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GASBO for LPG Gas Detection and Controlling Using Mobile App

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ABSTRACT

An acute gas sensor is utilized to detect the presence of a combustible LPG leak in your car or in a service station, storage tank environment. This unit can be easily incorporated into an alarm unit, to sound an alarm or give a visible indication of the LPG assiduity. The sensor has excellent sensitivity combined with a quick response time. The sensor can also sense isobutane, propane, LNG and cigarette smoke. If the LPG sensor senses any gas dropout from storage the output of this sensor goes down. This down signal is monitored by the microcontroller and it will identify the gas leakage. Now the microcontroller is turned on LED and Buzzer. After few milliseconds delay. Gas leakage is a major problem with an industrial sector, residential premises etc. O-associated with the gas leakage is to install a gas leakage detection kit at vulnerable places. The aim of this project is to present such a design that can automatically ascertain, alert and control leakage of gas. In this project, after the drop-off of gas is ascertained, the valve is automatically closed, thereby stopping the leakage. In particular, gas sensor has been used which has high sensible to gasses like propane and butane. Gas leakage system comprises of GSM module, which alerts the user by sending SMS.

Keywords: *LPG (Liquefied Petroleum Gas), GSM (Global System for Mobile Communication), LED (Light Emitting Diode), LCD (Liquid Crystal Display), Gas Sensor MQ5, Stepper Motor Driver IC (ULN2003A), Knob Control.*

1. INTRODUCTION

LPG comprise of blending of gasses like propane and butane. These gasses can catch flame easily. LPG is used as propellant, fuel and as a refrigerant. When a leak occurs, the leaked gasses may lead to an eruption. The number of deaths occurring due to an eruption of gas cylinders has increased. So the leakage should be leash to protect people from the hazard. Bhopal gas tragedy is an example for mischance due to gas leakage. Gas leakage detection is not only eventful but controlling the leakage is also eventful. Liquid petroleum gas is generally utilized in houses and industries. In homes, LPG is used mainly for cooking motive. This energy source is primarily reconciled of propane and butane which are highly flammable chemical compounds. LPG dropout can happen, though rarely, inside a home, commercial premises or in gas powered vehicles. Leakage of this gas can be unhealthy as it enhances the risk of detonation. An odorant such as ethanethiol is added to LPG so that dropout can be detected easily by most people. However, some people who have a reduced sense of odor may not be able to rely on this inherent safety mechanism. In such cases, a gas dropout detector becomes vital and helps to protect people from the flammable gas leakage. In this project, advanced gas leakage detection technology is used. MQ-5 Semiconductor Sensor for Combustible Gas Sensible material of MQ-5 gas sensor is SnO₂, which with lower conductivity in clean air. When the target combustible gas exists, the conductivity of sensor is higher along with the gas assiduity rising. We use simple electro-circuit, convert the change of conductivity to correspond output signal of gas assiduity. The MQ-5 gas sensor has the high sensibility to Methane, Propane, and Butane and could be used to detect both Methane and Propane. The sensor could be used to detect distinct flammable gas especially Methane, it is with low cost and suitable for the distinct application.

2. LITERATURE SURVEY

[1]"International Journal of Innovative Research in Computer and Communication Engineering (An ISO 3297: 2007 Certified Organization) Vol. 4, Issue 10, October 2016"Various research groups are working all over the world for the development of Microcontroller based LPG Gas Leakage Detectors using GSM Module. LPG, first generated in 1910 by Dr. Walter Snelling is a concoction of Commercial Propane and Commercial Butane having saturated as well as unsaturated hydrocarbons. Before the progression of electronic household gas detectors in the 1980s and 90s, gas presence was detected with a chemically inculcated paper that amended its color when exposed to the gas.

[2]"IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2278-2834,p- ISSN: 2278-8735.Volume 9, Issue 1, Ver. VI (Feb. 2014), PP 53-58.

