Harmful gases Wireless Network Monitoring System Design

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Abstract—Single network for traditional wired and monitoring systems in the wiring, coverage, scalability, compatibility and other aspects of the problem, this paper proposes to Zigbee technology-based, GSM technology, supplemented by the master-slave wireless network, this system architecture designed remote detection terminal, control master station, mobile monitoring terminal communication protocol. Remote monitoring terminal is used to detect the site environment and gas concentration. Remote sense terminals to detect scene conditions and gas concentration state. Control station is used to handle the main station to join the network of remote detection terminal data, timely alarm information sent to your phone via GSM module monitoring terminal. In addition, through the serial port to transfer data to a computer monitor server, to achieve the status of each remote terminal data analysis and management. Experimental results show that this paper designed system is capable of long-term stable and reliable operation with low power consumption, always online, covering a wide area advantages.

Keywords—ZigBee network; LabVIEW; data collection; database; monitoring platform; GSM;

I. INTRODUCTION

In the chemical, petroleum, coal and other production processes, Harmful leaking gas often occur, efficiently and reliably kinds of data collection, transmission and monitoring system has become the focus of scholars from various countries. L. Chen proposed ZigBee-based wireless sensor network, Implementation of gas concentration detection and alarm, but not for data analysis and storage [1]. Chang jiang Li analyzed based on ZigBee technology, the advantages of wireless sensor networks to clarify the network functions and ZigBee network networking architecture, but did not propose and implement network communication protocols [2]. Hsin-Mu Tsai application ZigBee wireless sensor network node technology UV flame of fire safety inspection, but only to achieve a single node applications, without a network, you can not achieve real-time monitoring [3]. Young Wung Kim used labview to monitor indoor air pollutants and indoor environmental parameters of the gas concentration, the realization of

real-time data analysis, but did not consider the alarm information processing problems [4].

This paper designs GSM network technologies based on ZigBee gas monitoring system that combines low-rate ZigBee technology, low cost, low power consumption and GSM network coverage, cheap price advantage, the ability to put the terminal data uploaded to the monitoring server, and timely transmission of the alarm information to the relevant person in charge of promotion of high practical value.

II. WIRELESS REMOTE MONITORING SYSTEM DESIGN

Entire monitoring system to monitor the main station at the core, monitoring the main station there are three major tasks, namely by receiving remote terminal data; second is to send data to a central monitoring server; Third, when determining an emergency alarm information, via GSM module to send text messages to mobile phone users to bind to enable monitoring and timely decision-making and are able to deal with. Overall system shown in Figure 1.
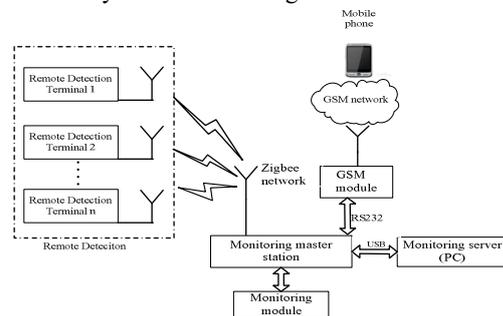

Figure 1.   System structure

III. SYSTEM SOFTWARE DESIGN

A. ZigBee monitoring master station software design

ZigBee monitoring master station's main functions are: formation of networks, the network address assigned to the nodes in the network [6]; receiving remote terminal data analysis and processing, real-time updates and display terminal data or status information when there is live data exceeds the alarm value when, through the GSM network to the mobile terminal; through

the serial port to send data first bit machine monitoring software, as well as polling key tasks, the PC user commands. Program main flow chart shown in Figure 2.
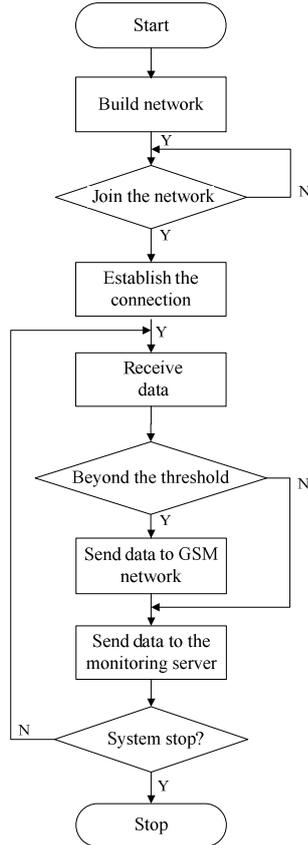

