

# Arduino based Underground Cable Fault Detection

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**Abstract** - The principal target of this undertaking is to distinguish the deficiencies and variations from the norm happening in underground links utilizing an Arduino. The fundamental thought behind the working of this undertaking is ohm's law. At the feeder end, when a DC voltage is applied, in view of the area of the issue in the link, the estimation of current likewise changes. In this way, if there should arise an occurrence of a short out deficiency like L-G or L-L shortcoming, the adjustment in voltage esteem estimated over the resistor is then taken care of to the in-manufactured ADC of the Arduino. This worth is handled by the Arduino and the shortcoming is determined as far as good ways from the base station. This worth is sent to the LCD interfaced to the Arduino board and it shows the specific area of the flaw from the base station in kilometers for all the three stages. This undertaking is orchestrated with a lot of resistors which speak to the length of the link. At each realized kilometer flaw

**Key Words:** LCD, L-G, L-L, ADC, ARDUINO

## 1. INTRODUCTION

Till a decade ago links were made to lay overhead & as of now, it is laid to an underground link which is better than prior technique. Since the underground link isn't influenced by any unfavorable climate condition, for example, storm, a day off, precipitation just as contamination. Be that as it may, when any shortcoming happens in the link, at that point, it is hard to find the deficiency. So, we will move to locate the specific area of the issue. Presently the world is become digitalized so the venture is proposed to identify the area of the shortcoming in an advanced manner. The underground link framework is an increasingly basic practice followed in numerous urban zones. While issue happens for reasons unknown, around then the fixing procedure identified with that specific link is troublesome because of not knowing the specific area of the link shortcoming.

## 2. TYPES OF CABLE FAULT

There are the types of Cable Faults Commonly Found in the underground Cables.

### A. Open-Circuit Fault

Open circuit fault is a kind of fault that occurs as a result of the conductor breaking or the conductor being pulled out of its joint. In such instances, current will not flow there at all, as the conductor is broken (conveyor of electric current).

### B. Short-circuit or cross fault

This kind of fault occurs when the insulation between two cables or between two multi-core cables gets damaged. In such instances, through the main core the current will not flow which is connected to load but will flow directly from one cable to another or from one core or multi-core cable to the other instead. The load will be short circuited.

### C. Ground or earth faults

This kind of faults occurs when the insulation of the cable is damaged. The current will flow through the faulty cable starts flowing from core of the cable to earth or the sheath of the cable. Current will not flow through the load.

## 3. FAULT LOCATION METHODS

Fault location methods can be classified as follows:

### 1) Online method

To determine the fault points this method utilizes & processes the sampled voltages & current. Online method for underground cable is less than overhead lines.

### 2) Offline method

This method uses special instrument to test out Service of cable in the field. The offline Methods are as follows,

#### a) Tracer method

In this method fault point in the cable lines is detected by walking on ground. The fault point is indicated from audible signal or electromagnetic signal. It is used to point out fault location very accurately.

Example:

#### 1) Tracing current method

#### 2) Sheath coil method

#### b) Terminal method

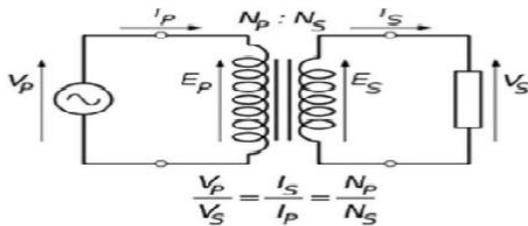
This technique is used to detect fault location of cable from one or both ends without tracing. The general area of fault is located by the use of this method, to expedite tracing on buried cable. Example:

- 1) Murray loop method
- 2) Impulse current method

#### 4. COMPONENTS

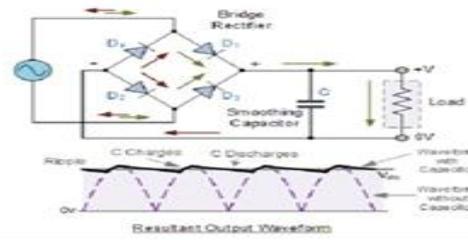
##### 4.1. TRANSFORMER

A transformer is a static machine utilized for changing force starting with one circuit then onto the next without evolving recurrence. Since there is no turning or moving part so the transformer is an astatic gadget. Transformer works on air conditioning flexibly. The transformer takes a shot at the rule of shared enlistment. Age of electrical force at a low voltage level is a lot of practice. Hypothetically, this low voltage level force can be transmitted to the less than desirable end. This low voltage power whenever transmitted outcomes in more noteworthy line current which in fact causes more line misfortunes yet in the event that the voltage level of influence is expanded, the current of the influence is decreased which causes a decrease in Ohmic or  $I^2R$  misfortunes in the framework, decrease in the cross-sectional zone of the conductor for example decrease in capital expenditures of the framework and it likewise improves the voltage guideline of the framework. As a result of these, low level



