

Transformer Parameter Measurement and Protection by Using Wireless System

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Abstract:- This project is focused on used for various transformer parameter measurements by using wireless mechanism, which has incorporated step-down transformer with parameter like voltage and frequency and some measurement circuit for calculating the transformer parameter. This project is achieved to observe the various criteria's i.e voltage, frequency, temperature, oil level and prevent the transformer extra voltage and overburden and we used the GSM for transmitting data through wireless channel. If any abnormality or an emergency situation occurs the system sends SMS message to the mobile phones containing information about the abnormality.

Keyword:- Step Down Transformer, Various Parameter Like Voltage, Frequency, Temperature, Oil Level, GSM Modem.

I. INTRODUCTION

Electricity is an useful form of energy. A power system consists of components such as lines ,transformers ,loads and switches. The 230v main supply is step down into 12v ac using step down transformer and output is inclined to frequency and voltage parameter for measurement at last this measuring data is supplies to microcontroller for further process .Here system to detect all parameters and so it we need a transformer real-time monitoring can provide useful information about the health of parameters. This all attributes are transmitted using GSM module. GSM mobile is required to receive the SMS from GSM module.

II. PROBLEM RECOVERY

By doing this project any fault occur during transmission in transformer can be measured and protected . By the help of wireless guided system which is based on microcontroller system . In this project the over voltage, temperature and overburden are guided in single system . It thus protect transformer from fault conditions.

III. LITERATURE SURVEY

The aim of the project is TLM which is Transformer Load Monitoring for reducing cost, enhancing the efficiency and improve account to customer. The objective was to built a medium voltage distribution transformer monitoring. These type of transformer are installed on roadside electric pole in Bangkok. An advanced distribution load monitoring system of transformer have capacity of measuring voltage, current and power.

IV. OBJECTIVE

The main objective of this project is to Distribute different parameters of transformer to monitor and protection. We used GSM module for monitoring and protecting the transformer parameter. architecture based ATMEGA328P microcontroller from NXP is used to perform and implement this project. This module is programmed using AT commands through USART.KEIL IDE is used to program the microcontroller.

➤ *The main Objectives of this project is,*

- Voltage Measurement.
- Frequency Measurements.
- Thermal Measurements.
- Oil Level Measurements.
- Overburden Protection.

V. COMPONENTS USED

- Microcontroller ATMEGA328P
- Voltage regulator -LM7805
- Crystal Oscillator- 16 MHz
- Capacitor-22pf ----ceramic capacitor
- Diode- 1n4007
- Relay- 12 volt sugar cube relay
- LCD – 16X2 Character LCD
- Resistors – 1K,10K, 4.7 K,330r
- Transistor- BC547
- Connector
- PCB
- Transformer – 9-0-9volt 1A
- GSM Module – SIM800L

➤ *Microcontroller ATMEGA328P –*

ATmega is a low power CMOS 8 bit and 28 pins microcontroller. ATmega328 is widely used in autonomous systems and the most common use of this chip is on Arduino development.

➤ *Voltage regulator -LM7805 –*

A voltage regulator is an electronic circuit that generally gives a stable DC voltage independent of the load current, temperature and AC line voltage variations. A voltage regulator sometimes use as a simple design or it may include negative feedback.

➤ *Crystal Oscillator- 16 MHz-*

A crystal oscillator is also called as an electronic based oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a precise frequency.

➤ *Capacitor-22pf-----ceramic capacitor*

A capacitor is a passive and a two-terminal electrical component that stores the electrical energy in an electric field. Ceramic capacitor have good frequency response and is a fixed value capacitor that acts as a dielectric.

➤ *Diode- 1n4007 –*

A diode is a two-terminal electronic component that allows flow of current that conducts only current in one direction and has low resistance to the current in one direction, and high resistance in the other. A semiconductor diode ,the most common type is a crystalline piece of semiconductor material with a p-n junction that is connected to two electrical terminals.

➤ *Relay 12 volt sugar cube relay –*

A relay is an electrically operated switch. The relays are used where several circuits must get controlled and it is necessary to control a circuit by a separate low-power signal by one signal.

➤ *LCD – 16X2 Character LCD-*

An LCD is a flat panel display module which uses liquid crystal to produce a electronic visual image. It consists of tiny segments called as pixels that can be used

to give information. The 16×2 LCD display is a basic module commonly used in circuits.

➤ *Resistors – 1K,10K, 4.7 K,330r –*

Resistors are elements of electrical networks and electronic circuits and are used in electronic circuit or kit. This resistors are mainly practically described as discrete components can be composed of various compounds and forms.

➤ *Transistor- BC547 –*

A transistor is a semiconductor device that regulates voltage or current and is used to amplify or switch electronic signals and power. It is composed of semiconductor material usually with at least three connections to an external circuit.

