International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 07 | July 2020 www.irjet.net p-ISSN: 2395-0072

Detection of Fault and Location in Overhead Transmission Lines using Internet of Things

Vivek Kr Verma[1], Vipul kumar[2], Shriyam Singh[3], Vikas Gupta[4]

[1]Assistant Professor, ABES Engineering College, Ghaziabad, Uttar Pradesh, India
[2-4]Students, ABES Engineering College, Ghaziabad, Uttar Pradesh, India

---

Abstract - *In recent times there are numerous challenges in the field of power system engineering. One of the major problems is the occurrence of a fault in overhead transmission lines. Fault detection in the electric transmission line has always been an important topic in the power system as they run millions of kilometers across the country. The early detection of a fault in overhead cables can significantly enhance the reliability, safety, and economic issues of power systems. This paper helps in describing an automatic way to determine the fault in OC and inform to specific authorities of that location. In this project, a device has been introduced which will use the incoming and outgoing values to detect abnormalities with the help of sensors. This paper deals with the straightforward concept of Ohm's law. Whenever any fault occurs in transmission lines such as short circuits, the resistance becomes small, and the current becomes too high and there is also a change in voltage. The microcontroller senses the voltage changes and as per the programming, it provides fault information and displays the location of the fault and in which phase fault has occurred on LCD as well as on blynk(Android app) with the help of Wi-Fi Module(ESP8266).*

Key Words: **Overhead Cables (OC), Liquid Crystal Display (LCD), Wi-Fi, Internet Of Things (IoT).**

1. INTRODUCTION

1.1 BACKGROUND

In a power system, transmission lines play a very important role to transmit the power from one end to the other end[1]. It helps in delivering power to the household, companies, and industries. Therefore to deliver minimally interrupted power supply, there is a need to locate the fault and identifying the types of fault.

Fault detection in the electric transmission line has always been an important topic in the power system. The early detection of a fault in overhead cables can significantly enhance the reliability, safety, and economic issues of power systems[2]. Whenever any fault occurs in overhead cables, detection of fault is very necessary to clear the fault and to avoid any damage to the electrical components[3]. One of the most common reasons for the fault in the overhead cables is the failure of insulators[4]. Some unexpected faults arise due to falling trees, wind speed, construction work, etc. These disturbances are responsible for short circuit conditions in overhead transmission lines[5].

1.2 OBJECTIVE

When any fault occurs in overhead cables then the resistance of the cable is affected accordingly there is a change in voltage as well as in current[6]. A microcontroller which is programmed provides a specific value of resistance voltage drops digitally, that are connected in series. An ADC converter converts the distance in units from the base station and the final result including the location details and type of fault will be displayed on a BLYNK (Android app) or on a web page using IOT[7].

This paper helps to design an automatic fault detection and location system for overhead power transmission lines to avoid any mishappening and also helps in providing protection to the electrical equipment[8]. It reduces human efforts and also saves time to find the location of the fault.

2. IOT

Internet evaluation in the electrical industry transformed things[9]. Generally, the boom in wireless technology came due to the Internet of Things. This wireless connectivity connects our household, infrastructure to power industry. Now Indian Government starts connecting power grids using IoT to each other so that power loss and fault detection can be minimum and frequently respectively. This makes the grid and Smart grid system which is more reliable. The devices in IOT collects data from various sensors are attached. IOT system has various layers and these layers are Perception layer, Network layer and application layer. The perception layer includes internet enabled devices that detect objects and collect information. It includes Sensors, GPS, RFIDs.

The Network layer forwards data from the perception layer to application layer under some protocols. IoT uses a combination of short range communication protocols and internet. Internet protocols like Wi-Fi, 2G, 3G, 4G, and short-range protocols are Bluetooth, Zigbee. The application layer where incoming information is processed for better power management.

The interconnection of devices and sensors under some protocol provides automation in the field of applications like smart grid smart cities[10]. The main aim of IOT is

connecting things like devices, sensors but also allowing the devices to exchange and successfully communicate the data and other useful information. The data collection is performed via a cloud-based application.

Basically the internet is a client-server system, the information that can be accessed using the internet, there are two components: server and client. The client request the information from the server and server stores the various information. When the client requests for the information from server, the server software transfers the data via Hypertext Transfer Protocols (HTTP) which is a communication protocol.

