

Wind Speed Measurement and Alert System for Tunnel Fire Safety



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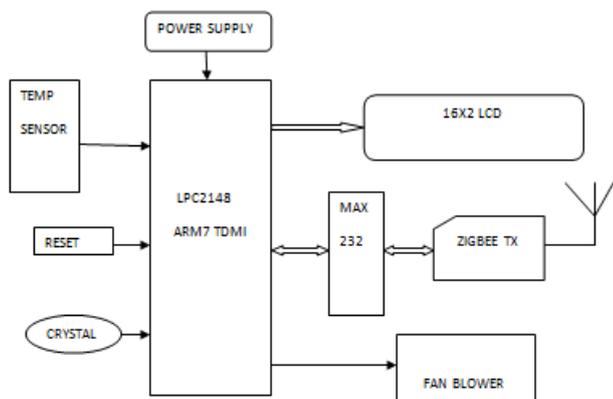
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ABSTRACT:

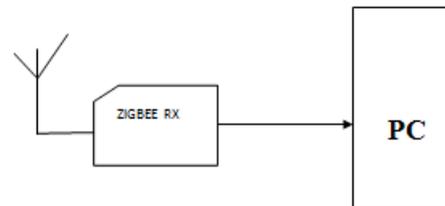
This application describes a system for wind speed measurement and alert. This application is implemented with the help of two sections one is transmitter section which is responsible for monitoring the environment temperature using temperature sensor and depending upon the variation in temperature the speed of the wind changes automatically and whatever the temperature is changed in the transmitter section is displayed on the 16x2 LCD and parallelly is transmitted to the receiver section and displayed on the PC using Zigbee communication. In the transmitter section the temperature sensor is connected to the LPC2148 controller and this controller is responsible for manipulating the entire application. This project uses two power supplies, one is regulated 5V for modules and other one is 3.3V for LPC2148. 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:

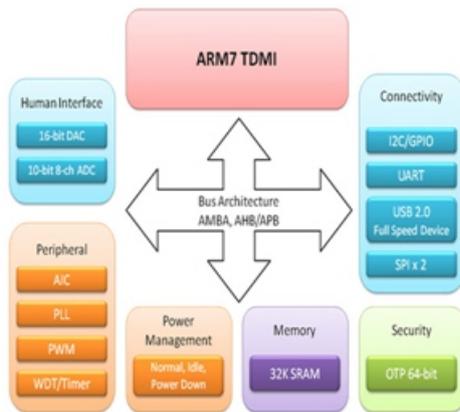


Wireless Communication::

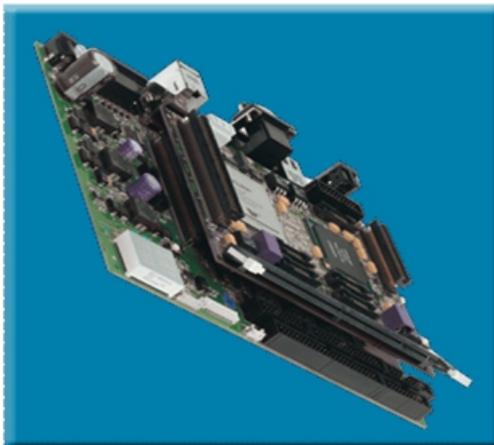
Wireless communication, as the term implies, allows information to be exchanged between two devices without the use of wire or cable. A wireless keyboard sends information to the computer without the use of a keyboard cable; a cellular telephone sends information to another telephone without the use of a telephone cable. Changing television channels, opening and closing a garage door, and transferring a file from one computer to another can all be accomplished using wireless technology. In all such cases, information is being transmitted and received using electromagnetic energy, also referred to as electromagnetic radiation. 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 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.

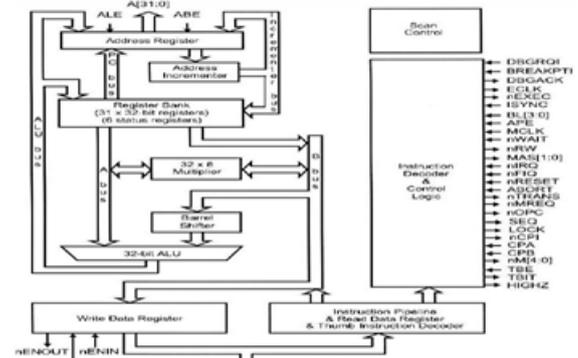


ARM PROCESSOR:



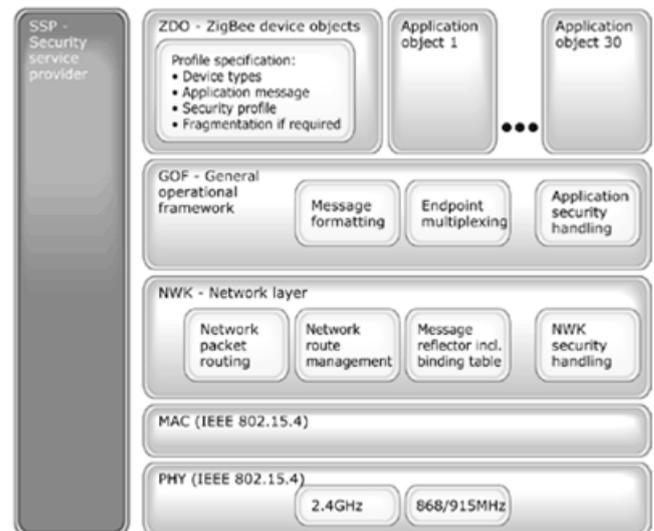
ARM7TDMI Processor Core:

- 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



Core Diagram

ZIGBEE ARCHITECTURE:

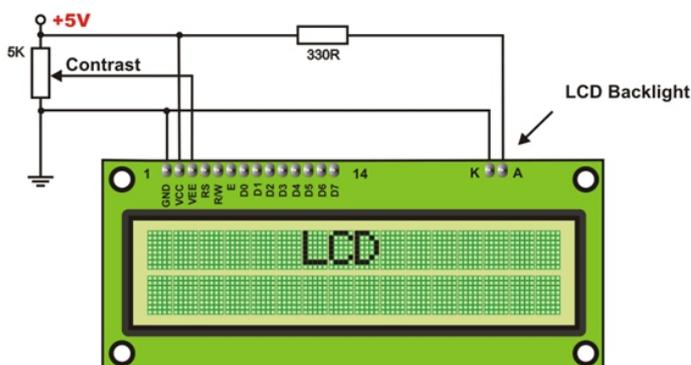


ZigBee is a home-area network designed specifically to replace the proliferation of individual remote controls. ZigBee was created to satisfy the market's need for a cost-effective, standards-based wireless network that supports low data rates, low power consumption, security, and reliability. It may be helpful to think of IEEE 802.15.4 as the physical radio and ZigBee as the logical network and application software. Following the standard Open Systems Interconnection (OSI) reference model, ZigBee's protocol stack is structured in layers. The first two layers, physical (PHY) and media access (MAC), are defined by the IEEE 802.15.4 standard. The layers above them are defined by the ZigBee Alliance. The IEEE working group passed the first draft of PHY and MAC in 2003. ZigBee-compliant products operate in unlicensed bands worldwide, including 2.4GHz (global), 902 to 928MHz (Americas), and 868MHz (Europe). Raw data throughput rates of 250Kbps can be achieved at 2.4GHz (16 channels), 40Kbps at 915MHz (10 channels), and 20Kbps at 868MHz (1 channel).

The transmission distance is expected to range from 10 to 75m, depending on power output and environmental characteristics. Like Wi-Fi, Zigbee uses direct-sequence spread spectrum in the 2.4GHz band, with offset-quadrature phase-shift keying modulation. Channel width is 2MHz with 5MHz channel spacing. The 868 and 900MHz bands also use direct-sequence spread spectrum but with binary-phase-shift keying modulation.

LCD SCREEN:

LCD screen consists of two lines with 16 characters each. Each character consists of 5x7 dot matrix. Contrast on display depends on the power supply voltage and whether messages are displayed in one or two lines. For that reason, variable voltage 0-V_{dd} is applied on pin marked as V_{ee}. Trimmer potentiometer is usually used for that purpose. Some versions of displays have built in backlight (blue or green diodes). When used during operating, a resistor for current limitation should be used (like with any LE diode).



Advantages:

- Ease of operation
- Low maintenance cost
- Fit and forget system
- No wastage of time
- Durability
- Accuracy

Applications:

- Mining safety
- Industries
- Factories

Authors Details:

Mr. G. Lakshma Reddy was born in Guntur,AP, on February 11, 1985. He graduated from the Jawaharlal Nehru Technological University,Hyderabad, His employment experience included PrakasamEngineirngCollege,Kandukur, the Nalanda Institute of Engineering and technology, and Institute for Electronic Governance,Hyderabad. His special fields of interest included VLSI & Embedded Systems, Digital Signal Processing & communication Systems. Presently He is working as a Asst Prof in Newton's Institute of Engineering, Macherla. So far he is having 7 Years of Teaching Experience in various reputed engineering colleges.

Mr. K.Sivarama Krishna was born in Guntur,AP, on April 27 ,1991. He graduated from the Jawaharlal Nehru Technological University,Kakinada.His special fields of interest included VLSI & Embedded Systems. Presently He is Studying Mtech in Newton's Institute of Engineering, Macherla.