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WIRELESS MONITORING OF DISTRIBUTION TRANFORMER AND INFORM TO ELECTRICAL BOARD

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Abstract- Power transformers are one of the most important electrical equipment that is used in power transmission system as they perform the function of transforming the voltage levels. Hence maintenance of power transformer is mandatory; as they are located at different geographical areas periodical monitoring is not possible all the time due to insufficient man power. Due to this reason transformer failure may occur which leads to unexpected power shutdown. To overcome this shutdown due to transformer failure we proposed a system for monitoring the transformer .The aim of our project is to monitor and protect oil level, oil quality, temperature, etc, of transformer without involving man power. If any critical condition occurs the SMS will be send to the control unit .This monitoring system consist of AT MEGA 16 micro controller, LM35 temperature sensor, level sensor, GSM and LCD.

Keyword: ATmega 16 microcontroller, GSM, LCD display, light dependent resistor, Voltage and Current sensor and Temperature and Oil level sensor

1. INTRODUCTION

In power systems, distribution transformer is electrical equipment which distributes power to the low-voltage users directly, and its operation condition is an important component of the entire distribution network operation. Operation of distribution transformer under rated condition(as per specification in their nameplate) guarantees their long life .However, their life is significantly reduced if they are subjected to overloading, resulting in unexpected failures and loss of supply to a large number of customers thus effecting system reliability. Overloading and ineffective cooling of transformers are the major causes of failure in distribution transformers. The monitoring devices or systems which are presently used for monitoring distribution transformer exist some problems and deficiencies. Few of them are mentioned below.

(1) Ordinary transformer measurement system generally detects a single transformer parameter, such as power, current, voltage, and phase. While some ways could detect multi-parameter, the time of acquisition and operation parameters is too long, and testing speed is not fast enough.

(2) Detection system itself is not reliable. The main performance is the device itself instability, poor anti-jamming capability, low measurement accuracy of the data, or even state monitoring system should is no effect.

(3) Timely detection data will not be sent to monitoring centers in time, which cannot judge distribution transformers three-phase equilibrium.

(4) A monitoring system can only monitor the operation state or guard against steal the power, and is not able to monitor all useful data of distribution transformers to reduce costs.

(5) Many monitoring systems use power carrier communication to send data, but the power carrier communication has some disadvantages: serious frequency interference, with the increase in distance the signal attenuation serious, load changes brought about large electrical noise. So if use power carrier communication to send data, the real-time data transmission, reliability cannot be guaranteed.

According to the above requirements, we need a distribution transformer real-time monitoring system to detect all operating parameters operation, and send to the monitoring centre in time. It leads to online monitoring of key operational parameters of distribution transformers which 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 will help to identify problems before any serious failure which leads to a significant cost savings and greater reliability. Widespread use of mobile networks and GSM devices such GSM modems and their decreasing costs have made them an attractive option not only for voice media but for other wide area network applications.

1.1 REVIEW OF THE EARLIER SYSTEM

TO Monitoring of transformer is done using wired network accompanied with temporary test unit & involving man into action, here continuous monitoring is not Possible all the time which may lead to malfunction or failure of power transformer.

For this we have referred following research papers

Paper 1

- Vishakha shinge, Omika shukla, prateek panday & prof . Megha chaple are worked on this project of wireless transformer parameter monitoring system using RF module published in the year of April 2016 , the drawbacks are complex & bulky circuit , battery backup is compulsory at monitoring is required . In our project circuit is very simple & battery backup is not required.

Paper 2

- Sonal A. mahajan, Vaibhav v. khedkar, prof. Akash A.Gophane are worked on this project of monitoring parameter of distribution transformer by using XBEE technology published in the year of 2016, the drawbacks are only oil level & temperature parameter sensors are monitored. we overcome those drawbacks in our projects are parameters like oil quality , under voltage/over voltage , short circuit current are monitored.

Paper 3

- Pathak A. K , Kolhe A.N , Gagare J.T , Khemnar S.M are worked on this project of GSM based distribution transformer monitoring & controlling system are published in year of 2016 , the drawbacks are the important parameters like oil quality & oil level is not monitored .we included those parameters in our project .

1.2 PROPOSED SYSTEM

Our proposed system provides effective monitoring and protection of power transformer by measuring it oil level, oil quality, temperature and operating voltage without involving human intervention.