3. METHODOLOGY

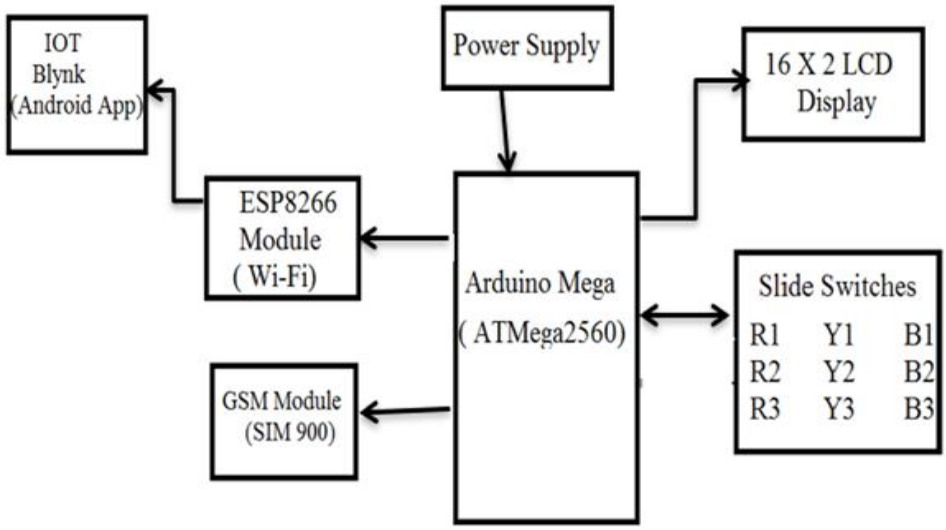
This paper deals with the determination of fault and location of the fault. This prototype deals with the principle of OHM's law. When a small dc voltage is a feed at the one end of the overhead cable using a set of resistors, then there will be a change in current based on the position of fault in a cable.

There are 7 switches (representing as fault switches) these switches can create a line to line faults i.e (L-L, L-L-L faults) and line to ground faults (L-G, L-L-G), etc.

Whenever any fault occurs in transmission lines such as short circuits, the resistance becomes small, and the current becomes too high and there is also a change in voltage. Then it is given to the ADC converter of Arduino board and this converter generates digital data and this data helps in providing the information of the location of the fault and in which phase fault has occurred. Then the final result will be displayed on an LCD interfaced with the microcontroller.

The microcontroller used is Atmega 2560 which is a High-Performance Low Power CMOS 8- Bit microcontroller and we have also interface this project with IoT so whenever there is any fault occur in transmission line a message will be sent to the registered mobile number showing the location of the fault and in which phase fault has occurred and it is also displayed on a blynk (Android App) with the help of Wi-Fi module(ESP8266).

