



Gas Leakage Detection and Automatic Gas Booking Using IOT

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ABSTRACT: The main objective of this paper is to automatically book a LPG (Liquefied Petroleum Gas) and also to detect the leakage of gas or the reduction of the hazards that can be caused due to unawareness of the user. If there is any gas leakage from LPG cylinder, then a buzzer will turn ON and an alert message will be sent to a registered mobile number using GSM (Global System for Mobile communication) model. The LPG will be automatically booked when the level of the LPG cylinder goes below the preset threshold value, which will be measured using the load cell. The output of the sensor is connected to Arduino Uno R3 microcontroller and information will be sent to the user. Proposed system alerts users if any leakage occurs from the gas cylinder and also automatically books for refilling of gas from the gas booking center before the cylinder gets empty.

KEYWORDS: Microcontroller, Gas sensor, GSM (Global System for Mobile communication), LPG (Liquefied Petroleum Gas), Load cell, LCD (Liquid Crystal Display).

I. INTRODUCTION

LPG gases have been widely used in home appliances and industry. More than 50% of the heaters use LPG as cooking. Most important task is detection and identifying the level of gas present in the LPG. And with the rising demand for LPG, automatic booking of the LPG is done with the help of the Load Cell which measures the level of gas present in the LPG and using GSM gas booking is done. Leakage detection is used in household safety. The Leakage detection can be found using using a gas sensors which senses the leakage of the gas. Leakage detection is classified according to technical nature. Technical nature includes both hardware and software. Hardware methods mean acoustic, cable sensor, optical, soil monitoring. Software based means continuously monitoring the state of pressure, flow rate or other pipeline parameters. Low levels of LPG leak can avoid any possible accidents.

II. PROBLEM STATEMENT

The problem statement is to develop a system which continuously monitors the leakage of LPG gas and alerts user regarding the leakage and also to automatically book a gas whenever the level of gas goes behind the threshold level. Whenever a gas leakage is detected home appliances will be relayed and a sms is sent to the user regarding the leakage and also the booking.





III . METHODOLOGY

The below fig indicates the basic building blocks of the whole system..The ATMEGA 328 microcontroller plays the most important role to carry out all the required processes.

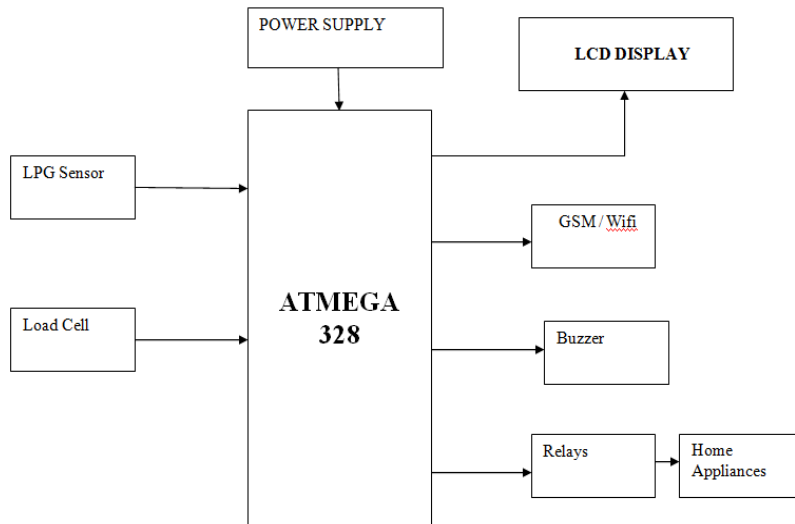


Figure-1: Basic Block diagram

1)Microcontroller

The ATMEGA 328 is a single chip microcontroller created by Atmel in the megaAVR family. It has a modified Harvard architecture 8-bit RISC processor core. It combines 32KB ISP flash memory with read-while-write capabilities, 23 general purpose I/O lines and 32 general purpose working registers. The implementation of this chip is the popular Arduino development platform namely Arduino Uno model.



Figure-2 : Microcontroller

2)GSM

GSM is a standard developed by ETSI to describe the protocols for 2G cellular networks used by mobile devices . Whenever there is a leakage in the gas and when the gas level is below the threshold value the microcontroller communicates with GSM modem and sends command to the GSM modem. Thus sms is sent to the user and also to the gas booking agency .

3)Gas Sensor

Gas sensors is a device that detects the presence of gases in an area, often as a part of a safety system. MQ6 is the gas sensor used in this project. MQ6 is used to detect the LPG. The breakout board is easy to use. It can be connected with Arduino or other microcontroller to detect the level of LPG concentration in air.



Figure-3 : MQ-6 Gas Sensor

4) Loadcell

A Load Cell is a type of transducer, specifically a force transducer. It converts a force such as tension, compression, pressure into electrical signal that can be measured and standardized. As the force applied to the load cell increases, the electricity signal changes proportionally. Here Gas is placed on the load cell and the level of gas will be monitored and displayed on the LCD display.



