International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 05 | May 2021 www.irjet.net p-ISSN: 2395-0072

ELECTRIC LEAKAGE DETECTION SYSTEM

T.Nithyashree[1], M.Bhuvaneswari[2], A.Dharani[3], E.Hamsadhwani[4]

[1]*Professor, Department of Computer Science and Engineering, Sri Ramakrishna Engineering College Coimbatore, India*

[2,3,4]*Student, Department of Computer Science and Engineering, Sri Ramakrishna Engineering College Coimbatore, India*

---***---

Abstract - *When power is transmitted from one place to another place(electric post), sometimes there may be failure in the transmission line due to thundering , rain , lightning phenomenon, pollution. It leads to transmission loss and because of the breakage line, it causes damage to living beings. It is a great threat to lives and property. Electric leakage detection systems have become increasingly sophisticated and functionally more capable and reliable. They are designed to fulfill two general requirements: protection of property and assets and protection of lives of people.Electric leakage detection system provides real-time surveillance and monitoring. Electric leakage detection systems can seem straightforward when considering the ease of installation, but it can present some complex operational and legal responsibility. The device is mostly useful to support the life of farmers. IoT based fault detection in overhead transmission lines enable farmers to have knowledge of breakage of electric wires and leakage of current in the fields at very low cost so that needed action can be taken.With IoT productivity can be increased as there is much safety ensured. The system will assist farmers by saving them from the effect of live electricity and the application provides notification to take the proper and immediate action to save the lives of people. The electricity leakage may threaten the lives of many farmers. So it becomes important to detect the electricity leakage. It allows people to be aware of the line breakage. Hence this device is a reliable, comfortable and accurate option for finding line breakage.*

Key Words: Arduino UNO, Voltage sensing circuit, ESP8266, Wi-Fi, IoT application.

1.INTRODUCTION

Electricity leakage is dangerous because it harms the life of many living things. So it becomes important to detect the electric leakage. When power is transmitted from one place to another place(electric post), sometimes there may be failure in the transmission line due to thundering, rain, lightning phenomenon, winter ice, pollution.It leads to transmission loss because of the breakage line. Electric leakage detection systems have become increasingly sophisticated and functionally more capable and reliable. They are designed to fulfill two general requirements: protection of property and assets and protection of lives of people. The system will assist farmers by saving them from the effect of live electricity. The ultimate purpose is to warn the farmers in the agricultural fields that there may be electric leakage in the field by giving the alert message.

The main objective of this project is to prevent the damage of property and lives of many people due to electricity leakage. This also reduces the loss of power and helps to take immediate action to detect leakage and resolve them as soon as possible. The system can be implemented at the low cost.The death of human lives is a great threat to society. Electricity leakage detection system provides real-time surveillance, monitoring and automatic alert. It sends an early alert message when the electric leakage occurs and helps to reduce the damage. This model is based on the Internet of Things where the data are taken and analysed if there is presence of any electricity leakage. It is designed for a general purpose electric leakage alert security in order to provide early information about the transmission line breakage. Internet of Things (IoT) technology has brought revolution to every field by making everything smart and intelligent. It refers to a network of things which make a self-configuring network. The development of the IoT based Electricity leakage prevention system is saving lives of people and other living beings and also is cost-effective and efficient. The aim / objective of this report is to propose an IoT Electricity leakage prevention system assisting farmers in saving them from the adverse effect of live electricity which will enable them to work with less fear in the fields.

Electricity leakage prevention system being proposed via this report is integrated with Arduino Technology mixed with different Sensors and an IoT application that provides message feed when there is leakage of electricity The system being proposed will be tested on Live Agriculture Fields giving high and expected accuracy over 98% .

