

Transmission Line Cable Fault Distance Identifier over Internet of Things (IOT) Platform

¹Kunal Patil, ²Amol Baile, ³Tejas Randive, ⁴Shubham Dhore, ⁵Prof. P.P.Mahajan

^{1,2,3,4}Student, B.E., Electrical, All India Shree Shivaji Memorial Society Institute of Information of Technology, Pune, Maharashtra, India

⁵Professor, B.E., Electrical, All India Shree Shivaji Memorial Society Institute of Information of Technology, Pune, Maharashtra, India

Abstract - The objective of this project is to determine the distance of Transmission line cable fault from base station in kilometers. The Transmission line cable system is a common practice followed in many urban areas. While a fault occurs for some reason, at that time the repairing process related to that particular cable is difficult due to not knowing the exact location of the cable fault. The proposed system is to find the exact location of the fault and the information has to be sent to the user mobile phone by using IOT module. The project uses the standard concept of Ohms law i.e., when a low DC voltage is applied at the feeder end through a series resistor (Cable lines), then current would vary depending upon the location of fault in the cable. In case there is a short circuit (Line to Ground), the voltage across series resistors changes accordingly, which is then fed to an ADC to develop precise digital data which the programmed microcontroller of Arduino Uno family would display in kilometers.

The project is assembled with a set of resistors representing cable length in KM's and fault creation is made by a set of switches at every known KM to cross check the accuracy of the same. The fault occurring at a particular distance and the respective phase is displayed on a LCD interfaced to the microcontroller. Further this project can be enhanced by using capacitor in an ac circuit to measure the impedance which can even locate the open circuited cable, unlike the short circuited fault only using resistors in DC circuit as followed in the above proposed project.

Keywords: DC circuit, LCD interface, IOT module, Transmission.

I. INTRODUCTION

This project is to determine the distance of Transmission line cable fault from base station in kilometers using an Arduino board. Many time faults occur due to construction works and other reasons. Cables have some resistance. We are mainly focusing that resistance. Resistance can vary with

respect to the length of the cable. If the length of the cable is increase, the value of the resistance will also increase. If any deviation occurs in the resistance value, we will call that is fault point and finding that place through Arduino technology. That fault point represents the standard of distance (kilometer) from the base station. This value displayed by display unit. Before attempting to locate Transmission line cable faults on cable, it is necessary to know where the cable is located and what route it takes. If the fault is on secondary cable, knowing the exact route is even more critical.

Since it is extremely difficult to find a cable fault without knowing where the cable is, it makes sense to master cable locating and tracing and to do a cable trace before beginning the fault locating process. Success in locating or tracing the route of electrical cable and metal pipe depends upon knowledge, skill, and perhaps, most of all, experience. Although locating can be a complex job, it will very likely become even more complex as more and more Transmission line plant is installed. It is just as important to understand how the equipment works as it is to be thoroughly familiar with the exact equipment being used.

II. METHODOLOGY

Use of underground power cable is expanding due to safety considerations and enhanced reliability in the distribution systems in recent times [5]. Due to safety reasons and high power requirements in densely populated areas, use of underground cable has seen a sharp hike. The underground cable systems have the advantages of not getting affected by any adverse weather condition such as storm, snow, heavy rainfall as well as pollution. But it has its own drawback for immediate tracking of fault in the underground cable lines.

Study of cable failures and development of accurate fault detection and location methods has been interesting research topics in the past and present. Fault tracking entails determination of the presence of a fault, while fault location detection includes the determination of the physical location of the fault. However, this fault detection and fault location detection technology for underground power distribution

systems is still in developing stages.[6] Before fixing any fault in cables, the fault has to be identified first. There are many ways to find the cable fault location. This paper deals with the method to locate faults and identify the phase line in damaged cables. A basic idea of fault location and phase identification in the pictorial view is undernoted.

