2nd International Conference on Frontiers in Engineering Science & Technology
in association with International Journal of Scientific Research in Science,
Engineering and Technology | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
[https://ijsrset.com | doi : https://doi.org/10.32628/IJSRSET]

Smart E-Line Monitoring System Using IoT

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ABSTRACT

Transmission lines are used to transmit power to large load centers in remote areas. These lines can fail as a result of natural disasters, short circuits, equipment failures, operator mistakes, human error, overload, and aging. To avoid this situation, you need the exact location where the error occurred. This problem is solved by a series of resistors that represent the length of the cable in KM and the distance and phase displayed on the LCD connected to the microcontroller. The readings are updated on the PC and monitored using an IoT-based application that is used as a reference for the date and time when the event occurs.

Keywords- IoT, WiFi module, Transmission line, node MCU.

I. INTRODUCTION

Energy systems are divided into energy generation, transmission and distribution. The power system is considered one of the most important parts of the energy system.Connect supply and demand. Today, the power infrastructure is extremely vulnerable to various forms of naturaland physical events that can affect the overall performance and stability of the system. Power grid failures are rattle the supply of electricity to consumers. Therefore,error detection and elimination in the transmission network needs to be done very quickly.

On other hand, there is much need to equip the aged transmission line infrastructure with a high performance data communication network that supports future operational requirements like real time monitoring and fault detection control necessary for smart grid integration. Many electric power supply companies have primarily relied on circuit indicators to detect faulty sections of their transmission lines and areas. Even though the sensors, breakers and other communication line is made the system look bulkier, costly and time consuming one for fault location and clearance of the fault. However, there are still challenges in detecting the exact location of these faults and errors. Although fault indicator technology has provided a reliable means to locate permanent faults and errors, the present scenario in identification of fault is very annoying and time consuming as the technical crew and service teams still has to physically service and inspect the devices for many hours to detect faulty sections and errors of their transmission lines and then have to clear the fault, which requires a

more human effort in identifying the fault location, errors and clearing the fault. Wireless sensor based monitoring of transmission lines provides a solution for several of these concerns like real time situational awareness, quicker fault localization, correct fault prognosis by identification and differentiation of electrical faults from the mechanical faults, cost reduction due to condition of preserving rather than maintaining it everyday, etc. These applications specify stringent requirements such as fast delivery of various amount of highly reliable data. The success of these applications depends on the design of cost effective and reliable network design with a fast response time. Demand of power has been increasing extensively in region of industrial, agriculture, medical ,school and colleges. But now a days problems with transmission line are more and it is difficult to find exact location. Therefore, it is not suitable for power transmission lines because it causes a heavy loss when recognize the location of an accurate faults. The longer the troubleshooting time, the shorter the useful life of the transmission line. The latest technology is highly developed to reduce power line problems. Currently in India, the system does not notify you in real time when an error occurs. I'm worried that without a real- time system. The underlying connected device poses a threat to the people around us. To do so void such accidents as much as possible, such as transmission maintenance and verification. This leads to more staff demands. The fact remains that the original intentions have not been achieved, as line failures are often caused by unexpected rain and fallen trees. Therefore, error detection and eradication in the transmission network should be very quick and smooth. To overcome this, this project proposes power lines based on the Internet of Things. Multiple error detection and display in EB. When the current threshold is outstrip, the microcontroller immediately initiates a message and sends it to the area line engineer and control station to indicate the exact position from pole to pole. This helps to realize a real-time system and real time faults .

II. OBJECTIVES

The objective is to provide a live monitoring of electricity line to the lineman.It will show the voltage varying across the line.To detect the exact location to the lineman It helps in order to give quality service to its customer without any kindof problem.To overcome from the human hazards and nature hazards.To give direct notification to the line man by using IoT Techniques.

III. LITERATURE SURVEY

“Automatic Fault Detection and Location of Electric Transmission Lines with the help of internet of things” Sajal Menon.et.al. This process is provided in a low cost and easy to find transmission line faults and also supports data enhancement. Therefore, you can apply this procedure to detect an error and retrieve the corresponding data at any time.

“Sag Calculation Difference Caused by Temperature Difference between the Steel Core and Outer Surface area of Transmission Lines”- Gang Liu et al, This paper presents an best establishment of a cost-optimized wireless network that can transmit time- sensitive sensor data over an electrical transmission line network.

“EPRI-sponsored transmission line wind loading research & development”- Phillip G. Landers et al. In this paper, we studyed how wind calculations are calculated and how wind acts on transmission lines.

"Electric line and fault monitoring identification system by using internet of things"- S. Suresh.et al. In this paper, we explored how the IoT works and is used.

Transmission Line Fault Detection System".R Navaneth Krishna, This paper proposes a fault detection system using Arduino to save lots of time find the miscellaneous location.line failure monitoring is extremely important because delayed recovery can cause losses, deluge failures, and ultimately power outages. Next-generation monitoring analysis and control for the longer term smart control centre," P.Zhang et al, this paper presents a vision for next- generation inspection and control potentiality for further intelligent energy system center.

This paper first gives an sketch of current command center technology then provides a vision for subsequent generation of monitoring,and control capabilities. This paper also identifies the technology and infrastructure design gaps that require to be closed and develops a road map to realize the proposed vision.The vision of the center is predicted to be a crucial a part of the intelligent power system of the longer term.

Vehbi C. Gungor, "Sensor and Network Challenges in Smart Grids", in this article, experimental measurements provide valuable insights into the IEEE 802.15.4 sensor network platform, with the WSN-based Smart Grid Application Option Guide. Mentioned design arrangement.

