IOT BASED DISTRIBUTION TRANSFORMER MONITORING AND CONTROLLING SYSTEM

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ABSTRACT

Distribution transformers are one of the most important equipment in power network. Because of, the large amount of transformers distributed over a wide area in power electric systems, the data acquisition and condition monitoring is important issue.

The main aim of this system is distribution transformer monitoring and controlling through IOT. Also, it sends SMS to a central database via the GSM modem for further processing. The idea of on-line monitoring system mixes a global service mobile (GSM) Modem, with chip micro controller and different sensors.

Here transformers are damaged due to the oil damage. Oil damage is depends on different parameters and environmental conditions. Now in this system we are concentrating on temperature of transformer and viscosity of oil .In this system temperature and viscosity monitoring and control action is performed based on the AVR microcontroller. After interfacing the required components user has to develop one application program in embedded-c. Here controller is continuously reading the temperature, voltage and current and display on the LCD.

Keywords: *IOT (Internet of Things), GSM, Micro controller, Sensors.*

I. INTRODUCTION

In power system distribution transformer is main equipment which distributes power to the low-voltage users directly and its health condition is a vital part of the operation of distribution network. Operation of distribution transformer under rated condition insurance their long life. However, their life is significantly reduced if they are subjected to overloading condition, resulting in sudden failures and loss of supply to a large number of customers thus affecting system reliability. Overloading and rise in oil & winding temperature of transformer are the major causes of failure in distribution transformers.

Our system is designed based upon online monitoring of key Operational parameters of distribution transformers can provide useful Information about the health of transformers which will help the utilities to Optimally use their transformers and keep the asset in operation for a longer Period. This system will help us to identify problems before any objectionable failure, thus resulting in a long life service for transformers. This system is based on embedded system as we are using microcontroller as discussed before. Embedded systems

are usually set to a specific task another way to think of an embedded system is as a computer system that is created with optimal efficiency, thereby allowing it to complete specific functions as quickly as possible. It is also has the advantages of significant cost savings, power consumption and greater reliability.

II. PROPOSED SYSTEM

Smart grid, the next generation electric power system is actual way of digital transmission of electricity. It is digital technology that allows resourceful two way communications between utility and customers. Our project designed based upon online monitoring of main operational parameters of transformers can provide useful information about the health of transformers which will help the utilities to optimally use their transformers and keep the asset in operation for a longer Period. This system will help us to identify problems before any objectionable failure, thus resulting in a long life service for transformers. In transformer monitoring system we used four sensors for monitoring that is voltage sensor, current sensor, temperature sensor and oil level sensor. We used power supply to operate microcontroller AT mega 16 and GSM module. Fig shows the connection between microcontroller and all other devices. Sensors sense the data and display it on LCD display at the same time GSM module send the message(data) to user on given number as per program. If we get any unsecure data about transformer we can avoid failure and protect the device.

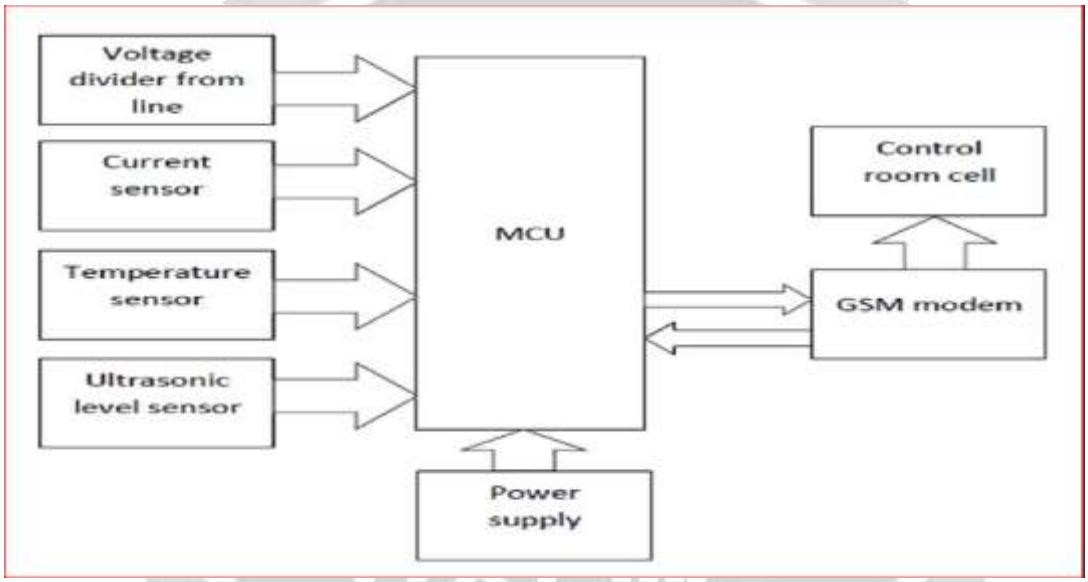


Figure: Block Diagram of Transformer monitoring system.

