

USING ARDUINO TOTALLY UNDERGROUND CABLE FAULT DETECTION

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Abstract - The catchword of this challenge is to peer the distance of underground cable fault from predominant station in kilometers exploitation companion diploma arduino board. The underground cable tv might be a common observe accompanied in numerous city regions. While fault takes place for some cause, at that point the repairing approach associated with that specific cable is difficult due to not understanding an appropriate place of the cable fault. The planned gadget is to hunt down the ideal region fault. The venture makes use of the nice assemble of ohms regulation as soon as an occasional dc voltage is implemented at the feeder finish thru a sequence electrical tool (cable lines), then present day might vary relying upon the state of affairs of fault in the cable. Simply in case there is a short circuit (line to floor) the voltage throughout collection resistors modifications therefore, that is then fed to integrated adc of arduino board to expand unique virtual records for show in kilometers. The project is assembled with a group of resistors representing cable's length in kilometre's and fault advent is shaped through a collection of switches at every a long way-famed km to move check the accuracy of an equal. The fault taking place at a specific distance and consequently the various section is displayed on a liquid crystal show interfaced to the arduino board. Similarly this mission is accelerated by means of exploitation condenser in associate degree ac circuit to stay the resistivity which might also even locate the open circuited cable, in evaluation to the quick circuited fault completely exploitation resistors in dc circuit as observed within the on top of planned assignment.

Index Terms - Arduino Board, Ohms Low, LCD (liquid Cristal display), cable Fault, ADC (Analogue to digital converter), Digital Data

I. INTRODUCTION

Power supply networks are increasing constantly and their reliability is getting extra important than ever. The complexness of the complete community consists of range of components which can fail and interrupt the electricity deliver for the quit consumer or receiver. For most of the worldwide operated low voltage and medium voltage distribution traces underground cables have been used for decades. Over the past years, additionally excessive

voltage traces had been developed to cables. To lessen the sensitivity of distribution networks to environmental impacts underground high voltage cables are used more and more. They may be no longer laid low with weather conditions, heavy rain, hurricane, snow and ice in addition to pollution. Even the technology utilized in cable factories is improving swiftly certain influences may also motive cables to fail for the duration of operation or take a look at. Cables have been in use for over 80years.

The variety of different designs as well as the style of cable kinds and accessories used in a cable network is excessive. The capacity to determine all form of extraordinary faults with extensively exclusive fault characteristics is turning on the suitable measuring device in addition to at the operator's skills. The proper aggregate permits to reduce the highly-priced time this is going for walks for the duration of a cable outage to a minimal. The goal of this assignment is to discover the gap of underground cable fault from major station in kilometers. The underground cable machine is now a not unusual device accompanied in lots of city regions. While a fault occurs for a few cause, at that point the repairing system associated with that unique cable is hard because of no longer knowing the exact location of the cable fault.

This assignment is to discover the exact region of the fault. This challenge uses idea of ohms law, when a low dc voltage is carried out on the feeder give up through a series resistor (cable lines), then contemporary could range depending upon the place of fault inside the cable. In case there is a quick circuit (line to ground), the voltage across series resistors modifications thus, which is then provided to an mcu inner adc to develop correct virtual information which the programmed microcontroller of atmega own family would show in kilometers. This undertaking is assembled with the set of resistors representing cable period in km's and fault is created via a fixed of switches at every recognised km to go take a look at the accuracy of the same. The fault occurred at a particular distance and the respective segment is displayed on a lcd interfaced to the microcontroller.

