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Three Phase Transmission Line Fault Detection Using IOT

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ABSTRACT: The fault occurred in transmission line is very much dangerous for the locality. In HV and EHV transmission line there are less fault occurrence but in locality the fault occurrence is more as compared to outer transmission line. In our project we design a model which is to be detect the fault in transmission line by comparing the voltage signal between the transmission line and a reference value, the reference value is predetermined and if the transmission line voltage is more than or less than reference value then fault is to be shown in display. The information regarding fault occurrence in particular phase is send to web page via IOT device which is NODE MCU(Esp8266) and also shown in display. The optocoupler is used to sense the voltage and send output to microcontroller IC. Here microcontroller IC ATMEGA 16 is used in this IC programming is done which compare the voltage signal and send output to IOT module and display.

KEYWORDS: Arduino, Transformer, 555 Timer

I.INTRODUCTION

It is known that when a fault occurs in overhead transmission line system then instantaneous changes in voltage and current at the point of fault generate high frequency. Electromagnetic impulses called travelling wave which propagate along the transmission line in both directions away from the fault point. The electric power infrastructure is highly end angered against many form of natural and spiffy physical events. Which can skeptically affect the overall performance and stability of the grid. The fault impedance being low. The fault current is relatively high, during the fault. The power flow is diverted towards the fault and supply to the neighbouring zone is affected Voltage become unbalanced. It is important to detect the fault as early as possible that is why a kit is being made using microcontroller to make its process faster. The transmission line conductor resistance and inductance distributed uniformly along the length of the line. Travelling wave fault location methods are usually more suitable for application long lines. Power transmission lines employ at 50-HZ are more than 80-km long are considered to have the properties of voltage and current wave that travel on the line have the properties of voltage and current wave that travel on the line with finite speed of propagation.

Traveling wave methods for transmission line fault location have been reported since a long time. Following developments employ high speed digital recording technology by using the traveling wave transients created by the fault. Currently, the electric power infrastructure is more vulnerable against many forms of natural and malicious physical events, which is directly affect the stability of grid. There will be some parameter which is affected. With this, there is an approaching need to equip the age old transmission line infrastructure with a high performance data communication network, that supports future operational requirements like real in the time record and control necessary for smart grid integration. Due to this technique the real time monitoring is necessary. Many electric power transmission companies have primarily depended on circuit indicators to detect the faulty sections of their transmission lines. However, there are still challenges in identifying the exact location of these faults.

Although fault indicator technology has provided a flexible means to locate permanent faults, the technical crew and patrol teams still has to physically patrol and inspect the devices for large duration to detect faulty sections of their transmission lines. Wireless sensor based monitoring of transmission lines provides a solution for several of these disquiet like real time structural awareness, faster fault localization, accurate fault diagnosis by identification and difference of electrical faults from the mechanical faults, cost reduction due to condition based maintenance rather than periodic maintenance, etc. These implementations identify stringent requirements such as fast delivery of enormous

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amount of highly reliable data. The success of these appeal depends on the design of cost effective and reliable network architecture with a fast response time.