2.RELATED WORKS

Reference[2] presents an industrial monitoring system design using the Internet of Things (IoT). The gas sensor (MQ-5) after reading the information it gets posted into a data cloud. The gas sensor used in this system will detect the leakage of gas in the surrounding. Arduino (UNO-1) connected with the gas sensors. When the sensor detects the gas leakage in the atmosphere, it will raise an alarm in the form of a buzzer. Safety is always a priority. In this regard, the less costly options for accident and prevention in oil and gas industries are commonly adopted, yet these measures ought to be effective. The system detects natural gas leakage such as Methane and LPG. Once the sensor detects the leakage, the ESP modem connected with the sensor and arduino will be activated and a notification alert to the user will be transmitted.

Reference[13] The fundamental quantities of the electrical system are voltage and current. The accurate measurements are very vital in electrical load monitoring. It is necessary to facilitate energy management with accurate load monitoring that ensures sustainability in the electrical power system which is considered the most important factor, by eliminating energy waste and unwanted activities. The most important aspect of energy monitoring is sensor calibration. The management, measurement and control of electrical equipment are all dependents upon reliable and accurate sensing. All other electrical quantities are determined from the voltage and current which are the fundamental quantities. To detect the current and voltage, current and voltage sensors are used. Some of the current sensors like ACS712, ACS716 and ACS 756 come with their factory settings, in which it can convert the ADC value of the sensor into the analog input using a sensitivity. The computational requirement will be be reduced with the polynomial reduction which helps in faster response by the system

Reference[12] The disclosure pertains to the leakage in the flame sensing circuits. A detection circuit coupled to the amplifier output and capacitor for detecting the amplified flame sense current. It includes a capacitor having a first end operatively coupled to the amplifier output and a first resistor having a first end coupled to the amplifier output.. (e.g. close a gas valve that supplies fuel to the combustion system) When the leakage current condition is determined the microcontroller shuts down the flame(e.g. a gas valve has been closed which supplies fuel to the combustion system). In this method the amplified flame sense current has been supplied to the amplifier via a charge storage device that produces a first charging rate. The method may determine a leakage current based on the comparison of the charging of the first charging circuit and the charging of the second charging circuit.

3.METHODOLOGY

When AC voltage is applied across a capacitor which consists of two conductors and a dielectric in between, current will tend to pass on account of eloctron's attraction or repulsion via the voltage on opposite plate.Thus an AC circuit will be created.The two capacitors are in series, hence voltage division takes place.Generally, in series circuits a high voltage with high impedance will develop across the component.Since capacitance and impedance are inversely proportional,

The relation is

$X_c=1/2\pi fC$;

$V=Q/C$;

Where,

Q → Charge (Coulomb)
C → Capacitance (Farad)
XC → Capacitive reactance (Ω)
f → Frequency (Hertz)

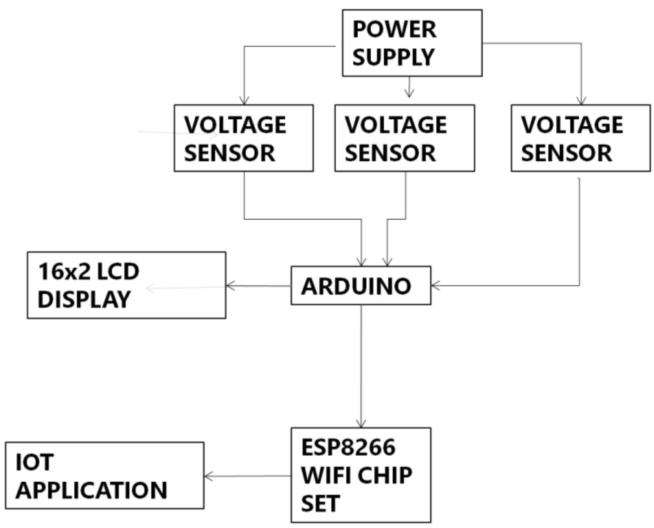

Fig-1: Proposed block diagram

There will be highest voltage across smallest capacitor and the voltage sensing circuit is based on this principle.Hence when this sensing element of high impedance is receiving an external voltage, the sensing circuit is coupled to the live voltage.Subsequently, the whole voltage will develop across this circuit, and can detect it using an indicator.