1.3 PROBLEM STATEMENT

Abnormality in distribution transformer is accompanied with variation in different parameters like Winding temperature , Top and bottom oil temperatures, Ambient temperature, Load current, Oil flow (pump motor), Moisture in oil ,Dissolved gas in oil, Bushing condition, LTC monitoring, Oil level. However, we are dealing with oil temperature and load current.

Online monitoring system consists of embedded system, GSM modem, mobile-users and GSM networks and sensors installed at transformer site Sensors are installed on transformer side which reads and measures the physical quantity from the distribution transformer and then it converts it into the analog signal. The embedded module is located at the transformer site. It is utilized to acquire process, display, transmit and receive the parameters to from the GSM modem. The second is the GSM module. It is the link between the embedded system and the public GSM network. The third is utility module that has a PC-based - server located at the utility control center. The server is attached to GSM modem and received transmits SMS from/to the transformer site via the GSM module.

2. BLOCK DIAGRAM

This chapter explains regarding the Hardware Implementation of the project. It tells about the design and working of the design with the help of circuit diagram and explanation of circuit diagram in detail. It explains the features, programming and serial communication of ATmega 16 microcontroller. It also explains the different modules sed in this project.

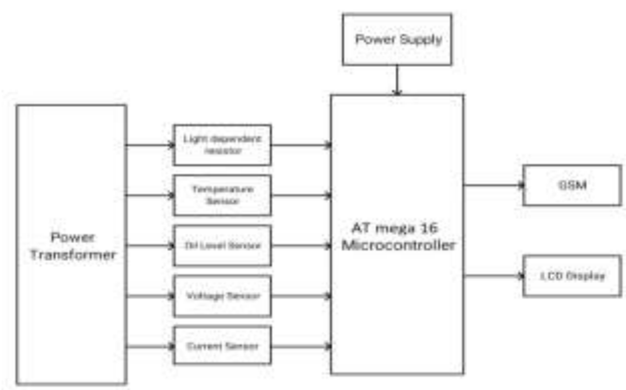

FIG: 2 BLOCK DIAGRAM OF PROPOSED SYSTEM

3. HARDWARE COMPONENTS

- Microcontroller
- Power supply
- Potential transformer
- Light dependent resistaor
- Temperature sensor
- Oil level sensor
- GSM technology
- Current sensor
- Voltage sensor
- LCD Display

The above scheme depicts the sequence of methodologies followed in the monitoring of distribution transformer via GSM technology. First sensors which are installed at the transformer site sense the various parameters of transformers and convert into analog signal to be processed in signal conditioning circuits Next the SCC consisting of opamps and resistors manipulates the analog signal to a compatible value so that can be read by the embedded system. Next the signal is passed through microcontroller. The ADC is used to read the parameters, built-in EEPROM is used to host the embedded software algorithm that takes care of the parameters acquisition, processing, displaying, transmitting and receiving. The built-in EEPROM is used to save the online measured parameters along with their hourly and daily averages. The GSM modem is interfaced with the microcontroller through RS 232 adapter by which it uploads and downloads SMS messages that contain information related to the transformer parameters and status. This GSM modem then sends this SMS to mobile users containing information about parameters value of the distribution transformers.

3.1 MICROCONTROLLER

FIG3.2.1: ATmega 16 MICROCONTROLLER

Microcontroller is defined as a system on computer chip which includes number of peripherals like RAM, EEPROM, etc. required to perform some predefined task. There are number of popular families of microcontrollers which are used in different applications as per their capability and feasibility to perform various task, mostly used of these are 8051, AVR and PIC microcontrollers.

In this subject we will introduce you with AVR family of microcontrollers. AVR is an 8-bit microcontroller belonging to the family of Reduced Instruction Set Computer (RISC). In RISC architecture the instruction set of the computer are not only fewer in number but also simpler and faster in operation. The other type is CISC. We will explore more on this when we will learn about the architecture of AVR microcontrollers in following section.

The microcontroller transmits and receives 8-bit data. The input/output registers available are also of 8-bits. The AVR families controllers have register based architecture which means that both the operands for an operation are stored in a register and the result of the operation is also stored in a register.

