Transmission Line Fault Detector and Safety System

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Abstract- ***Electricity has become the most sought after amenity for all of us. Gone are the days when electricity would be only limited to cities. It is now reaching to every distant parts of the world. So we have now a complex network of power system. This power is being carried by the transmission lines. These lines travel very long distances so while carrying power, fault occurring is natural. These faults damages many vital electrical equipment like transformer, generator, and transmission lines. For the uninterrupted power supply we need to prevent these faults as much as possible. So we need to detect faults within the shortest possible time. This project is about designing the Numerical relay where the fault is detected when the input value exceeds the reference value set in the relay which then gives the trip signal to the circuit breaker. 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. Both methods could encounter various types of malfunctions is usually referred to as a "Fault". Fault is simply defined as a number of undesirable but unavoidable incidents can temporarily disturb the stable condition of the power system that occurs when the insulation of the system fails at any point. Moreover, if a conducting object comes in contact with a bare power conductor, a short circuit, or fault, is said to have occurred. In this study, the causes and effects of faults in the overhead transmission lines were the focus of the research. Some of the many causes of faults and some detection methods will be discussed. These faults lead to substantial damage to the power system equipment. In India it is common, the faults might be in the supply systems and these faults in three phase supply system can affect the power system.***

I. INTRODUCTION

In This Project We solve the big problem by our idea , These days when three phase transmission line first wire touch to second wire then that fault effect on substation and sometimes substation transformer fused so we make a system for transmission line all type of fault , for example in transmission any fault Line to Line fault or Line to ground fault or fire fault then that time automatic transmission line electricity power cut so our substation safe by that fault , So This is Our Idea For Solving this big problem. Relay acts as an electrical switch that is operated by a circuit of small power rating to control circuit of larger power rating. Electromechanical Relay operates on electromagnetic principle. It has a magnetic coil which is energized by electric current to behave as a magnet. These relays which prevents faults are called as Protective relays. Nowadays OVERLOAD relays are gaining more popularity than the traditional Electromechanical relays and used extensively to prevent faults due to its faster response, reliability, less cost, compact size etc. Overcurrent relay act on the principle that when the input current or voltage value exceeds the predefined set value then the relay works and sends a trip signal to the circuit breaker. This Project will be controlling the value of relay pickup current by the help OF SIGNAL. Fault is detected and Trip signal is generated when the input current value is greater than that of relay preset value.

II. LITERATURE SURVEY

Seada Hussen Adem, “Fault Detection, Protection and Location on Transmission Line” in 2020. This paper will review the type of fault that possibly occurs in an electric power system, the type of fault detection and location technique that are available together with the protection device that can be utilized in the power system.

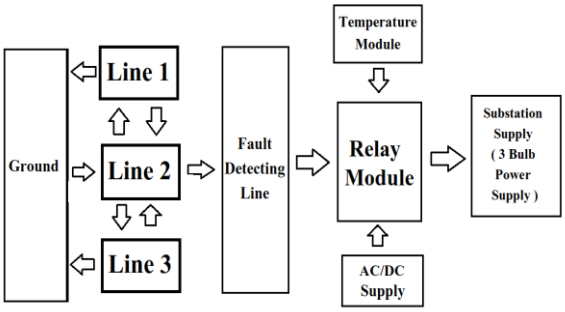
Avagaddi Prasad, J.Belwin Edward, K.Ravi, “Fault classification methodologies in power transmission” in 2018. This paper presents a survey on different fault classification methodologies in transmission lines.

Padma Bhushan Singh, October 2019, “Fault detection and its location evaluation”. This paper presents a complete review on the approaches used for fault detection, faulty section identification, fault classification and fault location evaluation in different configurations of transmission lines Abdul Qayyum Khan, Qudrat Ullah, Muhammad Sarwar, Sufi Tabassum Gul, Naeem Iqbal, “Transmission line fault detection and identification” in 2018. This paper proposes a novel hybrid technique to detect and identify transmission line faults in an interconnected network using the measurements from Phasor Measurement Units (PMUs).

III. METHODOLOGY

In this project we are showing 3 phase transmission line and that line we connected to relay module , and relay module connect to sensing line so when any two wire cut or any wire fall down and touch to earth that time always small back current generate in wire that back current sensing that signal sensing wire and signal sensing wire connected to relay module so relay directly cut the supply of substation so our substation save by that fault.

IV. BLOCK DIAGRAM



V. WORKING

For detection of transmission line faults like line to line and line to earth we are using innovative method of detection and automatic disconnection of the transmission line which prevent any kind of accident takes place on the transmission lines for this we are using arduino atmega328 microcontroller which is connected with different line and ground input at its digital pins and the digital pins are connected with the DC 5 volt power supply to maintain a safety in the operation we are using a DC level of voltages for lines for the operation of detection of fault.

The atmega 328 Arduino microcontroller is connected with 16 mhz crystal which is useful to generate oscillations and to execute the program for the detection of line to line we are using DC 5 volt and digital pin as soon as there is a short between the digital pin and vcc the microcontroller activate and disable the relay so the load gets disconnected the program executed inside controller continuously monitor the short circuit between the digital pin and vcc lines , the vcc line and the digital pin wires are arranged on the pole to monitor like a real transmission line.

For the operation of line to ground we are using the similar kind of a technique which we are used for line to line transmission in this case the digital pin wire is a hanged on the transmission line pole and in case of any disconnection or cable break the live wire fall on the ground and the ground potential is flows through the wire and reaches to the arduino controller and the program execute and immediately disable the relay to disconnect the transmission line.

To monitor any kind of fire or flame takes place on the transmission line detected by using a flame sensor which are connected nearby the cable joints as soon as any kind of a flame are fire captures on the transmission line pic immediately and send this signal to the microcontroller unit which further disable the relay to disconnect the transmission line for any further accidental damages.

The 7805 IC referred to fixed positive voltage regulator, which provides fixed voltage 5 volts. The 7805 regulator is known as fixed voltage regulator.

Fixed –Voltage regulator design has been greatly simplified by the introduction of 3-terminal regulator ICs such as the 78xx series of positive regulators and the 79xxx series of negative regulators, which incorporate features such as built-in fold back current limiting and thermal protection, etc. These ICs are available with a variety of current and output voltages ratings, as indicated by the 'xxx' suffix; current ratings are indicated by the first part of the suffix and the voltage ratings by the last two parts of the suffix. Thus, a 7805 device gives a 5V positive output at a 1mA rating, and a 79L15 device gives a 15V negative output at a 100mA rating. 3-terminal regulators are very easy to use. The regulators ICs typically give about 60dB of ripple rejection, so 1V of input ripple appears as a mere 1mV of ripple on the regulated output.

VI. ADVANTAGES

1) We can stop losses by line to line fault in transmission line.
2) We can stop losses by ground to line fault in transmission line.
3) We can stop losses by fire and temperature fault in transmission line.
4) Increases Transmission efficiency.
5) This project save fault in transmission line so our government money save.

VII. APPLICATIONS

1) Telephone lines.
2) Traces in Printed Circuits Boards.
3) Microwave applications, e.g., radar system, global positioning system (GPS).
4) High frequency, e.g., circuit boards etc.
5) Used for guiding electromagnetic waves.

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