

# AUTOMATIC LPG RESERVATION AND GAS SPILLAGE IDENTIFICATION SYSTEM

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**Abstract**— There are numerous strategies available for booking a LPG gas in the gas office. Strategies include web based booking, telephonic booking and so on. In some cases we may neglect to do the booking because of the different reasons. It will be troublesome circumstance for the person who utilizes LPG gas for cooking consistently. So we have proposed a method which naturally book a cylinder when the gas is going to empty by sending a SMS by utilizing GSM. In our task we have utilized load cell to find the weight of the LPG gas consistently. The obtained values are given to the microcontroller. If the gas level crosses the minimum level, at that time, a SMS will be sent to gas organization naturally to book the new cylinder. In addition to that MQ-6 sensor is used to sense the gas leakage. If any gas spillage detected, solenoid valve will automatically shut off the gas supply.

**Keywords**— Gas Sensors; Valve; Cock; Nozzle; GSM

## 1. INTRODUCTION

Nowadays everyone needs a facility which reduces their effort, time and gives an approach to do their work more easily. There are roughly 30crore LPG clients in the country in which mostly 40% of the population. LPG is a mixture of commercial propane and commercial butane having saturated as well as unsaturated hydrocarbons. The allowed level for butane is 600ppm above which it is considered to be of high level and poses a danger. LPG having flexible nature so its demand raises day by day. In INDIA gas distributor utilizes IVRS, SMS or ONLINE reserving for LPG which are tedious techniques in quick running life. We find uneducated people are not able to do these task and busy schedule people they haven't adequate time to do all the activity. Also, safety plays the important role. As we all know that many accidents happen due to gas spillage. So to avoid these difficulties we develop a project. The main aim of this project is to detect the leakage of liquid petroleum gas (LPG) and also alert the consumer by voice message to avoid major fire accidents and automatic cylinder booking without human intervention.

## 2. PROBLEM STATEMENT

The gas is an invisible thing which can be detected only through the physical analysis of the smell. Else, any sensors should be placed it is many times seems risky because there is less probability for having some people in the place to notify and switch off. When old people use the gas system it is difficult for them to book the residential gas online by listening to the IVRS. So, these problems are approached in this system. The bribe is another problem, on demand for the gas cylinder through the agents or by the person who delivers. So there is a need for the regulated gas booking system.

## 3. CURRENT ISSUES

The leakage sensing is automated to off only when a person is physical in their absence the detection is

impossible that leads to many serious hazards. Then booking system is done by telephone is many times a trouble. The line may be busy or network traffic could happen. So during the emergency period it is a major problem.

## 4. LITERATURE SURVEY

The paper titled as "A Wireless Home Safety Gas Leakage Detection System", Luay Fraiwan, Khaldon Lweesy, Aya Bani-Salma, Nour Mani Jordan University of Science & Technology. The analysis of this paper is the detection alone is done when the leakage occurs.

The next paper is titled "GSM Based Gas Leakage Detection System", Ashish Shrivastava, Ratnesh Prabhaker, Rajeev Kumar, Rahul Verma Galgotias College of Engineering and Technology. This paper notifies the user about the gas leakage through GSM.

## 5. EXISTING METHOD

In the existing method, distinctive gas sensing technology is utilized. The LPG gas spillage is sensed by the MQ-5 sensor. Nowadays LPG accidents happen exceptionally normal. The main reason for these accidents is due to the spillage of LPG. This spillage of LPG starts when we forget to close the main regulator valve. This is the basis of these kinds of accidents. Already there are some sorts of remedial measures such as when the leakage is detected; a message is sent to the user by using RF transmitter and receiver. This method has the disadvantage that there is no control action taken, it needs a manual controlling which puts human at direct risk. The other remedial measure is that when the leakage is detected, buzzer is switched on. In all these specified techniques above, only the gas spillage is detected no control action is taken.

## 6. PROPOSED METHOD

### A. LPG spillage detection

In LPG gas spillage detection, gas spillage is detected by an MQ-6 sensor which is interfaced with

Arduino ATMEGA328 Microcontroller. When gas spillage is identified, relay will turn on and it immediately shut off the gas supply by utilizing the solenoid valve. We inform the client about the gas spillage by sending the SMS, turning on the recorded voice message and furthermore displaying it on PC.

*B. Automatic gas booking:*

In automatic gas booking, we consistently measure the amount of gas which is present in the cylinder. When gas level goes beneath the threshold level then the message will be sent to the gas agency through GSM and confirmation message received by the user from the gas organization. So the user gets cylinder within time.

PROPOSED SYSTEM-BLOCK DIAGRAM

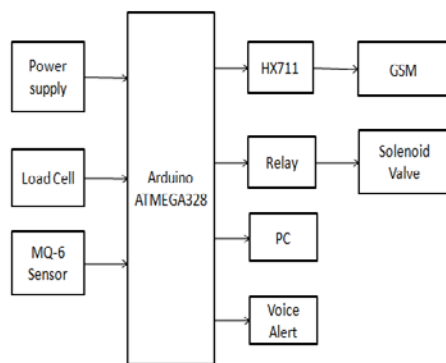


Fig. 1 Proposed block diagram

*C. POWER SUPPLY*

At first, 230v AC is coupled to a step-down transformer, which steps that ac voltage down to the level of the 12V dc output. A full wave bridge rectifier along with capacitor filter to provide the voltage to the 5-V regulator (LM7805) whose output is utilized as the input of the microcontroller.