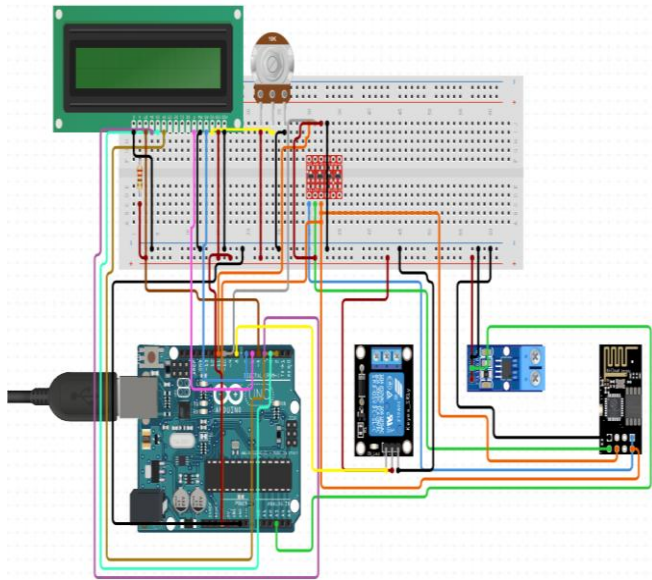


Figure 1: Circuit Diagram

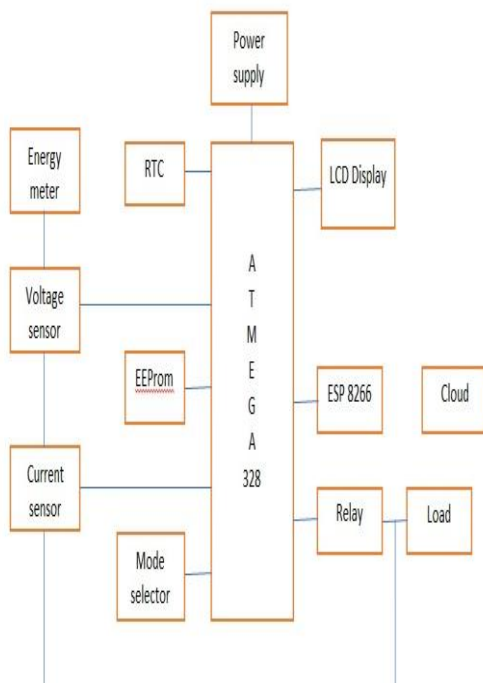


Figure 2: Block Diagram

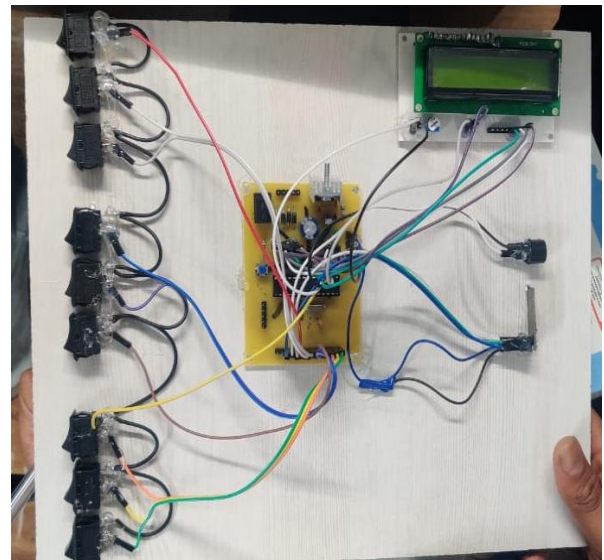


Figure 3: Hardware Implementation

III. RESULTS AND CONCLUSION

Thus the project on Transmission line cable fault detection using Arduino was done and the distance of the fault from the base station in kilometers was displayed for the three individual phases R,Y and B. Circuit can be tested with different resistor values to simulate various fault conditions In this project faults up to a distance of 20km can be detected. When the fault switches are operated to fault condition then the phase corresponding to that particular switch is considered as the faulty phase. So the faulty section can easily be located.

In this paper we detect the exact location of short circuit fault in the Transmission line cable from feeder end in km by using Arduino. In future, this project can be implemented to calculate the impedance by using a capacitor non AC circuit and thus measure the open circuit fault.

REFERENCES

- [1] Anurag. D. Borkhade (2014) ‘Transmission Line Fault Detection Using Wavelet Transform’-International Journal on Recent and Innovation Trends in Computing and Communication Volume 2 Issue 10.
- [2] Xia Yang, Myeon-Song Choi ,Seung-Jae Lee, Chee-Wooi Ten, and Seong-Il Lim(2008) ‘ Fault Location of Transmission line power cable using Distributed parameter approach’ -IEEE.
- [3] Pooja P.S and Lekshmi M (2015) ‘Fault Detection Technique to pinpoint Incipient Fault for Transmission line Cables’-International Journal of Engineering Research and General Science Volume 3, Issue 3, May-June, 2015.
- [4] Yu Xiang and Joseph F.G. Cobben (2015) ‘A Bayesian Approach for Fault Location in Medium Voltage Grids

With Transmission line Cables'-IEEE Power and Energy Technology Systems Journal, Volume 2, No. 4, December 2015.

- [5] Abhishek Pandey and Nicolas H. Younan (2010) 'Transmission line cable fault detection and identification via Fourier analysis'- International Conference on High Voltage Engineering and Application, 11-14 Oct. 2010.
- [6] H. Shateri, S. Jamali, "Impedance Based Fault Location Method for Phase to Phase and Three Phase Faults in Transmission Systems", IEEE 2010.
- [7] Abhishek Pandey, Nicolas H. Younan, "Transmission line Cable Fault Detection and Identification via Fourier Analysis", 2010 IEEE.
- [8] A.Ngaopitakkul, C. Pothisarn, M. Leelajindakrairerk, "Study of Characteristics for Simultaneous Faults in Distribution Transmission line Cable using DWT", 2011 IEEE.
- [9] Yuan Liao, Ning Kang, "Fault-Location Algorithms Without Utilizing Line Parameters Based on the Distributed Parameter Line Model", IEEE Transactions on Power Delivery, VOL. 24, NO. 2, April 2009.
- [10] S. Navaneethan, J. J. Soraghan, W. H. Siew, F. Mc Pherson, P. F. Gale, "Automatic Fault Location for Transmission line Low Voltage Distribution Networks" IEEE Transactions on Power Delivery, Vol. 16, no. 2, April 2001.

AUTHORS BIOGRAPHY



Kunal Patil, Student, B.E., Electrical, All India Shree Shivaji Memorial Society Institute of Information of Technology, Pune, Maharashtra, India.



Amol Baile, Student, B.E., Electrical, All India Shree Shivaji Memorial Society Institute of Information of Technology, Pune, Maharashtra, India.



Tejas Randive, Student, B.E., Electrical, All India Shree Shivaji Memorial Society Institute of Information of Technology, Pune, Maharashtra, India.



Shubham Dhore, Student, B.E., Electrical, All India Shree Shivaji Memorial Society Institute of Information of Technology, Pune, Maharashtra, India.

Citation of this Article:

Kunal Patil, Amol Baile, Tejas Randive, Shubham Dhore, Prof. P.P.Mahajan, "Transmission Line Cable Fault Distance Identifier over Internet of Things (IOT) Platform" Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 6, Issue 4, pp 130-132, April 2022. Article DOI <https://doi.org/10.47001/IRJIET/2022.604030>
