



HARMFUL GASES WIRELESS NETWORK MONITORING SYSTEM DESIGN USING ZIGBEE, GSM TECHNOLOGIES

V. SRI VALLAVHA¹ Mr. K.MANJUNATH²

¹ V. Sri Vallavha, Department of ECE, Sree Rama Engineering College, Tirupati, JNTU Annapur university

² Mr. K.Manjunath, Asst.Professor, Department of ECE, Sree Rama Engineering College Tirupati, JNTU Annapur university

ABSTRACT: An odor is composed of molecules, each of which has a specific size and shape. Each of these molecules has a correspondingly sized and shaped receptor in the human nose. When a specific receptor receives a molecule, it sends a signal to the brain and the brain identifies the smell associated with that particular molecule. Electronic noses based on the biological model work in a similar manner, albeit substituting sensors for the receptors, and transmitting the signal to a control circuit, rather than to the brain. Electronic noses are one example of a growing research area called biometrics, or which involves human-made applications patterned on natural phenomena. Electronic noses were originally used for quality control applications in the food, beverage and cosmetics industries. Current applications include detection of odors specific to diseases for medical diagnosis, and detection of pollutants and gas leaks for environmental protection. This project uses two sensors like carbon monoxide sensor and LPG gas sensors. These sensors are mounted on a PCB and visual indicator with audible buzzer is provided for alert signal. When the sensor is activated it sends the signal to receiver section using ZIGBEE and sends the SMS using GSM modem. This project is much useful for mines detection and surveillance applications.

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. 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. Hsin-Mu Tsai application ZIGBEE wireless sensor network node technology UV flame of fire safety inspection, but only to achieve single node applications, without a network, you can not achieve real-time monitoring. Young Wung Kim used lab view 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. 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. The hardware system

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

III. Design of Proposed Hardware System

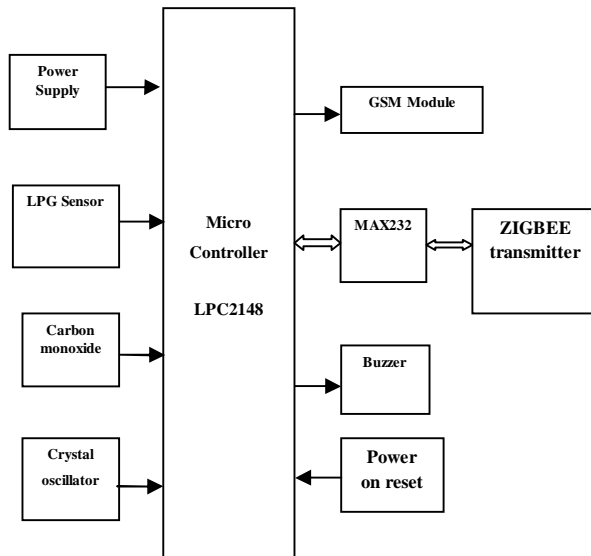


Fig 1 Transmitter Section

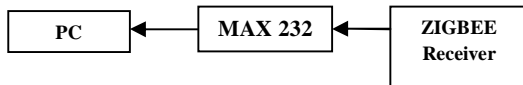


Fig 2 Receiver Section

IV. Board Hardware Resources Features

Power supply:

The power supply are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can be broken down into a series of blocks, each of which performs a particular function. A D.C power supply which maintains the output voltage constant irrespective of A.C mains fluctuations or load variations is known as “Regulated D.C Power Supply”

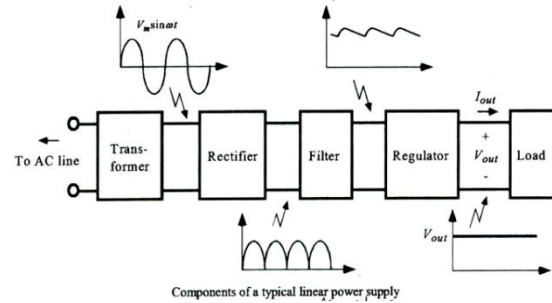


Fig 3. Power supply

LPG Sensor:

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals. Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in firefighting.

Gas leak detection is the process of identifying potentially hazardous gas leaks by sensors. These sensors usually employ an audible alarm to alert people when a dangerous gas has been detected. Common sensors include infrared point sensors, ultrasonic sensors, electrochemical gas sensors, and semiconductor sensors. More recently, infrared imaging sensors have come into use. All of these sensors are used for a wide range of applications and can be found in industrial plants, refineries, waste-water treatment facilities, vehicles, and homes.



Fig 4 LPG sensor

Buzzer:

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave ovens, & game shows. The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. The "Piezoelectric sound components" introduced herein operate on an innovative principle utilizing natural oscillation of piezoelectric ceramics. These buzzers are offered in lightweight compact sizes from the smallest diameter of 12mm to large Piezo electric sounders.



Fig 5 Types Of Buzzers

MAX 232:

MAX232 converts from RS232 voltage levels to TTL voltage levels, and vice versa. One advantage of the MAX232 chip is that it uses a +5V power source which, is the same as the source voltage for the 8051. In the other words, with a single +5V power supply we can power both the 8051 and MAX232, with no need for the power supplies. The MAX232 has two sets of line drivers

for transferring and receiving data. The line drivers used for TXD are called T1 and T2, while the line drivers for RXD are designated as R1 and R2. In many applications only one of each is used.

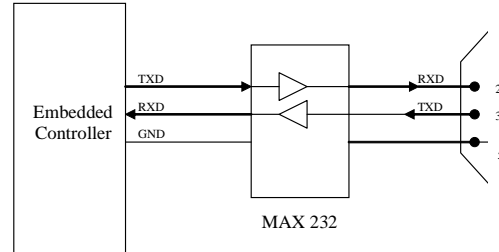


Fig 6. Max 232

GSM :

An embedded system is a special-purpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few pre-defined tasks, usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Embedded systems are often mass-produced, benefiting from economies of scale. Global System for Mobile Communication (GSM) is a set of ETSI standards specifying the infrastructure for a digital cellular service. The standard is used in approx. 85 countries in the world including such locations as Europe, Japan and Australia.

ZIGBEE Technology:

ZIGBEE is a new wireless technology guided by the IEEE 802.15.4 Personal Area Networks standard. It is primarily designed for the wide ranging automation applications and to replace the existing non-standard technologies. It currently operates in the 868MHz band at a data rate of 20Kbps in Europe, 914MHz band at 40Kbps in the USA, and the 2.4GHz ISM bands Worldwide at a maximum data-rate of 250Kbps. Its features are Standards-based wireless technology, Interoperability and worldwide usability, Low data-rates, Ultra low power consumption, Very small protocol stack, Support for small to excessively large networks, Simple design, Security ,Reliability. ZIGBEE is the

only wireless standards-based technology that addresses the unique needs of remote monitoring and control, sensory network applications. Sensors and controls don't need high bandwidth but they do need low latency and very low energy consumption for long battery lives and for large device arrays.

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[5] Young Wung Kim 肇 Sang Jin Lee肇 Guk Hee Kim Gi Joon Jeon. Wireless electronic nose network for real-time gasmonitoring system, *Robotic and Sensors Environments*, , pp 169 - 172 , IEEE.2009

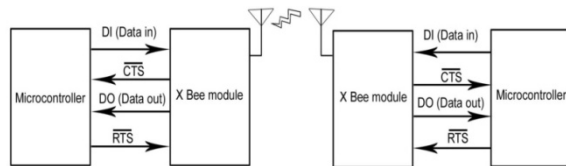


Fig 7. Zigbee Module

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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.

VI. REFERENCES

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