

Automatic Intelligent Transmission Line Fault Detector

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Abstract

The fault that occurred in the transmission line is very much dangerous for the locality. Transmission line protection is an important issue in power system. This paper presents a technique to detect the different faults detection on a transmission line for quick and reliable operation of transmission line. These faults directly affect the customers so that it must be found out and rectified as fast as possible. The exact fault location can help the serviceman to remove the persistence the faults and locate the areas where the faults occur regularly, thus reducing the occurrence of a fault and minimize the time of power outages.

Internet of Things (IoT) is a rapidly increasing technology. IoT is the network of physical objects or things embedded with electronic software, sensors, and network connectivity that enables these objects to collect and exchange data. IoT then deals with bringing control of physical devices over the internet. In this project, we are developing a system that will automatically monitor the transmission line faults and generate Alerts/Alarms or make intelligent decisions using the concept of IoT. The information regarding fault occurrence in a particular phase is sent to the web page via IoT device which is NODE MCU(Esp8266) and also shown on the display.

Keywords:

Internet of things, Microcontroller, Transmission line, Fault in transmission line, Rectification panel, Webpage.

1. INTRODUCTION

The main function of the electrical transmission and distribution systems is to transport electrical energy from the generation unit to the customers. Generally, when the fault occurs on transmission lines, detecting fault is necessary for the power system to clear the fault before it increases the damage to the power system. 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 a signal to the relay. Fault detection is an important task to protect electric power systems. Protection of the transmission line is an important part of power system engineering because 85-87% of faults of the power system occur in the transmission lines.

Power system reliability and fault detection has the most important requirement and to ensure good quality and also the continuous power supply to consumers. Due to a lack of a monitoring system, the utility does not get timely data on the health of lines. The utility comes only when there is a serious fault. If there is continuous monitoring of the transmission lines and if the data is available on the internet, then the utility can take required actions in advance to avoid serious damage.

The purpose of this paper is to present an accurate method to detect the different faults in the transmission line.

2. BLOCK DIAGRAM

The block diagram for the proposed system is shown below.

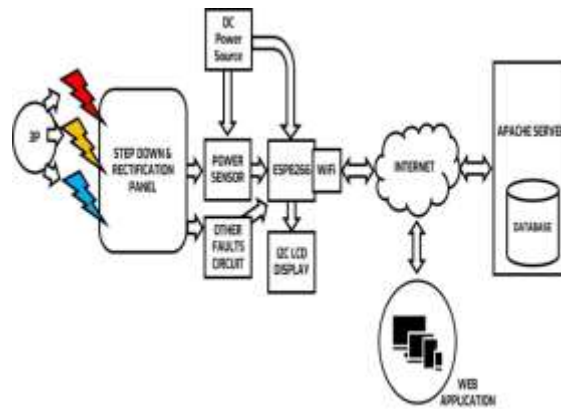


Fig. 1. Block Diagram

3. CIRCUIT DIAGRAM

The circuit diagram for the proposed system is shown below.

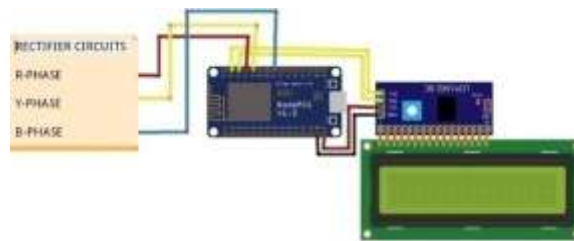


Fig. 2. Circuit Diagram

4. COMPONENT LIST

- Transformer 230/6 Centre Tapped.
- AC Power Switch
- Small Zero/Dot PCB
- Node MCU Dev Board PCB
- Node MCU CP2102 ESP8266
- 16x2 LCD Display
- DC Adapter 12V/2A
- POT 10K
- Capacitor 1000u/25v
- IC 7805

5. WORKING AND OPERATION

After Power ON, the project initializes with all sensors & actuators. It will continuously read for R, Y, & B Faults. If a fault occurred it NodeMCU ESP8266 will create HTTP Request & send information through the same request to the Web Server having fault information. Server record this info & store it in the database along with Time & Date.[3]

6. INTERNET OF THINGS (IoT)

The Internet of Things, or IoT, refers to the billions of physical devices around the world that are now connected to the internet, all collecting and sharing data.

