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LPG Gas Weight and Leakage Detection System Using GSM

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Abstract: In this paper, we proposed an LPG Gas Weight and Leakage Detection System Using GSM. This is useful in various applications in homes and hotels. Many times it happens that because of the rush or due to the shortage of cylinder, there is a delay in providing the gas cylinder. Main reason behind this is delay in informing to the gas provider or we inform the gas provider at the last moment when the gas cylinder is empty. So the use of first low priority SMS is the user gets intimation about the weight of the gas. So the user can book a new gas cylinder. It avoids the problematic situation caused due to unavailability of gas cylinder. Sometimes the leakage of the LPG gas is not detected by person due to low séance of smell so in this project we use the gas sensor for leakage detection. In this project whenever there is LPG gas leakage is occurred then buzzer is ON. This project avoids the accident which is caused due to leakage of LPG gas

Keywords: Micro-controller 89c51, Gas sensor MQ-6, GSM SIM300, Weight Sensor.

I. INTRODUCTION

LPG gas weight and leakage detection system using GSM has applicable in home, restaurants, hotels as well as industries. This project is used to continuously monitor the weight of the LPG gas cylinder. Many times we observe that in our home whenever LPG gas cylinder is empty, then we give request for new cylinder at the office of LPG gas provider. Many times it happens that because of shortage of LPG gas cylinder, there is delay in providing gas cylinder. Main reason behind this is delay in booking /informing to the gas provider or we inform the gas provider office at a last moment whenever our gas cylinder is empty. The use of the LPG gas is in the home or restaurants for the cooking purpose and it also useful in industries for the cutting or welding purpose. In these places if the LPG gas in the gas cutters are empty at that time request for new gas cylinder are sent to the storage department and if there is shortage of gas cylinder in the storage department then there is delay in providing LPG gas cylinder. To avoid all such situation, we are implementing a project which is "LPG Gas Weight and Leakage Detection System Using GSM". When our gas is 20% remaining then a lower priority MSG is send to the owner of the gas cylinder and when the gas is 5% remaining then the higher priority MSG is send to the owner of the gas cylinder. This Project is also useful for the LPG gas leakage detection. When LPG gas is leaked then the BUZZER will be ON automatically.

II. BLOCK DIAGRAM

The implementation of this system mainly involves the LPG gas weight and leakage detection.

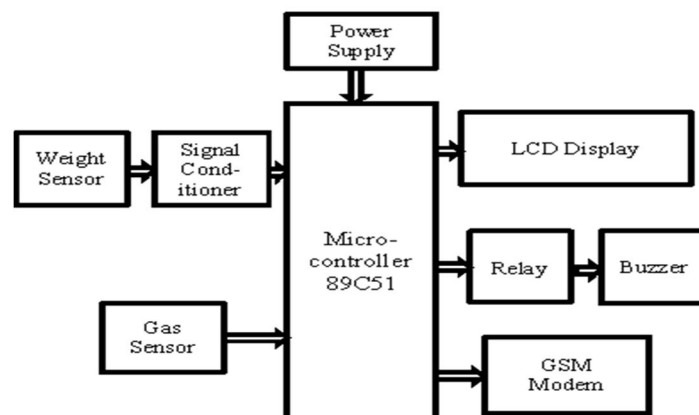


Fig1. Block Diagram of LPG Gas weight and leakage detection system.

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III. BLOCK DIAGRAM DESCRIPTION

A. Microcontroller

We have used 89c51 microcontroller which is a 8051 series microcontroller. The various function of controller are as follows:

It reads the input from gas sensor.

It reads the output from weight sensor digitizer board and calculates the output.

Display the data on the LCD display.

Find out whether the gas has been reached to 20% and 5% and display on LCD display.

Turn ON buzzer whenever the Gas leakage occurred.

For sending SMS through GSM.

1) Features of Microcontroller:

4k Bytes of in-system programmable flash memory.

Fully static Operating 0 Hz to 33MHz.

Three-Level program memory lock.

128x8 bit internal RAM.

32 Programmable I/O lines.

Two 16 bit Timer/Counter.

Fast programming time.

Six interrupt source.

Watchdog Timer.

Full duplex UART serial channel.

Dual data pointer.

B. Power Supply Unit

When working with the electronic system, we always need some amount of power. In every electronic system power supply is needed. The proper working of all the electronic systems or component, it is important to give exact amount of power supply. If the power is exceeded then the device or the system may be damaged. The +5v power supply is implemented on the basis of voltage regulator IC 7805 which is used to produce a steady +5v output. it also produce current limiting circuitry, so the IC won't damage.

C. Weight Sensor

We have use strain gauge as a weight sensor. Here we are use load cell as a weight sensor which is having 40kg capacity. The function of strain gauge is to give output voltage as per force/weight applied to it. The output of the load cell is in the analog form but our controller accepts only digital form. the output of the load cell is in the millivolt then to amplify it the conditional amplifier are used then the output are given to the digitizer board to convert it into digital form then the digital output is given to the microcontroller. The output of the load cell is in the millivolt i.e. 0-10mv. To convert it into volt we are using an amplifire.

Load cell use different operating principle:

Load cell based on Elasticity.

