International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 06 Issue: 06 | June - 2022 Impact Factor: 7.185 ISSN: 2582-3930

Transformer Health Monitoring System Using IOT

Prof.Ms Ashwini C[1*], Harshitha A Dixit[2*]

[1] Associate Professor, Department of Master Applications,

University B.D.T College of Engineering, Davanagere, Karnataka, India

[2]Student, Department of Master Applications,

University B.D.T College of Engineering, Davanagere, Karnataka, India

Abstract: Electrical power plays a significant role in people's daily activities. Due to the advancement of technology IoT technique is used in most real-time applications. Various sensors are used to collect real data from the environment . With the help of the IoT concept, people can create a machine to machine connection. This proposed system is designed to monitor and detect the faults of the transformer and immediately sent the message to the authenticated person. The important indicators used to measure the condition of the transformer are temperature, oil level, and vibration. This system can reduce manpower and increases the stability, accuracy, and efficiency of the transformer. The sensor data transfer to the controller and check the indicators limit values. If the indicator's value crosses the threshold values the message transfer to the concerned people. All the sensor values are sent to the android phone through IOT. This system will be an advanced step to the automation by diminishing human dependency. Thus Transformer health monitoring system offers a more improved transformer monitoring.

KEY WORDS: Distributed Transformer, IOT, Transformer health monitoring, Sensors, Wi-Fi module, PC / Laptop

1.Introduction

Every second of human life electricity is an important component. Various components are used to regulate the energy distribution based upon the user's requirements . The transformer is one of the major components used to distribute electrical energy. This component distributes the electrical power to the low-level voltage users. The condition of the transformer is the major criterion of the total network. Compare with the other components cost the transformer cost is high. So, continuous monitoring is necessary for all transformers. But transformers are situated in various places. In the olden days, the condition of the transformers is monitored with manual help. Continuous monitoring is a major issue in traditional systems. To overcome such kind of issue various new devices are used to monitor the condition of the transformer. Now IoT plays a major part in most of the real-time applications. Various sensors are used to measure the real-time data from electrical devices. overloading, temperature, and oil level are the major parameters used to monitor the condition of the transformer. It is essential to employ continuous monitoring techniques and on-site diagnostics followed by quality maintenance for having trouble-free and reliable operation with minimum outages.

Reliable and quality power is needed for our economic development of a country. For providing reliable electrical energy, it is very necessary to have highly reliable associated electrical equipment. Hence it is, all the more essential to employ continuous monitoring techniques and on-site diagnostics followed by quality maintenance for having trouble-free and reliable operation with minimum outages. The embedded technology will be used in our project to minimize the electronic hardware components . Embedded technology is used to minimize the cost and maximizing the work ability. Embedded systems will provide the needs of industrial control, monitoring, interfacing with any latest communication systems like GSM, GPRS, Bluetooth .

3.LITERATURE REVIEW

Observing the condition of the transformer is a very critical task. Any small problems in the transformer also lead to major issues. Regular monitoring transformer health condition is important. Preventive devices are used to identify the fault and it will be helpful at the fault time. This system can be used to monitor the important transformer features like temperature and the current level. The collected data sent through the TCP/IP internet protocol. using this system the user will receive an alert signal when a power failure occurs. The LED display is used to display the phase defect message. The major goal of this system is to predict and prevent the fault of the transformer . For the development of the Indian economy power system safety is very important. To provide the safety and reliability of the transformer monitoring system is used. A transformer is an important asset of the electrical network and it needs extra care and concentration. it is a very difficult task to observe the condition in a manual way of every transformer. So, an automatic monitoring system is needed to observe the condition of the transformer. This proposed system is embedded with the mobile to observe the load of the current, voltage level, oil temperature, and level of the oil. This system is integrated with the GSM (Global Service Mobile), microcontroller, and various sensors. The sensor data are collected and stored on the memory. The system checks the condition of the transformer using inbuilt instructions. If any abnormal conditions are occurring on the transformer the GSM component sent the message to the receivers' mobile phones contains the data about the abnormal condition. It is a wireless system to offer better monitor the condition of the transformer. The developed system is embedded with the transformer and it sends the abnormal parameters to the cell phone using the GSM technique

