

# The Design and Implementation of Wireless Sensor Network monitoring and control system based on Zig-bee

MD Rasheeduddin

Al Habeeb College of Engineering and Technology  
Line 2-name of organization, acronyms acceptable  
Hyderabad, India

G.Ansar Ali

Al Habeeb College of Engineering and Technology  
Line 2-name of organization, acronyms acceptable  
Hyderabad, India

**Abstract**— The population of the elderly people is in a steady rise throughout the world, creating the need to increase the facilities for the care of the elderly. If they prefer to live alone they do however require constant monitoring so that medical help can be provided immediately in times of dire needs. In the Present Project, implementing the Task of Monitoring Using Sensors like Temperature sensor, smoke detector sensor, Heart beat Sensor and controlling through wireless Sensor Network. Designed a System for Patient Monitoring and controlling system, acquiring data from the sensors to PC through Zig bee. With the Corresponding information received form controlling devices through wireless communication called Zig-bee by sending some commands through PC to ARM Processor. Based on those commands the corresponding controlling will be done. [1, 5].

**Keywords**— ARM, Zigbee, Patient Monitoring

## I. INTRODUCTION

The embedded based applications need sensitive data transfer between different nodes. In order to increase the speed and to reduce the hardware complexity, this proposed system focuses on the implementing the task of monitoring using sensors like temperature sensor, smoke detector sensor, heart beat sensor and controlling through wireless sensor network. Designed a system for patient monitoring and controlling system, and acquiring data from the sensors to PC through Zig bee. With the corresponding information received, controlling devices through wireless communication called Zig-bee by sending some commands through PC to ARM Processor. Based on those commands the corresponding controlling will be done. [2].

## II. RELATED WORK

### A. ARM

The ARM core uses RISC architecture. It's a design philosophy aimed at delivering simple but powerful instructions that execute within a single cycle at a high clock speed. The RISC philosophy concentrates on reducing the complexity of instructions performed by the hardware because it is easier to provide greater flexibility and intelligence in software rather than hardware. As, a result RISC design plays greater demands on the compiler. In contrast, the traditional complex instruction set computer (CISC) relies more on the

hardware for instruction functionality, and consequently the CISC instructions are more complicated. [3]

TABLE I. DIFFERENCE BETWEEN RISC AND CISC ARCHITECTURES

	CISC	RISC
1	Complex instruction taking multiple cycles	Simple instructions taking 1 cycle
2	Any instruction may reference memory	Only LOADS/STORES reference memory
3	Not pipelined or less pipelined	Highly pipelined
4	Instructions interpreted by the micro program	Instructions executed by the hardware
5	Variable format instructions	Fixed format instructions
6	Many instructions and modes	Few instructions and modes
7	Complexity in the micro program	Complexity is in the compiler
8	Single register set	Multiple register sets

### B. Maintaining the Integrity of the Specifications

ZigBee is an IEEE 802.15.4 wireless networking standard which is aimed at remote control and sensor applications it is suitable for operation in harsh radio environments as well as in isolated locations. The ZigBee protocol provides an open standard for low-power wireless networking of monitoring and control devices. Working with the IEEE 802.15.4 standard—which focuses on low-rate personal area networking and defines the lower protocol layers (i.e., the physical layer, or PHY, the medium access control layer, or MAC)—ZigBee. [7]

### C. Existing System

Some of the studies have demonstrated the feasibility of remotely monitoring activities at home. In earlier days, Camera based system for home monitoring system has been popular with the old people. It is not convenient to keep on monitoring them through the Camera based surveillance. So we need an efficient method to get constant monitoring. [5]

### D. Proposed System

In the Present Project, implementing the Task of Monitoring Using Sensors like Temperature sensor, smoke detector sensor, Heart beat Sensor and controlling through wireless Sensor Network. Designed a System for Patient

Monitoring and controlling system, acquiring data from the sensors to PC through Zig-bee. With the Corresponding information received from controlling devices through wireless communication called Zig-bee by sending some commands through PC to ARM Processor. Based on those commands the corresponding controlling will be done.