Discussing about AVR we will be talking on Atmega16 microcontroller, which is 40-pin IC and it belong to mega AVR category of AVR family. Some of the key features of Atmega16 are:

- 16KB Flash memory
- 1KB SRAM
- 512 Bytes EEPROM
- 40-Pin DIP
- 8-Channel 10 bit ADC
- Two 8 bit Timers/Counters
- One 16 bit Timer/Counter
- PWM Channels
- In System Programmer (ISP)
- Serial USART
- SPI Interface
- Digital to Analog Comparator

3.1.1 Why AT mega16?

The system requirements and control specifications clearly rule out the use of 16, 32 or 64 bit micro controllers or microprocessors. Systems using these may be earlier to implement due to large number of internal features. They are also faster and more reliable but, 8-bit micro controller satisfactorily serves the above application. Using an inexpensive 8-bit Microcontroller will doom the 32-bit product failure in any competitive market place.

Coming to the question of why to use AT89C51 of all the 8-bit microcontroller available in the market the main answer would be because it has 4 Kb on chip flash memory which is just sufficient for our application. The on-chip Flash ROM allows the program memory to be reprogrammed in system or by conventional non-volatile memory Programmer. Moreover ATMEL is the leader in flash technology in today's market place and hence using AT 89C51 is the optimal solution.

3.1.2 ATmega16 MICROCONTROLLER ARCHITECTURE

The 89C51 architecture consists of these specific features:

- Eight –bit CPU with registers A (the accumulator) and B
- Sixteen-bit program counter (PC) and data pointer (DPTR)
- Eight- bit stack pointer (PSW)
- Eight-bit stack pointer (Sp)
- Internal ROM or EPROM (8751) of 0(8031) to 4K (89C51)
- Internal RAM of 128 bytes:
- Four register banks, each containing eight registers
- Sixteen bytes, which maybe addressed at the bit level
- Eighty bytes of general- purpose data memory
- Thirty –two input/output pins arranged as four 8-bit ports:p0-p3
- Two 16-bit timer/counters: T0 and T1
- Full duplex serial data receiver/transmitter: SBUF
- Control registers: TCON, TMOD, SCON, PCON, IP, and IE
- Two external and three internal interrupts sources.
- Oscillator and clock circuits.

The block diagram of ATmega 16 microcontroller is shown in figure below respectively 3.1.3

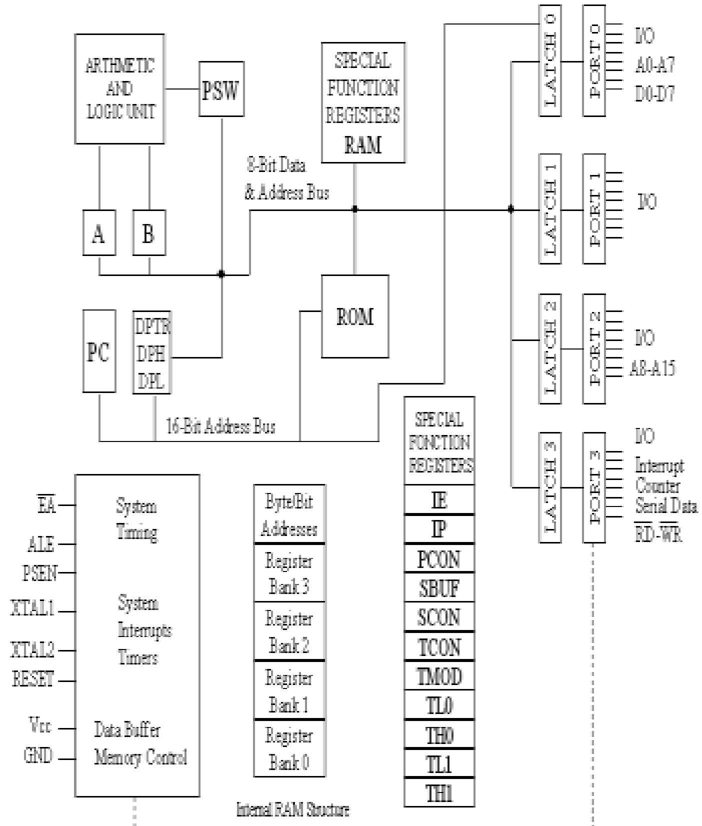

FIG3.1.2: BLOCK DIAGRAM OF ATmega 16 MICROCONTROLLERS

3.2 POWER SUPPLY

Power supply is the circuit from which we get a desired dc voltage to run the other circuits. The voltage we get from the main line is 230V AC but the other components of our circuit require 5V DC. Hence a step-down transformer is used to get 12V AC which is later converted to 12V DC using a rectifier. The output of rectifier still contains some ripples even though it is a DC signal due to which it is called as Pulsating DC. To remove the ripples and obtain smoothed C power filter circuits are used. Here a capacitor is used. The 12V DC is rated down to 5V using a positive voltage regulator chip 7805. Thus a fixed DC voltage of 5V is obtained.