III. VOLTAGE SENSOR

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

CURRENT SENSOR

A current sensor is a device which detects electric current in a wire, and generates a signal proportional to it. The generated signal can be analog voltage or current. 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 and also can be utilized for control purpose.

OIL LEVEL SENSOR

Oil level sensor is a device that 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.

TEMPERATURE SENSOR

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. We remember from our school science classes that the movement of molecules and atoms produces heat and the greater the movement, the more heat that is generated. Temperature sensors measure the amount of heat energy or even coldness that is generated by an object or system, allowing us to "sense" or detect any physical change to that temperature producing either an analogue or digital output.

ATMEGA 16

• High-performance, Low-power AVR® 8-bit Microcontroller

• Advanced RISC Architecture

– 131 Powerful Instructions – Most Single-clock Cycle Execution

– 32 x 8 General Purpose Working Registers

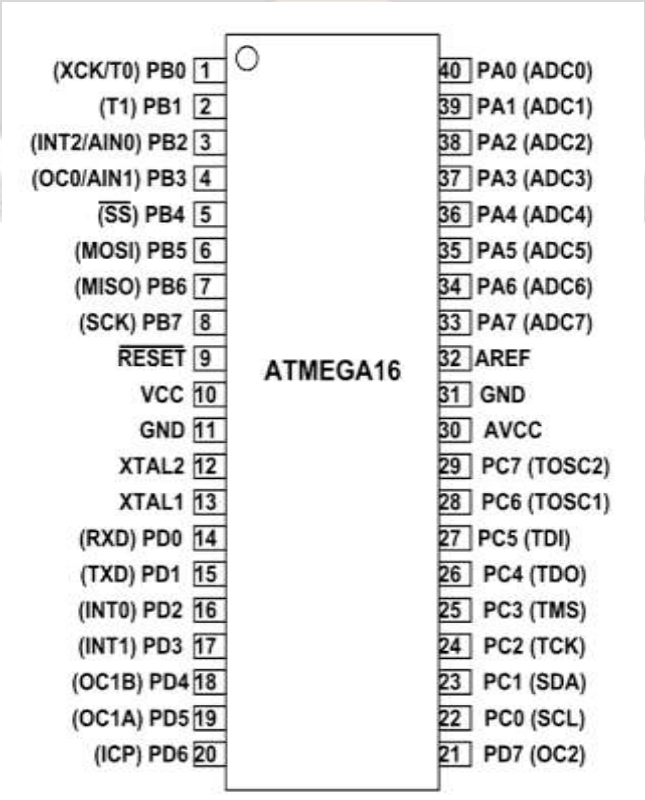
– Fully Static Operation

– Up to 16 MIPS Throughput at 16 MHz

– On-chip 2-cycle Multiplier

• Nonvolatile Program and Data Memories

– 16K Bytes of In-System Self-Programmable Flash



LCD Module

In recent years the LCD is finding widespread use replacing LEDs (Seven Segment LEDs or other multistage LEDs). The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters**.**

IV. ADVANTAGES

- Low cost.
- Real-time monitoring.
- High efficiency.
- High Accuracy.
- Improve system reliability.

V. APPLICATIONS

- Distribution Transformer.
- Industrial Applications.
- On High Grade Motors.

VI. CONCLUSION

The IOT based monitoring of distribution transformer is quite useful as compared to manual monitoring and also it is reliable as it is not possible to monitor always the oil level, ambient temperature rise ,load current manually. After receiving of message of any abnormality we can take action immediately to prevent any objectionable failures of distribution transformers. In a power distribution network there are many distribution transformers and associating each transformer with such system, we can easily figure out that which 40 transformer is undergoing fault from the message sent to mobile. We need not have to check all transformers and corresponding phase currents and voltages and thus we can recover the system in less time. The time for receiving messages may vary due to the public GSM network traffic but still then it is effective than manual monitoring**.**

VII. RESULT

This system would be eliminating the requirement of human power and thus providing efficiency and accuracy. This paper will give accurate details of energy theft. It will help to manage sensing the parameters and also record details for electricity theft. This paper will also assure the safety and help in decrease in theft level &would not result in any harm to the environment and surroundings.

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