A Novel Method for Maintenance of Electric Power Distribution Line using Wireless Sensor Network

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ABSTRACT

Detecting and locating fault in power line is very necessary for healthy operation of power system. In electrical power line fault often occur many times making the power system unreliable. In this paper a novel concept using wireless sensor for detecting fault which includes phase to phase, short circuit and mainly line to ground fault in power line for better reliable and optimum operation of the system is presented. In the proposed concept power line is divided by WSN (Wireless Sensor Network) nodes that could sense the faulty condition in power line, display to operator as well as send SMS through GSM modem to service engineer.

Keywords: WSN, GSM, SMS, Arduino, MCB

I. INTRODUCTION

In development of nation power sector provides one of the most important input especially in moderately developing nation. In India, the consumption of electricity is increasing at much faster rate. Electrical power system is been divided into generation, transmission & distribution.

Losses in distribution system are much higher than losses in transmission side and also fault are more frequent in distribution side. In distribution system most of the losses are caused by faults like voltage fluctuation & short circuit.Detecting and locating fault in power line is very necessary for healthy operation of power system. In electrical power line fault often occur many times making the power system unreliable. When fault has occurred then it becomes challenging for the Power Company to detect fault and identify the exact location.

The reliability can be improved with the help of sensors. The sensor itself is a testing field for the state-of-art technologies. Where sensors are, install to detect the abnormal flow of power through the distribution line. Protection systems are designed in such a way that when a fault has occurred it controls the MCB and notify to authority about fault. Then exact

location is sent through the android application. This way we can significantly improve the reliability of Electric Distribution line.

II. RELATEDWORK

Electrical distribution lines are always a risk to work with. However, on the power distribution lines, which are often spread out over wide areas, can create many problems like voltage fluctuation & short circuit. There may be problems related to two consecutives lines passing out from the transformer. In these cases, it becomes difficult to detect where exactly the problem is. Thereafter we need to examine the whole distribution line from the sub-station to place where fault has occurred. So a much time is required to detect the exact fault and where it is located. These overhead can be reduced with the help of sensors where they will notify to the android application about the exact location and the problem.

Generally, when a fault occurs in Distribution or Transmission line, unless it is severe it is unseen. But gradually these minor faults can lead to damage of transformer. It may also initiate fire. Present day in India, we do not have a system in hand that would let us know in real time once a fault occurs. Matter of concern is that since we do not have a real time system, this leads to damage of the transformers and power lines and turns out to be a threat to human around. In order to avoid such incidents to the maximum extent, maintenance or checking distribution lines are generally carried out on frequent bases. This leads to increased manpower requirement. These human efforts can be reduces using sensor system which helps us in detecting those faults.

III. OBEJECTIVES

A. Designing hardware system for

- Short circuits detection

- Detection of oscillatory motions of physical lines due to adverse weather conditions such as high winds.

-Prior alert regarding abnormal current flow.

-Affected region location detection.

-Alerting MCB.

B. Designing an android application for notifying the appropriate authority regarding the problems detected by the hardware system.

IV. EXISTING SYSTEM

In distribution system most of the losses are caused by fault and theft. In this paper the focus is on single phase to ground fault in power line. When single phase to ground fault occurs, it

becomes significant to detect fault quickly and with accuracy. It becomes challenging for the power company to detect and repair the fault as quickly as possible.

Protection system is designed to identify the location of faults and isolate only the faulted session in order to not to damage the whole equipment in power system. In the proposed concept with the use of wireless sensor network exact location of fault can be diagnosed. There was providing optimums operation of electric power the objective of this paper is to provide with the simple way to detect a fault and show the exact location of occurred fault which will ultimately lead to optimum operation of the whole system and to improve the reliability of distribution network.