#### E. Description

The single ended wireless link consists of a transmitter and a receiver. At the transmitter, the temperature sensor, LM35 is interfaced with LPC2148 microcontroller which is connected to Zigbee module. The input sensor data is encrypted using the encryption algorithm and the cipher text is sent to the receiver through the zigbee module. The peripherals used here are ADC0 at the transmitter end and a pair of UART0 and UART1 at both the transmitter and the receiver ends. Zigbee module is interfaced with the microcontroller at transmitter and the receiver to set a wireless communication link. Another Zigbee module at the receiver is also connected to the Personal Computer. The receiver receives the encrypted data at the receiver from the actual transmitted data. The terminal displays the data at the transmitter and the receiver. [8]

#### At the Transmitter

- LM35 senses the surrounding temperature and it is converted to digital using ADC0. This is displayed on the terminal.
- Set the baud rate as 9600.
- The converted data is sent to LPC2148 through UART0, which is initialized to receive and transmit data.
- A 128 bit key which is entered and the plain text are displayed on the terminal and are sent to LPC2148 through UART0.
- The data and the key are stored in a FIFO buffer. In the microcontroller, the data is received using UART1.
- The encrypted data is also displayed on the terminal. UART1 which is initialized to transmit data sends the cipher text to the receiver using ZigBee module. [9]

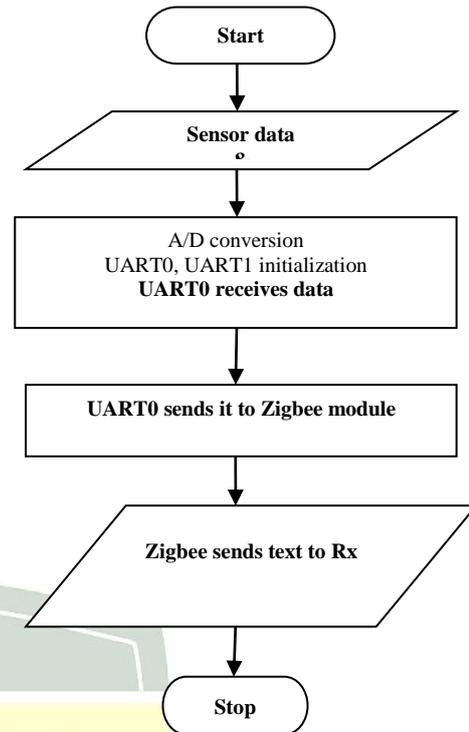


Fig. 1. Depicting the implementation at transmitter. (Flow Chart)

#### At the Receiver

- Set the baud rate as 9600.
- Wait for the cipher text to be sent by the transmitter.
- The Zigbee module receives the data and sends it to PC, which is initialized to receive and transmit data.
- Monitoring and controlling can be done after receiving the commands, instruction received at the output terminal of PC. [10]

CONCLUSION

The procedure implemented has impressive performance in terms of power consumed by the microcontroller and Zigbee module, provides data transfer with high security and has less execution time. The communication link can also be used to securely transmit messages of variable length. The 128 bit key which is entered by the user at the receiver must match with that entered at the transmitter for the correct transmitted data to be display on the terminal at the receiver end.