II.LITERATURE SURVEY

- Mr.S.Surendiran, D.Naveen Kumar proposed the Electric Power System is divided into many different sections. One of which is the transmission system, where power is transmitted from generating stations and substations via transmission lines into consumers. A smart GSM based fault detection and location system was used to adequately and accurately indicate and locate the fault had occurred. This will ensure a shorter response time for technical crew to rectify these faults and thus help save transformers from damage and disasters. The system automatically detects faults, analyses and classifies these faults and then, calculates the fault distance from the control room using an impedance-based algorithm method. Finally, the fault information is transmitted to the control room. In conclusion, the time required to locate a fault is drastically reduced, as the system automatically and accurately provides accurate fault location information. By using this project, we can detect the faults of three phase transmission lines one can monitor the Temperature, Voltage, Current by means of GSM modem by sending message.
- K Sathya Kumar, M Rajeshvara Boopathi presented the fault occurred in transmission line is very much dangerous for the locality. In HV and EHV transmission line there are less fault occurrence but in locality the fault occurrence is more as compared to outer transmission line. In our prototype we design a model which is to be detect the fault in transmission line by comparing the voltage signal between the transmission line and a reference value, the reference value is predetermined and if the transmission line voltage is more than or less than reference value then fault is to be shown in display. The information regarding fault occurrence in particular phase is send to web page via IOT device which is MCU Esp8266). Here in our project if the peak hour consumption is high, the system itself will check it and cut off the least priority loads. The loads are assigned with static priorities, if the consumption is high, the currently running low priority load will be switched off and we can get load controlled. And following faults are reduced and the faults may include line to line fault, increased sag, Pole tilt these are the faults which are reduced.
- S.Surendiran, D.Naveen Kumar, S.Palraj proposed the Electric Power System is divided into many different sections. One of which is the transmission system, where power is transmitted from generating stations and substations via transmission lines into consumers. A smart GSM based fault detection and location system was used to adequately and accurately indicate and locate the fault had occurred. This will ensure a shorter response time for technical crew to rectify these faults and thus help save transformers from damage and disasters. The system automatically detects faults, analyses and classifies these faults and then, calculates the fault distance from the control room using an impedance-based algorithm method. Finally, the fault information is transmitted to the control room. In conclusion, the time required to locate a fault is drastically reduced, as the system automatically and accurately provides accurate fault location information. By using this project, we can detect the faults of three phase transmission lines one can monitor the Temperature, Voltage, Current by means of GSM modem by sending message.
- Sushrut Adlok, Ankit Ramteke, Sumit Parchake, Rajat Tawade presented the fault occurred in transmission line is very much dangerous for the locality. In HV and EHV transmission line there are less fault occurrence but in locality the fault occurrence is more as compared to outer transmission line. In our prototype we design a model which is to be detect the fault in transmission line by comparing the voltage signal between the transmission line and a reference value, the reference value is predetermined and if the transmission line voltage is more than or less than reference value then fault is to be shown in display. The information regarding fault occurrence in particular phase is send to web page via IOT device which is NODE MCU(Esp8266) and also shown in display. The optocoupler is used to sense the voltage and send output to microcontroller IC. Here microcontroller IC ATMEGA 16 is used in this IC programming is done which compare the voltage signal and send output to IOT module and display. The power supply is provided to supply 5-volt dc power to all component this supply is separate from the supply which is used to check the fault occurrence.

