# Transmission Line Fault Monitoring System

[1]R Navaneetha Krishna,[2]Babugouda R J,[3]Vannesh B M, [4]Md. Shamim Khan

[1]Assistant Professor,[2,3,4]UG Scholar

[1,2,3,4] Department of Electrical and Electronics Engineering, RR Institute of Technology, Bangalore, Karnataka

***Abstract*: –** Fault monitoring in power line is very important as the delay in restoring leads to loss, cascading failure and finally may lead to blackout. This paper proposes the fault monitoring system using Arduino, wherein the time is saved in finding the fault location.

## I. INTRODUCTION

Power system consists of power generation, transmission and distribution system. The occurrence of fault is very common in all the three areas of power system. The fault in transmission line is identified as critical part, as it is the main link between generation and distribution. The fault in transmission system indicates power outage for the nearby load centers. Hence fault location identification and clearance of fault is utmost important in transmission network.

The current fault monitoring system has a drawback of identifying the fault location and clearance of fault. Therefore this paper proposes a transmission line fault monitoring system using Arduino Uno, which is time saving and cost effective. The following figure 1.A shows the current scenario in fault identification and figure 1.B shows how the proposed system works


FIGURE 1.A FAULT IDENTIFICATION AND CLEARING CURRENT METHOD 1.B PROPOSED METHOD

## II. BLOCK DIAGRAM

The following figure shows the block diagram for the proposed system. Here we are using an Arduino Uno board for processing the data and send the location of fault. The location of fault is displayed in LCD Screen.

The proposed system finds the exact location of the fault. The prototype is modelled with a set of resistors representing cable length in km and fault creation is made by a set of switches at every known distance to cross check the accuracy of the same. In case of fault, the voltage across series resistors changes accordingly, which is then fed to an ADC to develop precise digital data to a programmed PIC IC that further displays fault location in distance. The fault occurring distance and phase is displayed on a 16X2 LCD interfaced with the Arduino.

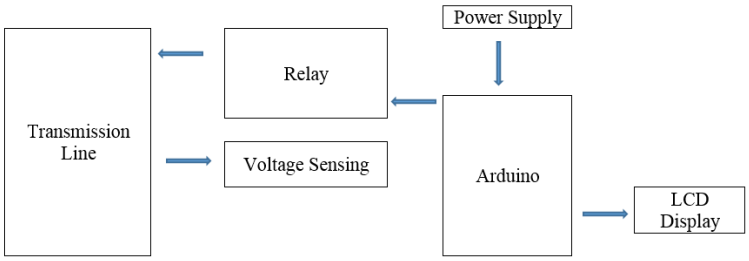


FIGURE 2 BLOCK DIAGRAM

## III. HARDWARE USED

- Arduino UNO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328Pmicrocontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with theArduino IDE(Integrated Development Environment) via a USB cable. It can be powered by a USB cable or by an external 9 volt

battery, though it accepts voltages between 5 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes preprogramed with a bootloader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

- Relay Module:

A relay is an electrically operated switch that can be turned on or off, letting the current go through or not, and can be controlled with low voltages, like the 5V provided by the Arduino pins. Controlling a relay module with the Arduino is as simple as controlling any other output.This relay module has four channels (those blue cubes). There are other models with one, two and eight channels. This module should be powered with 5V, which is appropriate to use with an Arduino. There are other relay modules that are powered using 3.3V, which is ideal for ESP32, ESP8266, and other microcontrollers.This is a 5V 4-channel relay interface board, and each channel needs a 15-20mA driver current. It can be used to control various appliances and equipment with large current. It is equipped with high-current relays that work under AC250V 10A or DC30V 10A. It has a standard interface that can be controlled directly by microcontroller.

- LCD

16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8×1, 8×2, 10×2, 16×1, etc. But the most used one is the 16×2 LCD, hence we are using it here.

- ULN2003

ULN2003 IC is one of the most commonly used Motor driver IC. This IC comes in handy when we need to drive high current loads using digital logic circuits like Op-amps, Timers, Gates, Arduino, PIC, ARM etc. For example a motor that requires 9V and 300mA to run cannot be powered by an Arduino I/O hence we use this IC to source enough current and voltage for the load. This IC is commonly used to drive Relay modules, Motors, high current LEDs and even Stepper Motors. This is used to protect the circuit from high current.

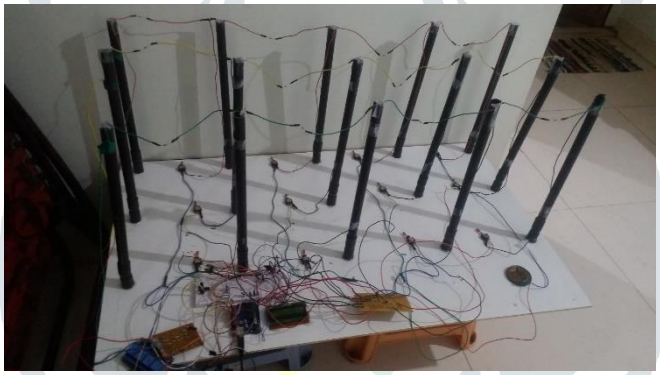

FIGURE 3. WORKING MODEL

## IV. CONCLUSION

The short circuit fault at a particular distance in the transmission line is located to rectify the fault efficiently using simple concepts of Ohms law. The work automatically displays the phase and distance of occurrence of fault with the help of Arduino. The benefits of accurate location of fault are fast repair to revive back the power system, it improves the system performance, and it reduce the operating expense and the time to locate the faults in the field.

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