A 5V regulated supply is taken as followed:

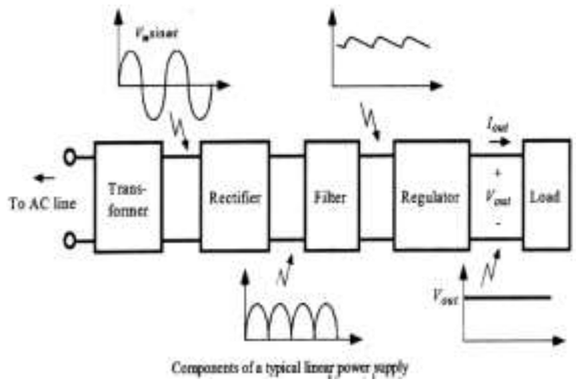

FIG 3.2 EACH OF DAIGRAM DESCRIBED BELOW

Transformer - steps down high voltage AC mains to low voltage AC.

Rectifier - converts AC to DC, but the DC output is varying.

Smoothing - smoothes the DC from varying greatly to a small ripple.

Regulator - eliminates ripple by setting DC output to a fixed voltage.

3.3 TRANSFORMER

Transformer is the electrical device that converts one voltage to another with little loss of power. Transformers work only with AC. There are two types of transformers as Step-up and Step-down transformer. Step-up transformers steps up voltage, step-down transformers steps down voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage to a safer low voltage. Here a step down transformer is used to get 12V AC from the supply i.e. 230V AC.

Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC. Step-up transformers increase in output voltage, step-down transformers decrease in output voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage to a safer low voltage. The input coil is called the primary and the output coil is called the secondary. There is no electrical connection between the two coils; instead they are linked by an alternating magnetic field created in the soft-iron core of the transformer. The two lines in the middle of the circuit symbol represent the core. Transformers waste very little power so the power out is (almost) equal to the power in.

Note that as voltage is stepped own current is stepped up. The ratio of the number of turns on each coil, called the turn's ratio, determines the ratio of the voltages. A step-down transformer has a large number of turns on its primary (input) coil which is connected to the high voltage mains supply, and a small number of turns on its secondary (output) coil to give a low output voltage.

FIG3.3 An ELECTRICAL TRANSFORMER

Vp = primary (input) voltage
Np = number of turns on primary coil
Ip = primary (input) current

3.4 LIGHT DEPENDENT RESISTOR(LDR)

A photoresistor (or light-dependent resistor, LDR, or photo-variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photoresistor can be applied in light-sensitive detector circuits, and light-activated and dark-activated switching circuits.

FIG3.2.4: LIGHT DEPENDENT RESISTOR(LDR)0-5V

A photoresistor is made of a high resistance semiconductor. In the dark a photoresistor can have a resistance as high as several megaohms, while in the light, a photoreisitor can have a resistance as low as few hundred ohms. If incident light on a photoresistor exceeds a certain frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electrons (and their hole partners) conduct electricity, thereby lowering resistance. The resistance range and sensitivity of a phtotresistor can substantially differ among dissimilar devices. Moreover, unique substantially differently to photons within certain wavelength bands.

A photoelectric device can be either intrinsic or extrinsic. An intrinsic semiconductor has its own charge carriers and is not an efficient semiconductor, for example, silicon. In intrinsic devices the only available electrons are in the valence band, and hence the photon must have enough energy to excite the electron across the entire bandgap. Extrinsic devices have impurities, also called dopants, added whose ground state energy is closer to the conduction band; since the electrons do not have as far to jump, lower energy photons (that is, longer wavelengths and lower frequencies) are sufficient to trigger the device. If a sample of silicon has some of its atoms replaced by phosphorus atoms (impurities), there will be extra electrons available for conduction. This is an example of an extrinsic semiconductor.