Gas leakage leads to individualized mischances resulting into both financial losses as well as human injuries. In human's daily life, environment gives the most emphasis consequences to their health issues. The risk of firing, eruption, suffocation all is based on their physical properties such combustibility, toxicity etc. The number of deaths due to the explosion of gas cylinders has been increasing in recent years.

[3]"International Journal of Electrical and Electronics Research ISSN 2348-6988 (online) Vol. 3, Issue 2, pp: (264-269), Month: April - June 2015.

In the past, it has been a conventional practice to employ oxidation apparatus such as a furnace, heater, stove or LPG kit in cars, which utilizes a flammable vapor or gas to produce heat energy when properly ignited. In the use of oxidation apparatus in which a hazardous gas such as natural or liquid propane gas is burned in heating boilers, domestic water heaters, furnaces, stoves and the like, the apparatus or appliance is generally of an automatic recycling type.

3. EXISTING SYSTEM

In the existing system, different gas sensing technologies are used to sense the leakage of LPG gas. LPG gas leakage is detected using semiconductor gas sensor. Nowadays gas accident occurs very commonly. The reason behind such type of accident is we forget to close the regulator valve. There is some remedial measure like after LPG gas detection messages are sent to owner and security and second is exhaust fan is switched on. But it has some disadvantages firstly there is no control action taken which puts the human into risk and secondly if the wiring of an exhaust fan is not proper it may cause an explosion.

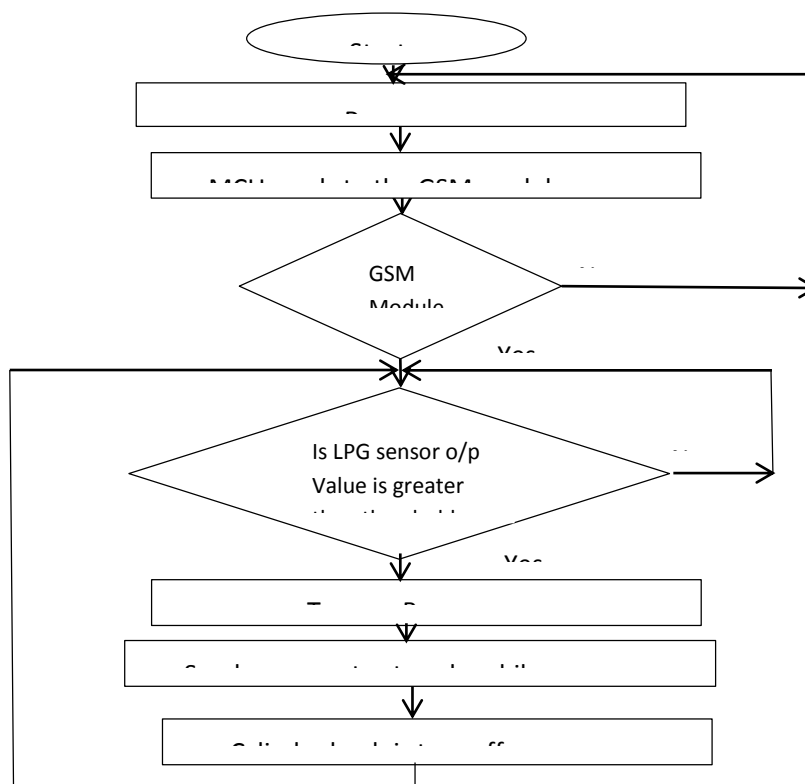
4. PROPOSED SYSTEM

Module1: Proposed system takes automatic action on detection of LPG gas automatic control action after the detection of (0.001%) of LPG leakage.

Module2: Send Alert message to owner and security using android app.

Module3: Buzzer blows on Gas detection.

Module4: Automatic action provides the mechanical handler for closing the valve.