IV. METHODOLOGY

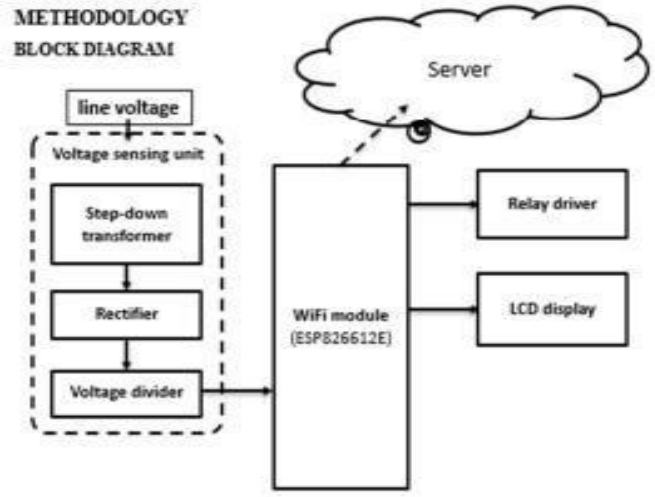

Fig3.Methodology design

Transmission line

A transmission line is used for the transmission of voltage from generating base station to the various distribution units. It transmits the voltage and current from one end to another end. The transmission line is made up of a conductor having a uniform cross section along the line to pass the electric power. Air act as an insulating medium between the conductors.

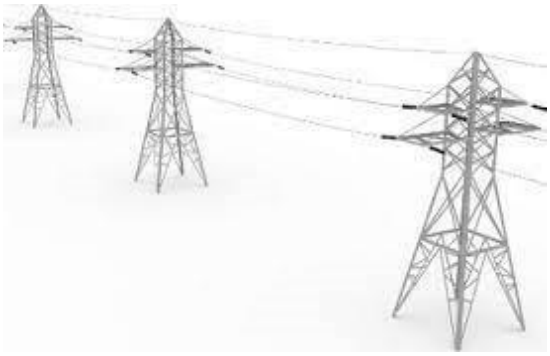

Fig3.1.a Transmission line

WiFi module

ESP8266-12E WiFi module is used here to monitor line voltage and update voltage status to sever

Fig3.2.a WiFi module

Voltage sensor

A voltage sensor is a sensor used to monitor the amount of current in an device or object. Voltage sensors can determine both the AC voltage and DC voltage level accurately.

Fig3.3.a Voltage Sensor

Relay Driver Unit

Relay is also known as electro mechanical switching device. Here relay is used to detach electric line if line fault accurs or in case of short-circuit.

Fig3.4.a Relay Driver Unit

IoT

The Internet of Things (IoT) describes the network of physical objects that are embedded with various sensors, software, and technologies for the need of connecting and exchanging data with other devices and systems using the internet. IoT has become one of the most important technologies of the 21st century. Now that we can connect everyday objects, kitchen appliances, thermostats, baby monitors –to the internet via embedded devices logical communication is possible between people, processes, and things.

Fig3.5.a IoT

V. PROPOSED SYSTEM

If a power outage occurs in a specific location, it will show which line is out of power. The project is set up so that the current from the board is sent to the transformer, where the transformer receives a voltage of 12 volts and is given to the rectifier. The rectifier is given to a 1000 uF capacitor whose current is converted to DC form, and the output is given to the two resistors. As a unit resistor of 330 ohms and 10000 k, it receives the voltage across it and passes it from the node to the microcomputer unit. The WiFi module node MCU provides data when the power flows, the amount of current flowing, and the voltage flowing, which is relayed to the server and can be monitored by the app. The app has installed in phone, connected via a mobile hotspot and database, so you can record data about line and voltage. You can monitor errors over n lines.

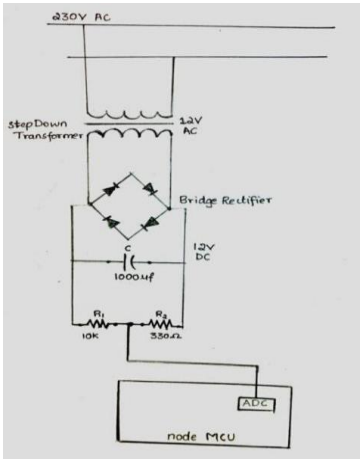

Fig 4. Circuit Design

Fig 5. Application

VI. RESULT

According to our project, we have obtained real-time fault monitoring results in the right place that can be monitored by a mobile application that displays grid voltage, location, date and time. Obstacles can be indicated by color. There are two colors, red and green, where green means that the correct voltage is flowing through the line, and red indicates a failure and a voltage break in the line.

VII. CONCLUSION

IoT has become a most anxious topic in the engineering field. As the number of smart objects grows, people are looking for ways to do more with smartphones, TVs and other wireless objects. The area of strong demand for integration into the IoT is transmission line systems based on live voltage detection. Monitor voltage lines so that you can easily find the exact location of an error using IoT (sensors) and embedded systems. Power outages due to line failures are common in rural and suburban areas of India. Power outages affect the lives of most people and small businesses operating in the area. Transmission line failures include not only voltage fluctuations, but also live lines that can be harmful to living organisms. The same problem can be addressed by using an embedded system (in this case a microcontroller as the control system) to detect the line failure and using the IoT to control the fault arising.

VIII. REFERENCES

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