IOT Based Fault Detection of Underground Cables through node MCU Modules

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Preambular

***Abstract*- In the downtown, underground cables are used rather than overhead transmission lines. It is hard to go through the specific spot of shortcomings. As India becomes prominent as a progressive country, the civilized field is too boosting every day. The underground lines are beating under the same circumstances its uses are additionally growing as a result of their clear advantages such as lower line losses, and lower maintenance cost and they are less powerless against the effects of serious climate. As it isn't clear it moves extremely to identify propel area of the shortcoming. In this proposed work we are trying to rectify this problem by proposing a method that is good enough for the digital world. In this paper, we have used IOT based technique with a Google database for fault detection with the help of Node MCU WIFI Module. It is based on IOT. We used here Node MCU which connects Arduino sensors to the Internet. We had created a Hot spot through the router for communication. We connected each MCU Module with the transformer and used the Google database to check the status of the transformers. The accuracy and efficiency of our proposed method are more as compared to the other techniques.**

I.INTRODUCTION

Electricity becomes a basic need in our daily life. Most activities of our lifestyle depend upon electricity. Electricity has been involved in our lifestyle in such a way that it plays a very important role in every field. The transformer is decisive equipment in the power system for transmission and distribution. In the power system, underground cables are used to transmit the electric power from generators. Stations to the distribution point then it is transferred to the consumer ends by overhead and underground cables. Underground cables have to suffer various problems due to aging and different types of faults.

To overcome these problems in cables, lots of Research work has been done. Here we proposed a method to rectify these problems. There are so many online and offline methods available for the detection of faults and life in underground cables. Murray loop, Varley loop, ohm's law & Fourier transformation, etc. methods are used for fault detection of earth or underground cables**.**

II.LITERATURE SURVEY

1.M. R. Hans, S. C. Kor, and A. S. Patil,
"Identification of underground cable Fault location and development," 2017International Conference on Data Management, Analytics and Innovation (ICDMAI), 2017.
For Fault exposure, the Murray loop technique is used. This scheme is very Straightforward. For observation or exposure of short circuit faults in the Underground line this method is used. These two loop tests (Murray & Varley Loop) are usually used for identifying the Faults in earth cables. This trial is based on the law of Wheatstone Bridge. By using this experiment, a fault site in an earth cable may be found by arranginWheatstone bridge in it. In this scheme, we first need to connect a sound cable of the Same length as of defective cable. Sound cable means the cable without any error and we have to short circuit the ends of both the cables (sound cables & faulty Cable) [5]. Now we connect a galvanometer in between the beginning of both the Working cable & not working cable. Now we connect two registers crosswise the working cable & not working cables in such a manner that both the registers are variable. Now the entire loop will form a Wheatstone bridge. Then we attach one battery via the ground. For balancing the bridge, we regulate the value of both registers till the galvanometer shows the zero value. We shall carry out the shortcoming spot by comparing the resistances. We should have the values of both resistances [1], [6].
2.R. Salat and S. Osowski, "Accurate Fault Location in the Power Transmission Line Using Support Vector Machine Approach," IEEE Transactions on Power Systems, vol. 19, no. 2, pp. 979– 986, 2004 Under this practice, an unsophisticated OHM's law is applied to establish the short Circuit shortcoming. A DC voltage is tested at the feeder side over a series Resistor; relying on the distance end to end of the shortcoming of the cable current Deviate. The voltage leak crosswise the series resistor adjusts consequently, this Voltage drop is used in the estimate of a fault zone. This scheme is made with a Compilation of resistors showing the cable length in KMs & fault formation is Made by a set of switches at each known KM to cross-ensure the exactness of the Same [7]. The voltage goes down over the feeder resistor is specified to an ADC Which builds up exact superior information which the made to order Microcontroller would show the alike in Kilo Meters, the deficit happening at What division and which phase is shown on a 16X2 LCD interfaced through the Microcontroller. In this approach, we utilize a microcontroller ATMega8 which is an 8-piece. The program is baked into the ROM of the microcontroller and written in either Embedded C or low-level computing construct. The power contribution Comprises a stage-down transformer 230/12V, which steps down the voltage to 12V [3], [7], [9].
3.R. Salim, M. Resener, A. Filomena, K. R. C. D. Oliveira, and A. Bretas, "Extended Fault-Location Formulation for Power Distribution Systems," IEEE Transactions on Power Delivery, vol. 24, no. 2, pp. 508–516, 2009
That is changed over to DC utilizing a Bridge rectifier. Waves are evacuated Utilizing a capacitive channel and it's then managed to +5V utilizing a voltage Controller 7805 which is mandatory for the activity of the microcontroller and Diverse parts. Comprises

of venture down X_mer which is 230 V step-down to 12 V. In a circuit, DB107 is utilized to shape the attached rectifier which conveys Throbbing dc voltage and then bolstered to the capacitor channel the yield voltage from the rectifier is encouraged to channel to take out any ac segments nearby Considerably after amendment. The sifted DC voltage is specified to a controller to Produce 12V steady DC voltages. Murray loop method applies the Whetstone Bridge to estimate the accurate distance of the fault site from a base station and sends it to the user's mobile. While in Ohm's law, when any shortcoming takes place, voltage Fall will fluctuate depending on the length of fault in line, since the current varies. Both methods deploy a voltage converter, microcontroller & potentiometer to Stumble on the fault sight underneath LG, LL, and LLL shortcomings. Consequently, a gadget that can identify the area of shortcomings doesn't exist. To distinguish the area of issues of UGCs, a few techniques have been Formed and can list into three. Primary techniques: feedback pulse method, a method is tested with different Fault duration, noise, and system parameters. Traveling wave method, and impedance system.

