



Closed Loop Control of Substation Transformer with Remote Monitoring Using GSM and Lab View

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ABSTRACT: The electrical parameters of the substation transformer is redetected using voltage transformer (VT) and current transformer (CT) for measuring voltage and current and to monitor the oil level by the help of oil sensor and the temperature by means of Temperature sensor(LM35). The oil level and oil color change are detected by oil level sensor and oil color change detector .Loads to the setup are interfaced with the controller using driver-relay circuit .The wireless communication is established between the main unit and monitoring unit by GSM module .To monitor and control the industrial parameters using lab view and to identify the default failure in the respective area.

KEYWORDS: Voltage transformer (VT), Current transformer (CT), Temperature sensor (LM35), Lab view.

I. INTRODUCTION

In this fast developing technology both automation and control system play an equally important role. All this technology is important for the next level growth of the respective sectors. The virtual instruments are developed by the National instruments (NI) where it is based upon Graphical User Programming Interface (GUI). Some features of GUI are like control and measurement in our real-time. Where it is being supported by the most powerful software tool like Lab view. The main aim of this closed loop control system is to continuously monitor the industrial parameters like oil monitoring oil, temperature, and power.

The oil level in an industry is monitored by the help of oil sensor to avoid error and defects in prior. The temperature of the oil is monitored by temperature sensor (LM35) continuously to avoid over heating of machine that maintains a smooth and sustainable working function. The power from the voltage transformer and current transformer are monitored to protect the respective areas like industry to save power and avoid power leakage from the transformer initially.

II. DESIGN OF SYSTEM ARCHITECTURE

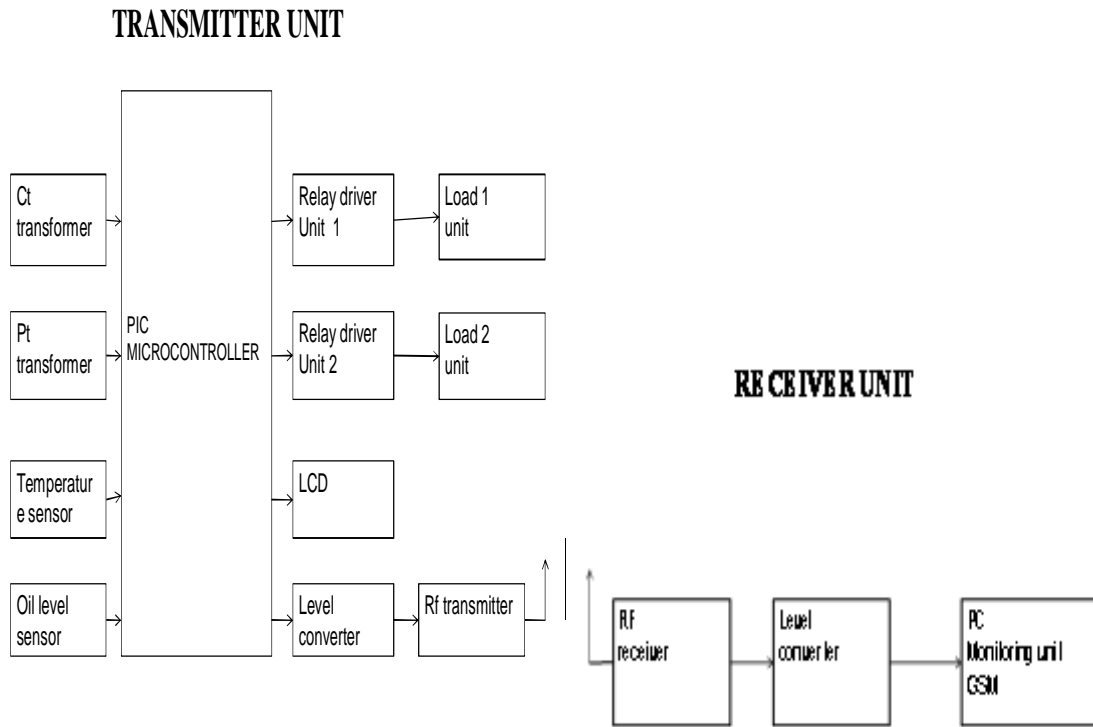
The PIC microcontroller is the important device it functions according to the pin connection in it. The ct transformer is a current transformer that produces current output from it. The pt transformer is a potential transformer that produces voltage output from it. The temperature sensor (LM35) senses the temperature level of the oil and produces the output whether the oil is overheated or it is in a sustainable state to run the machine. The oil level sensor senses the level of the oil in the machine when the machine is under work and gives a message that whether the oil in the machine is enough to run the machine smooth or not. All the above parameters are connected initially to the PIC Microcontroller to the respective pins. The relay driver unit 1 and relay driver unit 2 acts as switches. The LCD display produces the output as a message indication. The GSM is the Global system mobile Module that connects the output from the industry to the user in their respective location.

