REMOTE MONITORING AND CONTROLLING OF INDUSTRIAL PARAMETERS BY ZIGBEE

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ABSTRACT

Remote control network is a research focus in the application domain of wireless communication technology. Zigbee technology makes up for the vacancy of wireless communication market in the low-cost and low-power equipment domain. This paper presents the design and application of wireless sensor network web server based on Zigbee protocol. This server can realize real-time monitoring and control for the remote object. This system uses ARM7 Processor, it makes the system more real time and handling various processes based on multi-tasking and reliable scheduling mechanisms. Web server application is ported into an ARM processor using embedded 'C' language. It has been proved that the server runs stability and has good scalability, which can be widely used in smart home, monitoring systems, industrial control, and other fields.

*Keywords: Arm, Embedded System, Humidity Sensor, Temperature Sensor, Zigbee*

I. INTRODUCTION

Data acquisition systems with remote accessibility are in great demand in industry and consumer applications. In some applications, human beings have been replaced by unmanned devices that will acquire data and relay the data back to the base. There are data-acquisition and control devices that will be a substitute for a supervisor in a multisite job operation. A single person can monitor and even interact with the ongoing work from a single base station. An acquisition unit designed to collect data in their simplest form which is based on Linux, which is a popular choice for embedded PC systems. Some applications adding remote accessibility which are built to collect and send data through a modem to a server. Although these are well-built systems that serve the purpose for a specific task, the user cannot interact with the system. Another unidirectional data transfer which uses the Global System for Mobile Communications (GSM): a popular wireless choice for connectivity between the data-acquisition units and clients. With the development of information electrical technology, network and wireless communication, real-time remote control network has been received people's attention recently. Zigbee which is the emerging wireless communication technology, with very little energy, can relay the data through radio waves from a sensor to another sensor. It is a good solution of bottlenecks in wireless sensor network, such as network connectivity and power assumption. In order to realize real-time monitoring of remote wireless sensor network, a wireless network web server based on ARM micro-controller and Zigbee transceiver chip is studied in this paper.

In numerous environmental factors, temperature, humidity is the most important and the most difficult to control environmental factor. And in some industrial areas there is some special requirements for it. Monitoring and

control is very important in realizing industrial automatization and high efficiency. With the development of modern industry, the requirement for industrial monitoring system is getting higher. The system is required to be able to acquire, save, analyze, and process data. It is also required controlling related instruments to change those environment factors and monitoring in long distance so that it realizes modern, intelligent, and accurate control. In this paper, we propose a Zigbee-based portable low-cost data-acquisition system, which can establish a reliable bidirectional connection for data-acquisition. The application of Zigbee and embedded technology makes the remote monitoring possible and give the stability, reliability, security and real time of the data transmission. It will effectively improve the scalability and maintainability of the control system and reduce cost of the equipment maintenance.

II. DATA DESCRIPTION
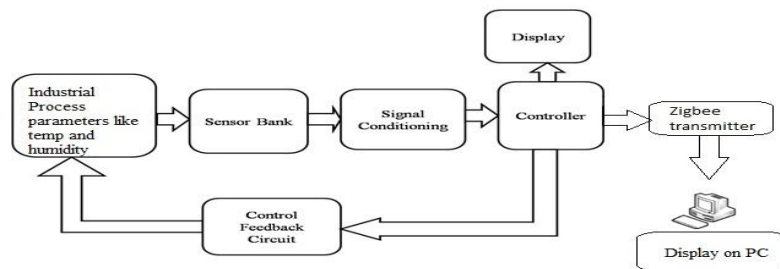
Fig1. Remote Monitoring & Controlling of Real Time Industrial Parameters through Zigbee Module

Fig1. shows Block Diagram of the overall system. Humidity, Temperature are taken as a parameter and the sensors concerned to each sensor (Humidity sensor, Temperature sensor) will sense and give output corresponding to the value. This signal is analog in nature, so it is required to convert these analog signals in digital form because microcontroller reads digital signals. For conversion of analog to digital signal, signal conditioner is used. This signal is taken into ARM Microcontroller through the input channel for comparison. This Microcontroller compares the data with its threshold value for any status changes or value crossing the limit. If the value is more than the threshold value, alert the user by making the relay ON, else the relay is in OFF condition. Also, these values send to the computer which is placed on remote place near to the user or authority.