3.5 TEMPERATURE SENSOR

Temperature is the most often-measured environmental quantity. This might be expected since most physical, electronic, chemical, mechanical, and biological systems are affected by temperature. Certain chemical reactions, biological processes, and even electronic circuits perform best within limited temperature ranges. Temperature is one of the most commonly measured variables and it is therefore not surprising that there are many ways of sensing it. Temperature sensing can be done either through direct contact with the heating source, or remotely, without direct contact with the source using radiated energy instead. There are a wide variety of temperature sensors on the market today, including Thermocouples, Resistance Temperature Detectors (RTDs), Thermistors, Infrared, and Semiconductor Sensors. Digital output sensor usually contains a temperature sensor, analog-to-digital converter (ADC), a two-wire digital interface and registers for controlling the IC's operation. Temperature is continuously measured and can be read at any time. If desired, the host processor can instruct the sensor to monitor temperature and take an output pin high (or low) if temperature exceeds a programmed limit. Lower threshold temperature can also be programmed and the host can be notified when temperature has dropped below this threshold. Thus, digital output sensor can be used for reliable temperature monitoring in microprocessor-based systems. Above temperature sensor has three terminals and required Maximum of 5.5 V supply. This type of sensor consists of a material that performs the operation according to temperature to vary the resistance. This change of resistance is sensed by circuit and it calculates temperature. When the voltage increases then the temperature also rises. We can see this operation by using a diode.

Temperature sensors directly connected to microprocessor input and thus capable of direct and reliable communication with microprocessors. The sensor unit can communicate effectively with low-cost processors without the need of A/D converters.

An example for a temperature sensor is LM35. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius temperature. The LM35 is operates at -55˚ to +120

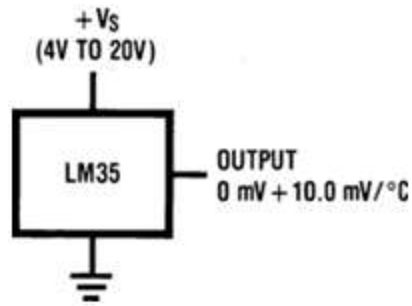

FIG3.5: LM35 TEMPERATURE SENSOR (0-5V)

3.5.1 Features of temperature sensors:

- Calibrated directly in ˚ Celsius (Centigrade)
- Rated for full l −55˚ to +150˚C range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Low self-heating,
- ±1/4˚C of typical nonlinearity

3.5.2 Operation of LM35:

The LM35 can be connected easily in the same way as other integrated circuit temperature sensors. It can be stuck or established to a surface and its temperature will be wi thin around the range of 0.01˚C of the surface temperature.

This presumes that the ambient air temperature is just about the same as the surface temperature; if the air temperature were much higher or lower than the surface temperature, the actual temperature of the LM35 die would be at an intermediate temperature between the surface temperature and the air temperature.

The temperature sensors have well known applications in environmental and process control and also in test, measurement and communications. A digital temperature is a sensor, which provides 9-bit temperature readings. Digital temperature sensors offer excellent precise accuracy, these are designed to read from 0°C to 70°C and it is possible to achieve ±0.5°C accuracy. These sensors completely aligned with digital temperature readings in degree Celsius.

3.6 Oil level sensor

An alternate application is the remote observing of merchant tanks in the fuel business. The certainty of having a full guide with the distintive sellers needs permit improving the conveyance, which deciphers in gigantic funds and high effectiveness.

FIG3.6: Oil level sensor (0-5V)

The oil tank level sensor is connected on the outside of the tank in diverse positions relying upon the capacity (normal positions are top and base). It has the capacity gather data with respects of the tank level and different parameters utilizing advances like ultrasound and Hall Effect. The sensor accompanies a connection framework and normally controlled by a battery, in some remote areas a sunlight based generator is added to keep the battery charged.

The best approach that can be made to keep oil burglary from the tanks is to utilize an oil tank level screen along with the oil tank level indicator. By utilizing the steel level estimation you can gauge the level of oil in the oil tank. This keeps you educated about the measure of oil in the tank and the level of utilization that is carried out. The oil level screens accompany a sensor alongside a caution that cautions you if there is a drop in the oil level underneath a certain point, educating you therefore if there is the right utilization happening or if the oil has been stolen.

The steel level estimation utilized for oil tanks are tank level pointers which utilize a transmitter over the tank and the ultrasonic level estimation strategies to quantify the high oil level. The basic system that it uses is that, it has a recipient that conveys data get to; this is further associated with an electric divider attachment that can be kept inside the home. As and when the larger amount of oil in the supply drops to 10 every penny or underneath, the push image shows up, hence educating the holder that the oil tank needs refilling level gauge.