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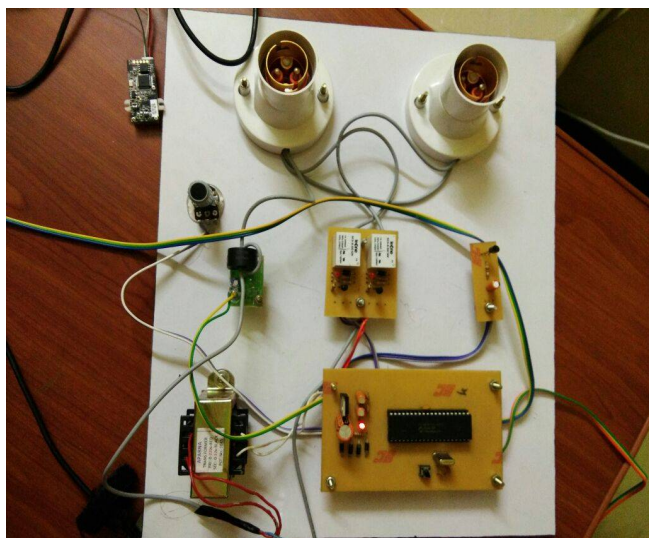
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III. EXPERIMENTAL SETUP

HARDWARE IMPLEMENTATION

The experimental set up of the closed loop control of substation transformer with remote monitoring using GSM and Lab view is as follows.,



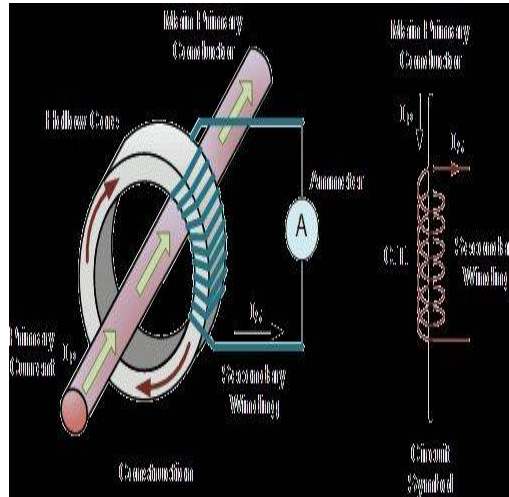
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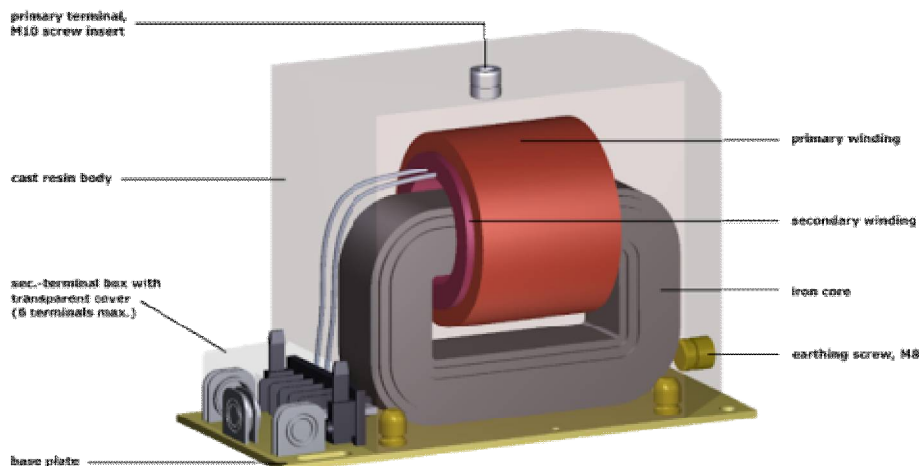
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CURRENT TRANSFORMER



Current transformer is a type of Instrument transformer that is designed to provide current in its secondary which is accurately proportional to the current flowing in its primary. Current transformers measure power flow and provide electrical inputs to power transformers and its instruments. The two basic types of current transformers is wound and toroidal . Wound current transformers consist of an integral primary winding that is inserted in series with the conductor that carries the measured current. Toroidal or donut-shaped current transformers do not contain a primary winding.

POTENTIAL TRANSFORMER (PT)



The principle of electromagnetic induction is what makes transformers work. When a current flows through a wire, it makes a magnetic field around the wire. Also, if a wire is in a magnetic field is changing; a current will flow in the wire. Transformers are devices used in electrical circuits to change the voltage of electricity flowing in the circuit. Transformers can be used either to increase or decrease the voltage. The process of increasing the voltage is known as step-up and the process of decreasing the voltage is known as step-down respectively.