II. BLOCK DIAGRAM

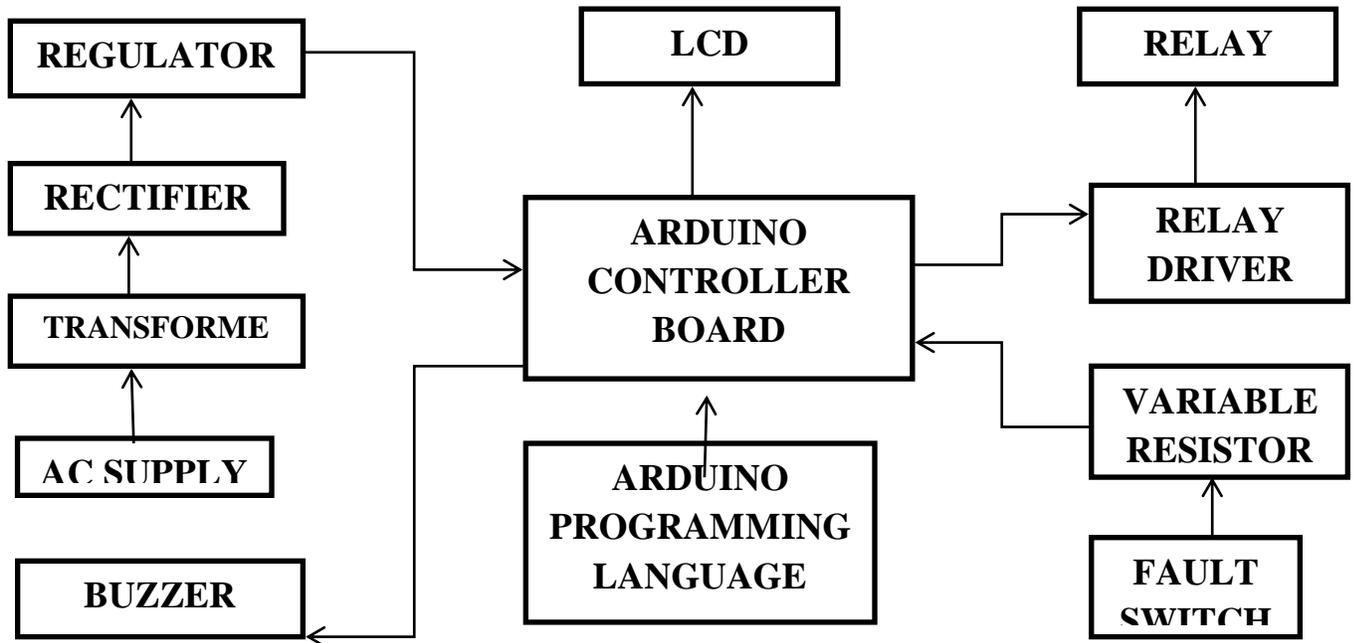


Fig 1: Block diagram of Arduino based underground cable fault detection

III. CIRCUIT DIAGRAM

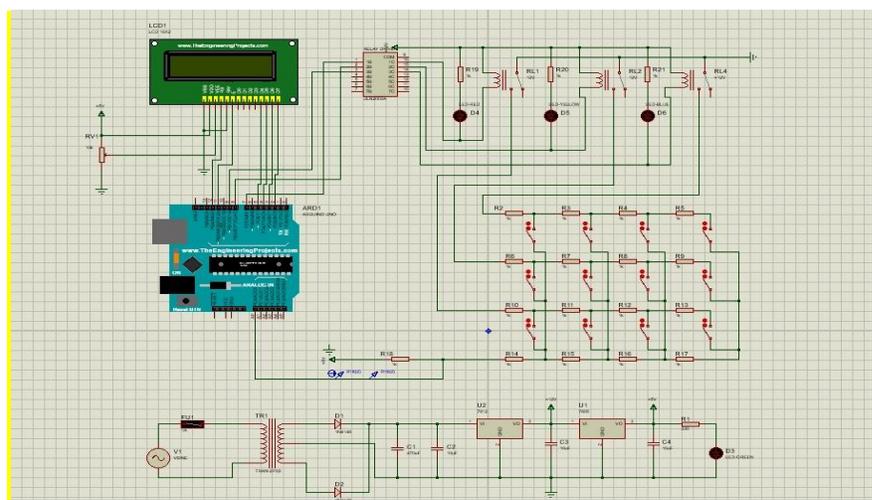


Fig. 2 Circuit diagram underground cable fault detection system

WORKING

See the functional block diagram of entire machine. The input voltage starting from 0 - 5v is scaled all the way down to the output $v_a = \text{zero} - 5v$ using resistor divider network circuits. That is applied to the micro controller inner adc enter. The analog sign is converted into digital format by way of the inbuilt analog-to-virtual converter (adc) of the microcontroller. The programmed microcontroller of percent family could show in kilometers. This project makes use of a set of resistances asynchronous E. R10,r11,r12,r13 and r17,r16,r14,r21, r20,r19,r18,r25,r22 as shown in the circuit diagram, one set for each segment. Each collection resistors represents the resistance of the underground cable for a specific distance consequently four such resistances asynchronous constitute 1-4kms.

Three relays accustomed commonplace purpose of their contacts are grounded while the no factors are related to the input of the r17, r21 & r25 being the 3 phase cable input. R10 is fed with a sequence electric tool r1 to 5v provide. The common cause of r10 & r1 is given to enter pin 0 of arduino thanks to wired as explained better than. Normally parents use business voltage (230v). This voltage is decrease thanks to transformer. Electric device can be a static device that transfers electricity between 2 or a whole lot of circuits via magnetic force induction. Usually, transformers are accustomed increase or lower the voltages of ac in electrical energy applications.

This decrease voltage then goes to rectifier unit. Rectifier is not anything however partner in nursing tool that accustomed convert accomplice in nursing ac provide into dc provide. This task we will be predisposed to were victimization bridge rectifier. 12v ac offer is converts into 12v dc offer. These voltage actions to the regulator unit. Regulator is accomplice in nursing device this is employed to maintain up a continuing voltage. Here we will be predisposed to have been victimization 2 transformer. Particularly transformer 7812 and transformer 7805. 7812 transformer keeps the 12v dc offer. This voltage is sufficient to work relay unit and 7805 transformer maintains the 5v dc provide. This voltage is hired to handle the arduino package. We uploaded the program within the kit. Software become written if any fault occurs in the cable, now can open the relay terminal and disconnect that defective line entirely. Remainder of the other strains operates normally. Presently an afternoon's embedded device changed chop-chop. Arduino is that the superior model of embedded gadget. Those arduino has many kinds however we have a propensity at hand-picked arduino uno.

