

An Embedded Based Sensor Node Failure Detection Using Arm7LPC2148

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ABSTRACT:

The main theme of this application is to transmit the data from the remote place to main station or server station which is far away from the transmitter section. The transmitter section consists of microcontroller and zigbeemodules which is implemented like a mesh and it is surrounded with total three nodes. Here continuously each node is transferring the message to the server node even though if anyone one of the node gets failure the message will be transmitted by the another node and in the receiver section the message will be displayed on the PC with the help of zigbee and microcontroller. 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.

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

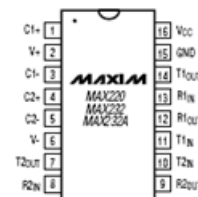
oM: enhanced Multiplier, yield a full 64-bit result, high performance

oI: Embedded ICE hardware

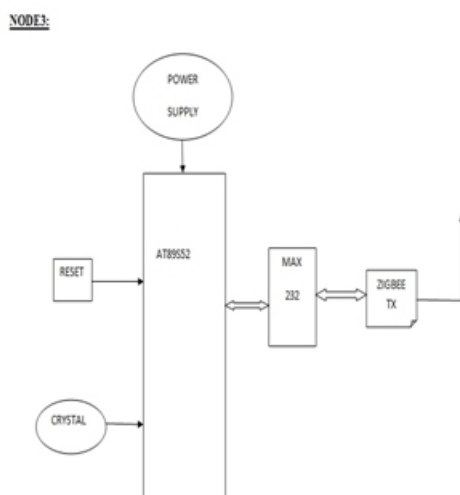
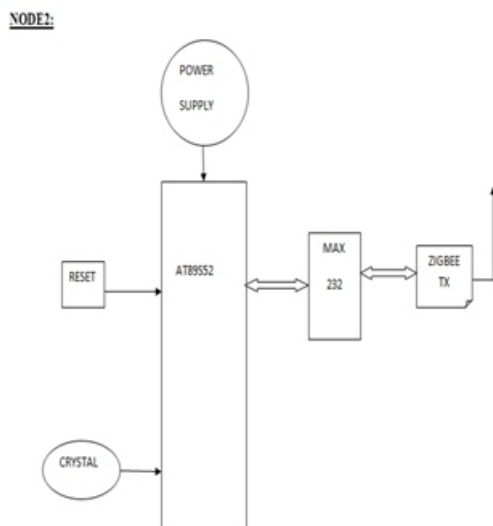
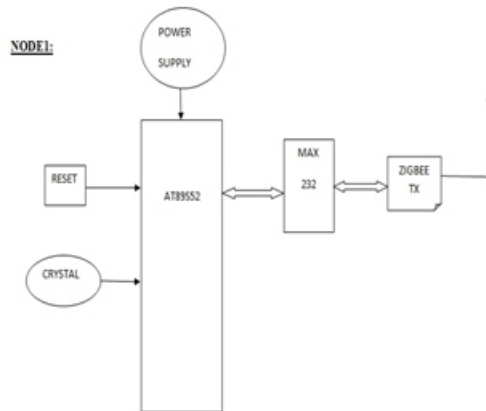
- Von Neumann architecture

MAX 232:

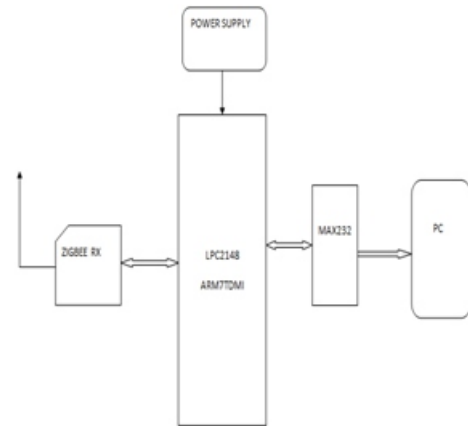
Max232 IC is a specialized circuit which makes standard voltages as required by RS232 standards. This IC provides best noise rejection and very reliable against discharges and short circuits. MAX232 IC chips are commonly referred to as line drivers. To ensure data transfer between PC and microcontroller, the baud rate and voltage levels of Microcontroller and PC should be the same. The voltage levels of microcontroller are logic 1 and logic 0 i.e., logic 1 is +5V and logic 0 is 0V. But for PC, RS232 voltage levels are considered and they are: logic 1 is taken as -3V to -25V and logic 0 as +3V to +25V. So, in order to equal these voltage levels, MAX232 IC is used. Thus this IC converts RS232 voltage levels to microcontroller voltage levels and vice versa.



BLOCK DIAGRAM: TRANSMITTER SECTION:



RECEIVER SECTION:



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.

ZIGBEE TECHNOLOGY:

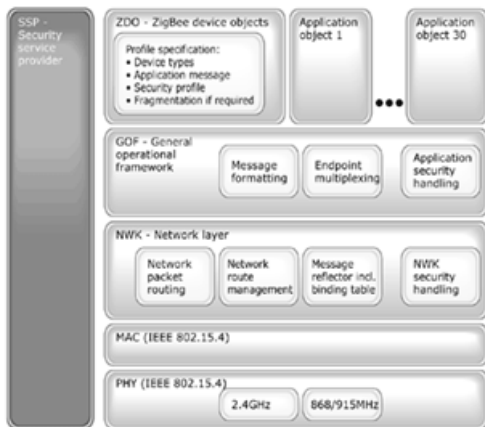


ZigBee module. The €1 coin, shown for size reference, is about 23 mm (0.9 inch) in diameter. ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4-2003 standard for wireless personal area networks (WPANs), such as wireless headphones connecting with cell phones via short-range radio.

The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking. The ZigBee Alliance is a group of companies that maintain and publish the ZigBee standard.



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.

Applications of Zigbee:



AT89S52:

Microprocessors and microcontrollers are widely used in embedded systems products. Microcontroller is a programmable device. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical. The Intel 8052 is Harvard architecture, single chip microcontroller (μ C) which was developed by Intel in 1980 for use in embedded systems. It was popular in the 1980s and early 1990s, but today it has largely been superseded by a vast range of enhanced devices with 8052-compatible processor cores that are manufactured by more than 20 independent manufacturers including Atmel, Infineon Technologies and Maxim Integrated Products.

8052 is an 8-bit processor, meaning that the CPU can work on only 8 bits of data at a time. Data larger than 8 bits has to be broken into 8-bit pieces to be processed by the CPU. 8052 is available in different memory types such as UV-EPROM, Flash and NV-RAM. The present project is implemented on KeilVision. In order to program the device, proload tool has been used to burn the program onto the microcontroller. The features, pin description of the microcontroller and the software tools used are discussed in the following sections.

Working procedure:

- The above given three nodes will be connected in a mesh
- Data will be transferred from all the nodes to the receiver

- This will happen even with a failure of one node .

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