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An Intelligent Transmission Line Fault Detection System based on Internet of Things (IoT)

V. Umayal Muthu[1], V. Subhashini[2], M. Swathy[3], K. Vidhyalakshmi[4]
[1]*Assistant Professor,* [2,3,4]*UG Student, EEE Department, Velammal College of Engineering and Technology, Madurai, Tamil Nadu*

Abstract: ***The fault location detection is aim of power system engineers in the construction of distribution and transmission systems. Quick fault detection protect the equipment by allowing the disconnection of unhealthy lines before any significant damage of the equipment. The accurate fault location help utility personnel to remove the faults and locate the place where the faults occur, thus reduce the occurrence of fault and minimize the time required for power outages. while the fault location detection techniques are developed, a variety of methods continuously developed to perform the task more accurately and more effectively. The detection and location of faults on power transmission lines is necessary for the protection and maintenance of a power system. Earlier methods of fault detection and location relate to the measurements of electrical quantities provided by current and voltage transformers. These transformers require physical contact with the monitored high voltage equipment and they are expensive.***

I. INTRODUCTION

Transmission Line cables have been widely used with the development of power system grid. Till last decades cables were made to lay overhead & currently it is to lay Transmission Line which is superior to earlier method. Because the Transmission Line cable are not affected by any weather condition such as storm, snow, heavy rainfall and pollution. But when any fault occur in Transmission Line cable, and then it is difficult to locate the exact location of fault. Today the world is digitalized so this paper is planned digitally to detect the loication of fault.[1] The faults occur due to different reason , the repairing process related to the cable is difficult since we don't know the exact location of fault. As it is very difficult to find the exact faulty location manually, which affect the efficiency of the cable wire suddenly due to losses occurred. Nowadays many techniques are already implemented in order to detect cable line fault. But the problem is how to detect fault in cable wire when it is under grounded, and how to retrieve those data related to faulty location whenever it is required.

In order to fill those queries, we proposed the system which detects the exact location of the fault through IoT which is serially communicated towards server.[2] [3] [4] This project is "IoT based Transmission Line cable line fault detection system"is used to find out the faults and to locate the faults. The manual method is time consuming. Here, we propose the system that detects the exact fault position with the use IoT that makes repairing work very quick. In most of the worldwide operated low voltage and medium voltage distribution lines transmission line cables are used from many decades. The complexity of the whole network is that system consists of numerous components that can interrupt the power supply for the end user. Use of Transmission Line power cable is expanding due to safety considerations and enhanced reliability in transmission and distribution in recent times. Due to safety reasons and high power requirements use of Transmission Line cables has been increased. To increase the reliability of the system proper fault detecting and locating techniques are required.[5] [6] [7] The inaccessibility of the Transmission Line cable makes the location and detection of fault in the cable a challenging task. The fault detecting and locating techniques play a very important role in maintaining the system and thereby increasing the reliability. [8]

II. SYSTEM SUMUP

A. Resistor

Resistors used for controlling the current and/ or voltage present in a circuit. Typical applications involve the provision of bias potentials and currents for transistor amplifiers, converting the collector or emitter output voltage drop, and providing a predetermined value of attenuation.

B. LCD Display

Liquid crystal displays (LCDs) have both the properties of liquids and crystal. They have liquid crystal material covered with two glass panels. Transparent electrodes are used in the inner surface which displays the character, symbol or patterns.

C. ESP8266

The ESP-01 is the Wifi module which is used to connect the system to a wifi network for the internet access. The ESP01 is based on the ESP8266 chip. On the GISMO board, the ESP-01 is used as a Wifi adapter to give internet access to the microcontroller. The microcontroller and the ESP-01 is connected in serial interface. The RX and TX pins of the ESP-01 module are connected to pin 9 and 8 .Since these pins are not the hardware, the Software Serial library is used to create a soft serial port.