Figure-4 : Load cell

5) Power Supply

The complete unit is getting power from a main supply by means of a step-down transformer to convert 230V AC primary into 0-12V, 500mA secondary. The microcontroller board can be supplied with power either from the DC power jack (7-12V), the USB connector (5V), or the VIN pin of the board (& -12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator and can damage the board.

6) Buzzer

A buzzer is used to produce audio alert about the leakage of the gas. A tiny buzzer called piezo buzzer can be directly connected to the Arduino. From the Arduino using the tone buzzer can make sound and we can set the frequency and how long the buzzer makes the sound.

7) LCD Display

A LCD (liquid crystal display) is a type of flat panel display which uses liquid crystals in its primary forms of operation. In the microcontroller Liquid Crystal library allows you to connect LCD display that are compatible with the drivers. The weight of the LPG measured by the load cell is displayed on the LCD.

IV. WORKING OPERATION

1) Leakage Detection

A gas leakage detector is a device that detects the presence of the gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak or other emissions and can interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life. Whenever the gas is detected the output of the sensor is sent to the microcontroller and the buzzer is turned on and also the home appliances are relayed. SMS iks sent to the user regarding the leakage detection. Gas detectors can be classified according to the operation mechanism (semiconductors, oxidation, catalytic, infrared). Gas detectors come packaged into two main form factors: portable devices and fixed gas detectors. Gas leakage detection is detected using the MQ6 gas sensors.

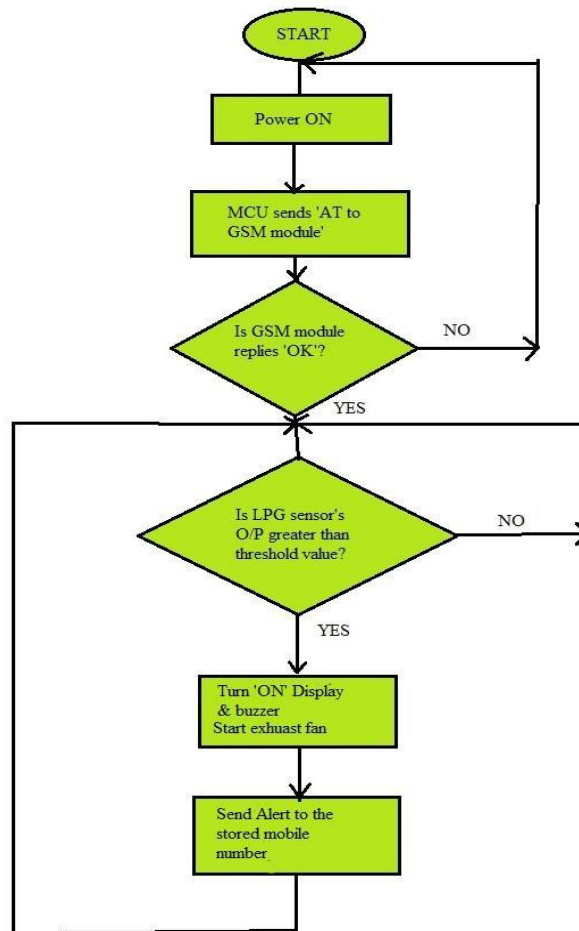


2) *GSM Module*

The GSM(global system for mobile communication) is a standard developed by the European telecommunication standards institute to describe the protocols for second generation digital cellular networks used by mobile devices such as mobile phones and tablets.The GSM standard originally described a digital,circuit-switched network optimized for full duplex voice telephony.Whenever a gas leakage is detected a alert message is sent to the user regarding the leakage and also whenever the level of gas is low the gas is automatically booked where a booking message is sent to the gas agency with the unique id and also the confirmation message to the user using GSM model.

3) *Automatic Gas Booking*

The level of LPG is measured using the load sensors or the load cell.The output of the sensor is connected with Arduino R3 Microcontroller.By the use of the GSM module,the information is sent to the user by SMS and also automatic booking is done by the unique id.The level of gas detected by the load cell is displayed on the LCD display.Load cell continuously monitors the level of gas. A threshold value is fixed while programming.,if the level of gas reaches below this threshold level then automatic gas booking is done.Booking information is sent to both the user and the gas agency.



Flow Chart 1 : Design Assemble circuit

V. RESULTS

By testing the system prototype it is found that when a small amount of LPG is introduced near the gas sensor the system detects the leakage and sends an alert message to the consumer by using the GSM module. Simultaneously the buzzer is activated and the exhaust fan is switched ON. The system prototype also monitors the gas level of the cylinder, books the new cylinder automatically and also sends an alert message to the consumer to remind about the refilling of the cylinder before the cylinder becomes empty.



Figure-5 : Hardware implementation

The hardware implementation is projected in the above figure.

VI.CONCLUSION

The motive of designing a cost effective and reliable LPG leakage detector and automatic gas booking is successfully done by this paper. By testing the system prototype model it is found that when a small amount of LPG is introduced near the gas sensor the system detects the leakage and suddenly activates its indicators. Also when the level of gas falls below some predefined value it automatically dials the number of the booking center as well as informs the user.

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