

Gas Leakage Detection Based on IOT

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ABSTRACT

Gas leakages results a serious problem in household and other areas where household gas is used, therefore the proposed gas leakage detection and monitoring system is developed. There are many methods available for booking a Gas Refill, methods include online booking, telephonic booking etc. It will be difficult situation for the one who uses LPG gas for cooking regularly. The aim of this paper is to present a new system automatically books a cylinder when the gas is about to empty by sending a notification to the gas agency using wifi using Internet of Things approach. In addition to that sensor is used to detect gas leakage at home. If the gas leakage is sensed automatically it will send SMS to the user. wifi is one of the most used networks across the world. Hence, load cell has been used to monitor the weight of the LPG gas regularly. The values are next fed to the microcontroller. If the gas in the cylinder indicates a value where the remaining percentage level is crossed below the threshold level set for gas to be indicated as getting emptied, then a notification will be delivered to gas enterprise automatically to book the new cylinder. Subsequently, reply notification will be sent to the customer about the booking status. At the same time, application software is developed in the gas enterprise to inform and record the booking. This, work this helps the society to specifically indicate gas leakage and also helps both customers and the agency to get the gas booking made automatically using the IOT technique.

Keywords: LPG, sensor, Arduino, IOT, Home Safety;

I. INTRODUCTION

Internet of things endeavor towards making life simpler and faster by automating the entire small tasks associated with the life of human. Today, everything is getting smart due to the technological progress such as of IOT. As IOT is very beneficial for automating the tasks, the advantage of IOT can also be comprehensive for enhancing the convenient safety methods.

Security plays a significant role while constructing home, buildings, industries as well as towns. The enlarged focus of certain gases in the environment can be exceptionally unsafe, in recent time, everyone needs a facility which reduces time and effort and expect their work to be as easy as possible. One such area where

man prefers to get the work faster and easier is cooking. Most commonly LPG is used for cooking purpose which was introduced by Dr. Walter Snelling. It is an amalgamation of propane and butane along with saturated contents in addition to unsaturated hydrocarbon contents. Gas enterprises use SMS, IVRS or Online booking for the LPG, which is time consuming methods in people's daily life[1].

However, due to fast nature and high competition, today people look for smarter way of operations than tedious and mechanical as well as manual routine. As such, booking gas has also become one of the tasks where one has tendency to either postpone or forget its booking due to busy schedule and lack of time. Usually in home or industries, most of the disaster happens due to gas leakages[10], which leads to several accidents and also causes human life. In order to handle such situation, the proposed gas leakage detection and monitoring system is developed and put forth in this paper.

In this layout MQ-5 sensor is used to detect and sense the gas leakage, it is capable of sensing H₂(molecule hydrogen), LPG, CH₄(methane), CO(carbon monoxide) and Alcohol[5]. This proposed system is not only capable of Sensing or detecting the gas leakages as well as alerting the user about the gas leakage by buzzer alarm and sending notification to the user in the other side automatic LPG booking is allowed this is done by using load cell[3], as soon as the LPG reaches below the threshold level it will send a notification about the low weightage of LPG by getting notification user can be able to book a LPG by just confirming message through the mobile which is connected to wifi[4].

II. LITERATURE SURVEY

Author of [6] has proposed a gas leakage system and monitoring the LPG level where the gas leakage is detected automatically

Authors of [3] has suggested that the leakage of the gas can be detected by using various gas sensors. However, authors of [1] has worked on gas leakage and said that gas leakage can be detected by using the gas sensor and booking the gas is done automatically, when the small amount of gas is brought near the sensor it starts alerting the user about the leakage of the gas

Author of [11] has suggested that the message or the notification can be displayed by using the LCD display for a visual indication of the LPG monitoring

III. LPG LEAKAGE DETECTION AND MONITORING SYSTEM

The sensors microcontrollers ,relays ,LCD display and buzzer which is being motorized by power supply .this power supply sector is involved to convert from alternative current to direct current and to decrease the amplitude signal

Mq 5 sensor

It is constructed by micro AL2O3 ceramic pipe and contains SnO2 (Tin Dioxide) layer, capable of measuring electrode and heater covered by plastic and stainless steel [9]

Arduino

Arduino is a microcontroller, whose main aim is to make electronic to be as easy as possible. It uses different microcontrollers, containing several input and output pins[7]. Several methods are available in order to flash the memory and RAM in the arduino .It provides integrated development environment (IDE). Arduino contains several numbers of parts and integrated interfaces in a particular circuit board.

Relay

A relay is an electrical switch which is used to control all other electronic devices by using electromagnetic mechanical toggle

LCD display

LCD (liquid crystal display) contains two interfaces on upper and lower side of the module. the 16x2 LCD display has the height and width size of 80.0 x 36.0 mm and containing VA size of 66.0 x 16.0 mm and thickness is 13.2 mm. its operating power supply ranges from +5.0 V or +3.0 V.

Load cell

Load cell is a transducer which is used to transform force into electronic output [6]. Basically, it is used to detect the weight of the cylinder in this proposed system [12] and is organized to Interface with Microcontroller.

Wifi modem

WiFi network can easily establish a connection through a serving WiFi adapter. It is easily accessible by any microcontroller due to its simple connection through UART (universal asynchronous receiver/transmitter) interface.