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III. PROPOSED SYSTEM

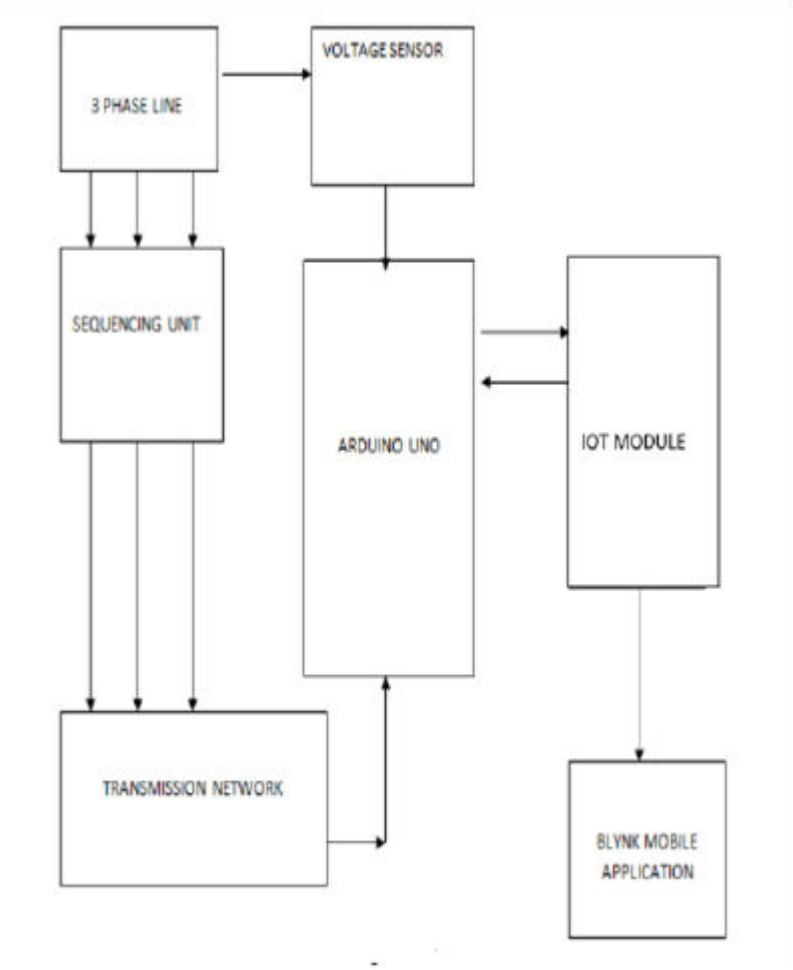

Fig. 1 Block diagram of the proposed system

Fig.1 shows the proposed system consists of Arduino, transformer, voltage regulator, 555 timer and IOT module. Here we show a prototype model or 3p fault detection, so we make the fault line by using switches. We know that impedance of line is increases with increase in length. So we use resistance combination in senses, for each phase different set of resistance is used for each phase one relay is use to isolate the load at the time of fault which give exact length of fault occur on line. The mastermind of our project is audino. The DC supply is require for controlling board. Which is provideds with the help of rectifier and transformer combination. Output switches is given analog pin or aurdino (uno) and display is also connected to digital output pin of aurdino. So when we move fault it indicate of display with exact distance, and at a same time aurdino give output to mp relay and it disconnect load from supply. This all thing happen as soon as fault is occur in line. Due to proper program insert in aurdino on a based. It is possible become voltage of add pin is changes according to flowing from line and it depend upon distance of line.

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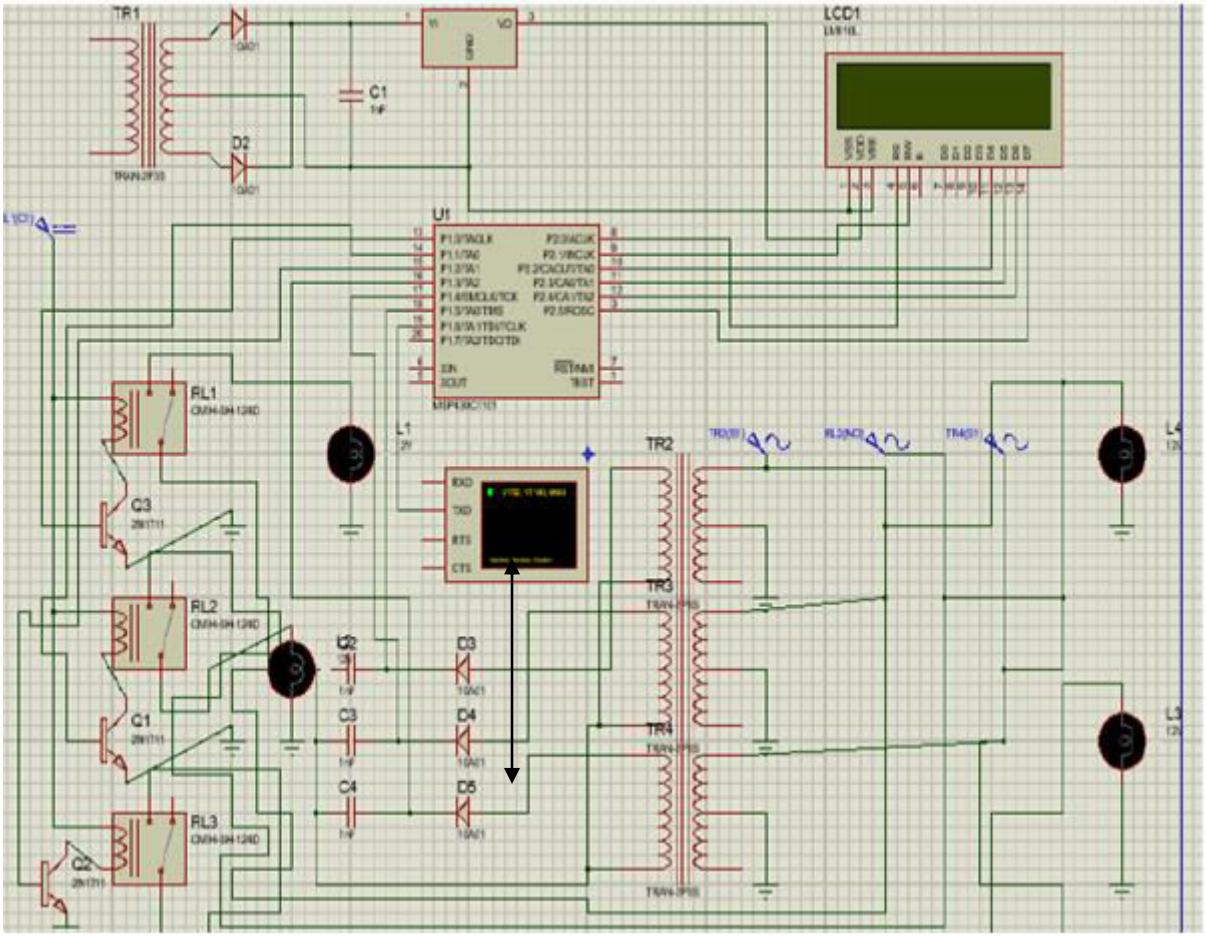

