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Distribution Transformer Health Monitoring System Using IOT

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ABSTRACT: Transformers are a vital part of the transmissions and distribution systems. Monitoring transformers for problem before they occurs prevent fault that are costly to repair and results in a loss of services. Current system provides information about the state of a transformers, but are either offline or very expensive to implement. Transformer is essential part of power transmission system, are costly, as is the cost of power interruption. The costs of scheduled and unscheduled maintenance, especially at remote site, the utility industry has begun investing in instrumentation& monitoring of transformers. This project objective is to develop low cost solution for monitoring health conditions of remotely located Distribution Transformer using IOT technology to prevent premature failures of distributions transformers and improving reliability of services to the customers. This is done by deploying sensors to monitor the transformer winding temperature ,oil temperature ,level of the transformer oil ,voltage and based on the load current monitored if it is any abnormalities happen will indicate to Website page of the above transformer IP Address so has to avoid failure cause of the transformer.

I. INTRODUCTION

Present industry is increasingly shifting towards automation. Two principle components of today's industrial automations are programmable controllers and robots. In order to aid the tedious work and to serve the mankind, today there is a general tendency to develop an intelligent operation.

The proposed system "DISTRIBUTION TRANSFORMER HEALTH MONITORING SYSTEM USING IOT" is designed and developed to accomplish the various tasks in an adverse environment of an industry. The intelligent This project is an owe to the technical advancement. This prototype system can be applied effectively and efficiently in an expanded dimension to fit for the requirement of industrial, research and commercial applications.

Microcontroller is the heart of the device which handles all the sub devices connected across it. We have used as microcontroller. It has flash type reprogrammable memory. It has some peripheral devices to play this project perform. It also provides sufficient power to inbuilt peripheral devices. We need not give individually to all devices. The peripheral devices also activates as low power operation mode. These are the advantages are appear here.

The objective of this project is to wireless monitor and protect if the transformer parameters such as voltage, current, frequency, oil level, coil and winding temperature level are exceed above the normal value. This project is to fault monitor in transformer in electric board. Parameters such as voltage and current, temperature, frequency, voltage, current, frequency, oil level, coil and winding temperature level the microcontroller monitor this value and transmitted to EB station through IOT with help of GPRS modem.

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II. METHODOLOGY

In this project we are going to monitor the voltage, current, oil level and frequency. Voltage to the transformer is measured with the help of a potential transformer. The potential transformer will convert the mains supply voltage to low voltage AC. That AC voltage will be rectified with the help of a precision rectifier. Then the rectified output will be given to the micro controller through an analog to digital converter.

Current consumed by the load is measured with the help of a current transformer. The current transformer will convert the load current in to lower values that current output will be converted in to voltage with the help of the shunt resistor. Then the corresponding the AC voltage will be rectified with the help of a precision rectifier. Then the rectified output will be given to the micro controller.

Frequency will be measured with the help of the potential transformer. The P.T output will be given to a zero crossing detector (ZCD); the zero crossing detector output will be in +12V. That should be converted to the TTL logic pulses with the help of zero crossing detectors. Then the amplified signals will be given to the micro controller through a buffer.

Level sensor used to monitor oil level in the transformer. The temperature sensor output is given to microcontroller through amplifier. Then the micro controller will receive above mentioned parameter and displayed on the LCD display which equal to monitored parameter.

Temperature sensor is used to monitor coil and winding temperature level in the transformer. The temperature sensor output is given to microcontroller through amplifier and analog to digital converter. Then the micro controller will receive above mentioned parameter and displayed on the LCD display which equal to monitored parameters. If any of the parameters get abnormal relay automatically trip the supply and indicate the buzzer. And same time the values transmitted to EB station through IOT with help of GPRS Modem.

III. SYSTEM CONFIGURATION

MICROCONTROLLER:

The microcontroller that has been used for this project is from PIC series. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory.

ULTRASONIC SENSOR:

Ultrasonic sensor is used to check the oil level in the transformer. Due to overheating the oil start to evaporate and the oil level decreases and thus this decrease in the oil level may be dangerous to the transformer. Thus this sensor indicates the level and we get aware about the level. Thus we can look over the oil viscosity also. Ultrasonic sensors measure distance by using ultrasonic waves.

CURRENT SENSOR:

A current sensor is a device that detects electric current (AC or DC) in a wire, and generates a signal proportional to it. The generated signal could be analog voltage or current or even digital output. It can be then utilized to display the measured current in an ammeter or can be stored for further analysis in a data acquisition system or can be utilized for control purpose.

