

THREE PHASE TRANSMISSION LINE AUTOMATIC FAULT DETECTION.

¹Nikhil Mohite, ²Aakash Chawan, ³Namrata Bhosale, ⁴Chaitali Warade

¹UG Scholar, Department of Electrical Engineering. JSPM's Polytechnic, Wagholi, Pune

²UG Scholar, Department of Electrical Engineering. JSPM's Polytechnic, Wagholi, Pune

³UG Scholar, Department of Electrical Engineering. JSPM's Polytechnic, Wagholi, Pune

⁴UG Scholar, Department of Electrical Engineering. JSPM's Polytechnic, Wagholi, Pune

chavanakash7756@gmail.com

ABSTRACT- "Power System" is the most important in the world. Power system is consist and divided in many sections as like generation, transmission and distribution. Transmission lines are assumes significant part in power framework. In this framework power is sent from creating station to the dispersion framework and afterward towards buyer end with the assistance of Transmission Line just as circulation framework. While sending the force causes different kinds of failing and undesirable and unfortunate episodes is generally called as "Flaws." Faults make aggravation in power framework and harm transformer. In typical stable condition issues happens when the protection comes up short at the any area of the framework. A three stage transmission line programmed shortcomings recognition framework is utilized to precisely and enough show what is the issue had accure. It saves the time and endeavors of experts to redress these flaws. It save transformer just as force framework from mechanical harm and fiasco. In this system by using Arduino Nano, microcontroller 238p. The system automatically detects the faults. System will analyses and classifies those faults and calculate the faults nature, locations and distance from the control room. Using algorithm methods the accurate information of faults is transmit to control room and indicate the fault nature and location. Finally we conclude using this system we save the time and reduce the extra efforts of line patrolling wok.

Index Terms- Arduino Nano, Faults, Microcontroller, transmission line,

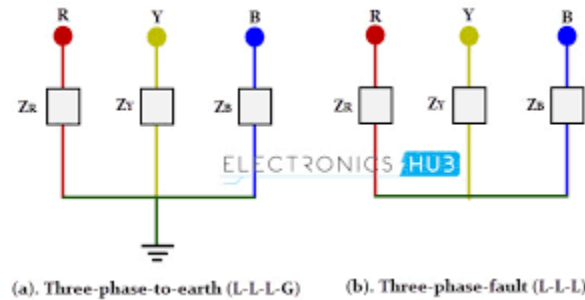
I. INTRODUCTION

In power system transmission lines runs through several natural conditions as likes forest area, mountains, Thilly areas and farms in results various electrical faults caused by lightning stroke, storm, tree falling birds perching and other accidents. Since this faults are reason for fails the continues power and quality of power supply. They ought to have redress precisely and suitably. Deficiency discovery measure it is extremely fundamental and critical to the protected and smooth activity of force transmission. There are different strategies as of now existing for identifying and finding deficiencies. In power transmission the greater part of the techniques are done by estimation of voltage and current boundaries of potential and current transformers at substation and exchanging station. While communicating the force causes different sorts of breaking down and undesirable and unfortunate occurrences is typically called as "Flaws." In this paper we introduce Working principle of 3 phase Transmission line fault detection system. 3 phase Transmission is the most important part of electrical power system, hence taking care of electrical power system and detecting its fault is so essential for better reliability of the electrical power system. In this setup we used three step down center tapped(12-0-12) transformer for each phase/line and voltage get stepped down from 230 volt to 12 volt. In case of operation of Arduino nano 12 volt is not readable for arduino .its only have 5 volt needed for do his operation then we decreases voltage level using connect resistance in series of arduino. After that we used three number of switch in series with each lines for create open circuit fault and another three

toggle switches for create short circuit fault in each phase. When user creates this types of fault arduino sense the voltage variation and display the fault condition or type of fault. We connect voltage regulator to create under voltage and over voltage fault, when this type of faults get occur arduino sense and displayed the type of fault. this way we indentify the fault condition and severity of faults and gets accurate information of faults.