4. BLOCK DIAGRAM OF PROPOSED SYSTEM



5. COMPONENTS USED FOR PROPOSED SYSTEM

5.1 Arduino UNO

5.2 LCD Display

5.3 Wi-Fi Module (ESP8266)

5.4 Transformer

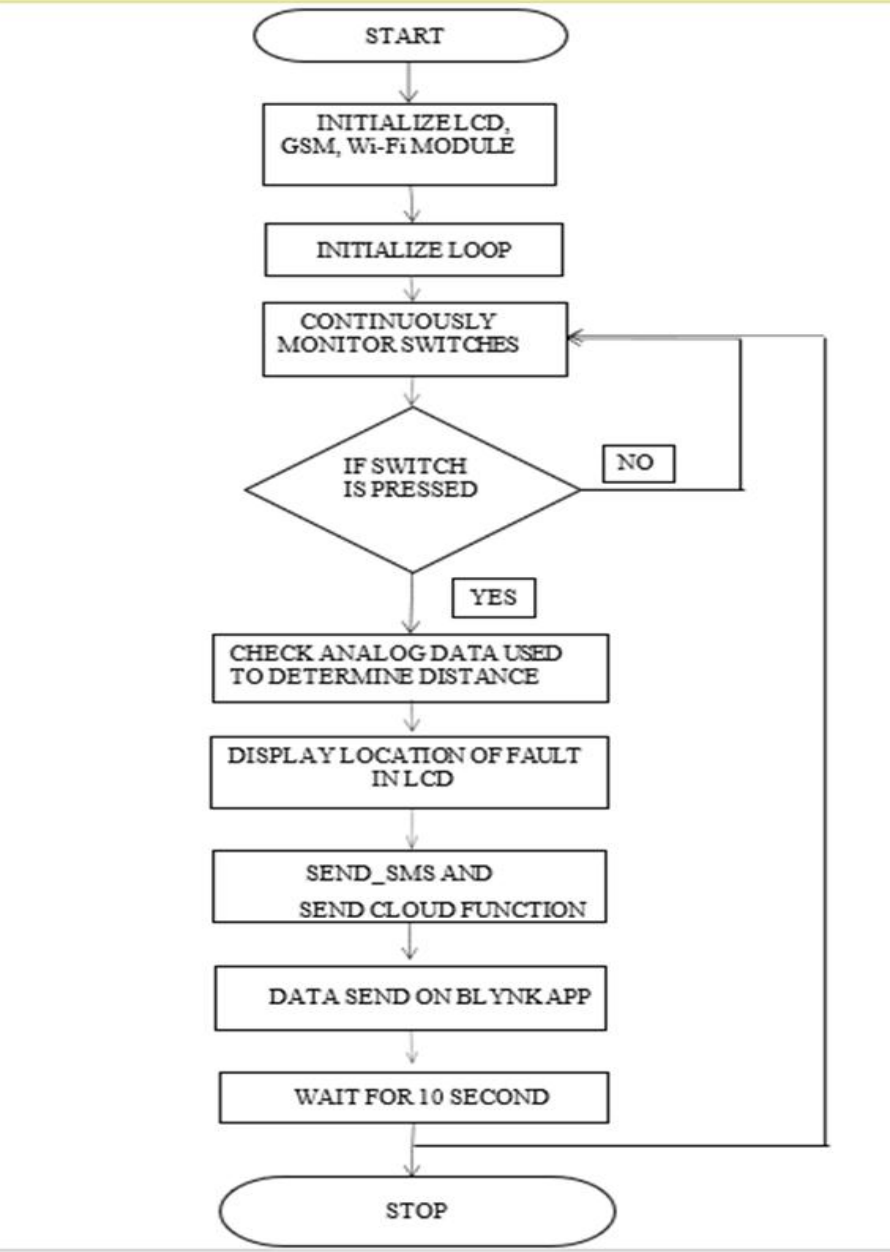
5.5 Capacitor

5.6 Resistors

5.7 Voltage Regulator (IC7805)

5.8 Printed Circuit Board (PCB)

6. FLOW CHART



7. ADVANTAGES

7.1 Devices and sensors communicate wirelessly.

7.2 Less number of man required for time to time observation.

7.3 Economically reliable.

7.4 Faults can identify and rectify immediately.

8. CONCLUSION

The ohms law used to locate fault point in three phase overhead transmission lines. In this method the resistance of feeder is already calculated, and the voltage difference across feeder changes according to the fault current varies. The fault detected by the change in voltage in the feeder. By using microcontroller, the fault point can be located precisely. Whenever the fault happens, the location and type of fault displays on LCD screen. The reliability of existing system is very poor. This method is more reliable to locating and finding the type of fault in three phase overhead lines

REFERENCES

[1] R. V Deshmukh, "Combine Study of Transmission Line Fault Detection Techniques," vol. 3, no. 2, pp. 264–267, 2014.

[2] "Line Fault Detection and," pp. 127–132.

[3] K. K. A. P. Eee, "Wide Area Fault Location in Transmission Line using Differential Protection Strategy," vol. 7, no. 02, pp. 2–6, 2019.

[4] M. Khandelwal, "A Review on Transmission Line Faults Detection," Int. J. Electr. Eng. Technol., vol. 7, no. 2, pp. 50–58, 2016.

[5] A. Sharma, A. Nirwan, and A. S. Shekhawat, "Fault Analysis on Three Phase Transmission Lines and its Detection," vol. 5, no. 2, pp. 229–233, 2017.

[6] G. S. Nandakumar, "Fault Detection in Overhead Power Transmission," Ijpam.Esu, vol. 118, no. 8, pp. 377–381, 2018.

[7] A. Sharma, H. Sharma, and I. Ahmed, "Arduino Based Underground and Overhead Cable Fault Detection," Int. J. Eng. Inf. Syst., vol. 1, no. 9, pp. 63–69, 2017.

[8] M. Mounika, "A Novel Method of Issue Identification in Induction Motors using Smart Sensors," Int. J. Res. Appl. Sci. Eng. Technol., vol. 6, no. 3, pp. 369–374, 2018.

[9] A. Raza, A. Benrabah, T. Alquthami, and M. Akmal, "A review of fault diagnosing methods in power transmission systems," Appl. Sci., vol. 10, no. 4, 2020.

[10] A. Prasad, J. Belwin Edward, and K. Ravi, "A review on fault classification methodologies in power transmission systems: Part-II," J. Electr. Syst. Inf. Technol., vol. 5, no. 1, pp. 61–67, 2018.