TEMPERATURE SENSOR:

The most commonly used type of all the sensors are those which detect Temperature or heat. These types of temperature sensor vary from simple ON/OFF thermostatic devices which control a domestic hot water heating system to highly sensitive semiconductor types that can control complex process control furnace plants.

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POWER SUPPLY:

The step down transformer is used commonly in power supplies to reduce the high risk associated with high voltage to considerably low voltage. The transformer has two coils namely primary coil and secondary coil. Between this two coils there is no electrical connection rather they are connected by the alternating magnetic field. This field is created by using soft-iron core of the transformer.

BLOCK DIAGRAM:

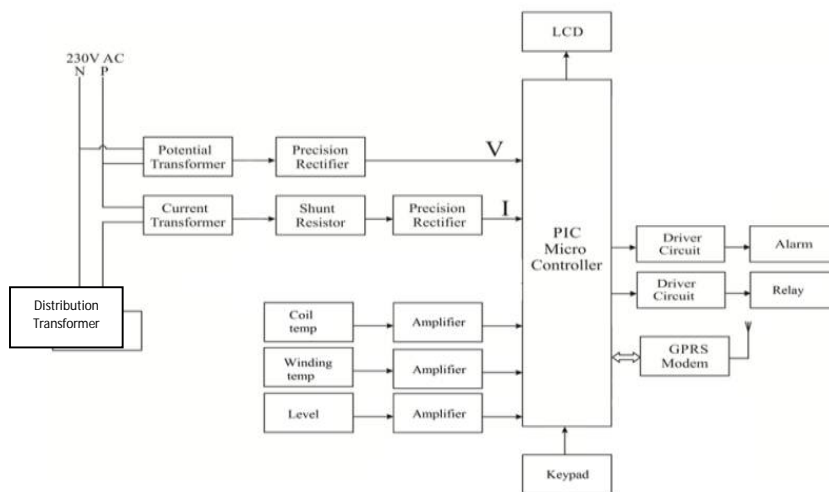


Fig 1: Proposed Block diagram

LCD:

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as pre-set words, digits, and 7-segment displays, as in a digital clock.

ADVANTAGES:

1. This project is used to monitor the parameters. So we can easily take the precaution if anyone is exceed or below the normal value.
2. Low power consumption.
3. Small size
4. Economical
5. Reliable

IV. RESULT

According to definitions of IOT, if we consider a sensor as an element of IOT which enables to communicate its current status and be published on Internet via our web page, then our proposal is very close to what we are intending to achieve within the concept of Internet of things. So far, we have built a android app, that sends data an towards smart-phones about the distribution transformer health.

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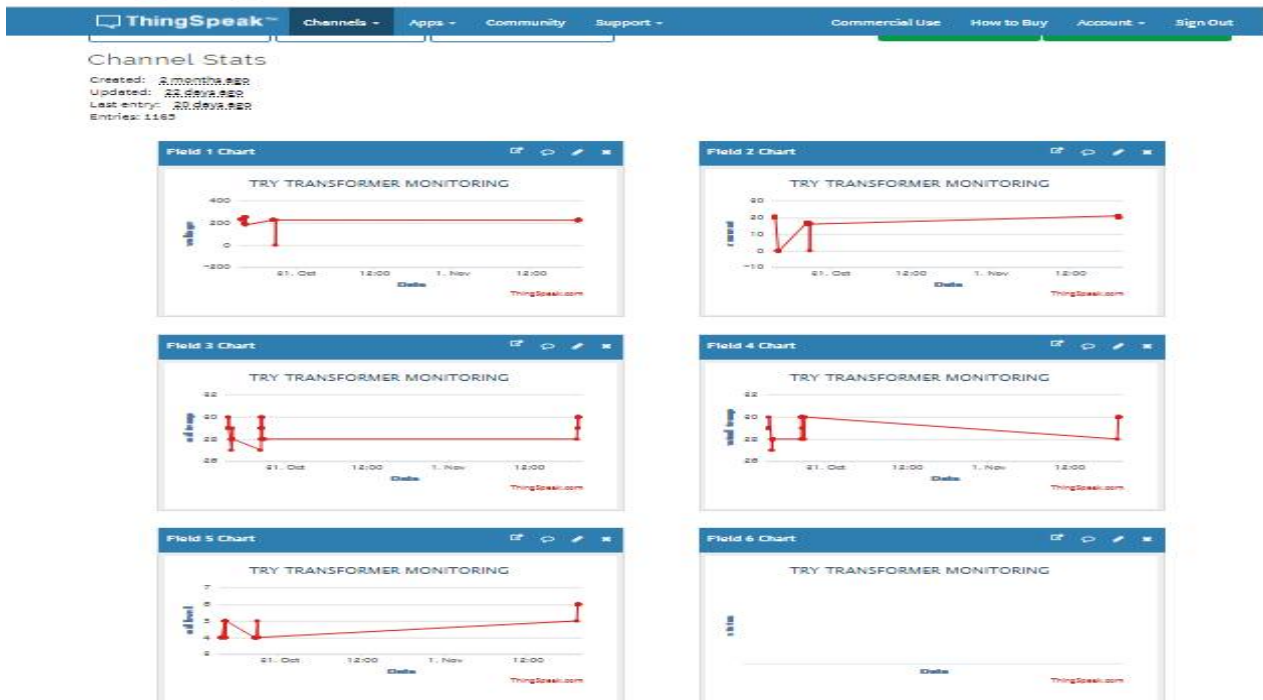