3.7 GSM TECHNOLOGY

An embedded system is a special-purpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few pre-defined tasks. Usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Embedded systems are often mass-produced, benefiting from economies of scale.

3.7.1 What is GSM?

Global System for Mobile Communication (GSM) is a set of ETSI standards specifying the infrastructure for a digital cellular service. The standard is used in approx. 85 countries in the world including such locations as Europe, Japan and Australia[1].

- Mobile Subscriber Roaming

When a mobile subscriber roams into a new location area (new VLR), the VLR automatically determines that it must update the HLR with the new location information, which it does using an SS7 Location Update Request Message. The Location Update Message is routed to the HLR through the SS7 network, based on the global title translation of the IMSI that is stored within the SCCP Called Party Address portion of the message. The HLR responds with a message that informs the VLR whether the subscriber should be provided service in the new location.

FIG3.7: GSM INTERFACING MODEL

- Mobile Subscriber ISDN Number (MSISDN) Call Routing

When a user dials a GSM mobile subscriber's MSISDN, the PSTN routes the call to the Home MSC based on the dialed telephone number. The MSC must then query the HLR based on the MSISDN, to attain routing information required to route the call to the subscribers' current location.

The MSC stores global title translation tables that are used to determine the HLR associated with the MSISDN. When only one HLR exists, the translation tables are trivial.

When more than one HLR is used however, the translations become extremely challenging; with one translation record per subscriber.

3.8 VOLTAGE SENSOR

FIG3.2.8: VOLTAGE SENSOR (0-5V)

Sensors are basically a device which can sense or identify and react to certain types of electrical or some optical signals. Implementation of voltage sensor and current sensor techniques has become an excellent choice to the conventional current and voltage measurement methods.

In this article, we can discuss in detail about voltage sensor. A voltage sensor can in fact determine, monitor and can measure the supply of voltage. It can measure AC level or/and DC voltage level. The input to the voltage sensor is the voltage itself and the output can be analog voltage signals, switches, audible signals, analog current level, frequency or even frequency modulated outputs. That is, some voltage sensors can provide sine or pulse trains as output and others can produce Amplitude Modulation, Pulse Width Modulation or Frequency Modulation outputs. In voltage sensors, the measurement is based on the voltage divider. Mainly two types are of voltage sensors are available- Capacitive type voltage sensor and Resistive type voltage sensor.

3.9 CURRENT SENSOR

Current sensors can be split into two categories: shunt resistors, which directly measure current through a voltage drop; and magnetic field sensors, which measure current-induced magnetic fields to retrieve the original current. While galvanic insulated, protected against over current spikes, and sparsely dissipating, the latter have been the focus of considerable development efforts with a wide offer, ranging from conventional current transformers and Hall effect sensors to innovative fluxgate or giant magneto-resistive (GMR) sensors. Of those, Rogowski sensors are well known for measuring alternating current (AC) such as high-speed transient, pulsed currents, or power frequency sinusoidal currents. They comprise an air-cored coil placed around the conductor in a toroidal shape. Simple to retrofit, the clip-around Rogowski coil sensor is thin, lightweight, flexible, and robust. The main drawback of Rogowski coil technology is that it only measures AC currents.

Fig3.9: current sensor

3.10 LCD (Liquid Crystal Display)

The display used is 16x2 LCD (Liquid Crystal Display); which means 16 characters per line by 2 lines.The standard is referred as HD44780U, which refers to the controller chip which receives data from an external source (Here Atmega16) and communicates directly with the LCD. Here 8-bit mode of LCD is used, i.e., using 8-bit data bus.

The three control lines are EN, RS, and RW.

The EN line is called "Enable." This control line is used for telling the LCD that we are sending data. For sending data to the LCD, the program should make sure that the line is low and then set the other two control lines or put data on the data bus. When the other lines are ready completely, bring EN high (1) and should wait for the minimum time required by the LCD datasheet and end by bringing it low (0) again.

The RS line is "Register Select" line. When RS is low (0), the data is treated as a command or special instruction (such as clear screen, position cursor, etc.). When the RS is high (1), the data sent is text data which is displayed on the screen. For example, to display the letter "B" on the screen you would set RS high.

The RW line is "Read/Write" control line. When RW is low (0), the information on the data bus is written to the LCD. When RW is high (1), the program is effectively questioning (or reading) the LCD. Only one instruction ("Get LCD status") is read command. All the others are write commands--so RW will always be low. In case of an 8-bit data bus, the lines are referred to as DB0, DB1, DB2, DB3, DB4, DB5, DB6, and DB7.

