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A Proposed System for Monitoring Street Transformers in Rural Areas using Embedded system

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Abstract - *The aim of the paper is to meet the requirements of transformer system management automation especially in rural areas. This describes a system which builds up a wireless, real-time, multi-object remote monitoring system of electric equipment depending on ARM and GSM network. The wireless monitoring system of electric equipment is to utilize wireless technology to control the operation parameters of electric equipment real-timely and remotely. For transformer station, the monitoring system based on controller is designed in this paper. The system describes the specific hardware in detail and simultaneously describes the specific application in data collection system of the transformer. The system with good real-time, high reliability, high-speed and good flexibility will have a good prospect*

Key Words: ARM, GSM, TRANSFORMER

1.INTRODUCTION

In power systems, transformer is electrical equipment which provides power transmission by transforming induced current to one circuit to another. The main operation of transformer is used to step up and step down the current or voltage. if they operated under good and rated conditions, they have long life services. In countries like India, the power cuts are happened frequently in official manner or sometimes due to faults in transformers. But the people from rural areas were not aware of faults with transformers. If any power cut happened due to fault in transformer, instead of complaining to operator (Line man), most of the people especially farmers wasting their time and waiting for power to do their work. To rectify this difficulties faced by rural people, I am proposing a embedded system which monitor with faults of transformer and report to the operator in specified time. In this system we are using ARM LPC2148 microcontroller and GSM network, LCD display and different types of sensors.

1.1 SYSTEM ARCHITECTURE

The system architecture consists of ARM LPC2148 microcontroller which play major role in collecting and processing data. There are different types of sensors used to detect the transformer ratings and GSM play major role sending data to operator. LCD display messages of transformer which is connected to microcontroller.

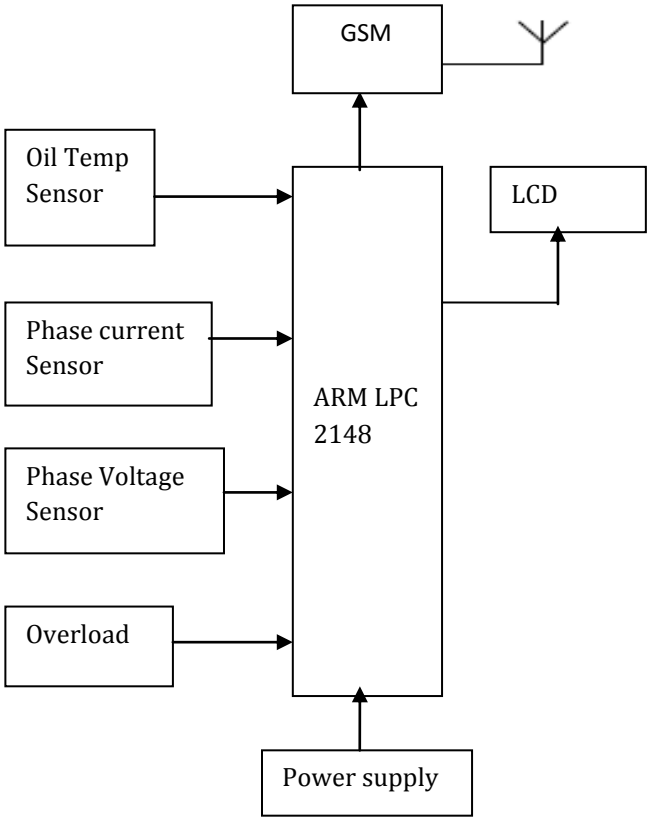

Fig -1: Transmitter Section

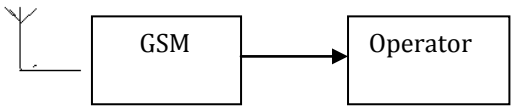

Fig -2: Receiver Section

1.2 INTERFACING OF ARM AND GSM

GSM is a digital mobile system. GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band. The interfacing of ARM LPC2148 and GSM is shown in fig (a)

