Measurement and control of industrial parameter using Zigbee

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Abstract: Wireless based industrial automation is a prime concern in our day-to-day life. The approach to Zigbee Based Wireless Network for Industrial Applications standardized nowadays. In this paper, we have tried to increase these standards by combining new design techniques to wireless industrial automation. The personal computer based wireless network for industrial application using Zigbee can be adopted at micro and macro Industries, it has various types of Processors and Microcontrollers. Here Microcontrollers,Sensors, Relays are used. The system is fully controlled by the Personal Computer through ADC (Analog to digital converter). All the processor and controllers are interconnected to personal computer through Zigbee. The Personal Computer will continuously monitor all the Data from remote processing unit and compare with value preloaded process structure. If any error is found the personal computer takes necessary action. Here star topology three node Zigbee network is tried. The first Zigbee is connected to the personal computer it acts as full function devices and is used to send and receive data from other nodes. The second and third Zigbee are reduced function devices and they are used to control the temperature, humidity, pressure and level respectively. All the Zigbee's are interconnected with processing unit through RS232 protocol.

Keywords: Wireless Communication; Zigbee Network; Secured data transmission; Analog to digital converter.

I. INTRODUCTION

Zigbee based wireless network for industrial applications standardized nowadays. In this paper, these standards will be improved by combining new design techniques to wireless industrial automation. Microcontrollers AVR AT mega 16, Zigbee S2, Temperature, Humidity, Level and Pressure sensors are used [1]. The system is fully controlled by the Personal Computer through AVR ATMEGA16 [4] using Zigbee. All the processors and controllers are interconnected to personal computer through Zigbee. The Personal Computer will continuously monitor all the data from remote processing unit and compare with value preloaded process structure. If any error is found, then the personal computer takes necessary action. Star topology three node Zigbee network is tried in which the first Zigbee is connected to the personal computer.

It acts as full function devices and used to send and receive data from other nodes. The second and third Zigbee are reduced function devices and they are used to control the speed of fan, temperature, level and pressure control respectively .

All the Zigbee's are interconnected with processing unit through RS232 protocol [2].

II. PROPOSED WORK

Wireless communication is the transfer of information over a distance without the use of electrical conductors or wires. The distances involved may be short (a few meters as in television remote control) or long (thousands or millions of kilometres for radio communications). It encompasses various types of fixed, mobile, and portable two-way radios,cellular telephones, personal digital assistants (PDAs), and wireless networking. In this paper.

we use the wireless network for industrial data communication. Zigbee uses the IEEE 802.15.4 physical and MAC layers to provide standard-based, reliable wireless data transfer [1].

Zigbee adds network structure, routing, and security to complete the communication suite. On top of this wireless engine, Zigbee profiles provide target applications with the interoperability and inter-compatibility required to allow similar products from different manufacturers to work seamlessly [2].

The fig1 shows that the basic blocks diagram of secured wireless communication for industrial automation. The data from the sensor are taken from the ADC and the values are stored in the AT mega 16 microcontroller [4].

The data from node1 (shown in fig2) and node 2 (same as node1) is transmitted to master node (shown in fig3). The overall information is transmitted to PC using USART.

Threshold values of each sensors are set and appropriate actions will be taken for e.g. temperature is controlled using fan and pump is turned on when LEVEL is reduced.

Zigbee is used for wireless data transmission which comes under ISM band. Zigbee plays a vital role in secured data transmission [3].
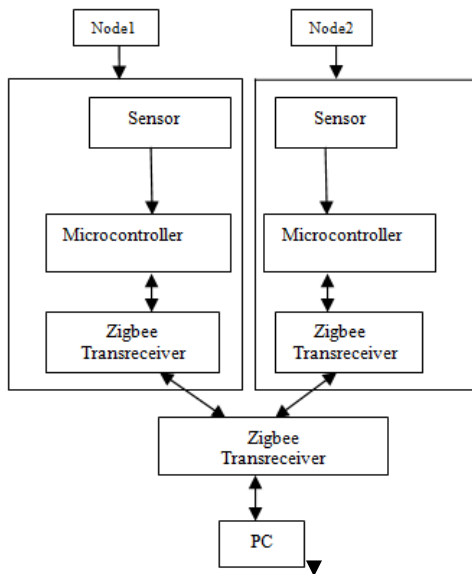
Fig. 1 Block diagram of secured wireless communication for industrial automation.
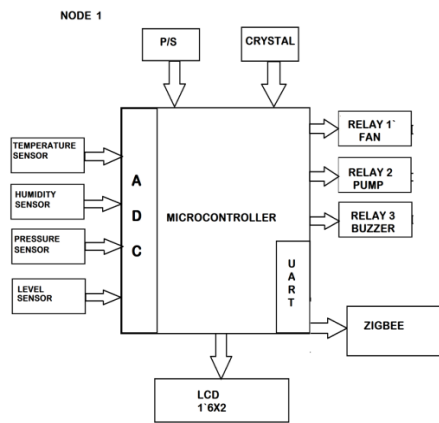

Fig. 2 Node 1

Above fig.2 shows a block diagram of node1consist of AVR AT mega16 microcontroller with four data from the sensor are taken from the ADC and the values are stored in the microcontroller. The data from node1 is transmitted to master node. Similarly; node2 also performs same operation like node 1.
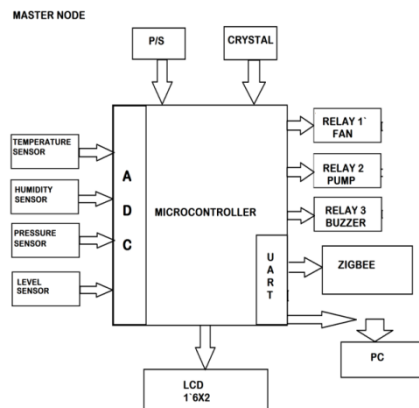

Fig. 3 Master node

The above Fig. 3 shows the master node that collects overall information from node 1 and node 2 and transmitted it to PC using USART [4].

III.   CONCLUSION

Zigbee provides proper network topology, and it overcomes all problems in industries caused due to environmental issues. An error free proper communication was established between the processing unit and monitoring unit. The Personal Computer will continuously monitor all the Data from remote processing unit and compare with value preloaded process structure. If any error is found the personal computer takes necessary action.

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