

LPG LEAKAGE DETECTION WITH PREVENTION AND AUTOMATIC CYLINDER BOOKING WITH ALERT SYSTEM

R. Senthil Kumar¹, S. Soumiya², O. Sowndaraya², J. Vishali²

¹Assistant Professor, Department of Electronics and Communication Engineering, SSM Institute of Engineering and Technology, Dindigul, Tamilnadu, India

²Final Year Student, Department of Electronics and Communication Engineering, SSM Institute of Engineering and Technology, Dindigul, Tamilnadu, India

Abstract: In today's technology there has been rapid development which forces the human life in several appearances due to different fields so we need to adopt the technology and make their life better. This system detects the leakage of the gas and alerts the user about it and then sends the SMS to the user with the help of GSM module. Mostly people engaged with their works in companies or any other places at that time we will see the SMS, and we can't control the gas leakage which cause fire in house. In order to avoid this problem whenever the gas leakage exceeds the abnormal level it wills automatically turnoff the regulator by using relay driver circuit. In our house many times LPG gets empty. Advance LPG booking through IVRS or online which is most troublesome for the uneducated people and busy working individuals to book the gas cylinder. so the system continuously monitor the level of the present LPG using load cell and gas reaches below the threshold value around 14Kg it will automatically send the SMS to the user as well as LPG gas providing agency with the help of relay driver circuit. This system also senses the room temperature using temperature sensor.

Keywords: MQ-2 Sensor, Load cell, Arduino, Temperature sensor, Relay Driver circuit, GSM Module.

I. INTRODUCTION

LPG gas is a mixture of propane, butane, flammable mixture of hydrocarbon and natural gases, it was produced by Dr. Walter Snelling in the year 1910. propane and butane can easily cause the fire in hotels, homes, industries. Gas leakage due to various problems resulting in both financial loss and human life. In day to day life human life can busy with their own works, and they don't about the lack of awareness about gas leakage and cylinder booking. Without human intercession it cans automatically booking the cylinder when gas reaches minimum threshold value. In recent years the number of deaths were increased due to explosion of the gas. LPG is heavier than air. Unlike natural gas and these will flow along floors and tend to settle in low spots such as basements. There are two main dangers from this. The first one is, if the mixture of LPG and air is within the explosive limits and there is an ignition source. The explosion limits of propane and butane are 2.15 and 9.6, 1.9 and 8.5 and ignition temperature range is 493-604 °C and 482-538 °C. Natural gas is 4.7-15 and ignition source is 482-632 °C. The second

one is suffocation due to LPG displacing air causing a decrease in oxygen concentration. In order to avoid this problem to detect the gas leakage is easy due to smell but controlling the gas leakage is very important in human's day life. With the help of temperature sensor we will sense the room temperature.

II. LITERATURE SURVEY

In the year 2011 a paper: "Design and Implementation of Economic Gas Leakage Detector" was written by A.Mahalingam, R.T.Naayagi, N.E.Mastorakis, they detect the gas leakage and providing immediate alarm or intimation to the user Later in 2013 a authors Rahul Varma, Rajeev Kumar designed the " GSM based gas leakage detection system". This project when gas leakage exceeds the peak value it alerts the surrounding people about the leakage through the SMS.

In the year 2014 Hitendra Rawat, Ashish Kushwah, Khyati Ashthana and Akanksha Shivare proposed the "LPG Gas monitoring and automatic cylinder booking with alert system". These report focus on the measure the weight of the cylinder it reaches the minimum threshold value it automatically sends the SMS to the LPG agent.

In the proposed system we designed the " LPG leakage detection with prevention and Automatic cylinder booking with alert system ". These project focus on detects the gas leakage ,when the gas leakage exceeds the abnormal level ,it automatically turns off the valve and it also the sense the surroundings temperature. When the weight of the cylinder reaches the threshold value, it will automatically booking the cylinder with help of GSM module.

III. BLOCK DIAGRAM

The main platform of this project is Arduino which is based on the platform of Microcontroller. It is an open source and easy programming.

The other principle part we are utilizing is Strain gauge Load cell. Load cell other name is a Weight sensor, which senses the weight of the cylinder. It alerts the user when the weight of the cylinder reaches the threshold value.

MQ-2 Sensor senses the gas leakage. It alerts people using buzzer. Gas leakage causes the fire in our house and surroundings. In order to control the gas leakage we use a relay driver circuit which turn off the regulator. Arduino allows only voltage. Amplifier is used to convert milli voltage to voltage. The temperature sensor is used to sense the room temperature.

The use of GSM module, it sends the SMS about gas leakage and current status of the cylinder. The GSM module works on 800 MHZ frequency. When gas cylinder reaches below 14 kg, it automatically books the cylinder with the help of GSM module.