4.Mahmoud Gilani, Doaa khalil Ibrahim, and El Sayed Tag Eldin, "Travelling wave-based fault location scheme for multident-aged Underground cable system," IEEE Trans. On Power Delivery, Vol 22 No.1, January 2007

The intelligent heartbeat comprises two primary sorts, voltage and flow Heartbeats. The qualities of those heartbeats are lofty recurrence and lofty Plentifulness. In request to acquire the reflected heartbeat from the short-out Deficiency point, the estimating gear must have a decent class with an adequate Inspecting time (barely any kHz) and a vast estimating plentifulness (a few kV).

(iii) Impedance system. The process of decisive the fault site is based on the Estimate of the flow of charge and the voltage together with the data of the total Resistance of the line for the period of the operation instantly before the short Circuit occurred to calculate the fault site. The impedance system [6] Depends on the shortcoming resistance and inaccuracy in the case of too much Fault resistance [10]. The technique of aggregation can be separated into two categories: (i) based on wiring and (ii) based on two terminals depending on the number of terminals at which the voltage and flow data are composed. This Scheme frequently used with digital reserve relays is situated on the shield side Of the 110kV line.

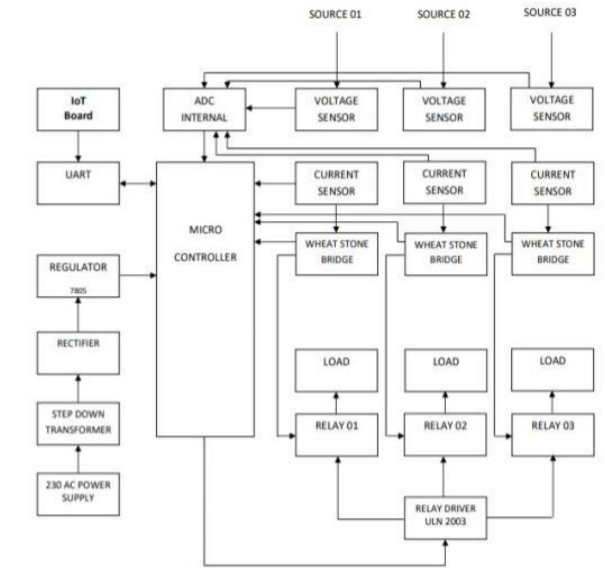
III.EXISTING SYSTEM

In the existing system, an arcing fault-based multicyclei ncipient fault detection and location Scheme for medium voltage underground cable is proposed. This method makes full use of the Arc voltage distortion feature for reliable and accurate incipient detection. The distance Estimation method tries to find out the fault distance by searching all possible fault distances Using parameter estimation. The detection method is tested with several different types of Disturbances with different parameters. The distance estimation the method is tested with different Fault duration, noise, and system parameters.

IV. PROPOSED SYSTEM

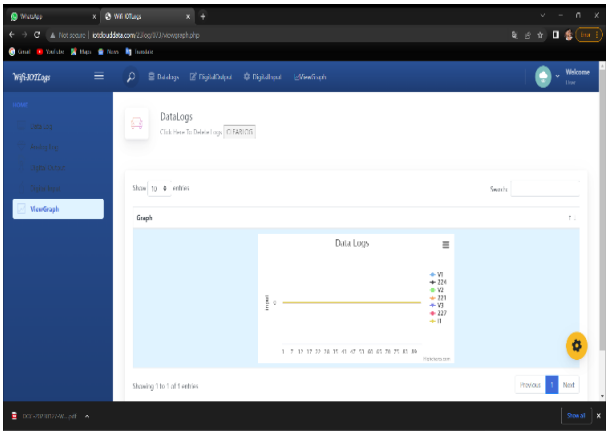
Electric utilities continue to deploy innovative technologies in power distribution systems to reduce outage time and provide more reliable delivery of electric power. Fault location and fast service restoration are challenging in underground looped distribution feeder systems electrically separated by normally open switches. Traditional fault location detection methods are time-consuming, labor-intensive, costly, and detrimental to field equipment. In this proposed system, a new method is proposed to detect the incipient fault and location in the underground cable. The algorithms only utilize the fundamental voltages and currents recorded at a single end, normally at a substation, and with the relay, the fault can be easily detected by the user.