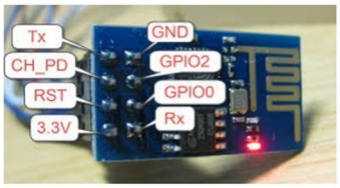

Fig 1 : ESP Pin details

D. Relay With Driver

Relays are switching devices which are the heart of industrial electronic systems. When a relay is energized , contacts are connected or broken. Relays used to control either ac or dc power. They are used to control the sequence of events in the operation of a system such as an electronic heater, counter, welding circuits, X-ray equipment, measuring systems, alarm systems and telephony. Electromagnetic relay uses electromagnets in which the current in the coil produces a magnetic effect. It pulls or pushes soft iron armatures carrying relay contacts.Relay contact are operated to get several possible ON/OFF combination

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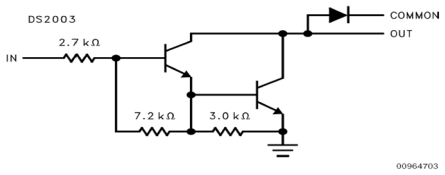

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Fig 2: Relay with driver

E. Buzzer

A buzzer is a signalling device, which is electronic, used in automobiles, household appliances such as game shows or microwave ovens. It consists of a number of switches or sensors connected to a control unit that determines which button was pushed and if a preset time has lapsed, and usually illuminates a light on the appropriate button , and sounds a warning in the form of a continuous or intermittent beeping sound. Earlier this device was based on an electromechanical system which was similar to an electric bell without the metal gong.

F. Alarm

An alarm gives audible warning when there is problem or abnormal condition. Alarms has the capacity of creating a fight (or) flight response in humans; a person under this mindset will panic and attempt to eliminate it. We describe the person this characteristics as "alarmed".

Fig: 3 Alarm model

G. Microcontroller

A microcontroller is a complete Setup of microprocessor built on single integrated chip in order to reduce the system. Since we build whole microprocessor setup on single chip it helps us to reduce the cost of building other simple products which uses the same supply which is used by microprocessor. Because microprocessor is used to connect more products naturally. we know that the 8 bit based microprocessor like 8085 are costly. They are expensive because they require additional circuits and connections to build the microprocessor system. Each part carries costs of money.

Though the product design requires only simple system, the parts needed to make this system should be low cost product. To solve this problem microprocessor system is build on a single chip microcontroller. This kind of setup is called microcomputer, and all the major parts are in the Integrated chip. Usually they are called microcontroller because they perform control functions.

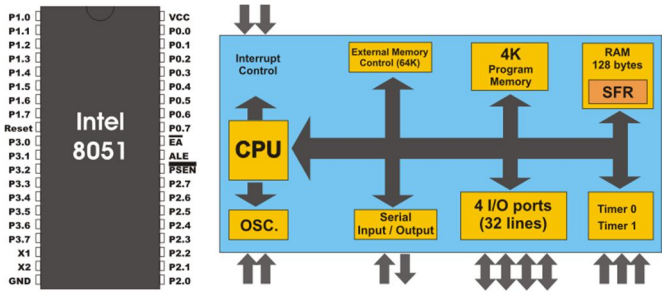


Fig: 4 Microcontroller basic architecture

H. Internet Of Things

Internet of Things (IoT) refers to the intelligent devices connected to data gathered by embedded sensors and actuators in system and other physical objects. IoT is upcoming technique to spread rapidly over the upcoming years and this system will reveal a new dimension of services that improve the quality of life of consumers and productivienterprises, unlocking an opportunity of 'Connected Life'.