Fig.2 Equivalent circuit of proposed system

Fig.2 shows the circuit diagram of design of three phase transmission line fault detection using IOT. The components used are Adruino, transformer, voltage regulator, 555 timer and IOT module works as a main function. In electric power supply services, power transmission lines are very important and very indispensable. For that, power transmission lines are equipped with various protection systems that are checked varies times periodically because of the unexpected troubles that may destroy the lines. For the purpose of protecting these lines, a new system was invented to discover the Fault Location using Composite Fiber Optic Overhead Ground Wire (OPGW). This system deals mainly with most causes of fault situations such as lightning, dew, snow, fog, or gales. This new fault location system was developed to find out where electrical fault happened on overhead power transmission lines by detecting the current induced in the ground wire. Any fault situation needs the fastest processing in fixing the fault. For that, the fault location system helps engineers to detect the point or the section where an electrical fault happened in very logic time. Mainly this scheme is based on the use of neural architecture and implementation of digital signal processing concepts. Figure 8 shows functional parts of protective relay. The protective relay need sampled values of currents and voltages of three lines build inputs of the system. In general, a knowledge control module controls all other parts of the relay and is responsible for sending trip signals. This module classifies weather a 1-phase-to-ground, 2-phase-to-ground, phase-to-phase or a 3-phase fault has occurred. In the classification process, arcing and non-arcing must be known in order to obtain a successful automatic reclosing. Generally speaking, neural network classifies the fault into types. The first type (1-phase, 2-phase, 3-phase faults) is fast 5-7 ms and reliable. The second type, arcing and non-arcing faults support a successful automatic reclosing.

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IV. WORKING PRINCIPLE OF PROPOSED SYSTEM

Our prototype is used to detect the fault, which has occurred in transmission line. By using ATMEGA16 microcontroller, optocoupler, LCD. A prototype is assemble with a set of resistor, cable length in km, by using set of switches made to creation of fault in prototype. A 230v ac supply is fed to the terminal, let us consider the terminals (R,Y,B)we took supply and fed to the terminal there one resistor connected with diode, resistor rating is 470k ohm and diode IN4007 which rectify the voltage signal and gives variable DC as a output. A capacitor which is connected in parallel which is used to keep out all unwanted signal as well as gives constant DC supply. The DC supply is then gives to optocoupler and input Side of optocoupler the DC supply is present that glows the LCD. Inside the optocoupler one LED and transistor are present. The transistor is NPN transistor, the base terminal is sense the radiation of LED and the current flow inside the transistor from collector to emitter. The emitter terminal is connected to ground and the collector terminal is connected to IC ATMEGA 16.The program is done in IC ATMEGA16 which compare the voltage level and gives the output on LCD and Wi-Fi module result shown on PC and screen.

The three terminal is connected to the switch when one switch is one and remaining two switches are closed then the output shown is display is terminal Y and B has been faulted (Supposed terminal is R, Y, B and terminal R is connected to supply i.e. switch is ON and other switch which is connected between terminal Y and B is OFF hence its shows the fault.)