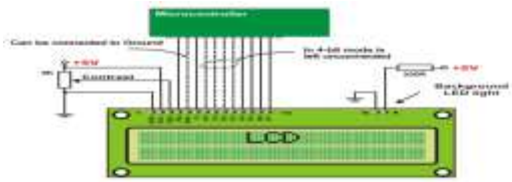

FIG3.10: LCD DISPLAY

4. Working model of entire project

In this project we required operating voltage for Microcontroller ATmega16 is 5V. Hence the 5V D.C. power supply is needed for the IC's. This regulated 5V is generated by stepping down the voltage from 230V to 18V now the step downed a.c voltage is being rectified by the Bridge Rectifier using 1N4007 diodes. The rectified a.c voltage is now filtered using a 'C' filter. Now the rectified, filtered D.C. voltage is fed to the Voltage Regulator. The figure will be the model of wireless monitoring of distribution transformer and inform to electrical board

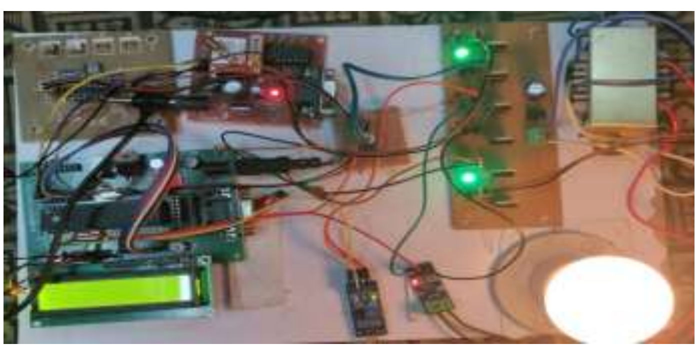

Fig 3.10: working model of wireless monitoring of distribution transformer and inform to electrical board

In this project we required operating voltage for Microcontroller ATmega16 is 5V. Hence the 5V D.C. power supply is needed for the IC's. This regulated 5V is generated by stepping down the voltage from 230V to 18V now the step downed a.c voltage is being rectified by the Bridge Rectifier using 1N4007 diodes. The rectified a.c voltage is now filtered using a 'C' filter. Now the rectified, filtered D.C. voltage is fed to the Voltage Regulator. This voltage regulator provides/allows us to have a Regulated constant Voltage which is of +5V. The rectified; filtered and regulated voltage is again filtered for ripples using an electrolytic capacitor 100μF. Now the output from this section is fed to 40th pin of Atmega16 microcontroller to supply operating voltage. The microcontroller Atmega16 with Pull up resistors at Port0 and crystal oscillator of 11.0592 MHz crystal in conjunction with couple of 30-33pf capacitors is placed at 18th & 19th pins of Atmega16 to make it work (execute) properly. In this project, we are using two transformers. One is as mains supply to corporate and second transformer as secondary (UPS) supply. In the begining we are giving the main supply by transformer one, but if due to some reason mains supply is not working. Then by power detector circuit this information goes to microcontroller and buzzer will produce an alarming sound. Microcontroller will send the message to authorised person by GSM modem. If person wants to continue the power supply by second transformer then that person has to send message to gsm modem. Whenever the gsm modem receives sms message to change the power supply connection it gives instruction to microcontroller .The microcontroller simply connects the second power supply and disconnects the existing supply using relay based control circuit.

5. ADVANTAGES

- Efficient & low cost design
- Greater reliability
- Low power consumption
- Device can operate anywhere in the world
- Real time monitoring

6. APPLICATION

- Power quality monitoring
- Load forecasting
- Condition monitoring of transformer

7. CONCLUSION

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 oil level, oil temperature rise, ambient temperature rise, 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.

7.1 FUTURE WORK

A server 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 will be a useful source of information on the utility transformers. Analysis of these data is stored to helps the utility in monitoring the operational behavior of their distribution transformers and identify faults before any catastrophic failures thus resulting in significant cost saving as well as improving system reliability.

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BIOGRAPHIES

SUBHASH H D (3BR15EEE090) completed bachelor of degree in Electrical and electronic engineering from Ballari institute of technology and management. He was presented in final year of the degree and this journal is concerned with the final year project.