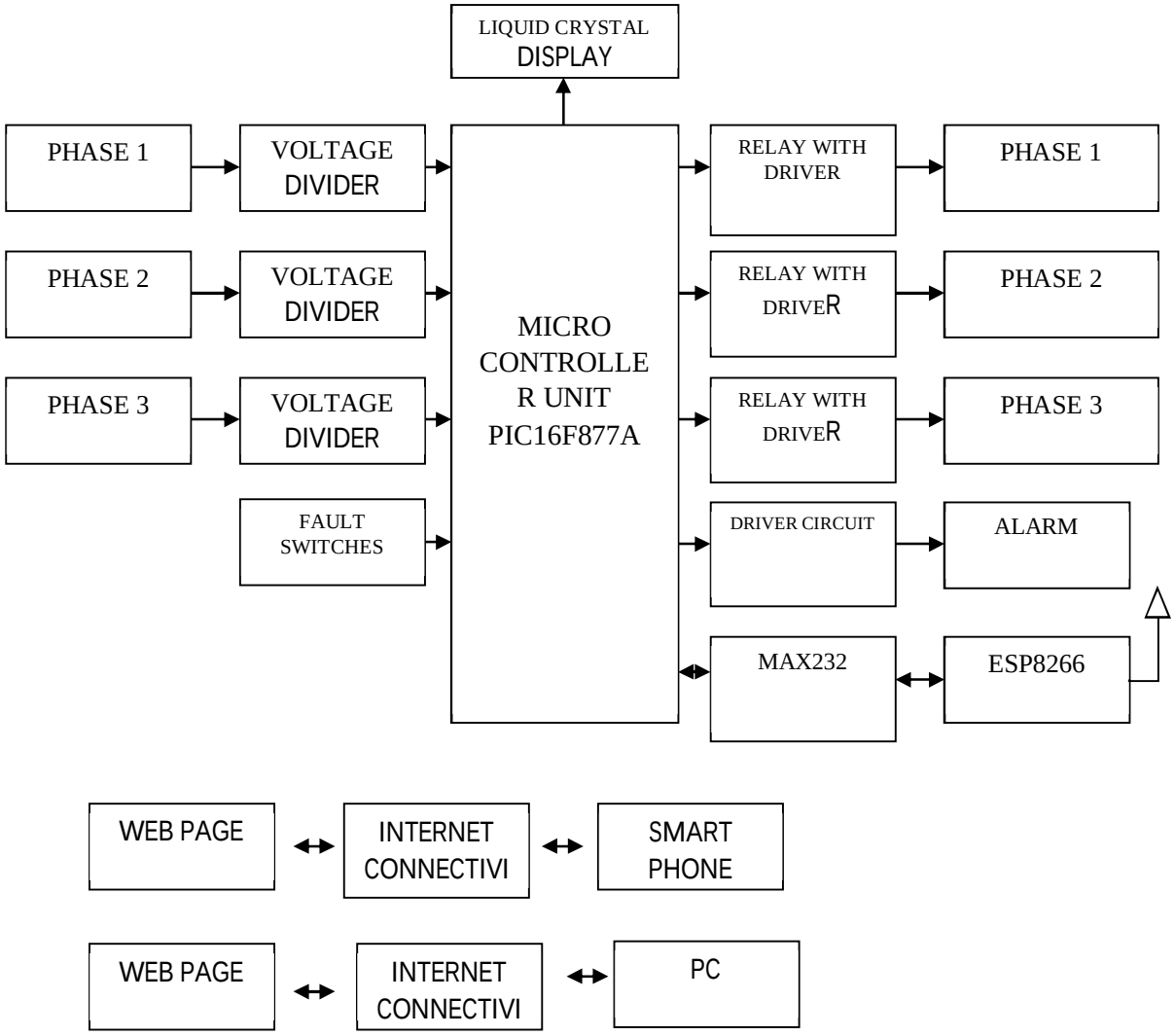


Fig: 5 Block Diagram of Working Module

III. RESULT

When powered the microcontroller, it'll initialize the LCD module with suitable commands. After that controller initialize serial port. ESP Module is used to communicate with the serial port. After both initialization process, controller will displayed project title on the LCD. Even after the controller clears the LCD the data will be visible for four seconds.After LCD and Serial initialization controller initialize ESP Module. ESP module is nothing but low cost Wi-Fi which has TCP protocol. Controller sends the suitable commands to the ESP Module and displays the income result. The whole process is based on internet connectivity. But we cannot give internet connectivity through wire. So, Wi-Fi signal is used to communicate with the page. After successfully pair with the Wi-Fi controller connect the hardware kid into the webpage. After connecting with server, controller read the cable voltage and displayed it. In this process underground cable fault is detected by resistance level. The analog voltage is fetched from the cable. Digital system only indicates that the cable is affected with fault or not. But analog signal may useful to find the range of fault. The controller has internal analog to digital converter. The cables are connected to the analog channel and they are converted into digital. If the cable is working fine, controller activates the relay to supply the cable. In case of any damage or fault in the cable, the voltage will flow in ground or another cable that will become risky. So, the controller continuously checks the cable fault. If any fault detected means it'll deactivated the particular cable line.

