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A SINGLE ENDED FAULT LOACTION METHOD FOR GRID CONNECTED CONVERTER SYSTEM BASED ON CONTROL AND PROTECTION COORDINATION

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ABSTRACT: The fault location detection has been a main objective of power system engineers, in transmission and distribution systems. Identification of fault source is tedious task; fast fault detection can help to protect the equipment before any significant damage of the equipment. The exact fault location can help service man to remove persistent of the faults and locate the areas where the faults occur regularly, thus reducing the occurrence of fault and minimize the time of power outages. The paper is intended to detect the location of fault in transmission line using an Arduino board and the same is transmitted to control centre using IoT device. Protection of transmission line is important, because 85-87% faults of power system occur in these transmission lines. In this study, it presents a method and technology to detect and classify the various shunt faults on a transmission line for quicker and reliable function of protection schemes.

Keywords: Transmission lines, GSM module, buzzer.

I INTRODUCTION

A electrical equipment with a fault is defined as a defect in its electrical circuit because of which the current is changed from the original path. These faults are mostly created by accidents, mechanical failure, excessive internal and external stresses etc. With the lower fault impedance, the fault currents are relatively becomes higher. During the faults, the power flow is changed towards the fault which affects the supply to the neighboring zone. Voltages become unbalanced. It is mandatory to detect the fault as soon as possible. It will detect the faults and will give signal to relay. Fault detection are important task to protect electric power systems. Protection of the transmission line is an important part in power system engineering because 85-87% faults of power system occurs in the transmission lines. The occurrence of short circuit in main power line causes serious problem. It affects the actual load and voltage which can easily damage the many electronic devices. The main problem in high voltage transmission line is efficiency and safety. Efficiency of any transmission line depends on factors like

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conductor, temperature, length of wire etc. Nowadays transmission lines are heavily loaded due to increased power consumption moreover, the conductor used in transmission lines undergo expansion and shrinkage due to fluctuation in voltage throughout the year and also quality of the conductor, like copper or aluminum which are used as a main line conductor and during the high load and temperature, it gets expanded.That expansion of conductor disturb the transmission line structure and causing them to Sag. Sometimes it may cause the line fault. Safety of transmission line can be improved using Sag monitoring system and line fault prediction The design methodology includes the use of microcontroller and the combination of relay circuitry with display on a LCD screen. It sends the notification to nearest power distribution center with geo location using wireless technology so that the data can be easily sent to the server. Power system is classified into power generation, transmission and distribution. Transmission network is considered to be one of the vital parts of power system, as it connects the supply and the demand. The loss in transmission and distribution network is considered to be very high, compared to other parts of power system. Currently, the electric power infrastructure is highly vulnerable against many forms of natural and malicious physical events, which can adversely affect the overall performance and stability of the grid. The fault in the transmission network obstruct the supply of power to the consumer. Hence the transmission network fault identification and clearance should be very fast. Additionally, there is an impending need to equip the age old transmission line infrastructure with a high performance data communication network that supports future operational requirements like real time monitoring and control necessary for smart grid integration. Many electric power transmission companies have primarily relied on circuit indicators to detect faulty sections of their transmission lines. Even though the sensors, breakers and other communication line is used the system look bulkier costly and time consuming one for fault location and clearance. However there are still challenges in detecting the exact location of these faults. Although fault indicator technology has provided a reliable means to locate permanent faults, the present scenario in identification of fault is very tedious and time consuming as the technical crew and patrol teams still has to physically patrol and inspect the devices for longer hours to detect faulty sections of their transmission lines and then have to clear the fault, which requires a more human effort in identifying the fault location and clearing the fault. Wireless sensor based monitoring of transmission lines provides a solution for several of these concerns like real time structural awareness, faster fault localization, accurate fault diagnosis by identification and differentiation of electrical faults from the mechanical faults, cost reduction due to condition based maintenance rather than periodic

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maintenance, etc.. These applications specify stringent requirements such as fast delivery of enormous amount of highly reliable data. The success of these applications depends on the design of cost effective and reliable network architecture with a fast response time.

II LITERATURE SURVEY

S. Lefebvre [1] et.al displayed the benefits of versatile tuning of current controllers in a HVDC converter framework relying on the framework prerequisites. It is demonstrated that the converter SCR or the net recompense obstruction offered by the converter is the significant parameter which impacts tuning .An essential HVDC framework is linearity around a working point and the controller takes care that Eigen esteems and zeros of the framework are kept up at predefined areas for each arrangement of variety of framework parameters. Estimation of this parameter variety is finished by exposing the framework to a little commotion signal .Estimation and controls are done at various transfer speeds to improve heartiness of the controller.

John Reeve [2]et.al in his paper attempted to fuse gain booking versatile control in to the quick controller circles in the control of dc transmission frameworks to improve the exhibition of the framework under expansive intrusions ,low Effective Short Circuit Ratio‟s and shortcomings that bring down the working SCR of the framework further. DC current blunder signal, dc voltage mistake signal, air conditioning voltage zero intersections, and terminating point at the rectifier are the different booking factors picked relying on the reaction of the framework under vast air conditioning aggravations. These factors are assumed for each case to improve the strength of the framework under vast intrusions dependent on the outcome given by the possibility pointers.

