ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 6, June 2017

Overall Real Time Monitoring of Power Transformer Using Arm 7 and Zigbee

Sonia .P. Parate[1] , Harikumar Naidu[2] , Pratik . C. Ghutke[3]

M.Tech Student , Department of Electrical Engineering, Tulsiramji Gaikwad Patil College of Engineering and Technology, Mohgaon, Wardha road , Nagpur, Maharashtra, India. [1]

HoD , Tulsiramji Gaikwad Patil College of Engineering and Technology, Mohgaon, Wardha road , Nagpur, Maharashtra, India. [2]

Department of Electrical Engineering, Tulsiramji Gaikwad Patil College of Engineering and Technology, Mohgaon, Wardha road, Nagpur, Maharashtra, India. [3]

ABSTRACT: Power transformers are one in all the foremost important electrical equipment that are employed in power transmission system as they perform the operation of transforming the voltage levels. Hence maintenance of power transformer is mandatory; as they're located at completely different geographical areas periodical observation isn't possible all the time because of inadequate man power. because of this reason electrical device failure could occur that ends up in sudden power closure. to overcome this shutdown because of transformer failure we projected a system for monitoring the transformer. This work projected a new real time observation system in distribution transformer with communication through a ZigBee network. It obtains the voltage, current, power, energy and frequency of all hundreds connected at the distribution transformer. the data collected within the measurements are send to a server through a ZigBee network for safe the data. The new real time system build a wireless network with low energy consumption and a large transmission distance with enough conditions to work in an urban distribution electrical network. this method makes possible a low price infrastructure to try and do a task of save electrical magnitude moreover as possible diagnostic of the electrical network.

KEYWORDS*:* power transformer, monitoring, EEPROM, ZIGBEE.

I. INTRODUCTION

As WSN's are having many advantages, here we have designed smart meters predicting the usage of power consumption. However it is low-cost, flexible, and robust system to continuously monitor and control based on consumer requirements, ZigBee technology for networking and communication, because it has low-power characteristics, which enable it to be widely used in home and building environments. The demand of electric power for house hold purpose, commercial purpose and industrial purpose increases day by day. Home automation is a method of controlling home appliances automatically for the convenience of users. It also involves switching on & off electrical appliances like air-conditioners or refrigerators when a desired temperature has been reached. It also is used to secure a house from thieves by sending alerts to the nearest police station. This system principally monitors electrical parameters of household appliances such as voltage and current and subsequently calculates the power consumed. The existing method of management of electrical power system is complex as they are generally interconnected with many operating machine units working together. If any of the machine in this interconnected system faces failure entire power system is affected hence careful monitoring and protection of these machines are necessary. Among the interconnected machine transformer which is a static machine which plays key role of stepping up or stepping down voltage levels in power systems based on electromagnetic induction principle. In the existing system monitoring of transformer is done using wired network accompanied with temporary test unit and involving man into action , here continuous monitoring is not possible all the time which may lead to malfunction or failure of power transformer. Our

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proposed system provides effective monitoring and protection of power transformer by measuring operating voltage without involving human intervention.

II. HARDWARE SYSTEM

The proposed methodology is based on Robust technology meets safety reliability and fastest in operation. It consists of a sensing system, signal conditioning Electronic circuit, controller. It is installed at the transformer site and the finding parameters recorded using the analog to digital converter of the embedded system. The acquired parameters are processed and recorded in the system memory. System will help the system to run under reliable condition and identify problems before any failure. For above result we are using a small step down transformer of 12 V, 1 Amps rating and small bulb are connected as a load. In this project we are using CT transformer for measuring load current. Energy meter is interfacing to loads to provide energy consumption. Along with this, a display is connected in the input port of the microcontroller value then the transformer will automatically shut down and in this way transformer life will be increased. We also designed Two-way communication here by which we can ask system about given parameter value just by sending Wireless Data to it so that we can have watch over transformer .For this it is not necessary for the operator to sit in the system premises which was the case at conventional system.

