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# Advanced distribution transformer load monitoring and controlling by using GSM modem

S.Brindha[1], N.Nandhini[2], S.Raghul[3], V.Saravanakumar[4], K.Tamilselvan[5]
[1]Assistant Professor, [2345]UG Students
Department of Electronics and Communication Engineering, Nandha Engineering College, Erode-52
Tamil Nadu, India.
[1]*brindha.bliss@gmail.com*,[2]*nandhininaga1996@gmail.com*,[3]*royalraghul750@gmail.com*,
[4]saravanakumarvelan@gmail.com, [5]tamilselvank122@gmail.com.

***ABSTRACT*---This project is about intend and completion of a mobile embedded system to observe and evidence key framework of a distribution transformer like load currents, voltage and ambient temperature. The proposal of on-line monitoring system accomodate a global service mobile (GSM) Modem, with a detached single chip microcontroller and different sensors. It is connected at the distribution transformer site and the above factors are inscribedby means of the analog to digital converter (ADC) of the embedded system. The obtained criterion are refined and registered in the system memory. If any deviation or an disaster situation occurs the method sends SMS (short message service) messages to the mobile phones containing in sequence about the irregularity according to some predefined information programmed in the microcontroller. This cell phone system will help the transformers to manage smoothly and identify evilsfacing any terrible failure.**

**KEYWORDS: Distribution transformer, PIC Microcontroller, GSM, Temperature sensor, Voltage sensor, Current sensor**

## I.INTRODUCTION

An audit system can only monitor the operation state or guard adjacent to steal the power, and is not able to monitor all positive data of distribution transformers to diminish costs. Temperature and over voltage. If the amplify in temperature rises higher than the desirable temperature, the monitoring system will defend the distribution transformer by problems. According to the above necessities we need a distribution transformer real-time monitoring system to distinguish all operating parameters action and propel to the monitoring centre in time. It ahead to online monitoring of key equipped parameters of distribution transformers which can offer useful in sequence 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. In this project we will be in domination of constraint like tenderness and current, voltage. Monitor is over

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longer period. In this project we will be in domination of constraint like tenderness and current, voltage. Monitor is over and done with LM35 temperature feeler, GSM & microcontroller component.Therefore, it be mandatory in the direction of stay put on scrutiny thecondition while make bigger in tenderness, force as well as environmental condition. It be logic by feeler and which is position in pointer to microcontroller. The indication as monitor as of commencement to finish

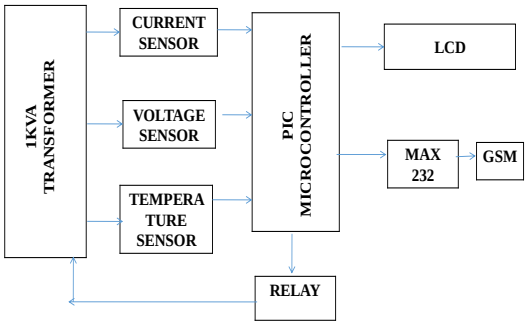
GSM Module. This will help to identify troubles before any serious failure which leads to a major cost savings and greater dependability.

## II.RELATED WORKS

A study of these troubles and various suggestions about the progress of the present explore work on the transformer monitoring has been obtainable by Alessandro Ferrero. Monitoring and scheming of substations is an vital undertaking for supplying healthy power to the customers in this automated era. But due to the aging communications of the distribution grids (substations) and lack of computerization systems that monitors the serious conditions at the substations, the menace of blackouts, brownouts and fire are speedily mounting. Substations consist of diverse electronic mechanism like transformers, circuit breakers, relays etc. The transformer solution leaks or internal insulation crash basis overheating that leads to failures. The usual method includes periodic guide inspection of the scheme which is time intense and with very low precision. Also the substations in the pastoral areas are even more hard to monitor yourself and hence requires more time to take respective actions. Distribution transformers have aextendedcheck life if they are operated under high-quality and crated conditions. However, their life is considerablycondensed if they are congestedresultant in sudden failures and defeat of contribute to a huge number of customers thus carrying out system reliability. overfilling and ineffective of transformers are the major causes of breakdown in distribution transformers. Most power companies use Supervisory Control and Data Acquisition (SCADA) method for online monitoring of power transformers but extending the SCADA method for online monitoring of distribution transformers is an expensive proposition. Distribution transformers are presently monitored physically where a person occasionally visits a transformer site for protection and proceedings parameter of significance. This type of monitoring cannot offer information about irregular overloads and overheating of transformer windings. All these factors can notablycondense transformer life.

