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THREE PHASE TRANSMISSION LINE FAULT DETECTION BY USING ARDUINO

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ABSTRACT

In electricity journey the generation of transmission, distribution, utilization of electrical power is called electrical technology in power generation transmission and distribution many components are involved. So there are many types of electrical faults or faults like in transmission lines occurs in transmission system like line to line faults and line to ground fault in power system etc. In this project I will show you the prototype of three phase fault detection system. Mainly occurred in H.V transmission line our project accurately detect the distance of three phase fault from source system and display on control panel by using aurdino mega. In this project we use sensing device which is present on the line even though L-L ,L-Gnd and any unsymmetrical fault was occurred it will show on display. Aurdino is a heart of our project it will detects the fault, analyses and classifies these faults and then, determined the fault distance. Then, the fault information is transmitted to the control room.[1]

Key words- Aurdino, GSM module, Relay, LCD, Transmission Line, Transformer

1. INTRODUCTION

Fault occurrence in power systems could result in losing their stability and cause severe damages in faulted devices or adjacent healthy devices. Also, stability proposition is charged as an important component in energy management and planning of power systems [1]. Moreover, during the motor starting period, it draws a large current from the system, results in voltage drop of system and poses disturbances to the normal operation of other loads. Various studies have shown that anywhere from 70%, to as high as 90%, of faults on most overhead lines are transient. A transient fault, such as an insulator flashover, is a fault which is cleared by the immediate tripping of one or more circuit breakers to isolate the fault, and which does not recur when the line is reenergized. Faults tend to be less transient (near the 80% range) at lower, distribution voltages and more transient (near the90% range) at higher, sub transmission and transmission voltages. Lightning is the most common cause of transient faults, partially resulting from insulator flashover from the high transient voltages induced by the lightning. Other possible causes are swinging wires and temporary contact with foreign objects. Thus, transient faults can be cleared by momentarily de-energizing the line, in order to allow the fault to clear. Auto reclosing can then restore service to the line.[2]

In now a days the electricity is very important in our life. In the power system there are various types of fault occurs due to natural calamity(like lightning, collision of branches of trees with the transmission line). Overloading due to this short circuit or fault may occurs like (line to line, line to ground, double line to ground). Out of these double line to ground fault is more savior in the power system which could damage the electrical equipment. So this fault should be remove as soon as possible. Mostly line to ground fault is occurred about the 80% in the power system.

2. TYPES OF TRANSMISSION LINE FAULTS

Power system's faults may be categorized as shunt faults or series faults. Single line-to-ground fault: The most common type of shunt faults is Single Line-to-ground faults (SLG). This type of fault occurs when one conductor falls to the ground or gets into contacts with the neutral wire. It could also be the result of falling trees in a rainy storm.

line-to-line fault: The second most occurring type of shunt faults is the Line-to-Line fault (LL). This is said to occur when two transmission lines are short-circuited. As in the case of a large bird standing on one transmission line and touching the other, or if a tree branch happens to fall on top of two power transmission lines

line-to-ground fault: The third type of shunt fault is the Double Line-to-Ground fault (DLG. This can be a result of a tree falling on two of the power lines, or other causes

Balance three phase: The fourth and the real type of fault is the balanced three phase, which can occur by a contact between the three power lines in many different forms.[5]

3. OBJECTIVES

To devise and program a PIC microcontroller based Numerical relay using Assembly Language to detect fault in Transmission lines. A smart GSM based fault detection and location system was used to adequately and accurately indicate and locate the exact spot where fault had occurred The time required to locate a fault is drastically reduced, as the system automatically and accurately provides accurate fault location information. To design an efficient

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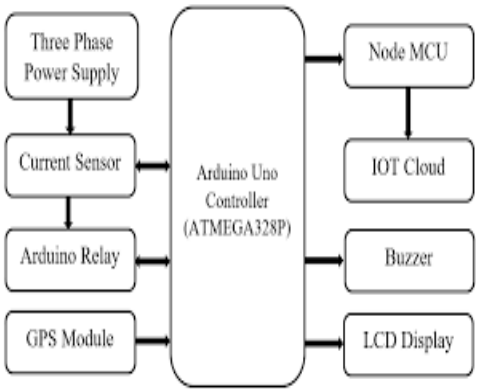
impedance-based and robust automatic fault detection and location system for overhead and underground power transmission lines. To reduce response time needed to rectify and save expensive transformers from damage or theft which usually occurs during longer power outages. To increase productivity of technical crews since the time needed to locate faults will be minimised. To ensure stability and reliability of the power supply system in the country to boost economic growth.[6]

4. BLOCK DIAGRAM



5. WORKING

With the increase in the power supply need for the growing population and improvement in the technology it is mandatory to maintain an uninterrupted power supply and in case of any fault occurring in the transmission or distribution side the phase must be rectified as soon as possible to provide consumer with an uninterrupted supply. In case of any phase fault occurring in the system and to monitor the current and voltage flow in the transmission line we have done a project based on IoT and GSM. In the block diagram the power supply unit represents the three-phase AC transmission line supply which represents the real time three phase power AC power supply [9]-[19]. The three-phase AC supply is connected with the voltage sensor and step-down transformer for reducing the voltage that is given as input to the Arduino. The voltage sensor is used to measure the voltage flow in the line and used to regulate the voltage that is supplied to the Arduino. The step-down transformer is connected to a rectifier circuit which converts the AC to DC to feed input to Arduino. The Arduino is connected to the IoT module, GSM module, and LCD display. The LCD displays the value of current and voltage. The IoT module is used to upload the data regarding the voltage and current in the transmission line. The GSM module is used as a device that transmits SMS alert to the authorized person and maintenance team to alert about any fault occurring in the transmission line. When phase fault occurring in the transmission line or any change in the value of the current and voltage the Arduino sends signal to the GSM module and IoT module which transmits the data to the cloud and alert message to the authorized person mobile number which is linked with the Arduino program. With the help of this technology, it will be easy to monitor and rectify the faults occurring in the transmission line as soon as possible.[8]

6. ADVANTAGES

- Work in real time response inter
- Coverage area in large compared to existing system
- cost efficient
- Devices enable by wireless communication • Number of components are used
- Economically reliable and low cost

7. APPLICATIONS

- Used in transmission line
- Used in distribution lineUsed in villages

8. FUTURE SCOPE

- Underground Line fault Detection
- Data Logging

9. CONCLUSION

In this paper a model design to solve the problems faced by consumer by using Aurdino. We can easily detect the type fault and solve it and there distance in real time, this prototype model is very effective. It is works in less time perfect distance of fault is locate. Avoid the future problem in transmission line.[1]

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