Zigbee is used for communication purpose. It has RF waves, which are electromagnetic waves propagate at the speed of light, or 186,000 miles per second (300,000 km/s). The frequencies of RF waves, however, are slower than those of visible light, making RF waves invisible to the human eye. The frequency of a wave is determined by its oscillations or cycles per second .One cycle is one hertz (Hz); 1,000 cycles is 1 kilohertz (KHz); 1 million cycles is 1 megahertz (MHz); and 1 billion cycles is 1gigahertz (GHz). A station on the AM dial at 980, for example, broadcasts using a signal that oscillates 980,000 times per second, or has a frequency of 980 KHz. A station a little further down the dial at 710 broadcasts using a signal that oscillates 710,000 times a second, or has a frequency of 710 KHz. With a slice of the RF pie licensed to each broadcaster, the RF range can be neatly divided and utilized by multiple parties.

III. ANALYSIS OF SYSTEM
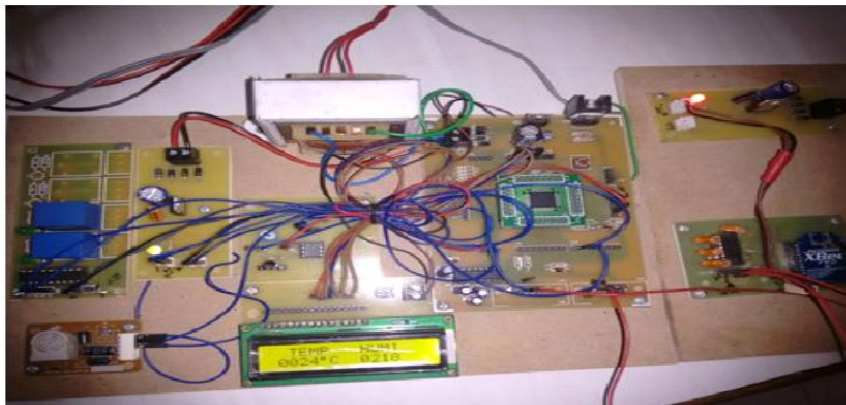
Fig.2 Reading of Temperature and Humidity on LCD Display

In figure 2, LCD is displaying temperature and humidity of the system. In this way it is possible view results from sensors at the system. Temperature and Humidity is monitored continuously so LCD will display continuously reading of the sensors. Relay 1 is designed to turn ON and OFF, when temperature exceeds 350C. Relay 2 is designed to turn ON and OFF, when humidity exceeds 250.
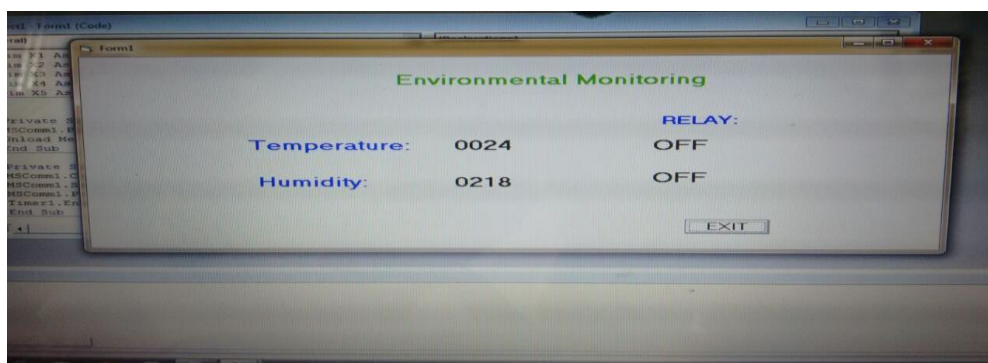
Controller is further interfaced with zigbee transmitter. Zigbee transmitter transmits data and receiver at the other end which is connected to PC receives data for further processing. Zigbee receiver is connected to PC via COM port 1. Visual Basic software is used to show output on PC. Four points are made. Two points are used for temperature and humidity sensor output, two for relays 1 and 2, to shows current status of relays, whether it is turned ON or OFF.

IV. CONCLUSION AND FUTURE WORK

This control system is designed for multiple input and output arrangements for industrial applications. The module is small, simple and flexible which performs different I/O operations remotely over Zigbee module. There are different drawbacks of existing system like difficult of wiring, high maintenance cost and limitation of control range of the system. This system is implemented to overcome the drawbacks of existing system. System eliminates the need to send the service person to the particular application & control the industry. Thus it saves labour, time & money.

The system is implemented with Zigbee interface is showing good performance. It is suitable for real-time monitoring of Industrial appliances. Moreover this system has a wide variety of industrial applications such as

supervisory data control, remote monitoring and controlling etc. Our system can be extended for sensing malfunctioning in industrial machines and making corrective measures in it. More and more automation can be handled via remote communication. Also one can implement this system with the help of GPRS modem that additionally supports the GPRS technology for data transmission. It is packet switch technology that is extension of GSM. GPRS has a higher data transmission speed. Also, one can add Ethernet for the communication to get high performance.

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