Thus, when this sensing circuit is positioned in electric posts, the leakage from post acts as a external voltage. There will be an analog voltage signal which is then fed to the arduino UNO board. This arduino takes the analog signal as input and provides an output to the ESP8266 wifi module. The power supply to the ESP8266 is 3.3V.The Esp8266 wifi module is connected to a local server using a wifi and notifies the nearby wire man of electricity board regarding the leakage via an IOT application. This application can be installed and is configured with a login id and password. Hence the user could login and will be sent a notification if there is any leakage. The user will also be apprised about the level of leakage along with the post number if specified initially.

4. CONCLUSION AND FUTURE WORK

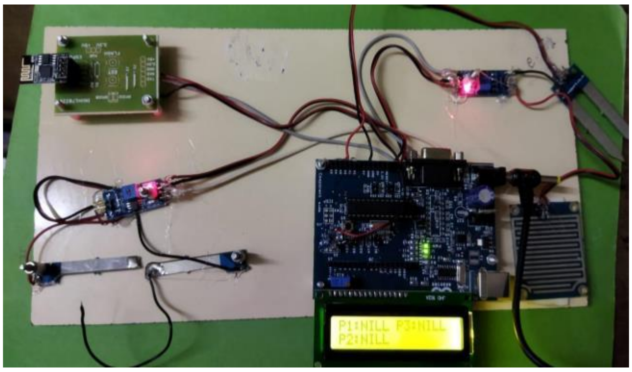

FIG -2 :Experimental Setup.

The system has been tested several times, improvising the result and accuracy at each test. The training accuracy tends to be 80% and the model results coped up with the accuracy. This device is a reliable, comfortable and accurate option for finding line breakage. The device is mostly useful to support the life of farmers. With IoT productivity can be increased as there is much safety ensured. The system will assist farmers by saving them from the effect of live electricity and the IOT application notification feed to take the proper and immediate action to save the lives of people. This project is compatible with all the systems.

This system can be further made use for real time application in industries and real transmission lines. Rather than, we can use a D-dot sensor for measuring voltage over transmission lines. The experimental results demonstrated that the D-dot sensor measurement system based on a Gaussian integral achieves high accuracy and the relative error is lower than 0.5%. Instead of using the GSM module, the WI-FI module is best because they offer low-cost infrastructure and ease of development, these modules are now regarded as the most suitable candidate for IoT applications. Wi-Fi HaLow, Same as Wi-Fi, Wi-Fi HaLow allows digital devices to connect to the internet without exhausting the cellular data.Most importantly, Wi-Fi HaLow is designed for the network of connected devices in a smart home and multiple smart wearables that include IoT.. According to Wi-Fi Alliance, Wi-Fi HaLow works in the radio frequency range, 900 MHz band.GPS can be used to know about the exact location of the breakage of the transmission lines. GPS is the only system today that can show your exact position on the Earth anytime, in any weather, no matter where you are .

