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Research Article

HUMAN SECURITY FRAMEWORK IN SEEPAGE, UNUSED WELL, AND TRASH CAUTIONING FRAMEWORK FOR THE SAVVY CITY

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ABSTRACT
In today's society, safety is critical, and strong safety procedures must be adopted in places of education and business. This study improves an existing industrial safety paradigm, and the system can be utilized in homes, villages, towns, and offices. Toxic gases are being produced by the majority of the drainage and underused wells. The major goal of this project is to create poisonous gas detection and alerting systems as well as gas purification systems using microcontrollers. Hazardous gases such as H2S, CO, and methane will be detected and presented on the LCD display every second.If the levels of these gases climb above the normal range, an alarm is triggered, and an alert message (SMS) is sent to the designated person.

Keywords*: Air pollution Monitoring, Gas Sensors, GSM Module, Wireless Networks, Gas Purification*

INTRODUCTION

With the advancement of technology and the human race, we have neglected to take care of the environment in which we live. As a result, we degraded the environment, lowering the quality of our living environment. Although there are various types of pollution, including soil, air, and water pollution, air pollution is the most harmful since the other types may be identified visually and by taste, whereas contaminated air is odourless, tasteless, and colourless. As a result, environmental pollution monitoring and control systems are in high demand Given the growing number of pollution sources containing dangerous chemicals, these systems should be able to detect and measure the sources quickly. Toxic gases are one type of gas that has major health consequences yet is widely employed in the industry. These gases must be monitored so that any changes in their usual levels may be detected and appropriate precautions are taken. However, the present solutions are not very portable, and they are expensive and complex to deploy. As a result, an embedded system employing a Microcontroller is created to detect hazardous gas leaks, hence avoiding the risk of human life. Hazardous gases such as hydrogen sulphide, carbon monoxide, and methane were taken into account in this study. If these dangerous conditions persist, gases.The level exceeds the normal level that is H2S>1000ppm or Methane>10000ppm then an alarm is generated immediately, and an SMS is sent to the authorized useras an alert message, which leads to faster diffusion of emergencies. The system is affordable and can be easily implemented in the drainage and in the unused well area whichis surrounded by the chemical industries or plants, to avoid endangering human lives. The system also supports providing real-time monitoring of the concentration of the gases present in the air. As this method is automatic the information can be given in time such that the endangering of human lives can be avoided.

EMBEDDED AND REAL TIME SYSTEM

The phrase "embedded system" is vague. A real-time system is one in which the accuracy of the calculations is determined not only by the precision of the result but also by the time it takes to obtain the result. This suggests that a late response is incorrect. In a hard real-time system, failure to respond to an event within the deadline results in the system failing and endangering human lives, whereas, ina soft real-time system, failure to meet the deadline results in erroneous output and does not jeopardizehuman

lives. Embedded systems are either Real-time systems or are not real-time systems, and vice versa. And the embedded system that we built is a soft real-time system.

FEATURES OF EMBEDDED SYSTEM

- Multiple operations can be performed using a singlechip
- Fully automatic.
- Compact and Faster.

COMPONENTS OF EMBEDDED SYSTEM

Hardware specifically built for that application. An embedded operating system. User interfacelike push buttons, LCD, and, numericdisplays the hardware model, which includes enough sensors and an embedded system, is a crucial component of this project. In the broadest sense, embedded systems are computers. Embedded systems are classified as stand-alone, real-time, networked information appliances, and mobile devices based on their functionality and performance needs. Every embedded system is made up of bespoke hardware that is centred around a central processing unit (CPU). The programme is put onto memory chips in this device. Firmware refers to the software that resides on the memory chip.

