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IOT BASED FAULT DETECTION IN A TRANSMISSION LINE

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Abstract: The main aim of this paper is to identify which type of fault occurred in the transmission line. The transmission line is defined as power transmitted from generating stations and substations via transmission lines to the consumers.it is needed to rectify the faults that occurred in the line. generally, the most frequent occurrent faults are open circuit and short circuit faults .due to these faults affects the reliability of the power supply. to find which fault occurred in the line and in which phase occurred. So, by connecting the current sensing device to the Arduino we can detect the type of faults that occurred in which phase by using Arduino and IoT based Blynk application

Index Terms - Transmission line, IoT, BLYNK, WIFI Module, Current Sensor.Atmega328

I. INTRODUCTION

The transmission system is a bridge between generating and distribution systems. The fault is defined as the deviation of voltages and currents in the line .due to this voltages in the line become unbalanced. The most frequent faults in the transmission line are the open circuit and short circuit faults. The occurrence of the short circuit faults affects the actual load and Voltages which can damage the electronic devices and also due to these faults it also affects the efficiency of the line. It is important to detect which type of fault occurred in the system . for quick identification of type fault in line, we designed Arduino Atmega328 and also the IoT technology by creating an application, The type of the fault can be displayed on the LCD. In this way, we detect the type of faults in the transmission line

2 . FAULTS IN THE TRANSMISSION SYSTEM

Electrical faults are simply defined as the deviation of voltages and currents from their normal values. When the fault occurs, it affects high currents to flow under voltage, high voltage surges, and reversed power which leads to damage to the equipment's in the line

Mainly following faults exist in the power system

2.1 Open circuit faults

An open-circuit fault occurs if a circuit is interrupted by a failure of a current-carrying wire(phase or neutral) or blown fuse or circuit breaker

A. SYMMETRICAL FAULTS

This type of fault occurs infrequently, when a line, which has been made safe for maintenance by clamping all the three phases to earth, is accidentally made alive and cuts quickly through the whole calculation and generally pessimistic answers. These are of two types

(i) **Line to Line to Line (L-L-L) Fault**: All three phases of the system are short-circuited with each other

(ii) **Line to Line to Line to Ground (L-L-L-G) Fault:** All three phases of the system are earthed. The probability of occurrence of such fault is nearly 2-3 percent in the power system network.

B) Unsymmetrical Faults: The term unsymmetrical fault is used to mean an unbalanced condition. It is a connection or situation which causes an unbalance among the three phases. An unsymmetrical shunt fault is an unbalance between phases or between phase and ground. A series fault is an unbalance in the line impedances. These are of the following types

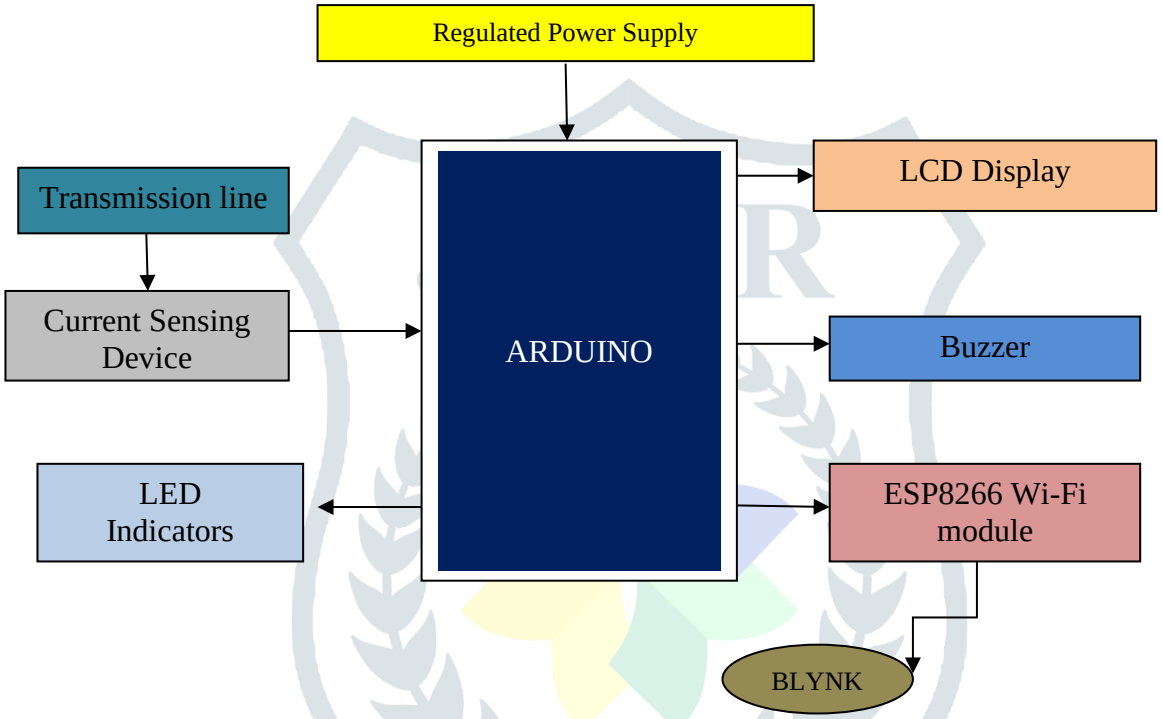
(i) Line to Ground (L-G) fault: It is the most common fault and65-70 percent of faults are of this type. It causes the conductor to make contact with the earth or ground.`