V. CONCLUSION & FUTURE ENHANCEMENTS

The model design in such a way to solve the problems faced by consumer. By using such method, we can easily detect the fault and resolve it. It is highly reliable and locate the fault in three phase transmission line and also supposed to data storage. It works on real time so we maintain all data sheet and avoid the future problem in transmission line.

In future, this project will enhance the fault detection in underground cables and line cable using Raspberry PI. It helps to detect which type of fault occurred and exact location of fault also.

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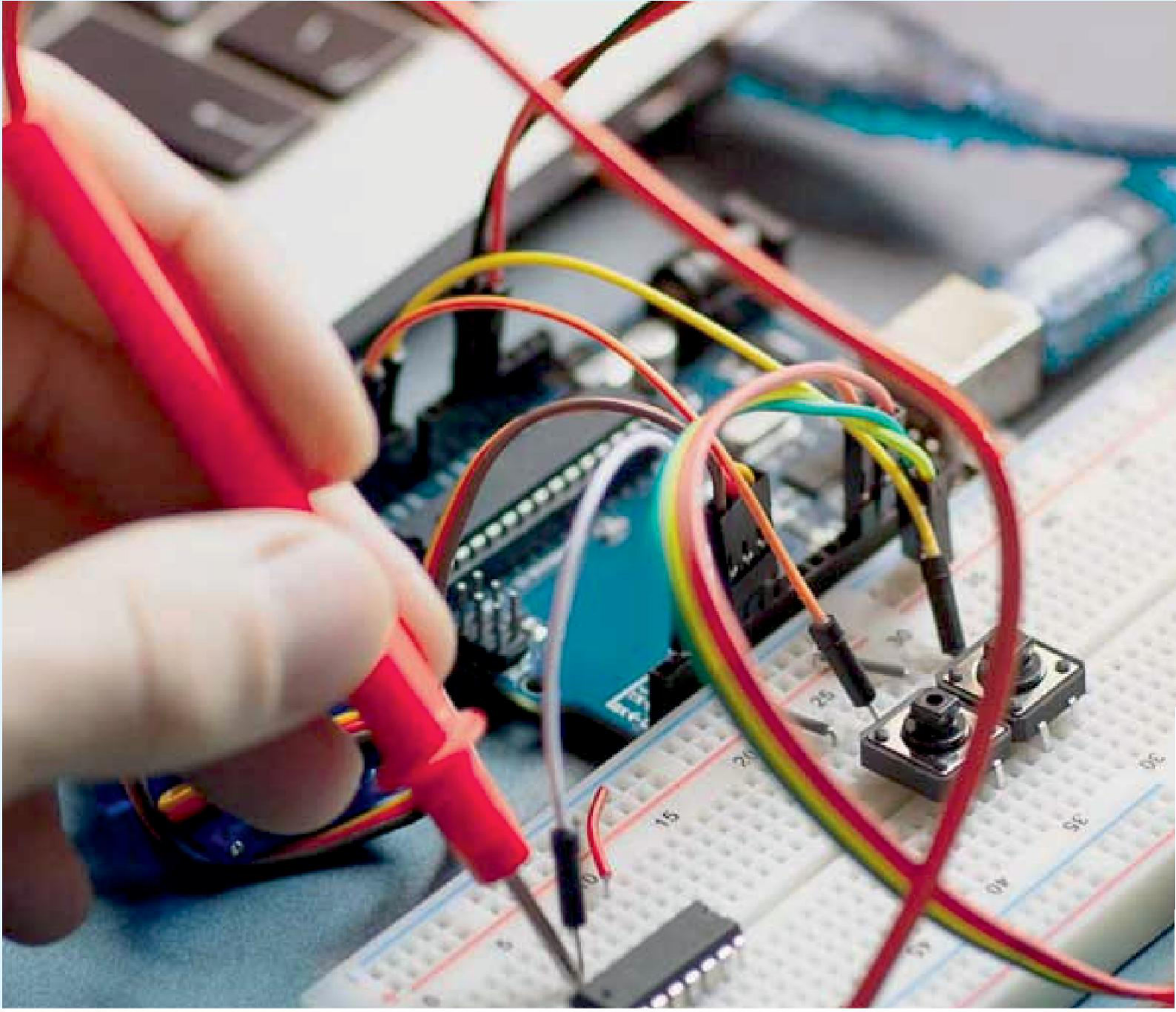

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