V. PROPOSED WORK

A. System Architecture Diagram :

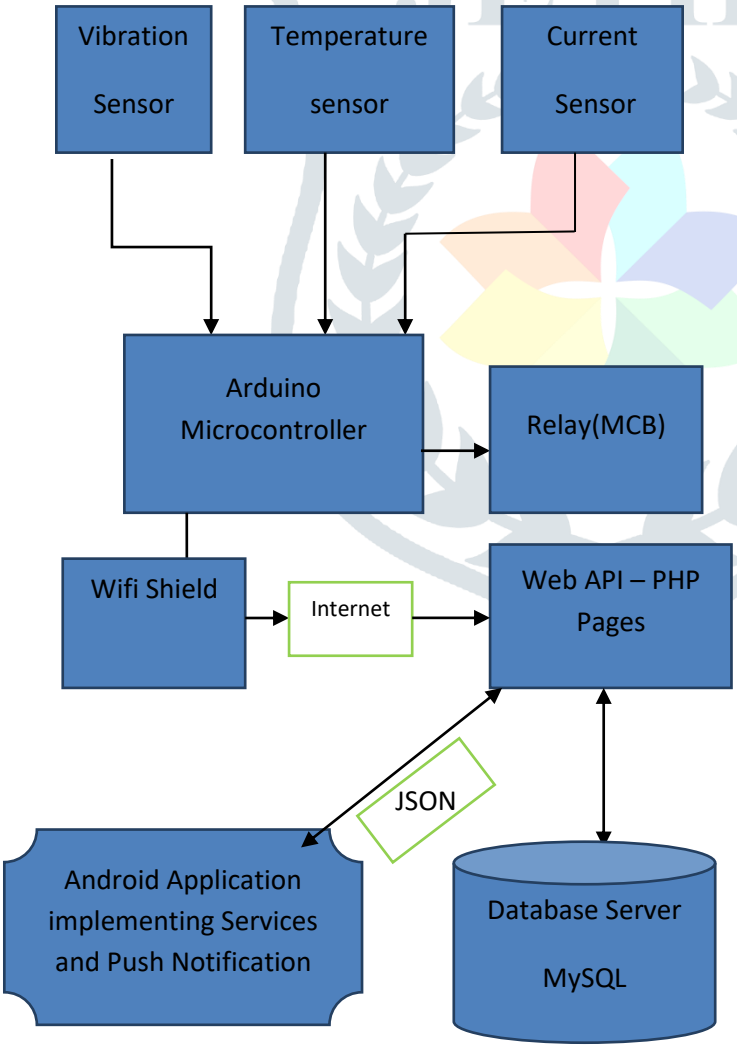


Fig.5.1 System Architecture Diagram

VI.REQUIREMENTS

A.SENSORS:

1. Temperature Sensor: DHT11 Temperature & humidity sensor features a calibrated digital signal output with the temperature & humiditysensor complex. It has a sense of temperature measuring devices.

2.Current Sensor : It is used to measure AC/DC current up to 5A.The sensor can even measure high AC mains current & is still isolated from the measuring part due to integrated hall sensor.

3. Vibration Sensor: It detects the vibration beyond the threshold .We Have a vibration Sensor SW-420.

B.Wi-Fi Shield :

The Arduino Wifi Shield allows an Arduino board to connect to the internet using the Wifi library & to read & write an SD card using SD library.

C.Arduino Microcontroller:

Arduino is an open source hardware/software programming platform based around microcontrollers.

VII. WORKING

Distribution line can be monitored using sensors like vibration sensor, current sensor &temperature sensor. These sensors are connected to the Arduino using connectors (Male/Female). If any fault has occurred, sensor detects that fault and thenit sends the information to Arduino. Arduino controls the output for obtaining desired result with exact location.We notify to authority through android application about faults information, which is send by Arduino. And also it gives exact location of fault.

Faults can be defined as the flow of a massive current through an electric line path, which could cause enormous equipment damage; this may lead to interruption of power, personal injury, or death. To overcome this we control the MCB through Arduino. When oscillatory motion of physical lines due to adverse weather conditions is detected then MCB is off for temporary time period until weather conditions get normal. And when short circuit is occurred then MCB will off permanently.