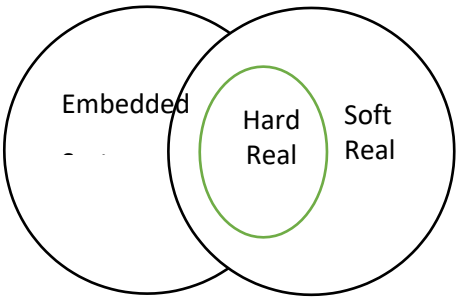

Fig 1: Real- time operating system

A. Block diagram for the proposed system

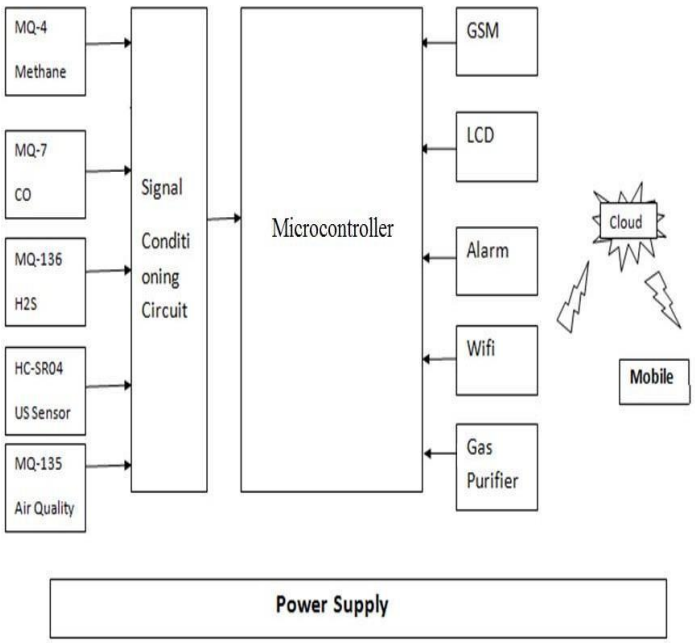

Fig.2. Block Diagram of the Proposed System

HARDWARE SYSTEM DESIGN

The gas levels are sensed through the respective gassensors (here MQ-4, MQ-136 and MQ-7 are used for sensing H2S and CH4 respectively for (demonstration purpose) and sent to the PIC16F887. The sensed analog signals are converted to digital through ADC. The sensed gas levels are displayed in the LCD . If any one gas level exceeds the set point then an alarm is generated immediately. At the same time an alert message is sent as SMS to the authorized user through the GSM modem. The blockdiagram of the proposed system is shown in figure 2.

GAS SENSORS

A gas sensor is typically made composed of a transducer that detects gas molecules. As an output,it delivers electrical impulses that are proportionate to the gas concentration. Because gas sensors cannot detect a specific gas, they must rely on analytical procedures to identify it. However, these analytical approaches have a number of drawbacks, including the need for a professional operator, particularly developed PCs, and long reaction times, among others, which are not present in the suggested system although the suggested system is automated, it must be reset after every severe circumstance.It's the perfect sensor for detecting a harmful hydrogen sulphide leak in our home, at a service station, in a storage tank, or even in a car that runs on H2S gas. This unit can easily be integrated into an alarm circuit or unit to sound an alarm or display the H2S concentration visually.

The sensor has a high sensitivity as well as a fast reaction time. The conductivity of the sensor increases as the gas concentration rises when the target flammable gas is present.

The change in conductivity is converted to the matching output signal of gas concentration usinga simple electronic circuit. The MQ-7 gas sensor exhibited is used to detect toxic gases and has a high sensitivity to CO as well as natural gas response. It is a low-cost, portable gas detector with a long life.The H2S, CO, and Ch4 gas sensors' specifications.

Fig.3. MQ-4, MQ-7 and MQ_136 gas sensor

Table 1. Specification of LPG sensor

S. NO	GAS SENSOR'S	
	Specification	*Comments*
1	Sensor Type	Semiconductor
2	Standard	Bakelite
3	Detection Gas	(H2S, CH4, CO)
4	Concentration	300-1000ppm
5	Sensor's	MQ-4,7,135,136

GSM

The acronym GSM stands for Global System for Mobile Communications. GSM offers suggestions rather than requirements. Figure 6 shows the GSM module specifications, which specify the operations and interface requirements but do not address the hardware. The purpose behind this is to constrain designers as little as possible while yet allowing operators to purchase equipment from a variety of sources. There are three major systems that make up the GSM network.

Fig.4. GSM SIM800 Module

SOFTWARE DESCRIPTION

The RTOS (Real Time Operating) Real-time requires only the basic functionalities of the OS which are needed for the specific application.

CONCLUSION

An embedded system for hazardous gas detection has been constructed; for demonstration purposes, just one gas (CO) has been detected. The gas sensors should be identified, as well as the critical level of the corresponding gas, so that this system can be used to detect various gases drainage, unused wells, residential and industrial regions, and avoid jeopardising human life. This system has a fast response rate, and the critical situation can be diffused faster than with manual approaches.

Fig.5. graphical representation of gas sensor values

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