*D. MQ-6 SENSOR*

MQ-6 is a gas detecting sensor which is reasonable for detecting LPG concentrations in the air. Its detection range is 200-10000 ppm. It has less sensitivity to liquor and cooking exhaust however it can identify butane and propane. It operates at 5-V. The material utilized here is SnO<sub>2</sub>. The principle is when the conductivity of SnO<sub>2</sub> increases, the air concentration also increases. When the concentration of air reaches the dangerous level because of gas spillage, the conductivity of SnO<sub>2</sub> increases to a level which is adequate to pass the current to send a pulse to the microcontroller. The output of sensor module is connected to the microcontroller. The microcontroller digitizes the voltage and checks whether the concentration is below the threshold levels. If the concentration exceeds, the output of the Arduino is given to the relay. It is appropriate for various applications since it is having minimal effort.

*E. RELAY*

A relay is electromagnetic switch, which is used to turn on or off the solenoid valve. If a relay contact is normally open, it becomes open circuit and not energized. Otherwise, it will energize when it is short circuited.

*F. SOLENOID VALVE*

Solenoid valve consists of number of coils, which operates at 5-V. It is used to convert electrical energy into mechanical energy which results in opening or closing the valve mechanically. When the signal from the relay passes through this valve it automatically shut off the gas supply.

*G. LOAD CELL*

A load cell is a transducer that is utilized to change over force into electrical signal. It is a measurement device that is used for displaying weight in digits. For the most part cantilever load cell is utilized. Here we measure a weight of the cylinder by placing the cylinder on load cell arrangement. In reality Load cell comprises of four strain measures in a Wheatstone connect design. Initially by utilizing mechanical arrangement force being detected deforms a strain gauge and after that strain gauge measures the deformation as an electrical signal, due to the fact that the strain changes the effective electrical resistance of the wire. The resulting electric signal is given to HX711.

*H. HX711*

It is a weight conversion unit interfaced between load cell and the microcontroller. It consists of 4 pins and operates at 5-V. The output from the load cell is in analog form. In order to convert it into digital and for enhancing the signal, it is used. It is preferable because of its high sensitivity and reliable performance.

*I. GSM*

It is one of the essential blocks in our project. GSM modem is utilized for sending SMS so that client can get remote indication. GSM network operates with a frequency of 900-1800 MHZ. It sends and receives text message with very less memory and operates on 5-V. Here we are consistently checking the weight of the cylinder. In the event that weight goes beneath the threshold level and spillage is identified then through GSM message will be send to the gas office and the client individually.

*J. ARDUINO*

The Atmega328 is an 8-bit microcontroller chip delivered by Atmel. It has 32K of flash memory, 1K of EEPROM, and 2K of internal SRAM. It has 28 pins with 14 digital I/O pins, of which 6 can be utilized as PWM yields and 6 simple analog pins. The principle of microcontroller is to execute every one of the procedures being included. Low power utilization and minor size are the key highlights to choose the microcontroller. It utilizes Arduino IDE (Integrated Development Environment) software which enables you to compose programs and transfer them to your board. It gives us the adaptability to compose the code in convenient way and furthermore it will provide some main features like Inexpensive, Simpler, Open source and extensible programming.

*K. VOICE ALERT*

A voice response structure can be enclosed into GSM based LPG weight and LPG spillage location system. Client will get warning through pre-recorded voice messages like the density of gas Cylinder is XYZ kg.

7. WORKING PROTOTYPE

The gas is sensed over tube and the cock. When a leakage is detected, the sensors starts giving sensed information to the processor in the digital format. Once the information is passed with logic 0 means it will be sent to relay. Also when it is logic 1, it indicates as there is no leakage. When the logic 0 is detected digital information is sent to relay through processor. Relay will change its state from normal open to normal connected. Hence the current passes to the solenoid valve which start rotating will lead to turn off the gas supply. So that the nozzle is shut automatically which, immediately stops the flow of the gas to the connected supply. The cylinder is placed on the load cell. Load cell calculates the weight of the cylinder consistently. There is a fixed threshold which is already been programmed for the detection of limit which is to be informed by the load cell to the process. When the line of limit to be intimated is reached then it will send the signal to the GSM module. The user has no work in booking and false information from the customer is reduced. There is a predefined message format for both user and the gas agency to inform the regards. The confirmation for sent message is needed, else GSM resends the message to gas agency only twice.

8. PROGRAM FLOW

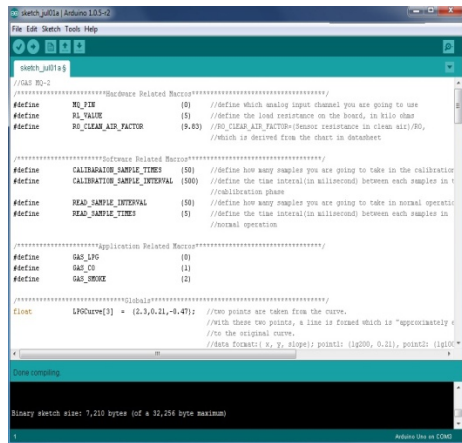


Fig. 2 Program execution

Program is first initialized to the allotment of the pins. The Arduino pins are fixed as per the program. Leakage detection loop first runs when the logic 0, processor controlled over this only for the leakage as its input. Then the load cell detection is analysed from the “sms2 setup” loop. It has the direct link to load cell result. The analog output from load cell is directed as the GSM module input for the message to be sent as the information of reduced gas inside the cylinder.

9. RESULT AND CONCLUSION

The automatic gas booking system as well as gas spillage detection was proposed, composed and effectively executed in this paper. This technique gives a completely programmed approach towards the gas booking .This structure detects the spillage of the gas and alerts the user about the gas spillage by SMS. This technique consistently notes the weight of the gas cylinder. By achieving this project we help the people to save their time by providing

automatic gas booking. It can also provide the security to people by sensing the spillage of gas.

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