SMART GAS CYLINDER SYSTEM

Abhishek Gupta[1], Garvit Gupta[2], Shashank Sharma[3], Sanjay Kumar[4], Shubham Sharma[5], Rajpal Choudhary[6], Saurabh Kumawat[7]

[1] Associate Professor SKIT, M&G, Jagatpura, Jaipur, Rajasthan, India [2]Assistant Professor SKIT, M&G, Jagatpura, Jaipur, Rajasthan, India [3, 4,5,6,7] B.Tech SKIT, M&G, Jagatpura, Jaipur, Rajasthan, India

Abstract

We are using LPG gas cylinder in every sector of our life. Since we are busy we cannot monitor our cylinder continuously. If LPG starts leaking from the cylinder it can cause huge destruction and various accidents. So, to be safe from such situations we had designed this project. Our project basically prevents us from such disasters. Our system is based on ATMega16 microcontroller, it contains MQ6 Gas sensor which senses the gas if leaked and alerts the consumer by buzzer and through SMS and also turn off the regulator valve with help of servo motor. Also, it has a feature of automatic gas booking by which it looks after the level of gas in cylinder with the help of load cell and when it goes near to empty it sends SMS for booking through GSM Module. Two more advantages that our project posses are it can be battery operated when electricity is cut off and also it is enabled with exhaust fan for proper ventilation at the time of leakage.

Keywords: ATmega16controller, Gas sensor MQ6, GSM Module, Load cell, Exhaust Fan, Servo Motor.

I. INTRODUCTION

LPG (Liquid petroleum gas) is mainly composed of propane or butane, and is flammable mixtures of hydrocarbon gases used as fuel in heating appliances, in cooking, for rural heating, conversion to gasoline, refrigeration, vehicles, etc. When it is used as a vehicle fuel it is often referred to as auto gas. Varieties of LPG include mixes that are mostly propane (C_3H_8), mostly butane (C_4H_{10}). Due to its vast usage, chances of accidents also increase.

As we all see there are many news related to accidents caused by cylinder blast due to leakage. Our Project prevents such problems and provides safety to consumers. On the identification that level of LPG is reached to specify level then it send SMS to registered mobile phone and it alert the person at home by active alarm which includes a buzzer simultaneously and also display the same message on LCD to take necessary action and act accordingly. Also it turns off the regulator valve so that the gas emission stops and leakage can be controlled. In households when gas cylinder goes empty it causes difficulty in cooking so, to resolve this problem we provide system with automated gas booking characteristic.

This design takes the weight of the cylinder and on reaching to threshold level it automatically sends message to the respective LPG Agency so; they can deliver the gas cylinder on time. Our project has ATMega16 Microcontroller, MQ6 gas sensor, GSM Module, load cell for proper functioning of the project. In the case of power cut our system will continue to work with the help of chargeable battery which an important characteristic of the project. And also with help of exhaust fan it emits out all the LPG gas leaked from the cylinder and helps in ensuring safety. Thus, we have implemented this project named "smart gas cylinder system".

II. DESIGN AND IMPLEMENTATION

A. Block Diagram and Description

The block diagram of the "Smart gas Cylinder System" is shown in below figure-

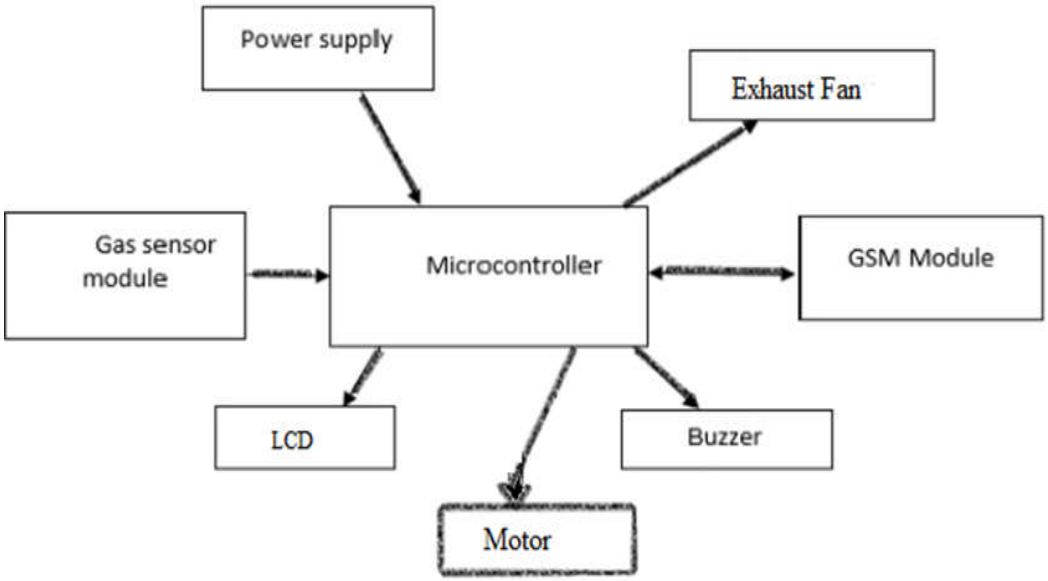

Figure 1. Block Diagram

Mainly this block diagram consists of the following essential blocks

1. Power Supply
2. ATmega16 Controller
3. MQ6 Gas Sensor
4. LCD Display
5. Load Cell
6. GSM Module
7. Servo motor
8. Exhaust Fan

1. **Power Supply Unit:** We are using 230V power supply which is rectified to 12V dc then further through voltage regulator it is used as per requirement. Also our system is back up by a dc battery which is rechargeable so, circuit will remain in operation in case of power cut.