##### 4.2. RECTIFIER

A rectifier is an electrical gadget that changes over rotating flow (AC), which occasionally turns around course, to coordinate flow (DC), which streams in just a single bearing. The procedure is known as correction since it "fixes" the course of the current. Genuinely, rectifiers take various structures, including vacuum tube diodes, mercury-circular segment valves, piles of copper and selenium oxide plates, semiconductor diodes, silicon-controlled rectifiers and other silicon-based semiconductor switches. Generally, even simultaneous electromechanical switches and engines have been utilized. Early radio beneficiaries, called precious stone radios, utilized a "feline's hair" of fine wire pushing on a gem of galena (lead sulfide) to fill in as a point-contact rectifier or "gem identifier".



##### 4.3 RELAYS

Hand-off is detecting gadget which detect the flaws & sends an outing sign to the electrical switch to disengage the broken area. A hand-off is a programmed gadget by methods for which an electrical circuit is in a roundabout way controlled and is administered by an adjustment in the equivalent or another electrical circuit. There are different sorts of the transfer: Numerical hand-off, Static hand-off and electromagnetic hand-off. Hand-off is housed in a board in the control room.

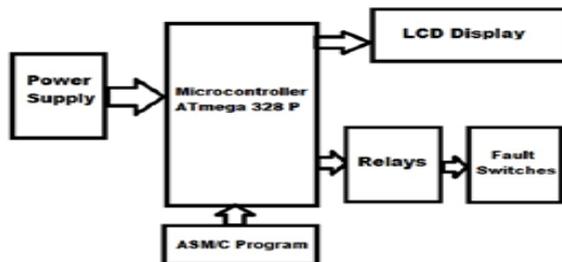
##### 4.4. FILTERS

The capacitive channel is utilized in this undertaking. It expels the waves from the yield of the rectifier and smoothens the DC yield got from this channel and stays steady until the mains voltage and burden are looked after consistent. In any case, if both of the two fluctuates, DC voltage got now changes. In this manner a controller is applied at the yield stage the straightforward capacitor channel is the most fundamental sort power gracefully channels. The utilization of this channel is constrained. It is some of the time utilized on amazingly high voltage, low current force supplies for cathode-beam and comparable electron tubes that require almost no heap current from the flexibly. This channel is additionally utilized in circuits where the force gracefully, swell recurrence isn't basic and can be generally high. Underneath figure shows how the capacitor charges and releases

##### 4.5. ARDUINO

The Arduino Uno is a microcontroller board dependent on the ATmega328 (datasheet). It has 14 computerized input/yield pins (of which 6 can be utilized as PWM yields), 6 simple information sources, a 16 MHz artistic resonator, a USB association, a force jack, an ICSP header, and a reset button. It contains everything expected to help the microcontroller; essentially interface it to a PC with a USB link or force it with an AC-to-DC connector or battery to begin.

## 5. BLOCK DIAGRAM



## CONCLUSION

This is a proposed model of underground link flow separation locator utilizing microcontroller. It is arranged into four sections DC power gracefully part, link part, controlling part, show part. DC power flexibly part comprises of air conditioning gracefully of 230v is step-down utilizing a transformer, connect - rectifier changes over air conditioning sign to dc and controller is utilized to deliver consistent dc voltage. The link part is indicated by a lot of resistors alongside switches. The current detecting some portion of link spoke to as a lot of resistors & switches is utilized as deficiency makers to show the shortcoming at every area. This part detects the adjustment in current by detecting the voltage drop. Next is controlling part which comprises of simple to computerized converter which gets contribution from the current detecting circuit, changes over this voltage into an advanced sign and feeds the microcontroller with the sign. The microcontroller likewise shapes some portion of the controlling unit and makes essential counts with respect to the separation of the issue. The microcontroller likewise drives are lay driver which thus controls the exchanging of a lot of transfers for legitimate association of the link at each stage. The presentation part comprises of the LCD show interfaced to the microcontroller which shows the status of the link of each stage and the separation of the link at the specific stage, if there should be an occurrence of any deficiency

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## BIOGRAPHIES



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