IoT is a new revolution to the internet due to the advancement in sensor networks, mobile devices, wireless communication, networking and cloud technologies.

Characteristics of IoT:

Various characteristics of IoT are:

- Dynamic and self-adapting.
- Self-configuring.
- Interoperable Communication protocols.
- Unique identity.
- Integrated into information network.

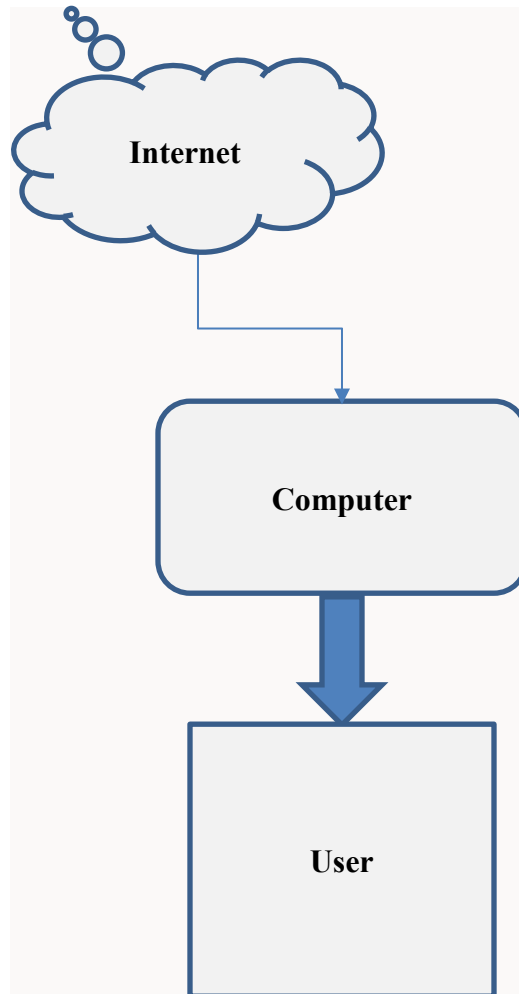


Fig. 3. Internet of things

7. TESTED RESULT

The three-terminal is connected to the switch when one switch is on and the 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. the switch is ON and another switch which is connected between terminal Y and B is OFF hence its shows the fault.)

Fault Category	Design	Result
Line	L1, L2, L3	R, Y, B phase status Indication off & same status show on web screen in red color
Line-Ground	L-G	Fault status show on web screen in red color
Line-Line	L-L	
Line-Line-Ground	LL-G	
Line-Line-Line	LLL	
Line-Line-Line-Ground	LLL-G	
Over voltage fault		

A. Applications

- Used in transmission line
- Used in distribution line

B. Future scope

- Underground Line fault Detection
- Data Logging

C. Advantages

- Using such a method can easily detect the fault and resolve it.
- The coverage area is large compared to the existing system.
- Devices enabled by wireless communication.
- It works in real-time and maintains all datasheets.
- Minimize the time of power outages.
- Economically reliable and low cost.
- Avoid future problem in the transmission line.

8. CONCLUSION

IoT based transmission line fault monitoring system is proposed. The model design in such a way as to solve the problems faced by the consumer. By using such a method, we can easily detect the fault and resolve it. It works in real-time so we maintain all data-sheet and the avoid future problems in the transmission line. The system uses Arduino to detect fault occurrence with the help of software developed, which works on analyzing the voltage drop in the transmission line. The fault location is transmitted to the control center using a Wi-Fi module.

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