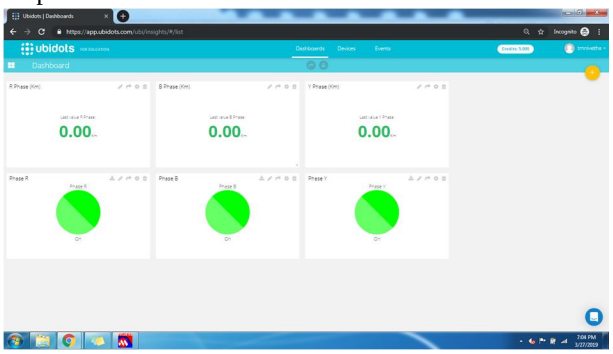


Fig 10: Initial Status of the Webpage

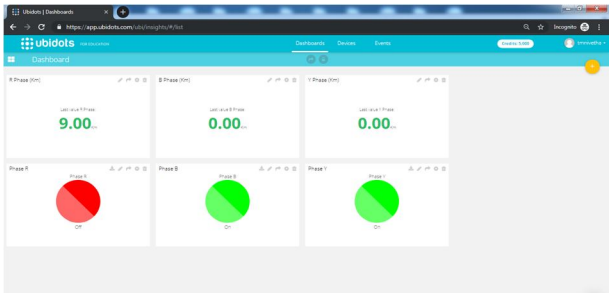


Fig 11: Cable Fault

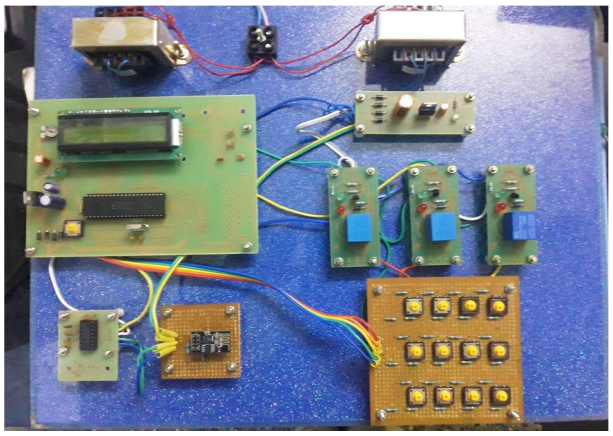


Fig 12: Whole System

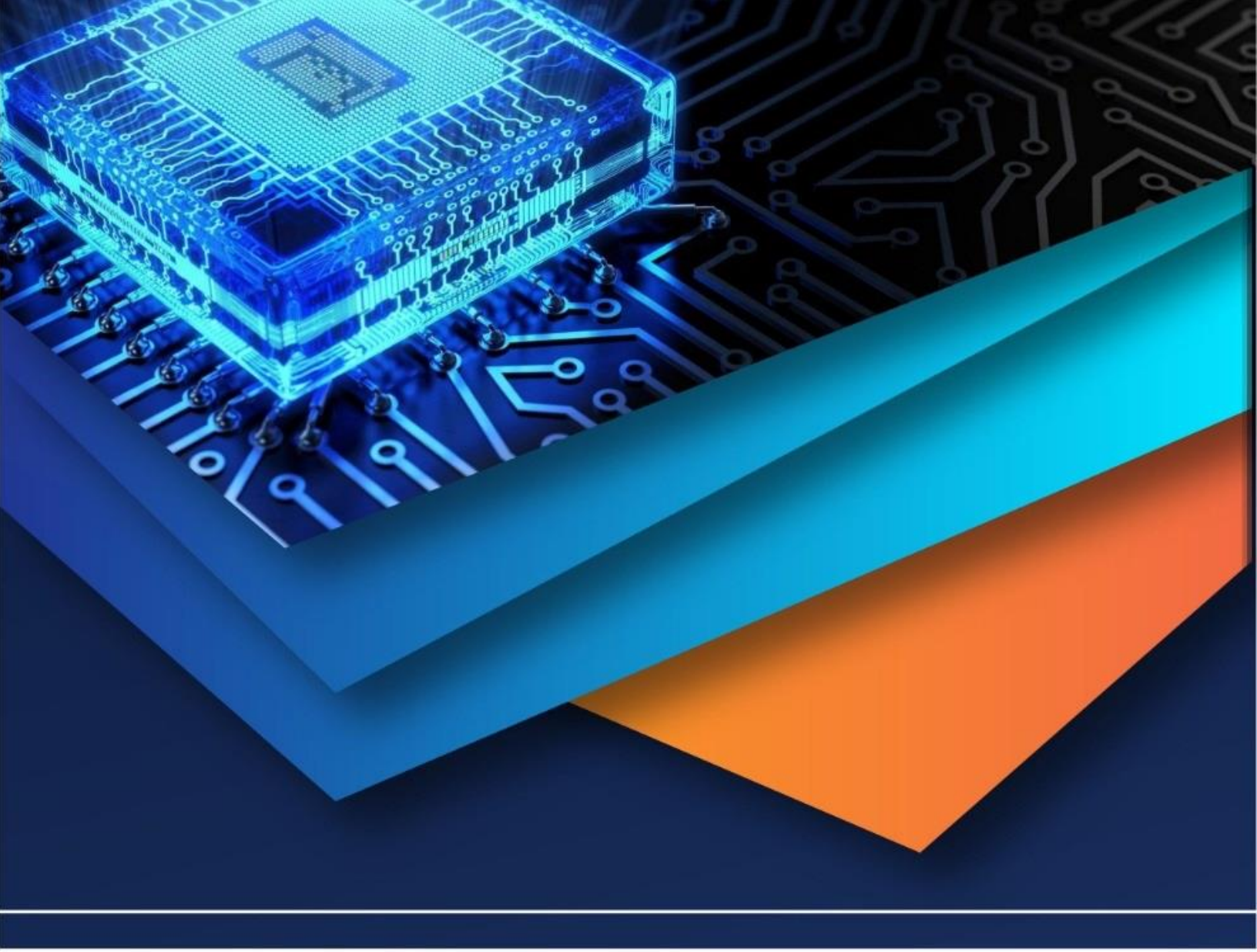
When controller indicates the cable fault in any one of the cable it will deactivates the power in the cable. After deactivate the relay controller update the data into the webpage. The webpage result contain with fault distance and power enable status. After publishing the data into webpage, controller displays the fault location in local and activates the timer module. The automation process doesn't have a control to activate or deactivate the power. The timer module will activate the relay after 10 seconds. If the fault is keep appear the controller again trips the power. The process will continue until fault resolved.

