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The Wireless Transmission Design of a Novel Electronic Current Transformer

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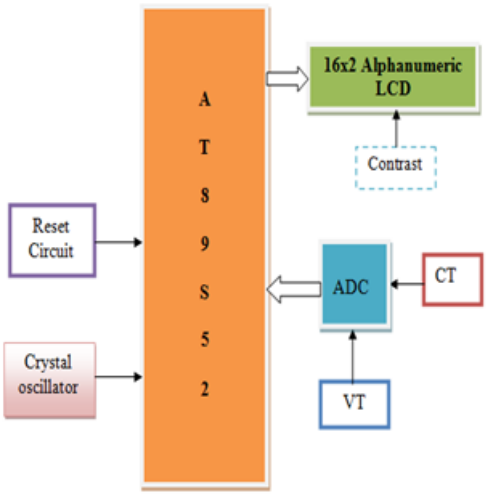
ABSTRACT:

In the present world in the case of any thermal or power plant to measure the temperature or current manually is very difficult.This drawback can be easily overcome with the help of embedded technology.The main theme of this application is to measure the temperature,voltage and current by using sensors and displaying on the concerned display device.

Existing System:

We are monitoring current and voltage through ADC and displayed on the LCD. This is done through AT89S52.



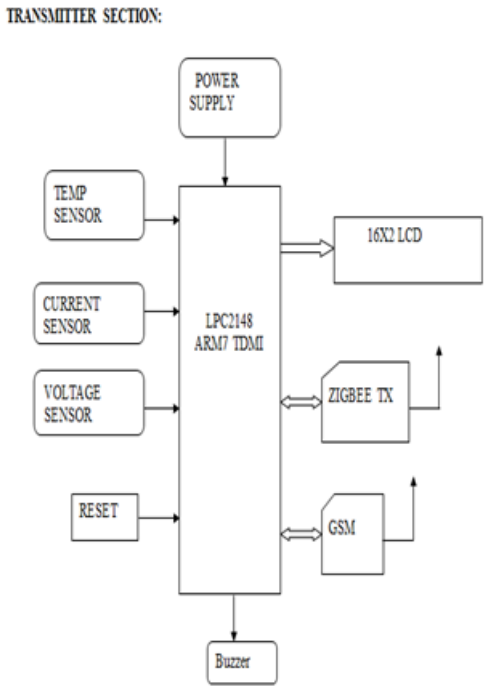
Drawback: There is no wireless communication to remote place

Proposed system:

In this application total two sections are implemented one is transmitter section and another one is receiver section.

In the transmitter section three sensors are interfaced to the LPC2148 controller and this controller is responsible for entire manipulations and the updated condition is displayed on the LCD and the same status is transmitted to the receiver section by using zigbee communication and is displayed on the pc which is on the receiver section. A GSM modem is also interfaced to the controller to send the status to the pre-stored mobile number. This project uses two power supplies, one is regulated 5V for modules and other one is 3.3V for microcontroller. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

BLOCK DIAGRAM:



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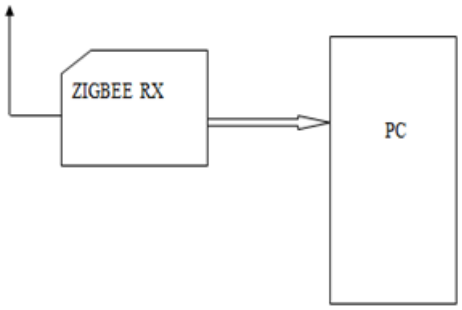
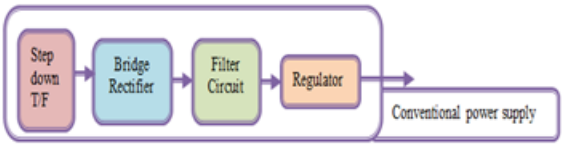
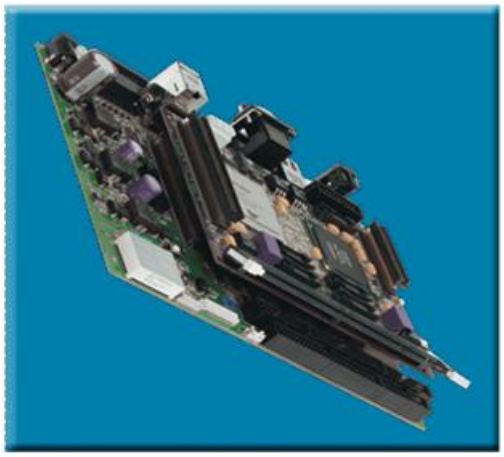
RECEIVER SECTION:



Power supply section:



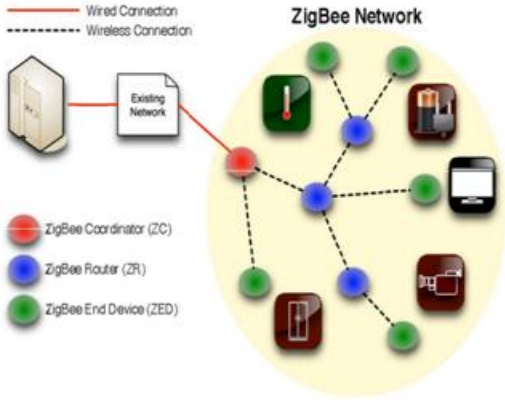
ARM PROCESSOR



ARM7TDMI Processor Core

- Current low-end ARM core for applications like digital mobile phones
- TDMI
    - T: Thumb, 16-bit compressed instruction set
    - D: on-chip Debug support, enabling the processor to halt in response to a debug request
    - M: enhanced Multiplier, yield a full 64-bit result, high performance
    - I: Embedded ICE hardware
- Von Neumann architecture