REFERENCES

- [1] New Zealand's 65+ Population: A statistical volume, Wellington, New Zealand, 2007
- [2] A. Wood, G. Virone, T. Doan, Q. Cao, L. Selavo, Y. Wu, L. Fang, Z. He, S. Lin, J. Stankovic, "ALARM-NET: Wireless Sensor Networks for Assisted-Living and Residential Monitoring", Technical Report CS-2006-13, Wireless Sensor Network Research Group, Department of Computer Science, University of Virginia.
- [3] Anuroop Gaddam, Subhas Chandra Mukhopadhyay, Gourab Sen Gupta, "Elder Care Based on Cognitive Sensor Network", IEEE Sensors Journal, Vol. 11, No. 3, March 2011, pp: 574-581
- [4] Davide Merico, Alessandra Mileo and Roberto Bisiani, "Wireless Sensor Networks supporting Context-aware Reasoning in Assisted Living", Proceedings of the 1st international conference on Pervasive Technologies Related to Assistive Environments (PETRA) 2008.
- [5] Smart Medical Home Research Laboratory, University of Rochester, "http://www.urmc.rochester.edu/future-health/validation/smarthome.cfm".
- [6] "Loss of Independence in Activities of Daily Living in Older Adults Hospitalized with Medical Illnesses: Increased Vulnerability with Age", Journal of the American Geriatrics Society, Volume 51, Issue 4, pages 451-458, April 2003
- [7] <http://www.monnit.com/products/wireless-sensors>
- [8] Monnit Link Ethernet Gateway: Technical overview, <http://www.monnit.com/pdf/MDG02-Ethernet-Gateway-Data-Sheet.pdf>
- [9] Monnit Software, Wireless Sensor Monitoring and Notification Systems, <http://www.monnit.com/pdf/m0015-Monnit-Wireless-Sensor-Monitoring-Overview.pdf>
- [10] Gourab Sen Gupta, Mark Hetherington, "Miniaturisation of Wireless Sensor Nodes for Smart Digital Home", IEEE Instrumentation and Measurement Technology Conference (I2MTC), Graz, Austria, May.

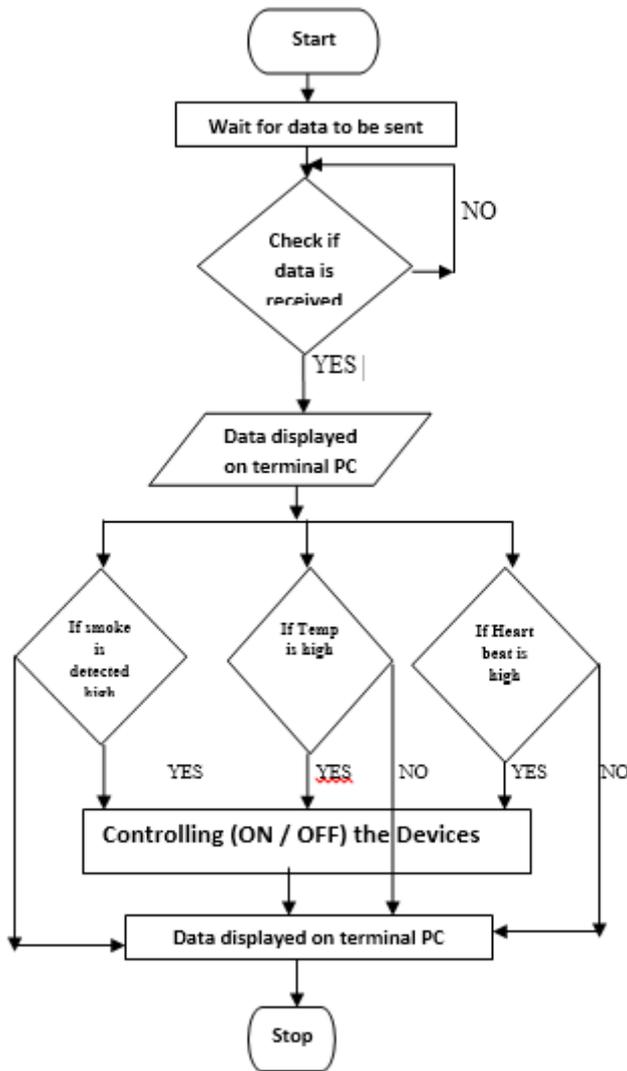


Fig. 2. Depicting the implementation at Receiver. (Flow Chart)