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THREE PHASE TRANSMISSION LINE FAULT DETECTION AND ANALYSIS SYSTEM

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ABSTRACT

Transmission line is the most important part of the power system. Transmission lines a principal amount of power. The requirement of power and its allegiance has grown up exponentially over the modern era, and the major role of a transmission line is to transmit electric power from the source area to the distribution network. The exploded between limited production, and a tremendous claim has grown the focus on minimizing power losses. Losses like transmission loss and also conjecture factors as like as physical losses to various technical losses, Another thing is the primary factor it has a reactive power and voltage deviation are momentous in the long-range transmission power line. In essentially, fault analysis is a very focusing issue in power system engineering to clear fault in short time and re-establish power system as quickly as possible on very minimum interruption. However, the fault detection that interrupts the transmission line is itself challenging task to investigate fault as well as improving the reliability of the system.

Keyword: IOT, ESP8266, Arduino, Relay, GPS Module, etc

INTRODUCTION:

As we seen our surrounding the fault occurred in the transmission line is very common in rainy season and it is very dangerous for us. The electrical power system is growing in size and complexity in all sectors such as generation, transmission, distribution,

distribution so in this complex network fault is happened which results in several economic losses and reduce reliability of electrical system. We take care to resolve this fault as soon as possible, if we failed to resolve this then it can cause complete black our or grid failure. Generally the 70% to 90% of faults on overhead lines, most of the faults occurred due to lighting smiles, storm, flashover these is very harmful for the society. In transmission line this type of faults line to line faults line to ground fault there are many types of faults. Due to faults power failure and also damage the electric equipment.

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. 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. The remaining 10 - 30% of faults are semi-permanent or permanent in nature. A small branch falling onto the line can cause a semi-permanent fault. In this case, however, an immediate de-energizing of the line and subsequent auto reclosing does not clear the fault.

Instead, a coordinated timedelayed trip would allow the branch to be burned away without damage to the system. Semi-permanent faults of this type are likely to be most prevalent in highly wooded areas and can be substantially controlled by aggressive line clearance programs. Permanent faults are those that will not clear upon tripping and reclosing. An example of a permanent fault on an overhead line is a broken wire causing a phase to open, or a broken pole causing the phases to short together. Faults on underground cables should be considered permanent. Cable faults should be cleared without auto reclosing

and the damaged cable repaired before service is restored. There may be exceptions to this, as in the case of circuits composed of both underground cables andoverhead lines. This de-energizes the line long enough for the fault source to pass and the fault arc to de-energize, then automatically recloses the line to restore service. Thus, auto reclosing can significantly reduce the outage time due to faults and provide a higher level of service continuity to the customer. Furthermore, successful high-speed reclosing auto reclosing. on transmission circuits can be a major factor when attempting to maintain system stability. For those faults that are permanent, auto reclosing will reclose the circuit into a fault that has not been cleared, which may have adverse affects on system stability.

Effects of faults on transmission line:

Fault can damage or disrupt power systems in several ways. Faults increase the voltages and currents at certain points on the system. A large voltage and current may damage the insulation and reduce the life of the equipment, or can cause excessive heating which may result in fire Faults can cause the system to become unstable, and the three-phase system equipment operates improperly. And even the complete shutdown of the power system may occur.

Hence, it is necessary that, on the occurrence of the fault, the fault section should be disconnected. So, the normal operation of the rest of the system is not affected.

- **CLASSIFICATION OF FAULTS**

Symmetric faults In a three-phase system, if a fault affects all three phases equally, it is called a symmetric or a balanced fault. Generally symmetric faults constitute about 5% of the total faults. Asymmetric faults An unbalanced fault or asymmetric fault results in unequal effect of fault on each of the three phases. Asymmetric faults are further classified as LL or Line to Line fault, LG or Line to Ground fault and LLG or Double Line to Ground fault.

1. LL fault is a short circuit between two lines, caused by ionization of air, or when lines come into physical contact, for example due to a broken insulator.
2. LG Fault is a short circuit between one line and ground due to physical contact caused by lightning or storm.
3. LLG fault occurs when two lines come in contact with the ground and each other. This is mainly caused by storm damage. Transient faults In a system, if a fault diminishes when power is disconnected for a short period of time and then restored, the fault is referred as a transient fault. A transient fault may also be an insulation fault that

temporarily affects a device's dielectric properties. Transient faults may be caused due to momentary tree contact, animal contact, lightning strike, etc.

