Security Against Gas Leakage using GSM Modem

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Abstract— **Now a days we all are very busy in our daily life and it is difficult to know the status of LPG gas cylinder. If LPG is going to finish without informing us it can create very difficult condition for cooking etc. Our proposed design can help us to avoid such kind of problem in our daily life. The aim of this project is to monitor for liquid petroleum gas (LPG) leakage to avoid fire accidents providing house safety feature where security has been an important issue. The system detects the leakage of the LPG using gas sensor and alerts the consumer about the gas leakage by sending SMS. The proposed system uses the GSM to alert the person about the gas leakage via SMS. When the system detects the LPG concentration in the air exceeds the certain level then it immediately alert the consumer by sending SMS to specified mobile phone and alert the people at home by activating the alarm which includes the LED, Buzzer simultaneously and display the message on LCD display to take the necessary action .**

Keywords — Microcontroller, GSM, Gas sensor, SMS, gas detection and prevention

I. INTRODUCTION

The LPG or propane which is flammable mixture of hydrocarbon gases used as fuel in many applications like homes, hostels, industries, automobiles, vehicles because of its desirable properties which include high calorific value, which produce the less smoke, produces less soot, and does not cause much harm to the environment. Natural gas is another widely used fuel in homes. Both gases burns to produce clean energy, however there is a serious problem about their leakage in the air. The gases being heavier than air do not disperse easily and may lead to suffocation when inhaled also when gas leakage into the air may lead to explosion. Due to the explosion of LPgas the number of deaths has been increased in recent years. To avoid this problem there is a need for a system to detect and also prevent leakage of LPG. Gas leak detection is the process of identifying potentially hazardous gas leaks by means of various sensors. These sensors usually employ an audible alarm to alert people when a dangerous gas has been detected [1].

The alert mechanism in the proposed system includes an LED indication, buzzer and an SMS sent to the stored numbers with the help of GSM. The Other main objective to prevent damage or explosion of LPG by using MQ 6 sensor. It can detect gas leakage and alert us by buzzer using Beep sound and send an alert SMS using GSM module.

A. Purpose of this project

The purpose of the project is to prevent the accident by gas leakage. There have been many technologies to avoid the accident butThe limitations of other technologies have been reduced to great extent in this project.

Moreover, this project also aims prevention after theaccident has taken place using GSM technologies.

B. Existing System

In general the gas leakage detection system is classified based on operating mode of the sensor, one is based on direct contact, where the monitoring station and sensing unit are wired or could be wireless, enabling their integration with a wireless module[8]. The other type is based on wireless transducers utilizing the change of electrical indicators to indicate the variation of physical parameters, such as gas concentration. While most sensors belong to the first type, we think that the latter type of sensor could be regarded as a new type of reconfigurable antenna. Unlike conventional reconfigurable antennas, the reconfigurable part is controlled by the gas concentration.

The wireless sensor networks are very popular and are studied widely on the hardware and software configurations and modelling of network performance. Considerable research efforts have been focus towards environmental gas monitoring application. Some gas detection systems have also been designed and developed which describes intelligent self diagnosis strategy for semiconductor gas sensor [5]. The development of smart sensor network for hazardous gas monitoring by using three types of gas sensors is also done.

C. Literature survey

Sunithaa.JetaThes design of a wireless LPG leakage monitoring system is proposed for home safety. The system detects the leakage of the LPG and alerts the consumer about the leak and as an emergency measure the system will switch on the exhaust fan and also checks the leakage. An added feature of the system is that the approximate consumption is indicated in terms of the total weight [1]. The proposed system makes use of GSM module in order to alert about the gas leakage via an SMS. Whenever the system detects the increase in theconcentration of the LPG it immediately alerts by activating an alarm and simultaneously sending message to the specified mobile phones.