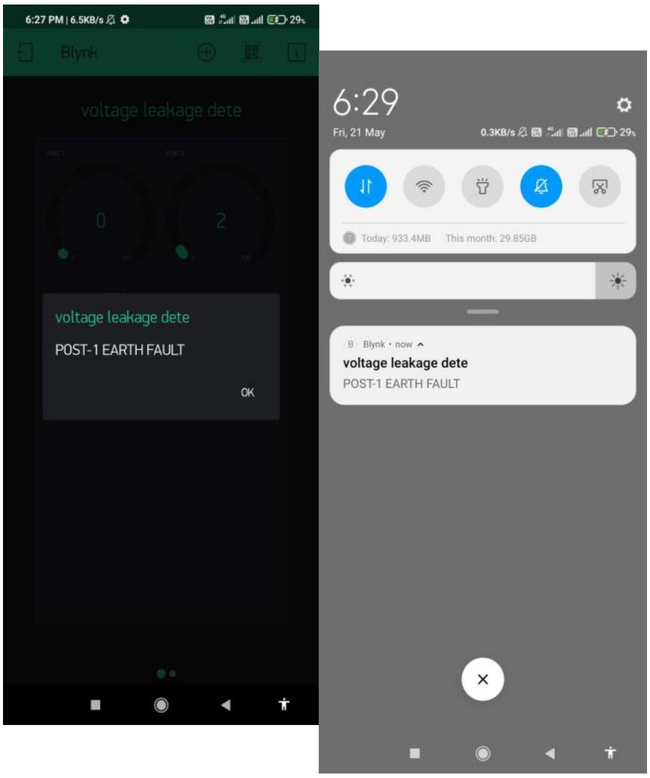

FIG -3: Snapshots of output

REFERENCES

[1] Alexander, G. E., and J. G. Andrichak, "Distance relay fundamentals," Twenty-third Annual Western Protective Relay Conference, Oct. 1996.

[2] B. F. Alshammari,M. T. Chughtai ,"IoT Gas Leakage Detector and Warning Generator",Pages: 6142-6146,August 2020

[3] Chung T. M. and Daniyal H. 2006. ARDUINO based power meter using instantaneous power calculation method. ARPN Journal of Engineering and Applied Sciences. 10: 9791-9795.

[4] Emmanuel.B.S. 2012. Microcontroller-based intelligent power management system (IPDMS) for satellite application. ARPN Journal of Engineering and Applied Sciences. 7: 377-384.

[5] Fransiska, E. Septia, W. Vessabhu, W. Frans and W. Abednego. 2013. Electrical power measurement using Arduino Uno microcontroller and LabVIEW. in Instrumentation, Communications, Information Technology, and Biomedical Engineering (ICICI BME), 2013 3rd International Conference on. pp. 226-229.

[6] Jesus Pacheco, Daniela Ibarra, Ashamsa Vijay, Salim Hariri, "IoT Security Framework for Smart Water System", Computer Systems and Applications (AICCSA) 2017 IEEE/ACS 14th International Conference on, pp. 1285-1292, 2017.

[7] Minns P. D., C Programming For the PC the MAC and the Arduino Microcontroller System. Author House, 2013.

[8] Tamkittikhun N., Tantidham T. and Intakot. P.2015. AC power meter design based on Arduino: Multichannel single-phase approach. in 2015 International Computer Science and Engineering Conference (ICSEC). pp. 1-5.

[9] Tan. D. K., Sun.H, Lu.Y, Lesturgie M., Chan H., "Passive radar using global system for mobile communication signal: theory implementation and measurements", Radar Sonar and Navigation IEE Proceedings-, vol. 152, no. 3, pp. 116-123, 2005.

[10] Tsividis Y. P., Ulmer R. W., "A CMOS voltage reference", *IEEE J. Solid-State Circuits*, vol. SC-13, pp. 774-778, Dec. 1978.

[11] Raman B., Katz R.H., Joseph A.D., "Universal Inbox: providing extensible personal mobility and service mobility in an integrated communication network", Mobile Computing Systems and Applications 2000 Third IEEE Workshop on., pp. 95-106, 2000.

Jan Vorlicek, Jiri Kastan, John Evers,"Leakage detection in a flame sense circuit", United States Patent Application, Dec, 2018

Ramos P. M., N. B. Brás and A. C. Serra. 2006. A new calibration method for current and voltage sensors used in power quality measurements in 2006 IEEE Instrumentation and Measurement Technology Conference Proceedings. pp. 2283-2288.

[12] Srividyadevi P., D. V. Pushpalatha, and P. M.Sharma. 2013. Measurement of Power and Energy Using Arduino. Research Journal of Engineering Sciences. Vol. 2, 10th October, 2013.

[13] Vaibhav Bhatnagar, Ramesh Chandra, Internet of Things and Analytics for Agriculture, Volume 2, vol. 67, pp. 1, 2020.