ii)Double Line to Ground (L-L-G) fault: The 15 to 20 percent of faults are double line to ground and cause the two conductors to make contact with the ground.

WORKING :

In this paper, fault monitoring can be done in the transmission line. For this, we should connect the Arduino to the current sensing device and the ESP8266 Wi-Fi module, and also the LCDs. the operation of the Arduino is to detect the fault in the transmission line and display on the LCD the type of fault that occurred in the transmission line. The ESP8266 Wi-Fi module is connected to Arduino by turning on the mobile hotspot it is connected to the Blynk application so by entering the user name and password in the Blynk application we can get the alerts to mobile or laptop which type of fault is detected in the transmission line. In this way, the prototype works

3. PROPOSED METHODOLOGY



3.1 ARDUINO UNO

The Arduino UNO board mainly consists of a microcontroller which is ATmega328P, a USB jack, a mini power jack, and a reset button. UNO has 14 digital input/output pins (from which 6 can be used as PWM pins), 6 analog input pins, a 16MHz crystal oscillator, and ICSP pins. This Arduino board gets a power supply from a USB cable when it is connected to the PC, or directly from the power supply jack. It is also supported by the number of libraries that makes programming easier. we use embedded C programming for this prototype.it is connected to the current sensing device and the Wi-Fi module an (ESP8266), LCD. Its operating range is up to 5V

Fig – 1 Arduino Uno

3.2 LCDS

A liquid crystal display also known as an LCD is one of the display units which displays the type of fault that occurred in the transmission line in the form of a visible image. The 16×2 LCD is a very basic module commonly used in DIYs and circuits. The 16×2 translates the display 16 characters per line in 2 such lines.

Fig - 2 LCD Display

3.2 Buzzer:

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren

Fig - 3 Buzzer

3.4 LEDs *:*

A Light-emitting diode is a semiconductor device that emits light when an electric current flows through it. When current passes through an LED, the electrons recombine with holes emitting light in the process. LEDs allow the current to flow in the forward direction and block the current in the reverse direction.