Fig 2: Data Monitoring using Web Server

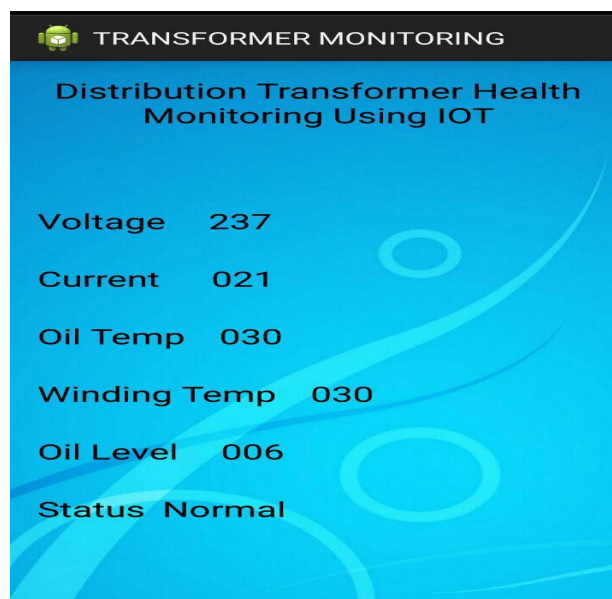


Fig 3: Android Application Output

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V. CONCLUSION

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place.

The proposed system based on PIC microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications. Due to the probability of high technology (PIC microcontroller) used this system “DISTRIBUTION TRANSFORMER HEALTH MONITORING SYSTEM USING IOT” is fully software controlled with less hardware circuit. The feature makes this system is the base for future systems.

The principle of the development of science is that “nothing is impossible”. So we shall look forward to a bright & sophisticated world.

REFERENCES

- [1] MILL MAN J and HAWKIES C.C. “INTEGRATED ELECTRONICS” MCGRAW HILL, 1972
- [2] ROY CHOUDHURY D, SHAIL JAIN, “ LINEAR INTEGRATED CIRCUIT”, New Age International Publishers, New Delhi,2000
- [3] “THE 8051 MICROCONTROLLER AND EMBEDDED SYSTEM” by Mohammad Ali Mazidi.
- [4] Leibfried, T, “Online monitors keep transformers in service”, Computer Applications in Power, IEEE, Volume:11 Issue: 3 , July 1998 Page(s):36-42.
- [5] Chan, W. L, So, A.T.P. and Lai, L., L.; “Interment Based Transmission Substation Monitoring”, IEEE Transaction on Power Systems, Vol. 14, No. 1, February 1999, pp. 293-298.
- [6] Par S. Tenbohlen,T. Stirl, M. Rösner,” Benefit of sensors for on-line monitoring systems for power transformers”
- [7] T. D. Poyser, "An On-Line Microprocessor Based Transformer Analysis System to Improve the Availability and Utilization of Power Transformers". IEEE Trans. On Power Apparatus and Systems, Volume PAS-102, April 1983, pp.957-962.
- [8] Muhammad Ali Mazidi , Janice GillispieMazidi, RolinD.Mckinlay, The 8051 Microcontroller And Embedded Systems Using Assembly And C, Second Edition, Pearson Education, 2008, India.
- [9] Microcontroller ATmega 16; www.atmel.com/Images/doc2466.pdf .
- [10] Constantin Daniel Oancea,” GSM Infrastructure Used for Data Transmission”, 7th International Symposium on Advanced Topics in Electrical Engineering (ATEE), 2011 May 12-14, Page(s): 1 – 4.
- [11] Abdul-Rahman AI-Ali, Abdul Khaliq& Muhammad Arshad,” GSM-Based Distribution Transformer Monitoring System”, IEEE MELECON 2004, May 12-15,2004, Vol 3 Pages-999-1002, Croatia.