V.Ramyaet al Safety plays a major role in today's world and it is necessary that good safety systems are to be implemented in places of education and work. This work

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modifies the existing safety model installed in industries and this system also be used in homes and offices. The main objective of the work is design in microcontroller based toxic gas detecting and alerting system. The hazardous gases like LPG and propane were sensed and displayed each and every second in the LCD display. If these gases exceed the normal level then an alarm is generated immediately and also an alert message (SMS) is sent to the authorized person through the GSM. The advantage of this automated detection and alerting system over the manual method is that it offers quick response time and accurate detection of an emergency and in turn leading faster diffusion of the critical situation [2].

II. PROPOSED SYSTEM

Earlier the gases being heavier than air do not disperse easily and may lead to suffocation when inhaled, also the leaked gases when ignited may lead to explosion so the number of deaths due to the explosion of gas cylinders has been increasing in recent years. There is a need for a system to detect and also prevent leakage of gas. Before the development of electronic household gas detectors in the 1980s and 90s, gas presence was detected with a chemically infused paper that changed its color when exposed to the gas. Since then, many technologies and devices have been developed to detect, monitor, and alert the leakage of a wide array of gases. The wireless sensor networks are very popular and are studied widely on the hardware and software configurations and modeling of network performance. A number of research works have been published in last few years in the domain of integrated gas sensors and node [1]. LPG weighing machine is used to overcome this problem. It will monitor and display the quantity of gas level in the cylinder, when gas level reaches below the threshold limit of around 2kg it sends SMS alert to the user.It uses a MQ5 gas sensor which can detect different combustible gases with low cost, and a PIC microcontroller to alert when the levels of gas detected is beyond safety limit and also to take emergency measures to turns off the power supply, when the leakage is detected.The proposed system makes use of GSM module in order to alert about the gas leakage via an SMS.Whenever the system detects the increase in the concentration of the LPG it immediately alerts by activating an alarm and simultaneously sending message to the specified mobile phones.The device ensures safety and prevents suffocation and explosion due to gas leakage.The main objective of the work is design in microcontroller based toxic gas detecting and alerting system. The hazardous gases like LPG and propane were sensed and displayed each and every second in the LCD display [2].

III. METHODOLOGY

The functionality of system is divided into three main steps. In the initial step, the gas leakage is detected by the gas sensor MQ-7. This detects the gas leakage and gives the signal to the microcontroller with the help of ADC. After that in second step the microcontroller

receive the signal, send by gas sensor. It sends activation signal to other external devices attached with it. Such as buzzer, LCD, GSM module and RF link. In the last step, many tasks have been performed such as buzzer activates simultaneously message display on liquid crystal display screen, GSM module activated, which send warning SMS to the user.

➢ *TRANSFORMER*

As name suggests it transforms the voltage level from one level to another. Transformer used is the step down transformer to step 230 v to +5v.It provides isolation too from the mains.
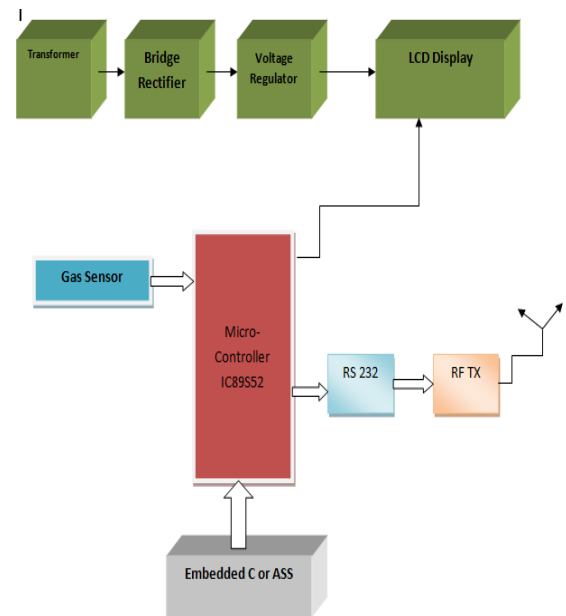
.

