

Smart Fault Detection of Transmission Line

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Abstract

This paper deals with the fabrication of an IoT device deliberate to detect the fault in transmission lines from the base station using an Arduino microcontroller kit and display the result through a web page. Easily or quick fault detection can help protect the equipment by allowing disconnection of faulted lines before any major damage of the equipment as energy leakage is one of the major problems. In this project, we are developing a system that will automatically monitor the transmission line fault and generate Alerts/Alarms or make intelligent decisions using the concept of IoT.

The fault occurring, phase, Wi-Fi connectivity, and time are displayed on a 16X2 LCD interfaced with the microcontroller. IoT is used to display information over the Internet using the Wi-Fi module ESP8266. A webpage is created using HTML coding and the information about the occurrence of a fault is displayed in a webpage.

Keywords: Internet of things, Microcontroller, Transmission line, Fault in transmission line, Automatic Fault detection techniques, 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 the 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 in 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 internet of things or IoT, is a system that is connected between the devices, analog, mechanical and digital machines, objects, animals, or people that are provided with unique identifiers (UIDs) and the ability to sending data over a network without requiring human-to-human or human-to-computer interaction. The Internet of Things is simply defined as "A network of Internet-connected objects able to collect and transfer data". IoT is the concept of connecting any device.

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

2. ARCHITECTURE AND WORKING OF THE SYSTEM

The block diagram for the proposed system is shown below. ESP 8266 is used to analyze the data and transmit the information very quickly.

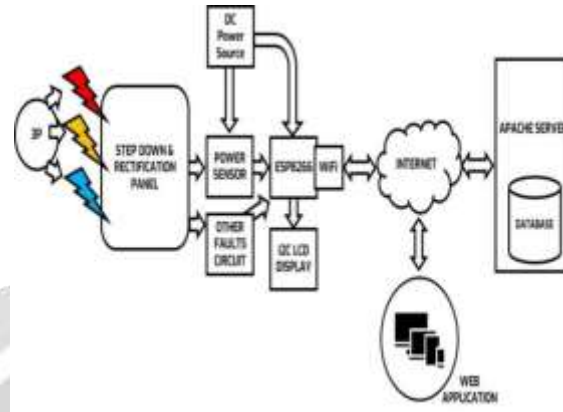


Fig. 1. Working Diagram of the system

The paper proposes a very simple, fast efficient, and cost-effective approach to detect the fault in the transmission network. 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 wherein it compares with the predefined value for fault condition and sends information to the control center. Figure 1 shows the working diagram for the proposed system.

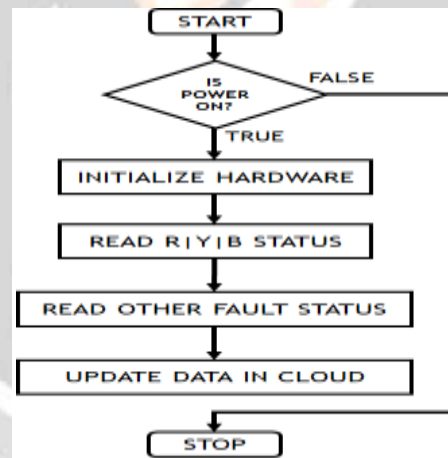


Fig. 2. Flow Chart Strategy

3. EXPERIMENTAL RESULT

The result of the practical test conducted on the experimental set-up is presented here. The test includes those to verify the proper working of the laboratory-developed module of the transmission line. The entire setup is shown in Fig. 3.



Fig. 3. Project Image

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.[2]

4. CONCLUSION

IoT based transmission line fault monitoring system is proposed. The system uses Arduino to detect the distance of 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. The benefits of this system are

- Reduces the time to detect the fault in the transmission line.
- Fast repair to revive back the power system.
- Improves the performance of the system
- Reduces the operating expense.
- Avoid future problems in the transmission line.

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