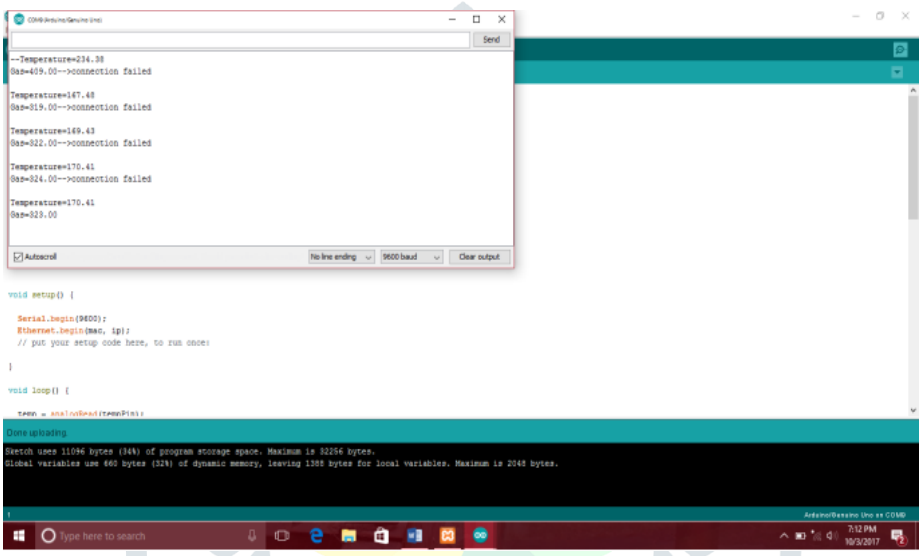
Authority notification:

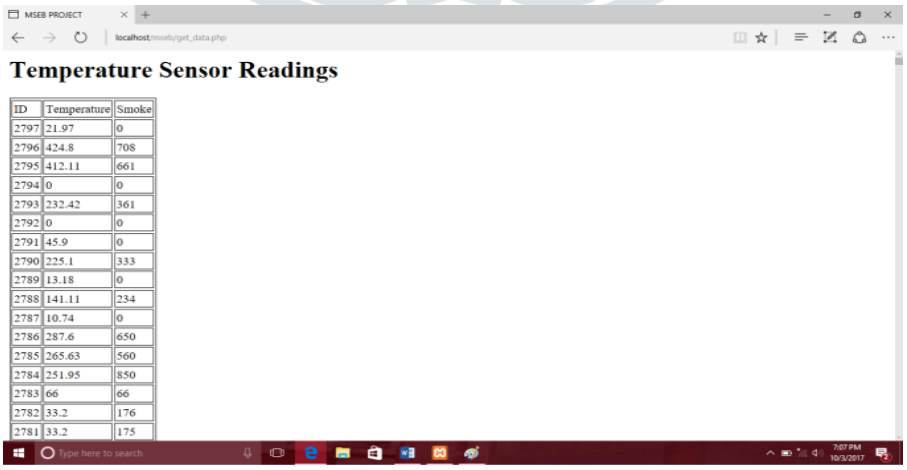
When fault is occurred then MCB is off. Then information is sent about MCB to authorized user through android application. When fault is fixed then MCB is restarted.

WEB API and Database:

Communication between Arduino and android application is done with help of WEB API using PHP language. Database is used for storing the notification about faults.

VIII. Results





ID	Temperature	Smoke
2797	21.97	0
2796	424.8	708
2795	412.11	661
2794	0	0
2793	232.42	361
2792	0	0
2791	45.9	0
2790	225.1	333
2789	13.18	0
2788	141.11	234
2787	10.74	0
2786	287.6	650
2785	265.63	560
2784	251.95	850
2783	66	66
2782	33.2	176
2781	33.2	175

IX. ADVANTAGES

- In the short time we can able know the fault and rectify immediately.

- The man work is reduced.
- The sends messages instantly to the power station.
- The proposed method is efficient method to detecting and intimating the faults through the distribution line.

CONCLUSION

The paper proposed the system with the help of hardware model to sense the faulty conditions such as increasing temperature, vibration and current. I also identify the exact faulty location in power line and send the SMS to the service engineer through the GSM Modem.

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