The sensing material in TGS gas sensors is a metal oxide, most typically SnO₂. When a metal oxide crystal such as SnO₂ is heated at a somewhat high temperature in air, oxygen is adsorbed on the crystal superficies with a negative charge. Then donor electrons in the crystal superficies are transferred to the adsorbed oxygen, resulting in leaving positive charges in a space charge layer. Thus, superficies potential is formed to serve as a likely barrier against electron flow. Inside the sensor, electric current flows through the conjunction parts (grain boundary) of SnO₂ micro crystals. At grain boundaries, adsorbed oxygen forms a likely barrier which prevents carriers from moving freely. The electrical resistance of the sensor is attributed to this likely barrier. In the presence of a deoxidizing gas, the superficies density of the negatively charged oxygen decreases, so the barrier height in the grain boundary is reduced. The reduced barrier height decreases sensor resistance.

5. RESOURCES USED

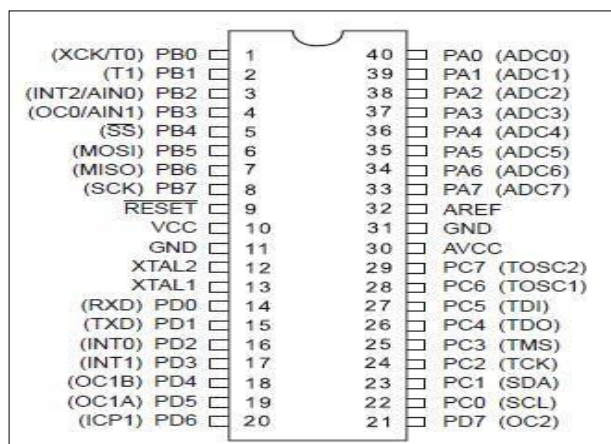
A.GAS SENSOR

Generally, the semiconductor is used to detect gas leakage. The MQ-5 gas sensor is used to detect gas leakage in this project. The sensible material of MQ-5 gas sensor is SnO₂, which with lower conductivity in clean air. When the target excitable gas exist. The sensor conductivity increases along with the rising gas. Assiduity the MQ-5 gas sensor has high sensitivity to Propane, Butane, and LPG, also the response to Natural gas. The sensor could be used to detect different excitable gas, especially Methane; it is with low cost and suitable for different application. The MQ-5 can detect gas assiduity anywhere from 200 to 10000 ppm. The sensor's output is an analog resistance.

B. MICROCONTROLLER

The AT89S52 is a Low-power, high-performance CMOS 8-bit microcontroller with 8KB of ISP flash memory. The device uses Atmel high-density, nonvolatile memory technology and is compatible with the pursuit-standard 80C51 instruction set and pinout. On-chip flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. This powerful microcontroller is suitable for many embedded control applications. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the pursuit-standard MCS-51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcomputer which feeds a highly-variable and cost-effective solution to many embedded leash applications.

PIN DIAGRAM



Features

1. Flash (k bytes)-8kbytes
2. Pin count-44
3. Max operating frequency (MHz)-24MHz
4. Min I/O pin-32
5. CPU-8051-12C
6. URAT-1
7. Operating Voltage (VCC)-4.0-5.5
8. SRAM (bytes)-0.25

C.GSM MODULE

For sending a message, we are using a GSM Module named SIMCOM_300. GSM Module SIM300 with SIM card holder, RS232 interface, power supply, buzzer, and audio interface. You can connect this to PC utilizing a USB to Serial Adaptor and use terminal programs such as Real term to send & receive data. We can also interface GSM Module with microcontroller directly through wires. GSM Module concerns with AT COMMANDS. AT commands are used to control MODEMS. AT is the abbreviation for Attention. AT commands with a GSM/GPRS MODEM or mobile phone can be used to access following information and services:

1. Information and configuration related to mobile device or MODEM and SIM card.
2. SMS services.
3. MMS services.
4. Call services.
5. Data and Voice link over the mobile network.

D. BUZZER

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows.