Load cell based on Fluid pressure.

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Diagram of Load cell



D. Gas Sensor

We have used Gas sensor for the leakage detection system. Here we have used MQ-6 gas sensor. It has the sensitivity to séance LPG Gas as well as natural gas.

The MQ-6 sensor having the detecting concentration scope 200-10000ppm.

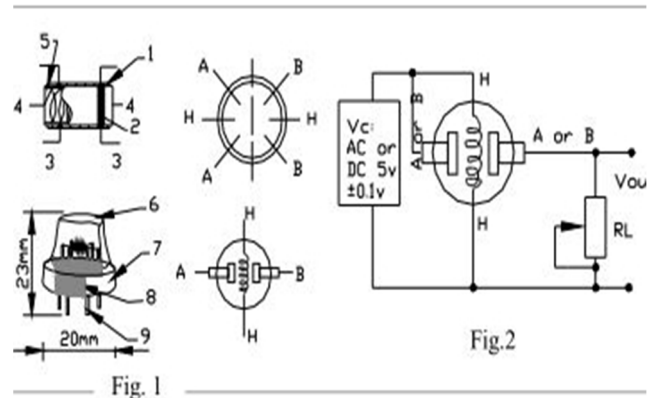
If the gas is detected then sensor gives output +5v.

If the gas is not detected then sensor gives output 0v.

1) *Working Principle of MQ-6 Sensor:* When gas interacts with this sensor then it ionized into its constituents and then absorbed by the sensing element. This absorption creates a potential difference and the current flowing through the connecting leads. This current which flowing through the connecting leads is known as heating current. The value of the sensing resistance changes as the current between the connecting leads changes.

2) Specifications of Gas Sensor:

| Symbol | Parameter | Technical condition |
|--------|---------------------|---------------------|
| V_C | Circuit voltage | $5V \pm 0.1$ |
| V_H | Heating voltage | $5V \pm 0.1$ |
| P_L | Load resistance | 20K Ω |
| R_H | Heater resistance | $33\Omega \pm 5\%$ |
| P_H | Heating consumption | Less than 750 mw |



3) Features Of Gas Sensor:

Longer detecting scope.

More Stable and long sensing life.

Response speed and sensitivity is high.

E. LCD Display

We have used Liquid crystal display (LCD display) for continuously monitoring the weight of the LPG Gas cylinder. Here we are used 16x2 alphanumerical displays. It can used to display the current status of the Gas cylinder. it can also be used to display the output of the system. LCD display can show the weight of the gas cylinder at a same it can display the various MSG like “Gas

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Leakage”. When our system is ON then the MSG will be display on the LCD is “System ON” and when there is no gas leakage occurred then the MSG display on the LCD is “System secure”. When leakage is occurred then MSG on LCD are “System insecure”.

F. Buzzer

When LPG gas leakage has been occurred then the buzzer will be ON. Then the people near the gas cylinder to know the status of the gas.

G. GSM Modem

The GSM modem is mainly used in this project for communication between system and user. In this project the LPG gas is leakage and gas is below 20% or 5% then microcontroller communicates with GSM modem and sends command to the GSM modem. Thus SMS is send to the owner of gas cylinder. We have used SIM900 GSM modem.

1) Feature Of GSM Modem

One serial port.

Operating frequency 900/1800MHz.

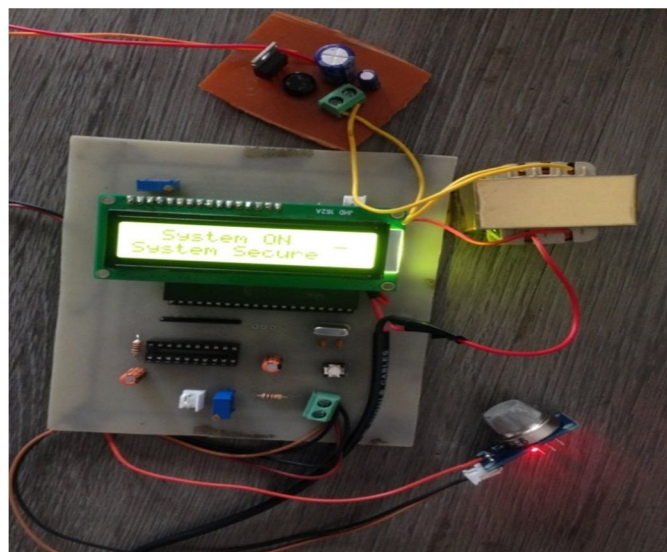
SIM card on board.

External reset pin.

Headset connector.

H. Relay

Relay is used to provide connection between two or more devices. The relay is used for switching purpose. Whenever LPG gas leakage is occurred then microcontroller send signal to relay then the buzzer will be ON. Here we have used SPDT. The relay provides isolation between controller and devices



IV. CONCLUSION

These projects are fully automated so the human attention is not required. By implementing this project we can avoid the problematic situation caused due to unavailability of gas cylinder or we inform to the gas provider office at last moment when our gas is empty and avoids the accident caused due to the leakage of the LPG gas. This project is used in domestic as well as in industrial purpose.

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