Fig 1.1 block diagram of proposed system

➢ *RECTIFIER*

The rectifier is used to convert A.C to D.C voltage. The design that we have carried out is of the full wave rectifier, using1N4001 diodes are use. The bridge rectifier has advantage over the full wave rectifier like

1) The need for the centre-tapped transformer is eliminated.
2) The PIV is one half of the centre–tap circuit

➢ *IC 7805 VOLTAGE RAGULATOR:*

The 78 xx series of three terminal regulators is available with fixed output voltage making them use full in wide range of applications. One of this is local on call regulation, eliminating the distortion problems associated with single point regulation. If internal power dissipation becomes too high for the heat sinking provided, the thermal shut circuit takes place over preventing the IC from over heating.

FEATURES:
1) Output current is excess of 1A
2) Internal thermal overload protection.
3) Internal short-circuit current limit.
4) No external components required.

> *LCD*

The electronics industry has used liquid crystal display (LCD) technology for years, in many products ranging from calculators to laptop screens. Now, LCD monitors or flat-panel displays, are quickly replacing traditional cathode ray tube (CRT) computer monitors. LCDs use less space than traditional monitors, but did you know they also use less energy?

LCD creates images on a flat surface by shining light through a combination of liquid crystals and polarized glass. The technology differs from CRT because a CRT uses a beam of electrons projected through a large glass tube to create images.

Advantages
1) Smaller size
2) Less eyestrain
3) Lower power consumption
4) Less heat generation
5) Better image contrast

> *GSM MODEM*

This GSM modem is a highly flexible plug and play GSM 900 operating frequency modem for direct and easy integration RS232, voltage range for the power supply and audio interface make this device perfect solution for system integrators and single user. Voice, Data/Fax, SMS, GPRS, integrated TCP/IP stack, RTC and other features like the GSM / GPRS..

> *RS-232 WAVEFORMS*

So far we have introduced RS-232 Communications in relation to the PC. RS-232 communication is asynchronous. That is a clock signal is not sent with the data. Each word is synchronized using its start bit, and an internal clock on each side, keeps tabs on the timing.

The diagram shows the expected waveform from the UART when using the common 8N1 format. 8N1 signifies 8 Data bits, No Parity and 1 Stop Bit. The RS-232 line, when idle is in the Mark State (Logic 1). A transmission starts with a start bit which is (Logic 0). Then each bit is sent down the line, one at a time.
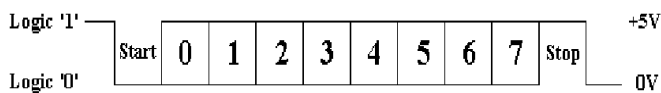

Fig 1.2 TTL/CMOS Serial Logic Waveform

The LSB (Least Significant Bit) is sent first. A Stop Bit (Logic 1) is then appended to the signal to make up the transmission.

The diagram shows the next bit after the Stop Bit to be Logic 0. This must mean another word is following, and this is it's Start Bit. If there is no more data coming then the receive line will stay in its idle state (logic 1). We have encountered something called a "Break" Signal.

This is when the data line is held in a Logic 0 state for a time long enough to send an entire word. Therefore, if you don't put the line back into an idle state, then the receiving end will interpret this as a break signal. The data sent using this method, is said to be *framed*. That is the data is between a Start and Stop Bit. Should the Stop Bit be received as Logic 0, then a framing error will occur. This is common, when both sides are communicating at different speeds.

> *EMBEDDED C*

It is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as, fixed-point arithmetic, named address spaces, and basic I/O hardware addressing. Embedded C uses most of the syntax and semantics of standard C, e.g., main () function, variable definition, data type declaration, conditional statements (if, switch, case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, etc.

> *MICROCONTROLLER*

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory, The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. The Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry.

IV. CONCLUSION

Experiment will be conducted number of times to study the behavior of sensors' response and tested the smartness of the wireless transmission system. The experiment will be carried out in two phases. We will record the statistical data periodically and analyzed. Initially in the absence of combustible gases the MQ7 sensors will give a sluggish response.In the second phase the concentration of gas will get increased. During this phase, the response of the sensor and the alarming unit will be instantaneous. In continuation with this, the wireless actuator send a alarm will alert to the consumer.In the current semester we have designed the front end. Front end includes both hardware and software part of the project. We design power supply and microcontroller using eagle software. We have all hardware components with us.

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