3.1PROPOSED SYSTEM:

The transformer is one of the important devices used to transfer electrical power to various places. Traditional transformer monitoring systems are working based on the wired communication here uninterrupted monitoring is not feasible The proposed prototype includes various things such as transformer, DHT11 sensor, ESP32 development board, sensor continuously monitors the health of transformer and when temperature crosses the threshold voltage notification is sent to concerned authorities mobile to take care to avoid further damage. The transformer is one of the important devices used to transfer electrical power to various places. Traditional transformer monitoring systems are working based on the wired communication here uninterrupted monitoring is not feasible. Different kinds of methods are used to safeguard the transformer from faults . This proposed system is used to monitor the transformer conditions automatically using various sensors and microcontrollers. Mainly this system consists of three important sensors and an Arduino controller

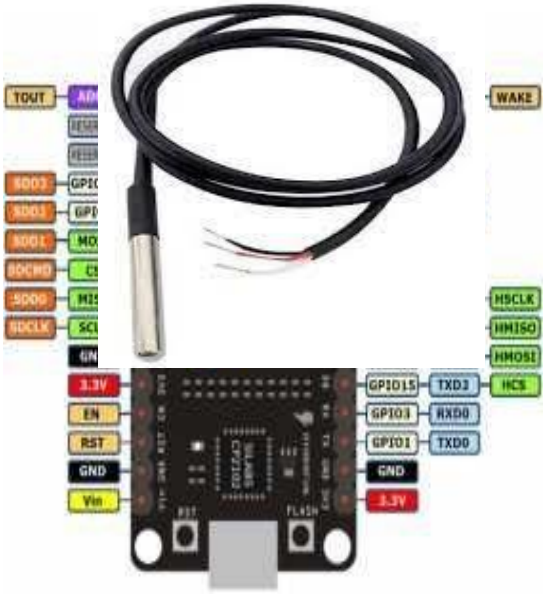
4.SYSTEM DESIGN

Hardware used in design of the system

Temperature sensor
ESP 32 Wroom kit ,Tranformer
Bread board
Jumper wires
buzzer

TEMPERATURE SENSOR:

The major function of the temperature sensor is to find the temperature of the surroundings or the concerned devices. It produces the digital form output. It is one of the low price sensors it offers reliable and stable data.



Temperature sensors work by providing readings via electrical signals. Sensors are composed of two metals that generate an electrical voltage or resistance when a temperature change occurs by measuring the voltage across the diode terminals. When the voltage increases, the temperature also increases.

Temperature sensors are devices that provide readable temperature measurements via an electrical signal. The most basic way to measure temperature is using a thermometer; this measures how hot or cold something is. With advances in technology, we now have access to a variety of temperature sensors that are much more accurate. Fig shows the temperature sensor which utilized for proposed approach

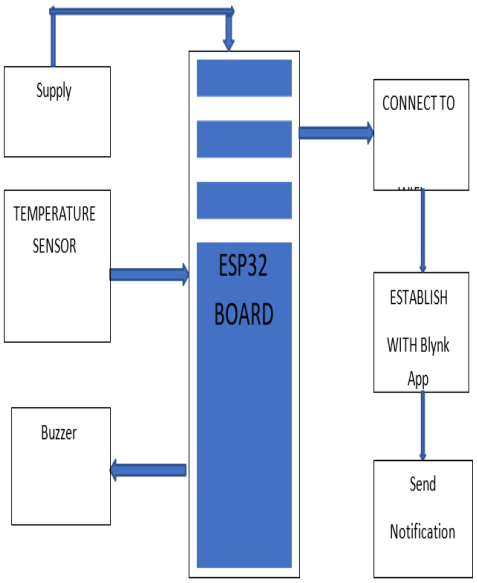
ESP32:

ESP32 is a low-cost, low-power Microcontroller with an integrated Wi-Fi and Bluetooth. It is the successor to the ESP8266 which is also a low-cost Wi-Fi microchip albeit with limited vastly limited functionality. It is an integrated antenna and RF balun, power amplifier, low-noise amplifiers, filters, and power management module. The entire solution takes up the least amount of printed circuit board area. This board is used with 2.4 GHz dual-mode Wi-Fi and Bluetooth chips by TSMC 40nm low power technology, power and RF properties best, which is safe, reliable, and scale-able to a variety of applications.ESP32 is one of the microcontroller 802.11b/g/n integrated with802.11b/g/n Wi-Fi and dual mode Bluetooth its means it supports both Bluetooth 4.0 (BLE) and Bluetooth Classic (BT). It is a low-cost, low-power system so it has more advantages to implement the projects. ESP Ressif Systems and Shanghai-based Chinese company created/invented and developed this ESP32 microcontroller and it is manufactured by TSMC with the help of their 40 nm process. Sometimes it connects the network of its own. It provides power supply is of about 5V through USB. The ESP32 is good option for peer-to-peer connection without the need of an access point supports wi-fi Direct as well.

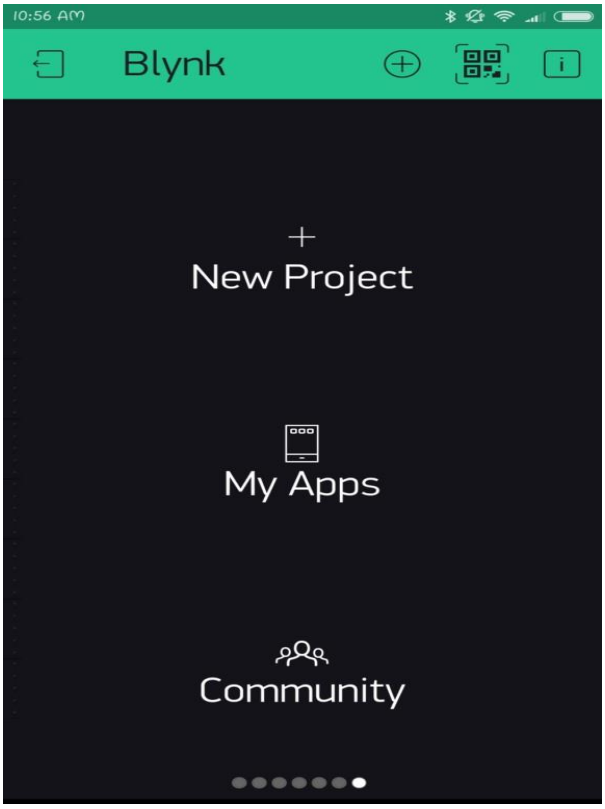
Buzzer

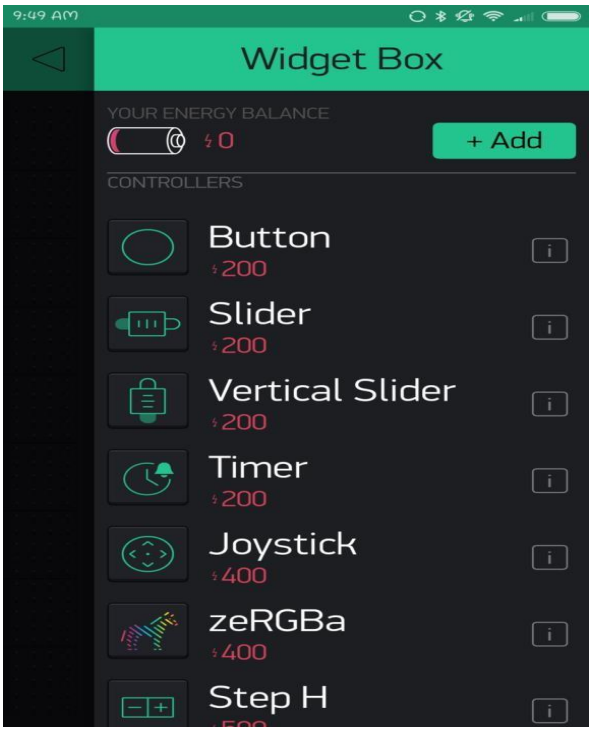
Buzzer is a kind of voice device that converts audio model into sound signal. It is mainly used to prompt or alarm. According to different design and application, it can produce music sound, flute sound, buzzer, alarm sound, electric bell and other different sounds.Typical applications include siren, alarm device, fire alarm, air defense alarm, burglar alarm, timer, etc. It is widely used in household appliances, alarm system, automatic production line, low-voltage electrical equipment, electronic toys, game machines and other products and industries.