2. **ATmega16 Controller**: We are using ATmega16 in our project. It is an 8-bit high performance microcontroller with low power consumption. It is enabled with 131 powerful instructions. Mostly all instructions execute in one machine Cycle. It can work on a maximum frequency of 16MHz. ATmega16 is a 40 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports named as PORT A, PORT B, PORT C and PORT D. Its operating voltage is 4.5 - 5.5V.

3. **MQ6 Gas Sensor:** We are using MQ6 gas sensor in our project for detecting leakage of gas. These are used in gas leakage detecting equipments in various applications and are suitable for detecting LPG, iso-butane, propane, LNG. These have high sensitivity to LPG, iso-butane and propane.

4. **LCD Display**: For the purpose of displaying various parameters of the system we are using a LCD. It helps us to display the level of gas, various warning messages, etc. It supports low power operation: - 2.7 to 5.5V. Also it automatically reset circuit that initializes the controller/driver after power on. It has Low power consumption and wide range of instruction functions.

5. **GSM Module**: GSM MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Our System uses the extremely popular SIM300 GSM module.

6. **Load Cell**: We are using load cell in our system for the purpose of weight sensing. It senses the weight of the cylinder and gives the output to the microcontroller. Microcontroller checks the output and takes the necessary action if required.

7. **Servo Motor**: We are using servo motor for rotating the regulator of the cylinder in case of leakage of the gas to the off position. A servomotor is a rotary actuator that allows for precise control of angular position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback.

8. **Exhaust Fan**: In our system exhaust fan is used for the necessity of ventilation. It helps in removing the leaked gas out of the room and ensures the safety.

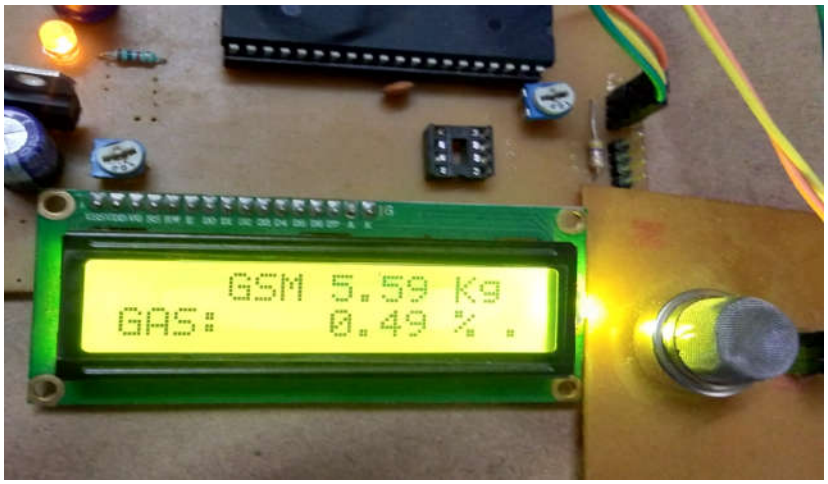

Figure 2. Smart gas cylinder system

B. Advantages

1. Provides the security from the gas leakage and disasters.
2. System is also battery operated.
3. Less time consuming.
4. Fully automated booking system.

C. Applications

This system can be used in different areas like

1. Residential purpose
2. Gas agencies
3. Chemical factories
4. Hospitals, etc.

D. Future Work

1. Turn off the room power supply when gas is leaked.
2. System can monitor and controlled on internet.

III. CONCLUSION

Smart gas cylinder system has been designed and successfully implemented which has wide varieties of applications. This system detects the leakage of gas and automatically rotates the valve of regulator to the off position. Also it sends the SMS to the consumer with the warning and also sound is produced by the buzzer at the time of leakage. In case of lowering the level of gas in cylinder it automatically send SMS to the agency for the booking of gas cylinder. So, it is enabled with automatically booking feature. And also, it has exhaust fan for ventilation purposes and backup by battery.

IV. REFERENCES

[1] Shailendra Kumar Dewangan3 Praveen Singh Rathore4 Abid Khan1, Neju K. Prince2. Gsm based automatic lpg ordering system with leakage alert. IJRET: International Journal of Research in Engineering and Technology, 3(12), Jun-2014.

[2] P Rajasekar S Shyamaladevi, V G Rajaramya and P Sebastin Ashok. Arm7 based automated high performance system for lpgre_ll booking & leakage detection. International journal of engineering research, science and technology (IJERST), 3(2), May, 2014.

[3] Dr.M. Dhanabhakyam & T. Sumathi. A study on customers attitude and satisfaction towards hplpg in house hold. The SIJ Transactions on Industrial, Financial and Business Management (IFBM), 2(2), March-April 2014.