Multiparameter Web Sensor

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Abstract—Design a multi-parameter data acquisition system for an Air Quality Monitoring and publish the data over internet through embedded web server The most common causes of CO exposure are fires, faulty combustion heating systems, exhaust from internal combustion engines and heating gases other than natural gas. Leading cause of accidental poisoning deaths is due to carbon monoxide. CO impairs oxygen delivery and has its most lethal effects on organs requiring high levels of oxygen like the brain and heart. Air quality monitoring system presents a network for indoor and outdoor air quality monitoring. Each node is installed in a different room and includes tin dioxide sensor arrays connected to an acquisition system. The nodes are hardwired or wirelessly connected to a central monitoring unit. To increase the gas concentration measurement accuracy, two gas sensor influence quantities like temperature and humidity are also measured. Therefore, the proposed work is multi parameter data acquisition system for air quality monitoring and to publish the data over internet through embedded web server. The data of the different sensors are transmitted using the wireless transmission technique and it is published over the internet.

Key words: Multi-Parameter, Zigbee Technology, Web Sensor, ADC

I. INTRODUCTION

A Web server can be embedded in a device to provide remote access to the device from a Web browser if the resource requirements of the Web server are reduced. The end result of this reduction is typically a portable set of code that can run on embedded systems with limited computing resources. The embedded system can be utilized to serve the embedded Web documents, including static and dynamic information about embedded systems, to Web browsers The development of EWS must take into account the relative scarcity of computing resources. EWS must meet the device's memory requirements and limited processing power. General-purpose Web servers have evolved toward a multi-threaded architecture that either dedicates a separate thread to each incoming connection, or uses a thread pool to handle a set of connections with a smaller number of threads. Single process or thread to every incoming connection is usually impractical due to the memory overhead required and, in some cases, to the lack of system support for multiple processes.

Generally network devices require high reliability. As one embedded component of network device, EWS also must be highly reliable. Because it is a subordinate process, at least it must protect propagation of internal failure to the whole system. EWS needs to run on a much broader range of embedded system in RTOS environments that vary widely in terms of the facilities they provide, and with much tighter resource constraints than mainstream computing hardware. So it requires high portability.

More difficult than memory limitation is managing the impact of Web request servicing on the system CPU: Can request processing be done in a way that allows the rest of the system to meet its real-time constraints? An EWS process as a subordinate process to the main purpose of the device must use as little CPU as possible, in order not to interfere the main task of system. To minimize system resource usage, EWS can place restrictions on some parameters. For example, it is not necessary to support a very large number of connected users; usually one to a half dozen users will be accessing the system at a time.

II. RELATED WORK

Generally network devices require high reliability. As one embedded component of network device, EWS also must be highly reliable. Because it is a subordinate process, at least it must protect propagation of internal failure to the whole system. EWS needs to run on a much broader range of embedded system in RTOS environments that vary widely in terms of the facilities they provide, and with much tighter resource constraints than mainstream computing hardware. So it requires high portability Generally network devices require high reliability. As one embedded component of network device, EWS also must be highly reliable. Because it is a subordinate process, at least it must protect propagation of internal failure to the whole system. EWS needs to run on a much broader range of embedded system in RTOS environments that vary widely in terms of the facilities they provide, and with much tighter resource constraints than mainstream computing hardware. So it requires high portability

III. DESIGN PROCEDURE

Design a multi-parameter data acquisition system for an Air Quality Monitoring and publish the data over internet through embedded web server The most common causes of CO exposure are fires, faulty combustion heating systems, exhaust from internal combustion engines and heating gases other than natural gas. Leading cause of accidental poisoning deaths is due to carbon monoxide. CO impairs oxygen delivery and has its most lethal effects on organs requiring high levels of oxygen like the brain and heart. The sensor module gives the analog output in terms of voltage. These analog values are then converted into digital value using the A/D convertor. The microcontroller used in the system is PIC18F452, which consists of in built A/D convertor. The data is further sent for the wireless data transmission using the serial communication (RS232). Zigbee module is connected serially with the PIC18F452 and transmits the data of the sensor module. MPLAB IDE is

used for developing the application and Hi-tech compiler is used for compiling the application code. The code is developed using Embedded C language. PIC18F452 contains 10-bit A/D convertor which converts the analog input signal into corresponding digital values. The output is stored in the SFR.