1.1 Types of the faults accurse in transmission line

Symmetrical Faults: A fault where all phases are affected so that the system remains constant nature. In this types of faults all three phases shorted with each other or all three phases shorted with each other earthing also.



Unsymmetrical Faults : The faults which leads unequal currents with unequal phase shifts in a three phase system. The **unsymmetrical** fault occurs in a system due to presence of an open circuit or short circuit of transmission or distribution line. It can occur either by natural disturbances or by manual errors.

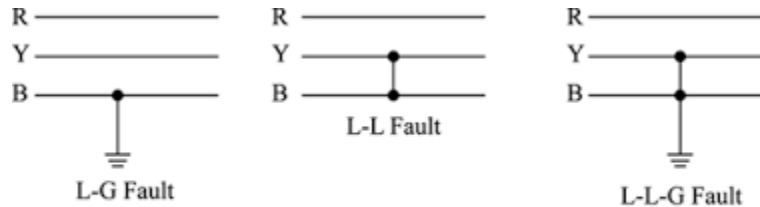


Figure 1

Line to ground fault:- A single line to ground fault occur on transmission line when one conductor comes in contact with neutral conductor or conductor drops on to the ground. Such types of faults may occur in transmission line due to high-speed wind, falling tree on lines, lighting strokes etc.

Line to Line fault:- This types of faults occurs when two numbers of conductors are short circuited. Such types of faults may occur in transmission line due to high-speed wind, falling tree on lines, lighting strokes etc.

Double line to ground fault:- Double line to ground fault are occurs when any two phases of the power transmission line is short circuited to **ground** or neutral.

II. WORKING AND CONSTRUCTION OF THIS SETUP

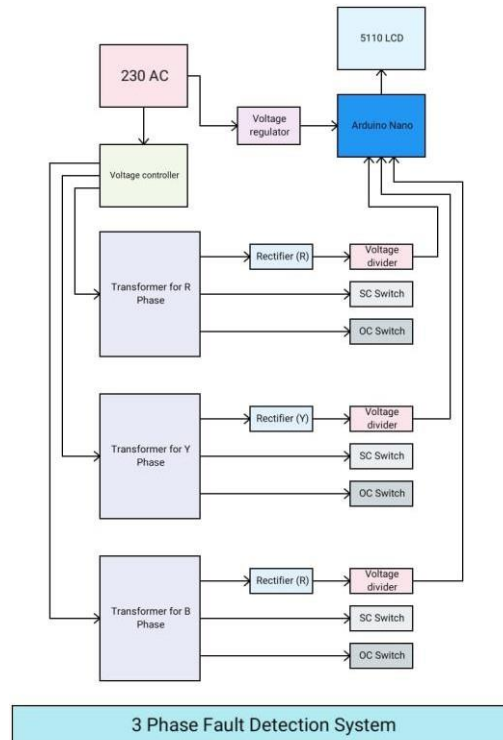


Fig.1:-Working & Construction

Fig.1 Main Switch is mostly used any kind of electrical system, The main switch used in the proposed system is used to completely turn on and off from the mains supply so that at any of the critical situation we can quickly turn on and off the system for its protection and as well as humans protection. It provides complete isolation from the mains with phase and neutral line. a switch has the purpose of turning on and off the system for various purposes like to keep the system off until the suitable condition or timings march, it is also used for better flexibility of system while operation like see have no need to go to switch Board again and again if the system has main switch, if any kind of abnormal behavior occurred, user can instantly turn off the system resulting safety of equipments and user.

The working is simple like a switch, when pressure is applied on the handle of switch, it gets shifted to otherside and makes the connection and system gets turn on.

Every AC appliances where stepping up and down the voltage is necessary a transformer is used, because it provides any voltage level easily, the same is used in the proposed system, a 12-0-12 center taped transformer is used which has maximum 500 milli ampere of current handling capacity and 12 volt output, dry type of transformer is used because it doesn't require forced cooling at such low levels of current and voltage. This transformer is protected by a 10 ohm of resistor used in series, it will reduce the amount of short circuit current than direct short circuit method, transformer has weight around 150 grams each. The reason behind stepping down the system Voltage to 12 volt is Arduino have maximum 5 volt of reading capability, again it is reduced using the voltage divider circuitry As we have reduced the voltage from 230 to 12 volt, but still it is not readable by the Arduino, so required the technique to reduce it to 5 volt, so for this 2 resistors used in series, the 47K side of resistor is connected to 12 volt output of transformer and middle point is connected to Analogue Pin of

Arduino, the other end of 33k resistor is joined to the ground so that excessive amount of voltage should be grounded. It has half watt resistors, cause less amount of Current flows through it.

