

The Wireless Transmission Design of a Novel Electronic Current Transformer Using GSM

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ABSTRACT:

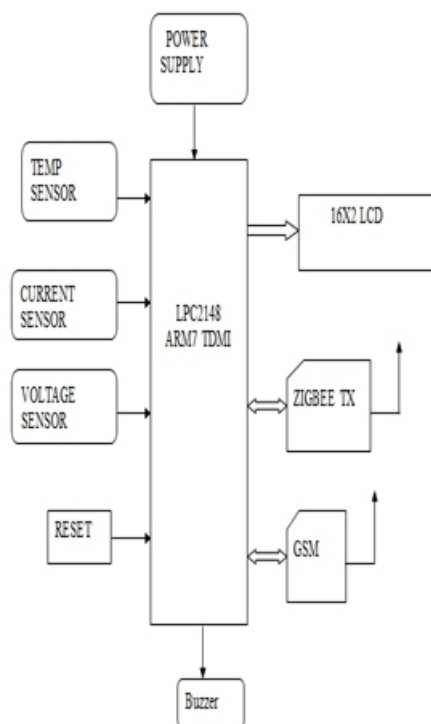
In the present world in the case of any thermal or power plant to measure the temperature or current manually is very difficult. This drawback can be easily overcome with the help of embedded technology. The main theme of this application is to measure the temperature, voltage and current by using sensors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

The LPC2148 are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes (kB) of embedded high speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT, PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.

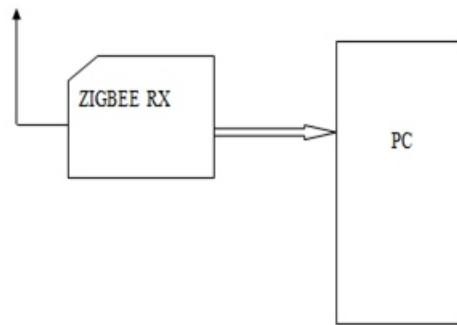
This project uses two power supplies, one is regulated 5V for modules and other one is 3.3V for microcontroller. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

BLOCK DIAGRAM:

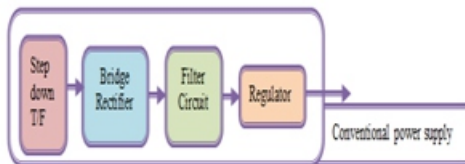
TRANSMITTER SECTION:



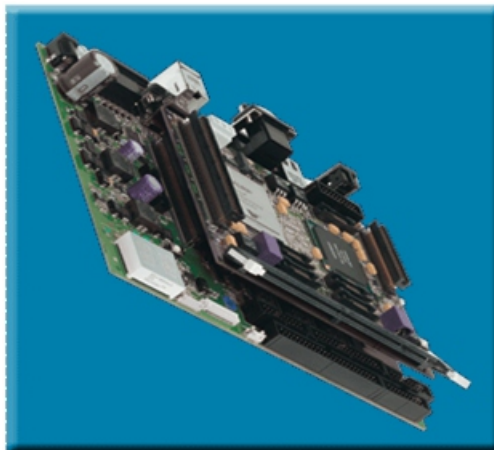
RECEIVER SECTION:



Power supply section:



ARM PROCESSOR:



ARM7TDMI Processor Core

- Current low-end ARM core for applications like digital mobile phones
- TDMI

oT: Thumb, 16-bit compressed instruction set

oD: on-chip Debug support, enabling the processor to halt in response to a debug request

oM: enhanced Multiplier, yield a full 64-bit result, high performance

oi: 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. Its 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. 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:

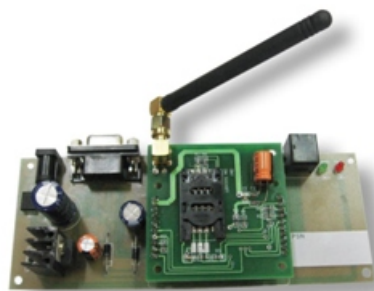
- Frequency band 2.400 — 2.483 GHz

- Number of channels 16
- Data rate 250 kbps
- Supply voltage 1.8 – 3.6 V
- Flash memory 128 kB
- RAM 8 kB
- EEPROM 4 kB Operating
- Temperature -40 — +85 °C

Global System for Mobile Communication (GSM):

Definition:

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.



MODEM SPECIFICATIONS:

The SIM300 is a complete Tri-band GSM solution in a compact plug-in module. Featuring an industry-standard interface, the SIM300 delivers GSM/GPRS 900/1800/1900 MHz performance for voice, SMS, data and Fax in a small form factor and with low power consumption. The leading features of SIM300 make it deal fir virtually unlimited application, such as WLL applications (Fixed Cellular Terminal), M2M application, handheld devices and much more.

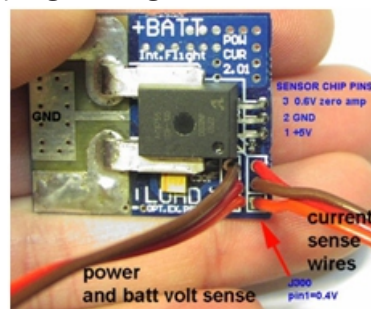
1. Tri-band GSM/GPRS module with a size of 40x33x2.85
2. Customized MMI and keypad/LCD support

3. An embedded powerful TCP/IP protocol stack
4. Based upon mature and field proven platform, backed up by our support service, from definition to design and production.



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.



Fig: Diagram of voltage sensor

Advantages:

- Ease of operation
- Low maintenance cost
- 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:

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