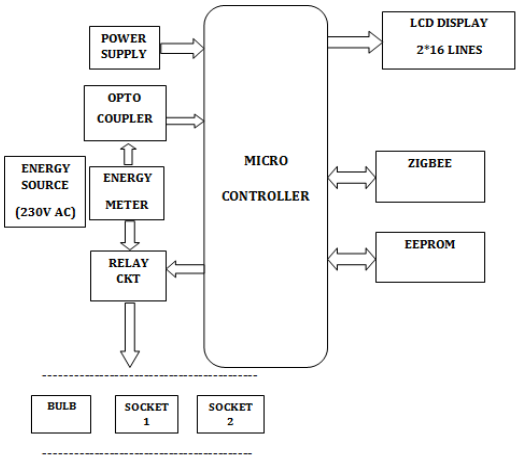

Fig 1: Monitoring section

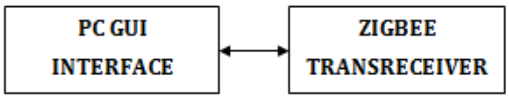

Fig 2: Control section

III. FEATURES OF HARDWARE

OPTO COUPLERS:

There are many situations where signals and data need to be transferred from one system to another within a piece of electronics equipment, or from one piece of equipment to another, without making a direct electrical connection. Often this is because the source and destination are (or may be at times) at very different voltage levels, like a microcontroller which is operating from 5V DC but being used to control a triac which is switching 230V AC. In such situations the link between the two must be an isolated one, to protect the microprocessor from over voltage damage. Relays can of course provide this kind of isolation, but even small relays tend to be fairly bulky compared with ICs and many of today's other miniature circuit components. Because they are electro-mechanical, relays are also not as reliable ó and only capable of relatively low speed operation. Where small size, higher speed and greater reliability are important, a

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much better alternative is to use an Optocoupler. These use a beam of light to transmit the signals or data across an electrical barrier, and achieve excellent isolation.

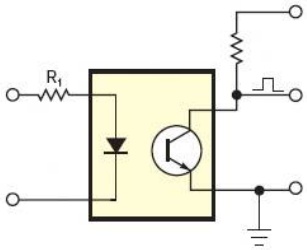

Fig 3: Optocoupler structure

ENERGY METER

An electricity meter or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device. Electricity meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meters establish billing cycles and energy used during a cycle. In settings when energy savings during certain periods are desired, meters may measure demand, the maximum use of power in some interval. In some areas the electric rates are higher during certain times of day, reflecting the higher cost of power resources during peak demand time periods. Also, in some areas meters have relays to turn off nonessential equipment

ZIGBEE:

Zigbee modules feature a UART interface, which allows any microcontroller or microprocessor to immediately use the services of the Zigbee protocol. All a Zigbee hardware designer has to do in this case is ensure that the host's serial port logic levels are compatible with the XBee's 2.8- to 3.4-V logic levels. The logic level conversion can be performed using either a standard RS-232 IC or logic level translators such as the 74LVTH125 when the host is directly connected to the XBee UART. The X- Bee RF Modules interface to a host device through a logic-level asynchronous Serial port. Through its serial port, the module can communicate with any logic and voltage Compatible UART; or through a level translator to any serial device.

Data is presented to the X-Bee module through its DIN pin, and it must be in the asynchronous serial format, which consists of a start bit, 8 data bits, and a stop bit. Because the input data goes directly into the input of a UART within the X-Bee module, no bit inversions are necessary within the asynchronous serial data stream. All of the required timing and parity checking is automatically taken care of by the X-Bee's UART.

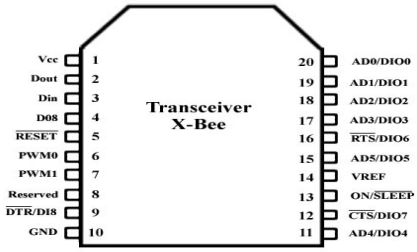

Fig 4: ZIGBEE pin diagram

IV. CONCLUSION

The proposed method is a very effective method for implementing green energy concept on a larger scale. The designed system is easy to implement and very customizable according to needs. It provides very effective techniques of using our renewable energy resources which would otherwise have been underutilized. The integration of Web of Things with existing power grid architecture will provide us numerous opportunities for improvements in our energy saving techniques. In future data base can be maintained for understanding the performance of transformer system. A server

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module can be included to this system for receiving and storing transformer parameters information periodically about all the distribution transformers of a particular utility in a database application. This database can be strictly utilized for analysis of distributed transformers. Moreover , faults of the system cost reduction can be done and in turn it improves system reliability.

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