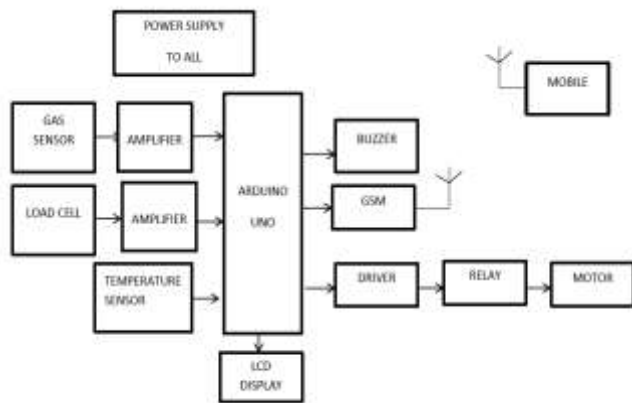


Fig -1: Block diagram of proposed method

1. MQ-2 sensor

The MQ-2 gas sensor module detects gas leakage in home and industry. It is a sensitive gas sensor. The MQ series of gas sensor use a small heater inside with an electrochemical sensor. They are sensitive to a range of gasses and are used indoors at room temperature. The output is an analog signal and it can be read with an analog input of the arduino. It operates 15v. It measures methane, sno2, butane, LPG, smoke.



Fig 2: MQ-2 Sensor

2. Load cell

Load cell is a transducer which converts mechanical force into measurable electrical input and the magnitude is directly proportional to the force being measured. The load value is in digital form which converts digital to analog and the minimum weight is 14kg and the maximum weight is

35kg. It operates at either 800MHz or 1800MHz frequency band.



Fig 3: Load cell

3. Temperature sensor

The temperature sensor is a device to measure the temperature through an electrical signal it requires a thermocouple or RTD (Resistance Temperature Detectors). The thermocouple is prepared by two dissimilar metals which generate the electrical voltage indirectly proportional to change the temperature. The RTD is a variable resistance, it will change the electrical resistance indirectly proportional to changes in the temperature in a precise, and nearly linear manner.



Fig 4: LM35 Temperature Sensor

4. ATMEGA328 microcontroller:

ATMega328 micro controller is a single chip micro controller created by Atmel in the negative family. At mega 8-bit AVR RISC based micro controller combines 32 KB ISP flash memory with read-while write capabilities 1 KB EEPROM, 2 KB SRAM, 23 general purpose input lines, 32 general purpose the working registers. The device operates between 1.8to5.5v and maximum frequency 20MHz. Flash memory 32 KB. Number of touch channels 16. Maximum input pins 23. SRAM 2 KB.



Fig 5: Arduino

5. RELAY

A relay is defined as an electrically operated switch their main use of controlling circuits by a low power signal or when several circuits must be controlled by one signal. The heart of the relay is electromagnet (a coil of wire that becomes a temporary magnet when electricity flows through it).

Relay Driver

It is a control higher voltage (120v-240v) device like fans, lights, heaters etc...since the Arduino operates at 5V can't control these higher voltage devices directly, but you can use a 5V relay switch the 120-240V current and use the Arduino to control the relay. For E.g. when gas leakage exceeds the abnormal level it will automatically turn off the valve.



Fig 6: Relay Driver

6. BUZZER

A piezoelectric buzzer is used. A piezoelectric buzzer is a sound producing transducer. It produces a very high sound even with the smallest energy input. A buzzer may be used to alert the people when the event occurs. For e.g. when gas gets leakage it produces the sound to alert the people.



Fig 7: Buzzer

7. GSM module

GSM stands for Global System for Mobile Communication. It is a digital cellular technique used for transmitting mobile voice data services. GSM was developed using digital technique. Arduino based LPG leakage detector with SMS indication using GSM modem project detects the LPG gas leakage. If the LPG level crosses minimum level then it sends SMS to the user using the GSM modem.



Fig 8: GSM Module

8. DC MOTOR

DC motor is electrical machines that convert the electrical energy into mechanical energy. The most common type rely on the forces produced by magnetic fields. Whenever the gas leakage exceeds the abnormal level automatically DC motor starts running and it automatically turns off the valve with the help of relay driver circuit.



Fig 9: DC Motor

9. LCD DISPLAY

LC D display is a 16*2 alphanumeric display which means that its displays alphabet and numbers. It displays the current status of the cylinder and displays the leakage and the temperature sensor.



Fig 10: LCD Display

IV. CONCLUSION

In this paper we implemented LPG leakage detection with prevention and automatic cylinder booking was proposed and designed successfully. This system detects the gas leakage using MQ-2 sensor and to prevent the gas leakage using Relay driver circuit, it can automatically turn off the regulator. If room temperature will be monitored using Temperature sensor and to display in the LCD. With help of GSM module it sends the SMS to the user as well as LPG providing agency, so we automatically book the cylinder and saves the people time. This project is user-friendly and cost is low compared to commercially available in the market.

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