## III.PROPOSED SYSTEM ARCHITECTURE

Distributed transformers are level to reparation due to the increasein temperature when there is an excess or enormous current flows during the internal winding of the transformer. When the temperature rises, it increases the probability of receivingcompensation in the transformers. The transformers are to be monitored very carefullythroughout these situations. No need to monitor from the relay room. System can be monitored and controlled from anywhere and also saves time and the men work. Mobile number can be changed at any time. A message will be sent on the number of Supervaiser when the fault occur in the transmission system. The proposed system consists of a monitoring unit that is linked with the distribution transformer for the function of monitoring the same. The controller consists of a sensing unit which collects the essential parameters such as current, voltage and the temperature within the distribution transformer. The digital demonstratecoupled to the processing unit displays resultant parameter values at the substation for any technical operations. The controller also senses the overload and high current streamcircumstances in the internal windings that may lead to breakdown of the equivalent unit. The PIC controller is programmed in such a manner so as to continuously scan the transformer and update the parameters at a particular time interval. The parameter values sensed by the PIC-controller.




Proposed system Block Diagram

### A.SENSING MODULES:

### CURRENT AND VOLTAGE TRANSFORMER:

Current or voltage instrument transformer are necessary for separating the safety & control. The performance of current and voltage transformer during and after the incidence of fault is serious in electrical fortification since error in signal fromtransformer can cause mal operation of the relays.

### TEMPERATURE SENSOR:

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. ... The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy.

B.PROCESSING MODULES:

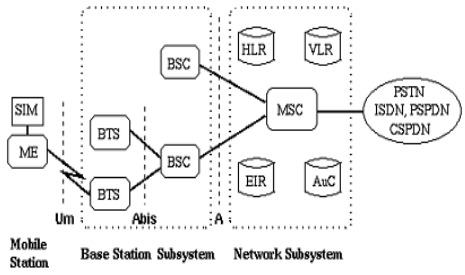
PIC MICROCONTROLLER:

PR 40 pins multiple function 8 bits microcontroller PIC 16F877A from microchip consists simple center processing unit (CPU) of 8K x 14 words of Flash program memory, 368 x 8 bytes of Data Memory (RAM) and 256 x 8 bytes of EEPROM data memory with A,B,C,D and E input/output ports provided. The function provided by this microcontroller is Timer which works as a counter, PWM module which works as controller to increase or decrease the power of any device such as motor of bulb, Synchronous (SSP) and Universal Synchronous Asynchronous Receiver Transmitter (USART/SCI) which are commonly used as the connection to computer terminal through serial port. 8channels 10 bits Analog to Digital Converter (ADC) which used to convert an analogue signal within 0-5V to a binary signal 1 or 0.

C.COMMUNICATION MODULES:

GSM:

A GSM Modem is a specialized type of modem which accepts a sim card and operates over subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective. The term GSM modem is used as a generic term to refer to any modem that supports one or more of the protocol in the GSM.GSM was proposed to be a protected wireless system. However, GSM is susceptible to dissimilar types of attack, each of them intended at a different part of the network. The development of UMTS introduces an voluntary USIM, that uses a longer verification key to give better security, as well as equally authenticating the network and the user, whereas GSM only authenticates the user to the network (and not vice versa). The security replica therefore offers privacy and confirmation but limited authorization capabilities, and no non negation. In the system any difficulty of given parameters then suddenly message will be send to the user. To solve problem of transformer it's important to send message.