6. BLOCK DIAGRAM OF HARDWARE

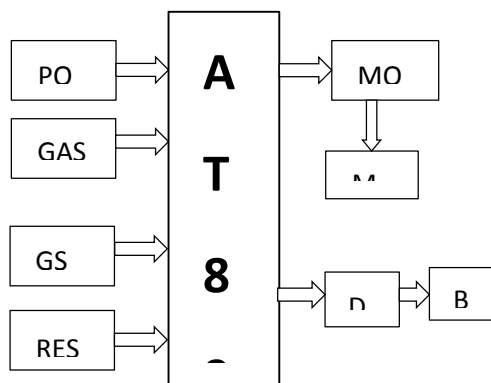
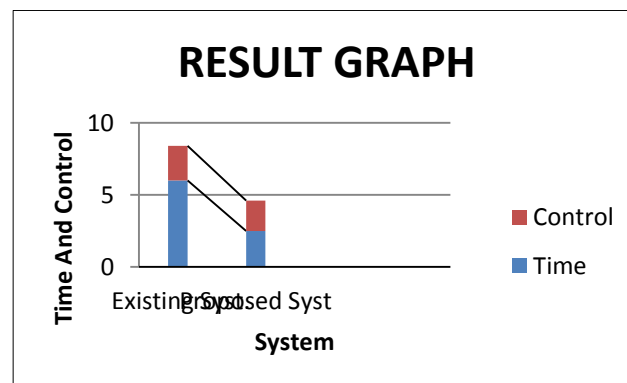
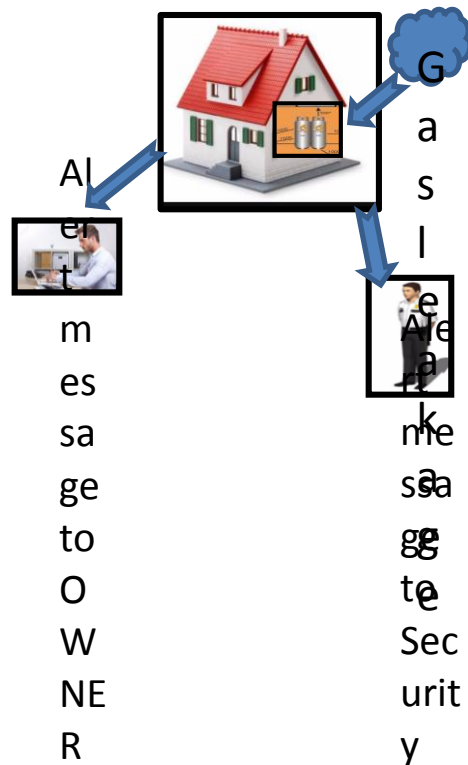


Figure. Block Diagram

SYSTEM OVERVIEW



7. ADVANTAGES

1. It is utilized in the house as LPG leakage detection.
2. It also detects alcohol so it is used as liquor tester
3. The sensor has excellent sensibility combined with quick fast response time.
4. The system is highly credible, tamper-proof and secure.
5. In the long run, the maintenance cost is very less when compared to present system.
6. It is possible to get an instantaneous result and high accuracy.

8. LIMITATION AND ASSUMPTION

1. It works only when at 5V power supply is given.
2. Its sensitivity depends on Humidity and Temperature.
3. Assuming a faithful person so that he could go and switch off the regulator or take necessary action on the particular situation.
4. The motor will continually rotate around the cylinder to detect the gas leakage.
5. An alert message will be sent to the people those who have registered in the gas App. So if they are nearby could take necessary action to prevent an eruption.

9. CONCLUSION

This project is embedded based project. A Gas sensor is used to detect gas leaks in the kitchen or near the gas heater.

Ideal to detect gas leaks in the kitchen. The sensor can also sense LPG and Coal Gas as well as an Ideal sensor for use to detect the presence of an LPG leak in your car or in a service station, storage tank environment. This unit can be easily assembled into an alarm unit, to sound an alarm or give a visual indication of the LPG. Assiduity The sensor has excellent sensibility combined with a quick response time.

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