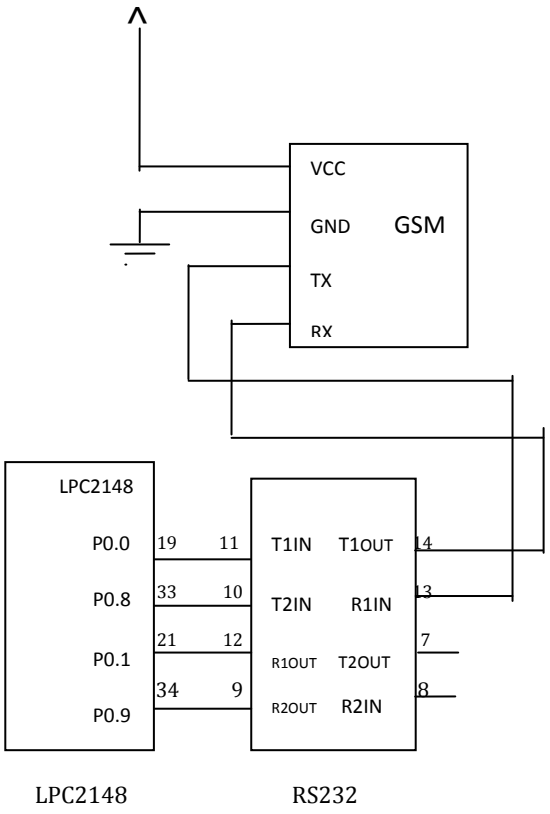

Fig -1: Interfacing of ARM and GSM

The GSM module is communicate the microcontroller with mobile phones through RS232. To communicate over RS232, we just need three basic signals which are namely, RXD (receive), TXD (transmit), GND (common ground).Text message may be sent through the modem by interfacing only three signals of the serial interface of modem with microcontroller i.e. TxD, RxD and GND. In this scheme RTS and CTS signals of serial port interface of GSM Modem are connected with each other. The microcontroller ports P0.0, P0.8 are connected to T1IN and T2IN ports of RS232.Where P0.1 and p0.9 ports are connected to R1OUT and R2OUT ports of RS232.

2. SENSORS

A sensor is a device which receives and responds to a signal when touched. Sensors are installed on transformer site are used for sensing Phase current, phase voltage, oil temperature. Here PT100 sensor is used measure top oil temperature.

Fig -1: Images of PT100 sensors

2.1 PROPERTIES OF PT100

One of the most interesting advantages of a resistance thermometer is the good stability over a long period of time. The absolute stability of this type of sensor is also quite high. Up to 300^0C a tolerance of 0.75% is applied. At temperatures of 700^0C to 800^0C a tolerance of 1% is applied. The time constants of Pt100 elements are usually larger than those of thermo-couples. The measuring surface is larger for metal resistance thermometers then for thermocouples. Isolation failures have more influence on the measurement in the case of Pt100 elements then in the case of thermocouples.
Voltage transformer and current transformer is used to measure voltage and current ratings of transformer. Over load of the transformer will cause automatically shut down.

3. LIQUID CRYSTAL DISPLAY (LCD)

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**.

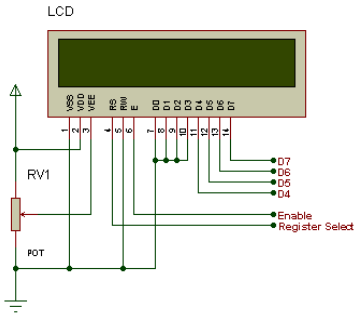

Fig -2: Interfacing of ARM and GSM

4. RESULTS & DISCUSSIONS

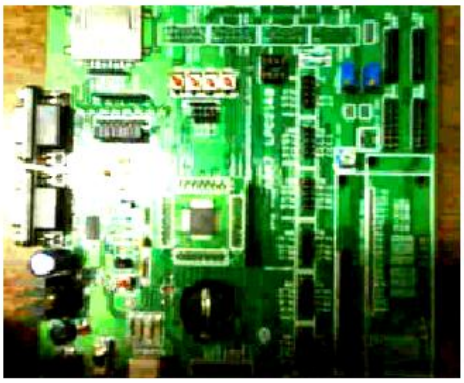

Fig-3: Snapshot of LPC 2148

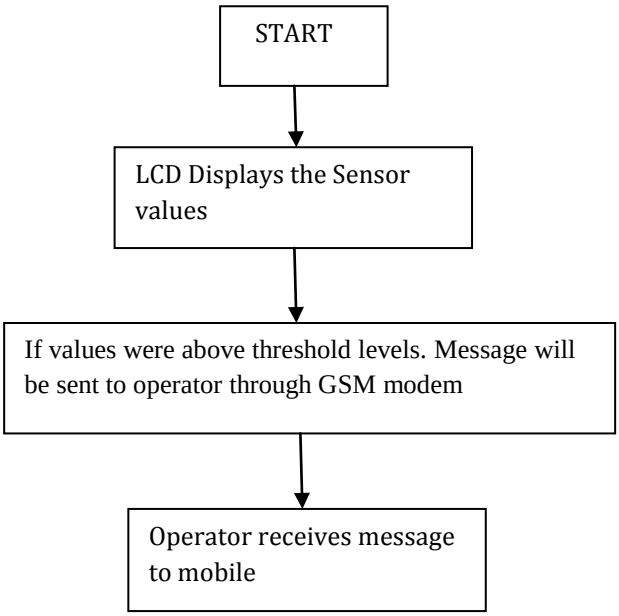

Fig -4: Flow chart of system

Fig-5: Snapshot of GSM Modem

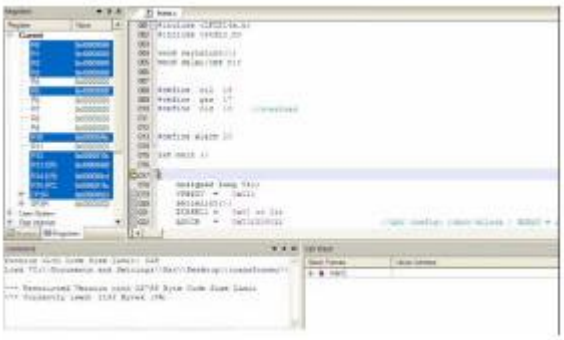

Fig-6: Snapshot of KEIL stimulator shows debugging unit

5. FUTURE WORK

In future data base can be maintained for understanding the performance of transformer system. 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 can be strictly utilized for analysis of distributed transformers. Moreover we can find the faults of the system cost reduction can be done and improves system reliability.

6. REFERENCES

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