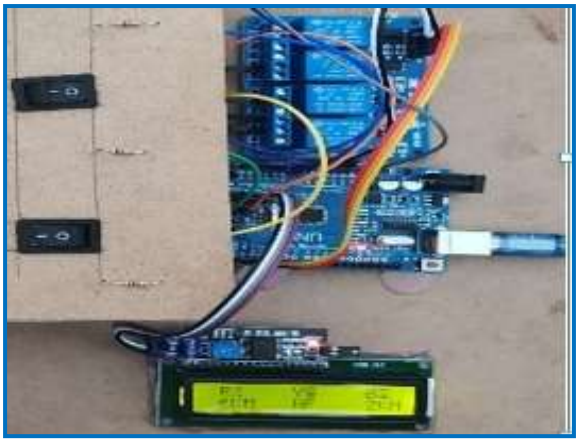


Fig.14. Represents fault is detected in R B phases at 6 km and 2 km

5 Conclusion and Future Scope:

This paper aims to determine the exact location of something like a cables problem in underground. when a subsurface communication network is in operation in remote regions, It's really challenging to locate the cable issue. Therefore, using this initiative can find the faulty site is advantageous. Therefore, it will be simple to find and fix the problem. Since such Arduino has much more benefits than the mcu, using it is more beneficial. The identification of subsurface faults using an Arduino is preferable to that using a microchip. Relay aids in divid-

ing the unhealthy line as from defective line. In this application, a Microcontroller board is used to detect that precise position of the network defect in subsurface cables starting from the feeders terminal in kilometres. Although the scope of this study is limited to locating a circuit failure in an underground power cable, it can be broadened to identify the open circuits failure too. A capacitor is employed by ac networks to detect open loop faults by tracking changes in load resistance and locating the reason for the fault.

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