Open circuit switch (OC) switch is associated between the period of each lines, the reason for oc switch is to turn ON and off to make Open circuit deficiency in the line for testing reason, when the client turn ON the oc switch, the separate stage become open and we get a notice on the screen as "OCF" with the name of line so we can comprehend, at the hour of open circuit issue the voltage gets zero and we check this condition utilizing the Arduino code and prints the flaw on nokia 5110 LCD, various libraries are utilized to show the line voltage and issue condition, we can likewise add an alert or ringer so client ought to get mindful about the issue, to identify the open circuit generally just one sign we get is zero voltage at the line and expanded voltage on different lines, due to open circuit shortcoming the potential distinction becomes zero consequently we don't get any sorts of Voltage of the line.

At the point when we again turn off the oc switch, potential contrast makes and current beginning streaming, which is detected by the Arduino and as indicated by the coding we get the message on screen that issue have settled, the total wonder is checked by the Analog pin of Arduino.

At that point same rationale is carried out on each stages for better security of the framework. The most generally Fault occurs in a framework is short out issue, which cause the majority of the harm in the framework, because of it, any of the electrical gadgets may harm or finish consume, impede immense measure of Current stream in a brief timeframe coming about voltage become exceptionally low, by utilizing this idea the issue condition is identified, in our framework the voltage is estimated after the short out Fault is around 30 to 40 volt, and utilizing the Arduino code it is distinguished and individual message is imprinted on the screen, doing short out is a troublesome and Risk assignment and it can likewise harm the framework forever, consequently to diminish the seriousness, a 10 ohm, 2 watts of resistor is utilized in each line in arrangement with the SC switch, due this the seriousness lessens and client can without much of a stretch exhibit and experience a SC flaw, executing a signal, caution or mechanical switch can be carry out in the framework for speedy activity against this shortcoming, the coding accomplished for this deficiency can undoubtedly be found in the Arduino code, utilizing the voltage perusing a contingent circle is utilized in Arduino sketch Which recognizes the issue and prints the issue there sort of their separate line, the short out condition can be feel by contacting the resistor utilized for hamper, get warmed up around 80 to 100 c' because of hefty Current stream, it tends to be harmed if the condition happens for long time, so don't press the SC switch for quite a while. The voltage controller or Variac is mostly used to increase and decrease the voltage levels, the same is used in our system, it has a fan regulator Which works on power electronics devices, using the chopping technique the voltage is reduced and increased to create artificial under Voltage and over voltage fault condition, because we have to test the implemented system, at the time of reduction of voltage levels, the PWM duty cycle decrease and hence voltage reduces and vice versa, Using the condition loop in coding with and logic each phase's Voltage value is monitored and if all the phases shows voltage value less than 200, the under Voltage fault takes place and Arduino shows the "UVF" on the screen,

If the system voltage becomes more than 235, it checks the voltage levels of each phase, if all the voltage become more than 235 volt, it prints the "OVF" message on the screen, buzzer, text message, Automatic turn off actions are also implementable if user want, the entire system is working on the Voltage level, on each kind of fault Voltage varies which is detectable and security and notification system can be implemented according to it. Under voltage fault can be takes place due many reasons like over loading, fault at power generators, due to short circuit etc

III. CONCLUSION

Here, in this paper we have designed a microcontroller based transmission line automatic fault detection and indication system that collect information through arduino nano and send or shown on lcd show. It gives the best approach to identify the flaws and got educated. The execution of the framework will save huge sum season of flaw finding and watching of lines just as save measure of power and in this way power will be accessible for additional buyers in a thickly populated country like India.

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