SIM Subscriber Identity Module BSC Base Station Controller MSC Mobile services Switching Center
ME Mobile Equipment HLR Home Location Register EIR Equipment Identity Register
BTS Base Transceiver Station VLR Visitor Location Register AuC Authentication Center

TRANSFORMER:

Single-phase electric power is the distribution of alternating current electric power using a system in which all the voltages of the supply vary in unison. Single-phase distribution is used when loads are mostly lighting and heating, with few large electric motors. A single-phase supply connected to an alternating current electric motor does not produce a revolving magnetic field; single-phase motors need additional circuits for starting (capacitor start motor), and such motors are uncommon above 10 kW in rating .Because the voltage of a single phase system reaches a peak value twice in each cycle, the instantaneous power is not constant. A single-phase load may be powered from a three-phase distribution transformer in two ways: by connection between one phase and neutral or by connection between two phases. These two give different voltages from a given supply. For example, on a 120/208 three-phase system, which is common in North America, the phase-to-neutral voltage is 120 volts and the phase-to-phase voltage is 208 volts. This allows single-phase lighting to be connected phase-to-neutral and three-phase motors to be connected to all three phases. This eliminates the need of a separate single phase transformer. Standard frequencies of single-phase power systems are either 50 or 60 Hz. Special single-phase traction power networks may operate at 16.67 Hz or other frequencies to power electric railways.

LCD:

Liquid crystal display is composed of several layers which include two polarized panel filters and electrodes. LCD technology is used for displaying the image in notebook or some other electronic devices like mini computers. Light is projected from a lens on a layer of liquid crystal. This combination of colored light with the grayscale image of the crystal (formed as electric current flows through the crystal) forms the colored image. This image is then displayed on the screen.

RELAY:

Relay is an electromagnetic device which is used to isolate two circuits electrically and connect them magnetically. They are very useful devices and allow one circuit to switch another one while they are completely separate. They are often use to interface an electronic circuit to an electrical circuit which works at very high voltage. In basic relay there are three contactors normally open (NO), normally close (NC), a common (COM).At no input state, the COM is connected to NC. When the operating voltage is applied to relay coil gets energized and COM changes to NO contact.A relay is an electromagnetic switch operated by a relatively small electric current that can turn on or off a much larger electric current. The heart of a relay is an electromagnet (a coil of wire that becomes a temporary magnet when electricity flows through it).

MAX 232:

The MAX232 replaced an older pair of chips MC1488 and MC1489 that performed similar RS-232 translation. The MC1488 quad transmitter chip required 12 volt and -12 volt power, and MC1489 quad receiver chip required 5 volt power. The main disadvantages of this older solution was the +/- 12 volt power requirement, only supported 5 volt digital logic, and two chips instead of one.

D.POWER REQUIREMENT FOR THE PROTOTYPE

Laboratory equipments use AC power andand the conversion to DC facilitated by the power supply units embedded inside the instruments while, operations of field operated devices utilize battery power. In this project use a 12v transformer The transformer that is used in power supply is step-down transformer, which *steps down* the input AC voltage. The magnitude by which transformer steps down the voltage depends on the turn's ratio of primary and secondary winding.

CONCLUSION AND FUTURE WORK:

In this paper we nearby the system architecture for a Wireless Sensor Network which aids in advanced distribution transformer load monitoring and controlling by using GSM Module. Transformers are among the most basic and expensive piece of utensils of the transmission and distribution system. Regular monitoring health situation of transformer not only is economical also adds to enlarged reliability. The GSM based monitoring of distribution transformer is constructive as compared to manual monitoring and also it is consistent as it is not possible to monitor always the temperature rise, load current, voltage, theft occur manually. Transformer is undergo fault from the message sent to mobile. We can recover the system in less time. In the midst of up-to-the-minute technology it is possible to monitor a large number of parameters of distributed transformer at a relatively high cost. In order to get valuable transformer scheming system to a restrained cost, it is necessary to spotlight on a not many key parameter. It installation on Wireless technology. We design this system to protect distribution transformer from overheating and overloading.

RESULT AND DISCUSSION:

In this project we can monitor the fault at power grids using GSM based mobile by means of SMS.PIC microcontroller sends actual load value to the authority via SMS by using GSM. The GSM 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 temperature, load current manually. After receiving of message of any abnormality we can take action immediately to prevent any catastrophic failures of distribution transformers. In a distribution network there are many distribution transformers and associating each transformer with such system, we can easily figure out that which 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.

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