International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 9 Issue 6 ǁ 2021 ǁ PP. 72-75

IOT Based Underground Cable Fault Detector

Nalimela Manasa
Department of Electrical and Electronics Engineering
ACE Engineering College
Ghatkesar 501301 India

Beera Sharath Kumar
Department of Electrical and Electronics Engineering
ACE Engineering College
Ghatkesar 501301 India

Reddy Uday Kiran
Department of Electrical and Electronics Engineering
ACE Engineering College
Ghatkesar 501301 India

Abstract: *Underground cables are prone to a wide variety of faults due to underground conditions, wear and tear, rodents etc. 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 an IOT Based Underground Cable Fault Detector which detects the exact location of fault between two substations using Arduino Uno. This 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 allows the authorities to monitor and check faults over internet.*

The system detects fault with the help of potential divider network laid across the cable. Whenever a fault gets created voltage drops and changes accordingly, Which is then fed to a Programmed Arduino Uno that further displays the location of Fault in LCD and also over the internet. The information conveyed to the user is the distance to which that voltage corresponds to. IOT is used to display the information over internet using Wi-Fi Module.

Keywords- *Underground Cable Fault, IOT, Arduino Uno, LCD, Wi-Fi Module*

Date of Submission: 03-06-2021 Date of acceptance: 17-06-2021

I. INTRODUCTION

Power supply networks are growing continuously and their reliability getting more important than ever. The complexity of the whole network comprises numerous components that can fail and interrupt the power supply for end user. For most of the worldwide operated low voltage and medium voltage distribution lines, underground cables have been used for many decades. Underground high voltage cables are used more and more because they are not influenced by weather conditions, heavy rain, storm, snow and pollution. Even though the Cable manufacturing technology is improving steadily, there are still influences which may cause cable to fail during test and operation. A cable in good condition and installed correctly can last a lifetime of about 30 years. However, cables can be easily damaged by incorrect installation or poorly executed jointing.

However, underground cables also prone to wide range of faults due to underground conditions (2). And diagnosing fault source is difficult and entire cable should be taken out from the ground to check and fix faults (1). So we are using the Proposed System to detect the fault location and display over the internet. Here we use IOT Technology to transfer the fault location data to the Internet using Wi-Fi Module (4).

II.BLOCK DIAGRAM

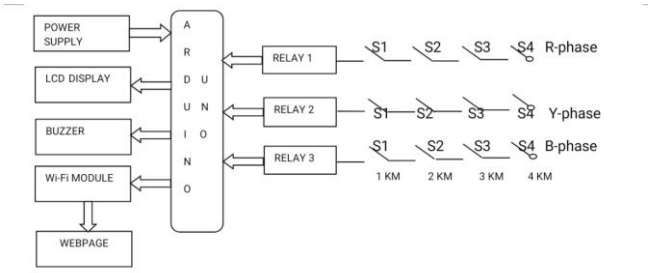


Fig 1. Block Diagram

III.POWER SUPPLY

The input to the circuit is useful from the regulated power supply. The a.c. input i.e., 230v from the main supply is step down to 12v by using a step down transformer and fed to rectifier which converts a.c. into d.c. voltage, output gained from the rectifier is pulsating d.c. voltage. Which is then fed to a filter to get pure d.c. voltage, filter removes a.c. components present even after rectification. This voltage is given to a voltage regulator to get constant d.c. voltage.

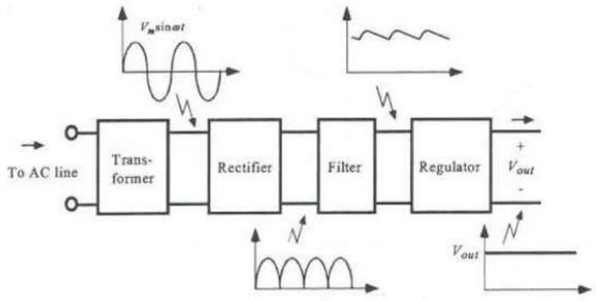


Fig 2. Power supply block diagram

IV. SWITCHES

A switch is an electrical component that can disconnect or connect the conducting path in an electrical circuit, interrupting the electric current or diverting it from one conductor to another. The most common type of switch is an electromechanical device consisting *of* one or more sets of movable electrical contacts connected to external circuits. When a pair of contacts is touching current can pass between them, while when the contacts are separated no current can flow. In this project we are using switches to create the fault in phase lines. Fault creation is done by opening the switches.

V. BUZZER

A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Prefer Board and even on PCBs which makes this a widely used component in most electronic applications. This buzzer makes beep sound whenever a fault created in the circuit.

VI. RELAY

A Power relay module is an electrical switch that is operated by an electromagnet. The electromagnet is activated by a separate low-Power signal from a Microcontroller. When activated, the electromagnet pulls to either open or close an electrical circuit. In this project we are using relay for protection purpose.