IV. CONCLUSION

The short circuit fault at a particular distance in the Transmission Line is located by the system to rectify the fault quickly using simple algorithms of Ohms law. The system displays the phase, distance and time at which the fault occurs with the help of PIC 16F877A and ESP8266 Wi-Fi module in a webpage/PC. The benefits of accurate location of fault (or) fast repair, it improves the system performance, and it will reduce the operating expense and the time to locate the faults in the system.

REFERENCES

[1] ZHANG Chao, KANG Xiaoning, MA Xiuda, JIANG Shuai, QU Xiaoyun Shaanxi Key Laboratory of Smart Grid "On-line Incipient Faults Detection in Transmission Line Cables Based on Single-end Sheath Currents "IEEE PES Asia-Pacific Power and Energy Conference,2016
[2] Xu Sun, Wing Kin Lee1, Yunhe Hou1, and Philip W. T. Pong1" Transmission Line Power Cable Detection and Inspection Technology Based on Magnetic Field Sensing at Ground Surface Level ",IEEE ,2014
[3] Saurabh Kulkarni, Student Member, IEEE, Surya Santoso,"Incipient Fault Location Algorithm for Transmission Line Cables", IEEE,2014.
[4] Kunal Hasija, Shelly Vadhera, Anurag Kishore" Detection and Location of Faults in Transmission Line Cable using Matlab/Simulink/ANN and OrCad",IEEE,2014
[5] Owen, Arch; Duckworth, Gregory; Worsley, Jerry, Optasense: Fibre Optic Distributed Acoustic Sensing For Border Monitoring, 2012 EuropeanIntelligence and Security Informatics Conference (EISIC)
[6] Schulze, Member, IEEE and Peter Schegner,"TwoTerminal Fault Location on Unsymmetrical Transmission Lines",IEEE,2010
[7] ShyamSadasivan, An introduction to the ARM Cortex-M3 Processor, October 2006, Open journal
[8] Girard, A.R.; Howell, A.S.; Hedrick, J.K;Border Patrol And Surveillance Missions Using Multiple Unmanned Air Vehicles, 2004. CDC. 43rd IEEE Conference on Decision and Control



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