John Reeve [3] et.al amalgamated the hypothetical part of auto tuning with addition planning .Two points are essentially adderesed.1) regardless of whether auto tuning gives adequate focal points over fixed additions i.e ordinary controller gain booking or the blend of two controls can be connected to expand the heartiness of the two controllers for substantial unsettling influences. It was appeared for specific applications including nonstop or unexpected low short out proportion, auto tuning alone may not be solid in light of specific unsettling influences .It must be joined with increase planning.

P. K.Dash et al [4] et.al presented a viable control technique for a HVDC framework dependent on the guideline of input linearization. A neural estimation calculation has been utilized to follow the linearised control parameters which are elements of rectifier side dc voltage, inverter side dc voltage, dc connect reactance and proportionate opposition . The dc interface is liable to different transient conditions to demonstrate the exhibition of the controller. A superior blunder following law can in any case ad lib the working of the controller for dynamic solidness.

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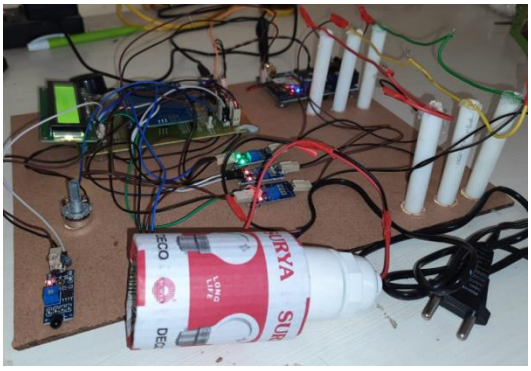
Q. A.Routary et al [5] et.al supplanted the rectifier side current controller with a fluffy self tuning controller .The controller gain which deals with Kp and KI, relative in addition to essential controller constants is balanced through fluffy interface. The linearised estimations of current blunder and its subordinate are the two data sources used to produce the arranged estimation of terminating plot for the rectifier end .On a comparable lines requested estimation of annihilation edge at the inverter end is created and the exhibition of the framework is seen under transient conditions and demonstrated the predominance of self tuning the PI controller parameters utilizing Fuzzy rationale.

III PROPOSED SYSTEM

This project Deals with new method of single phase fault detection and also Auto switching based on arduino displayed over the fault. Our detection system deals with the current flowing through cables. Each cable will have its maximum current capacity. When short circuit fault occurs, current suddenly increases. Also in case of open circuit, current will be zero. Current transformers are used to detect current level, this output current will be given to I to V converter unit so as to make in readable in terms of voltage. This voltage is then fed to ADC pin of Arduino, which convert it into digital and take appropriate action if any fault condition (SC or OC) occurs. This fault is displayed on LCD display & on LEDs. Relay driver and relay circuit is used to switch single phase load of city electricity distribution system on other ok phase to provide end user an uninterrupted power supply. Fault clearing switch is provided for manually tell the system about fault clearing. Then only load will be switched to regular phase. The information send to authority peoples with help of GSM module.

IV WORKING METHODOLOGY

The proposed system is IOT based transmission line stand fall detection and line detection. Compared to the existing system for Sag monitoring, the proposed system Sag system is easier to maintain the transmission line. The proposed system has some functionalities which makes it a bit more efficient than the previous existing system such as it has Real time monitoring of transmission line for any fault. It also has the capability to Inform the nearest power center.



The paper proposes a very simple, fast efficient and cost-effective approach to identify the fault location in the transmission network. The proposed system uses concept of ohms law. In this proposed system use of any kind of sensor is absent. Based on the program coded, it senses the voltage drop in the fault line where in it compares with the predefined value for fault condition and sends information to the control centre.

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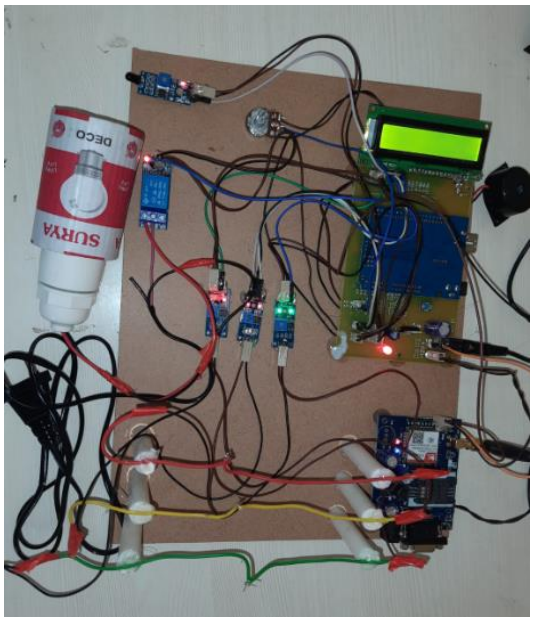

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V CONCLUSION

The design of the system is in such a way to solve the problems of the consumers. This paper contains an approach to detect the failure of the transmission line network. In this paper sensors are used for identifying the symptoms that leads to network failure. The detected issues are communicated through SMS to the concerned authorities. The communication technique used in the proposed system can be more widely used in the future when the infrastructure of the country gets more developed.

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