5.METHODOLOGY



Above diagram shows various functional units being used in the proposed project,ESP32 module plays key role in the project,it receives information from sensor data i.e in this case temperature sensor,the read information from sensor is analysed using control statements,if temperature lies in the normal range no notification is sent,when it crosses normal range i.e when it becomes greater than 100F a notification will be sent to blynk app which is installed in the smart phone, blynk app and ESP32 board will have been synched soon after turning on the system, while establishing the connection authcode ,ssid and password are used. Along with notification buzzer is also turned on to indicate the status of the transformer.





Blynk application:

Blynk is a easy to use android app for controlling and communicating with development boards,it has various widgets support with which user interface could be easily created and helps to mask digital and virtual pins with real time development board. Over various media such as wifi ,usb, bluetooth helps to control actuators from remote place. Blynk is a new platform that allows you to quickly build interface for controlling and monitoring your hardware project from your ios and android device . After downloanding the blynk app ,you can create a project dashboard and arrange buttons, sliders, graphs, and other widgets onto the screen.

FUTURE SCOPE

In future work we can develop database of all parameters of distribution transformer which are placed at different places. We can get all information by placing the proposed system modules at every transformer. We can send the data through Wifi module and also through Ethernet shield. With Ethernet shield we can make remote terminal unit as a server and store data on webpage or website. A Wifi module connects to nearby network and sends information to monitoring node.

CONCLUSION

An IOT based transformer temperature monitoring system for transformer was designed, implemented and tested. It is quite useful as compared to manual monitoring and also it is reliable as it is not possible to monitor always the oil temperature rise, ambient temperature rise. A server module can be added to this system to periodically receive and store transformer temperature information of transformers. After receivingmessage on any abnormality, we can take immediate action to prevent any catastrophic failures of transformers. We need not have to check the transformer temperature all the time. Thus we can recover the system in less time and we can avoid any uncertain failures in transformer thus resulting in significant cost saving as well as improving system reliability. From the proposed system if transformer shows abnormal temperature, we can know it from anywhere. No human power need to monitor the transformer temperature. Details about the transformer temperature are automatically updated in smart phone and also in serial monitoring of system.

REFERENCES

[1] E. Simonson, " Transformer Rating and Transformer Life," in proc. IEE Colloquium on Transformer Life Management, 22 Oct. 2015.

[2] Y. Han and Y. H. Song, "Condition Monitoring Techniques for Electrical Equipment—A Literature Survey," IEEE Trans. Power Del.,vol. 18, no. 1, pp 4-13, Jan. 2003.

[3] Ji Shengchang, Shan Ping, Li Yanming; Xu Dake and Cao Junling, "The vibration measuring system for monitoring core and winding condition of power transformer," in proc. 2001 International Symposium on Electrical Insulating Materials (ISEIM 2001), 19-22 Nov. 2001.

[1] Monika Agarwal and Akshaypandya, "GSM Based Condition Monitoring of Transformer", IJSRD - International Journal for Scientific Research&Development| Vol. 1, Issue 12, 2014 | ISSN (online): 2321-0613

[2] Hongyan Mao, "Research of Wireless Monitoring System in Power Distribution Transformer Station Based on GPRS", Volume 5, C 2010 IEEE,978-1-4244-5586-7/10/$26.00

[3] Pathak A.K, Kolhe A.N, Gagare J.T and Khemnar SM, "GSM Based Distribution Transformer Monitoring And Controlling System", Vol-2 Issue2 2016, IJARIIE-ISSN (O)-2395-4396.