➤ *Connector –*

An electrical connector is an electromechanical device used to join electrical terminals to create an electrical circuit. Most connectors have gender- the male component called a plug that gets connected to a female component or socket. The connection can be removal.

➤ *PCB –*

PCB supports mechanically and electrically which connects the electrical components using conductive tracks and other features. They are also used in some of the electrical products.

➤ *Transformer – 9-0-9volt 1A –*

A transformer is a device that transfers electrical energy from one circuit to another circuit through inductivity coupled conductors i.e. the transformer coils. A varying current in first coil of the transformer produces a varying magnetic field in second coil which in turn induces a voltage in a second coil.

➤ *GSM Module – SIM800L –*

GSM stands for Global System for Mobile Communications, formerly been called as Group Spécial Mobile used by mobile devices such as tablets. GSM is a cellular network, in which the cell phones get connected to it by searching for cells in the immediate vicinity.. A GSM is succeed by the 3rd generation and will evolve further as they move towards 4th generation.

VI. BLOCK-DIAGRAM

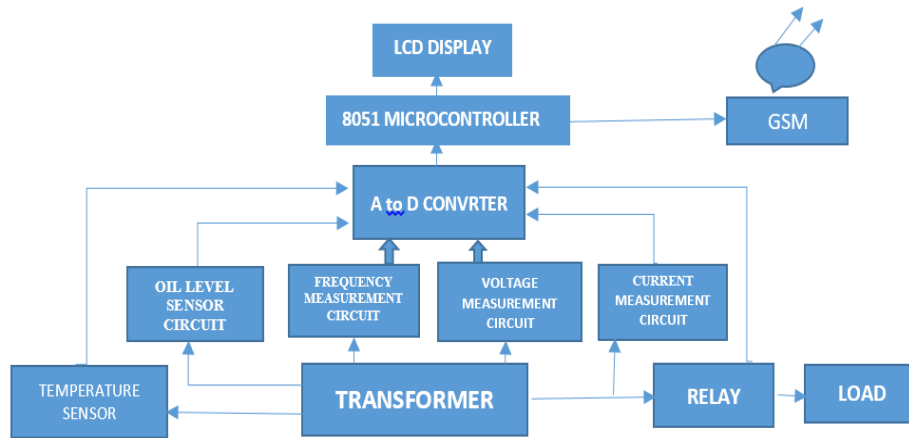


Fig 1:- Block Diagram of Wireless Transformer Parameter Measurement and Protection

VII. FLOWCHART

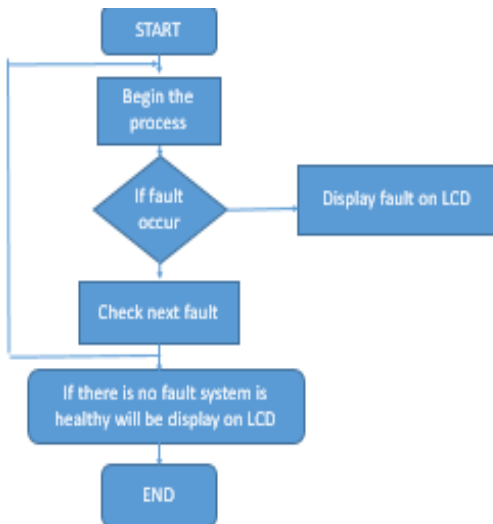


Fig 2:- Flowchart For Wireless Transformer Parameter Measurement And Protection

IX. SIMULATION VIEW

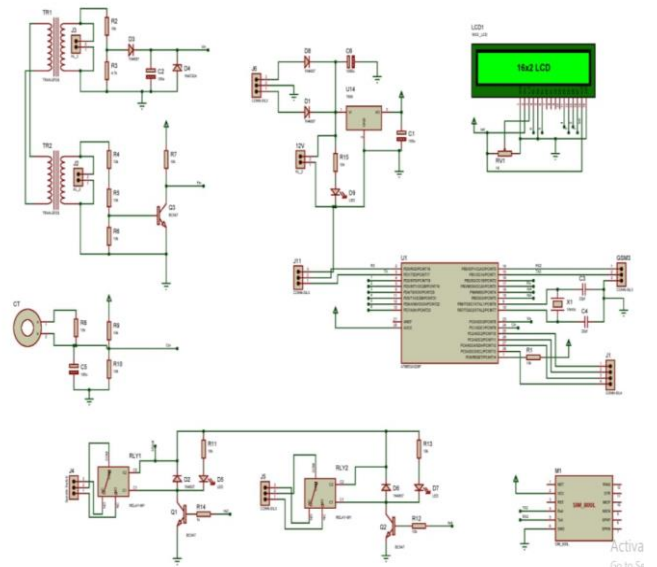


Fig 3:- Simulation view of Wireless Transformer Parameter Measurement and Protection