This arduino uno enables to broaden numerous superior version of arduino uno creates consumer pleasant surroundings. It's trustworthy to adopt alternative gadgets victimization interface. Subsequent we have a tendency to transport the relay. Relay is not anything however accomplice in nursing tool here that acted as a switch if any fault takes place inside the line, can disconnect the road victimization relay. The connective of the relay actions from generally close behavior to the usually open conduct. We have a propensity to simply realise the fault and to disconnect the road. Show unit is connected to the arduino kit this is hired to anyplace the fault takes place and to expose itself.

IV. ADVANTAGES AND DISADVANTAGES

A. ADVANTAGES

- Higher potency
- Less maintainance
- Cable Fault during a 132kv PILC Cable Finally for pin inform a surge generator with a most output voltage of 32kV are often applied. solely terribly rarely it's needed to use a surge generator with higher output voltage.
- Fault location instant, will have longer repair time.

B. DISADVANTAGES

Further this project are often increased by mistreatment capacitance in an AC circuits to live the resistance which might even find the open circuited cable, in contrast to the short circuited fault solely mistreatment resistance in AC circuit as followed within the higher than projected project.

C. APPLICATIONS

- Military and part embedded package applications.
- Communication applications
- Industrial automation and method management package.
- Mastering the quality.
- Reduction of product style time.
- Real time process of ever increasing amounts of knowledge

V. RESULT

Various generation innovated to degree underground cable fault detection. Earlier than arduino technology, microcontroller are used to find out underground cable fault. Any such system are used to well matched all gadgets as well as issue installed on pcb, firstly pcb designing is crucial as in keeping with requirement. Microcontroller has cpu, ram, program memory, digital enter and output timers but talk with any devices connected to the controller we've designed the well suited circuits one after the other. In preceding underground cable fault detection techniques it become no longer clean to discover precise vicinity of fault. Instead of microcontroller we're the use of arduino package (uno atmega 328), this package are readymade circuit and there's no want to put into effect more circuit to them. We are able to immediately join external devices to it. Microcontroller can be established on arduino kit, we are able to take supply from computer, pc to arduino kit. This system language is tons smooth than microcontrollers language, so it is easy to make application for operation of the kit. Through the

usage of arduino package it is straightforward to discover actual fault place of the cable which we're the use of in this mission. Mathematical expression for locating the fault on cable is,

$$R = \rho \frac{l}{a}$$

Where ,

R= Resistance of conductor of cable.