VII. LCD (LIQUID CRYSTEL DISPLAY)

We come across LCD displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in various devices and circuits. It can display 16 characters per line and there are two such lines. This LCD will display the information of fault distance and phase.

VIII. ARDUINO UNO

The Arduino uno is an open source microcontroller board based on ATmega microcontroller. The board has 14 digital I/O Pins, 6 analog I/O Pins, and it is programmed with the arduino IDE (Integrated Devolopment Environment) via a type B USB cable. Input voltage recommended is 7-12v and limits are 6-20v.

IX. Wi-Fi MODULE

It is wireless sensor network related device used for transferring of information from device to device with speed and we can operate some of the smart devices with the help of Wi-Fi module.
It is medium where the bridge is formed for the exchange of information using computer network concepts like sender and receiver response time plays a crucial role in this process. Here Wi-Fi module is used to transfer the information to the webpage.

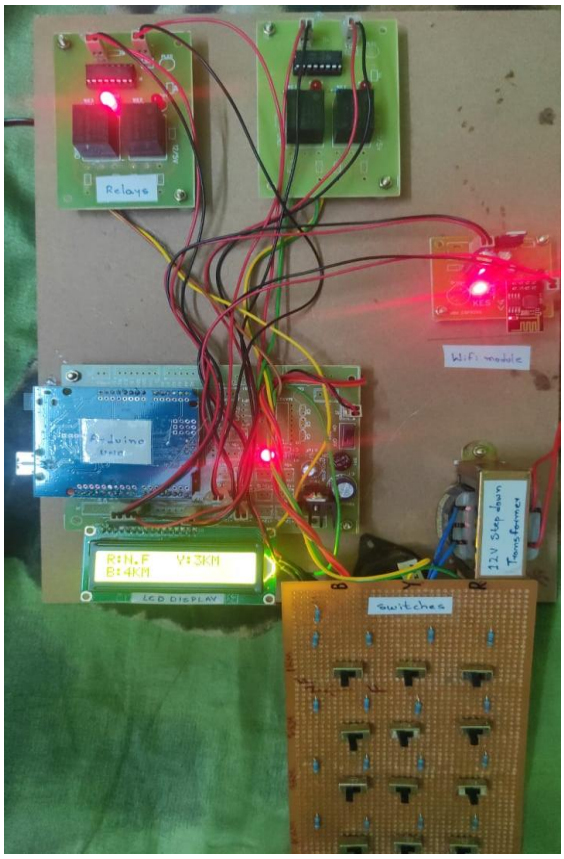
X. SOFTWARE DETAILS

When Arduino IDE is introduced on the PC, associate the board with PC using USB link. Open the Arduino IDE and pick the right board by choosing Tools>Boards>Arduino/Genuine Uno, and pick the right Port by choosing Tools>Port.

XI. ARDUINO – INSTALLATION

After learning about the main parts of the Arduino Uno board, we are ready to learn how to set up the Arduino IDE.
Here are steps to set up the Arduino IDE on our PC and prepare the board to receive the program via USB cable.
Step 1: Download Arduino IDE Software.
Step 2: Power up your board.
Step 3: Launch Arduino IDE.
Step 4: Open your first project.
Step 5: Select your Arduino board.
Step 6: Select your serial port.
Step 7: Upload the program to your board.

XII: OUTPUT



XIII. CONCLUSION

In this, we have detected the exact location of fault using Arduino Uno and We use IOT technology that allows the authorities to monitor and check faults over internet. This system does not lead to debugging of the entire area to detect the fault. Hence, the expenditure and manpower gets reduced. The benefits are fast repair to revive back the power system and improves the system performance. It reduces the operating expense and the time to detect the faults in the field.

REFERENCES

[1] Gilbert Cheung, Yuan Tian, Tobias Neier, Technics of Locating Underground Cable Faults inside conduits, International Conference on Condition Monitoring and Diagnosis IEEE (CMD 2016).

[2] M.Fonseca_Badillo, L. Negrete_Navarrete, A. Gonzalez_parada, A. Castaneda_Miranda, Simulation and analysis of underground power cables faults, 2012 Elsevier Procedia Engineering.

[3] K.K. Kuan, Prof. K. Warwick, Real-time expert system for fault location on high voltage underground distribution cables, IEEE Proceedings-C, Volume. 139, No. 3, MAY 1992.

[4] Snehal R. Shinde, A. H. Karode and Dr. S. R. Suralkar, Review onIOT Based Environment Monitoring System, International Journal of Electronics and Communication Engineering and Technology, 8(2), 2017, pp. 103–108.

ACKNOWLEDGMENT

We would like to convey heartful thanks to **DR. B. L. RAJU, Principal,** ACE Engineering College.
We also would like to thank our Project guide **Mr. B. Avinash, Assistant Professor.**