Zigbee



It is the wireless device for transmitting and receiving purpose or simply it called as Transceiver. Zigbee is based on the IEEE802.15.4 protocol. The range of the Zigbee is covered as 100m. It range is 10 times better than bluetooth device so it can be more preferable one in wireless device. The data rate is very low for transmission while using this device.

Zigbee is a PAN technology based on the IEEE 802.15.4 standard. Unlike Bluetooth or wireless USB devices, ZigBee devices have the ability to form a mesh network between nodes.

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Meshing is a type of daisy chaining from one device to another. This technique allows the short range of an individual node to be expanded and multiplied, covering a much larger area.

Technical Specifications of Zigbee

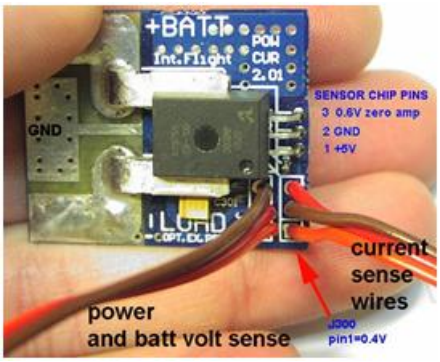
- Frequency band2.400 — 2.483 GHz
- Number of channels16
- Data rate250 kbps
- Supply voltage1.8 – 3.6 V
- Flash memory128 kB
- RAM8 kB
- EEPROM4 kBOperating
- Temperature-40 — +85 °C

GSM:

GSM, which stands for Global System for Mobile communications, reigns (important) as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.

CURRENT SENSOR:

In practice a current transformer can be used as a current sensor. The current sensor is to be connected in series with the transmission lines. When current in a circuit is too high to directly apply to measuring instruments, a current transformer produces a reduced current accurately proportional to the current in the circuit, which can be conveniently connected to measuring and recording instruments. A current transformer also isolates the measuring instruments from what may be very high voltage in the monitored circuit.



VOLTAGE SENSOR:

In practice a voltage transformer can be used as a voltage sensor. The voltage transformer must be connected across the transmission lines. The primary of the transformer must be connected to the transmission lines and the secondary must be given to the microcontroller. A step down voltage transformer is used.

Advantages

- Ease of operation
- Low maintenance cost

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- Fit and forget system
- No wastage of time
- Durability
- Accuracy

Conclusion:

Hence the system designed and implemented successfully to monitor the value of sensor wirelessly through zigbee. In the receiver the values are displayed on PC. By reading pulse values continuously from TEMPERATUR,CURRENT AND VOLTAGE sensor interfacing to microcontroller. These values are encoded and sent to remote station using Zigbee communication. Alpha numeric LCD is provided on receiver end to display the sensor value measurement.

References

1. T. W. Cease and P. Johnston, "A magneto-optic current transducer," IEEE Trans. Power Del., vol. 5, no. 2, pp. 548-555, Apr. 1990.

2. W. F. Ray, "Rogowski transducers for high bandwidth high current measurement," in Proc. IEEE Colloq. Low Frequency Power Meas. Anal London, U.K., Nov. 2, 1994, pp. 10/1-10/6

3. L. Cristaldi, A. Ferrero, M. Lazzaroni, R. T. Ottoboni, "A linearization method for commercial Hall-effect current transducers," IEEE Trans. Instrumentation and Measurement, vol. 50, no.5, pp. 1149-1153, Otc. 2011.

4. Y. P. Tsai, K. L. Chen and N. Chen, "Design of a Hall effect current microsensor for power networks," IEEE Transactions on Smart Grid, Vol. 2, No. 3, pp. 421-427, Sept 2011.

5. K. L. Chen and N. Chen, "A new method for power current measurement using a coreless Hall effect current transformer," IEEE Trans. Instrumentation and Measurement, vol. 60, no.1, pp. 158-169, Jan. 2011.

6. Y. P. Tsai, K. L. Chen, Y. R. Chen and N. Chen, "Multi-Function Coreless Hall Effect Current Transformer for Protection and Measurement of Power Systems", revised to IEEE Transactions on Instrumentation and Measurement.

7. K. L. Chen, Y. P. Tsai, N. Chen, Suratsavadee K. Korkua, and Wei-Jen Lee, "Using coreless Hall effect sensor for accurate current measurement in ZigBee based wireless sensor network," in Proc. 2011 IAS Annual Meeting, Orlando.

8. NXP LPC1768 Data Sheet, NXP Semiconductors B.V., August 2012.

9. Instrument transformers-Part 8: electronic current transformers, IEC Standard 60044-8, Jul. 2002.

10. Cheng, D. K. (1989), Field and Wave Electromagnetics, Addison-Wesley Publishing Co., Inc., pp. 226 and 321-345, Canada.