VIII. WORKING

We use the microcontroller here which is heart of our project. As we know it is very difficult to measure the actual parameter values and protect them from the damage or any fault occur in it. So we used microcontroller by using this system it is easy to find the damage and correct the values of circuit if they are change without manual interference. We used the different sensors to measure or sense the different quantities of the transformer parameter and this sensing signal is then given to A to D converter for converting this analog signal into digital one. After the signal is converted into digital one then it given to microcontroller. The microcontroller start the operation of measuring the values parameter and display the signal on LCD. If the system is healthy then it will display on LCD screen and the message will be send on connected GSM module to get the information about the transformer parameter.

X. RESULT

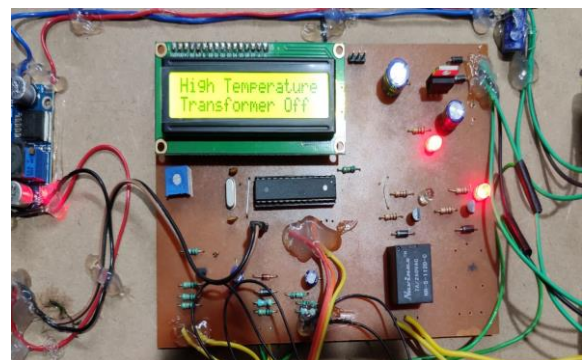


Fig (a)

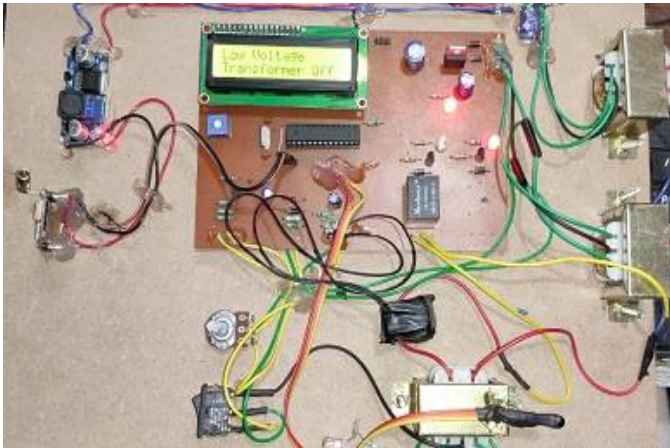


Fig (b)

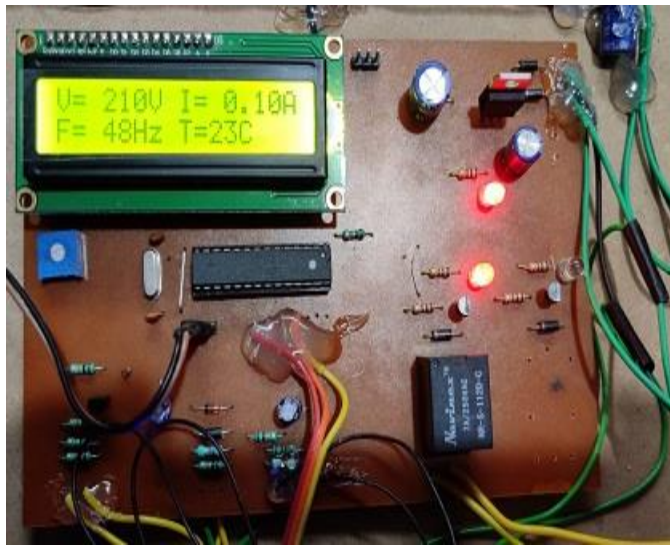


Fig (c)

Fig 4:- LCD display for temperature, voltage and current.

XI. APPLICATIONS AND ADVANTAGES

- Wireless transformer parameter measurement as well as protection from the damage is the main application of this project.
- If any fault is occur in the transformer then it is protected by using this project.
- It is also used in industry for different parameter measurement where the automation is needed.
- No manual interference is involve as the system is fully automated. So that the high accuracy of performance.
- It reduces the time because of automated system.

XII. FUTURE SCOPE

- The project can be used in many applications those are simple .For example the system can be implemented by using microcontroller to improve the performance of the system.
- With the help of GSM model we can send messages and can be executed by GPRS technology.
- Status of project will be shown with the help of 7 segment display.

XIII. CONCLUSION

We can conclude from this project that the transformer parameter being measured and protected from fault using this technique. In this project no manual interference is needed to measure and protect the transformer parameter so it will reduce the time which take by human handling. Also the accuracy to measure and protect the transformer parameter is high because of fully automated technique.

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