IV. ACTUAL WORKING

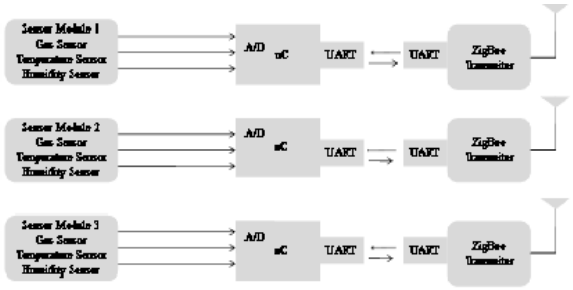

Fig. 1: Sensor Module with wireless data transmission

Air quality monitoring system consists of two block diagram. The data from different sensors' are transmitted using the wireless communication is shown in the figure 1. The data is received by the receiver and further stores in the external memory. The stored data is being transmitted through internet for the remote monitoring. This functionality is shown in figure 1.

There are multiple sensor modules located at different places such as in the building each floor consists of a sensor module as shown from the figure .1. Each sensor module contains a gas sensor, temperature sensor and humidity sensor. This sensor module is interfaces with the microcontroller. Output from each sensor is fed to the microcontroller. The microcontroller digitizes the analog sensor output. The microcontroller is interfaces with the ZigBee module for the wireless transmission of the sensor output. The ZigBee module is serially interfaced with the microcontroller. The ZigBee module then transmits the data came from the controller to the central unit which is the embedded web server.

At the receiving side, the ZigBee receiver receives the data transmitted at the specific interval as shown in the figure 2. This interval can be configured according to the demand of the client. The received data is stored in the memory which is interfaced with the microcontroller. The central functional unit to get access on the embedded system via web browser is the web server. Such web servers bring the desired HTML pages and pictures over the worldwide Internet or a local network to the web browser. A TCP/IP protocol stack, that means it is based on sophisticated and established standards, manages the entire communication. Web server (HTTP server) and browser (HTTP client) build TCP/IP applications.

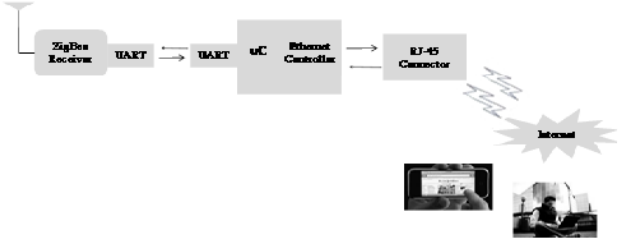

Fig. 2: Data receiver with embedded web server

V. CONCLUSION

The proposed work is the implementation of a measuring system for air quality monitoring. Two architectures are proposed for wireless communication between the sensing nodes and a processing unit that manages the whole system. Because of the communication range of the hardware used, the systems are particularly suited for indoor applications. The outdoor range limitation can be overcome using high-gain omni-directional antennas that provide extended coverage. Considering the increasing number of the low-cost wireless transmitter and the capabilities of the distributed air quality developed system (based on air-quality embedded Web sensors), different locations can be monitored and the air quality values web published.

The main novelties of this proposed work are given as follows.

1) The development of an air quality monitoring system that uses smart sensors in a wireless network;

2) The development of software for sensing node TCP/IP remote control and Web publishing software associated with air quality monitoring system.

The embedded web server that has been designed can be used in educational institutions, industries, offices and many other places. For web-based network element management provide an administrator with a simple but enhanced and more powerful user interface without additional hardware. Software contention and architectures can significantly affect web server performance. Poorly designed and configured software architectures might even generate high response times while the physical resources display low utilization. A remote user only requires a common Internet browser to carry out experiments on real hardware. The embedded web server replaces the PC, which is required for remote labs with special hard- and software.

ACKNOWLEDGMENTS

Tushar Dave, Abhay Upadhyay and Mohit Vekariya are thankful to ISTP Journal for the support to develop this document.

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