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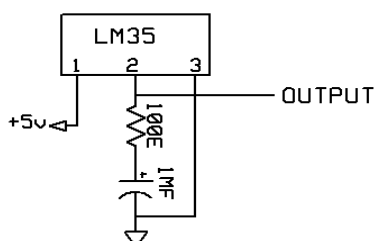
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RELAY

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover). Relays allow one circuit to switch a second circuit which can be completely separate from the first.

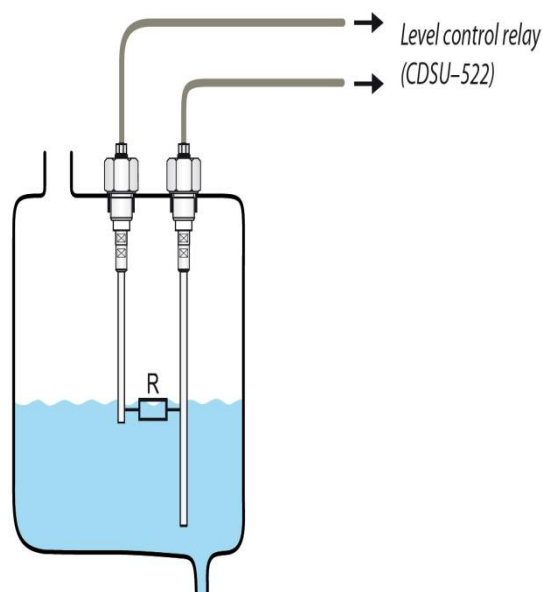
TEMPERATURE SENSOR

TEMPERATURE SENSOR



Temperature is the most often-measured environmental quantity most physical, electronic, chemical, mechanical, and biological systems are affected by temperature. There are a wide variety of temperature sensors on the market today, including Thermocouples, Resistance Temperature Detectors (RTDs), Thermistors, Infrared, and Semiconductor Sensors.

OIL LEVEL SENSOR (LM35)



The LM35 series are precision integrated-circuit temperature devices. It has three terminals and it requires 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. The LM35 is operates at -55° to $+120^{\circ}$ C.

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RF TRANSMITTER

It is an ideal for remote control applications where low cost and longer range is required. The transmitter operates from a 1.5-12V supply, making it ideal for battery-powered applications. 50 ohm antenna output. The antenna port impedance affects output power and harmonic emissions. An L-C low-pass filter may be needed to sufficiently filter harmonic emissions. Antenna can be single core wire of approximately 17cm. The features of RF transmitter are Features 433.92 MHz Frequency, Low Cost, 1.5-12V operation, 11mA current consumption at 3V, Small size, and 4 dbm output powers at 3V.

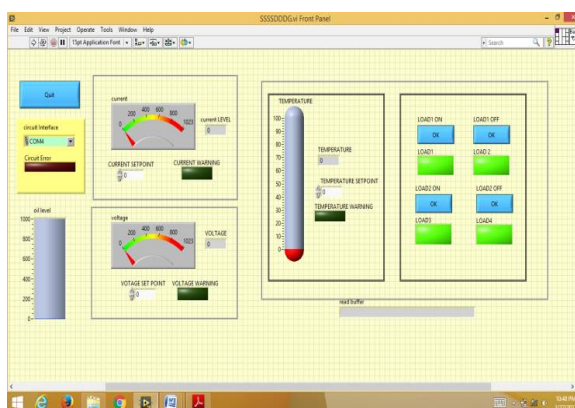
RF RECEIVER

It is an ideal for short-range remote control applications where cost is a primary concern. The receiver module requires no external RF components except for the antenna. It generates virtually no emissions, making FCC and ETSI approvals easy. The super-regenerative design exhibits exceptional sensitivity at a very low cost.

LAB VIEW

Laboratory Virtual Instrument Engineering Workbench (Lab VIEW) is a system-design platform and development environment for a visual programming language from National Instruments. Lab VIEW is commonly used for data acquisition, instrument control, and industrial automation on a variety of operating systems (OSs).

IV. RESULT AND DISCUSSION



The output of this system provides continuous monitoring, no data loss, no power loss, and it is cost effective.

V. CONCLUSION

Developing an electronic networking system integrates the devices and appliances found in the respective applications. By help of this the entire remote area can be monitored. Recent advancement in some technologies like sensor technology, communication systems, and information technology have created a wide range of opportunities that enables the remote monitoring in the desired conditions. It is a well known fact that usage and implementation of the wireless sensor networks drastically change from one application to the another. Two factors like Integration and data handling are the key issues of the wireless sensor network.

REFERENCES

- 1.Aalaa Abdullah , Shadal ai Enazi and Issam Damaj,"A SMART AND UBIQUITOUS CONTROLLED-ENVIRONMENT AGRICULTURE SYSTEM",IEEE, 2016 3rd MEC International Conference on big data and smart city.
2. Ferry A.Viavan, Daniel karlsson "Chamlers University of technology, Gothenburg, Sweden"IEEE2007.