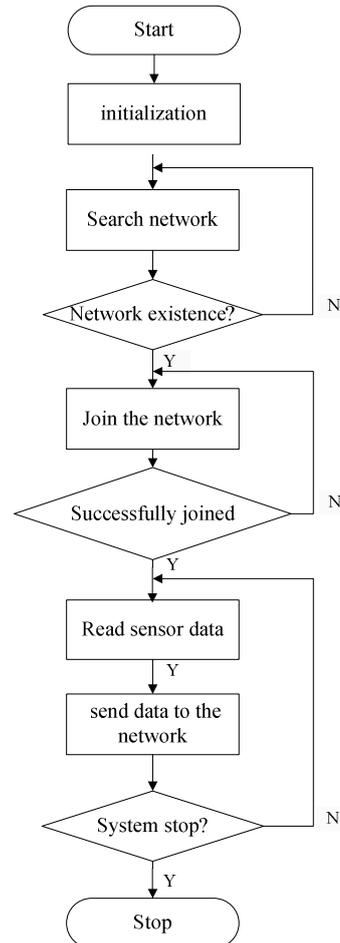Figure 2.   ZigBee master program flow monitoring

Figure 3.   ZigBee remote terminal program flowchart

B. GSM Network Software Design

Wireless transmission network software design TC35i module MCU controls the wireless transceiver for short messages , including TC35i module initialization, receiving a control command, the program sends the message of three parts. Establish a communication module, generally with ATE instructions to complete this confirmation; then use the command AT + CMGF selected short message data format; After receiving the correct answers GSM module AT command to complete readout function. The design uses AT + CNMI = 2,1 SMS arrives automatically prompts, Extracting short message by a program stored in the position information in the SIM.

IV.   SYSTEM TESTING

There is a monitoring system is mainly the main station, two remote terminal, a mobile phone and a stage mechanism into. One of the remote terminal and monitor the main station shown in Figure 4.1-4.2. Butane gas system as the detection target.
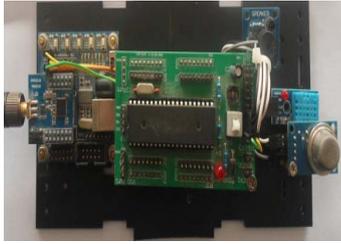
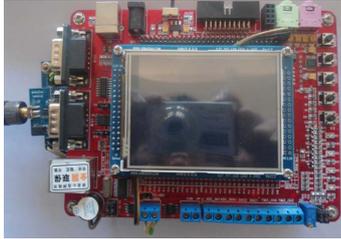Figure4.1.   Remote Terminal 1

Figure 4.2.   Monitoring Master

Before testing the GSM module into a mobile SIM card and monitor through the serial port is connected to the main station. System testing real-time display sub-station gathering and temperature and humidity of the gas concentration curve shown in Figure 5.1-5.2.
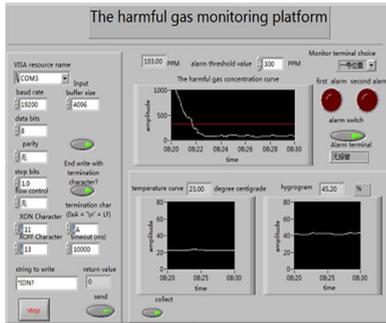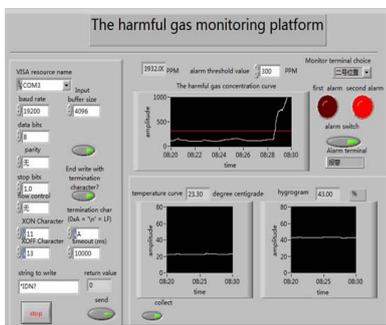

Figure 5.1.   the 1st normal data curve

Figure 5.2.   the 2nd alarm data curve

V. CONCLUSION

The results show that under the experimental conditions, ZigBee wireless sensor network can quickly network, receiving child node network, data transceiver, Interact with the user through the GSM network, and through the PC real-time display of temperature, humidity and gas concentration curves and alarm information.

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