Buzzer

A buzzer is an audio signaling device which is capable of controlling microcontrollers IO directly, with the working voltage of 5V.

IV. SYSTEM OPERATION

In this proposed system, the gas leakage is detected by MQ 5 sensor which is interfaced by arduino [2], when the gas leakage is detected through the MQ 5 sensor the

motor gets on and lights gets off with buzzer alarm and displaying alert message in LCD display [11], at the same time the notification will be sent to user through mobile which is connected via WiFi. Further, working of this proposed system is as below

- Load cell which is also known as pressure sensor is used to detect the weight of the gas and the result will be displayed through LCD display
- If the weight of the cylinder is below the threshold level, the booking confirmation message will be sent to user through mobile
- The threshold range will be embedded and usually developed using C Programming
- Wifi modem is capable of sending and receiving messages
- Message will be sent from user to LPG agency and gets a return notification of when the LPG is delivered.

However, as another segment of this system, it also detects leakage of gas in LPG models through sensors. LPG gas sensor will generate the signal to the UC and automatically shutdown the main power supply. LCD is used to display the alert message i.e “LPG leakage detected” displayed when the leak is detected by sensor.

Figure 1 depicts the architectural block diagram of the proposed gas leakage detection system

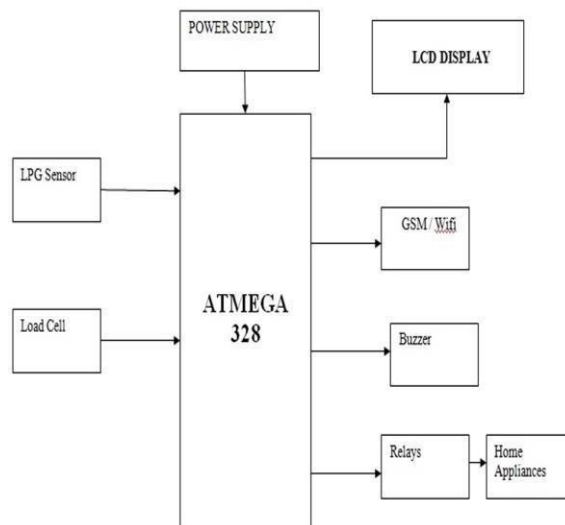


Figure 1: Architecture of gas leakage detection system.

Figure 2 indicates the flow diagram of the entire set of activities that the proposed gas leakage detection system will perform.

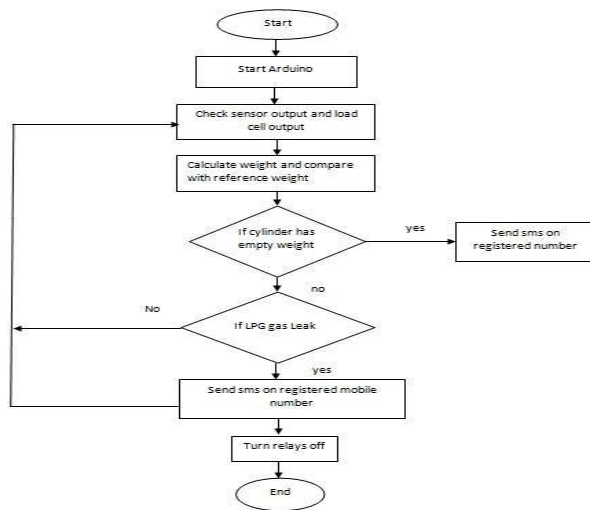


Figure 2. Flow diagram of the activities of the gas leakage detection system

V. EXPERIMENTAL RESULTS

The prototype of projected system is shown in the Figure 3. This proposed system is developed to detect and monitor the LPG, when a small amount of LPG is brought near the MQ5 sensor, it display the message in LCD i.e “GAS LEAKAGE” at the time of leakage of the gas and the system monitors the LPG level and displays the message[8] i.e, “HIGH or LOW”. As in recent times, the problems that are faced by the LPG gas customer is gas leakages and booking issues, the developed system will be helpful to the customer. It helps them to upgrade their safety norms and aids to prevent the major disaster. It also helps in protecting life and property from apparent accidents. The primary aim of this proposed system is therefore to detect the gas leakage which is detected through gas sensor and user should be notified to prevent injury or outburst. The secondary aim is to detect the weight of the gas remaining in the cylinder which can be done through weight sensor. Thus, the proposed system helps the LPG gas customers to lead a pleasant life.



Figure 3: Prototype model of the gas leakage detection system

VI. CONCLUSION

Internet of Things has gained its wide popularity in recent days due to its various streams of applications which has paved way for smooth, safe and easier mode of living style for human beings. One such area of applications includes gas booking and gas leakage detection for both domestic and commercial purposes. Though, several techniques are existing for the same, yet gas leakage detection is one major concern and a challenge always.

This paper thus put forth a new proposed system which is microcontroller based application of gas booking and gas detection systems using IOT. The sensor used in this model can sense and detect the leakage of the gas, and the user gets notification regarding to remaining percentage of gas in the cylinder as well certain action can be taken to pre-book the new cylinder without any barrier. This unit can be easily integrated into an alarm unit, or a visual indication of the LPG awareness for further benefits. This proposed system can be useful in marketing sectors like hotels, shop etc. The main intention of this work is to ensure a safe and easier way of gas booking and gas leakage detection to avoid disasters that may occur due to negligence.

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