METHODOLOGY:

- **MAJOR COMPONENTS USED**
  - **Arduino Uno Controller:** Arduino Uno controller is the main element of the mission. All sensors are connected to Arduino and it controls all sensors through giving instructions. by using the use of Arduino we can do all things at low price. Arduino has analog and virtual pins through which we will manage the challenge by way of giving inputs in analog in addition to digital form. Current Sensor: On this task we have used
  - **Node MCU:** Node MCU is the open supply IoT based platform. The wireless firmware included on this, which runs on ESP8266 WiFi The version of Node MCU used in this challenge is 1.0 carries ESP-12E in which E stands for more advantageous.
  - **IoT Cloud Platform:** The IoT cloud is a large community that supports IoT gadgets and programs. The platform consists of the underlying infrastructure, servers and garage, it wished for actual time operations and processing.

- **BLOCK DIAGRAM**

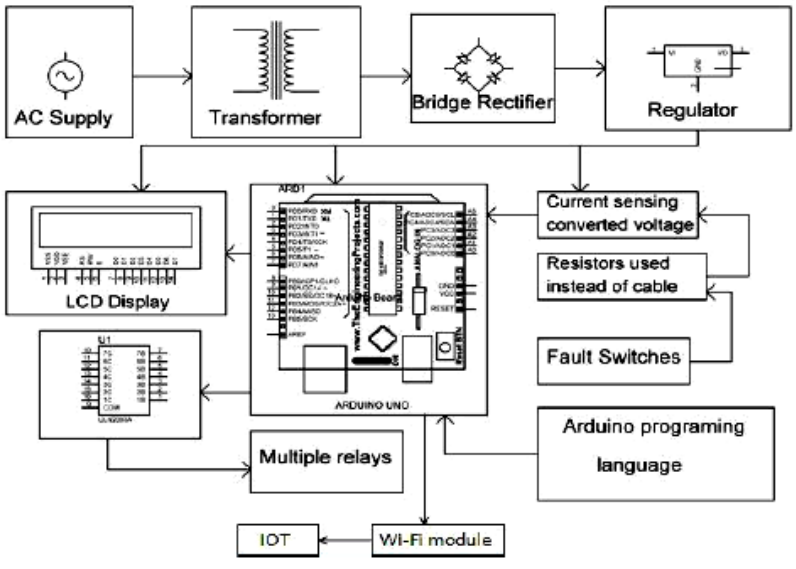

Fig. Block Diagram

- **WORKING**

The objective of this project is to determine the distance of line to ground and line to line fault from base station in kilometers using an Arduino board over IOT. This system is a

common practice followed in many urban areas. While a fault occurs for some reason, at that time the repairing process related to that particular cable is difficult due to not knowing the exact location of the cable fault. The proposed system is to find the exact location of the fault. The project uses the standard concept of Ohms law i.e., when a low DC voltage is applied at the feeder end through a series resistor (Cable lines), then current would vary depending upon the location of fault in the cable. In case there is a short circuit (Line to Ground/ Line to Line)The project is assembled with a set of resistors representing cable length in KM's and fault creation is made by a set of switches to cross check the accuracy of the same. The fault occurring at a particular distance and the respective phase is displayed on a LCD interfaced to the Arduino board.

Further this project can be enhanced by using capacitor in an ac circuit to measure the impedance which can even locate the open circuited cable, unlike the short circuited fault only using resistors in DC circuit as followed in the above proposed project.

- **ADVANTAGES**

The major advantage of the project is, it is not only save the appliance but it will also show the type of fault that has been occurred in the system so it will be easy for the operator to solve the problem easily. It will also check whether the fault is permanent or temporary fault.

CONCLUSION

This paper concludes that the Wifi technology used for the fault detection of three phase line through messages is provided to the In-charges of that location, by the means of communication protection schemes. The Messages of fault location will send to the In-charge at by the internal programming of Arduino connected toWifi Module. To get the exact faulty phase under abnormal condition has been occurred, the RYB Indicators are also provided for faulty phase indication purpose. Also this project helps to detect transformer temperature, when temperature rise to certain level transformer is automatically isolated from the system. If this system is implemented, our system will become reliable and faultless, which is our main vision in the project.

- **FUTURE SCOPE**

We can have a global positioning system (GPS) connected to it so it will send accurate location (latitude and longitude) of fault occur in transmission line. In future we can used appropriate programming for finding distance of fault from substation.

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