Fig - 4 LED Lights

PROTOTYPE

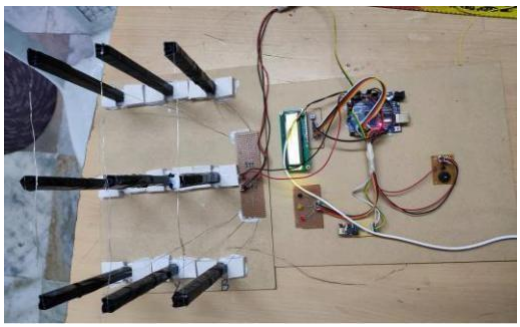


Fig - 5 Prototype

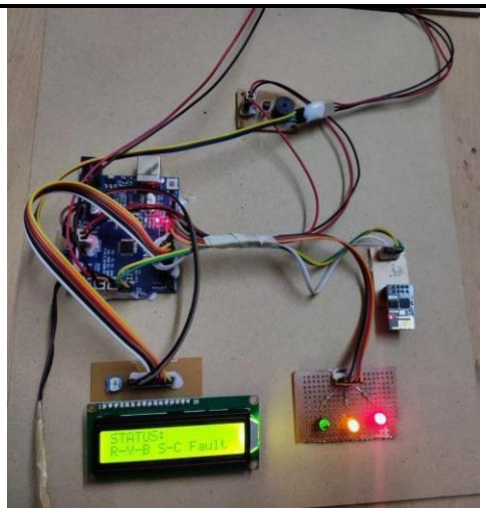


Fig - 5.1 Prototype

RESULTS AND DISCUSSIONS

When the R-Y-B has short-circuited the fault shows Lcd

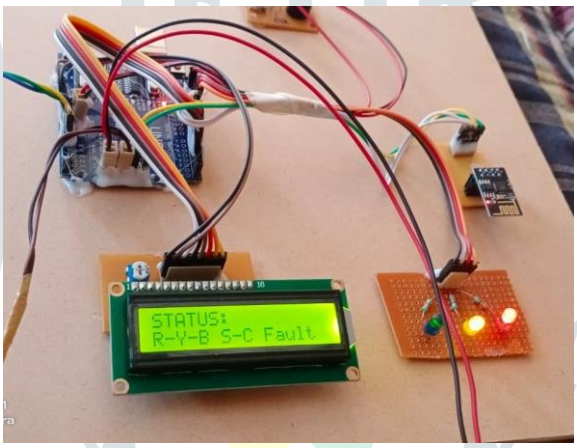


Fig - 6 R-Y B Short Circuit Fault

Y-B Short circuit fault shown below

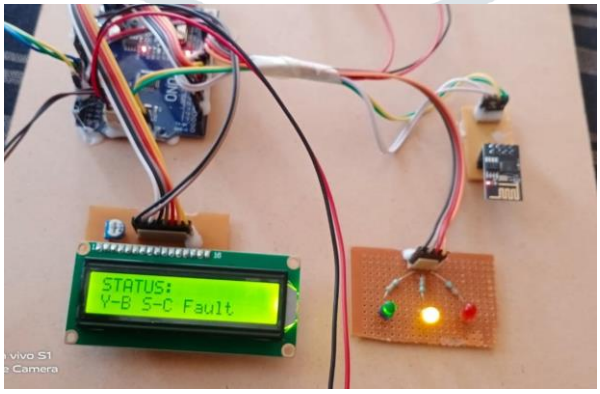


Fig - 7 Y-B Short Circuit Fault

When O.C circuit fault is detected by Arduino it shows in the LCD in this way

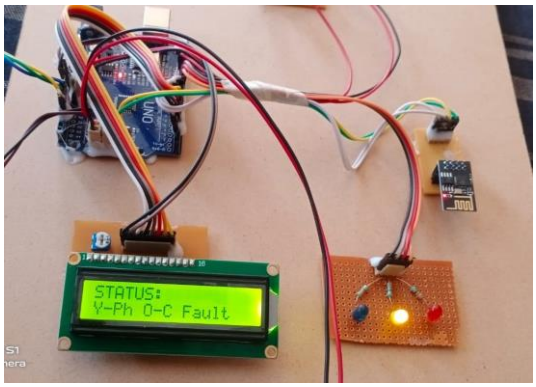


Fig - 8 Y Open Circuit Fault

In the Blynk application, The fault is shown in this way

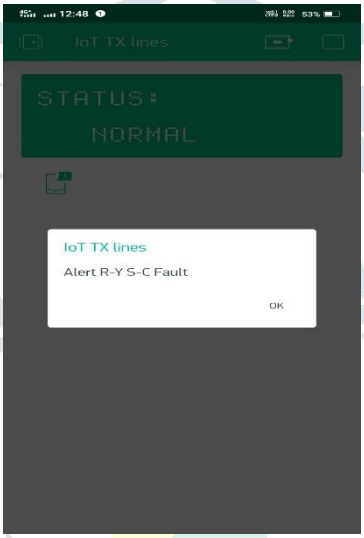


Fig – 9 R-Y Short Circuit Fault in Blynk Application

When a fault is detected it gets a notification on mobile in this way

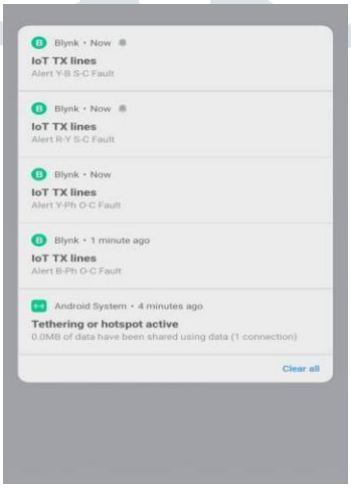


Fig - 10 Notifications when Fault Occur

CONCLUSION

By this prototype, we conclude that it detects the type fault in the transmission line with the help of Atmega328 and ESP8266 Wi-Fi module in an IOT-based application. so it is necessary to correct the fault in the line. The benefit of the fault repair to revive back to power system lead to improve efficiency and good reliability is obtained. Using this system is possible to identify the exact faulty phase under abnormal conditions. It also reduces the operating expense and the time of operation in the line. the Arduino gives us the status of the line and displays it on the LCD and also through the Blynk application we can know the type of the fault. In this way, the IoT based fault detection in the transmission can be done

FUTURE SCOPE

1. By this prototype we can also detect the exact location where the fault occurs in the line in Km Or m range
2. The system can be tested in real-time fault monitoring

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