ρ = Resistivity of conductor.

l= Length of conductor.

a= Cross-sectional area of conductor

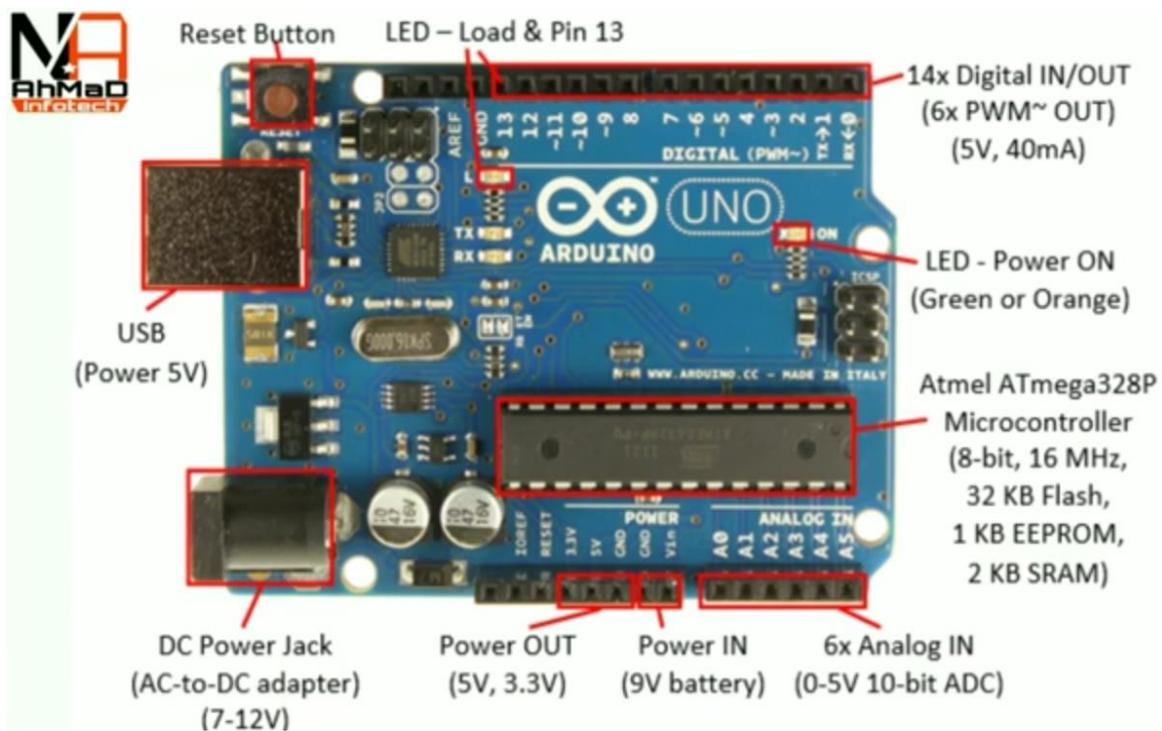


Fig.3 Arduino UNO ATmega 328

VI.CONCLUSION

Ultimately, we have performed this challenge for region of fault in underground cable within the rural regions anyplace underground tools mechanism is employed. It is tough to seek out the fault inside the cable as a consequence this challenge is useful to apply to find the fault area. Therefore the fault will genuinely find and extinguish. The arduino has many advantages over the microcontroller accordingly use of arduino is extra useful arduino based underground fault detection is additional fine than microcontroller primarily based underground fault detection.

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