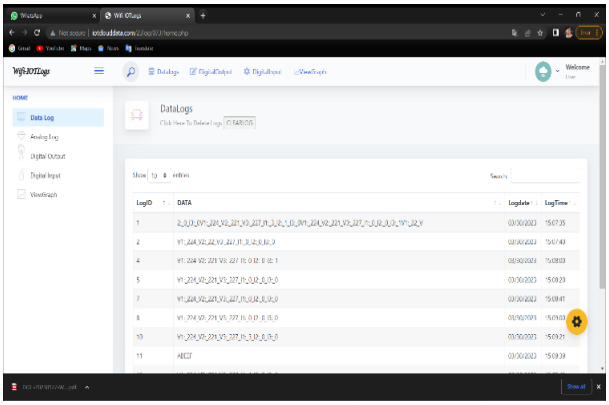
V.BLOCK DIAGRAM



VI.OUTPUT ND RESULTS:


Voltage 3 Low


DataLogs
Data Logs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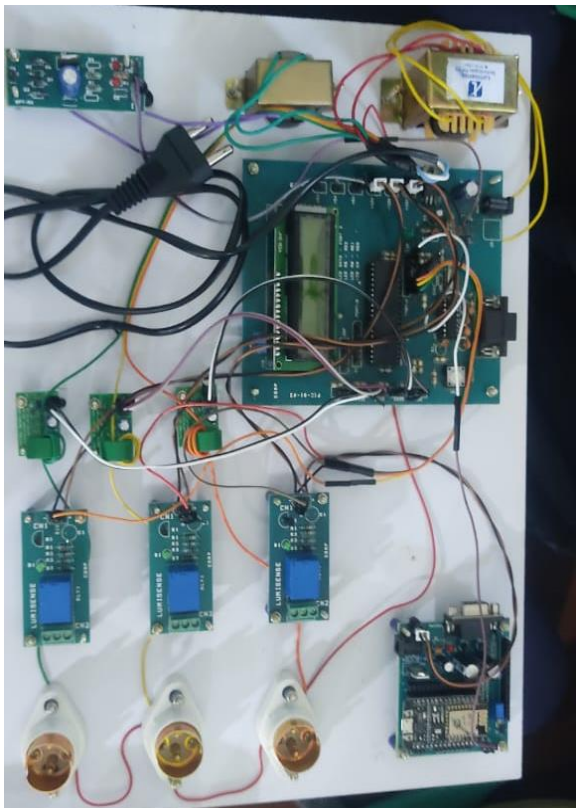

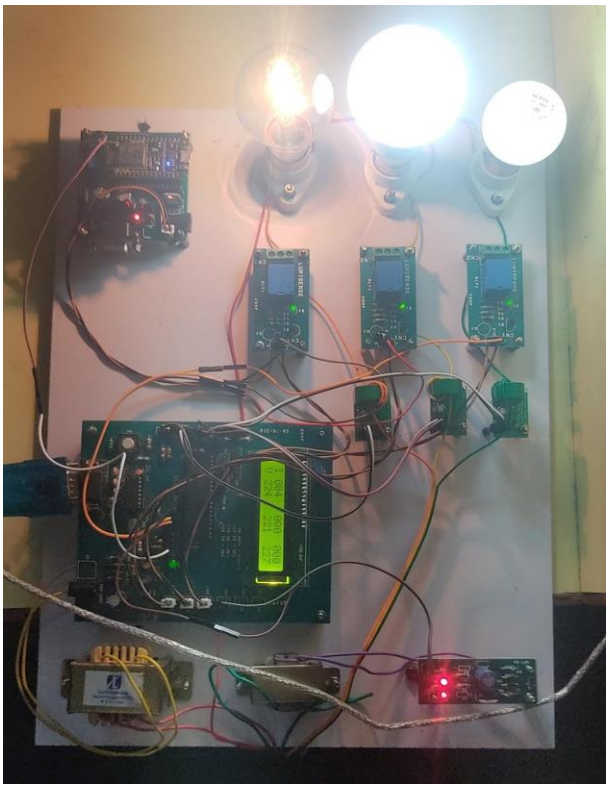

VII. CONCLUSION

In the proposed effort the difficulty of detecting the fault in underground lines is Done based on Node MCU WIFI Module. We projected an IOT-based model for healthier recognition of faults in the cables. We proposed a method to detect the Fault placed from the underground cables through the Node MCU WIFI module. This provided the best outcome and accuracy compared to other methods. This Technique is also given a very fast speed of operation, which is very essential for the continuity and stability of power quality. In the future, we can use this technique for the detection of faults in power lines/cables as well as for transformers by Connecting various sensors. And here the average accuracy of our proposed system In the Y B Phase for LL fault respectively, are 94.53% and 98.63%.

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3. R. Salim, M. Resener, A. Filomena, K. R. C. D. Oliveira, and A. Bretas, “Extended Fault Location Formulation for Power Distribution Systems,” IEEE Transactions on Power Delivery, vol. 24, no. 2, pp. 508–516, 2009.
4. M.-S. Choi, D.-S. Lee, and X. Yang, “A line to ground fault location algorithm for an underground cable system,” KIEE Trans. Power Eng., pp. 267– 273, Jun. 2005.
5. Heena Sharma, M.T.Deshpande, Rahul Pande “Different types of fault Analysis And Techniques of Fault Location Using PSCAD”, International Journal of Emerging Technology and Advanced Engineering(2250- 2459) May 2013.